Lower Thames Crossing

Volume 2 - Scope
Tunnels and Approaches Contract

Part 1 - General Requirements

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S0075 Acronyms and abbreviations

Acronym	Definition
ADMM	asset data management manual
AfP	application for payment
AID	automatic incident detection
AIM	Asset Information Model
AIP	Approval in Principle
ANPR	Automatic Number Plate Recognition
BBA	British Board of Agrément
B-EIR	Business Exchange Information Requirements
BIM	Building Information Modelling
BPSS	Baseline Personnel Security Standard
BRE	building research establishment
CA3a	compound area 3a
CA3b	compound area 3b
CAD	computer aided design
CAT	cable avoidance tool
CBS	Cost Breakdown Structure
CCC	customer contact centre
CCTV	closed-circuit television
CDE	common data environment
CDM	Construction Design and Management Regulations 2015
CEMAR	contract event management and reporting
CIRIA	construction industry research and information association
CIS	construction industry scheme
CISO	chief information security officer
CITB	construction industry training board
CLOCS	construction logistics community safety
CLG	community liaison group
CM	category management
CoCP	Code of Construction Practice
COMA	combined modelling and appraisal report
ComLot	commissioning lot
COSHH	control of substances hazardous to health regulations
CP	cross passages
CPA	Category Purchase Agreement
CPF	collaborative performance framework
CPM	Critical Path Method
CPNI	centre for protection of national infrastucture
CPP	Construction Phase Plan
CRM	Customer Relationship Management
CSCS	Construction Skills Certification Scheme

Acronym	Definition
DCO	Development Consent Order
DLOA	Detailed Local Operating Agreement
DMRB	Design Manual for Roads and Bridges
DMS	Delivery Management System
DNO	distribution network operators
DOORS NG	dynamic object orientated requirements system next generation
EA	Environment Agency
ECI	early contractor involvement
EDI	equality diversity inclusivity
EIR	Exchange Information Requirements
EMC	electromagnetic compatability
EMP	Environmental Management Plan
EPS	european protected species
EPP	emergency preparedness plan
ERP	emergency rescue plan
EMS	environmental management system
EnvIS	environmental information system
ERT	emergency roadside telephone
ES	Environmental Statement
ESDAL	electronic service delivery for abnormal loads
ESS	environmental sensor station
EVM	earned value management
FAT	factory acceptance test
FORS	freight operator recognition scheme
FFFS	fixed firefighting system
GCP	ground control points
GI	Ground Investigation
GIS	geographic information system
GPR	ground-penetrating radar
GVD	general vesting declaration
HADECS	highways agency digital enforcement camera system
HAGMS	highways geotechnical data management system
HAWCS	highways agency weather central system
HEDRP	Highways England's Design Review Panel
HGV	Heavy Goods Vehicle
HSE	health and safety executive
HSF	health and safety file
HSG	health and safety guidance
HSW	health, safety, and wellbeing
IAM IS	integrated asset management information system
I&M	instrumentation and monitoring

Acronym	Definition
IAN	interim advice notes
IAP	inclusion action plan
ID	identification
IDC	investment decision committee
IEC	international electrotechnical commission
IEEE	institute of electrical and electronics engineers
IFC	industry foundation classes (in relation to BIM)
ILP	institute of lighting professionals
IPR	intellectual property rights
ISO	international organisation for standardisation
ITS	Intelligent Transport Systems
JOF	joint operations forum
KPI	key performance indicator
LLFA	Lead Local Flood Authority
LOA	local operating agreement
LTC	Lower Thames Crossing
MCHW	manual of contract documents for highway works
MEICA	mechanical, electrical, instrumentation, control and automation
MIDAS	motorway incident detection and automatic signalling
MIDP	master information delivery plan
MOR	Minimum Operating Requirement
MPI	major project instruction
MWC	Main Works Contracts
NEBOSH	national examination board in occupational safety and health
NHS	National Health Service
NPC	network performance criteria
NRMM	Non-Road Mobile Machinery
NRTS	National Roads Telecommunications Services
NVSS	networked video surveillance system
O&M	operations and maintenance
OCI	optimised contractor involvement
OD	Operations Directorate
OH	Occupational Health
OLE	Overhead Line Equipment
OLEMP	Outline Landscape and Ecological Management Plan
PAC	partial acceptance certificate
PAS	publicly available specification
PCC	pre-commissioning certificate
PCF	Project Control Framework
PDF	portable document format
PFA	pulverised fuel ash

Acronym	Definition
PIARC	permanent international association of road congresses
PIF	performance incentivisation fund
PIM	Project Information Model
PLA	Port of London Authority
PoT	Port of Tilbury
POWRA	point of work risk assessment
PPE	personal protective equipment
PPN	procurement policy note
PRAMS	performance, reliability, availability, maintainability and safety
PTAG	project tunnel assurance group
QCRA	quantitative cost risk assessment
QMP	quality management points
QSRA	quantitative schedule risk assessment
RAMSa	reliability, availability, maintainability and safety
RAMSt	risk assessment and method statement
REAC	Register of Environmental Actions and Commitments
RESS	required excavation and support sheet
RIDDOR	reporting of injuries, diseases and dangerous occurrences regulations
ROC	Regional Operations Centre
RUC	Road User Charging
RWE	RWE - the group
SCHSMM	supply chain health and safety maturity matrix
SCRG	Safety Control Review Group
SDP	(NRTS) service delivery point
SEROC	south east regional operations centre
SES	safety engineering and standards
SGAR	Stage Gate Assessment Review
SHW	specification for highway works
SIA	Security Industry Authority
SIF	safety instrumented function
SIL	safety integrity level
SME	small and medium enterprise
SMIS	structures management information system
SMSTS	site management safety training scheme
SMS	stock management system
SoCG	statement of common ground
SRG	shift review group
SRN	Strategic Road Network
StART	strategic alignment review tool
STEM	science technology engineering and mathematics
SVD	stopped vehicle detection

Acronym	Definition
SWIS	severe weather information service
TAA	Technical Approval Authority
TBM	Tunnel Boring Machine
TIDP	task information delivery plan
TMS	tunnel management system
TRA	time risk allowance
TSB	Tunnel Service Building
TSP	Telecommunications Services Provider
UK	United Kingdom
UKAS	United Kingdom accreditation service
UKPN	United Kingdom power network
UXO	unexploded ordnance
VMS	variable message sign
VRU	vulnerable road users
WBS	Work Breakdown Structure
WCH	walking, cycling and horse-riding
WRRR	work related road risk
XML	extensible markup language

S075 Definitions

Identified and Defined Terms

S075.1 The capitalised and italicised terms referenced in the *conditions of contract* have the same meaning when referenced in the Scope.

S075.2 The Scope has additional defined terms which have the meaning set out in Table 1.

Table 1 - Definitions

Term	Definition
Acceptance Procedure	means the procedure set out in section S310 (“Design submission procedures and acceptance criteria”) of the Scope.
Accommodation Works	as defined by MCHW and represent activities that are undertaken or required to maintain structures, equipment, or land that is the property or under the control of a Statutory Undertaker.
As Low As Reasonably Practicable (ALARP)	relates to the time, cost and effort required to control a risk balanced against the severity of the risk. When a risk is reduced to a point that is ALARP, the cost and effort involved in reducing the risk further would be disproportionate to the amount of benefit that would be gained.
Applications for Roadside Electricity Connections (Exit Points)	has the meaning given in the Project Control Framework (see link in Annex A).
Approval in Principle	as defined in DMRB standard CG 300 (Technical approval of highway structures) (see link in Annex A).
Approval in Principle Checklist	has the meaning given in the Project Control Framework.
Archaeological Certificate	as contained in Annex D (“Certificates”).
As-built Documentation	has the meaning given in the Project Control Framework.
Asset Information Model	as defined in Clause 3.3.9 in ISO 19650-1 Building Information Modelling (see link in Annex A).
Asset Information Requirements (AIR)	are the requirements for asset information for the Works as specified in ADMM (see link at Annex A).
Behavioural Based Safety (BBS)	is about exploring how individuals people respond to health, safety and wellbeing incidences and challenge those behaviours to improve the outcomes or avoid such incidences in the first place.
Benefits Realisation and Evaluation Plan	has the meaning given in the Project Control Framework.
Baseline Personnel Security Standard (BPSS)	the HMG Baseline Personnel Security Standard (or ‘BPSS’) describes the preemployment controls applied to any individual including contractors who, in the course of their work, has access to government assets.
British Standard	the specification of recommended procedure, quality of output, terminology, and other details, in a particular field, drawn up and published by the British Standards Institution.
Building Information Modelling (BIM)	as defined in the UK Government’s Construction Strategy (see link at Annex A).

Term	Definition
Category 3 Structure	as defined in DMRB standard CG 300 (Technical approval of highway structures).
Category A	as defined in DMRB standard CD 352 (Design of road tunnels) (see link in Annex A).
Category One Consent	are those Consents that the *Client* decides in its discretion to prepare and obtain, with or without the assistance of the *Contractor*.
Category Purchase Agreement	is a contract (including framework agreements and dynamic purchase system) which is established or may be established by the *Client* for common requirements across its asset management and wider expenditure plan under which the *Contractor* and Others may enter into contracts with Category Suppliers.
Category Supplier	are parties to a Category Purchase Agreement with the *Client*.
Category Three Consent	are those Consents that the *Contractor* prepares all necessary activities to obtain.
Category Two Consent	are those Consents that the *Contractor* prepares the applications for acceptance by the *Project Manager*.
CEEQUAL	is the Civil Engineering Environmental Quality Assessment and award scheme that is an evidence-based sustainability assessment, rating and awards scheme for civil engineering, infrastructure, landscaping and public realm projects.
Central Asset Database	is a database hosted by the Main Works Contractor which will be populated with all asset content from the Project.
Centralised procurement of Roadside Infrastructure	has the meaning given in the Project Control Framework.
Certificate	as contained in Annex D (“Certificates”).
Certificate of Compliance with the Operations Technical Leadership Group	has the meaning given in the Project Control Framework.
Certification Procedure	means the procedure set out in section S311 (“Certification Procedure”) of the Scope.
Chalk	is the lithostratigraphic unit of Cenomanian to Maastrichtian Age. The group is known throughout the onshore outcrops in England (Yorkshire to Kent, Sussex and Dorset), and offshore in the Southern, Central and Northern North Sea areas. The lithological description is chalk, with or without flint and discrete limestone, marl (calcareous mudstone), sponge, calcarenite, phosphatic, hardground and fossil-rich beds.
Change Request Form	has the meaning given in the Project Control Framework.

Term	Definition
Client Parties	means any of the *Client's* departments, agents, contractors and subcontractors of any tier and its or their directors, officers and employees.
Code of Connection	has the meaning given in the Project Control Framework.
Code of Construction Practice	forms part of the DCO and sets out a framework for how the mitigation and management of environmental effects will be delivered and maintained.
Combined Modelling and Appraisal (ComMA) Report	means the Combined Modelling and Appraisal Report (ComMA) in the Development Consent Order.
Combined Operations	has the meaning given in the Project Control Framework.
Combined Safety and Hazard Log Report	has the meaning given in the Project Control Framework.
Commencement of Construction	has the meaning given to the term "commencement" as defined in the definition of "commence" in the DCO.
Common Data Environment	means an agreed source of Project information for any given activity or asset for collecting, managing and disseminating each information container through a managed process. This environment is configured to support document management workflows aligned to ISO 19650 Building Information Modelling.
Communications Planning for Major Projects	has the meaning given in the Project Control Framework.
Community	as defined in Highways England Customer Strategy.
Compound	means either a temporary compound or a construction compound as defined in the DCO documentation (also referenced as either Main Compounds, Satellite Compounds or Utility Logistics Hubs in the Scope).
Compound Areas	means an area identified in the DCO (and illustratively shown on the drawings in 'Environmental Statement Figure 2.2 – Construction Compounds' (as provided in Annex A DCO information)) within the Site for the *Contractor* to establish operational facilities including • offices, • welfare facilities and • storage.
Comptroller and Auditor General	is the UK Government official responsible for supervising the quality of public accounting and financial reporting.
Connect Plus Contractor	is the contractor managing and operating the M25 network.
Consent	is any licence, permit, consent, assent and other approval required from Others in order to Provide the Works.

Term	Definition
Consent Application	is the application and supporting documentation to be sent to the consent granting body.
Control Office Base System	means a computer system to operate Traffic Control and Communications Facilities (TCCF) or used to operate any part of such facilities (including telephone, signals, message signs, meteorological, road tunnel and MIDAS sub-systems)
Construction Certificate	as contained in Annex D ("Certificates").
Construction Phase	means the period between Commencement of Construction and Completion for the relevant construction activity, or the duration of Commencement of Construction and Completion (as the context requires).
Construction Phase Plan	has the meaning given in the Project Control Framework.
Construction Skills Certification Scheme	is a certification scheme that provides proof that individuals working in construction have the appropriate training and qualifications.
Contract Objectives	as defined in section S105.
CompeteFor	CompeteFor is an industry leading contract procurement platform supported by major projects and business.
Contracts Finder	is the UK Government website (see link at Annex A) for information about contracts with the UK Government and its agencies.
Control Account	means the management control point for budget, cost and performance to be reported and measured, and is the lowest level in the Work Breakdown Structure.
Cost Breakdown Structure	is a breakdown or hierarchical representation of the various costs in a project in the form provided by the *Client* ('Cost Breakdown Structure form' see link at Annex A). The Cost Breakdown Structure represents the costs of the components in the Work Breakdown Structure.
Critical Asset	a system or sub-system, failures of which affect achievement of the availability requirement of the LTC Tunnel System, as detailed within the 'LTC Tunnel System requirements specification' (see link in Annex A).
Critical Path Method	is the method according to which: • the critical path (longest path) is a series of activities or tasks within a project, none of which can be delayed without affecting the project end date, • it is possible for a network to have more than one critical path if there are multiple key or sectional completion dates and • it is also possible for multiple critical paths to exist leading to a single completion date.
Crown Commercial Services	is the https://www.crowncommercial.gov.uk

Term	Definition
Customer	is defined as anyone the *Client* directly provide products & services to including • road users, • communities and community groups, • tenants and persons and organisations that lease from the *Client*, • any householder or user of the existing local road network or WCH network potentially impacted by the *works* and • the public who use the *works*.
Customer Outcomes	as defined in the *Client's* customer service strategy titled "Better journeys, better conversations" (see link at Annex A).
Customer Relationship Management	is an approach to manage a company's interaction with current or potential customers and stakeholders.
Dartford Crossing	the river crossings, both tunnel and bridge between Dartford and Thurrock.
Data	all eye-readable or computer, or other machine, readable data which has been used, prepared or to be prepared by, or on behalf of, the *Contractor* relating to the design or construction of the works, including all Personal Data collected, generated or otherwise processed by the *Contractor* in the course of Providing the Works.
Data Protection Impact Assessment	is an assessment by the Data Controller or Joint Data Controller as applicable of the impact of the envisaged processing of Personal Data on the rights of a Data Subject(s).
Data Subject Access Request	is a request made by, or on behalf of, a Data Subject concerning their • rights of access to, and information relating to, Data, • rectification of inaccurate Data, • permanent erasure of Data, • objection to or restriction of processing of Data pursuant to the Data Protection Legislation, and • transfer of Data to a third party.
Data Subject	is an individual who is the subject of Personal Data.
DCO Application - Development Consent Order & Explanatory Memorandum	has the meaning given in the Project Control Framework
DCO -Managing Change	has the meaning given in the Project Control Framework
Departures from Standards Checklist	has the meaning given in the Project Control Framework.
Design and Check Certificates Checklist	has the meaning given in the Project Control Framework.

Term	Definition
Design Certificate	as contained in Annex D ("Certificates").
Design Data	means all drawings, reports, documents, plans, software, formulae, calculations and other data relating to the design, construction, testing and operation of the works.
Design Manual for Roads and Bridges	means the Design Manual for Roads and Bridges, published by the *Client* or The Stationery Office Ltd.
Design Release 4.3	means the reference design provided by the *Client* that is used to inform the invitation to participate in dialogue.
Designer	is • a Design Consultant or • the *Contractor* undertaking the design of the relevant part/element of the *works* or temporary works, as the case may be.
Design Consultant	a subcontractor (at any stage of remoteness from the *Client*) that provides the design for the *works* or temporary works or • a *design consultant*.
Detailed Local Operating Agreement	has the meaning given in GG 182 Major Schemes, enabling handover into operation and maintenance (see link in Annex A).
Digital by Default	The Digital by Default (DbyD) programme is a key enabler for the digital transformation of MPs delivery capability and is a workstream within Major Projects Directorate Transformation (MPDT).
Digital Twin	is a digital representation of a physical entity and its operation that can be queried and which will enable the *Client* to simulate its assets and improve its ability to design, construct, operate and maintain them with safety, customer and environmental outcomes at the forefront, as further detailed on the following webpage: https://nationalhighways.co.uk/industry/digital-data-and-technology/digital-roads/
Disadvantaged	is a term for individuals or groups of people who: • face special problems such as physical or mental disability • lack money or economic support
Disclosure Request	a request for information relating to the contract received by the *Client* pursuant to the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or otherwise.
Discrimination Acts	is a catch all term that includes the Equality Act 2010 and any provisions of any earlier statutes that are expressly preserved in force by that Act.
Distribution Network Operator	as defined in DMRB standard GG 182 (Major schemes: Enabling handover into operation and maintenance)
Driver Certificate of Professional Competence	as defined in Driver CPC training for qualified drivers: Getting your Driver CPC card - GOV.UK (see link in Annex A)

Term	Definition
Driving for Better Business	is a government-backed Highways England programme to help employers in both the private and public sectors reduce work-related road risk, control the associated costs and improve compliance with current legislation and guidance.
DYNAC	means DYNAC®
Earned Value	is a measure to determine the value of work which has been completed to date, in order to understand how the project is performing on a cost and schedule basis
Ecological Certificate	as contained in Annex D ("Certificates").
Ecologist	is an individual who studies the relationship between organisms and their environment.
Efficiency Register	has the meaning given in the Project Control Framework.
Efficiency Target	is the *Client's* efficiency target for roads investment period 2 of £2.23 billion delivered through cost control and innovation linked to four themes of procurement, effective operations, improved capability and effective processes.
End of Stage Report	has the meaning given in the Project Control Framework.
Environmental Assessment	is a process by which information about environmental effects of a proposed development is collected, assessed and used to inform decision making. For certain projects, Environmental Assessment is a statutory requirement, reported in an Environmental Statement.
Environmental Assessment Documents	means the environmental documents forming part of the Environmental Statement for the Development Consent Order (DCO).
Environmental Clerk of Works	is a key role described in S200 providing advice on environmental issues during construction-related activities. Typical issues include pollution, surface water management, material management, air quality and noise.
Environmental Management Plan	is one of the environmental management plans described in Table 1 of Section S207.
Environmental Masterplan	A package of information on existing and future environmental commitments and objectives, ongoing actions and risks to be managed, handed over to those responsible for future management and operation of the asset. The Environmental Masterplan for the Project is provided as Figure 2.4 (Application Document 6.2) of the ES.
Environmental Statement	means the environmental statement developed for the DCO outlining the environmental assessments findings and mitigation relating to the *works*.

Term	Definition
Equality Impact Assessment (EqIA) Screening, Analysis and Monitoring	has the meaning given in the Project Control Framework.
Euro VI	Euro VI limits for heavy-duty vehicles were introduced in Regulation 595/2009, and were amended by Regulations 582/2011 and 133/2014.
Evaluation of Change Register	has the meaning given in the Project Control Framework.
Exchange Information Requirements	as defined in the UK Government's Construction Strategy (see link at Annex A)
Exercise of Compulsory Acquisition Powers (outsourced) Checklist	has the meaning given in the Project Control Framework.
Federated Model	A managed set of 3d data models from various design disciplines, combined in a virtual environment to view an entire project as a whole, as further detailed in GG 184 - Specification for the use of Computer Aided Design of the DMRB and ISO 19650.
F10 Notification of Construction Project	has the meaning give in the Project Control Framework.
Field Bridge	means new Structures that span over drainage channels and small water courses, and that provide non-motorised user access or access for maintenance traffic as part of the *works*.
Final Estimate	has the meaning given in the Project Control Framework.
Flood Zone 3	is land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Flood Zone 2	is land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%) in any year.
Flood Zone 1	is land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
Form 001	is a Network Rail's design product Form 001 approval in principle.
Gantt chart	is a graphical tool which shows activities or tasks performed against time.
Geotechnical Activities	as defined in DMRB standard CD 622 (Managing geotechnical risk) (see link in Annex A).
Geotechnical Design Report (GDR)	as defined in DMRB standard CD 622 (Managing geotechnical risk).

Term	Definition
Geotechnical Feedback Report (GFR)	as defined in DMRB standard CD 622 (Managing geotechnical risk).
Ground Investigation Report	as defined in DMRB standard CD 622 (Managing geotechnical risk).
Haul Road	is a temporary road to allow for the movement of construction materials, construction machinery and construction labour around the Site.
Health & Safety File	has the meaning given in the Project Control Framework.
Heavy Goods Vehicle	includes vehicles over 3.5 tonnes.
Highway Authority	has the meaning given in the Highways Act (see link in Annex A).
Highways England's Design Review Panel	the *Client's* department seeking to ensure design excellence in landscape, engineering and the built environment. The aim of the Design Review Panel is to improve the design quality of the Strategic Road Network.
Historic England	is an executive non-departmental public body of the Department for Digital, Culture, Media & Sport and the government's statutory adviser on the historic environment, championing historic places and helping people to understand, value and care for them. https://historicengland.org.uk/
Home Office Type Approval	is an approval required by the home office in relation to speed enforcement cameras
Implementation Report for New Standards	has the meaning given in the Project Control Framework.
Incident Liaison Officer	means a person appointed by the *Contractor* who is responsible for the management and delivery of the *Contractor's* incident response to traffic related incidents within the Working Areas.
Independent Assurance Review	a review by independent specialists and experts hired by the *Client* to provide assurance that the project or scheme is developing in accordance with the scheme objectives.
Information Model	as defined in clause 3.3.8 of ISO 19650-1 Building Information Modelling.
Information System	can be a combination of hardware, software, infrastructure and trained personnel organised to facilitate planning, control, coordination and decision making in an organisation.
Information Technology Directorate	is a directorate in Highways England responsible for overseeing the provision of information and the use of technology on the Strategic Road Network.
Innovation	is an innovative solution to an issue which the *Client* wishes to invest its designated funds in.

Term	Definition
Intelligent Transport Systems	use technology to improve safety, efficiency, environmental performance and the journey experience for users
Just and Fair Culture	is a process where the *Client* works with its contractors to promote a fair culture approach to investigating how and why human failure may have contributed to an incident without attributing blame.
Kent Roads Contract	the Kent Roads Contract [Contract Ref].
Kent Roads Contractor	is the contractor delivering the Kent Roads Contract.
Key Data	has the meaning given in section S260 and section S310.
LA Maintenance Tracks	means a track providing a safe access for maintenance, inspection and repair of highway assets that will be operated and maintained by the Local Authority.
Land - Gaining Access for Surveys	has the meaning given in the Project Control Framework.
Land Certificates	as defined by the Project Control Framework.
Landscape and Architectural Certificate	as contained in Annex D (“Certificates”).
Landscape Architect	has the meaning as defined in DMRB standard LA 107 (Landscape and visual effects) (see link in Annex A).
Lead Local Flood Authority	are county councils and unitary authorities. They lead in managing local flood risks (i.e. risks of flooding from surface water, ground water and ordinary (smaller) watercourses).
Letter of no Objection Departures	means Departures that have been appraised by the SES on or before the starting date and may be submitted by the Contractor in accordance with section S316.
Lessons Learnt Log	has the meaning given in the Project Control Framework.
Local Authority	any of Thurrock Council, Kent County Council, Gravesham Borough Council, London Borough of Havering, Essex County Council, Medway Council, Dartford Borough Council, Brentwood Borough Council and Greater London Authority (including Transport for London).
Local Exhaust Ventilation (LEV)	is an extract ventilation system that takes airborne contaminants such as dusts, mists, gases, vapour or fumes out of the workplace air so that they can't be breathed in.
Long-term Closure	is a closure to part of the network that has any duration longer than overnight.
LTC Contractors	is a encompassing term that includes the Telecommunication Service Provider, Main Works Contractors, RUC Contractor, Connect Plus Contractor and any other contractors the *Client* and the Secretary of the State has procured to deliver part of the Project.

Term	Definition
LTC HSW App	is the application for uploading Health, safety and wellbeing data for the Project.
LTC Route	is the main crossing under the River Thames and all junctions and roads associated with the Project including all carriageways, hard shoulders, slip roads, Side Roads, access roads, bridges and other highway structures.
LTC Tunnel System(s)	encompasses all mechanical, electrical and communications equipment required for tunnel operation in the tunnels, approaches and portals - excluding civils elements. It also includes tunnel control systems as well as the Human Machine Interface (HMI) within the South East Regional Operating Control room (SEROC). The LTC Tunnel System excludes data and communications infrastructure providing connection between the tunnel and SEROC.
Main River	is a designation as larger rivers and streams as identified in the Main River Map by the Environment Agency (see link in Annex A). The Environment Agency carries out maintenance, improvement or construction work on main rivers to manage flood risk. Lead local flood authorities, district councils and internal drainage boards carry out flood risk management work on ordinary watercourses.
Main Works Contractor	is a term to encompass the Tunnels Contractor, the Roads North of the Thames Contractor or the Kent Roads Contractor.
Main Works Contracts	are collectively the Roads North of the Thames Contract, Kent Roads Contract and the Tunnels Contract.
Maintenance and Repair Statement	has the meaning given in the Project Control Framework.
Maintenance Period	is a period equal to the sum of • twelve months and • the Duration of Section 3 less the Initial Duration of Section 3.
Maintenance Service Providers	are the *Client's* agent responsible for the maintenance of technology and infrastructure.
Maintenance Tracks	means a track providing a safe access for maintenance, inspection and repair of highway assets that will be operated and maintained by the Maintenance Service Provider.
Major Accident Hazard Pipelines	include high pressure natural gas supply transmission and distribution pipelines which are covered by the Pipeline Safety Regulations (1996). The HSE website www.hse.gov.uk provides guidance on how to ensure safe systems of working in the vicinity to Major Accident Hazard Pipelines.
Manual of Contract Documents for Highways Works (MCHW)	means the Manual of Contract Documents for Highways Works published by Highways England or The Stationery Office Ltd.

Term	Definition
Minimum Operating Requirements	means the minimum combinations of conditions, availability of systems and procedures for safe continued operation of the tunnel which are required to be developed by the *Contractor* and accepted by the *Project Manager* in accordance with S2900.
Multiparty Collaboration Certificate	as contained in Annex D (“Certificates”).
Multiparty Collaboration Form	as contained in Annex D (“Certificates”).
National Roads Telecommunications Services	means the telecommunications services that link 30,000 roadside assets (signs, signals, cameras) to seven regional control centres and the National Traffic Operation Centre enabling the *Client* to manage and operate the network safely and efficiently. NRTS also delivers all new telecommunications services to the regional and smart motorway improvement schemes in support of RIS delivery. https://www.nrtsco.com/website/home.do
Network Rail	Is Network Rail Limited or any later replacement or successor organisation, entity or body performing any role previously performed by Network Rail Limited
Non-motorised user (NMU) (also known as walking, cycling and horse-riding (WCH))	means a non-motorised vehicles person including • pedestrians, • cyclists, • equestrians, • scooter riders (non-motorised), • cyclists with electrically assisted pedal cycles (where these conform to Department for Transport or other relevant regional regulations and where they may legally be used) and • users of powered wheelchairs (where these conform to Department for Transport regulations and where they may legally be used).
Walking, cycling and horse-riding Route or WCH Route	means the route used by a non-motorised user such as a walker, cyclist or equestrian.
Non-Road Mobile Machinery	has meaning within the vehicle certification agency for vehicle type approvals and means any mobile machine, transportable equipment or vehicle with or without bodywork or wheels which • is not intended for carrying passengers or goods on the road • includes machinery installed on the chassis of vehicles intended for the transport of passengers or goods on roads and • installed with a combustion engine - either an internal Spark Ignition (SI) engine, or a Compression Ignition (CI) engine.

Term	Definition
North Portal	means the structure(s) that forms the opening of the tunnel located to the west of East Tilbury, Thurrock.
North Portal Site	as shown on drawing reference HE540039-CJV-GCL-S3P_ZZZZZZZZZZ-DR-CW-00001 (see link in Annex A).
Notification of Development	has the meaning given in the Project Control Framework.
numbered appendix	means a numbered appendix described in section S2705 and including those contained in Annex DD.
Occupational Health	Is the branch of medicine dealing with the prevention and treatment of job-related injuries and illnesses.
ODC	as defined by the Project Control Framework
Outline Landscape and Ecological Management Plan	focuses on the management requirements for the land parcels that perform specific landscape and ecological mitigation functions for the Project submitted as part of the DCO.
Operations Directorate	a *Client* directorate responsible for the operation and maintenance of the Strategic Road Network.
Order Limits	means the limits of lands to be acquired or used permanently or temporarily shown on the land plans and works plans within which the authorised development may be carried out as set out in the DCO.
Organisational Information Requirements (OIR)	is information needed for CAPEX & OPEX operations and decisions as defined in DMRB GG-182 (see link at Annex A).
Overhead Line Equipment	means the assembly of masts, gantries and wires or otherwise found along electrified railways.
Personal Data	refers to any information relating to a person (a 'data subject') who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that person.
Planned Closure	resultant lane, highway, bore or tunnel closures that are scheduled to support preventative maintenance or recovery of tunnel systems, equipment or plant. Depending on the system, equipment or plant faults it is expected a number of maintenance activities to critical systems would take place within planned closures.
Post Decision Activities - Section 134 Compulsory Acquisition Notices & Document Certification / Deposit Processes	has the meaning given in the Project Control Framework.

Term	Definition
Principal	means a person who has the authority within the respective organisation and has the subject matter experience to sign off the relevant works on the organisations behalf.
Principal Contractor	as defined by the Health and Safety Executive in the CDM 2015 https://www.hse.gov.uk/pubns/books/l153.htm
Principal Designer	as defined by the Health and Safety Executive in the CDM 2015 https://www.hse.gov.uk/pubns/books/l153.htm
Principal Structure	as defined in the Development Consent Order
Private Apparatus	any other Apparatus (which is not owned by a Statutory Undertaker).
Private Means of Access	a private access that is used for the connection of premises and community facilities or otherwise to the highway network.
Programme Management Plan	is referred to in section S825.
Project	means the A122 Lower Thames Crossing as defined by the DCO.
Project Control Framework	is a joint Department for Transport and *Client* approach to managing major projects, which comprises of a standard project lifecycle, deliverables, control processes and governance.
Project Design Report	has the meaning given in the Project Control Framework.
Project Information Model (PIM)	as defined in Clause 3.3.10 in ISO 19650-1 Building Information Modelling.
Project Information Requirements (PIR)	information needed at each project stage, as described in the EIR.
Project Management Plan	has the meaning given in the Project Control Framework.
Project Reporting Calendar	means the calendar provided by the *Project Manager* within the timescales stated in S800 that determines the cycle of reporting to be provided by the *Contractor*.
Project Roads	means • Trunk Roads, • Side Roads, • Maintenance Tracks, • LA Maintenance Tracks, • Private Means of Access and • Non-Motorised User Routes.
Project Schedule	has the meaning given in the Project Control Framework.

Term	Definition
Protective Measures	are appropriate, technical and organisational measures implemented, consistent with good industry practice, to ensure a level of security appropriate to the risk posed by Personal Data, taking into account the state of the art, the costs of implementing, the harm that might result from a Security Incident, and which may include • pseudonymising and encrypting Personal Data, • ensuring confidentiality, • integrity, • availability and resilience of systems and services, • ensuring that availability of and access to Personal Data can be restored in a timely manner after an incident, and • regularly assessing and evaluating the effectiveness of such measures adopted by it including those outlined in "Procurement Policy Note 02/18 Changes to Data Protection Legislation and General Data Protection Regulation" (PPN 02/18) (see link at Annex A).
Provenance Certificate	means the certificate defined in the SHW (see link in Annex A).
Railway Authority	is the railway authority responsible for the railway infrastructure (including Network Rail and HS1 (as appropriate)).
Ramsar	means the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat is an international treaty for the conservation and sustainable use of wetlands. It is also known as the Convention on Wetlands. It is named after the city of Ramsar in Iran, where the convention was signed in 1971.
Readiness Reviews	is an assurance process tool used prior to, • the first *access date* and • commencement of o complex or critical construction activities and o high risk construction activities detailing the *Contractor's* actions to ensure and measure health, safety, wellbeing and environmental obligations to protect • all people, • the *works* and, • *Client's* and Others property and assets.
Reference Design	means Design Release 4.3
Regional Operations Centre	has the meaning given in GM 701 'Asset delivery asset maintenance requirements' (see link in Annex A).
Regional Maintenance Service Providers	means the *Client's* regional maintenance service providers.

Term	Definition
Register of Environmental Actions and Commitments	summarises the committed mitigation measures within the chapters of the Environmental Statement and associated appendices.
Regular Reporting	has the meaning given in the Project Control Framework.
Relevant Authority	• any person identified in S 910 ("Co-operation and Co-ordination") • any court with the relevant jurisdiction and any local, national or supranational agency, inspectorate, minister, ministry, official or public or statutory person of the government of the United Kingdom or of the European Union and • any other person whose authority is or may be required for the carrying out of all or any part of the Project or which has any authority or right in respect of any part of any of the Working Areas under any Law.
Relevant Conviction	other than for minor road traffic offences, any previous or pending prosecutions, convictions, cautions and binding-over orders (including any spent convictions as contemplated by section 1(1) of the Rehabilitation of Offenders Act 1974 by virtue of the exemptions specified in part II of schedule 1 to the Rehabilitation of Offenders Act 1974 (Exemptions) Order 1975 (SI 1975/1023) or any replacement or amendment to that order, or being placed on a list kept pursuant to section 1 of the Protection of Children Act 1999 or being made the subject of a prohibition or restriction under section 218(6) of the Education Reform Act 1988).
Reward and Recognition Scheme	is a mechanism that allows employees, whether that be managers or peers, to recognise their colleagues' efforts by nominating them to receive a reward, improving workforce morale and positively impacting performance.
Risk-Based Intrusion	is a tool used to assess the *Contractor's* tunnels technical submissions schedule and determine an intrusion level based on statutory obligations, expertise, experience and professional judgement
Risk Management Plan	has the meaning given in the Project Control Framework.
Risk Register	has the meaning given in the Project Control Framework.
Road User Charging	is the mechanism for charging users for using the Project.
Road Safety Audit	has the meaning given in the Project Control Framework.
Roads North of the Thames Contract	the Roads North of the Thames Contract [Contract Ref].

Term	Definition
Roads North of the Thames Contractor	is the contractor delivering the Roads North of the Thames Contract [Contract Ref].
RUC Contractor	installs Road User Charging equipment and operates the Road User Charging system on the Project.
Rules of the Route	rules agreed with train operators under which speed restrictions or temporary line closures can be imposed for maintenance purposes.
Safety Control Review Group	has the meaning as defined in DMRB standard GG 104 (Requirements for safety risk assessment) (see link in Annex A).
Safety Passport	is a single database accessible by all applicable license holders with the ability to record training, competence, toolbox talks, notify expiry dates, data sharing and migration on individuals moving between Service Providers that can be read by a variety of mobile or fixed access card readers.
Scheduled Monument	is a nationally important archaeological site or historic building, given protection against unauthorised change.
Scheme Asbestos Management Plan	has the meaning given in the Project Control Framework.
Security Incident	is a breach of security leading that results, or may result in, to the accidental or unlawful destruction, loss, alteration, unauthorised disclosure of, or access to, Data.
Security Industry Authority	is as defined at https://www.sia.homeoffice.gov.uk/Pages/home.aspx
Service Standards	means the asset delivery asset maintenance requirements standard GM 701 of the DMRB.
Side Roads	means classified roads, unclassified roads or other public rights of way as defined in the DCO.
Side Roads Order	the statutory order which authorises a Highway Authority to make alterations to roads or other highways affected by a trunk road scheme e.g. stopping up, diverting or connecting them to new trunk road and stopping up and replacing private accesses affected, as defined by section 14 of the Highways Act 1980.
Site Data Change Requests	has the meaning given in the Project Control Framework.
Site Won Materials	are wasted materials generated as a direct consequence of the works being undertaken on-site and which have the potential to be re-used.
South Portal	are the structure(s) that forms the opening of the tunnels, which is located to the East of Gravesend, Kent.
South Portal Site	the structures that form the opening of the tunnels, which is located to the south of the A226 in Gravesham as shown on drawing reference HE540039-CJV-GCLS3P_ZZZZZZZZZZ-DR-CW-00004 (see link in Annex A).
Specification for Highways Works	means volume 1 of the MCHW.

Term	Definition
SRN Regional Operating System	means the *Client's* existing regional operating system and facilities (including such upgrades to such systems and facilities at the time of technology commissioning).
Stage Gate Assessment Review	an assessment which provides approval to proceed into the next stage of the Project Control Framework phases.
Statutory Undertaker	an undertaker for the purposes of Part III of the NRSWA as defined in section 48(4) of the NRSWA.
Statutory Undertakers Diversions	has the meaning given in the Project Control Framework.
Strategic Road Network	is the road network managed by the *Client*. It consists of motorways and trunk roads. The Project will form part of the Strategic Road Network.
Structure	refers to any temporary or permanent structure including any • bridge, buried structure, subway, underpass, culvert or any other structure supporting the highway with a clear span or internal diameter greater than 0.9 metres, • road tunnel, • overhead crossing carrying a conveyor or utility service, • moveable inspection access gantry, gantry rail and gantry support systems, • earth retaining structure where the effective retained height (i.e. the level of the fill at the back of the structure above the finished ground level in front of the structure) is greater than 1.5 metres, • reinforced/strengthened soil/fill structure, with hard facings, where the effective retained height is greater than 1.5 metres, • reinforced/strengthened soil/fill which is an integral part of another highway structure, • reinforced/strengthened soil/fill structure where hard facings are not provided and the face inclination exceeds 45 degrees, • portal or cantilever sign or signal gantry, • cantilever mast for traffic signal or speed camera, • lighting column, • high mast of more than 20 metres in height (i.e. the vertical distance from top of post to underside of flange plate) for lighting, • mast for camera, radio and telecommunication transmission equipment, • catenary lighting support system, • environmental barrier, • proprietary manufactured structure or product, and

Term	Definition
	• traffic sign/signal posts of more than 7 metres in height (i.e. the vertical distance from top of post to bottom of flange plate or top of foundation, whichever is the lesser).
Structures Options Report Checklist	has the meaning given in the Project Control Framework.
Submission	as defined in section S310
Submission Schedule	as defined in section S310 .
Supervisory Authority	is any regulatory, supervisory, governmental or other competent authority with jurisdiction or oversight over the Data Protection Legislation.
Support Team	means the integration partner, the technical partner, the commercial partner and the archaeologist.
Supply Chain Sustainability School	As defined at the supply chain school website https://www.supplychainschool.co.uk/
Technical Approval Authority	as defined in DMRB standard CG 300 (Technical approval of highway structures).
Technology and Systems Commissioning Plan	has the meaning given in the Project Control Framework.
Telecommunications Requirements	has the meaning given in the Project Control Framework.
Telecommunications Services Provider	means the contractor appointed to provide the National Roads Telecommunication Services (NRTS).
Temporary Works	is defined in BS5975: 2008 “Code of practice for temporary works procedures and the permissible stress design of falsework” (see link in Annex A) as “(those) parts of the works that allow or enable construction of, protect, support or provide access to, the permanent works and which might or might not remain in place at the completion of the works”.
Thin Surface Course System (TSCS)	as defined in DMRB standard (CD 236 Surface course materials for construction).
Traffic and Safety Control Officer	means a person appointed by the *Contractor* to undertake the duties in stated in and accordance with numbered appendix 1/17.
Traffic Management Plan	has the meaning given in the Project Control Framework.
Traffic Signs	as defined in Road Traffic Regulation Act 1984.

Term	Definition
Traffic Signs Manual	means the manual of that name and any associated advice (including all local transport notes) that are issued by the Department for Transport and published by The Stationery Office.
Trunk Road	means special road or trunk road as defined in the DCO.
Tunnel or Tunnels	means as the context requires • the northern cut and cover tunnel, the bored tunnels, the cross passages and the southern cut and cover tunnel, • the northern cut and cover tunnel, the bored tunnels and the southern cut and cover tunnel, • the bored tunnels, • the northern cut and cover tunnel and the southern cut and cover tunnel, • the northern cut and cover tunnel, • the southern cut and cover tunnel or • the cross passages.
Tunnel Design Authority Report	has the meaning given in the Project Control Framework.
Tunnel Service Building	means buildings housing equipment and facilities for the operation and maintenance of the Tunnels which are required to be provided as part of the *works* by the *Contractor* in accordance with the contract.
Tunnels Contract	means this contract.
Tunnels Contractor	is the *Contractor*.
Threat and Vulnerability Assessment (TVA)	a formal process, set within an overall security risk management framework designed to identify and assess threats, vulnerabilities and impacts. The output from a TVA is used to inform the formulation of security plans and the selection of security mitigations, encompassing cyber, physical and personnel measures, underpinned by effective incident management planning and response.
Type P (Temporary Works)	as defined in DMRB standard CG 300 (Technical approval of highway structures)
Type S (Temporary Works)	as defined in DMRB standard CG 300 (Technical approval of highway structures)
Underpasses	means typically Structures that span over pedestrian or agricultural routes crossed by the Trunk Roads to be constructed as part of the *works* ("Underpass").
United Kingdom Accreditation Service (UKAS)	is the UK's National Accreditation Body, responsible for determining, in the public interest, the technical competence and integrity of organisations such as those offering testing, calibration and certification services.
Unplanned Closure	means resultant lane, highway, bore or tunnel closures that are required to be enacted prior to the subsequent planned closure due to the safety criticality of originating system, plant or equipment fault

Term	Definition
Utility Logistics Hubs	means a Compound provided by the *Contractor* for use by the Statutory Undertakers to undertake the Statutory Undertakers' Utility Works (non-contestable).
Utility Works	means the diversion, protection, removal or assurance of utility apparatus and temporary and permanent service connections in order to facilitate the provision of the *works*.
Value Management Delivery Plan	has the meaning given in the Project Control Framework.
Value Management Workshop Report	has the meaning given in the Project Control Framework.
Working Day	is weekday, but not an English bank holiday, public holiday, Saturday or Sunday.
Work Breakdown Structure	is the hierarchical decomposition of scope into discrete elements of work in the form provided by the *Client* ('Work Breakdown Structure form' see link at Annex A).
Worksite	means an area within the Site not identified in the DCO as a Compound Area where the Contractor establishes operational facilities focussed primarily on supporting construction activity over relatively short durations.
XER	is a proprietary project file format used by Primavera P6 project planning and management application.

S100 Description of the *works*

Background

Interpretation

S100.1 Defined terms not defined in the *conditions of contract* have the meaning given in section S0075.

S100.2 Unless otherwise stated, all sections in the Scope, either

- specify and describe the requirements of the *Contractor* to Provide the Works or
- state any constraints on the *Contractor* to Provide the Works.

All submissions required by the Scope are subject to the Acceptance Procedure contained in the Scope.

S100.3 In addition to any other reasons stated in the Scope (if any), a reason for non-acceptance by the *Project Manager* of a *Contractor's* submission is that it does not comply with the Scope.

S100.4 Where something is stated to be subject to the agreement of the *Project Manager* and the *Contractor* and an agreement cannot be reached, the *Contractor* complies with the *Project Manager's* instruction.

S100.5 Where there is a requirement in the Scope and it is not expressly stated to be fulfilled by either party, the *Contractor* fulfils the requirement.

S100.6 Any reference in the Scope to major projects includes the Project.

General

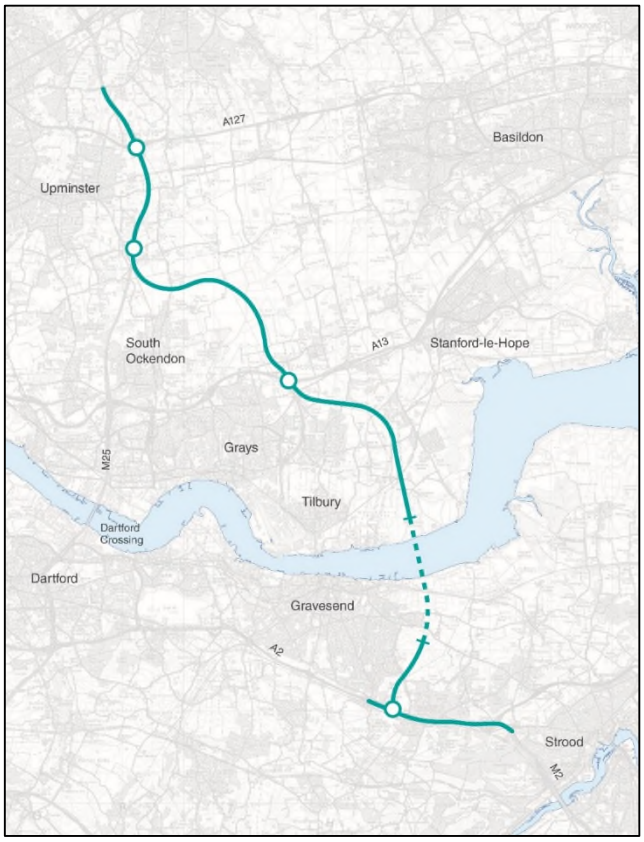
S100.7 The *Client* is an executive non-departmental public body, sponsored by the Department for Transport.

S100.8 The *Client* is the company appointed by the Secretary of State under the Infrastructure Act 2015 as Highway Authority for the majority of England's trunk roads. This includes constructing, modernising and maintaining highways. The *Client* also manages and helps prevent incidents on England's trunk roads through its traffic officer service.

S100.9 The *Client's* network is around 4,300 miles long and is made up of motorways and all-purpose trunk roads.

S100.10 The Project provides a connection between the A2 and M2 in Kent, east of Gravesend, crossing under the River Thames through two bored tunnels, before joining the M25 south of junction 29. The Project is presented in Figure 1.

Figure 1 - LTC Route



S100.11 The Project is approximately 23km long, 4.25km of which is in tunnels. On the south side of the River Thames, the LTC Route links the tunnels to the A2 and M2. On the north side, it links to the A13 and junction 29 of the M25. The tunnel portals are located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.

S100.12 Junctions, which form part of the Project, are proposed at the following locations

- new junction with the A2 to the south-east of Gravesend,
- modified junction with the A13/A1089 in Thurrock and
- new junction with the M25 between junctions 29 and 30.

S100.13 Much of the Project is an all-purpose trunk road, using technology for lane control and variable speed limits. The southbound carriageway from the M25 to the A13/A1089 junction is two lanes. The Project has hard strips for most of its length with hard shoulders along modified sections of the M25 and the A2. The Project has vehicle restrictions along the full length, emergency areas and technology providing lane control and variable speed limits.

S100.14 The *works* include the part of the Project that crosses beneath the River Thames which consists of two of the longest road tunnels in the United Kingdom, comprising of a twin-bore tunnel approximately 4.25 km in length. These tunnels each accommodate three lanes of traffic. The tunnels' portals form part of the *works* with

- the southern portal located to the east of the village of Chalk and South East of Gravesend and north of Thong Lane bridge over the new A122, in the county of Kent and
- a northern portal to the tunnels, that is located to the west of East Tilbury to Station Road, in the county of Essex.

Cross Passages (CP) connect each tunnel and provide emergency evacuation, as well as access for maintenance works.

S100.15 The *works* include approach roads leading to and from the North Portal and South Portal as outlined in the phase 1 contract boundary, interface drawings HE540039-CJV-GCL-S3P_ZZZZZZZZZZ-DR-CW-00062 and HE540039-CJV-GCL-S3P_ZZZZZZZZZZ-DR-CW-00063 (see links in Annex A).

S100.16 The *Contractor* develops a tunnel operational solution which ensures high Availability of the asset, minimises risk to maintenance workers, minimises the requirements for confined space entry during the operation and maintenance of the highway and does not impact the operation of the Project. The completed works allow safe access to the systems (services and controls) whilst the tunnel is open to public traffic.

S100.17 The *Contractor* designs, constructs, installs, tests and commissions the following in compliance with the DCO, except where otherwise stated, including

- both bored tunnels underneath the River Thames,
- permanent headwall and portal Structures,
- tunnel service buildings and all associated systems,
- provision of a total 10.3MVA with dual supplies,
- emergency areas,
- the tunnels and approaches and all associated highways works,
- the mechanical, electrical, instrumentation, control and automation (MEICA) design, installation, testing and commissioning associated with the works as well as the integration of the MEICA with works provided by Others,
- infrastructure for Road User Charging as per section S300,
- all associated drainage, drainage retention ponds, Structures, signage and flood compensation,
- diverting and protecting all assets owned or operated by Others impacted by the works, including utilities, unless stated otherwise in section S900,
- environment master plan,
- architectural features,
- landscape aftercare for the period stated in the Contract Data and
- the interface works described in section S900.

S100.18 The *Contractor* designs, supplies, installs, tests and commissions the MEICA systems. Illustratively this includes, except where otherwise stated

- monitoring and control systems,
- power supplies and local distribution network including resilient power supplies,
- ventilation and air quality monitoring system,
- firefighting system,
- lighting and emergency lighting,
- closed circuit television,
- automatic incident detection,
- traffic control systems including signs, signals and barriers,

- evacuation systems,
- communication systems,
- pumped drainage,
- weather monitoring systems and
- associated infrastructure including gantries, mountings and cabinets.

S100.19 The *Contractor* also develops its proposals in full compliance with the obligations relating to

- secondary consents as described in section S900,
- third-party agreements as described in section S900,
- carbon performance as described in section S200 and
- providing a high Availability asset as described in section S2900.

S100.20 The *Contractor* complies with and further develops the Minimum Operating Requirements (MORs) provided in section S2900. The MORs are closely linked to the NPC safety and the Availability target and define how the tunnels can safely operate during degraded levels of system Availability and where complete bore closures are required. Where the MORs have an impact outside of the *boundaries* of the site, the *Contractor* integrates its systems designs with the other relevant LTC Contractors to ensure the MORs can be achieved.

S100.21 The *Contractor* provides site roads, site cabins, welfare as described in section S1100, offices, stores and associated temporary Structures connected to the services in a phased manner to enable the *works* to progress.

S105 Contract Objectives

S105.1 The *Client* has developed the vision and guiding principles for the Project as described in the LTC Execution Strategy (see link in Annex A). Successful delivery of these ambitions will provide wider benefits and a lasting positive legacy on a regional and local level.

In Providing the Works, the C*ontractor* supports the realisation of the vision and guiding principles.

Safety for all

S105.2 In Providing the Works the *Contractor*

- leads health, safety and welfare provision during the *works*,
- maintains safety standards for road users and
- embeds a culture of support and respect for its Staff.

Putting our Customers first

S105.3 In Providing the Works the *Contractor*

- provides accurate and timely traffic information and minimises impact for road users and
- optimises stakeholder and customer relationships.

Delivering on time and to budget

S105.4 In Providing the Works the *Contractor*

- delivers to the Key Dates and Completion Dates,
- identifies and proposes innovation opportunities and value for money solutions,
- procures, manages and integrates its subcontractors (at any stage of remoteness from the *Client*),
- focuses on digital delivery and uses the best technological solutions that are available during design and construction and
- ensures fully integrated delivery of the *works* with the work of Others.

Being a good neighbour

S105.5 In Providing the Works the *Contractor*

- works with the *Project Manager*, community groups, stakeholders and others to support community initiatives and minimise the impact from the *works,*
- provides opportunities for skills development, employment and education programmes and
- minimises impacts on walkers, cyclists and horse-riders and promotes active travel by providing alternative routes if existing routes are closed which are better quality or part of a more coherent network.

Protecting the environment and driving down carbon

S105.6 In Providing the Works the *Contractor*

- minimises the impact on the environment and complies with
  - the Consents (including discharging any conditions of such Consents),
  - the environmental mitigation requirements,
  - the Register of Environmental Activities and commitments (REAC) and
  - the Code of Construction Practice,
- manages and minimises carbon and other emissions as set out in section S200 and
- identifies opportunities for improving the Project's biodiversity legacy.

Supporting and enabling economies to thrive

S105.7 The Project Manager provides a LTC social value strategy on the starting date. The Contractor aligns with the guiding principles in the LTC social value strategy and submits its proposals for a method of measurement of social value outcomes to the Project Manager for acceptance within 60 weeks of the starting date.

A reason for not accepting the proposals for a measurement of social value outcomes is that

- it does not align with the guiding principles of the strategy,
- it does not demonstrate how social value outcomes are measured or
- it does not provide the *Project Manager* with sufficient details as to how the guiding principles are to be delivered by the *Contractor*.

In Providing the Works, the *Contractor*

- supports economic development opportunities in the Project's local community,
- improves opportunities for the Project's local business through engagement and business forums and
- submits its proposals for a method of measurement of social value outcomes considering any LTC social value strategy to the *Project Manager* for acceptance.

Project Requirements

S105.8 In Providing the Works the *Contractor* complies with the following Project Requirements

- the *Contractor* delivers the design and construction and complies with the constraints and commitments stated in the Development Consent Order,
- the *works*

enable the required performance, reliability, availability, maintainability and safety in operation as defined in the Minimum Operating Requirements and Reliability, Availability, Maintainability, and Safety (RAMS) specifications to be achieved,

achieve Availability as set out in this section S105,

are in compliance with Highways England's Air Quality Strategy ("Our strategy to improve air quality" - 2017) (see link in Annex A) and have no adverse impact on the UK's ability to comply with Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (see link in Annex A),

comply with the five outcomes identified in Highways England's Biodiversity Plan ("Our plan to protect and increase biodiversity" - June 2015) and supports the progressive move to biodiversity net gain where practicable (see link in Annex A),

- except where the *works* interface with the existing strategic heavy load route ref HR93 (M25-A13-A1089-Port of Tilbury) the Project is not designed as a high load route or heavy load route,
- the *Contractor* ensures
    - the *works* aim to achieve and
    - in Providing the Works, it aims to achieve

  the lowest carbon practicable,
- the *Contractor* does not purchase (and ensures that subcontractors (at any stage of remoteness from the *Client*) do not purchase) Carbon Credits or equivalent, including to achieve the lowest carbon practicable,
- the *Contractor* ensures that the design of the twin bore tunnel and the tunnel approach Structures to the north and south are to Category A tunnel standard with no dangerous goods vehicle restrictions,
- the *Contractor's* design provides emergency access and vehicle turn-around facilities at the tunnel portals and
- the *Contractor's* design enables the *Client* to successfully apply to the Government Security Policy Framework (see link in Annex A) in relation to all aspects of protective security required for critical national infrastructure.

Safety

S105.9 In line with the road-user safety objectives and safety baseline defined in the Stage 3 Safety Plan (see link in Annex A) the *Contractor*, through the Combined Safety and Hazard Log Report (also known as the Safety Report) together with an assessment of impacts of the contributory factors to incidents, demonstrates and provides evidence against the following

- a minimum of 26% reduction from the safety baseline of Fatal Weighted Injuries (FWI) per billion vehicle miles for the Project,
- a minimum of 29% reduction from safety baseline of FWI per billion vehicle miles for the A2 and A13 within the limits of the *works,*
- a minimum three-star rating between the M2 and M25 using the iRAP (International Road Assessment Programme) methodology and
- compliance with the DCO.

The *Contractor* considers all parties (including those identified in Table 1.3 of GG 104) and provides details that enable the achievability of the safety objective to be determined.

The *Contractor* submits the Combined Safety and Hazard Log for acceptance in accordance with the Acceptance Procedure to the *Project Manager*, accompanied by the Multiparty Collaboration Certificate and submitted four weeks prior to the relevant Stage Gate Assessment Review (SGAR) or interim SGAR.

S105.10 A reason for not accepting the Combined Safety and Hazard Log Report and the associated assessments is that

- it does not comply with the Scope or
- it does not contain the same level of detail or constancy with the assessment provided in the Stage 3 Safety Plan.

Availability

S105.11 The target for the *works* (including its maintenance in accordance with the maintenance schedules) is to achieve Availability for

- Peak Periods, of at least 99.95% and
- Off Peak Periods, of at least 96.07%

following Completion of *section* 2.

S105.12 The *Contractor* provides the landscaping aftercare to achieve actual Availability

- for Peak Periods, of at least 99.95% and
- Off Peak Periods, of at least 96.07%

following Completion of *section* 2. The Availability assessment includes any maintenance undertaken by the *Client*.

S105.13 Within

- 44 weeks of the *starting date*, the *Contractor* assesses the Availability of the completed *works* (including its maintenance) and
- 130 weeks of the *starting date*, the *Contractor* assesses the Availability of the completed *works* (including its maintenance) and

achieves the Peak Periods and Off Peak Periods Availability target and prepares an initial report demonstrating how the design, specification and construction and scheduled maintenance of the *works* achieves the Availability

- over each annual period (commencing upon the Completion of *section* 2) and
- sub-divided into quarterly periods

for the duration covered by the *Contractor's* whole life cost model (see section S370)and submits it to the *Project Manager* for acceptance in accordance with the submission procedure.

The *Contractor* updates the report as design submissions are accepted and the construction works are completed and submits it to the *Project Manager* for acceptance in accordance with the Acceptance Procedure.

If the *Contractor's* assessment does not demonstrate the completed works (including its maintenance in accordance with, where accepted, the accepted maintenance schedules) achieve such Availability requirements, the *Contractor*

- corrects the *works* and
- updates its Availability assessment and the report to demonstrate the corrected *works* achieve such Availability requirements

(until such time as an assessment and its accepted report demonstrates that such Availability requirements are achieved).

A reason for not accepting the report or any update to the report is

- it does not demonstrate how the design, specification and construction and scheduled maintenance of the *works* achieves the Availability,
- it does not provide sufficient detail to enable the *Project Manager* to understand how the design, specification construction and scheduled maintenance of the *works* achieves the Availability or
- the periods for maintenance (including planned or unplanned) are not realistic for the design, specification and construction and maintenance of the *works*.

S105.14 In designing, specifying, constructing and scheduling maintenance of the *works*, the *Contractor* prepares two maintenance schedules

- one based upon full closure of the relevant tunnel bore (or similar Structure) or tunnel (or similar Structure) bores ("maintenance schedule 1") and
- one based upon adjacent two lane closures (i.e. lanes 1 and 2 or lanes 2 and 3) within each tunnel bore (or similar Structure) ("maintenance schedule 2").

and ensures the Availability requirements set out in paragraph S105.11 are met and demonstrates both schedules meet the targets for Availability, prior to commencement of the construction phase.

The *Contractor* ensures the design of the works enables the *Client* to close

- any one lane,
- any two lanes or
- three lanes

of the relevant tunnel bore (or similar Structure) to enable scheduled maintenance and unscheduled maintenance to be undertaken.

S105.15 The requirements for Availability do not include closures that result from incidents caused by a road user, unless the Project Road's condition caused or contributed to the incident.

S105.16 For Peak Periods, the *Contractor* ensures the actual Availability of the *works* (including its maintenance in accordance with the maintenance schedules) achieves at least 99.95% for a period of four years commencing upon Completion of *section* 3.

For Off Peak Periods, the *Contractor* ensures the actual Availability of the *works* (including its maintenance in accordance with the maintenance schedules) achieves at least 96.07% over each annual period commencing upon Completion of *section* 3 for a four-year period.

S105.16A Within 14 days following each anniversary of the Completion of *section* 3, the Project Manager provides the Contractor with a report of the Availability achieved for the 12 months preceding the relevant anniversary, detailing the actual Availability achieved and actual non Availability of the *works* (or part thereof)

- by each *defects state* and MOR State,
- for scheduled maintenance undertaken and
- other works (such as future improvement schemes) undertaken by the *Client*.

The *Project Manager* includes the schedule of planned closures of the Tunnel bores (or where appropriate lane closures) for the next 18 months (commencing on the relevant anniversary of the Completion of *section* 3) using the accepted "maintenance schedule 1" or "maintenance schedule 2" if the *Client* has adopted "maintenance schedule 2".

The *Contractor* provides a detailed report

- identifying each Defect that has impacted Availability of the *works* (and its impact upon the Availability of the works detailing the reduction percentage on the Peak Period and the Off Peak Period) and those Defects that have not caused an impact upon Availability of the *works*,
- identifying those Defects that have had permanent correction only in the current annual reporting period, how such Defects have been permanently corrected,
- identifying those Defects that have had temporary correction only, how such Defects have been temporarily corrected along with the proposed permanent correction, its timeline for implementation and the forecast impact upon future Availability,
- identifying those Defects that have had temporary correction in a previous annual reporting period and a subsequent permanent correction in the current annual

reporting period, how such Defects have been permanently corrected, its timeline for implementation and the forecast impact upon future Availability of the *works*,

- identifying those Defects that have had both a temporary correction and a subsequent permanent correction in the current annual reporting period, how such Defects have been temporarily and permanently corrected,
- the trend analysis of Defects occurring identifying any repeating or similar re-occurring Defects and making proposals to address such repeating or similar re-occurring Defects to prevent such repeating or similar re-occurring Defects re-occurring/repeating in the future,
- recommendations for updating “maintenance schedule 1” and “maintenance schedule 2” and the operation and maintenance manuals based upon lessons learn from Defect identification and correction and
- the *Contractor’s* assessment of compliance with and achievement of the four years Availability targets and objective for both Peak Periods and Off Peak Period (including forecast time allowances for corrective actions to correct outstanding Defects (including outstanding permanent correction to Defects) and to undertake future planned maintenance in accordance with the accepted “maintenance schedule 1” or “maintenance schedule 2” if the *Client* has adopted “maintenance schedule 2” (and as advised by the *Project Manager*)

Within 14 days of receiving the Availability achieved report from the *Project Manager*, the *Contractor* submits its detailed report for acceptance by the *Project Manager* in accordance with the Acceptance Procedure.

A reason for not accepting the report is

- it does not comply with the Scope,
- one of the reasons in paragraph S721.5,
- it does not identify trends, repeating or similar re-occurring Defects correctly,
- it does not include suitable time allowances for Defect correction or
- it does not use “maintenance schedule 1” (unless otherwise advised by the *Project Manager* to use “maintenance schedule 2”) and the accepted operation and maintenance manuals to undertake future planned maintenance.

S105.16B Once the report is accepted by the *Project Manager*, the *Contractor* updates

- the operation and maintenance manuals (complying with section 700 and other relevant parts of the Scope) and
- “maintenance schedule 1” and “maintenance schedule 2”

and submits the updated the operation and maintenance manuals, “maintenance schedule 1” and “maintenance schedule 2”to the *Project Manager* for acceptance in accordance with the Acceptance Procedure. Reasons for not accepting the updated operation and maintenance manuals are included in paragraph S721.

S105.16C If one or more lanes are not available due to a *defect state 1* or *defect state 2* and correction of the Defect continues across both Peak Period and Off Peak Period, then the reason for the non Availability is attached to the *defect state 1* or *defect state 2* even if the *Contractor* uses such closure to correct other Defects.

If the *Client* or its other contractors uses such a closure to reschedule and undertake scheduled maintenance in accordance with the accepted “maintenance schedule 1” or “maintenance schedule 2” if the *Client* has adopted “maintenance schedule 2” (and as advised by the *Project Manager*), then such rescheduled scheduled maintenance does not affect the attribution of non-Availability to the relevant *defect state 1* or *defect state 2*.

S105.17 Subject to the *works'* resilience requirements in the Scope, the actual Availability following Completion of *section* 2 does not include incidents caused solely by

- loss of utility supply to the *works* (including such works at the *Client's* South East Regional Operating Control (SEROC)) due to failures by Others,
- loss of NRTS equipment's operational capacity to support the works,
- defects in the completed *works* due to the *Client's* failure to comply with the accepted maintenance schedules post Completion of *section* 1 or
- loss of the *Client's* SEROC operational capability but excluding the tunnel management system (see section S2900) and associated elements of the works at the SEROC

unless the Project Road's condition caused or contributed to such loss.

S106 Utilities

S106.1 Without prejudice to other sections of the Scope, the *Contractor*

- undertakes the contestable Utility Works,
- manages and coordinates with relevant Statutory Undertakers and uses best endeavours to ensure delivery of the non-contestable Utility Works by the Statutory Undertakers,
- undertakes all supporting activities to enable the Statutory Undertakers to deliver the non-contestable Utility Works unless the *Contractor* agrees with the *Project Manager* and the relevant Statutory Undertaker that the Statutory Undertaker carries out such activities,
- manages and coordinates with the relevant Statutory Undertakers and uses its best endeavours to ensure the Statutory Undertaker complies with the DCO and
- undertakes all necessary actions to discharge the associated requirements of the DCO related to the Utility Works.

Details of contestable and non-contestable elements of the Utility Works are identified within numbered appendix 1/16. This includes utility designs that have been developed with the relevant Statutory Undertakers and telecommunications network owners and operators including by other *Client's* contractors.

S107 Road User Charging

S107.1 The *Contractor* supports the implementation of Road User Charging (RUC) by interfacing with the RUC Contractor and providing enabling infrastructure, further requirements are provided in section S900.

S200 General constraints on how the *Contractor* Provides the Works

S205 General Constraints

S205.1 The *Contractor* ensures

- the *works* comply and
- in Providing the Works, it complies

with the Development Consent Order (DCO).

S205.1A The Contractor ensures that its design of the works when the works are operating does not put the Client in breach of the DCO.

S205.2 Where a change to the DCO is required, the *Contractor*, when requested by the *Project Manager*

- provides any further analysis, information and materials and
- attends such meetings, including consultations

required to support the *Client* in seeking any agreements. The *Contractor* prepares, at the *Project Manager's* request, any materials required to enable the *Client* to seek the necessary DCO agreements.

S205.3 Subject to paragraph S205.3A, if in Providing the Works either the *Project Manager* or the *Contractor* become aware of an ambiguity or inconsistency in or between the DCO and the Scope

- it notifies the other as soon as either becomes aware and
- issues an early warning notification.

S205.3A Proposals do not give rise to any

- materially new or materially different environmental effects in comparison with those reported in the Environmental Statement,
- additional land take over that permitted in the compulsory purchase order for the Project,
- in the sole opinion of the *Client*, significant impacts on business and residents,
- not adversely impacting the *Client's* habitats regulations assessment for the Project,
- construction activities for the tunnels (between the northern portals and southern portals), including spoil and arisings extraction, being undertaken from the southern portals,
- access for the tunnels' construction activities being from the southern portal (except the *Contractor* is permitted to egress the southern portal of the first constructed main bore to ingress the second bore from the southern portal during the second main bore drive for essential construction activities until such a time as ingress from the northern portal is possible).

If the *Contractor* makes a proposal that is listed in the *non-material schedule*, but the *Project Manager* informs the *Contractor* that the *Client*

- does not wish to progress with such proposals or
- does not secure an amendment or revision to the DCO

then the *Project Manager*

- notifies the Contractor as soon it becomes aware and
- issues an early warning notification.

S205.3B Proposals demonstrate and justify that the works and Providing the Works are in compliance with paragraph S205.3A.

S205.3C When requested by the *Project Manager*, the *Contractor*

- provides any further analysis, information and materials and
- attends such meetings, including consultations

required to support the *Client* in seeking any agreements for such proposals including those that relate items on the *non-material schedule*.

S205.4 Within one week of the notification given under paragraph S205.3 or S205.3A unless agreed otherwise with the *Project Manager*

- the *Contractor* submits proposals, to change the Scope and the Quality Statement to resolve the ambiguity or inconsistency, to the *Project Manager* for agreement and
- the *Project Manager* and the *Contractor* meet to discuss the proposal.

S205.5 The *Contractor* revises the proposal within one week (or any longer period stated by the *Project Manager*) of the early warning meeting to reflect agreement or the *Project Manager*'s direction and submits it to the *Project Manager* for agreement.

S205.6 If the *Project Manager* agrees with the proposal, the *Project Manager* gives an instruction changing the Scope. If the *Project Manager* does not agree with the proposal, the *Project Manager* gives an instruction changing the Scope in accordance with its direction.

S205.7 Where in the Scope an agreement is required from the *Project Manager* or Others, if the *Contractor* and the *Project Manager* (or Others where relevant) do not reach an agreement within the *period for reply*, the *Contractor* complies with any direction of the *Project Manager*.

S205.8 The *Contractor* obtains all Consents necessary to Provide the Works unless otherwise stated that either the *Client* or *Project Manager* is to obtain these.

S205.9 The *Contractor* produces all deliverables required by the DCO and submits these for acceptance by the *Project Manager* in accordance with the Acceptance Procedure prior to commencement of the relevant construction activity, unless otherwise agreed with the *Project Manager.*

North Portal Site

Use of the Site

S205.10 The *Contractor* uses the Site solely to Provide the Works including

- preparation of all Working Areas, including surveys, erection of hoarding and fencing, provision of temporary power, general and task lighting,
- early works, including utility diversions and permanent or temporary relocation of existing assets,
- temporary works and falsework,
- all building, civil engineering, flood protection, mechanical, electrical, instrumentation, control and automation (MEICA) and integration,

- planning, managing and co-ordinating these activities and any other site activity required to complete the works in a safe and timely manner to the acceptance of the *Project Manager* and Others as required by the contract and
- complying with the DCO's outline traffic management plan for construction when developing its temporary traffic management plans.

The *Contractor* does not prevent or limit access through the Site to the other LTC Contractors.

Interfaces between the works and existing things

S205.11 The *Contractor* assesses the impact and monitors the effect of the *works* and Providing the Works on existing buildings or highway structures, infrastructure and utilities.

S205.12 For listed buildings and highway structures, the *Contractor* agrees an appropriate approach for assessment with Historic England. The *Contractor* submits this approach to the *Project Manager,* for acceptance, in accordance with the Acceptance Procedure, prior to commencement of the relevant construction activity. A reason for non-acceptance is that there is no agreement from Historic England if required.

As part of any assessment, the *Contractor* determines and considers the existing condition of buildings. The *Contractor* establishes monitoring systems to measure the impacts on the buildings or highway structures and ensures that the actual movements do not exceed the agreed movement criteria.

For non-listed buildings, the *Contractor* submits an appropriate approach for assessment to the *Project Manager* for acceptance*,* in accordance with the Acceptance Procedure, prior to commencement of the relevant construction activity. As part of any assessment, the *Contractor* determines and considers the existing condition of buildings. The *Contractor* establishes monitoring systems to measure the impacts on the buildings and ensures that the actual movements do not exceed any movement criteria agreed with third party asset owners.

S205.13 The *Project Manager* provides to the *Contractor*, within four weeks of the *starting date*, instrumentation and monitoring data produced by Others. The *Contractor* reviews this data and, where required, adopts and uses it to support the *Contractor's* design.

S205.14 For the assessment of other structures, utilities, infrastructure and land ground movement, the *Contractor* assesses the impact of ground movement and monitoring for these structures and agrees the outcome and any mitigation and monitoring required with the relevant owner.

S205.15 For any disconnected or redundant third party assets, the *Contractor*

- complies with a *third party agreement* if it exists or
- agrees with the relevant asset owner how the asset is to be removed or sealed off and backfilled.

Unless stated otherwise in any *third party agreement*, the title of such assets remains with the relevant asset owner unless agreed otherwise by the asset owner.

River Defence

S205.16 The *Contractor* Provides the Works whilst not impacting the river flood defences and the local flood defences. The *Contractor* carries out a pre-condition survey before and a post-condition survey as described in section S245.

Outfall

S205.17 The *Contractor* designs and constructs an outfall system, taking into consideration peak volumes of flow produced from the following sources

- construction process water,
- surface water run-off,
- dewatering water and
- any other activities the Contractor uses that discharge water in Providing the Works.

S205.18 The *Contractor* obtains all Consents required and complies with the relevant testing regimes that are required to meet the Consents.

Temporary and permanent flood protection

S205.19 The *Contractor* manages the risk of water ingress and provides flood protection as required in order to mitigate the risk.

Marine assets

S205.20 The *Contractor* notes the presence of groynes and other marine infrastructure within the foreshore on the north bank of the River Thames and plans the *works* around these in order to minimise impact on such assets.

Bowater sluices and Star Dam

S205.21 The local ditch and small river network are tidally locked and controlled by the Bowater Sluice. The *Contractor* allows the EA inspection and maintenance access to Bowater Sluice, the Star Dam and associated infrastructure at all times.

DHL (East Tilbury Marshes)

S205.22 The North Portal Site is located in an area of historical and current landfill which includes a former hazardous liquid disposal site called East Tilbury Marshes situated approx. 250-300 metres to the east of the North Portal Site location. Leachate from the originally disposed hazardous liquid is likely to have penetrated below ground and into the groundwater regime within the *boundaries of the site* as well as land immediately adjacent to the Site. The *Contractor* carries out an extensive contaminated land assessment prior to commencing any other work on the Site, to satisfy itself of any clean up or remedial measures required to minimise the risk associated with the leachate in the area. This includes addressing any of the EA's comments on the proposed remedial measures, enabling the *Contractor* to obtain necessary agreement from the EA.

S205.23 The *Contractor* submits its proposal for these remedial measures to the *Project Manager* for acceptance 130 weeks after *starting date* which includes a permanent solution that does not impact the operation of the expressway.

A reason for not accepting the *Contractor's* proposal is that the remedial measures are not acceptable to the EA.

S205.24 The 'light-vehicle access road' in this area is solely for emergencies, ecological translocation and infrequent use, not construction use. The *Contractor* assesses the surcharge limits. This includes addressing any of the EA's comments on the proposed remedial measures, enabling the Contractor to obtain necessary agreement from the EA. See drawing HE540039-CJV-GCLS3P_ZZZZZZZZZZ-DR-CW-00001 (see link in Annex A).

Previous use

S205.25 A large area of the North Portal Site has been used for pulverised fuel ash (PFA) extraction by Ingrebourne Valley Ltd (IVL), with another area used for the importing of excavated material

including from the Thames Tideway and Silvertown projects. The imported materials from the Thames Tideway and Silvertown projects are of poor quality.

Access to Site (North of the River Thames)

General

S205.26 The *Contractor's* 'traffic management plan' details the liaison required with the Roads North of the Thames Contractor and Others. The *Contractor* plans the works to minimise its impact to the SRN and local road network, the surrounding area and the operations of local businesses. The *Contractor* agrees and implements an 'operational management plan' for shared access with the Roads North of the Thames Contractor and Others, utilising the interface matrix described in section S926.

S205.27 There is no permanent access from the A13 to the Site. Temporary access may be provided and the *Contractor* minimises the amount of time for temporary access from the A13.

The *Contractor* ensures heavy good vehicles (HGVs) use Substation Road as the primary means of access to the Site around the North Portal of the Tunnels contract and the viaduct over the Tilbury Loop Railway unless alternative site haulage roads are available. The *Contractor* ensures HGVs avoid using Station Road wherever possible. The use of Substation Road has been agreed between the *Client* and the Port of Tilbury London Limited. Substation Road is a highway and is subject to all road traffic regulations applicable to such a classification. The illustrative traffic numbers using this access route are constrained in accordance with Table **Error! Reference source not found.**.

Table 2 - Illustrative traffic movement constraints

Tax Year (Apr-Mar)	Estimated HGV moves p/a (or pro-rata for part of a year)
Year 1	31,544
Year 2	63,088
Year 3	63,088
Year 4	63,088
Year 5	14,195
Year 6	14,195
Year 7	14,195
	Total: 263,390

S205.28 The *Contractor* provides access to the Roads North of the Thames Contractor via a temporary Haul Road from the west through the RWE site and the PoT existing and new sites, for the purpose of spoil movement. The Roads North of the Thames Contractor complies with the *Contractor's* site procedures when accessing the Site through the *Contractor's* site.

S205.29 The *Contractor* works together with the Roads North of the Thames Contractor to satisfy the constraints of the interface matrix (see section S926) and the *third party agreement* between the *Client* and Port of Tilbury with regard to traffic movement constraints.

S205.30 For the purposes of the table above, a single-vehicle movement is defined as every time a HGV accesses and then egresses the Site via the PoT access route.

S205.31 The *Contractor* extends the existing road at the boundary of PoT's site to the north-east of the North Portal Site, as per drawing HE540039-CJV-GCL-S3P_ZZZZZZZZZZ-DR-CW-00001 (see link in Annex A). The *Contractor* designs the route of this road for temporary purposes for Site access to Provide the Works and ensures a through connection to Station Road and the Roads North of the Thames Contract site. The *Contractor* considers the following when designing and constructing this road

- poor ground conditions,
- high-frequency HGV movements,
- abnormal indivisible loads (AILs) including Tunnel Boring Machine (TBM) elements for on-site assembly,
- the varying topography and
- the design criteria of the Roads North of the Thames Contractor, who is permitted use of this road at all times, including for spoil movement.

S205.32 Once completed, the *Contractor* provides access to this road for Ingrebourne Valley Ltd. (IVL) and other LTC Contractors, unless otherwise agreed with the *Project Manager*.

S205.33 During the design of this road, the *Contractor* agrees the provision of the following items and locations with IVL

- wheel washing,
- security,
- access arrangements and
- weighbridge

(unless otherwise agreed with the *Project Manager*).

S205.34 The *Contractor* uses Substation Road as the access for the delivery of the TBM and other abnormal or exceptional HGV and construction deliveries. Prior to starting work on-site, the *Contractor* surveys the whole route to verify the swept-path analysis suitability for all planned deliveries. The *Client* has provided an initial survey of the constraints along the Substation Road route in the Site Information.

S205.35 In addition to the limitations and responsibilities described in this Scope, limitations on traffic movements and the *Contractor's* responsibilities with regards traffic movements are further described in the REAC. The *Contractor* notes access via the stated routes is subject to various physical constraints, including

- horizontal and vertical geometric constraints,
- PoT and RWE security arrangements,
- weight limits,
- speed limits and
- swept-path limitation due to existing road layout.

S205.36 Substation Road crosses the Port of Tilbury facilities and the *Contractor*, its subcontractors (at any stage of remoteness from the *Client*) and Staff, may be subject to random checks on entry or departure by the Port of Tilbury London Police. The *Contractor* complies and procures Staff and subcontractors (at any stage of remoteness from the *Client*) comply with all instructions issued by the Port of Tilbury London Police. The Port of Tilbury implements a tiered security (which includes fire and other emergencies) and terrorist threat alert system. The *Contractor* notes that the tiered

security and terrorist threat alert system may result in an increased level of control up to and including closure of through access to and from the Site. A short or long-term increase in security or terrorist threat may result in increased entry or exit vehicle and personnel checks, which may include testing for concealed packages or bombs and swabbing any part of the vehicle for traces of explosive contaminants. Further constraints regarding access to the Site via the Port of Tilbury are provided by the *Client* in section S900.

Tilbury Loop Railway Line

S205.37 The *Contractor* does not use the user authorised crossings across the Tilbury Loop railway line or Station Road for access or egress when Providing the Works. The *Contractor* liaises with Network Rail and complies with any access restrictions that are imposed by them.

S205.38 The *Contractor* notes the permitted access route via Substation Road through the Port of Tilbury lands is subject to queuing whilst railhead deliveries arrive and leave.

Access for Roads North of the Thames Contractor to Site South of Tilbury Loop Railway

S205.39 The *Contractor* liaises with the Roads North of the Thames Contractor to allow the Roads North of the Thames Contractor's HGV loads to access the Site via Fort Road, Substation Road and travel through the Site as described in section S926.

S205.40 For traffic movement across Substation Road, the *Contractor* shares information obtained from its DMS with the Port of Tilbury.

S205.41 The *Contractor* agrees the frequency for which information is shared with Port of Tilbury within four weeks of the *starting date*.

S205.42 The information to be shared with the Port of Tilbury includes

- the registration numbers and vehicle types,
- the names of the drivers and passengers associated with each vehicle,
- confirmation that each driver has been briefed about Port of Tilbury access, security and operational procedures and
- its forecasted traffic movements that use Substation Road.

Temporary Logistics Bridge

S205.43 The *Client* is aware of proposals for a new overbridge (tilbury overbridge) over the railway to the east of the LTC Tilbury Viaduct. This is not part of the Project but may be available to the *Contractor* during the *works*.

Fort Road

S205.44 The DCO has not made provision for the movement of the TBMs around the Fort Road railway bridge. If the *Contractor* uses Fort Road for TBM movement, the *Contractor* models the TBM abnormal load movements and secures required approvals from the relevant Local Authorities and Highway Authorities to enable the bridge to be bypassed.

Light Good Vehicles (LGV) and Personnel

Station Road

S205.45 Station Road is a two-lane, single carriageway (with single track and passing places in parts) minor road that crosses the Tilbury Loop Railway Line via a level crossing, so the *Contractor* plans its traffic movements to minimise the use of this road.

S205.46 The *Contractor* notes that the site area designated as Compound 5 as per drawing HE540039-CJV-GCLS3P_ZZZZZZZZZZ-DR-CW-00059 provided in section (see link in Annex A) is situated on both sides of Station Road. The *Contractor* installs and operates a safe system of operation to cross Station Road that works in conjunction with and does not hinder the level-crossing. The *Contractor* consults with the Railway Authority and the Local Highway Authority. The *Contractor* designs and constructs the bell-mouth to facilitate safe access and egress from Station Road into Compound 5 while considering the location of existing services.

S205.47 The *Contractor* liaises with Statera Energy Limited regarding the construction of its pipeline project and the consequential impact to the works and in Providing the Works.

Level Crossing

S205.48 The *Contractor* plans traffic movements considering the location of the level crossing at the intersection of Station Road and Tilbury Loop Railway Line as this contains overhead line equipment (OLE) and other electrical hazards. The *Contractor* considers the frequency of train services and makes all necessary arrangements with the Railway Authority when using this crossing especially due to the anticipated increase in traffic frequency in the surrounding area.

Tilbury Link Road

S205.49 The *Contractor* ensures that its design of the *works* does not prevent the future construction of a link road connecting the Project to Tilbury and Thurrock. The *Contractor's* design of the *works* mitigates the risk of the introduction of the link road causing a reduction to the minimum lane Availability set out in section S105.

South Portal Site

Use of the Site

Phasing

S205.50 The *Contractor* carries out a phased takeover of the South Portal Site noting the non-contestable works being undertaken by Others to the east of the South Portal comprising the National Grid gas main diversion and the National Grid overhead lines diversion.

S205.51 The *Contractor* plans its *works* around the National Grid diversion activities. The *Contractor* only has access to *section* 1A ('Roads South Works gas main diversion area') from the completion of the diversion works as shown on drawing HE540039-CJV-GCLS3P_ZZZZZZZZZZ-DR-CW-00004 (see link in Annex A). The *Contractor* notes other diversions by other utilities as a constraint to its programme.

S205.52 The *Contractor* is required to phase the archaeology works in order to not affect the works of Others.

St Mary's Church Chalk and Thamesview Crematorium

S205.53 The *Contractor* carries out the works noting these sensitive receptors and avoiding any impact on them, paying particular attention to church service times and operational hours at the crematorium. The *Contractor* designs its access from the A226 in full recognition of the sensitivity of these key parts of the community.

South Thames Estuary and Marshes Ramsar

S205.54 The wetland area forming the South Thames Estuary and Marshes Ramsar wetland is located to the north of the South Portal Site. The *Contractor* notes the significance of the regulations around carrying out construction activities adjacent to this site of international importance and particularly notes the legal test contained within the regulations. There is no surface access to the South Thames Estuary and Marshes Ramsar and the *Contractor* ensures that it does not impact the area when Providing the Works, especially ground water levels within the South Thames Estuary and Marshes Ramsar as these create the wetland that attracts migrating birds. The *Contractor* does not enter the Ramsar at ground level.

S205.55 The *Contractor* notes the "South Portal discharge options paper" and "North Portal discharge assumptions paper" provided in Annex A, upon which the Statement of Common Ground with the Environment Agency has been based. The *Contractor* consults with the EA to finalise the design (or any other alternative design) and obtains the necessary Consents in accordance with section S929 and submits its proposals to the *Project Manager* for acceptance.

Access to the Site

Thong Lane

S205.56 The *Contractor's* access to Site avoids Thong Lane and instead comes from the A2/M2, A289 and A226 for all traffic movements. The Contractor designs and constructs temporary access roads within the Site. The temporary access roads are required to withstand heavy construction traffic including abnormal loads.

S205.57 The *Contractor* uses temporary access roads for removing any surplus materials from the Site. The Kent Roads Contractor provides an access road through the Kent Roads site to enable the *Contractor* to access the A2/M2 as described in the 'interface matrix' in section S926. The *Contractor* shares this access with the Kent Roads Contractor and manages this jointly with them, including compliance with the designated routes and protected crossing points over utilities and other sensitive infrastructure. The *Contractor* maintains a continuous dialogue with the Kent Roads Contractor ensuring safe and efficient operation.

Areas CA3a and CA3b

S205.58 The *Contractor* notes the areas north and south of the Ramsar that are within the Order Limits. These areas have been designated as CA3a and CA3b. The local ground conditions dictate that the *Contractor* uses several ground treatment measures required to safely deliver the *works* in these areas. These strengthen specific areas of the ground and control groundwater.

S205.59 To facilitate this ground treatment the *Client* has made provision in the DCO for a 5.8m dia. ground preparation tunnel, located above and in between the northbound and southbound running tunnels. It is envisaged that this construction activity starts from a shaft located south of Lower Higham Road and driven to a shaft located north of the North Kent Railway line.

S205.60 Once the ground treatment works are completed, both the shafts and ground preparation tunnel are backfilled and the ground reinstated to its original condition. The environmental effects of the 5.8m dia. ground preparation tunnel have been noted in the Environmental Statement. The

Contractor notes concept design for this temporary asset is contained within the *Client's* consultation materials.

Deliveries

S205.61 The *Contractor* ensures delivery vehicles are accepted, unloaded and despatched to avoid congestion on adjacent roads. Off-site holding areas are managed to ensure that vehicles do not stand and obstruct the highways.

HGV and Construction traffic

S205.62 In preparing the 'traffic management plan' as outlined in section S240, the *Contractor* considers the sensitive nature of the following local roads when accessing the Site

- Hever Court Rd west of A2 junction with Valley Drive and Valley Drive itself,
- Hook Green, Sole Street, Cobham and Istead Rise,
- the village of Thong,
- Thong Lane,
- Brewers Road beyond Park Pale, The Ridgeway and Woodlands Lane,
- B261,
- A226/Ordnance road junction,
- Castle Lane,
- Chalk Road leading to and from A226,
- Forge Lane or Rochester Road leading to and from A226,
- Church Lane leading to and from A226,
- east of Lower Higham Road and junction of Church Lane and Higham,
- A2/Sovereign Boulevard,
- A226,
- Non-motorised User (NMU) access to CA02 via A2/Sovereign Boulevard,
- works traffic, including staff parking within Shorne Wood Country Park,
- works traffic departing CA03 to depart eastbound along A226 and
- access or egress to Crutches Lane, other than from the A2.

Contaminated land disposal

S205.63 The *Contractor* carries out an extensive contaminated land assessment prior to commencing any work on Site and other Working Areas where necessary, to satisfy itself of any clean-up or remedial measures required working closely with consenting bodies (including the EA). This includes addressing any of the consenting bodies' comments on the proposed remedial measures, enabling the *Contractor* to obtain necessary agreements from the consenting bodies. Within 130 weeks of the *starting date*, the *Contractor* submits its proposal for these controls to the *Project Manager* for comment, including the permanent solution, demonstrating it does not impact on the operation of the Project, including proposals for the handling, storage and disposal of contaminated materials arising from the *works*. The *Contractor* addresses any comments made by the *Project Manager* before approaching the consenting bodies (including the EA). Once the *Contractor* has obtained the necessary agreements from the consenting bodies, it submits the proposals to the *Project Manager* for acceptance.

A reason for non-acceptance is that it does not obtain the necessary agreements.

Interfaces between the *works* and existing things

Railways

S205.64 The *Contractor* notes that bored tunnels pass underneath the North Kent Railway on their approach to the South Portal. The *Contractor* plans and designs safe havens for TBM maintenance or mode change to avoid impact on the railway or other third-party assets in the vicinity.

S205.65 The *Contractor* liaises with Rail Authority (noting the *third party agreements* (see section S928)) and develops a plan to mitigate ground movement in this area. The *Contractor* undertakes intrusive and active mitigations such as ground treatment or other improvement techniques. This includes addressing any of the Rail Authorities' comments on the proposed plans to mitigate ground movement, enabling the *Contractor* to obtain necessary agreements from the Rail Authorities.

Thames and Medway Canal

S205.66 The *Contractor* mitigates any impact on the Thames and Medway Canal if carrying out settlement mitigation works at CA3b. The proximity of the overhead power lines in this area means it is unlikely that the shaft could be relocated further south to accommodate any grout hole drilling so a smaller shaft may be required in the canal location.

Metropolitan Police Service Specialist Training Centre, Gravesend

S205.67 The *Contractor* safely carries out its operations around the location of what is known as the Milton Rifle Range to the north of CA3b. This public order training arena is a complex of realistic street facades including a mocked-up stadium, an underground station complete with a tube carriage and a complex of houses and flats.

S205.68 On the firearms side of the complex is an area housing two 25m firing ranges, a 50m firing range a 50m drive in firing range, a close quarter combat range and a live-fire video range, as well as many other specialist facilities that include an aeroplane fuselage, train carriage and outdoor firing ranges. These training areas are supported with classrooms, reception, accommodation for 302 students, canteen, leisure and fitness facilities.

S205.69 The *Contractor* recognises this facility and ensures liaison and communication is maintained as per the accepted communications and engagement plan as described in section S865.

Farm buildings

S205.70 The *Contractor* performs a condition survey on the farm barns to the north of the South Portal Site on the northbound tunnel, in accordance with section S245.

Leisure centre

S205.71 The *Contractor* Provides the Works without impacting the Cascades Leisure Centre.

TBM route out of the Site

S205.72 The *Contractor* surveys the whole route and develops a swept-path analysis to ensure suitability for TBM removal and the analysis becomes a design constraint for the *Contractor's* temporary access road proposals.

S205.73 The *Contractor* liaises with the other Main Works Contractors and agrees the timing and logistics of TBM movements along with any remedial works that the *Contractor* is responsible for.

S205.74 The *Contractor* undertakes a condition survey of any TBM movement routes in accordance with section S245.

Tunnel Depth on the Southern River Embankment

S205.75 The *Contractor* designs the tunnel linings to accommodate a future increased load due to the river flood defences height being raised to 8.0m AOD. Methods of raising may include

- earth embankment,
- earth embankment with wall upstand,
- earth embankment with sheet pile and
- earth embankment with controlled modulus.

non-material schedule

S205.76 The *Client* and the *Contractor* do not consider that the elements of the Quality Statement listed in the *non-material schedule* give rise to

- any materially new or materially different environmental effects in comparison with those reported in the Environmental Statement,
- additional land take over that permitted in the compulsory purchase order for the Project,
- in the sole opinion of the *Client*, significant impacts on business and residents,
- not adversely impacting the *Client's* habitats regulations assessment for the Project
- construction activities for the tunnels (between the northern portals and southern portals), including spoil and arisings extraction, being undertaken from the southern portals,
- access for the tunnels' construction activities being from the southern portal (except the *Contractor* is permitted to egress the southern portal of the first constructed main bore to ingress the second bore from the southern portal during the second main bore drive for essential construction activities until such a time as ingress from the northern portal is possible).

S206 Energy Efficiency Directive

S206.1 The *Contractor*

- complies with and ensures it does not put the *Client* in breach of the requirements of Procurement Policy Note 07/14 entitled "Implementing Article 6 of the Energy Efficiency Directive" (see link in Annex A) and any related supplementary Procurement Policy Notes in Providing the Works,
- ensures that any new products purchased by it for use partly or wholly in Providing the Works comply with the standard for products in Directive 2012/27/EU of the European Parliament and of the Council (see link in Annex A),
- ensures that any new products purchased by a subcontractor (at any stage of remoteness from the *Client*) for use partly or wholly in the performance of its obligations under its subcontract complies with the standard for products in Directive 2012/27/EU of the European Parliament and of the Council (see link in Annex A),

- ensures that subcontractors (at any stage of remoteness from the *Client*) demonstrate to the *Contractor* how any new products purchased by the subcontractor for use partly or wholly in the performance of its obligations under a subcontract complies with the requirements of PPN 7/14 and
- includes requirements to the same effect in any subcontract (at any stage of remoteness from the *Client*).

S206.2 The *Contractor* demonstrates to the *Project Manager* how any new products purchased by it for use partly or wholly in Providing the Works comply with the requirements of Procurement Policy Note 07/14 “implementing Article 6 of the Energy Efficiency Directive" (see link in Annex A).

S206.3 The *Contractor* demonstrates efficiency in resource use and maximisation of re-use and recycling to support the *Client's* “circular economy” ambition as stated in the *Client's* Sustainable Development Strategy (see link in Annex A), see section S209 for more details.

The Client's Commitments to Energy Efficient Plant

S206.4 The *Client* has included a number of energy efficient initiatives in its baseline carbon emissions model[1], provided in Annex A.

S206.5 Not used.

S206.6 The *Contractor* provides evidence in its design submissions on how it has considered energy efficiency for the following items

- jet fans - to induce longitudinal airflow in tunnels. The *Contractor* also considers combining these with carbon monoxide detection to operate more efficiently and to reduce carbon emissions,
- visibility and air quality sensors - these integrate tunnel sensors into the air quality management system to trigger ventilation systems when high concentrations of pollutant or poor visibility levels are experienced within the tunnels,
- soft start technology, to enable gradual motor speed acceleration. Energy efficiency is improved by limiting the in-rush currents which helps to meet power restrictions and lower peak demand charges which reduces maintenance costs, expanding lifecycle of equipment energy costs and consequently carbon emissions,
- start-stop technology for starter motors and pumps, to improve the efficiency of motors and pumps so that they are automatically switched off when not in use,
- variable frequency drives for heating, ventilation and air conditioning fans, pumps and lifts to provide energy efficient pumping and fans operations in air handling units, through a range of measures such as on-demand operation, advance sleep and wake functions, eco-vector operation and pump blockage detection,
- light-emitting diode (LED) luminaire system to significantly reduce energy consumption. The *Contractor* provides an intelligent lighting control system that provides dynamic dimming of the LEDs, to closely match requirements and further reduce energy consumption and
- active and adaptive lighting at the access zones of the tunnels, to provide close control of the lighting within the tunnels in accordance with the ambient lighting levels.

[1] Note to tenderers: the revised baseline carbon emissions model will be provided during the tender period.

Other Client Energy Efficiency Initiatives

S206.7 The *Contractor* considers the following Enhancements for the works and submits its proposals in accordance with Z108

- higher supply cable voltage distribution system. The *Contractor* installs cabling to ensure that power is transmitted at high voltages to increase efficiency,
- a solar and wind power facility, within the *boundaries of the site* to reduce long-term grid demand. There are a number of areas such as above the North and South Portals, restored Compounds and other orphaned sites that could be used for renewable energy production during the operational phase,
- transparent Structures using light attenuation into the tunnel operational buildings and at the North and South Portals to maximise collection, channelling and scattering sunlight,
- tunnel lining panels that are self-cleaning and as a minimum coated with special very low surface tension coating to make the panels less susceptible to dirt adherence,
- light coloured asphalt on the carriageways to allow the number of lights in the tunnel to be reduced in accordance with the Design Manual for Roads and Bridges (DMRB) (see link provided in Annex A),
- sub-pavement hydronic heating as an alternative method for de-icing of roads. The system consists of embedded pipes in the carriageway structure, with a fluid as energy carrier. The Contractor proposes the optimum length of these in its design and
- a ground source heat energy system, which complies with the UK Ground Source Heat Pump Association standards (see link at Annex A). The ground source heat energy system includes
    - a building energy profile identifying heating, cooling, hot water and electrical demand for operational facilities,
    - an open or closed geothermal loop system installed in the ground or within the piled or diaphragm wall foundations of the tunnel and approach Structures and
    - ground source heat pumps and controls.

Instrumentation and Monitoring (I&M)

S206.8 The *Contractor's* Enhancements proposals include an I&M regime that demonstrates compliance with the manufacturer's performance criteria. The outputs are incorporated into the tunnel's supervisory control and data acquisition system.

Charging infrastructure for Electric Maintenance Vehicles and Service Equipment

S206.9 The *Contractor* provides charging infrastructure for tunnel electric maintenance vehicles and service equipment in accordance with electric maintenance vehicles and plant specification provided in section S2700 and section S300.

S207 Environmental requirements

S207.1 The *Contractor* ensures its 'environmental management system' (EMS) and Environmental Management Plans (EMPs) align with the *Client's* environmental vision, strategy and objectives as described in the Scope.

Client's Environmental Strategy

S207.2 The *Client's* environmental vision is to deliver "A Strategic Road Network (SRN) working more harmoniously with its surroundings to deliver an improved environment" and the *Contractor* supports the *Client* in achieving this vision. In Providing the Works, the *Contractor* complies with the *Client's* Environmental Strategy, (see link in Annex A) which is to invest for the long-term and capture the vision for the environment. This includes the conservation of energy, water and other resources, the reduction of waste, phasing out the use of ozone-depleting substances and minimising the release of greenhouse gases, volatile organic compounds and other substances damaging to health and the environment.

Client's Environmental Objectives

S207.3 The *Client* has established environmental objectives. The *Contractor* Provides the Works in compliance with the following objectives to

- protect and enhance the environment,
- provide effective environmental and sustainability management leadership for the contract,
- provide proactive management and assurance of environmental and sustainability management in design and construction,
- actively manage environmental and sustainability risk,
- promote a positive environment and sustainability culture,
- engage in continuous improvement and share best-practice with the *Client*, *Project Manager*, other Main Works Contractors, Others and subcontractors (at any stage of remoteness from the *Client*),
- deliver the environmental mitigation requirements in the Development Consent Order (DCO),
- deliver improved biodiversity across the Project,
- minimise the environmental construction impacts by adhering to commitments in the Code of Construction Practice (CoCP) and the Register of Environmental Commitments (REAC),
- reduce water use through effective management,
- minimise carbon emissions using PAS 2080 - carbon management in infrastructure (see link in Annex A) and aim for a target reduction to the baseline and
- implement a waste strategy to target zero waste to landfill.

S207.4 The *Contractor* complies with the *Client*'s design vision and principles as set out in 'The road to good design' (see link in Annex A) by designing an inclusive, resilient and sustainable Project as part of the wider road network.

S207.5 In Providing the Works, the *Contractor* complies with the *Client*'s biodiversity plan entitled *Client's* Biodiversity Plan ("Our plan to protect and increase biodiversity" – June 2015) (see link in Annex A) including addressing the biodiversity challenges of no net loss of biodiversity by 2020 and a net biodiversity gain by 2040 which is to produce good biodiversity performance, manage the Strategic Road Network (SRN) to support biodiversity and ensure best possible biodiversity performance.

S207.6 The *Contractor* ensures in Providing the Works it complies with the biodiversity requirements within

- 'LD 118 - Biodiversity design" for the design and delivery of the *works* and

- the *Client*'s Biodiversity Plan ("Our plan to protect and increase biodiversity" – June 2015).

(see links in Annex A).

S207.7 The *Contractor* ensures that any goods purchased by the *Contractor* on behalf of the *Client* (or those which become the property of the *Client*) comply with the relevant minimum sustainable procurement standards specified in the Sustainable procurement: the GBS for paper and paper products (see link in Annex A).

S207.8 All printed output produced by the *Contractor* in connection with the contract complies with the UK Government Buying Standards for paper and paper products and is printed on both sides.

S207.9 The *Contractor* complies with the requirements of the ES, CoCP, (including the REAC), Environmental Masterplan and Design Principles.

S207.10 The *Contractor* undertakes self-certification and internal auditing throughout the *works* to ensure the EMS continues to meet the requirements of the contract.

Contractor's Environmental Management System for the works

S207.11 As part of the *Contractor's* environmental management system required within section S600, the *Contractor* ensures that it

- complies with the requirements of ISO 14001:2015 Environmental Management Systems – Requirements with guidance for use (link provided in Annex A) as described in section 602 "quality management system",
- identifies the individuals responsible for the *Contractor's* 'EMS',
- demonstrates alignment between the *Contractor's* policy and the *Client's* environmental policy,
- complies with the commitment(s) which are required by the Project's ES,
- includes the policies the *Contractor* establishes to meet the *Client's* environmental strategy and
- demonstrates the plan for the *Client's* environmental objectives to be met.

Contractor's Environmental Management Plan(s)

S207.12 The *Client's* Guidance LA120 - Environmental Management Plans (see link in Annex A) has three iterations of the EMP. These are defined in Table **Error! Reference source not found.** below.

Table 3 - Alignment between EMP definitions in LA120 and DCO documents

Phase	LA 120	Common DCO terminology for plans	Description	Terminology used in this document	Responsible for producing
design	first iteration of EMP	Code of Construction Practice or Outline Environmental Management Plan (OEMP)	produced during the design stage for the preferred route option.	CoCP	*Client*
construction	second iteration of EMP	Construction Environmental Management Plan (CEMP)	refined during the construction stage for the consented Project, in advance of construction.	EMP2	*Contractor*
end of construction	third iteration of EMP	Handover Environmental Management Plan	building on the EMP2, EMP3 is refined at the end of the construction stage to support future management and operation.	EMP3	*Contractor*

S207.13 The *Client* has provided CoCP within the DCO which is complaint with LA120.

S207.14 The *Contractor* complies with CoCP and produces EMP2 and EMP3 in accordance with the *Client's* Guidance LA120. The *Contractor* produces these using the template contained within LA120.

S207.15 The *Contractor* produces and submits a draft EMP2 to the *Project Manager* for acceptance in accordance with S3000. A reason for non-acceptance is that the EMP2 does not comply with the Code of Construction Practice or LA120.

S207.16 Not used.

S207.17 In agreement with the *Project Manager,* the *Contractor* submits (via the *Project Manager*) the updated draft for the Secretary of State's agreement.

S207.18 In the event that the Secretary of State has any comments on the EMP2, the *Contractor* addresses any comments and re-submits the EMP2 to the Secretary of State for agreement.

S207.18A Once agreement is obtained by the Secretary of State, the EMP2 is resubmitted to the *Project Manager*, for acceptance, in accordance with the Acceptance Procedure prior to the commencement of relevant construction activities.

S207.19 The *Contractor* does not commence construction of the *works* until the EMP2 is accepted by the *Project Manager* following Secretary of State agreement.

S207.20 The *Contractor* ensures that the EMP2 is compliant with ISO 14001:2015 Environmental Management System and includes

- the *Client's* objectives and targets,
- the *Contractor's* plans and procedures that demonstrate how it complies with the requirements of the CoCP and Schedule 2 of the DCO,
- the management plans for each environmental discipline (these can be incorporated within or appended to the EMP2),
- the appropriate industry standards, practice and control measures for environmental impacts to be used by the *Contractor* during the *works* and in Providing the Works,
- the *Contractor's* approach to maximising the harvesting and re-use of water,
- a link to the 'Consents register' required by the 'consents management plan', as outlined in section S929, in particular the environmental Consents within it,
- the environmental monitoring, mitigation and management measures the *Contractor* uses,
- an allocation of the *Contractor's* roles and responsibilities for ongoing monitoring and implementation of mitigation and management measures,
- the *Contractor's* approach to environmental management in Providing the Works,
- the *Contractor's* procedures to ensure environmental compliance,
- the *Contractor's* approach to continual improvement, as outlined in section S671,
- a list of environmental procedures the *Contractor* complies with when Providing the Works,
- how performance is measured during the *works* and reported against,
- an index of relevant subcontractors (at any stage of remoteness from the *Client*) identifying the EMS status of each of these subcontractors,
- the programme for EMS development, certification and implementation,
- the criteria and methods for monitoring and measuring effectiveness and efficiency for managing the environment,
- the monitoring systems for Equipment and Plant and Materials,
- the design control systems and procedures,
- a list of who is responsible for certifying that compliance with requirements has been achieved and
- how the *Contractor* delivers the Scope's environmental requirements and in particular the environmental targets.

S207.21 The *Contractor* liaises with Others as shown in Table 2 in the development of the EMP2.

Table 4 - Relevant Stakeholders

Tunnels and Approaches			
	Local Planning Authority	**Local Highway Authority**	**Other Body**
Environment Agency			X
Essex County Council		X	
Historic England			X
Kent County Council		X	
Medway Council	X	X	
Natural England			X
Thurrock Council	X	X	
Transport for London		X	

S207.22 The *Contractor* reviews the EMP2

- every three months as a minimum,
- after any incident and
- before any significant changes in construction activities.

S207.23 The *Contractor* reviews and considers whether the EMP2 remains suitable, adequate and effective as the *works* progress and if the EMP2 requires updating. If the *Contractor* establishes that the EMP2 requires updating, the *Contractor* submits the EMP2 updates to the *Project Manager* for acceptance, to an agreed timescale.

S207.23A Where required by either the *Contractor* or the *Project Manager*, the *Contractor* and the *Project Manager* follow the procedures set out in paragraphs S207.17 and S207.18 when the updated EMP2 requires resubmission to the Secretary of State.

S207.24 Not used.

S207.25 The *Contractor* produces and submits an EMP3 to the *Project Manager* for acceptance no later than six months prior to Completion of *section 1*. The *Contractor's* EMP3 is in accordance with LA120 and includes the activities required to ensure the effective long-term management of environmental matters associated with the operation of the *works*.

S207.26 The *Contractor* submits EMP3 to the *Project Manager* for acceptance prior to implementation. A reason for not accepting EMP3 is that it does not realistically reflect timing requirements, e.g. sufficient time for archaeological, European protected species licence (EPS) or Historic England requirements.

Records management

S207.27 The *Contractor* ensures all environmental documentation is held electronically on the Project Common Data Environment (CDE) and regularly uploaded to the *Client's* document management and record system, as specified in section S1900. This includes the EMS requirements, EMP (including all required management plans), environmental inspections, test plans and environmental Consents.

Meetings and reports

S207.28 The *Contractor* reports on environmental aspects identified within the CoCP and EMP's via attendance at meetings and forums. As a minimum, attendance is required at the Joint Operations Forum (JOF).

S207.29 The *Contractor* provides a monthly environmental report as part of the monthly progress reporting in accordance with section S850, to the *Project Manager* for information which includes the following

- management system status,
- environmental issues identified or anticipated,
- environmental incidents and corrective actions,
- improvement activities and
- performance against environment key performance indicators.

Environmental competence

S207.30 The *Contractor* demonstrates, at the request of the *Project Manager,* that Staff have an awareness and a working knowledge of environmental legislation, environmental standards and guidance relevant to the construction activities in which they are engaged.

Environmental Resources

S207.31 The *Contractor* develops and submits to the *Project Manager* for acceptance as part of its EMP2, an 'environmental management structure' that includes an organisation chart encompassing all Staff responsible for supervising environmental work. The 'environmental management structure' demonstrates the *Contractor*'s

- commitment to provide competent environmental Staff for the *works* and to Provide the Works and
- approach to ensuring an adequate level of resourcing for the *works*.

A reason for non-acceptance is that

- the environmental management structure does not cover the aspects of the environmental work,
- it does not provide Staff with the required competency and
- it does not include specific roles and responsibilities.

S207.32 The 'environmental management structure' includes

- respective roles and responsibilities concerning the environment,
- *Contractor's* nominated roles
    - construction manager,

  - environmental manager,
  - Environmental Clerk of Works and
  - interface manager and
- the competency requirements for the following roles
  - noise and vibration specialist,
  - built heritage specialist,
  - archaeologist,
  - Ecologist,
  - air quality specialist,
  - geo-environmental specialist,
  - arboriculture,
  - transport assessment specialist,
  - waste manager and
  - water specialist.

S207.33 The *Project Manager* reviews the 'environmental management structure' and responds within four weeks.

Environmental Clerk of Works

S207.34 The *Contractor* appoints an Environmental Clerk of Works whose responsibilities include

- providing daily updates to the environmental manager on work progress, compliance, issues, problems and successes,
- liaising with the *Contractor's* site management team and general site Staff,
- supporting in delivering the environmental components of the *works* during construction,
- providing environmental training to the Staff,
- recording the progress of the environmental works,
- monitoring and supervising construction activities about environmental aspects,
- performing inspections of all activities within the Working Areas and continuously monitoring the *works* and Provides the Works to ensure compliance with environmental legislation, CoCP and the EMPs,
- assisting in the review of method statements,
- identifying key environmental concerns on-site as construction progresses,
- instructing and confirming the environmental requirements to site Staff throughout Providing the Works and the *works*,
- monitoring and updating the environmental manager on the progress of pre-construction surveys,
- assisting in monthly formal audits with the environmental manager,
- assessing and checking survey results and updating Information Systems and EMPs with new information,
- identifying cost savings and best practice activities,
- reporting, investigating and closing out incidents,

- supporting the environmental manager in liaison with the statutory environmental bodies and consultees and
- accompanying the statutory environmental bodies and consultees when they attend site visits.

Environmental Assessment specialists

S207.35 The *Contractor* appoints environmental discipline specialists to manage and undertake Environmental Assessments required for the *works.* These specialists undertake activities such as pre-construction surveys, watching briefs and advising the *Contractor* on specific issues as and when they arise throughout the *works*.

Ecology Requirements

S207.36 The *Contractor* Provides the Works in accordance with the contract specific Environmental Masterplan (see link in Annex A), Design Principles and Outline Landscape and Ecological Management Plan (OLEMP) (see link in Annex A).

S207.37 The *Contractor* achieves the same biodiversity net gain for the Environmental Masterplan as provided for within the DCO.

S207.38 Where the *Contractor* wishes to change the contract specific Environmental Masterplan's design, it submits an environmental masterplan deviation form to the *Project Manager* for agreement. The environmental masterplan deviation form includes

- a revised contract specific Environmental Masterplan design and
- the calculations that demonstrate the amended contract specific Environmental Masterplan design still achieves the equivalent or better biodiversity net gain in comparison to the same geographic area in the DCO's Environmental Masterplan.

A reason for non-acceptance is that it does not take account of specific mitigation measures required by the DCO.

S207.39 The *Contractor* develops a 'biodiversity improvement plan' within 40 weeks of the *starting date* and submits to the *Project Manager* for acceptance with a completed Multiparty Collaboration Form in accordance with section S318. The 'biodiversity improvement plan' includes

- proposals for making improvements within the *boundaries of the site* which supports the *Client* in achieving an overall biodiversity net gain improvement for the Project of 21.4% against baseline value contained within the DCO's Environmental Statement (ES) Chapter 8: Terrestrial Biodiversity. Appendix 8.21. Biodiversity Metric,
- proposals for making improvements outside of the *boundaries of the site* which supports the *Client* in achieving an overall biodiversity net gain improvement for the Project of 21.4% against baseline value contained within the DCO's ES Chapter 8: Terrestrial Biodiversity. Appendix 8.21. Biodiversity Metric and
- a register of biodiversity improvement opportunities for discussion with the *Project Manager*, *Client* and other Main Works Contractors.

A reason for non-acceptance is that it does not take account of specific mitigation measures required by the DCO.

Air Quality requirements

S207.40 The *Client*'s Air Quality Strategy entitled 'Our strategy to improve air quality' (see link in Annex A) sets out how it ensures that all activity on the *Client*'s roads is delivered in a way that not only minimises harm but ultimately improves the environment including air quality. This strategy helps support the UK Government as they work to improve air quality in the UK and deliver nitrogen dioxide compliance at the roadside in the shortest time possible.

S207.41 The *Contractor* supports the *Client*'s implementation of its strategy by

- ensuring that any new vehicles purchased by it for use partly or wholly in Providing the Works comply with the minimum mandatory standards (detailed for central UK Government departments) detailed in UK Government Buying Standards for transport (see link in Annex A),
- when requested by working in collaboration with the *Project Manager* to prepare reports to identify how the best practice standards detailed in the UK Government Buying Standards for Transport 2017, or its replacement, can be achieved and
- complying with the additional requirements in section S209 (sustainable development requirements).

S207.42 Until 1st January 2025 the *Contractor* ensures all Non-Road Mobile Machinery (NRMM) complies with the standards set within the Greater London Authority's Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance (see link at Annex A). From no later than and including 1st January 2025 the *Contractor* ensures all NRMM of net power from 37 kW up to and including 560 kW used on the Site as a minimum meets Stage V of EU Regulation 2016/1628 of the European Parliament and of the Council, 2016 and its subsequent amendments or UK equivalent.

S207.43 The *Contractor* ensures all on-road Heavy Goods Vehicles (HGVs, >3.5 tonnes) utilised for the *works* are powered by Euro VI (or lower-emission engines), unless it is an exempt vehicle. Certain HGVs may be exempted on the grounds of

- specialism, being a specialist vehicle (not readily available as Euro VI-compliant),
- unforeseen circumstances, for example, breakdowns or mechanical failure requiring a replacement vehicle that is not readily available as Euro VI-compliant or
- triviality, if it is expected that a particular vehicle is planned to and only makes no more than 12 visits in any 12-month rolling period to all *works* then the vehicle may be given a specific exemption.

S207.44 All exemptions are obtained by the *Contractor* and records submitted to the *Project Manager* for acceptance within one week of being obtained. The exemption is obtained from the *Project Manager* or the London Borough of Havering where appropriate.

Noise and vibrations

S207.45 The *Contractor* complies with the mandatory requirements set out in the CoCP and limits the impact of the *works* and Providing the Works on the surrounding area by committing to these good practice construction methodologies.

S207.46 The *Contractor* communicates and engages with the local community to ensure that they are effectively and regularly informed of construction activities.

S207.47 The requirements for working within noise and vibrations limits are included in the CoCP.

Noise Insulation and Temporary Rehousing

S207.48 The *Contractor* provides noise insulation for property owners or occupiers in accordance with the requirements of the Development Consent Order (DCO).

In addition, the *Contractor* ensures that noise insulation is provided, where applied for by other property owners or occupiers (where agreed with the property owner), where the construction activities cause, or are expected to cause, a measured or predicted airborne noise level that exceeds the specified levels contained in The Noise Insulation Regulations 1975 (as amended 1988) (see link provided in Annex A).

S207.49 The *Contractor* provides temporary rehousing for property owners or occupiers in accordance with the requirements of the DCO.

In addition, the *Contractor* ensures that temporary rehousing is provided to other property owners, where applied for by owners or occupiers (where agreed with the property owner), where the construction activities cause, or are expected to cause, a measured or predicted airborne noise level that exceeds either of the following at a property lawfully occupied as a permanent dwelling

- a noise level 10 dB above any of the trigger noise levels presented in Table E.2 of BS 5228-1, (see link provided in Annex A) for the corresponding times of the day or
- a noise level 10 dB above the pre-construction ambient noise level for the corresponding times of the day,

whichever is the higher and for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any six consecutive calendar months.

S207.50 The *Contractor* ensures the contents of the requirements (including noise assessments) provided as part of the DCO are reviewed and adopted. The *Contractor* confirms to the *Client* (via the *Project Manager*) prior to commencement of the relevant construction activity or phase, whether the construction activities cause any additional properties to be eligible for noise insulation or temporary housing.

S207.51 In accordance with the paragraph S207.50 above, where the *Contractor* identifies any additional properties that are eligible for noise insulation or temporary rehousing, the *Contractor* submits a revised noise assessment to the *Project Manager*, in accordance with the Acceptance Procedure prior to the commencement of the relevant construction activity or phase.

Landscape requirements

S207.52 The *Contractor* ensures in Providing the Works it complies with the landscape requirements within

- LD 117 - Landscape design (provided in Annex A) and
- DCO requirements.

The *Contractor* undertakes a tree survey in accordance with BS 5837:2012 Trees in relation to design, demolition and construction (see link in Annex A), for the full extent of the Site to inform the *Contractor's* arboriculture method statement and tree protection measures. The *Contractor* submits these documents to the *Project Manager* as part of its relevant detailed design submission.

Archaeology Requirements

S207.53 The *Contractor* Provides the Works in accordance with the contract specific archaeological mitigation strategy and outline written scheme of investigation provided in the DCO.

S207.54 The *Contractor* develops a site specific detailed written scheme of investigation for parts identified within the contract specific archaeological mitigation strategy and outline written scheme of investigation.

S207.55 The *Contractor* submits the draft site specific detailed written scheme of investigation to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, no later than ten weeks prior to Commencement of Construction in accordance with the Accepted Programme.

S207.56 Not used.

S207.57 In agreement with the *Project Manager,* the *Contractor* submits (via the *Project Manager*) the site specific detailed written scheme of investigation for the Secretary of State's agreement.

S207.58 In the event that the Secretary of State has any comments on the site specific detailed written scheme of investigation, the *Contractor* addresses any comments and re-submits it via the *Project Manager*) to the Secretary of State for agreement.

S207.58A Once agreement is obtained from the Secretary of State, the site specific detailed written scheme of investigation is resubmitted to the *Project Manager*, for acceptance, in accordance with the Acceptance Procedure prior to the commencement of relevant construction activities.

S207.59 A reason for not accepting a site specific detailed written scheme of investigation is that

- the site specific written scheme of investigation does not comply with the Scope.

S207.60 The *Contractor* ensures no construction activity commences until the site specific detailed written schemes of investigation has been accepted by the *Project Manager* following Secretary of State agreement.

Restrictions on the use of hazardous products

S207.61 The *Contractor* manages the use of all materials on the Site and minimises the use of hazardous products in Providing the Works as described in the EMP2 and sources eco-friendly and pH neutral products. The *Contractor* uses hazardous products to Provide the Works when it has exhausted all other avenues and satisfies itself that these are the only options available. All hazardous products used, prior to their use, are submitted to the *Project Manager* for acceptance. A reason for not accepting the hazardous materials proposal is that the *Contractor* has not demonstrated due diligence in seeking alternatives.

Existing watercourses and water voles

S207.62 The *Contractor* fences off and protects all existing watercourses and rivers on or adjacent to the Site where they are being retained, at a minimum distance of 8m to negate or minimise the necessity for capture and translocation of the significant water vole population. The exception is at the location of the Haul Road temporary crossings, where the *Contractor* carries out displacement of water voles using habitat manipulation and at waterways impacted by the works where trapping and relocation is used. Habitat manipulation and displacement are only used in areas where less than 50m of continuous bankside habitat is impacted. For any length of watercourse impacted that is greater than 50m, trapping and translocation is carried out.

Floodplains and Water Discharge

S207.63 The *works* require construction in areas of environmental sensitivity including EA Flood Zones 2 and 3. The *Contractor* establishes flood compensation storage area features prior to displacing any volume within the existing floodplain.

S207.64 The *Contractor* ensures that Compound Areas and Worksites situated in Flood Zones 2 and 3 operate under a suitable flood warning and evacuation plans. Any works, over, under or within 8m of the banks of Main Rivers or flood defences require flood risk activity permits from the EA and works to culvert or divert ordinary watercourses need Consent from the relevant Lead Local Flood Authority.

S207.65 Measures for the protection of surface and groundwater quality are described in the CoCP, which also highlights the likely need for monitoring to be undertaken of those watercourses that would receive discharges of runoff from Compound Areas and those that accept discharges of water drawn from excavations and cuttings. Consent for discharge of water from cuttings or other excavations is needed from the EA, under the Environment Permitting Regulations (England and Wales) (2016) (see link provided in Annex A).

S208 Site waste management plan

S208.1 To reduce the need for waste disposal, the *Contractor* minimises the generation and environmental impacts of waste arising in Providing the Works and maximises opportunities for the re-use and recovery of waste. The *Contractor* submits a site waste management plan (SWMP) and a materials management plan as part of its EMP submissions for acceptance by the *Project Manager*. The SWMP includes the following

- procedures for monitoring waste generation and the proportions subject to reuse, recycling, recovery and disposal,
- a commitment to avoid waste where possible,
- forecast of construction waste listed by waste type, waste code, source and anticipated weight from detailed design,
- an up to date calculation of construction waste listed by waste type, waste code and source,
- calculation of compliance with waste targets and objectives as detailed in the REAC and CoCP,
- a commitment that all Plant and Materials are delivered to the Working Areas in reusable transit containers which are returned to the relevant manufacturer/supplier and
- correlation of waste movements with relevant duty of care records.

S208.2 The *Contractor* makes applications to the Local Authority or the Environment Agency (EA), under the terms of The Environmental Permitting Regulations (England and Wales) 2016 (see link in Annex A) (as amended) for the storage, treatment or disposal of wastes.

S208.3 The materials management plan is developed in alignment with CL:AIRE Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011) (see link in Annex A). The format and content of the SWMP and materials management plan are compatible to allow an auditable trail of waste and materials management.

S209 Sustainable development requirements

S209.1 In Providing the Works, the *Contractor*

- complies with the requirements of
    - GG 103 Introduction and general requirements for sustainable development and design and
    - LA114 Climate and
- demonstrates alignment with the principles and requirements of the *Client's* 'Life Cycle Assessment Technical Requirements'

(see links in Annex A).

S209.2 The *Contractor* submits a plan to the *Project Manager* for acceptance in accordance with the Acceptance Procedure setting out how its organisation(s) will reach a net zero position within five weeks of the *starting date*.

The *Contractor* ensures the plan

- includes science-based targets and initiative targets for emissions reduction and
- aligns with the 1.5C reduction goal of the Paris Agreement and the UK's commitment to be net zero by 2050.

S209.3 In Providing the Works, the *Contractor* adopts the principles in

- the National Highways document Net Zero Highways: our 2030/2040/2050 plan (see link in Annex A),
- the *Client's* Lowest Carbon Strategy (see link in Annex A) and
- the *Contractor's* net zero plans.

CEEQUAL

S209.4 The *Contractor* Provides the Works to achieve a CEEQUAL 'Very Good' standard by Completion of *section* 1 and supports the *Client* in achieving a Project standard of 'Excellent'.

S209.5 The *Contractor*'s certified assessors manage the CEEQUAL process which is audited by the *Project Manager* twice-yearly.

S209.6 The *Contractor* arranges informal verifier reviews by Building Research Establishment (BRE) staff annually.

S209.7 The *Contractor* provides the *Project Manager* with evidence of the BRE reviews and a report on progress towards its CEEQUAL target within one month of each review. If the report demonstrates that the *Contractor* is not going to achieve the CEEQUAL the *Contractor* submits a corrective action plan to the *Project Manager* for acceptance within two months.

A reason for not accepting the corrective action plan is

- it does not provide sufficient detail on corrective actions or
- it does not demonstrate how the *Contractor* will achieve CEEQUAL 'Very Good' standard by Completion.

S209.8 The *Project Manager* prepares a table based on each of the Main Works Contractors' CEEQUAL performances and places it on the Project Common Data Environment (CDE). The *Contractor* agrees that the *Client* may publish this information.

Responsible Sourcing

S209.9 The *Contractor* procures goods and services certified to BES 6001 Responsible Sourcing of Construction Products (see link in Annex A), or an equivalent standard agreed with the *Project Manager*. Compliance is managed through the EMS and the *Contractor's* EMPs.

S209.10 The *Contractor* calculates the embedded environmental impacts for the contract in accordance with the *Client's* 'Life Cycle Assessment Technical Requirements' (see link in Annex A).

S209.11 The *Contractor* submits environmental impacts information to the *Project Manager* in accordance with the *Client's* CBS and WBS provided in Annex A.

Climate resilience

S209.12 The *Contractor* includes resilience to future climate change in its design, in accordance with LA114 Climate.

S209.13 The *Contractor* uses the climate trends in the most recent UK Climate Projections (UKCP) - Met Office high emissions scenario (50% probability) (see link in Annex A) to assess climate change resilience requirements.

S209.14 The *Contractor* submits evidence to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, as part of its relevant detailed design submission prior to commencement of the relevant construction activity, that its design meets the requirements of LA114 Climate.

Carbon management

S209.15 The *Contractor* complies with PAS 2080 - carbon management in infrastructure (see link in Annex A) throughout Providing the Works.

S209.16 The *Contractor* obtains certification to PAS 2080 'Carbon management in infrastructure' by an independent, UKAS accredited third-party certification body accredited to provide PAS 2080 'Carbon management in infrastructure' certification, within 52 weeks of the *starting date* and maintains that verification annually.

S209.17 The *Contractor* ensures that all subcontractors are compliant with PAS 2080 'Carbon management in infrastructure' throughout Providing the Works, unless agreed otherwise with the *Project Manager*. The *Contractor* achieves Carbon Literacy Project Silver certification within 52 weeks of the *starting date* and ensures that subcontractors achieve Carbon Literacy Project Silver certification within 52 weeks of their engagement.

S209.18 The *Contractor* appoints a director responsible for carbon from the *starting date*.

In accordance with PAS 2080, the *Contractor's* carbon director

- develops and implements carbon management processes which will achieve the *Client's* 'Lowest Carbon Strategy' (see link in Annex A),
- communicates consistently and regularly to Staff on the importance of carbon management,
- communicates consistently with other value chain members to develop collaborative relationships with the goal of reducing carbon emissions,
- challenges the *carbon target* where they consider there is potential for greater carbon reduction,
- develops and maintains training programmes to fill gaps in knowledge and skills,
- provides adequate personnel for the development and implementation of the carbon management process,
- instigates and maintains carbon management process that are compatible and integrated with existing business processes (asset management, procurement, health, safety and wellbeing, cost management, quality, delivery programme, sustainability, environmental management),
- demonstrates a commitment to continuous improvement through the sharing of current good practice and collaboration with the other Main Works Contractors,
- implements governance structures where carbon management underpins the delivery of an asset or programme of work and

- uses feedback from value chain members to improve business processes to drive low carbon solutions.

S209.19 The *Contractor* ensures all subcontractors have obtained certification to PAS 2080 'Carbon management in infrastructure' within 52 weeks of appointment unless otherwise agreed by the *Project Manager*. The *Contractor* provides to the *Project Manager* a copy of all subcontractors' certification to PAS 2080.

S209.20 The *Contractor* submits a draft 'carbon and energy management plan' (DCO reference, Schedule 2, Requirement 16) to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure and accompanied by a Multiparty Collaboration Form, within 44 weeks of the *starting date*.

S209.21 Not used.

S209.22 In agreement with the *Project Manager*, the *Contractor* submits (via the *Project Manager*) the carbon and energy management plan for the Secretary of State's agreement.

S209.23 In the event that the Secretary of State has any comments on the 'carbon and energy management plan', the *Contractor* addresses any comments and re-submits it via the *Project Manager* to the Secretary of State for agreement.

S209.23A Once agreement is obtained from the Secretary of State, the carbon and energy management plan is resubmitted to the *Project Manager*, for acceptance, in accordance with the Acceptance Procedure prior to the commencement of relevant construction activities.

S209.24 A reason for not accepting a 'carbon and energy management plan' is that

- it does not meet the requirements of PAS 2080 'Carbon management in infrastructure',
- it does not adopt the principles in the *Client's* 'Lowest Carbon Strategy',
- in the opinion of the *Project Manager* the updated 'carbon and energy management plan' is an adverse change to the plan submitted and accepted previously,
- it does not align with the commitments made in the 'carbon and energy management plan' in the DCO or
- the 'carbon and energy management plan' does not comply with the Scope.

S209.25 The *Contractor* submits an updated 'carbon and energy management plan' to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, every 52 weeks following Secretary of State agreement.

S209.26 Where required, by either the *Project Manager* or the *Contractor*, the *Contractor* and the *Project Manager* follow the procedures set out in paragraphs S209.22 and S209.23 when the updated plan requires resubmission to the Secretary of State.

Carbon Target

S209.27 The *Contractor* does not exceed the *carbon target*, as updated, in accordance with

- paragraph S209.29,
- the accepted proposals in accordance with clause Z135 that have been verified as delivered by the *Project Manager* and
- the relevant agreed and instructed Enhancements.

S209.28 In Providing the Works, the *Contractor* reduces the total carbon emissions calculated in the life cycle assessment below the *carbon target* and to the lowest carbon practicable, following the principles of the *Client's* 'Lowest Carbon Strategy'.

S209.29 The *Contractor* provides a *carbon target* impact assessment to the *Project Manager* with every quotation for a compensation event for the agreement of the *Project Manager*.

Reporting carbon emissions

S209.30 The *Contractor* uses the *Client's* preferred carbon tool to develop a carbon model and uses and updates the carbon model until Completion. The carbon model is drafted and developed in accordance with the *Client's* 'Life Cycle Assessment Technical Requirements'.

S209.31 The *Contractor* submits a 'carbon report' to the *Project Manager* for acceptance within 12 weeks of the *starting date* and then at a minimum of every quarter. The 'carbon report' includes

- the carbon emissions (in accordance with the *Client's* CBS WBS)
  - incurred to the date of the report and
  - forecast to be incurred by Completion of the whole of the *works*

  for the *works* and in Providing the Works, ('the carbon total'),
- the variance between the 'carbon total' and the *carbon target* as updated in accordance with paragraph S209.29, by accepted proposals in accordance with clause Z135 and relevant agreed and instructed Enhancements,
- an explanation for the variance,
- details of planned carbon reduction measures and their anticipated impact on future carbon emissions and
- any proposed Innovations or Enhancements for the *works* and their anticipated impact on future carbon emissions.

S209.32 Where the *Contractor* reviews, agrees and adopts or prepares a new Structures options report or an AIP for a Structure, the *Contractor* ensures such documents link and align with the carbon report required by paragraph S209.31. The *Contractor* ensures each Structure's AIP and the Structures options report, unless agreed otherwise by the *Project Manager*, identifies the carbon emissions in accordance with the *Client's* 'Life Cycle Assessment Technical Requirements'.

S209.33 If the carbon and energy management plan or carbon report demonstrates that the *Contractor* will not achieve the *carbon target* as updated in accordance with paragraph S209.29, accepted proposals in accordance with clause Z135 and relevant agreed and instructed Enhancements, the *Contractor* submits a corrective action plan in accordance with section S660.

S209.34 The *Contractor* calculates the carbon emissions for the contract and reports those emissions in accordance with the *Client's* 'Life Cycle Assessment Technical Requirements'.

Low carbon products

S209.35 The *Contractor* submits to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, as part of its relevant detailed design submission, prior to commencement of the relevant construction activity, a report that details for all Plant and Materials to be used, and Equipment to be consumed the carbon emissions they will produce and identifies the top ten carbon emitting items of Plant and Materials and Equipment.

A reason for not accepting the report is it does not calculate the highest ten items correctly.

Upon acceptance of the report, the *Contractor* submits to the *Project Manager* the Environmental Product Declarations for the ten construction products with the highest overall emissions (quantity

multiplied by emission factor). The *Contractor* demonstrates that the products included have lower emission factors than the European average for that product.

S209.36 The *Contractor* provides Compounds, Worksite offices and welfare facilities with sustainable, low carbon emission performance and ensures

- all Worksite offices and welfare facilities and Compounds feature a minimum of 20% of on-site renewable-energy generation, in addition to the purchase of renewable energy from grid, unless otherwise agreed by the *Project Manager*,
- Compounds have high standards of thermal insulation, passive ventilation and heating in relevant buildings,
- if generators are used, they are zero tailpipe emission electric generators, unless otherwise agreed by the *Project Manager*,
- zero tailpipe emission vehicles are used for all Staff movements within the Working Areas and to and from public transport hubs,
- the use of active transport is encouraged for personnel to and from the Working Areas,
- managed electric vehicle charging facilities are provided, using zero carbon electricity, for 30% of parking capacity in each Compound, increasing this to satisfy demand as required by the *Project Manager* and
- managed electric charging facilities for e-bikes are provided at each Compound, in covered cycle parking areas, to satisfy demand.

S209.37 The *Contractor* submits a biodiversity management plan for each Compound scheduled to be in place for longer than 3 years to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, prior to commencement of the relevant construction activity and in accordance with section S3000.

The biodiversity management plan includes proposals for

- increasing non-invasive plant and animal biodiversity and
- legacy biodiversity opportunities for the Compounds.

Collaborative carbon reduction workshops

S209.38 The *Contractor* coordinates with the other Main Works Contractors to ensure monthly carbon reduction workshops are held, unless otherwise agreed with the *Project Manager*. The first carbon reduction workshop is chaired by the *Project Manager* to set expectations and agree the agenda for future workshops.

S209.39 The *Contractor* agrees with the other Main Works Contractors, which Main Works Contractor, on a rotating basis

- chairs and arranges the workshop,
- provides a venue at a location that is agreed with the *Project Manager*,
- sets the agenda (including any technical queries or other relevant information),
- identifies all attendees (including the directors responsible for carbon) and agrees these with the *Project Manager*, two weeks in advance of each workshop,
- provides all workshop information (including agendas, minutes and actions) on the Project Common Data Environment (CDE) and
- ensures minutes include an action list with assigned responsibilities and timescales for action(s).

S209.40 The *Contractor* ensures that these carbon reduction workshops include

- opportunities for collaboration,
- proposals for Innovations or Enhancements,
- sharing of best practice and
- potential issues and opportunities for improvement.

S210 Confidentiality

S210.1 Within two weeks after the *defects date* or termination of the *Contractor's* obligation to Provide the Works, the *Contractor* returns to the *Project Manager* any confidential or proprietary information belonging to the *Client* in the *Contractor's* possession or control and deletes (and procures that any subcontractor (at any stage of remoteness from the *Client*) deletes) any electronic information or data held by the *Contractor* or any subcontractor (at any stage of remoteness from the *Client*) relating to the *Client* or the contract.

S211 Insurance

S211.1 The *Contractor* complies with the insurance requirements contained in Annex J.

S211.2 The *Client* or the *Project Manager* may provide materials (including revisions) on the management and operation of the insurances provided by the *Client* (including actions to be undertaken by the *Contractor* whether (or not) it is an insured party under such insurances). The *Contractor*

- complies and keeps evidence of compliance with such materials,
- provides access to the *Contractor's* evidence of compliance with such materials,
- if the *Contractor* has not complied with such materials, notifies the *Project Manager* on identification of a non-compliance and (in addition to any requirements of section S600) provides to the *Project Manager* a detailed report of the non-compliance within 2 days of the non-compliance and
- provides to the *Project Manager* on the same day a copy of all correspondence with the *Client's* insurance broker and where relevant the *Client's* insurance provider.

S211.3 The *Contractor* complies with the requirements of the 'Joint Code of Practice for Risk Management of Tunnel Works in the UK (September 2003)' (see link in Annex A) produced by the Association of British Insurers and The British Tunnelling Society and maintains records of compliance. The *Contractor* confirms its compliance on a monthly basis and identifies any concerns to the *Project Manager*. Records of compliance may be audited by the *Project Manager* and the *Client's* insurance providers. Non-Conformance Reports are raised and dealt with in accordance with section S600.

S212 Transparency

S212.1 All central UK Government departments and their executive agencies, non-departmental public bodies, and arm length bodies are subject to control and reporting within the UK Government. In particular, these all report to the UK Cabinet Office and HM' UK Treasury for all expenditure. Further, the UK Cabinet Office has a cross-government role in delivering overall UK Government policy on public procurement - including ensuring value for money and related aspects of good procurement practice.

S212.2 The *Client* may disclose to the UK Government any of the *Contractor's* documents and information (including any that the *Contractor* considers confidential and commercially sensitive) submitted by the *Contractor* during the contract (including any dispute and dispute settlement).

The information is not disclosed outside the UK Government. The *Contractor* taking part in the contract consents to these terms.

S213 Conflict of interest

S213.1 The *Contractor* does not take an action that causes a conflict of interest (or potential conflict of interest) to arise in connection with the contract. The *Contractor* immediately notifies the *Project Manager* if it considers that a conflict of interest may exist or may occur.

S213.2 The *Contractor* notifies its Staff and procures that any subcontractor (at any stage of remoteness from the *Client*) notifies its employees, who are engaged in Providing the Works that they do not take any action which causes an actual or potential conflict of interest to arise in connection with the *works*.

S213.3 The *Contractor* ensures that Staff complete the "Conflict of Interest Information" form, as set out in Annex M. The *Contractor* issues the completed forms to the *Project Manager* upon request from the *Project Manager.*

S213.4 If there is any uncertainty about whether a conflict of interest may exist or arise, the *Contractor*

- immediately notifies the *Project Manager* and
- procures that any subcontractor (at any stage of remoteness from the *Client*) immediately notifies the *Contractor*.

S213.5 Following a notification from the *Contractor*, the *Project Manager* may

- instruct the *Contractor* to stop Providing the Works until any conflict of interest is resolved and
- instruct the *Contractor* to submit to the *Project Manager* for acceptance a proposal to remedy the actual or potential conflict of interest.

S213.6 A reason for not accepting the proposal is that it does not resolve the conflict of interest.

S213.7 The *Contractor* amends the proposal in response to any comments from the *Project Manager* and resubmits it to the *Project Manager* for acceptance.

S213.8 The *Contractor* complies with the accepted proposal.

S213.9 A failure to comply with this section is treated as a substantial failure by the *Contractor* to comply with its obligations.

S214 *Client's* Codes of Conduct

S214.1 The *Contractor* complies (and ensures that any person employed by it or acting on its behalf complies) with the *Client's*

- Fair Payment Charter and
- Counter Fraud, Bribery and Corruption Policy.

(see links in Annex A) throughout Providing the Works and for a period not less than 12 years after the end of the *works*.

S214.2 A failure to comply with this section is treated as a substantial failure by the *Contractor* to comply with its obligations.

S214.3 The *Contractor* ensures that all subcontracts (at any stage of remoteness from the *Client)* contains provisions to the same effect as section S214.

S215 Security and protection of the Site

S215.1 The *Contractor's* (including any relevant subcontractor) security services are registered within the 'approved contractor scheme' with the Security Industry Authority (SIA) and are compliant with the following British Standards

- BS 7499 Static site guarding and mobile patrol services,
- BS 7958:2015 Closed circuit television (CCTV) Management and operation code of Practice and
- BS 7858 Screening of individuals working in a secure environment

(see links provided in Annex A).

S215.2 The *Contractor*

- ensures 24 hour 7 days a week security cover is provided,
- ensures there is no lone working on any security services and
- provides a minimum of 2 SIA trained security officers, one of which can have a dual function if suitably qualified as a traffic marshal.

S215.3 The *Contractor* ensures all security officers

- are proficient in the use of all equipment issued to them,
- are aware of all relevant legal and compliancy requirements for all equipment,
- are equipped with body-worn safety cameras (unless otherwise agreed with the *Project Manager*) and
- are trained in their use.

The *Contractor* proposes the body worn safety camera system to the *Project Manager* for agreement.

S215.4 Operational security vehicles are fitted with tracking devices and safety cameras front and rear with dashboard output/visuals.

S215.5 The *Contractor* submits a processes and procedures for the management and use of data collected on vehicle and body worn cameras for the acceptance of the *Project Manager* in accordance with the Acceptance Procedure within four weeks of the Construction Phase. A reason for not accepting the processes and procedures is

- it does not provide sufficient information for the *Project Manager* to understand the processes and procedures,
- it does not demonstrate how the processes and procedures are compliant with Data Protection Legislation or
- it does not demonstrate how the processes and procedures comply with section S227 and its schedule A.

S215.6 In Providing the Works, the *Contractor* consults with the *Project Manager* on a weekly basis (unless otherwise agreed with the *Project Manager*), with regards to the security and protection of

- the *works*,
- all persons entitled to be upon the Working Areas and
- the Working Areas.

S215.7 The *Contractor* in line with the *Client's* Physical Security Execution Plan (SEP) (see link in Annex A) implements a risk-based holistic approach towards security of the *works* and applies it to the physical and personnel elements of the *works*.

The *Contractor* is responsible for all aspects of physical security within the *boundaries of the site* in line with the *Client's* Physical Security Execution Plan. The *Contractor* retains operational responsibility and control within the *boundaries of the site*, but operating within the direction of the *Client's* Physical Security Execution Plan.

S215.8 The *Contractor* develops and implements its approach, as laid out in the *Client's* Physical Security Execution Plan using the security principles outlined in the SEP and guidance from the Centre for Protection of National Infrastructure (CPNI) website.

S215.9 Six months prior to the first *access date* and in accordance with S3000, the *Contractor* develops and submits to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure and accompanied by a Multiparty Collaboration Certificate, a Security Management Plan (SMP). The requirements for the SMP are detailed in the SEP.

S215.10 Not used.

S215.11 A reason for not accepting the SMP is that it does not provide sufficient details on the processes and actions to be taken and implemented.

S215.12 Once the SMP is accepted by the *Project Manager,* the *Contractor*

- complies with the SMP,
- manages any Protester Action and Trespassers effectively,
- maintains and keeps the SMP under constant review to ensure its effectiveness to current threats or as required by the *Project Manager* and
- revises the SMP to accommodate changes and effectiveness to threat levels and submits any revised SMP to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

S215.13 When the conditions of the accepted Security Management Plan for the deployment of specialist Protester removal capability are met, the *Client* provides and manages specialist support to deal with complex incidents and coordinates it with the *Contractor*. The *Contractor* remains responsible for the overall management of the incident.

[redacted]

S215.15 The *Contractor* liaises with the *Project Manager* for updates on current threats and likely threats.

S215.16 The *Contractor*

- prevents trespass onto the sites, Compounds, and work areas or land otherwise under their control of any person not entitled to be there and
- does not give directly or indirectly, or permit or suffer to be given, to any Protester or Trespasser any inducement, monetary or otherwise, with a view to avoiding, limiting or influencing the manner of protest activities by that Protester or Trespasser or by other Protesters or Trespassers.

[redacted]

S215.18 If it appears to the *Contractor* that the powers under any applicable law which are necessary to enable the *Contractor* to take the measures referred to in this section S215 are

- vested in or available to the *Client* or
- not vested in or available to either the *Contractor* or the *Client* and are vested in some other Relevant Authority

then the *Contractor* gives notice to that effect to the *Project Manager*, specifying

- the relevant applicable law and
- a request to the *Project Manager* and *Client* to use reasonable endeavours to procure such assistance and co-operation of the Relevant Authority as is necessary for the effective pursuit by the *Contractor* of such measures.

S215.19 The *Contractor* supplies any further information requested by the *Project Manager* in respect to such a notice issued under paragraph S215.16.

S215.20 The *Project Manager* confirms to the *Contractor* if the powers under any applicable law which are necessary to enable the *Contractor* to take the measures referred to in this section S215 are vested in or available to the *Client*.

S215.21 Where the powers under any applicable law which are necessary to enable the *Contractor* to take the measures under section S215 are not vested in, or available to the *Contractor*, but are vested in the *Client*, the *Contractor* gives notice to that effect to the *Project Manager*, specifying

- the relevant legal rights and
- requesting authority for the *Contractor* to commence and conduct legal proceedings (including discontinuing or compromising the same) in the name or on behalf of the *Client* or otherwise as directed by the *Client*.

S215.22 The *Contractor* supplies any further information requested by the *Project Manager* in respect to such a notice issued under paragraph S215.19.

S215.23 The *Client* considers any request made by the *Contractor* in accordance with paragraph S215.18 and, in its absolute discretion, decides whether to grant such request. The *Project Manager*

notifies the *Contractor* of the *Client's* decision and any authorisation given by the *Client*. The grant of any authority by the *Client* to the *Contractor* in accordance with this paragraph does not preclude the *Client* from taking any action whether by way of proceedings or otherwise in connection with Protesters or Trespassers or any other matter.

S215.24 Where authority is granted by the *Client* in accordance with paragraph S215.23, the *Contractor* in the name of and for and on behalf of the *Client* takes the measures which have been authorised, subject always to paragraph S215.23 and to the following provisions

- the *Contractor* in doing anything in the name of or on behalf of the *Client*, acts in accordance with the terms of the Relevant Authority and in accordance with all applicable law and all in a manner so as not to cause the *Client* to be in breach of any such requirement or any duty upon it,
- the *Contractor* keeps the *Project Manager* fully informed of the progress of all measures being planned or taken by the *Contractor* pursuant to this section S215, and promptly provides the *Project Manager* with all information (including copies of any documents or evidence of any kind) requested by the *Project Manager* concerning such measures and proposed measures,
- the *Contractor* gives at least five (5) days' notice to the *Project Manager* (or, in the case of urgency, such shorter period as is reasonably practicable) of any action which has been planned in advance to remove Protesters or Trespassers from the land or otherwise to deal with Protester and Trespasser action and
- the *Contractor* in taking action against Protesters and Trespassers and, whenever there is reasonable cause to anticipate disorder or violence, the *Contractor* informs the *Project Manager* to ensure that the emergency services, are given (so far as practicable) sufficient notice to enable the emergency services to attend the anticipated incident in such numbers as the emergency services deem appropriate.

S215.25 The *Client* may, at any time in its absolute discretion, revoke (in whole or in part including as to any specific proceedings) any *Client* authority granted in accordance with paragraph S215.23 by the *Project Manager* giving notice to that effect to the *Contractor* and thereupon in respect of the relevant measures

- the authority of the *Contractor* to continue taking the measures in the name of or on behalf of the *Client* ceases,
- the *Client* takes over the conduct of any relevant legal proceedings or other matter being conducted in its name or on its behalf and is entitled to conduct, compromise or discontinue the same as it sees fit in its absolute discretion and
- the *Contractor* promptly takes all steps necessary to transfer the conduct of such matter to the *Project Manager* and gives to the *Project Manager* all documents in the *Contractor's* possession relating to any such legal proceedings or the enforcement of any law or court order and provides such further assistance as the *Project Manager* and *Client* require to effect an orderly transfer of the conduct of such matters to the *Client*.

S215.26 The *Contractor* supports the *Project Manager* in establishing monthly security group workshops (which include the *Client's* security team) to be chaired by the *Project Manager*, to be held during the design and implementation for the security arrangements, unless otherwise agreed with the *Project Manager*.

S215.27 The *Contractor* supports the *Project Manager* by hosting on a rotating basis with the Main Works Contractors where the *Contractor*

- arranges the workshop with attendance from the relevant LTC Contractors,
- provides a venue at a location that is agreed with the *Project Manager*,
- proposes the agenda for agreement by the *Project Manager* (including any technical queries or other relevant information),

- identifies all attendees and agrees these with the *Project Manager*, two weeks in advance of each workshop,
- provides all workshop information (including agendas, minutes and actions) on the Project Common Data Environment (CDE) and where an attendee does not have access to the Project CDE, the *Contractor* sends the workshop information to the relevant party and
- ensures minutes include an abbreviated action list with assigned responsibilities and timescales for action(s).

Asset Protection – Not used

S215.28 Not used.

S215.29 Not used.

S215.30 Not used.

Perimeter Security and Fencing

S215.31 Not used.

S215.32 Not used.

S215.33 Not used.

S215.34 The *Contractor*, using the *Client's* Physical Security Execution Plan and in accordance with the SMP, develops operational requirements (OR level 1 & 2) for CCTV, or other suitable technology (such as thermal imaging) at Working Areas, including temporary measures. The *Contractor* develops the technical specifications for the security system and submits to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, prior to commencement of the relevant construction activity. A reason for not accepting the specifications is that they do not provide sufficient provisions to address the *Client's* Physical Security Execution Plan.

S215.35 The CCTV (or other detection technology) OR Level 1 and 2 defines camera location, type or other technology locations and types used to

- monitor and control,
- detect,
- observe,
- recognise and
- identify.

S215.36 The CCTV (or other detection technology) system is integrated with perimeter intruder detection system (PIDS) and located with consideration of security lighting and aligns with the principles in the *Client's* Physical Security Execution Plan. The *Contractor* ensures the integrated PIDS consider

- a networked video surveillance system (NVSS),
- infra-red/thermal imaging,
- integrated bio-metric access control system configurable for various clearance zones, including a backup redundancy system,
- perimeter fencing and lighting including infra-red system.
- anti-vehicle mitigation systems at identified points,

- automatic number plate recognition (ANPR),
- perimeter detection systems and
- security communication systems, including two-way audible cameras at access points.

Access Control – Not used

S215.37 Not used.

Security assurance

S215.38 The *Contractor* provides reports on the 'Security performance indicators' listed within the Balanced Scorecard (see link in Annex A) to the *Project Manager* as part of the monthly progress report described in section S800. The *Project Manager* provides the Balanced Scorecard with updated 'Security performance indicators' within four weeks of the *starting date*.

S215.39 The *Contractor* carries out

- scenario exercises to test the effectiveness of its security capabilities two months prior to the first *access date* on the Accepted Programme. The *Contractor* agrees with the *Project Manager* the scenarios to be undertaken and
- exercises to test the effectiveness of its security measures on mobilisation upon access to land provided by the *Client* and on a regular basis thereafter as required by the *Project Manager*. The *Contractor* agrees with the *Project Manager* the exercise format and the programme.

S215.40 The *Project Manager* may, at any time, undertake an audit or assurance of the *Contractor's* security service and systems.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

S225 Protection of existing Structures and services

S225.1 The *Contractor* liaises and coordinates with third-party asset owners and operators to ensure all necessary Consents and certificates are in place, which includes

- engineering works,
- possessions,
- planned shutdowns or outages,
- temporary diversion works,
- arrangements for access to hydrants,
- maintenance holes and
- all Others'
    - o asset apparatus,

- plant or
- associated equipment that is made temporarily inaccessible.

S225.2 The *Contractor* adopts and identifies shortcomings in ground investigation (GI) works, ground-penetrating radar (GPR), cable avoidance tool (CAT) scan and trial trench investigation works that have previously been undertaken by the *Client*. The *Contractor* undertakes any work to close any shortcomings.

S225.3 The *Contractor* is to have a dedicated team in place for the planning and management of breaking ground activities.

S225.4 The *Contractor* ensures that any activities that affect the *Client's* or Others' assets are undertaken in accordance, and only after agreement, with the respective affected asset owners.

S225.5 The *Contractor* determines and locates all services that affect the *works*.

S225.6 The *Contractor* mitigates the impact of the *works* on the *Client's* and Others' assets.

S225.7 The *Contractor* is responsible for all mitigation, liaison, co-ordination, co-operation with the appropriate bodies and protection measures required to minimise the risk of damage to the *Client's* or Others' assets in Providing the Works.

S225.8 The *Contractor* notifies damage to Structures and services to the *Project Manager* and the owners of the Structures and services damaged. The *Contractor* repairs any damage to Structures and services, in accordance with the relevant agreement with the third party.

S225.9 The *Contractor* liaises with the *Client* and Others to understand the potential restrictions on the available working land and traffic routes on the grounds of safety and risk to Others' assets, including Major Accident Hazard Pipelines.

Protection of highway assets

S225.10 The *Contractor* undertakes surveys, investigations, obtains Consents and agreements and undertakes the design and implementation of any repairs, strengthening, modifications (temporary or permanent) of highway assets required to enable the use of the routes to Provide the Works.

S226 Official Secrets Acts

S226.1 The Official Secrets Act 1989 (see link in Annex A) applies to the contract from the *starting date* until the *defects date*.

S226.2 The *Contractor* notifies Staff of their duties under the Official Secrets Act 1989.

S226.3 A failure to comply with this section is treated as a substantial failure by the *Contractor* to comply with its obligations.

S227 Data Protection

S227.1 The *Contractor* complies with the *Client's* data protection requirements provided in Annex L.

S227.2 The *Contractor* ensures that all data protection notices are maintained and kept up to date.

S227.3 The *Contractor* prepares and submits a 'data protection impact assessment' to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure. The *Contractor* complies with the control measures identified within the 'data protection impact assessment'. The *Contractor* proposes a review schedule for the 'data protection impact assessment' for acceptance

by *Project Manager.* Following any updates the *Contractor* continues to comply with any control measures identified within the updated 'data protection impact assessment'.

S227.4 A reason for not accepting the “data protection impact assessment” is that the control measures identified do not protect Data in line with Data Protection Legislation.

S227.5 The *Contractor* proposes and agrees with the *Client* mechanisms to manage Data Subject's rights under Data Protection Legislation.

S227.6 The *Contractor* assists the *Client* in defining and maintaining a record of processing activity for all Personal Data handled by the *Contactor*.

S227.7 The *Contractor* ensures there are provisions to comply with data protection requests including the

- right to be informed,
- right of access,
- right of portability,
- right of erasure,
- right of rectification,
- right to restrict processing and
- right to object to processing.

S227.8 On Completion of the whole of the *works*, or earlier termination, the *Contractor* gives to the *Project Manager* all Personal Data held by it in a format specified by the *Project Manager* (and procures any subcontractor (at any stage of remoteness from the *Client*) and a Sub-Processor gives to the *Project Manager* all Personal Data held by it in a format specified by the *Project Manager*) and destroys, and procures any subcontractor (at any stage of remoteness from the *Client*) and the Sub-Processor destroys, any electronic and paper copies of such data in a secure manner.

S227.9 For the purposes of the contract, the Data Protection Legislation and this section S227 only

- the *Client* is the Data Controller unless otherwise specified in schedule A of Annex L,
- the *Contractor* is the Processor unless otherwise specified in schedule A of Annex L and
- this section and schedule A of in Annex L constitutes a data processing agreement where required by the Data Protection Legislation.

S227.10 The *Contractor* processes the Personal Data in accordance with the Data Protection Legislation and only to the extent necessary for the purpose of Providing the Works.

S227.11 The *Contractor* does not knowingly do anything or permit anything to be done which might lead to a breach of the Data Protection Legislation by either Party.

S227.12 The *Contractor* obtains and maintains, until Completion all registrations and notifications that it is obliged to obtain and maintain pursuant to the Data Protection Legislation in respect of Providing the Works.

S227.13 The *Contractor* only processes Personal Data to the extent that it relates to

- the types of Data,
- the categories of Data Subject and
- the nature and purpose

as set out in schedule A of Annex L and only for the duration specified in schedule A of Annex L.

S227.14 Without prejudice to paragraphs S227.10 and S227.36 the *Contractor* processes the Personal Data only in accordance with the instructions of the *Project Manager* unless the *Contractor* is required to process Personal Data for other reasons under the laws of the United Kingdom or European Union (or a member state of the EEA) to which the *Contractor* is subject. If the *Contractor* is required to process the Personal Data for these other reasons, it informs the *Project Manager* before carrying out the processing, unless prohibited by relevant law.

S227.15 The *Contractor* immediately informs the *Project Manager* if it believes that an instruction infringes the Data Protection Legislation or any other applicable law.

S227.16 The *Contractor*

- implements and maintains Protective Measures which take into account the nature, scope, context and purpose of processing the Data,
- implements adequate security programmes and procedures to ensure that unauthorised persons do not have access to the Data or to any equipment used to process the Data and
- ensures that its processing is in accordance with the Data Protection Legislation and protects the rights of Data Subjects.

S227.17 The *Contractor* submits details of its Protective Measures to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure. A reason for not accepting them is that they are not appropriate to protect against a Security Incident. Acceptance (or a failure to reject) by the *Project Manager* does not amount to acceptance by the *Client* of the adequacy of the Protective Measures.

S227.18 The *Contractor* ensures that all persons authorised to process Data are bound by obligations equivalent to those set out in this section and section S210 (Confidentiality) and are aware of the *Contractor's* obligations under the contract and the Data Protection Legislation.

S227.19 The *Contractor* ensures that access to the Data is limited to those persons who need access in order for the *Contractor* to Provide the Works and (in each case) to such parts of the Data as are strictly necessary for the performance of that person's duties.

S227.20 Where the *Contractor* obtains or collects Personal Data on behalf of the *Client*, the *Contractor*

- provides to Data Subjects, a data protection notice in a form agreed by the *Project Manager* (or directed if the *Contractor* and the *Project Manager* do not agree), informing the Data Subject of the identity of the *Client*, the identity of any data protection representative it may have appointed, the purpose or purposes for which their Personal Data is processed and any other information which is necessary having regard to the specific circumstances in which the Personal Data is, or is to be, processed to enable processing in respect of the Data Subject to be fair and comply with the Data Protection Legislation and
- where applicable, obtains all necessary consents for the processing of Data.

S227.21 On request, the *Contractor* takes all necessary actions and provides the *Project Manager* with all reasonable assistance necessary for the *Client* to comply with a Data Subject Access Request.

S227.22 The *Contractor* immediately notifies the *Project Manager* if it receives

- a Data Subject Access Request (or purported Data Subject Access Request),
- a complaint or request relating to the *Client's* obligations under the Data Protection Legislation or
- a request from any Supervisory Authority for assistance or information, unless prohibited by relevant law.

S227.23 The *Contractor* assists and co-operates with the *Project Manager* in relation to any complaint or Data Subject Access Request received pursuant to paragraph S227.22, including

- providing full details of the complaint or Data Subject Access Request,
- complying with the Data Subject Access Request within the time limits set out in the Data Protection Legislation and in accordance with the instructions of the *Project Manager* and
- promptly providing the *Project Manager* with any Personal Data and any other information requested to enable the *Client* to respond within the time limits to the Data Subject Access Request.

S227.24 The *Contractor* does not process the Data outside the EEA (other than in the United Kingdom) without the agreement of the *Project Manager.* Where the *Client* agrees, the *Contractor*

- provides evidence (acceptable to the *Project Manager*) of appropriate safeguards as required by the Data Protection Legislation and
- complies with the instructions of the *Project Manager.*

S227.25 The *Contractor* complies with the requirements of the *Client* and the *Project Manager* in relation to the storage, dispatch and disposal of Data in any form or medium. Any requirement for the *Contractor* to destroy or delete copies of the Data is subject to any law of the European Union, the United Kingdom or a member state of the EEA to which the *Contractor* is subject that requires Data to be retained.

S227.26 The *Contractor* notifies the *Project Manager* as soon as it becomes aware of a Security Incident or any other breach of this section. The notification includes, as far as possible

- a description of the nature of the Security Incident, including the categories and approximate number of Data Subjects concerned,
- the likely consequences of the breach and
- the Protective Measures taken, or to be taken, to address the breach, including measures taken to mitigate any possible adverse effects.

S227.27 In the event of a Security Incident, the *Contractor* provides the *Project Manager* with full co-operation and assistance in dealing with the Security Incident, in particular, notifying individuals affected by the Security Incident or a Supervisory Authority as required by the Data Protection Legislation and in accordance with the instructions of the *Project Manager*.

S227.28 On request, the *Contractor* provides to the *Project Manager* all necessary information to demonstrate the *Contractor's* compliance with this section.

S227.29 The *Contractor* promptly provides all assistance and information requested by any Supervisory Authority or required by the *Project Manager* in order for the *Client* to ensure compliance with its obligations under the Data Protection Legislation, including in relation to

- security of processing,
- preparation of any necessary Data Protection Impact Assessments and
- undertaking any necessary data protection consultations of Supervisory Authorities.

S227.30 The *Contractor* maintains electronic records of all processing activities carried out on behalf of the *Client*, including

- the information described in paragraph S 227.13,
- the different types of processing of Data being carried out (if applicable),

- any transfers of Data outside the EEA or the United Kingdom, identifying the relevant country or international organisations and any documentation required to demonstrate suitable safeguards and
- a description of the technical and organisation security measures referred to in paragraph S227.16.

The *Contractor* makes these records available to the *Project Manager* promptly on request.

S227.31 Before allowing any Sub-Processor to process any Personal Data related to the contract, the *Contractor*

- notifies the *Client* in writing of the intended Sub-Processor and processing,
- obtains the agreement of the *Project Manager*,
- enters into a written agreement with the Sub-Processor which gives effect to the terms set out in the contract such that they apply to the Sub-Processor and
- provides the *Project Manager* with such information regarding the Sub-Processor as the *Project Manager* may reasonably require.

S227.32 The *Project Manager* may, at any time revise this section S227 and **Annex L** by replacing it with any applicable controller to processor standard provisions or similar terms forming part of an applicable certification scheme.

S227.33 The Parties agree to take account of any guidance issued by the “Information Commissioner’s Office”.

S227.34 Each Party designates its own data protection officer if required by the Data Protection Legislation.

S227.35 A failure to comply with this section S227 and Annex L is treated as a substantial failure by the *Contractor* to comply with its obligations.

General offshoring requirement

S227.36 In Providing the Works, the *Contractor* complies with the LTC offshoring policy (see link provided in Annex A) unless otherwise agreed with *Project Manager*.

S228 Information Security and Data handling requirements

S228.1 The *Contractor's* information security management system aligns with the *Client's* requirement to meet Her Majesty's Government Protective Security Policy and National Security requirements.

S228.2 The *Contractor* submits an 'information security management plan' to the *Project Manager* for acceptance.

S228.3 The *Contractor's* ‘information security management plan’ meets the requirements in the

- Acceptable Use policy,
- Working Away from the Office Security Policy,
- Password Policy,
- Digital Services Security Operations Policy,
- Business IT Asset Management Policy,
- LTC offshoring policy,
- Personal Data Incident Policy,

- Data Protection Policy,
- Freedom of Information (FOI) and Environmental Information Regulations (EIR) Policy,
- Camera Technology Privacy Policy,
- Information Security Policy,

provided in Annex A and the policies and standards referenced therein.

S228.4 A reason for not accepting the *Contractor's* 'information security management plan' is that

- it does not meet the requirements in paragraph S228.3 or
- the control and security management procedures identified do not protect the *Client's* information security.

S228.5 The *Contractor* ensures that the *Client's* information security requirements are met by all subcontractors (at any stage in remoteness from the *Client*).

S228.6 The *Contractor* does not use any confidential or proprietary information provided to or acquired by it for any purpose other than to Provide the Works. The *Contractor* implements measures to prevent the disclosure of such information by Staff.

S228.7 A failure to comply with this section is treated as a substantial failure by the *Contractor* to comply with its obligations.

S229 Discrimination, bullying and harassment

S229.1 The *Contractor* complies with all requirements of the Equality Act 2010 and does not discriminate directly, indirectly, or by way of victimisation or harassment against any person contrary to the Equality Act.

S229.2 The *Contractor* co-operates with and assists the *Project Manager* and the *Client* to satisfy the *Client's* public sector equality duty under s.149 of the Equality Act 2010 to

- eliminate unlawful discrimination, harassment and victimisation and any other conduct prohibited by this Act,
- advance equality of opportunity between people who share a protected characteristic and people who do not and
- foster good relations between people who share a protected characteristic and people who do not.

S229.3 The *Contractor* co-operates with and assists the *Project Manager* and the *Client* to discharge these duties by requiring that and ensuring that subcontractors (at any stage of remoteness from the *Client*) co-operate with and assist the *Client* in discharging these duties.

S229.4 Where any Staff are required to carry out any activity on the *Client's* premises or alongside the *Client's* employees on any other premises, the *Contractor* ensures that Staff comply with the requirements of the Equality Act 2010 and with the *Client's* Respect at Work Policy (see link in Annex A).

S229.5 The *Contractor* notifies the *Project Manager* of any investigation or proceedings brought against the *Contractor* and its Staff under the Equality Act 2010 in connection with the contract and

- provides any information requested by the investigating body, court or tribunal in the timescale allotted,
- attends (and permits a representative from the *Client* to participate in) any associated meetings,

- promptly allows access to any relevant documents and information and
- co-operates fully and promptly with the investigatory body, court or tribunal.

S229.6 The *Contractor* complies (and ensures that any subcontractor (at any stage of remoteness from the *Client*) complies) with the *Client's* policies relating to bullying and harassment. If the *Project Manager* considers that the presence or conduct of any Staff at any location relevant to the performance of the *works* is undesirable or in breach of the *Client's* policies, the *Project Manager* instructs the *Contractor* to implement corrective action.

S229.7 A failure to comply with this section is treated as a substantial failure by the *Contractor* to comply with its obligations.

Human Rights and Modern Slavery

S229.8 The *Contractor* complies with all applicable human rights and employment laws in the jurisdictions in which they work and has robust means of ensuring that subcontractors (at any stage of remoteness from the *Client*) also comply. This includes complying with the provisions of the Modern Slavery Act 2015 (see link in Annex A) including the production of an annual transparency statement which sets out the steps that the *Contractor* has taken during the financial year to ensure that slavery and human trafficking is not taking place in any of its supply chains or any part of its business.

S229.9 The *Contractor* carries out an annual audit to monitor its compliance with the Modern Slavery Act 2015 which covers all its obligations under all its existing *Client* contracts. The *Contractor* prepares and delivers to the *Project Manager* no later than 1st August each year an annual

- slavery and human trafficking report,
- transparency statement and
- a Risk Register with mitigating actions

which complies with the Modern Slavery Act 2015 and sets out the steps it has taken to ensure that slavery and human trafficking is not taking place in any of its supply chains or in any part of its business.

S229.10 The *Contractor* notifies the *Client* as soon as it becomes aware of any actual or suspected slavery or human trafficking in any of its supply chains or any part of its business. The *Contractor* ensures that all subcontracts (at any stage of remoteness from the *Client)* contain provisions to the same effect as this section.

S229.11 A failure to comply with this section is treated as a substantial failure by the *Contractor* to comply with its obligations.

S230 Protection of the *works*

S230.1 The *Contractor* is responsible for protecting the *works* from damage.

S230.2 The *Contractor* does not carry out any activities liable to damage or affect the stability of the *works*.

S230.3 The *Contractor* plans, co-ordinates and controls the activities of its subcontractors (at any stage of remoteness from the *Client*) and Others to ensure that the *works* are provided in a way that eradicates the potential for damage or instability to the *works*.

Use of explosives

S230.4 The *Contractor* does not use explosives in Providing the Works without agreement of the *Project Manager*.

S235 Cleanliness of roads

S235.1 The *Contractor* prevents mud, litter and debris from being tracked onto any highway, road or other routes by any vehicle exiting the Working Areas. Depending on local restrictions this involves hard surfacing of site roads, fixed drive-through wheel washers, positioned at the points of egress supplemented by pressure washers and road sweeping. The *Contractor* works in accordance with the Code of Construction Practice (CoCP) and the requirements of the highways and local authorities to achieve this.

S235.2 The *Contractor* prevents litter from accumulating on or adjacent to the Working Areas and where access is restricted by the *Contractor's* temporary traffic management.

S235.3 Where a Detailed Local Operating Agreement (DLOA) is not applicable, the *Contractor* agrees the extent of its maintenance responsibility with the local Highway Authority using a local operating agreement.

S235.4 The *Contractor* is responsible for wheel washing all vehicles leaving its Working Areas and complies with the control procedures at Others' sites. The *Contractor* notifies the drivers of vehicles of its control procedures and ensures they are complied with.

S240 Temporary Traffic management

S240.1 Where temporary traffic management is required, the *Contractor* designs, implements and undertakes safety audits, applies lessons learned and ensures its proposals comply with the

- Development Consent Order (DCO),
- Traffic signs manuals Chapter 7 and Chapter 8 (see link in Annex A),
- 'Roadworks a Customer View Toolkit' provided in Annex A and expected best practice,
- numbered appendix 1/17,
- relevant Local Authority requirements or guidance and
- Major Projects Dynamic Roadworks – a vision for the future (see link in Annex A).

S240.2 The *Contractor* complies with the DCO's outline traffic management plan for construction when developing its traffic management plans.

S240.3 During the *works,* the *Contractor* ensures that all existing carriageway lanes are available for use on the SRN during peak hours and manages delays through traffic management. The temporary traffic safety and management measures are implemented on the SRN with a minimum of 60mph temporary speed limit, unless otherwise agreed with the Traffic Management Forum (TMF).

The *Contractor* ensures that the 60mph temporary speed limit does not compromise the safety of personnel on Site or within Working Areas or the road user.

S240.4 The *Contractor* assesses the temporary traffic safety and management measures on trunk roads

- considering a temporary speed limit of 60mph (where the existing speed limit is 70mph) and
- considering a temporary speed limit of 50mph,

to demonstrate a 9% reduction in journey times over the 50mph temporary speed limit. The *Contractor* provides a comparison of the outcomes of the two temporary speed limits to determine the difference between journey times.

If the *Contractor* is unable to meet the 9% reduction in journey times then it seeks the agreement of the TMF to implement the *Contractor's* temporary traffic safety and management measures without the 9% reduction.

The *Contractor* considers dynamic 60mph or other measures if the 9% reduction cannot be achieved.

The *Contractor's* mitigations include measures outlined in the *Client's* 'Roadworks A Customer View Toolkit' provided in Annex A where possible.

S240.5 The *Contractor* submits its traffic management plan including

- evidence of the TMF endorsement,
- comments from the Traffic Management Forum (TMF) and
- evidence of Secretary of State's (SoS) agreement

for acceptance by the *Project Manager*, in accordance with the Acceptance Procedure and accompanied by a Multiparty Collaboration Certificate, at least four weeks before implementing the temporary traffic safety and management measures. The *Contractor* ensures that the traffic management plan complies with the requirements of numbered appendix 1/17.

S240.6 A reason for not accepting the traffic management plan is

- it does not comply with the Scope,
- it does not comply with the DCO's outline traffic management plan for construction or
- it is not acceptable to Others.

S240.7 The *Contractor* ensures

- its temporary traffic management audit team includes a practitioner who holds an Institute of Highway Engineers' Professional Diploma in Temporary Traffic Management and
- none of the temporary traffic management audit team undertakes any temporary traffic management design for the *works*.

S240.8 The *Contractor* ensures that, as a minimum, monthly TMF meetings are carried out in accordance with the requirements of numbered appendix 1/17 and this section S240.

S240.9 Prior to engaging with the TMF about traffic management, the *Contractor* notifies the *Project Manager* the intent to do so at least five weeks prior to any TMF meetings. No later than two weeks before the TMF engagements, the *Contractor* invites the *Project Manager* and the *Client*'s traffic manager to all accepted engagement activities.

S240.10 The *Contractor* submits the findings of the TMF engagements to the *Project Manager* and the *Client*'s traffic manager for information in its 'communications and engagement plan'.

S240.11 The *Contractor* plans and communicates the diversion routes clearly to the Customer. The *Contractor* tests the diversion routes before implementation and ensures they are adequate for all types of vehicle impacted by the diversion.

S240.12 The *Contractor* works with Others to maintain areas of the road network impacted by the *works* to ensure a positive image is received by Customers. Where required this includes litter picking, cleaning and a breakdown and recovery service.

Traffic Management Forum (TMF)

S240.13 The *Contractor* collaborates with the *Client's* traffic manager (via the *Project Manager*) to facilitate the Traffic Management Forum in accordance with the requirements contained in the DCO's outline traffic management plan for construction.

S240.14 The TMF reviews the performance of the impacted traffic management, including

- direct impacts to the travelling public (including walkers, cyclists and horse riders (WCH)),
- indirect impacts on the wider network as a result of the implemented traffic management
- impact on local businesses and communities and
- reviewing specific traffic management operations including
    - weekend closures for demolition and
    - special events.

S240.15 The *Client*

- chairs the TMF,
- maintains the TMF workflow and
- notifies the *Contractor* one week in advance of each TMF engagement.

The *Project Manager*

- identifies all attendees in consultation with the *Contractor*, to represent the Project.

The *Contractor*

- notifies the *Project Manager* of the need for a TMF engagement including
    - a minimum monthly engagement commencing from the *starting date* and
    - when substantial changes, or changes having a substantial impact, are made to the traffic management plan and
- arranges venues for the TMF engagement at locations that are agreed with the *Project Manager*.

S240.16 The *Contractor* provides the *Project Manager* with the traffic management plan (including any supporting information or additional information requested by the *Client's* traffic manager (via the *Project Manager*)) two weeks in advance of each TMF engagement.

S240.17 The *Contractor*

- attends all TMF engagements where invited by the *Project Manager*,
- ensures the programme submitted for acceptance provides the required time for TMF engagements,
- implements or resolves the TMF comments and
- ensures the appropriate Staff attend the TMF engagement.

S240.18 The *Contractor* provides all TMF engagement information (including agendas, posters and leaflets) and also includes copies of this information on the Project Common Data Environment (CDE) no less than two weeks prior to the TMF engagement.

S240.19 The *Client's* traffic manager (via the *Project Manager*) prepares minutes within 10 working days of closing the engagement and includes an abbreviated action list with assigned responsibilities and

timescales for each action, as agreed following the TMF engagement in a debriefing session between the *Client*, *Project Manager* and the *Contractor*.

S240.20 The TMF consists of

- the *Client* (and its team),
- the *Project Manager* (and its team),
- the *Supervisor* (and its team),
- the *Contractor*,
- other Main Works Contractors,
- relevant Statutory Undertakers,
- relevant Local Authorities,
- public transport operators,
- emergency services,
- the *Client's* maintenance service providers and
- any other interested party

affected by temporary traffic management and safety measures.

S240.21 The *Contractor* ensures that the TMF is informed of the *Contractor's* proposed traffic management plans and addresses the views of the TMF, where practical to do so, before implementation of the traffic management plan.

S240.22 The *Contractor* provides all TMF engagement information (including agendas, contractor recorded minutes) on the Project Common Data Environment (CDE) within five working days of the TMF engagement.

S240.23 The *Contractor* reviews all comments raised by the TMF, provides a feedback report within two weeks of each TMF engagement that details the appropriateness of its implementation into the traffic management plan. This feedback report is submitted to the *Client's* traffic manager (via the *Project Manager*).

Evidential Trails

S240.24 The *Contractor* ensures that evidential trails are provided for the enforcement system in accordance with the "Evidential Trail Suite of Documents" (see link provided in Annex A) and "Speed Camera Policy & Approval - Index of Guidance Documents" (see link provided in Annex A).

S240.25 The *Contractor* ensures that all average speed and spot speed enforcement systems have Home Office Type Approval (HOTA).

S240.26 The *Contractor* complies with the enforcement group requirements contained in section S300 and enforcement system testing requirements contained in section S700.

Construction Travel Plan

S240.27 The *Contractor* prepares a construction travel plan and the Multiparty Collaboration Form in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to commencement of the DCO Construction Phase.

S240.28 A reason for not accepting the construction travel plan is

- it does not comply with the Scope or
- it does not comply with the DCO's framework construction travel plan.

South Portal Site

S240.29 The *works* include an interface with the SRN. The *Contractor* notes that the A2 has known network issues at peak hours. The *Contractor* develops a design and construction methodology that minimises the impact on the SRN.

Maintenance During Construction

S240.30 The *Contractor* develops the Detailed Local Operating Agreement (DLOA) which details the provision of maintenance obligations for the existing assets in Providing the Works and details when the maintenance obligations transfer from the Regional Maintenance Service Providers (or equivalent) to the *Contractor* in accordance with GG 182 Major Schemes, enabling handover into operation and maintenance (see link in Annex A).

For the *Client's* assets, the *Contractor* assumes full maintenance obligations except for the winter maintenance services.

In the event that the traffic management provision prevents the Regional Maintenance Service Providers (or equivalent) from undertaking their winter service, the *Contractor* provides alternative winter maintenance fleet.

S240.31 Where necessary and where directed by the *Project Manager*, the *Contractor* develops local operating agreements (LOAs) which detail the provision of maintenance obligations for the existing assets in Providing the Works and detail when the maintenance obligations transfer from the relevant Local Authority's maintenance service providers to the *Contractor*.

The *Contractor* ensures that these LOA's contain the same level of detail and are consistent with the DLOA requirements in accordance with GG 182 Major Schemes, enabling handover into operation and maintenance (see link in Annex A).

S240.32 The DLOA or LOA includes

- the approach to conducting surveys,
- defines the obligations of all parties during construction and
- describes how the handover process is managed.

S240.33 The *Contractor* complies with the agreed DLOA or LOA.

S240.34 The *Contractor* ensures that the DLOA and LOAs include details of the interim maintenance arrangements for all assets.

S240.35 The *Contractor* prepares the DLOA using the DLOA template (link provided in Annex A), unless otherwise agreed with the *Project Manager.*

S240.36 The *Contractor* submits the DLOA to the *Project Manager* for agreement and accompanied by the Multiparty Collaboration Certificate within 120 weeks after the *starting date*. The *Contractor* updates the DLOA when changes occur and when it is no longer current, resubmits to the *Project Manager* for agreement.

S240.37 The *Contractor* submits the Local Authority agreed LOAs to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, accompanied by the Multiparty Collaboration Certificate, within 130 weeks after the *starting date*.

S240.38 The *Contractor* updates the LOAs when changes occur and they are no longer current and agrees such updates with the relevant Local Authority and submits it to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

S240.39 The *Contractor* provides evidence of endorsement from Local Authorities for LOAs prepared for Local Authority highway assets, alongside the submission to the *Project Manager*.

Local Authority Adoption Report

S240.40 The *Contractor* consults with the relevant Local Authority and prepares a local authority adoption report for each relevant Local Authority, that details the procedure for adoption and takeover of Local Authority owned assets, including

- Side Roads,
- WCH Routes,
- LA Maintenance Tracks and
- Structures

in compliance with the relevant Local Authority's requirements for adoption and takeover. These local authority adoption reports are to be submitted to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, prior to the commencement of the construction phase.

S245 Surveys

Condition Surveys

S245.1 The *Contractor* carries out risk assessments on the potential effects that the construction of the *works* (temporary and permanent) have on the structural integrity of adjacent roads, railways, buildings, Structures, utilities and other assets. The *Contractor's* risk assessment includes

- details of any proposed survey works to inform design development, which has the potential to affect any Others' assets, land and access roads,
- details of trigger levels and
- proposed actions when a trigger is breached.

The *Contractor* provides these risk assessments for information to the *Project Manager* eight weeks prior to undertaking the relevant construction activities.

S245.2 The *Contractor* ensures that

- all buildings, assets, land and access roads identified in the risk assessment as affected, or at risk of being affected, by the *works* have condition surveys to determine their state before and after the *works* are completed,
- condition surveys are undertaken by a chartered building surveyor or, in cases where Structures are already showing signs of distress prior to commencement of any construction activities which may affect that structure, a competent chartered structural engineer or equivalent,
- condition surveys do not damage the surveyed asset and
- condition surveys adequately record the condition of the asset, including
    - cracks and historical signs of movement and
    - previous remedial works.

S245.3 Where buildings and assets are likely to be affected by ground movements due to construction activities, the *Contractor* undertakes movement monitoring of these existing Structures.

S245.4 The *Contractor* ensures that photographic images are of a standard to enable defects, such as cracks and bulges, to be identified and quantified.

S245.5 The *Contractor* carries out condition surveys in accordance with CS 450 – Inspection of highway structures (see link in Annex A).

S245.6 The *Contractor* carries out condition surveys in two stages, as follows

- pre-construction condition surveys are carried out jointly with the building or asset owner. The *Contractor* agrees existing defects with the building or asset owner at the time of the survey. The survey adequately records the condition of the building or asset prior to, but no earlier than within three months of, any construction activities being undertaken that influence the asset. The *Contractor* makes pre-construction condition survey records available to the *Project Manager* in advance of the relevant construction activities and
- post-construction condition surveys are carried out jointly with the building or asset owner. The post-condition surveys adequately record the conditions on completion of the relevant construction activities. Post-construction condition surveys are undertaken as soon as reasonably practical. The *Contractor* makes its survey records available upon request by the *Project Manager*.

S245.7 If the building or asset owner raises concerns over movement of their building or asset, or the *Contractor's* monitoring shows movements beyond predictions or that they are likely to move beyond predictions, the *Contractor* undertakes additional surveys during this movement and submits its proposals for reducing the movement and associated remediation works or actions if required.

S245.8 The *Contractor* does not enter land or property, or contact the land or property owner, without the prior agreement of the *Project Manager*. The *Contractor* has no authority to commit the *Client* to any payment for land or property entry. The *Contractor* co-ordinates all access requirements, and submits the survey's scope, methodology and any other relevant details for agreement by the *Project Manager*.

S245.9 Unless otherwise agreed with the *Project Manager*, the *Contractor* records all survey access arrangements and submits a copy of this correspondence to the *Project Manager,* no later than 48 hours prior to taking access.

Survey Control Network

S245.10 The *Client* has created a Project Survey Control Network provided in Annex A, to establish a homogeneous network of control points through the area of the main carriageway from J29 of the M25 to the tie-in point of the A2. This network seeks to ensure that all subsequent survey works are on the same co-ordinated system, therefore errors incurred when bringing together data from different sources are to be eliminated. The Project survey control network provides a set of stable co-ordinates for dimensional control. This network also provides the basis for the Main Works Contractors to have a single chainage system.

S245.11 In Providing the Works, the *Contractor* adopts and uses the Project survey control network.

S245.12 In addition to the Project survey control network, the *Contractor* establishes a network of ground control points (GCP) on or adjacent to the carriageways of the three main junctions, A2, A13 and M25. The *Contractor* may use GCPs for any subsequent topographic surveys providing they tie-in with the Project survey control network.

S245.13 The *Contractor* proposes for agreement by the *Project Manager* any local amendments to facilitate its own management of the *works* (e.g. an amended tunnel datum to avoid negative numbers). The *Contractor* provides records (e.g. as-built information) in the original Project survey control network format such that there is continuity across all Main Works Contracts, unless otherwise agreed by the *Project Manager.*

S250 Consideration of Others

S250.1 The *Contractor* only closes any existing Private Means of Access to be stopped up under the *works* when an alternative means of access, or otherwise, has been agreed and provided with the access owner. The *Contractor* advises any permitted users of the alternative access.

S250.2 The *Contractor* minimises the impact on any residence, residential areas, roads and the wider highway network resulting from the *works* or Providing the Works including those associated with the provision of its Compounds or other areas associated with the *works* through the delivery of the CoCP.

Considerate Constructors Scheme

S250.3 The *Contractor*

- registers the site, as an ‘Ultra Site’ under the Considerate Constructors Scheme (CCS) prior to the first *access date*,
- maintains the ‘Ultra Site’ standard in accordance with the CCS’s code of considerate practice for the duration of the *works*,
- notifies the *Project Manager* of CCS site visits and advisory meetings and
- submits copies of all reports and compliance certificates to the *Project Manager,* within two weeks of their completion.

S251 Customer Service

S251.1 The *Client* has published an overarching Customer Service Strategy (see link in Annex A), which sets out the approach to improving works and services provided to its Customers. The *Contractor* collaborates with the *Client* to support the successful delivery of the Customer Service Strategy. Key aspects of the Customer Service Strategy include the requirement to

- consistently, effectively and efficiently manage delays and make Customer journeys as safe and stress-free as possible using traffic modelling data to provide a baseline for delays during construction,
- improve the *Client’s* service and network, being more effective in operating, maintaining and improving the roads and
- develop the *Client’s* relationships with Customers, building strong dialogue with Customers and communities, providing information to help people make the best choices and understand the needs and expectations of the Customer.

S251.2 The *Client* has an overarching LTC Customer Plan (see link in Annex A). The *Contractor* collaborates with the *Client* and the *Project Manager* to support the successful delivery of the LTC Customer Plan.

S251.3 The *Contractor* immediately notifies the *Project Manager* of any Customer service issues and provides support in mitigating any negative consequences as outlined in the 'communications and engagement plan' as described in section S865 and the LTC Customer Plan.

S251.4 The *Contractor* provides any information needed to enable the *Project Manager* to prepare statements or responses to questions or issues raised by or on behalf of any Customer.

S251.5 The *Contractor* implements the principles set out in the *Client's* 'Roadworks A Customer View Toolkit' provided in Annex A).

S251.6 The *Contractor* adopts a joined up and shared working approach with relevant Others, Local Authorities and the *Client* where the *works* interface with other works, as detailed in section S865 including demonstrating that it has minimised the impact, as far as practically possibly, for short and long-distance journeys.

S251.7 The *Contractor* innovates and challenges the conventions traditionally used to design and manage traffic to help deliver better outcomes on its network and for local communities affected by diversion routes. The *Contractor* aligns to and trials new safety and customer initiatives in line with the *Client's* annual Customer Service Plans (see link in Annex A), where applicable.

S251.8 Two weeks prior to a planned closure event, the *Contractor* makes no additions to the planned closures or the related road space booking information. If the road closure is no longer required (in full or in part), the *Contractor* informs the *Project Manager* and updates the related road space booking information.

S251.9 The *Contractor* produces and submits the first Customer plan to the *Project Manager* for acceptance within 40 weeks of the *starting date*.

The Customer plan includes the *Contractor's*

- Customer stakeholder groups,
- communication channels and timings for each stakeholder,
- approach to providing tailored information to bespoke Customer groups (including freight, haulage, coach, bus, ports and disabled drivers),
- feedback protocols from Customers,
- processes and procedures which achieve the *Client's* Customer Outcomes,
- roles, responsibilities and contact information for Staff involved in delivering the Customer plan
- organisation charts that demonstrate the resources and their responsibilities required to deliver the *Client's* Customer Outcomes and
- reporting metrics to be used to monitor and report on Customer performance, in line with the *Client's* Customer reporting metrics requirements.

The *Contractor* addresses the *Project Manager's* comments on a draft Customer plan.

S251.10 The *Contractor's* Customer plan aligns with the *Client's* Customer Strategy, LTC Customer Plan, the *Client's* annual Customer Service Plans and the Communications and Engagement Strategy provided in Annex A.

S251.11 A reason for not accepting the Customer plan is

- it does not align with the *Client's* Customer Service Strategy,
- it does not align with the LTC Customer Plan or
- it does not provide the *Project Manager* with sufficient detail as to how the guiding principles of the LTC Customer Plan are to be delivered by the *Contractor*.

S251.12 The *Contractor* reviews, updates and submits the updated Customer plan to the *Project Manager* for acceptance annually in line with the LTC Customer Plan (updated annually) and the *Client's*

annual Customer Service Plans, or when there is a significant change which impacts the Customer or upon request by the *Project Manager.*

S251.13 The Project has been audited against the Customer Assurance Framework KPIs as provided in 'Roadworks A Customer View Toolkit' provided in Annex A and has achieved a score of 8 out of 10.

S251.14 The *Contractor* plans its activities to meet or improve this score and the *Project Manager* reviews the *Contractor's* performance against these KPIs every three months from the *starting date*. Where the *Contractor* scores less than 8 out of 10 for any KPI performance review, the *Contractor* agrees improvement measures with the *Project Manager* and implements these measures.

S251.15 The *Project Manager* suggests recommendations to the *Contractor's* quality plan to improve Customer service assurance. The *Contractor* either implements these recommendations or responds to the *Project Manager* giving reasons why they are not to be implemented.

S252 Customer Focus

S252.1 The *Contractor* implements the principles as set out in the *Client's* 'Roadworks A Customer View', including

- planning and design of traffic management,
- information provision and
- engaging and communicating with Customers.

S252.2 The *Contractor* supports the *Client's* Customer Outcomes to

- safely keep traffic moving, with minimal disruption,
- provide timely, reliable and accurate information to Customers,
- be a good neighbour to communities and
- set out an approach to providing tailored information to bespoke customer groups, freight, haulage, coach & bus, disabled and ports etc.

S252.3 The *Contractor* implements the principles as set out in the LTC Customer Plan.

S252.4 The *Contractor* develops, maintains and implements a 'stakeholder engagement plan' based on the *Client's* Communications Strategy & Plans provided in Annex A. The *Contractor* submits the first stakeholder engagement plan to the *Project Manager* for acceptance within 40 weeks of the *starting date*, which includes

- an approach to minimise escalation of complaints (in alignment with Stakeholder Engagement Strategy),
- an approach to collaborative engagement and planning with Local Authority transport teams and local transport providers to share travel information and maximise opportunities to share information with Customers for a better end to end experience,
- an approach to sharing travel information across multiple services including car, bus, coach, train and ports,
- supports communication of real-time journey information on social media and
- continuous improvement processes on the cause of delays, similar to the rail network.

S252.5 The *Contractor* implements the *Client's* pre-employment customer and engagement assessment module as part of the interview process for employees employed in customer and engagement roles.

The *Contractor* implements the *Client's* customer and engagement training modules as part of their training for employees employed in customer and engagement roles.

S252.6 The *Contractor* provides, from the *starting date*, a person(s) responsible for community relations, which includes setting up Local community groups that focus on identifying local risks and opportunities, facilitating mitigations and community social value initiatives, as detailed in sections S251, S252 and S865. The community relations lead updates and maintains the *Client's* community platform, including responding to queries and providing reporting metrics to be used to monitor and report on customer performance.

For the purposes of this paragraph S252.6, "Local" means individuals and organisations representing those located within the LTC development boundary and the surrounding communities who will be directly impacted by scheme construction impacts namely those in the following wards

South	**North**
Higham	East Tilbury
Shorne, Cobham and Luddesdown	Tilbury Riverside and Thurrock Park
Chalk	Tilbury St Chads
Riverview	Chadwell St Mary
Westcourt	Orsett
Singlewell	Little Thurrock Blackshots
Cuxton and Halling	Stifford Clays
Strood Rural	Belhus
Strood North	Ockendon
Strood South	Upminster
Woodlands	Cranham
Riverside	Harold Wood
Northfleet South	Warley
Istead Rise	South Weald
Painters Ash	Little Thurrock Rectory
Central	Chafford and North Stifford
Newtown	West Thurrock and South Stifford
Stone Castle	Stanford-le-Hope West
Stone House	Stanford East and Corringham Town
Bridge	The Homesteads
Temple Hill	Corringham and Fobbing
	Harold Wood

S252.7 The *Contractor* develops, maintains and implements a 'community relations plan' in response to the public consultation feedback. The *Contractor* submits the first community relations plan' to the *Project Manager* for acceptance*,* in accordance with the Acceptance Procedure within 44 weeks of the *starting date*. A reason for not accepting the community relations plan is that it does not address the public consultation feedback.

S252.8 The *Client* is implementing key customer initiatives as part of the LTC Customer Plan as detailed in Annex A. The *Contractor* collaborates with the *Project Manager* to support the successful delivery of these customer initiatives, including

- LTC Customer experience survey,
- the *Client's* community platform and
- LTC Customer training modules

S252.9 The *Contractor* provides feedback received from Customers on the performance of its traffic management arrangements to the *Project Manager*.

S252.10 The *Contractor* develops an incident management plan and procedure as described in section S1102 for all types of incidents.

S252.11 The *Contractor* engages with the *Client's* other major projects to share knowledge and agree best practice.

S253 People Strategy

S253.0A The *Contractor* reviews the Operating Model Handbook (see link in Annex A) and provides proposals to update the Operating Model Handbook to the *Project Manager* for agreement within 30 weeks of the *starting date*.

S253.0B The *Project Manager* updates the Operating Model Handbook with any updates

- agreed with the *Contractor* and
- the *Project Manager* deems necessary.

S253.0C The *Contractor* is guided by the principles in the Operating Model Handbook (as updated by the *Project Manager* from time to time).

S253.0D The *Contractor* reviews the 'people proposition' (see link in Annex A) and provides proposals to update the 'people proposition' that enable better outcomes for Staff, to the *Project Manager* for agreement within 30 weeks of the *starting date*.

S253.0E The *Project Manager* updates the 'people proposition' with any updates

- agreed with the *Contractor* and
- the *Project Manager* deems necessary.

S253.0F The *Contractor* adopts the principles in the People Proposition (as updated by the *Project Manager* from time to time).

S253.0G The *Contractor* ensures Staff adopt and act in accordance with the values and behaviours set out in the 'Values and behaviours booklet' (see link provided in Annex A).

Onboarding

S253.0H The *Contractor* provides proposals for its onboarding process to the *Project Manager* for acceptance within four weeks of the *starting date*. The onboarding process includes proposals for Staff to receive

- *Contractor's* Project induction,
- *Client's* Safety Passport attending Working Areas, and when instructed by the *Project Manager,*
- relevant Construction Skills Certification Scheme cards,
- all relevant Scope required training (e.g. environmental, information systems),
- relevant medical requirements described in Scope,
- drugs and alcohol testing,
- mental health awareness briefing,
- OHW awareness briefing,
- an introduction to the

- LTC Execution Strategy,
- *Client's* values and behaviours booklet and
- *Client's* home safe and well approach,

- proposals for the induction programme including
  - *Contractor's* site induction (if attending a site),
  - *Contractor's* office induction (if attending an office) and
  - introduction to the *Contractor's* Behavioural Based Safety (BBS) modules.

The *Contractor's* onboarding process details its governance approvals for resources to start on the Project.

S253.0I A reason for not accepting the onboarding process is that

- the process does not comply with the Scope or
- the process is not clear on the ways in which resources will be onboarded.

Inductions

S253.0J All of the *Contractor's* inductions are immersive and interactive, replicating real-life site scenarios to ensure all persons involved in Providing the Works have an appreciation of the Project's values and behaviours, the site hazards and control measures and the processes and procedures by which the Working Areas is managed.

S253.0K Two weeks after the *starting date* the *Project Manager* provides the *Contractor* with the *Client's* induction criteria. The *Contractor* submits its proposals for its 'induction programme' (to the *Project Manager* for acceptance within four weeks of the *starting date* and begins delivery of inductions within six weeks of the *starting date*.

The *Contractor's* 'induction programme' includes details of its project induction, site induction and office induction.

S253.0L The *Contractor* ensures its 'induction programme' includes processes and procedures that are inclusive for

- inducting Staff, the *Project Manager* (and its team) and the *Supervisor* (and its team), visitors and Others,
- determining which induction is required for each attendee,
- ensuring that each component of its 'induction programme' aligns with the *Client*'s induction criteria,
- disseminating information on the *Client's* expectations of behaviours and values,
- adopting a 'digital by default' approach to inductions with a focus on virtual reality and augmented reality,
- reducing carbon whilst maximising efficiency, productivity and knowledge retention during the planning and delivery of all inductions,
- managing and communicating inclusively with Staff,
- communicating information on behaviours, values, hazards, controls and ways of working as well as sharing relevant materials as described in section S1100,
- sharing the expectations and requirements for Customer Relationship Management as described in section S840,

- enabling visual communication of hazards and controls and
- bespoke arrangements for each Work Site, Compound or other Working Area.

S253.0M The *Contractor* ensures that its project induction introduces each attendee to the

- *Contractor's* vision of the Project which aligns to the 'Highways England Strategic Business Plan' (see link provided in Annex A),
- the *Contractor's* plan which aligns to with the guiding principles of the LTC execution strategy,
- values and behaviours set out in the *Client's* values and behaviours booklet,
- the *Client*'s 'home safe and well approach', health, safety and wellbeing (HSW) focus areas and objectives,
- the *Client's* Lowest Carbon Strategy,
- principles for efficient and safe delivery,
- awareness of customer interfaces,
- overview of Consents requirements, management and assurance,
- role and structure of the *Client's* senior leadership team,
- data and management tools used by the *Client*,
- environmental constraints and an overview of mitigation measures and
- principles of stakeholder and community engagement.

S253.0N The *Contractor* ensures that in the Project induction

- attendees are encouraged to take part, not just attend,
- attendees are made to feel included and valued on the Project, regardless of role or duration of role,
- attendees have opportunity to practice challenging and influencing skills to support the achievement of a safe environment,
- the expected behaviours and values for the project are shared and how a Just and Fair Culture is applied in all aspects of Providing the Works,
- the tools described and practiced in the induction are applicable to all roles and functions,
- the induction format is multisensory and innovative, combining facilitated discussions, live or virtual scenario-based action and activity and
- provision is made to ensure that the induction content is updated, at least once a year, to reflect changes in messages or new phases of delivery.

S253.0O The *Contractor's* site and office inductions complement the Project induction and continues to develop all attendees' understanding. The site and office inductions, as a minimum

- are interactive and requires audience participation,
- provide a brief overview of the key Project messages,
- introduce and informs on fatal and construction safety risks as described in section S1100,
- include health, safety and wellbeing (HSW) communication and endorsement from the *Contractor*'s (or Consortium Members) senior leadership team. A member of the *Contractor*'s (or Consortium Members) senior leadership team leads at least one induction per month,

- include Project, site and office rules and emergency processes and
- describes the *Contractor's* Just and Fair Culture as described in section S1100 and how to raise concerns, observations and promote innovation.

The *Contractor* ensures that the induction content is updated, at least once a year, to reflect changes in messages or new phases of delivery.

People Engagement Plan

S253.0P The *Contractor* submits a 'people engagement plan' that demonstrates how the relevant aspects of the People Proposition will be implemented (see link in Annex A), to the *Project Manager* for agreement within 30 weeks of the *starting date*. This should include action plans outlining the *Contractors* proposals relating to

- training and education programme,
- alignment with the guiding principles of the *Client's* 'People strategy' (see link in Annex A),
- employee relations strategy,
- surveys,
- Reward and Recognition Scheme,
- training and development,
- apprentice and graduate training,
- 'Inclusion Action Plan (IAP)' and
- 'employment and skills plan (ESP)'.

S253.0Q The *Contractor* submits to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, its proposals for an ongoing training and education programme for Staff that implements the *Client's* values and behaviours detailed in the values and behaviours booklet including

- methods of delivery,
- how the education programme outlines what the values and behaviours mean for Staff and to Staff including
    - what Staff can expect from others and
    - how Staff feel psychologically safe to challenge behaviours,
- timescales for delivery and
- reporting capability including completion rates.

The *Contractor* implements the accepted training and education programme.

S253.0R The *Project Manager* provides the *Client's* 'People strategy' (see link provided in Annex A), setting out the strategic themes and people expectations. The *Contractor* reviews the strategy and prepares a plan to outline how it aligns with the guiding principles of the strategy and submits it to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

S253.0S A reason for not accepting the plan is that

- it does not align with the strategic themes of the strategy,
- it does not align with the people expectations of the People Proposition and seven areas of focus within the proposition or
- it does not provide the *Project Manager* with sufficient details as to how the strategic themes and seven areas of focus are to be delivered by the *Contractor*.

The *Contractor* implements the plan.

Employee relations

S253.0T The *Contractor* submits an employee relations strategy to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, within 60 weeks of the *starting date*. This strategy

- includes proposals for how the *Contractor* prioritises the fostering of supportive, collaborative and positive labour relations with trades unions and Staff led forums or works councils,
- aligns with the Project's outline approach for employee relations (provided on the *starting date*),
- includes an out-placement programme and it details the *Contractor's* proposals for the out-placement programme and
- aligns with the principles in the Project's People Proposition.

S253.0U A reason for not accepting an employee relations strategy is it does not align with the principles of the People Proposition.

S253.0V The *Contractor* provides a monthly report on its employee relations strategy including where relevant

- metrics as agreed with the *Project Manager*,
- provision of minutes of meetings,
- action logs or
- evidence of attendance at meetings.

Surveys

S253.0W The *Contractor* undertakes an annual employee engagement survey of Staff.

S253.0X The *Contractor* undertakes a quarterly focused pulse survey of Staff, unless otherwise agreed by the *Project Manager*.

S253.0Y The *Contractor* agrees target completion rates for the surveys with the *Project Manager.*

S253.0Z The *Contractor* submits to the *Project Manager,* the collated and analysed results of such surveys with an identified action plan of improvement and progress as part of the 'monthly progress report' described in section S850. The *Contractor* ensures the results of the surveys are filterable based on Staff demographics as agreed with the *Project Manager*.

S253.0AA The *Contractor* undertakes other surveys as requested by the *Project Manager,* including a monthly employee net promotor score assessment and 'happy' surveys. The *Contractor* submits to the *Project Manager*, the collated and analysed results of such surveys with an identified action plan of improvement and progress as part of the 'monthly progress report' described in section S850.

S253.0BB The *Contractor* ensures Staff participate in *Client's* surveys as requested by the *Project Manager.*

Reward and Recognition Scheme

S253.0CC The *Contractor* implements an electronic Reward and Recognition Scheme embedded in its organisation that allows Staff and the *Project Manager* (and its teams) and the *Supervisor* (and its teams) to recognise achievements by nominating them to receive a reward for positive behaviour, attitudes, innovation and good practice improving workforce morale and positively impacting

behaviours and performance. The *Contractor* provides a monthly report to the *Project Manager* on the number of awards given, who the awards are given to and for what reasons. The Reward and Recognition Scheme includes

- on the spot awards,
- monthly awards and
- exceptional awards.

Training and Development

S253.0DD The *Contractor* develops and implements processes, procedures and systems for the

- delivery and management of training and development and
- management of competence procedure

for Staff and reporting on compliance as and when requested by the *Project Manager*.

S253.0EE The *Contractor* uploads the training and competency of Staff onto its learning management system and keeps this up to date on a monthly basis, unless otherwise agreed with the *Project Manager*.

S253.0FF The *Contractor* ensures

- real-time compliance reports are created and
- it highlights every six months, Staff's training that is
  - overdue,
  - due for refresher or renewal,
  - due for transfer to national vocation qualification (NVQ) programme or equivalent vocational development or
  - relevant for the maintenance and upkeep of competence certificates.

S253.0GG The *Contractor* provides compliance reports when requested by the *Project Manager*.

S253.0HH The *Contractor* develops and maintains a 'training programme' that includes

- formal training courses,
- continual professional development,
- assessed internal training,
- assessed familiarisation training,
- manufacturers training for bespoke systems and
- discipline-specific practical training modules requiring active participation in the task environment.

S253.0II The *Contractor* provides

- access to the 'training programme' records and
- a copy of the 'training programme' records

to the *Project Manager* when requested.

S253.0JJ The *Contractor* provides a system that enables any *Client* required training e.g. *Client* produced e-learning modules to be uploaded to it therefore providing access to said training to all Staff. All other reporting requirements are as stated in paragraph S805.11.

S253.0KK For those roles where no suitable recognised competence standards exist, the *Contractor* provides information to the *Project Manager* on the selection criteria or method used to provide assurance of an individual's competence. This includes reference to the selection process used prior to employment, any subsequent appraisals of performance and competence and any relevant training and experience.

S253.0LL The *Contractor* ensures all training and competences are in place prior to undertaking the relevant work. In situations, such as apprentices, where it is not reasonable for an individual to have completed all training prior to undertaking the relevant work, the *Contractor* ensures appropriate supervision is provided to that individual until the training has been completed. The status of training is checked in the Readiness Review prior to the commencement of the relevant construction activity.

S253.0MM The *Contractor* develops an apprentice and graduate training plan and submits this to the *Project Manager* for acceptance. This plan includes proposals for providing secondment opportunities and experiential learning placements for the *Client's* graduates and apprentices.

The *Project Manager* provides the *Client's* graduate or apprentice education provider's plan on the *starting date* and annually thereafter.

The *Contractor* updates its apprentice and graduate training plan each year and submits the updated plan to the *Project Manager* for acceptance.

A reason for not accepting the plan is

- it does not comply with the Scope,
- it does not comply with the *Client's* latest graduate or apprentice education provider's plan or
- it does not align with the LTC Skills, Education and Employment Strategy provided in Annex A.

S253.0NN The *Contractor* nominates individuals to take part in the *Client's* leadership training programmes, including the 'Roads academy' (see link in Annex A), in the development and retention of talent. The *Contractor* releases Staff approved by the provider to attend such programmes.

S253.0OO The *Contractor* supports the *Client* in its development of collaborative leadership and training events and inputs into the development of these events. The *Contractor*'s senior leadership team (as identified on the organisation chart) attends these training events.

S253.0PP The *Contractor* ensures its senior leadership team (as identified on the organisation chart)

- attend quarterly collaboration events with the other Main Work Contractors held and chaired by the *Client*,
- attends behavioural based training led by the *Project Manager* and
- attends collaborative leadership and training events

unless otherwise agreed with the *Project Manager*.

S253.0QQ Commencing at month three after the *starting date*, the *Contractor* provides the *Project Manager* with a list of knowledge management case studies to be produced in the forthcoming quarter and uploaded to the Project's knowledge management tool, for agreement with the *Project Manager*. The *Project Manager* may add a topic to the proposed topics. The *Contractor* produces the case studies during the quarter unless agreed otherwise by the *Project Manager*.

The *Contractor* attends training on the system as requested by the *Project Manager*.

Equality, Diversity and Inclusion

S253.1 The *Contractor* assists the *Client* in the achievement of its equality, diversity and inclusion (EDI) objectives. The *Client's* key objective is to embed principles of equality, diversity and inclusion into all areas of its business, driving real change in how it works with its Customers and communities, its supply chain and Staff. The *Client* has developed an EDI strategy (see link provided in Annex A) and the *Contractor* demonstrates alignment with the EDI strategy in the development of an 'inclusion action plan'.

S253.2 The *Contractor* prepares an 'Inclusion Action Plan (IAP)' in accordance with the template provided in Annex G and submits it to the *Project Manager* for acceptance within 30 weeks of the *starting date*. The IAP demonstrates how the *Contractor* in Providing the Works plans to implement an iterative approach to supporting the *Client* in meeting the *Client's* EDI objectives.

S253.3 A reason for the *Project Manager* not accepting the IAP is

- it does not demonstrate how the requirements are passed down to its subcontractors (at any stage of remoteness from the *Client*),
- it does not demonstrate alignment with the EDI strategy,
- it does not demonstrate how the *Contractor*
    - attracts, recruits and retains a greater diversity of new entrants to the sector,
    - ensures the working culture, practice and environment is inclusive,
    - considers and understands the diverse needs of Customers and neighbouring communities,
    - holds itself and its subcontractors (at any stage of remoteness from the *Client*) to account in delivering the IAP or,
    - monitors and provides evidence of year on year improvements or
- it does not meet the aims of the public sector equality duty within s.149 of the Equality Act 2010 and defined in section S229 of the Scope.

S253.4 Each quarter commencing in the second quarter from the *starting date*, the *Contractor* prepares a progress report against the IAP and provides a copy to the *Project Manager* within two weeks of the end of each quarter. The *Client's* Collaborative Performance Framework (CPF) team reviews and scores the IAP in line with the CPF metrics.

S253.5 The *Contractor* develops and implements an 'EDI training plan' and submits it the *Project Manager* within 30 weeks of the *starting date* for acceptance. The 'EDI training plan'

- sets outs role-specific EDI training and identifies
    - who will receive the training,
    - what the training entails,
    - when the training will be delivered,
    - who delivers the training and
- includes training such as
    - EDI in induction,
    - inclusive leadership,
    - requirements of the Equality Act 2010,
    - inclusive recruitment,
    - inclusive design and,

- accessible communications.

S253.6 The *Contractor* undertakes data reporting on a quarterly basis of diversity characteristics in

- recruitment, including application, shortlist, interview and hire,
- employment practices including complaints and grievances, progression and promotion, disciplinaries and
- leavers.

S253.7 On an annual basis, the *Project Manager* reserves the right to audit the *Contractor's* progress against the EDI strategy, IAP and 'EDI training plan' in accordance with the process set out in section S660.

Employment and Skills

S253.8 The *Contractor* implements inclusive and accessible recruitment processes to attract and select people with the appropriate skills, resources and capabilities to Provide the Works and deliver the performance required. This applies to the *Contractor* and its subcontractors (at any stage of remoteness from the *Client*) and includes

- supporting the *Client* in the implementation of its skills, employment and education objectives and embed, manage and monitor the performance of its subcontractors (at any stage of remoteness from the *Client*) of the skills, employment and education requirements,
- ensuring that the *Contractor* attracts, develops and retains key personnel with the skills necessary to Provide the Works,
- maintaining detailed and accurate records of all employment opportunities generated whilst Providing the Works,
- recording and providing evidence of the steps taken to recruit people based on experience, abilities and qualifications, irrespective of gender, race, disability, sexual orientation, religion or belief, age, transgender status, pregnancy and maternity, marriage or civil partnership (this list is not exhaustive),
- identifying and delivering on opportunities to develop and deploy new skills that improves the *Contractor's* performance against the *Client's* key performance indicators and imperatives. This includes those new skill areas outlined in the LTC Skills, Education and Employment Strategy provided in Annex A and
- identifying and delivering on opportunities to improve perceptions of careers within the highways sector including through outreach, work placements, work experience and apprenticeships to develop a new talent pool for the sector. This includes assisting the *Client* in delivering on its commitments in relation to the Transport Infrastructure Skills Strategy: building sustainable skills (see link in Annex A).

S253.9 Within 20 weeks of the *starting date* the *Contractor* prepares an 'employment and skills plan (ESP)' and submits it to the Pr*oject Manager* for acceptance.

S253.10 The *Contractor* ensures the ESP

- demonstrates how the *Contractor* meets the ambitions and approaches stated in LTC Skills, Education and Employment Strategy (SEE) (see link provided in Annex A) including
  - creating a lasting skills legacy,
  - bringing new jobs and training,
  - developing pre-employment programmes for all socio-economic groups,

- how the *Contractor* proposes to engage in outreach activities and publicise vacancies to encourage applicants from a diverse range of groups. This includes how the *Contractor* analyses the local demographic and works with relevant partners to ensure that employment opportunities contribute as effectively as possible to local economic growth and that the workforce used to Provide the Works becomes increasingly reflective of the diverse communities served by the *works,*
- inspiring future careers and
- supporting business growth and economic recovery,

- demonstrates the obligations the *Contractor* embeds into its subcontracts (at any stage or remoteness to the *Client)* to incorporate such subcontractors into the delivery of the ambitions and approaches stated in the SEE,
- clearly defines outcomes and outputs and how they are measured and
- meets or evidences how the *Contractor*
  - attracts, recruits and retains a greater diversity of new entrants to the sector in accordance with its IAP,
  - holds itself and its subcontractors (at any stage of remoteness from the *Client*) to account in delivering the ESP and the outcomes of the *Client's* SEE or
  - monitors and provides evidence of year on year improvement.

S253.11 The *Contractor*

- consults with key consultees identified within the *Client's* SEE strategy in the development of the ESP,
- ensures the implementation and on-going development of the ESP,
- updates the ESP once a year and submits it to the *Project Manager* for acceptance,
- ensures quarterly reports and information provides measurement of the outcomes and outputs including the monitoring requirements and contribution from subcontractors (at any stage of remoteness from the *Client*) of the *Client's* SEE strategy,
- facilitates continuous improvement reviews and
- assigns a single point of contact on all matters concerning employment and skills for the *works*.

S253.12 A reason for not accepting the ESP is that it does not

- demonstrate how the requirements are passed to its subcontractors (at any stage of remoteness from the *Client*),
- demonstrate how the *Contractor* complies with the contract,
- clearly define outputs and how they are measured,
- align with the LTC Skills, Education and Employment Strategy or
- meets or evidences how the *Contractor*
  - attracts, recruits and retains a greater diversity of new entrants to the sector,
  - holds itself and its subcontractors (at any stage of remoteness from the *Client*) to account in delivering the ESP and the outcomes of the *Client's* Skills, Education and Employment Strategy or
  - monitors and provides evidence of year on year improvement.

S253.13 The *Contractor* submits a proposal to the *Project Manager* within 10 weeks of the *starting date* detailing the *Contractor's* proposals to achieve accredited National Skills Academy for

Construction (NSAfC) project status within six months of the *starting date* (unless agreed otherwise with the *Project Manager*).

S253.14 The *Contractor* in preparing its proposal considers any guidance issued by the *Client* and guidance issued by the Construction Industry Training Board (CITB).

S253.15 If any conflict exists between the CITB guidance and the *Client's* guidance, the *Contractor* uses the *Client's* guidance in the development of its proposal unless agreed otherwise with the *Project Manager*.

S253.16 A reason for not accepting the proposals is that it does not demonstrate how the *Contractor* complies with the contract, complies with any guidance issued by the *Client* or CITB, or successfully achieves the standard required for accredited NSAfC Project status within 12 months of the *starting date* .

S253.17 The *Contractor* amends the proposal in response to any comments from the *Project Manager* and resubmits it for acceptance by the *Project Manager*. The *Contractor* complies with the proposal once it has been accepted.

S253.18 Within seven days of each anniversary of the *starting date*, the *Contractor* prepares a 'workforce planning annual report'. The *Contractor* submits each annual report to the *Project Manager* for acceptance.

S253.19 A reason for not accepting the 'workforce planning annual report' is that it does not demonstrate how the *Contractor*

- complies with any guidance issued by the *Client*,
- complies with the contract,
- supports the aims of the 'Transport infrastructure skills strategy: building sustainable skills' (see link in Annex A) or
- successfully addresses any shortfall in Staff skills.

S253.20 The *Contractor* facilitates the *Project Manager*, in undertaking continuous improvement reviews of any and all information regarding the *Contractor's* progress in delivering against the provisions of employment and skills requirements including

- ensuring that the *Contractor* and its subcontractors (at any stage of remoteness from the *Client*) maintain and retain records relating to the ESP and their compliance with the contract,
- granting or procuring the granting of access to any
    - premises used in or for Providing the Works whether the *Contractor's* own premises or otherwise,
    - Equipment (including all computer hardware and software databases) used (whether exclusively or non-exclusively) in Providing the Works, wherever situated and whether the *Contractor*'s own Equipment or otherwise and
    - complying with the *Project Manager*'s requests for access to senior personnel engaged in Providing the Works.

S253.21 The *Contractor* ensures that any individual engaged by the *Contractor* (including its subcontractors at any stage of remoteness from the *Client*) in a supervisory or management role is enrolled onto the relevant leadership and management training within 3 months of the individual starting on the Project as follows

- members of the supervisory team - Institute of Leadership and Management level 3 or equivalent and

- members of the management team - Institute of Leadership and Management level 5 or equivalent.

The individuals complete the qualifications within the timescales specified by the Institute of Leadership and Management.

Reporting requirements

S253.22 The *Contractor* ensures that the *Project Manager* can identify all

- apprentices,
- graduates and trainees,
- work placements and
- Staff employed locally from the Site (within a 20 mile radius)

individually appointed under the requirements of the contract and provides a rolling three-month monitoring report to the *Project Manager* within five working days of the start of each calendar month.

This report details performance against the annual proposal in respect of each apprentice appointed or proposed to be appointed under the contract but who has not completed the apprenticeship and proposed graduates and trainees, work placements and Staff employed locally, including

- number to be started that month,
- actual and planned start dates,
- postcode of workplace,
- postcode of home address,
- gender,
- ethnicity,
- for apprenticeships
    - level of apprenticeship (1 – 7) as set out in the UK Government's "A guide to apprenticeships" publication of March 2019 (and as amended),
    - apprenticeship framework or standard,
    - occupation of apprenticeship (reported against the Standard Occupation Classification (SOC) 2020 codes),
    - category of apprenticeship,
    - planned apprenticeship finish date,
    - whether the apprentice is still engaged on Providing the Works and
    - number of school leavers and career changers and
- national insurance number.

Relevant Convictions and Disclosure and Barring Service

S253.23 The *Contractor* ensures that no person who discloses a Relevant Conviction, or who is found by the *Contractor* or *Client* (and notified to the *Contractor*) to have any Relevant Convictions (whether as a result of a police check or through the Disclosure and Barring Service procedures or otherwise), is employed or engaged (at any stage of remoteness from the *Client*) in the performance of the contract without the *Project Manager's* prior and express consent.

S253.24 Where any Staff involved in

- site visits by third parties,
- volunteering activities,
- activities related to Temporary Accommodation,
- activities related to repurpose trees or
- any other activities

have or are likely to have access to children, vulnerable persons or other members of the public to whom the *Client* (and if relevant the *Contractor*) owes a special duty of care, the *Contractor* (and the *Contractor* procures any subcontractors at any stage of remoteness from the *Client*)

- conducts thorough questioning regarding any Relevant Convictions and
- ensures that a police check is completed and such other checks as may be carried out through the Disclosure and Barring Service

and the *Contractor* (and any subcontractors at any stage of remoteness from the *Client*) does not engage or continue to employ for such activities any person who has a Relevant Conviction or what would reasonably be regarded as an inappropriate record.

Early career policy and targets and 'TunnelSkills'

S253.25 The *Contractor* provides early career persons who are either apprentices, graduates or trainees. For every £7m of spend the *Contractor* provides 1 early career person, with no less than 60% allocated to apprenticeships. The *Contractor* calculates the total number of early career persons required during the *works* using the forecast total of Defined Cost and provides this upon request to the *Project Manager* for information.

S253.26 The *Client* is committed to TunnelSkills, the organisation that benchmarks safety and competence in the underground environment by promoting on-site training and assessment leading to recognised accredited qualifications. The *Contractor* submits a tunnel training plan to the *Project Manager* that is in accordance with the TunnelSkills requirements within 12 weeks of the *starting date*. The plan includes a programme of training courses for its tunnelling personnel that aligns with the existing TunnelSkills developed programme and which follows the 'SKATE Matrix = *Skills Knowledge Attitude Training Experience'*, January 2021.

S254 Legacy Commitments

S254.1 The *Contractor* works with the *Client* and the *Project Manager* to develop and deliver legacy activities that support the guiding principles in the LTC Execution Strategy framework (link provided in Annex A) and section S100 through

- volunteering activities that focus on connecting communities and community initiatives,
- supporting opportunities for economic growth with the Project's local businesses,
- supporting opportunities for the third sector and
- developing enhanced archaeological and biodiversity focussed activities and initiatives.

S254.2 The *Contractor* contributes to identifying and developing activities to help raise the Project's profile by bringing significant benefits to local people, schools, businesses, and the Disadvantaged.

S254.3 The *Contractor* works with the *Client* and *Project Manager* to ensure a collaborative approach to the planning, delivering and monitoring of the above legacy outcomes using ISO 44001:2017 'Collaborative business relationship management systems – Requirements and framework' (link provided in Annex A).

S254.4 The *Contractor* applies for designated funding to support its initiatives, as described in section S2800.

Support Community Initiatives through Volunteering

S254.5 Where the *Contractor* has an existing volunteering policy or procedure within its organisation, Staff utilise their allocated hours or days under the following legacy themes to benefit the Project's local communities by

- supporting business growth through supply chain support,
- inspiring future careers, through science, technology, engineering and mathematics (STEM) initiatives in support of skills and employment outcomes,
- enhancing the biodiversity and heritage outcomes and
- connected communities and community investment.

S254.6 The Staff use their volunteering hours or days with organisations and charities within a 15-mile radius of the Project, or those known to the Project already. The *Project Manager* facilitates a meeting between the *Contractor* and *Client* within 12 weeks of the *starting date* to impart existing knowledge of the Project's stakeholders.

S254.7 If the *Contractor* does not have an existing volunteering policy, the *Contractor* sets aside a minimum of 1% of person hours projected for the year during the period of construction unless otherwise agreed with the *Project Manager*. Volunteering activities for the Project start on the Commencement of Construction but exclude landscaping aftercare. The *Contractor* proposes volunteering activities for acceptance by the *Project Manager* in accordance with the Acceptance Procedure, within 100 weeks of the *starting date*. A reason for not accepting the *Contractor's* proposal is that it does not align with the legacy commitments.

S254.8 The *Contractor* may propose to the *Project Manager* that a subcontractor (at any stage of remoteness from the *Client*) is excused from the volunteering policy.

The *Contractor* does not, and procures that a subcontractor (at any stage of remoteness from the *Client*) does not, appoint a subcontractor (at any stage of remoteness from the *Client*) who does not have a volunteering policy unless the *Project Manager* has accepted the *Contractor's* proposal.

A reason for not accepting the *Contractor's* proposal is that it is not practicable for the subcontractor (at any stage of remoteness from the *Client*) to undertake volunteering activities for the Project.

S254.9 Each quarter, the *Contractor* prepares a volunteering report and submits a copy to the *Project Manager* for information within two weeks of the end of each quarter from the *starting date*. The report contains the following information

- number of volunteering hours contributed,
- case studies on volunteering outcomes and
- any amount raised through fundraising (monetary, donations in-kind).

S254.10 The *Contractor* appoints an individual as a volunteering lead who

- is responsible for ensuring the implementation and on-going development of a volunteering programme,

- ensures quarterly reports and information is provided and
- acts as a single point of contact on all matters concerning volunteering.

Economy - Encourage the Local Supply Chain and Procurement

S254.11 The *Contractor* submits a 'supply chain support programme (SCSP)' to the *Project Manager* for acceptance within 30 weeks of the *starting date*. The SCSP demonstrates how the *Contractor* supports local business growth in both Essex, Kent, Thurrock and the London Borough of Havering. The SCSP sets out how the *Contractor* engages with local businesses, small and medium-sized companies and social enterprises to achieve the following

- meeting the buyer (or similar) events,
- business to business mentoring,
- growing skills and opportunities by posting subcontracting opportunities on procurement platforms such as CompeteFor,
- working with existing providers such as the Supply Chain Sustainability School to support their programmes and
- tracking spend through subcontractors (at any stage of remoteness of *Client*) together with business location and number of employees.

S254.12 The *Contractor* creates a visible, informed supply chain that can compete for contract opportunities in line with UK Government guidelines and procurement targets of 33% spend with Small and Medium-Sized Enterprises (SME).

S254.13 The *Contractor* submits a progress report against the SCSP to the *Project Manager* within two weeks of the end of each quarter commencing from the second quarter after the *starting date*. The *Client*'s Collaborative Performance Framework (CPF) team reviews and scores the SCSP in line with the *Contractor's* CPF metrics.

S254.14 The *Contractor* appoints an individual as a supply chain lead to

- be responsible for ensuring the implementation and on-going development of the SCSP,
- ensure quarterly reports and information are provided,
- facilitates continuous improvement reviews and
- acts as a single point of contact on all matters concerning SCSP.

Economy - Support the local business through accommodation

S254.15 The *Contractor* uses existing organisations such as 'Visit Kent' and 'Visit Essex' as part of its workers' accommodation strategy to assist Staff with finding suitable accommodation that also supports the local economy.

S254.16 Where the *Contractor* has purchased Temporary Accommodation (which the *Contractor* or an Associated Company holds the legal and beneficial title to) for Providing the Works, the *Contractor* identifies on its Accepted Programme when such are no longer required.

The *Project Manager* indicates that legal and beneficial title in the Temporary Accommodation (or part thereof) is to transfer from the *Contractor* to the *Client* free of all liens, charges, options, encumbrances, rights, claims and other interests of any third party the *Contractor* provides a condition survey for such Temporary Accommodation and enables the *Supervisor* to witness the condition survey. The *Project Manager* may validate any condition survey. The *Client* may provide the condition survey to third parties.

S254.17 If the *Project Manager* identifies a third party to transfer the part of the Temporary Accommodation to

- the *Project Manager* advises the *Contractor* the third party's representative who has the authority to sign a transfer and liability waiver form,
- the *Contractor* arranges with the third party's representative, to sign on-behalf of the third party the title transfer and liability waiver form (using the form in Annex CC) prior to the transfer and delivery of such Temporary Accommodation or part thereof and
- the *Contractor* moves such Temporary Accommodation (or part thereof) from the Working Area to the locations agreed with such third parties (the "Third Party Destination").

S254.18 The *Contractor* does make any charges to such third parties.

S254.19 The *Contractor* includes an activity in its Accepted Programme which allows the *Client* sufficient time for the potential transferring of ownership if the accommodation is donated to Others as a legacy of the Project.

Environment – Enhance environmental outcomes for Archaeology

S254.20 The *Contractor* provides a community engagement archaeologist for a duration of 52 weeks with a start date to be agreed with the *Project Manager*.

S254.21 The *Contractor* submits an 'archaeology community engagement plan' within 60 weeks of the *starting date* to the *Project Manager* for acceptance, which includes

- a programme of archaeology activities to engage the local community, schools, colleges, universities and other organisations to be agreed on an annual basis with the *Project Manager*,
- a programme of outreach work, work placements, experience and apprenticeships specifically related to archaeological activities and
- a programme of archaeology site visits, speaking engagements, public engagement activities, open days and volunteering opportunities.

S254.22 The *Project Manager* facilitates a meeting between the *Contractor* and *Client* within four weeks of the *starting date* to agree the archaeology outcomes and reporting structure, including the number of

- heritage organisations and societies engaged,
- schools engaged,
- students engaged,
- volunteers engaged,
- workless job starts,
- workless graduates,
- archaeology apprentices working on the Project,
- people retrained in archaeology,
- speaking engagements,
- visitors engaged and
- open days.

The *Contractor* includes the archaeology outcomes and reporting structure in the *Contractor's* 'archaeology community engagement plan'.

Environment - Improve biodiversity outcomes

S254.23 The *Contractor* repurposes trees where practicable within the DCO boundary that are removed as part of the Providing the Works, in preference to mulching and chipping. The *Contractor* prepares an inventory of which trees are suitable for repurposing for agreement by the *Project Manager* prior to commencement of the relevant construction activity. Trees so identified remain the property of the *Client.*

S254.24 The *Contractor* engages with organisations that can repurpose these trees including

- organisations that enhance the environment and increase biodiversity,
- local charities,
- schools and colleges,
- organisations that make charcoal and
- making benches for local amenities.

If the *Contractor* identifies an organisation that can repurpose trees that are removed as part of the Providing the Works, then the *Contractor*

- identifies a person who has the authority, and confirms such authority, and arranges for such person to sign on-behalf of such organisation the title transfer and liability waiver form (using the form in Annex CC) prior to the transfer and delivery of such trees or part thereof and
- moves such trees (or part thereof) from the Working Area to the locations agreed with such organisation (the “Repurposing Destination”).

If the *Contractor* cannot repurpose such trees, then title transfers to the *Contractor* who then disposes as appropriate.

S255 Project Control Framework

S255.1 The *Client* operates a Project Control Framework (PCF) (see link in Annex A) as part of its project management process. The *Contractor* complies with the PCF. The PCF comprises of products relating to the life cycle of a project, adjusted quarterly. These PCF products are produced, reviewed, updated or refined at various PCF stages of the Project life cycle.

S255.2 The PCF Forward Plan – Main Works provided in Annex A

- tab 2 indicates the *Contractor’s* responsibilities for the PCF products that apply to PCF stages 5, 6 and 7 and
- tab 3 is provided for information only and indicates how the *Contractor’s* deliverables relate to PCF products.

S255.3 The *Contractor* delivers the PCF products it is responsible for.

The *Contractor* supports the delivery of PCF products it is not responsible for.

S255.4 All PCF products are developed in accordance with the current version of ‘The project control framework best practice planning and consultation process’ provided in Annex A. The *Contractor* ensures that the PCF products for which it is responsible for are proportional and meet the content and quality criteria specified in ‘The Project Control Framework Best Practice Planning and Consultation Process’ guidance document prior to issue for review. The *Contractor* develops each PCF product by completing the relevant part of the stage management plan. The *Contractor* leads the PCF product reviews, engaging with the appropriate product owner and specialists in line with

the PCF Best Practice guidance. PCF products are most efficiently produced at programme level to reduce repetition. The *Contractor* liaises with Others and the *Client* to co-ordinate and develop these PCF products.

S255.5 In relation to PCF product development, the *Contractor* uploads its PCF products to the *Client's* Information Systems in accordance with the *Contractor's* document management processes. The *Contractor* submits its PCF products in accordance with the Acceptance Procedure. The *Client* leads the PCF product sign-off, distribution and archiving activities.

S255.6 All PCF deliverables set out in the PCF Forward Plan – Main Works are shown on the *Contractor's* programme for acceptance and on a PCF tracker which is managed by the *Contractor.* The programme for acceptance includes start date, finish date, and percentage complete for all PCF products against the PCF stage. The PCF tracker details the product inventory, status, planned, forecast and actual delivery dates, *Client* consultees and links to product records. These documents are submitted to the *Project Manager* at intervals to be agreed with the *Project Manager.*

S255.7 The PCF Forward Plan identifies how the deliverables that are to be submitted to the *Project Manager* fit into PCF products. Standard descriptions of each product are set out in the PCF. If the *Contractor* identifies the need for a deliverable that is not included in the PCF, the *Contractor* notifies the *Project Manager* for review and acceptance.

S255.8 The *Contractor* liaises with the *Project Manager* to ensure that appropriate Staff receive PCF training.

S255.9 The *Contractor* provides supporting information and resources to assist the *Client* with the relevant PCF interim or end Stage Gate Assessment Reviews (SGARs) and other assurance reviews and investment submissions for the contract. The *Client* holds annual SGARs, and the PCF Forward Plan identifies which PCF products might be needed for each SGAR.

S260 Control of works

Storage of fuel and chemicals

S260.1 The *Contractor* minimises the storage of fuel and chemicals on the Site and Working Areas as described in its EMPs. The *Contractor* sets out a designated storage area in a suitable area of the Site and Working Areas taking account of the topography, the Control of Substances Hazardous to Health (COSHH) Regulations information accompanying the chemicals, other relevant risks and legislation.

S260.2 The *Contractor* controls the delivery of fuel and chemicals to minimise the impact on the surrounding area, site operations and personnel.

Tunnelling Works

S260.3 The drive direction for both TBM drives is assumed to be from the North Portal to the South Portal. This assumption, included in the DCO submission, is based on several logistics principles. These include among other things the excavated material disposal strategy, power requirements, construction traffic modelling, north portal temporary and permanent works for the launch of TBMs and required temporary and permanent land take for Compounds and construction activities.

S260.4 The direction of TBM drives is not mandated. If the *Contractor* changes the direction, it is responsible for obtaining all required Consents, utility provisions, the management of any new risks and impacts as a result of this change. The *Contractor* submits its proposals for any such changes to the *Project Manager* for acceptance.

A reason for non-acceptance is that it has an unacceptable impact on the *Client's* costs.

S260.5 Where a proposal requires a change to the DCO, the *Contractor*, when requested by the *Project Manager*,

- provides any further analysis, information and materials and
- attends such meetings, including consultations,

required to support the Client in seeking any approvals for such proposals made under paragraph S260.4. The Contractor prepares, at the *Project Manager's* request, any materials required to enable the Client to seek the necessary DCO approvals.

S260.6 The *Contractor* ensures that all tunnelling Equipment and methodologies used satisfy both the detailed design and any other specified requirements within the Scope. This includes minimising disruption to the surrounding rural and built environment by maintaining tunnel stability and providing a safe working environment for all personnel.

S260.7 In order to minimise fatigue and improve safety, the *Contractor* ensures all Staff working on a shift rotation pattern work no more than eight hours per shift at their place of work in any 24-hour period on a days or afternoons (backs) or nights forward rotation shift pattern. The *Contractor* programmes such works for three gangs working eight hour shifts in any 24-hour period, a total of four gangs used including time off.

S260.8 Prior to the commencement of shift rotation pattern work, the *Contractor* makes its head office fatigue risk policies available for inspection and audit and permits observation visits to existing sites for the *Project Manager*.

S260.9 The *Contractor* submits, within 20 weeks of the *starting date*, to the *Project Manager* for acceptance a contract specific 'fatigue risk management plan' (FRMP). This includes the ID of the *Contractor's* fatigue risk champion who is accountable for the implementation of the plan. A reason for not accepting the FRMP is that

- it does not follow the guidance on the Energy Institute's publication 'Managing fatigue using a risk management plan (FRMP)', April 2014 (see link provided in Annex A) or later revision or
- it does not provide access to the latest advice and research in specialist fatigue management and control.

S260.10 The *Contractor* uses innovation and technology to plan, monitor and record fatigue using hardware and software including wearable devices like smart watches, robust enough for the working environment. The *Contractor* ensures it has access to advice and research and uses specialist fatigue advice and research to ensure that in Providing the Work, the *Contractor* is at the cutting edge of the latest fatigue control developments to ensure continuous developments in fatigue control. The *Contractor* includes its proposals in the FRMP for its access to advice and research for fatigue.

S260.11 The *Contractor* makes available the above information and technology to the *Project Manager* for use by the *Project Manager's* and *Supervisor's* personnel.

S260.12 The *Contractor* includes fatigue awareness in the site safety induction and as a standalone separate topic for regular site safety training and toolbox talks. The *Contractor* provides Occupational Health (OH) facilities in line with section S1104 (Occupational Health and wellbeing). Fatigue training includes advice and guidance on what the individual can do to improve sleep outside of working hours.

S260.13 The *Contractor* ensures that shift workers have more frequent health screening, in comparison to other site Staff. The *Contractor* has a process for recording absenteeism due to fatigue, with early intervention programmes where fatigue is detected. In addition, the *Contractor* encourages rewards or bonuses for workers who can demonstrate that they are getting more sleep, based on verified sleep tracker data made available via the wearable devices.

S260.14 The *Contractor* submits a 'tunnel management plan' for the acceptance of the *Project Manager* six months prior to the start of tunnelling. The plan is specific to the requirements of the Scope and demonstrates compliance with The Joint Code of Practice for Risk Management of Tunnel Works in the UK (September 2003) (see link at Annex A). The tunnel management plan includes the Required Excavation and Support Sheet (RESS) process.

S260.15 The *Contractor* complies with the requirements of Specification for the Machine Tunnelling for Running Tunnels (see link in Annex A) with respect to the provision and use of the TBMs for the construction of the bored tunnels.

Tunnels sub-stage gate process

S260.16 The *Client* operates a Project Control Framework (PCF) as part of its project management process, this is described in section S255. The *Client* has developed further sub-stages for PCF stage 5 and 6, these are

- PCF stage 5 construction preparation
  - 5a. design Approval in Principle for design elements required at PCF stage 5.
- PCF stage 6 construction, commissioning and handover
  - 6a. design Approval in Principle,
  - 6b. detailed design,
  - 6c. civils construction,
  - 6d. mechanical, electrical, and power systems construction and
  - 6e. testing and commissioning.

S260.17 The *Contractor* produces packages of Submissions for each sub-stage and at the end of each sub-stage, the *Contractor* provides a package of Submissions for a sub-stage gate review for acceptance by the *Project Manager* in accordance with the Acceptance Procedure.

S260.18 Following acceptance of the sub-stage gate review, the *Project Manager* notifies the *Contractor* to proceed to the next sub-stage for that package.

S260.19 Key Data means the Data that is submitted to the *Project Manager* for acceptance and is defined in the Scope sections as shown in the table below.

PCF stage 6 construction	Scope section
6a. Approval in Principle	section S316
6b. detailed design	sections S100, S200, S300, S2700 and S2900
6c. civils construction	paragraph S260.20
6d. mechanical, electrical, and power systems construction	paragraph S260.20
6e. testing and commissioning	paragraph S260.21

S260.20 Key Data for sub-stages 6c and 6d is the Data that is submitted to the *Project Manager* in those sub-stages (all other construction Data is made available via the Project CDE), this includes

- all construction Data, where required by the Scope to be submitted for acceptance in accordance with the Acceptance Procedure,

- all construction Data required by the *law of the contract* and the relevant standard(s) to be submitted for acceptance in accordance with the Acceptance Procedure,
- readiness reviews and permits to work,
- risk assessments and method statements (RAMS) as described in section S1102,
- testing and inspecting strategy as described in section S700,
- inspection and test plans as described in section S700,
- monitoring,
- site acceptance tests and
- factory acceptance tests.

In the particular case of tunnelling works, this includes

- the 'tunnel management plan' as described in section S260 and
- daily review meeting and required excavation and support sheet (RESS) processes.

S260.21 Key Data for sub-stage 6e is the Data that is submitted to the *Project Manager* in that sub-stage (all other testing and commissioning Data is made available via the Project CDE), this includes

- all testing and commissioning Data, where required by the Scope to be submitted for acceptance in accordance with the Acceptance Procedure,
- all testing and commissioning Data required by the *law of the contract* and the relevant standard(s) to be submitted for acceptance in accordance with the Acceptance Procedure and
- the requirements of section S700 and where necessary submitted for acceptance in accordance with the Acceptance Procedure.

S260.22 To achieve progressively increasing confidence, the *Contractor* submits its proposals for iterative reviews for acceptance by the *Project Manager* in accordance with the Acceptance Procedure. These proposals could include package reviews at the 30%, 50% and 80% completion of the sub-stage.

The components of any iterative review are agreed between the *Contractor* and the *Project Manager* and are appropriate to keeping the *Project Manager* informed and allowing the necessary co-ordination, liaison and review of the design to take place.

S260.23 The *Project Manager* uses Risk-Based Intrusion to assess the *Contractor's* Submissions Schedule. Where deemed applicable by the *Project Manager*, the *Project Manager* provides the determined level of intrusion on these submissions to the *Contractor* within two weeks of each Submission Schedule being submitted.

S260.24 The *Contractor* addresses the *Project Manager's* comments and updates the Submission Schedule within one week of receiving the *Project Manager's* comments.

S260.25 The *Contractor* does not proceed with the relevant construction (including works in sub-stage 6c-6e) activity until the *Project Manager* has accepted, accepted with comment, or determined there is no review required of the Submission.

S260.26 In addition to undertaking Risk-Based Intrusion, the *Project Manager* may audit any Data as described in section S600.

S265 Site cleanliness

S265.1 The *Contractor* complies with the requirements for site cleanliness as detailed in the Code of Construction Practice (CoCP).

S270 Waste materials

S270.1 Not Used.

S275 Equipment and Plant and Materials

S275.1 The *Contractor* removes Equipment and Plant and Materials from the Working Areas (with the *Project Manager*'s permission) when they are no longer needed to Provide the Works.

S285 Category Management (CM)

S285.1 The *Client's* existing Category Purchase Agreements (CPA), and any new CPAs awarded during the term of the contract, are mandated for use by the *Contractor* in Providing the Works. If required by the *Client,* the *Contractor* enters into an appropriate confidentiality agreement in relation to the operation of the CM contracts.

S285.2 The *Contractor* enters into a contract with a Category Supplier pursuant to a CPA for the purchase of Plant and Materials, works or services needed to Provide the Works where a CPA exists.

S285.3 The conditions of contract between the *Contractor* and a Category Supplier are those set out in the CPA and the *Contractor* does not change them unless the *Project Manager* agrees.

S285.4 The *Contractor* liaises with the *Project Manager* to identify and plan a programme that allows a Category Supplier's procurement and associated governance procedures to be incorporated within the Accepted Programme.

S285.5 The *Contractor* manages the process for entering into a contract with a Category Supplier in accordance with the 'category management guidance' (see link in Annex H and I) - for the relevant CPA.

S285.6 The *Contractor* provides full visibility to the *Project Manager* of the process for entering into a contract with a Category Supplier.

S285.7 The *Contractor* utilises all CM communities' commitment to support the development of the *works*.

S285.8 The *Contractor* co-operates with the *Client*, *Project Manager* and Others (and any other suppliers who enter into contracts with a Category Supplier) in forecasting demand for Plant and Materials, works or services related to a CPA.

S285.9 The *Contractor* remains responsible for Providing the Works and for the quality of any Plant and Materials, works or services supplied by a Category Supplier as if it had supplied them itself.

S285.10 The *Contractor* ensures that a subcontractor (at any stage of remoteness from the *Client*) enters into a contract with a Category Supplier pursuant to a CPA for the purchase of Plant and Materials, works or services needed to Provide the Works.

S285.11 The *Contractor* ensures that the conditions of contract between the subcontractor (at any stage of remoteness from the *Client*) and the Category Supplier are those set out in the CPA and that the subcontractor (at any stage of remoteness from the *Client*) does not change them unless the *Project Manager* agrees.

S285.12 The *Contractor* provides feedback and advice to the *Client* to help maximise the value for money obtained from the *Client's* CM contracts and processes.

S285.13 The list of categories is supplied to the *Contractor* once a request has been submitted to the *Project Manager*.

S285.14 Prior to entering into a contract with a Category Supplier, the *Contractor* may request the *Project Manager's* agreement to use an alternative supplier. The *Contractor* produces a business case that identifies

- the additional value and efficiency (including health, safety and wellbeing) over that of the CPA and how it delivers and demonstrates this additional value and efficiency and
- the necessary changes to the Quality Statement to enable the *Contractor* to deliver and demonstrate the additional value and efficiency over that of the CPA

for the agreement of the *Project Manager*.

S285.15 If the business case is agreed by the *Project Manager,* the Quality Statement is amended. The *Contractor* revises the quality plan in accordance with the contract and as accepted by the *Project Manager*.

Technology

S285.16 The *Contractor* procures and supplies all technology Plant and Materials required to Provide the Works, unless otherwise stated in the contract documents or otherwise instructed by the *Project Manager*.

S285.17 The *Contractor* prepares a roadside technology procurement strategy detailing

- the proposed approach for the procurement and supply of technology Plant and Materials,
- the use of *Client's* centralised procurement system,
- where the *Contractor* proposes to use an alternative procurement system or approach, which includes a cross reference to the associated business case(s) in accordance with paragraph S285.14, including details of why (programme and cost) the *Client's* centralised procurement system has not been utilised,
- the lead in times for procurement and supply of technology Plant and Materials,
- the consultation with relevant technology stakeholders (including the *Client's* centralised procurement team),
- the compliance with the relevant technology stakeholder (including the *Client's* centralised procurement team) requirements,
- specifications for all technology Plant and Materials not procured through the *Client's* centralised procurement system to ensure compatibility with the SRN Regional Operation System,
- the provision of warranties to the *Client* from the supplier upon engagement, in the form specified in Annex UD or such other form as the *Client* may require,
- evidence of the Plant and Materials' reliability to achieve the Availability targets from other deployments on the *Client's* network,
- a procedure for ensuring coordination and agreement with other Main Works Contractors (MWC) for the procurement of technology Plant and Materials and
- a procedure for ensuring the requirements of Others are managed.

The *Contractor* submits the roadside technology procurement strategy in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, accompanied by a Multiparty Collaboration Certificate, within 130 weeks of the *starting date*.

S285.18 A reason for not accepting the roadside technology procurement strategy is that it does not

- provide details of each type of technology Plant and Materials,
- align with the Technology and System Commissioning Plan,
- align with the accepted 'procurement and subcontracting plan' referenced in section S1200 or
- comply with the Scope.

S285.19 The *Project Manager* provides the contact details for the *Client's* centralised procurement team within four weeks of the *starting date*.

S285.20 Not used.

S285.21 Not used.

S285.22 Not used.

S285.23 Not used.

S285.24 Not used.

S295 Behavioural attributes

S295.1 The *Client* is delivering a programme of coaching focusing on becoming a high performing team throughout the whole Project. This approach supports the *Client*'s aim to evolve the industry's collaborative relationships away from immature behaviours that lead to negative and damaging consequences to mature behaviours that enable better performance and outcomes for all.

S295.2 The *Contractor* Provides the Works in accordance with and aligned to ISO44001:2017 'Collaborative business relationship management systems — Requirements and framework' (see link in Annex A), an established industry standard for collaboration, to ensure that these behavioural attributes are embedded and implemented by all Staff.

S295.3 The *Contractor* supports the *Client* in attaining a number of key drivers through a philosophy of collaboration, as follows

- shared ownership of delivery outcomes that releases the potential of the participants and results in exceptional levels of performance,
- open and transparent culture – fostering innovation, considered risk-taking, controlled delivery, shared problem-solving and joint investment in solutions – resulting in the creation of dynamic, responsive team-working that delivers better outcomes for all,
- understanding and maximising the strengths of the *Client* and its supply chain to maximise capacity and avoid duplication and wasted effort,
- shared knowledge and innovation - teams that actively demonstrate how to accrue value from repeatability and certainty, and where to seek to innovate and
- equitable relationships based on trust, fairness and constructive challenge resulting in value-adding outcomes.

S295.4 The *Client's* behavioural attributes are as follows

- trust and respect – doing what you say you are going to do at all times,
- supporting each other – being there for each other to enable personal, professional and contract and Project goals to be achieved,

- accountability – ensuring commitments are kept and resulting consequences are accepted,
- issue resolution and decision making – ensuring access to all of the necessary facts and information to make fully informed decisions and address issues,
- best person for the job – individuals are selected for the right work based on knowledge, attitude, experience, skills and behaviours,
- engagement – communicating with others in the best possible way to ensure understanding, share knowledge and avoid assumptions,
- constructive challenge – having the confidence to challenge everyone regarding decisions and actions and sharing views to develop understanding and
- innovation and continuous improvement – creating the right environment that allows new ideas to surface and be put into practice.

S295.5 The *Contractor* is required to enable Staff to attend workshops and training associated with this Project and are required to develop and implement a plan aimed at delivering a high performing team across all Staff, taking on board the behavioural attributes in paragraph S295.4.

S296 Strategic Alignment

S296.1 In Providing the Works the *Contractor* develops and maintains strategic alignment with the *Client*, complying with the *Client's* strategic alignment assessment process. The current strategic alignment assessment process is StART 3 (see link at Annex A) addressing the six StART principles of

- leadership and collaboration,
- health, safety and wellbeing,
- supply chain,
- efficiency and effectiveness,
- equality, diversity and inclusion and
- sustainability.

S296.2 Unless a StART 3 score has already been obtained, the *Contractor* (or, where the *Contractor* is an unincorporated joint venture, any Consortium Member) co-operates with the *Client* to enable the completion of the *Client's* strategic alignment assessment process within six months of the *starting date*.

S296.3 The *Contractor* embeds the strategic alignment principles into

- all subcontracts (at any stage of remoteness from the *Client*) unless agreed otherwise by the *Project Manager* and
- relevant processes and procedures.

S296.4 The *Contractor*, in collaboration with the *Client*, prepares and submits a StART development plan to the *Project Manager* within 30 weeks of the *starting date* for acceptance.

Where completion of the *Client's* strategic alignment assessment process is required in accordance with S296.2, the *Contractor*, in collaboration with the *Client*, prepares and submits a StART development plan to the *Project Manager* within eight weeks of completion of their strategic alignment assessment.

S296.5 A reason for not accepting the StART development plan is that it does not demonstrate how the *Contractor*

- supports the principles,
- understands how the principles apply or
- maximises the value added by the principles.

S296.6 The *Contractor* implements, operates and delivers the StART development plan once accepted by the *Project Manager*.

S296.7 As a minimum, on each anniversary of the *starting date*, the *Contractor* reviews and updates the StART development plan. The C*ontractor* submits the updated StART development plan within three weeks of the relevant anniversary of the *starting date* to the *Project Manager* for acceptance.

S298 Land

Land access process

S298.1 The *Client* provides access to land

- to construct the *works* within the Order Limits and
- to carry out surveys on land affected by the development authorised by the DCO.

The *Contractor* secures access to additional land outside the Order Limits where such access is required to Provide the Works.

S298.2 In this section S298, where appropriate, the term 'landowner' means any person with an interest in the relevant land. The *Project Manager* advises appropriate attendance at any land related meetings.

S298.3 The *Client* secures access to land by agreement (without recourse to the Powers in the DCO) within the Order Limits for surveys and works. The *Contractor's* access is subject to constraints such as longer notice periods, Consents, title matters, assurances and undertakings to which the land or access rights are subject to.

S298.4 Where land has already been acquired by the *Client* but used by Others, the *Contractor* is required to liaise with the incumbent contractor for any land access requirements, as detailed in section S926.

S298.5 The *Contractor* optimises land access and possession requirements to minimise the impact on landowners and drive value for money for the Project. This includes planning the *works* to avoid multiple land possessions of the same land and ensuring timescales for land possessions reflect the planned durations of the *works* to be performed.

S298.6 The *Contractor* does not negotiate land possession, compensation or payments with any landowners or occupiers without prior acceptance by the *Project Manager*.

S298.7 The *Contractor's* responsibilities concerning land includes

- duties in respect of principal contractor as per Construction (Design and Management) Regulations 2015 in line with section S1100, unless notified otherwise by the *Project Manager*,
- pre-entry condition surveys,
- security,

- stability, health and safety,
- controlled access by personnel,
- maintenance whilst in its occupation, including the agreed period of maintenance post Completion of the whole of the *works*,
- remediation, making good and post-condition survey for land that is to be handed back,
- occupational costs, including business rates, utility charges, drainage charges,
- leading any legal action necessary for evicting trespassers and preventing the trespasser regaining possession and
- providing an inventory and storing any goods, animals or chattels remaining on the property.

S298.8 Where the *Client* has entered into *third party agreements* with Statutory Undertakers and asset owners, the access processes and procedures included in section S928 take precedence over any land access requests from the *Contractor*.

S298.9 The *Contractor* agrees access to any operational land e.g. access to an operational road, with the *Project Manager*.

S298.10 Where the *Contractor* is granted access to the land permanently acquired by the *Client* within the Order Limits, the *Contractor* holds the land for the duration of the contract until all *works* are complete and the finished asset is handed over to the *Client*.

S298.11 Where the *Contractor* is granted access to temporary land within the Order Limits, the *Contractor* holds the land while using the parcel, when work on the land is finished, the land is handed over to the landowner.

Requesting Land Access

S298.12 The *Client* requires a minimum of 20 weeks' notice to arrange access to land. The 20 weeks commences upon the *Project Manager's* acceptance of the 'tracker for land access requests'. The *Contractor* utilises the 'tracker for land access requests' to also manage the handback arrangements for impacted land. The *Contractor* submits to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure and where applicable accompanied by a Multiparty Collaboration Certificate, a 'Tracker for land access requests' with an associated 'access plan' in accordance with the templates provided in Annex A. The *Contractor* co-ordinates with Others and the other Main Works Contractors its 'tracker for land access requests' that impacts the *works* or Providing the Works. If the *Project Manager* has accepted another Main Works Contractor's 'tracker for land access requests' the *Contractor* ensures that its 'tracker for land access requests' is aligned to it.

S298.13 A reason for not accepting the 'tracker for land access requests' and associated 'access plan' is

- that the programme provided is unrealistic,
- that it does not allow 20 weeks' notice to arrange access to land,
- it conflicts with the requirements of Others or the Main Works Contractors or
- there is no logic to the sequencing proposed.

S298.14 Within four weeks of the *Contractor's* accepted 'tracker for land access requests', the *Project Manager* confirms where access has been arranged by agreement.

S298.15 Where notice has to be served to the landowner in order to gain access, the *Project Manager* confirms when access has been granted.

S298.16 Where notice has to be served to the landowner in order to gain access, the notice period is a minimum of 13 weeks from serving the notice to gaining the access required. The *Project Manager* notifies the *Contractor* of when this period starts and ends. The *Project Manager* notifies the *Contractor* of any specific land parcel subject to a longer notice period. The *Contractor* updates the 'tracker for land access requests' to reflect this and submits to the *Project Manager* for information.

S298.17 The *Contractor* does not access the land until the *Project Manager* has notified the *Contractor* that access has been granted.

Access for walkovers and non-intrusive surveys

S298.18 Within four weeks of the *Contractor's* accepted 'tracker for land access requests', the *Project Manager* provides the landowner contact information to the *Contractor*, where access has been arranged by agreement.

S298.19 Where the *Contractor* requires access to land for walkovers or non-intrusive surveys prior to any construction activity and where agreement has already been granted, the *Contractor* organises access with the landowner using the contact details provided by the *Project Manager.* The *Contractor* follows the requirements agreed with the landowner and any landowner access procedures.

S298.20 The *Contractor* tracks the survey dates and locations on the 'tracker for land access requests', to enable payments to be calculated and made by the *Client* to the landowner.

S298.21 Where the *Contractor* is unable to arrange access, the *Contractor* notifies the *Project Manager*. In this event, the *Client* serves notice to the landowner. The *Project Manager* confirms access within 20 weeks of the request being accepted.

S298.22 Where notice has to be served to the landowner in order to gain access, the *Client's* notice period is a minimum of 13 weeks from the serving of that notice to gaining the access required. The *Project Manager* notifies the *Contractor* of when this period starts and ends. The *Contractor* updates the 'tracker for land access requests' to reflect this and submits to the *Project Manager* for information.

S298.23 The *Contractor* does not access the land until the *Project Manager* has notified the *Contractor* that access has been granted.

Access for intrusive surveys (limited scope)

S298.24 Within four weeks of the *Contractor's* accepted 'tracker for land access requests' and in the event access has been arranged by agreement with the landowner, the *Project Manager* liaises with the *Contractor* and organises a meeting with the landowner to facilitate introductions.

S298.25 Following the introductory meeting, the *Contractor* organises a follow up meeting with the landowner and *Project Manager* to provide information including

- the survey location,
- the proposed access routes to and from the survey area,
- scope of works,
- land drainage surveys and
- construction requirements.

S298.26 Once the *Contractor* has organised access with the landowner, the *Contractor* complies with the landowner's agreement requirements and any landowner access procedures.

S298.27 The *Contractor* follows the *Project Manager's* requirements including pre-start meetings and mobilisation meetings.

S298.28 The *Contractor* completes a pre-entry condition survey and agrees the state of the land documented in the survey with the landowner.

S298.29 The *Contractor* tracks the survey dates and location on the 'tracker for land access requests', to enable payments to be calculated and made by the *Client* to the landowner.

S298.30 The *Contractor* completes a post-construction condition survey and agrees the state of the land with the landowner.

Handover process (from landowner to *Contractor*) for intrusive surveys

S298.31 Where the *Client* rents a field, this includes a handover process with the landowner to the *Contractor*.

S298.32 In addition to the steps described above for 'Access for intrusive surveys (limited scope)', the *Contractor* organises a handover meeting with the landowner and *Project Manager* where a pre-entry condition survey and reinstatement plan is agreed with all parties. The *Contractor*, landowner and *Project Manager* sign off the handover form at this meeting prior to any *works* commencing.

Handback (from *Contractor* to landowner) process for intrusive surveys

S298.33 On completion of intrusive surveys, the *Contractor* organises a handback meeting with the landowner and the *Project Manager*.

S298.34 The *Contractor* completes a post-construction condition survey and agrees the state of the land with the landowner.

S298.35 The *Contractor* completes the reinstatement works based on the agreed 'remediation plan', as required.

S298.36 The *Contractor* agrees the post-construction condition survey and remediation at the handback meeting. The *Contractor*, landowner and *Project Manager* agree and sign off the handover form.

Specific Site Information

S298.37 Where the *Client* enters into agreements with Others for land situated within the *boundaries of the site,* the *Client* provides the *Contractor* with the details of these agreements, within two weeks of securing the agreement. The *Contractor* is responsible for complying with all obligations and constraints included in the agreement.

S298.38 The *Project Manager* provides the *Contracto*r with information about the Site as it becomes available through a new land agreement.

S298.39 The *Contractor* is responsible for making good the land areas used to Provide the Works, including access routes, returning these to the landowner in a condition, in line with the pre-agreed reinstatement plan. The reinstatement plan is agreed with the landowner prior to any *works* undertaken unless the landowner elects to reinstate the land themselves.

Logging Contact with Landowners

S298.40 The *Contractor* logs all contact and communications with landowners on the *Client's* appropriate Information Systems.

Point of contact

S298.41 The *Contractor* co-ordinates its land requirements such that there is a single source of information which negates multiple requests to the *Project Manager* for the same land.

S298.42 The *Contractor* provides an agronomist for agreement by the *Project Manager* from the *starting date*, who is responsible for engaging with landowners impacted by the *works* where appropriate.

The *Contractor's* Site Responsibilities

S298.43 The *Contractor* is responsible for the land from the grant of access or the date from which it is requested to have land access (where access is granted but not taken), whichever is the soonest, until it is either handed back to the landowner, it is handed over as instructed by the *Project Manager*, taken over by the *Client* or Completion of the whole of the *works*, whichever is the soonest.

S298.44 The *Contractor* is responsible for all activities associated with the *works*, including

- pre-entry condition survey including written and photographic records undertaken jointly with the landowner. The *Contractor* provides a copy of this survey to the *Project Manager* for information and acknowledges that the *Client*'s use of the pre-condition survey may include assessment of future claims for compensation made by landowners,
- security and safety of the land in use,
- controlled access,
- reinstatement making good and post-condition survey,
- maintenance, for example mowing grass,
- occupational costs, for example business rates, council tax,
- legal costs, for example removing squatters,
- reinstatement – *Contractor* to have an agricultural specialist on call to assist with providing a 'management plan' on how to reinstate the land correctly and in line with the CoCP and
- if a building is taken, payments for utility use during occupancy, including liaison with the utility providers.

Construction Materials and Aggregates

S298.45 The *Contractor* uses the Port of Tilbury and its facilities for the supply of aggregates for the North Portal Site and the tunnels. The *Contractor* minimises the environmental impact of its choice of aggregates supply, considering the originating location of the aggregates and its mode of transport to and through the Port of Tilbury.

The *Client* is aware of a construction materials aggregate terminal (CMAT) operated by Tarmac situated within the Port of Tilbury 2 facility close to the North Portal site.

The *Contractor* considers in its procurement decisions the potential environmental benefits arising from this local supplier of bulk aggregates.

The *Contractor* uses the Port of Tilbury and its facilities, unless it can demonstrate that an alternative supply of such material offers a lower environmental impact and lower cost.

Private landowners

S298.46 The *Client* provides access to third party off-site translocation receptor sites for ecological mitigation. The *Project Manager* notifies the *Contractor* of the access arrangements for third party off-site translocation receptor sites.

Corporate Landowners

Ingrebourne Valley Limited

S298.47 Several parcels of land owned by Others and leased by Ingrebourne Valley Limited (IVL) are within the Order Limits and are used for land reclamation and restoration by IVL. The *Contractor* ensures that its methods used to Provide the Works do not impact or hinder these Others or their affiliates' operations prior to the *access date*, especially when using Substation Road and access between Substation Road and the Site boundaries.

S298.48 Not used.

S298.49 Not used.

S298.50 Not used.

S298.51 Not used.

S298.52 Not used.

S298.53 Not used.

Statera Energy Limited

S298.54 Statera Energy Limited (SEL) has submitted an application for a development consent order for a new gas-fired power generating and battery storage facility to the West of the North Portal Site. This includes construction of a high-pressure gas main through the Site. The *Contractor* designs the layout and operation of the Site on the basis that a development consent order is granted for these facilities and liaises with Statera Energy Limited to ensure both operations can be carried out successfully without impacting each other.

S299 Logistics

Logistics Objectives

S299.1 The *Contractor* supports the *Client's* implementation of the following logistics objectives and performance measures

- collision near-miss reporting – to improve the level and quality of data,
- ensuring a commitment to the welfare, improved morale and wellbeing of Staff, by making the Project a desirable place to work,
- efficiency savings – to minimise waste in the supply chain and logistics,
- good community relations – to reduce the impact and perception of harm,

- innovation – to support continual improvement of process and application of technology,
- reduce impact on the environment – to reduce road miles travelled and emissions,
- minimise land take area and duration for temporary facilities – to plan delivery intelligently,
- safety – to reduce and control risk to workers and third parties,
- supply chain performance – to collect value-adding data to help evidence and direct improvements,
- value for money – to specify requirements that add value and prevent waste and
- vulnerable road users (VRU) measures including
    - implementing a CLOCS - Construction Logistics and Community Safety (see link provided in Annex A),
    - implementing a Freight Operator Recognition Scheme (FORS) (see link provided in Annex A) and
    - utilising evidence-based measures to reduce risk to VRUs.

The *Contractor* includes its performance against these objectives in its monthly progress report, as defined in section S800.

Highways

S299.2 The *Contractor* identifies the access and delivery routes to the Working Areas, working within the constraints set out within

- the Scope,
- the DCO, including the CoCP, the outline traffic management plan for construction and the Framework Construction Travel Plan,
- section 61 of the Control of Pollution Act 1974 notices,
- Standards and
- the *third party agreements* and Consents.

S299.3 Furthermore, access and delivery routes are developed in keeping with the known sensitivity and fragility of the local, suburban and rural roads network and with appropriate consultation with local stakeholders and interested parties e.g. schools and other sensitive receptors.

S299.4 Restrictions in relation to local roads connecting with the proposed Project are to be agreed by the *Contractor* and the *Project Manager*, in consultation with the relevant Highway Authority.

S299.5 The *Contractor* submits its proposed access and delivery routes to the *Project Manager* for acceptance as part of its Construction Phase Plan.

A reason for non-acceptance is that the proposed access and delivery routes do not account for sensitive receptors appropriately.

S299.6 The *Contractor* co-operates with Others and the other Main Works Contractors in the co-ordination and sharing of construction traffic routes used to access and egress the Working Areas as described in section S900.

Earthworks Strategy and Mass Haul

S299.7 The Project features significant earthworks and the *Client's* objective is to achieve a methodology that minimises earthwork movements, achieves a Project wide earthworks balance that minimises

off-site disposal and imports and establishes effective routes, taking into account storage and handling as key considerations.

S299.8 The *Contractor* submits to the *Project Manager* for acceptance

- an earthworks strategy including quantities and balance in accordance with section S323 and
- a mass haul diagram in accordance with the Acceptance Procedure within 100 weeks of the *starting date*,

each demonstrating how the *Client's* earthworks objective is achieved. The *Contractor* minimises the requirement for earthworks movements on the road network by using Site won materials for the construction of earthworks.

S299.9 To help achieve the *Client's* objective the transfer of site won materials between interfacing Main Works Contractors is required. The *Contractor* transfers the quantities, material class and timings as set out in the table below. The *Contractor* is required to confirm and agree these material transfer requirements with the neighbouring Main Works Contractors and Others. The *Contractor* submits the agreed interface co-ordinates in accordance with the Acceptance Procedure and accompanied by the Multiparty Collaboration Certificate, prior to commencement of the relevant construction activity.

Movement	Quantity	Material	Timing
Roads North to Tunnels North	406K m³ (insitu volume)	Class 1: 144K m³ Class 2: 262K m³	April 2029 to September 2030 (inclusive)
Tunnels South to Kent Roads	87K m³ (insitu volume)	Class 3 Fill with a maximum moisture content of 28% (maximum moisture content to be confirmed during the construction period based on test data)	April 2029 to September 2030 (inclusive)

For details of the Main Works Contractors' responsibilities in relation to stockpiling and transfer of site won material refer to the interface matrix described in section S926 (and see link provided in Annex A).

The Main Works Contractors utilise their respective Stage One and Mobilisation Phase (as defined in the Tunnel Works contract) to further collaborate to optimise the plan for the transfer of Site won materials developing the quantities, material classification and timing accordingly.

S299.9A The *Contractor* ensures the design and construction of Tilbury Fields landscaping/profiling maximises the use of excavated material generated from the *works* and Roads North transfer of site won materials (if required) in accordance with the constraints of the DCO and the agreed transfer of site won materials between interfacing Main Works Contractors.

S299.9B The *Contractor* develops and implements a Consents strategy for Providing the Works in the North Portal Site in consultation with relevant stakeholders for agreement with the *Project Manager* within 24 weeks of the *starting date*. The Consents strategy includes

- a review of existing Consents,
- activities for which Consents are required,
- types of Consents to be applied for,
- requirements for variations or surrenders of existing third-party Consents and
- indicative timing(s) for the submission(s) of the application by the *Contractor*.

S299.9C Where required by a Consent, the *Contractor* undertakes the role of the operator until the Consent is surrendered. The *Contractor* surrenders any Consents upon discharge of all requirements in the Consent unless otherwise agreed with the *Project Manager*.

S299.9D The *Contractor* submits a spoil handling execution plan to the *Project Manager* for acceptance in accordance with Acceptance Procedure prior to commencement of the relevant construction activity. This plan includes

- how the *Contractor* is maximising the use of Tilbury Fields for excavated material in accordance with the constraints of the DCO,
- detailed design of Tilbury Fields including geotechnical constraints and placement strategy,
- proposals for sequencing and management of the excavated material placement during the construction phases,
- expected settlements of the placed spoil and process for the management thereof,
- procedures for the management of run-off,
- permanent drainage proposals and
- proposals for discharge of Consents during *section* 1 and *section* 4 (if necessary).

S299.9E The *Contractor* provides a progress update on spoil handling activities as part of the monthly progress report described in section S850.

S299.9F Once the *Contractor* holds the land and prior to the commencement of the construction activities that impact on Tilbury Fields, the *Contractor* undertakes a topographical survey of that area. The *Contractor* ensures the existing ground level is clear (including vegetation) prior to undertaking the survey. If not possible to clear to existing ground level, the *Contractor* takes account of man-made and natural obstructions.

S299.9G The *Contractor* submits the survey methodology (including methodology for dealing with uncleared land) for agreement to the *Project Manager* and undertakes the survey using the agreed methodology. The *Contractor* ensures the survey is undertaken to accuracy of +/-20mm horizontally and vertically.

S299.9H The *Contractor* submits the results of the survey to the *Project Manager* for acceptance in accordance with the Acceptance Procedure.

Deliveries

S299.10 The *Contractor* arranges and manages all deliveries and collections to Provide the Works. When making deliveries to the Site and Working Areas which impact on public or private highways, including access to the Site and to other areas, the *Contractor* supplies, erects, maintains and removes all traffic signs and barriers required by the New Roads and Street Works Act 1991 ‘Code of Practice for the Co-ordination of Street Works and Works for Road Purposes and Related Matters’ (see link at Annex A) to guide and warn traffic and to protect pedestrians and to prevent danger.

S299.11 The *Contractor* ensures delivery vehicles are accepted, unloaded and despatched to prevent queuing on any highway. The *Contractor* utilises reception and holding areas to ensure that vehicles do not stand and obstruct any highway where site constraints do not permit on-site management. Figure Figure 2 - Example of an off-highway vehicle reception area used at Beckton STW Safety and Security Centre illustrates an example vehicle reception and security area. The *Contractor* secures agreement from the *Project Manager* or the appropriate local Highway Authority to enable operation of any off-site holding area.

Figure 2 - Example of an off-highway vehicle reception area used at Beckton STW Safety and Security Centre

S299.12 The *Contractor* provides traffic control personnel from each *access date* who possess the following credentials

- registered with the Security Industry Authority (SIA) and
- trained to CLOCS site access traffic marshall standard (or similar).

S299.13 The *Contractor* removes any obstructions required to facilitate deliveries and collections and then makes good on completion of the relevant *works* or as required by a *third party agreement.*

Logistics Scope

S299.14 The *Contractor*

- collaborates with the *Project Manager* and other Main Works Contractors to
  - drive innovation,
  - maximise use of resources,
  - reduce waste,
  - implement common systems where possible,
  - reduce risk and
  - implement the Project's logistics objectives,
- includes logistics in constructability reviews and reports outcomes and learning,
- includes logistics in consideration of modular construction,
- implements a 'delivery management system' and reports on it in accordance with the Scope,
- implements a material tracking system and reports on it in accordance with the Scope,
- plans all vehicle movements including abnormal loads,
- manages customs clearance processes for imported goods,
- minimises vehicle movements,
- identifies and implements efficient and effective material distribution on-site,

- provides weekly logistics returns (Plant and Materials and Equipment) to the *Project Manager*, for information and monitoring purposes,
- ensures subcontractors (at any stage of remoteness from the *Client*) comply with the Scope,
- ensures general logistics management including
    - reporting,
    - communications and
    - provision of forecasts and actuals for Staff, Equipment, Plant and Materials delivery, storage, removal, waste and spoil away,
- ensures Plant and Materials management including
    - traceability,
    - deliveries and
    - storage and handling,
- ensures people management including
    - site facilities,
    - accommodation,
    - Staff car parking and
    - site safety and
- transport management including
    - road, rail, river and marine transport,
    - traffic management (general) and
    - abnormal loads.

S299.15 The *Contractor* participates in a joint access interface group comprising senior leadership representation with the other Main Works Contractors to plan and execute access for it to Provide the Works. The *Contractor* organises these groups with the other Main Works Contractors at least once a quarter or when requested by the *Project Manager* or other Main Works Contractors. The *Project Manager* or a project manager for one of the other Main Works Contracts chairs these groups. All participants of the joint access interface group comply with the Project guiding principles as described in the LTC execution strategy and section S100 when making group decisions.

Logistics Strategy

S299.16 The *Contractor* produces a Logistics Strategy which encompasses the following

- construction logistics,
- delivery and transport management,
- project office and welfare management,
- sleeping accommodation and
- workplace transport.

S299.17 The *Contractor* further details how it implements the Logistics Strategy in respective management plans as detailed below.

S299.18 The Logistics Strategy is submitted to the *Project Manager* for acceptance in accordance with the Acceptance Procedure, S3000 and accompanied by a Multiparty Collaboration Certificate.

Construction Logistics Plan

S299.19 The *Contractor* submits a 'construction logistics plan (CLP)' to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure and accompanied by a Multiparty Collaboration Certificate, eight weeks before the earliest *access date*. The 'CLP' details how the *Contractor*

- implements as a minimum the requirements of CLOCS,
- implements as a minimum the requirements of FORS Silver or above and
- implements Driving for Better Business (see link provided in Annex A).

S299.20 The *Contractor* produces a 'CLP' that considers each area of the *works* in detail.

S299.21 The *Contractor* does not commence any construction works until the *Project Manager* has accepted the 'CLP'.

S299.22 A reason for not accepting the 'CLP' is

- it does not comply with the 'logistics strategy' or
- it does not sufficiently consider all the requirements and obligations within the CoCP.

S299.23 The *Contractor* trains Staff on the contents of the 'CLP'.

S299.24 The *Contractor* reviews and updates the 'CLP'

- following any material change to the status of the *works* or Working Areas that has an impact on logistics requirements,
- when requested by the *Project Manager* and
- at least every six months.

S299.25 The *Contractor* submits its revised 'CLP' to the *Project Manager* for acceptance. A reason for not accepting the 'CLP' is

- it does not comply with the 'logistics strategy' or
- it does not sufficiently consider all the requirements and obligations within CoCP.

Construction Logistics Plan contents

S299.26 The *Contractor* includes the following headings and content, where appropriate, within the 'CLP'

- Section 1: Project information
  - details of logistics management structure,
  - location of Compounds and Worksites and
  - working and delivery hours.
- Section 2: Implementation
  - details of how the CLP is implemented and managed.
- Section 3: Construction details
  - summary of the Scope,
  - summary programme,
  - modularisation and off-site manufactured plan and

- excavated materials plan.

- Section 4: Site Layout Plans
  - welfare and office space plan,
  - parking, loading and unloading and laydown area plan,
  - Plant and Materials storage,
  - excavated and demolition material storage and processing plan,
  - vehicle and pedestrian routes,
  - Haul Road crossings,
  - utilities connections,
  - emergency and first aid points,
  - waste management areas,
  - wheel wash facilities and
  - Equipment charging and fueling areas.
- Section 5: Traffic management
  - details of how traffic is managed at each phase of development,
  - access plans to each Compound and Worksite,
  - road diversions or temporary traffic provisions during the works,
  - parking arrangements for delivery vehicles,
  - pedestrian, cyclist, bus and general traffic considerations,
  - access arrangements for vehicles (off-road reception and security area),
  - details of any roads and or parking bays to be suspended to allow access for large construction vehicles and
  - vehicle swept path analysis modelling,
- Section 6: Delivery and Transport Management,
  - details of how the *Contractor* implements the requirements of data, delivery and transport sections outlined in section S299,
  - details of how freight routes are identified in advance and assessed in line with appropriateness for HGV movements. This includes
    - highway, structure and bridge assessments, protection and monitoring,
    - noise and vibration,
    - community relations,
    - alternative routes if there is an incident on the preferred route and
    - compliance with DCO, Environmental Assessment and the approved routes by the relevant Highway Authorities,
  - details of design of directional signage with installation completed as agreed with the relevant Highway Authority,
  - details of compliance with abnormal load requirements, including appropriate planning and notification to the *Client* via its Electronic Service Delivery for Abnormal Loads (ESDAL),
  - implementation plan of the requirements of CLOCS throughout its suppliers and subcontractors and

- o implementation plan of the requirements of the FORS at Silver or above and Driving for Better Business throughout the supply chain.

Project Office and Welfare Management

S299.27 The *Contractor* submits a 'project office and welfare facilities plan' to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, prior to the commencement of the construction phase. The 'project office and welfare facilities plan' details how the *Contractor*

- determines demand for project offices and facilities (including welfare facilities),
- designs and sets out facilities to make efficient use of available space and minimise land take and the environmental impact,
- incorporates and meets the requirements as detailed in sections S1000 and S1100 and numbered appendix 1/1 and
- manages the use and maintenance of the facilities in Providing the Works.

S299.28 The *Contractor* assesses its requirements for project offices and welfare facilities and plans the provision, management and maintenance of these facilities whilst ensuring the same high standard throughout.

S299.29 The *Contractor's* project office and welfare facilities meet the Health and Safety Executive's requirements with all areas fully accessible and includes

- catering (in a separate designated area),
- rest areas (including quiet areas),
- reception area,
- smoking and vaping areas,
- toilets and adequate sanitary conveniences,
- wash facilities, showers and drying areas - paying particular attention to the requirements for underground workers,
- multi-faith prayer rooms,
- health and leisure facilities to suit the *Contractor's* 'HSW implementation plan' described in section S1100 and
- suitable locations for site and Project inductions.

S299.30 The *Contractor* provides catering, taking into account shift patterns, seasons and choice of food. The *Contractor* ensures the catering service discourages personnel leaving the Site during shifts.

S299.31 The *Contractor* supplies eating and drinking consumables to designated canteens and visitors' centres (where applicable) and maintains access and stock, taking into account shift patterns, seasons and choice.

S299.32 The *Contractor* submits a draft 'site specific travel plan' in line with the requirements of section S209 and the framework construction travel plan provided in the DCO to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure within four weeks of the *starting date.*

S299.32A The *Contractor* submits copies of the initial or updated site specific travel plans to the Travel Plan Liaison Group (as defined in the framework construction travel plan provided in the DCO) as required by the framework construction travel plan.

The *Contractor* ensures that each submission or subsequent submission takes cognisance and addresses the Travel Plan Liaison Group comments throughout the development of the site

specific travel plans. The *Contractor* submits to the *Project Manager* its proposals to resolve any Travel Plan Liaison Group comments within four weeks of receipt of such comments.

Where the *Contractor* decides or proposes not to incorporate Travel Plan Liaison Group comments in its site specific travel plan, it provides a detailed rebuttal for agreement by the *Project Manager*.

The *Contractor* resubmits the updated site specific travel plans to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, within one week of addressing the Travel Plan Liaison Group comments.

S299.33 Not used.

S299.34 The *Contractor* submits (via the *Project Manager*) the updated site specific travel plans for the Secretary of State's agreement, prior to implementation into the *works*.

S299.35 In the event that the Secretary of State has any comments on the site specific travel plans, the *Contractor* addresses any comments and re-submits the site specific travel plans to the Secretary of State for agreement.

S299.35A Once agreement is obtained from the Secretary of State, the site specific travel plans are resubmitted to the *Project Manager*, for acceptance, in accordance with the Acceptance Procedure prior to the commencement of relevant construction activities..

S299.36 A reason for not accepting the site specific travel plans is that fatigue management has not been considered for Staff travelling to work.

S299.37 The *Contractor* updates the site specific travel plans on a quarterly basis and submits it to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure. A reason for not accepting the updated site specific travel plans is that in the opinion of the *Project Manager* the updated site specific travel plans is an adverse change to the plan submitted and accepted by the *Project Manager* previously.

S299.38 Where required, by either the *Contractor* or *Project Manager*, the *Contractor* and the *Project Manager* follow the procedures set out in paragraphs S299.32, S299.32A and S299.33, S299.34, S299.35 and S299.35A when the updated plan requires resubmission to the Secretary of State.

Staff Sleeping Accommodation

S299.39 The *Contractor* submits an 'accommodation plan' to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, 12 weeks before the earliest *access date.* The 'accommodation plan' details how the *Contractor*

- implements and manages a worker's charter which promotes and secures appropriate professional behaviour from all personnel whilst on-site and those in either on or off-site temporary accommodation during the *works* and
- implements an accommodation bureau in co-ordination with other Main Works Contractors to co-ordinate demand against available capacity.

S299.40 The *Contractor* carefully considers sleeping accommodation as part of its fatigue risk management policy as described in section S1100. If providing accommodation on or near to the Site, the *Contractor* submits proposals to the *Project Manager* for acceptance. Such proposals are in accordance with all local planning requirements.

S299.41 The *Contractor* ensures that no unauthorised off-site caravan parks or similar are provided, established or used by Staff.

Integration and Collaboration

S299.42 The *Contractor*

- joins or leads meetings and workshops with the *Project Manager* and other Main Works Contractors, during the development of the design, to progress collective or singular issues and are actively engaged in the understanding of
    - the scheme design,
    - the construction sequence and associated impacts,
    - Compound and personnel requirements,
    - vehicle movement forecast and
    - other logistics related matters and
- in conjunction with the *Project Manager*, investigates and proposes techniques to minimise impacts on logistics including the development of
    - access routes,
    - traffic flows and direction,
    - means of transport,
    - Compound location,
    - boundary demarcation and
    - sound attenuation barriers.

Management of Logistics Data

S299.43 The *Contractor*

- implements a Plant and Material tracking and reporting system and a ‘delivery management system’ (DMS) aligned to section S1900,
- provides read-only access to the *Project Manager* to the live (data input) elements of the implemented system,
- provides all data to the *Project Manager* in line with the requirements of section S1900 to the *Project Manager’s* elected information system and
- provides live access to the other Main Works Contractors to input tracking information and actual booking data for use during the *works*.

Delivery and Transport

Access Points - Vehicles

S299.44 The *Contractor* identifies authorised vehicles upon arrival to the Working Areas in accordance with the *Contractor’s* 'delivery management system (DMS)' described in section S299.

S299.45 Specifically, for ‘Access Points – Vehicles’, the *Contractor* ensures that the 'DMS' includes how it

- liaises with those making deliveries to the Working Areas, including deliveries being made on behalf of Others, regarding vehicle routes,
- manages delivery times and driver and vehicle identification,
- communicates any restrictions to those making deliveries to the Working Areas,
- communicates vehicle standards required in the Scope,

- escalates non-conformance to those responsible for the deliveries and to the *Project Manager* and
- records all vehicle and personnel movement on and off the Working Areas.

S299.46 The *Contractor* submits the 'DMS' to the *Project Manager* for acceptance four weeks prior to the earliest *access date*.

S299.47 The *Contractor* records all attempted unauthorised vehicles access as an unsuccessful attempt to gain access to the Working Areas.

S299.48 The *Contractor* maintains security logs of all delivery and collection vehicles entering and leaving a Working Area.

S299.49 The *Contractor* designs and installs electrical control barriers to regulate the movement of traffic on and off a Working Area.

S299.50 The *Contractor* establishes an access point that allows vehicle entry and provides sufficient space for vehicles to be refused access to the Working Areas without causing an obstruction or delay to other road users.

S299.51 The *Contractor* provides manual barriers where it is impossible or impractical to use electrical control barriers. The *Contractor* submits its justification for manual barriers to the *Project Manager* for agreement four weeks prior to the need for the manual barrier.

S299.52 The *Contractor* uses automatic number plate recognition systems at access points to the Working Areas, unless agreed otherwise with the *Project Manager*.

S299.53 The *Contractor* ensures electrical control barriers and manual barriers cannot be activated when a vehicle access point(s) is not staffed or where access or egress by any vehicle is not permitted. The *Contractor* ensures that an access point is always available for use by the emergency services.

Freight Operators Recognition Scheme (FORS)

S299.54 The *Contractor*

- implements the requirements of FORS Silver or above with its subcontractors (at any stage of remoteness from the *Client*),
- implements the requirements of FORS Silver to all vehicle types,
- implements the requirements of FORS Silver within or out of scope of operator licencing, such as suction excavators and volumetric mixers,
- implements ‘Safe Urban Driver’ and ‘Van Smart’ training including its subcontractors (at any stage of remoteness from the *Client*) and provides evidence of completion within the delivery booking system and
- implements the requirements of ‘Driving for Better Business’ including its subcontractors (at any stage of remoteness from the *Client*).

S299.55 If the *Contractor* seeks a derogation against the FORS requirements for a specific subcontractor (at any stage of remoteness from the *Client*) a request is submitted to the *Project Manager* for acceptance, stating why the requirement cannot be complied with and what steps are being taken to meet the requirements or other alternative measures. A reason for not accepting the derogation is

- that the steps being taken do not provide compliance within six months,
- it is not applicable to that subcontractor (at any stage of remoteness from the *Client*) or

- the alternative measures do not support the objectives of FORS.

Multimodal Transport

S299.56 The *Contractor*

- maximises the use of multimodal transport and minimises road miles travelled in Providing the Works,
- sets a target for road miles travelled in Providing the Works and establishes processes and procedures for reducing such mileage further and
- reports as part of the monthly progress report defined in section S800, the volume and environmental benefit of reduced road miles.

Delivery Management System

S299.57 The *Contractor*

- develops, discusses and agrees a dynamic 'delivery management system' (DMS) (for all deliveries and collections to and from the Working Areas) with the relevant Others and Main Works Contractors,
- ensures its DMS is compatible, eradicates clashes and improves efficiencies,
- works with Others to implement the booking requirements and
- enforces delivery booking requirements to its subcontractors (at any stage of remoteness from the *Client*) attending the Site.

The *Contractor* keeps the DMS up to date on a daily basis.

S299.58 The DMS

- forecasts deliveries and collections to and from Site which includes a
  - 12 month lookahead,
  - six month lookahead,
  - three month lookahead,
  - one month lookahead,
  - one week lookahead,
  - next day lookahead and
  - hourly lookahead for the next day,
- records
  - origin and destination of movement,
  - driver details,
  - Driver Certificate of Professional Competence,
  - load description,
  - delivery date and time,
  - on-site destination including room if applicable and
  - Project induction status of driver.

The DMS is capable of extracting data which is encrypted (unless otherwise agreed with the *Project Manager*) ensuring the digital information is protected. The DMS includes data on

- vehicle, vessel and train movements (date, arrival, time, departure time, total dwell time on-site and driver details),
- origin and destination,
- volumes and quantities,
- mileage and emissions,
- percentage of movements by road and rail and other transport methods,
- efficiency savings i.e. volume moved to river,
- modal data of movements,
- complaints received and outcome(s),
- FORS accreditation,
- transport delays, non-arrivals, non-booked, rejected deliveries,
- vehicle type classified under the following masses 3.5t, 7.5t, to 18t, 18t to 44t and abnormal loads (including its mass),
- queuing incidents including cause, delay and solution and
- Staff and other persons arrival and departure times and mode(s) of transport.

Abnormal Loads

S299.59 The *Contractor*

- assesses routes, including vehicle swept path analysis studies,
- assesses structural integrity and capacity of Structures on route,
- arranges with the relevant Highway Authority for the removal and reinstatement of street furniture (as necessary) and any modification of accesses in accordance with the Highway Authority process(es),
- manages traffic restrictions and
- liaises with relevant
    - o local authorities,
    - o police and
    - o stakeholders.

Plant and Materials Tracking

S299.60 The *Contractor* implements a Plant and Materials tracking and reporting system which records and reports on the flow of Plant and Materials through its subcontractors (at any stage of remoteness from the *Client*), including

- load description,
- Building Information Modelling and asset ID,
- description,
- dimensions,
- mass,
- handling instructions including lifting,
- weather protection,
- other details to ensure safe delivery, receipt and installation,

- identity of subcontractors (at any stage of remoteness from the *Client*) and where applicable manufacturers,
- scheduled
    - manufacture and sourcing dates,
    - despatch dates,
    - delivery dates,
    - installation dates and
- all variations to the above scheduled dates.

The Plant and Materials tracking and reporting system is capable of extracting data which is encrypted (unless otherwise agreed with the *Project Manager*) ensuring the digital information is protected.

Materials Storage and Distribution

S299.61 The *Contractor*

- provides (and decommissions) temporary storage facilities within Compounds and Worksites,
- controls stock descriptions and appropriate item codes to enable accurate ID,
- provides stock visibility and reporting of items delivered,
- provides and maintains cranes, forklift trucks and telehandlers (with booking system) and other lifting and handling equipment for materials movement including provision of competent operators as evidenced by the relevant Construction Skills Certification Scheme (CSCS) card or equivalent,
- stores topsoil in accordance with numbered appendix 6/8,
- stores Equipment and Plant and Materials in separate segregated areas, with defined segregated pedestrian and vehicle access points and
- adequately lights storage areas to ensure safe movement of Equipment, Plant and Materials and Staff.

Batching Plants

S299.62 If the *Contractor* uses a batching plant then it complies with the provisions in the DCO.

S299.63 Any batching plant has defined segregated pedestrian and vehicle access points and is adequately lit to ensure safe movement of pedestrians, Equipment and Plant and Materials.

Waste management

S299.64 The *Contractor*

- manages waste in accordance with the principles of the *Client's* Circular Economy provided in Annex A and
- provides waste recovery and management areas at all Compounds and Worksites to manage waste
    - to minimise trips for the exchange of skips and bins and
    - to minimise the risk of environmental incident (including spillage).

Fuel, Energy and Oil Management

S299.65 The *Contractor* produces a fuel, energy and oil management system with an objective to minimise usage including

- designing, supplying, constructing, installing and maintaining adequate storage tanks, pumps, pipework and appropriate bunds,
- managing the receipt, storage and distribution of fuel, energy and oil,
- setting a target for fuel, energy and oil reduction in Providing the Works and establishing processes and procedures for reducing such fuel, energy and oil use further and
- reporting as part of the monthly progress report defined in section S800, the volume and environmental benefit of reducing consumption of fuel, energy and oil.

Compounds and Worksites

S299.66 When establishing Compounds and Worksites, the *Contractor*

- minimises the impact on local roads – providing the shortest safe access for both personnel and deliveries to and from the SRN,
- minimises the impact on Others, including the local community by locating any alternative Compounds and Worksites and by planning internal layouts of all Compounds and Worksites away from sensitive receptors where practicable including efficient and convenient locations for traffic management control,
- develops, implements and ensures compliance with Staff travel plans,
- complies with the requirements of section S209 and
- complies with the CoCP and REAC.

S299.67 Where the Compound or Worksite is established on agricultural land, the *Contractor* reinstates the Compound or Worksite to agricultural use at the earlier of

- Completion of the relevant *section* or
- when the Compound or Worksite is no longer required to Provide the Works

in accordance with requirements of relevant *third party agreement* or as agreed with the *Project Manager.*

Existing River Jetties

S299.68 Existing river jetties on the Essex side of the River Thames are currently owned and operated by Others.

The *Contractor* notes that use of these jetties do not form part of the DCO. In the event the *Contractor* chooses to utilise the existing jetties as a route to and from Site it is responsible for the takeover, improvement, maintenance and disposal of these existing jetties, including any access routes to and from the Site, permits or Consents required for the takeover, improvement, use and removal. The *Contractor* makes the *Project Manager* aware of the proposals and does not use these jetties until all necessary approvals and Consents have been obtained.

Use of the River Thames

S299.69 If the *Contractor* seeks to use the River Thames to Provide the Works, including as a route to and from the Site (including the use of any berthing facilities), it obtains all necessary Consents.

S299.70 The *Contractor*

- confirms with the Port of London Authority (PLA) any review timescales it requires,
- provides a draft 'river transport plan' to the *Project Manager* for comment,
- takes into account and updates the draft 'river transport plan' following the *Project Manager's* comments,

then the *Contractor* seeks PLA's agreement to the 'river transport plan'.

Once agreed with the PLA, the *Contractor* submits the 'river transport plan' to the *Project Manager* for acceptance.

A reason for non-acceptance is that it has not obtained PLA's agreement.

S299.71 If the PLA does not agree the *Contractor's* 'river transport plan', the *Contractor* makes the necessary changes to gain PLA's agreement.

S299.72 A preliminary navigational risk assessment has been included in the Development Consent Order (DCO). The *Contractor* reviews, adopts and develops the preliminary navigational risk assessment into a detailed 'navigational risk assessment'. The *Contractor*

- incorporates the requirements of all other river users including, Tilbury to Gravesend ferry, PoT2, IVL barge movements and any other users of the River Thames,
- submits this to the relevant Others, takes into account their comments and updates the detailed 'navigational risk assessment' to obtain their agreement and any necessary Consents and
- submits it to the *Project Manager* for acceptance.

A reason for non-acceptance of the detailed' navigational risk assessment' is that it has not obtained the necessary agreements and Consents.

Staff sleeping and living accommodation

S299.73 The *Contractor*, as a minimum, provides Staff working in hyperbaric conditions with the provisions described in the DCO appendix 2.1 to the Environmental Statement.

S299.74 The *Contractor* provides project-specific sleeping and living accommodation and includes its proposals in its 'accommodation plan', within CA05, but only where the *Contractor* can demonstrate the local market does not have the capacity to support the accommodation demands of Staff.

S300 *Contractor's* Design

S305 Design responsibility

General

S305.1 The *Contractor*

- designs all permanent works (unless expressly stated otherwise in the Scope) and temporary works required to Provide the Works,
- meets and discharges any requirements imposed via the Development Consent Order (DCO),
- complies with and discharges the conditions of any Consents and
- meets any obligations imposed by *third party agreements*, as detailed in section S928.

S305.2 The *Contractor* complies with BS 5975:2019 (Code of Practice for Temporary Works Procedures) (see links in Annex A).

S305.3 The *Contractor* identifies and aligns the roles described in BS 5975: 2019 with the DMRB and agrees these details with the *Project Manager*, prior to commencement of the relevant temporary works activity.

S305.4 Within 10 weeks of the *starting date*, the *Contractor* submits to the *Project Manager* for acceptance a design management plan (DMP). The DMP includes

- design deliverables,
- organisational structure including a register of designers, design management and roles and responsibilities,
- record of the organisation(s) undertaking design activities and the identity of the individuals within these organisations,
- a register recording the names and original signatures of individuals authorised to carry out the various functions of DMRB standard CG 300 in accordance with section S316,
- identification of key external and internal interfaces,
- key constraints and assumptions,
- a design process including
    - coordination and cooperation arrangements,
    - sharing of information,
    - an assurance and consultation process and
    - systems integration,
- a design risk and engineering safety hazard management procedure,
- a process for environmental management,
- a process for sustainability assessment,
- a process for value engineering and risk management,
- a design approvals process and
- document control and management.

S305.5 The *Contractor's* design enables an ongoing review of all excavation and tunnelling activities on a 24 hours a day, seven days a week basis, ensuring the performance is in line with the design intent.

S305.6 The *Contractor* implements an ongoing review and verifies that actual ground conditions encountered align with expectations in accordance with sections S205 and S245.

S305.7 The *Contractor* organises shift review group (SRG) and required excavation and support sheet (RESS) meetings as appropriate. The purpose of the meetings is to review the progress and quality of tunnelling work as well as observed ground movements.

S305.8 The *Contractor* ensures relevant design representatives are available 24 hours a day and 365 days a year, unless otherwise agreed with the *Project Manager*, to

- review construction progress and monitoring information,
- attend daily SRG meetings and where appropriate, RESS meetings,
- ensure tunnelling is carried out in accordance with the SRG and RESS and
- respond and react to changes in ground conditions.

S305.8A A RESS is required before any excavation commences. The *Contractor* is responsible for producing the RESS and ensures this includes

- the tunnel section (chainages) to which the RESS is applicable,
- the date and times the RESS is applicable,
- the support to be installed,
- the excavation sequence,
- the method of ground support,
- monitoring to be installed in the tunnel section in question,
- measures to be taken during stoppage of works, including safe stop procedure,
- other instructions relevant to the tunnel section in question,
- reference to relevant design drawings,
- face pressure,
- soil conditioning,
- annulus grouting (around TBM),
- any deviations from the design support,
- RESS number,
- details of any restricted or exclusion zones,
- signatures and
- any specific risks or exceptional hazards relevant to the work covered by this RESS.

S305.8B The *Contractor* ensures the RESS is signed by design representatives (as described in section S305), the *Contractor* and the *Supervisor*.

S305.8C The *Contractor* appoints the works examiner (as defined in DMRB standard CG300) in agreement with the TAA (via the *Project Manager*), prior to commencement of the relevant construction activity.

S305.8D The *Contractor* notifies the *Project Manager* immediately of any potential issues that may affect the other Main Works Contractors in any manner which the *Contractor* has identified from the meetings described in paragraph S305.7.

S310 Design submission procedures and acceptance criteria

Key Data

S310.1 Key Data (Tunnels) means the Design Data that is submitted by the *Contractor* in accordance with the Acceptance Procedure for acceptance by the Project Manager (all other Design Data is made available via the Project Common Data Environment (CDE) by the *Contractor*).

The *Contractor* ensures that the following Key Data is submitted

- all Design Data, where required by the Scope to be submitted in accordance with the Acceptance Procedure,
- all Design Data required by the *law of the contract* (including that related to hyperbaric working),
- all Design Data required by the relevant design standard(s),
- the design management plan,
- a design statement that accompanies each submitted design related package (for each discipline) which includes
    a. a design methodology,
    b. design assumptions and a brief description of their rationale,
    c. design criteria,
    d. declaration of checking category in accordance with DMRB standard CG 300 (“Technical approval of highway structures”) (see link provided in Annex A),
    e. a list of (reference to) all relevant documents used to prepare the design package, including standards, specifications, IAN, guidance and best practice guidance,
    f. elements of high-risk or complexity,
    g. a list of software to be used,
    h. quality assurance (e.g. checking, review and verification procedure) and
    i. a list of output materials

    and the design statement is to include an executive summary,
- evidence of compliance with the Joint Code of Practice (JCoP) for Risk Management of Tunnel Works in the UK (see link provided in Annex A),
- Equipment as described in section S340,
- all relevant drawings including plans and profiles, general arrangements, *sections*, 3rd angle projections and details and applicable fabrication and shop drawings,
- Departures packages and supporting evidence to demonstrate these have been agreed in accordance with section S316,
- evidence that all Consents have been obtained,
- evidence of compliance with all consult and comply requirements of the Scope,
- evidence of compliance with all agreements with Others and
- all Certificates required by the contract.

Unless stated otherwise in the Scope, all listed Key Data is to be accepted prior to the associated design activity or construction activity or construction phase.

S310.1A The *Contractor* is not required to submit the following in accordance with the Acceptance Procedure, unless requested by the *Project Manager*

- calculations,
- Design Data in respect of Temporary Works, except for Type P and Type S Structures,
- Design Data for works being provided by Others and
- reinforcement drawings and associated bar bending schedules.

S310.2 The following are not required to be submitted to the *Project Manager* in accordance with the Acceptance Procedure, unless requested

- calculations,
- Design Data in respect of Temporary Works, except as provided for Type P and Type S Structures and
- Design Data prepared by or on behalf of the *Client's* Parties.

General

S310.3 The *Contractor* submits Key Data to the *Project Manager* in accordance with the Acceptance Procedure.

S310.4 Prior to any design work commencing, the *Contractor* submits to the *Project Manager* as part of the design management plan a record of the organisation(s) undertaking design activities and the identity of the individuals within these organisations who perform the following functions, as applicable to the Acceptance Procedure and the Certification Procedure

- agent as the context requires when read in conjunction with the DMRB, MCHW or IAN,
- Temporary Works Designer,
- Ecologist,
- Archaeologist and
- Landscape Architect.

The *Contractor* maintains this record and resubmits to the *Project Manager* when updates are made.

S310.5 The *Contractor* ensures all Data is made available within the Project Common Data Environment (CDE).

Acceptance Procedure

S310.6 Unless stated elsewhere in the Scope, the manner, form and timing of any Submission as required by section S310 is determined by the *Contractor* and submitted to the *Project Manager* for acceptance.

S310.7 A Submission is determined as a submission to the *Project Manager* when it comprises of

- Key Data and
- any information, materials, documentation or Certificates required in accordance with section S311.

S310.8 The *Project Manager* responds to Submissions as follows

- accepted,
- accepted with comments or
- not accepted

within four weeks of the date of receipt, or other such period as agreed with the *Project Manager*.

S310.9 If the *Project Manager* fails to respond to any Submission (including any re-submitted Submission) within the timeframe specified in paragraph S310.8, then the *Contractor* notifies the *Project Manager* of the outstanding submission and the implications for the programme.

S310.10 From the *starting date*, the *Contractor* submits to the *Project Manager* for acceptance in accordance with the Acceptance Procedure a schedule of Submissions ("Submission Schedule") covering a three-month forecast of Submissions. The *Contractor* updates the Submission Schedule and submits it to the *Project Manager* for acceptance in accordance with the Acceptance Procedure at the same time as each programme submitted to the *Project Manager* for acceptance.

S310.11 The *Contractor* ensures that the Submission Schedule

- includes a brief description of each proposed Submission and
- clearly divides the Submissions into Project Control Framework products and further divided as follows
    - commercial (financial or contractual),
    - design activities,
    - plan or process and
    - Construction Activities.

S310.12 The *Contractor* ensures that the Submissions are provided in packages (as appropriate), ensuring

- sufficient information is made available to allow the *Project Manager* to determine the individual Submissions are in accordance with the Scope,
- these packages do not rely on a Submission that
    - has not yet been submitted in accordance with the Acceptance Procedure and
    - the *Project Manager* has returned as not accepted
- alignment with the programme for acceptance and
- compliance with the accepted 'Method Statement for Submissions in Accordance with the Acceptance Procedure'

unless otherwise agreed with the *Project Manager*.

S310.13 The *Contractor* ensures that each Submission Schedule aligns with the *Contractor's* programme submitted for acceptance and provides for a systematic flow of Submissions from the *Contractor* to the *Project Manager*.

S310.14 If the *Contractor* fails to submit Submissions in compliance with the previously accepted Submission Schedule, revised Submission return periods are agreed with the *Project Manager* and included in subsequent Submission Schedule(s). The revised total number of Submissions are not to deviate by more than 10 percent of the total number of Submissions previously accepted by the *Project Manager*.

S310.15 A reason for not accepting a Submission is

- it does not comply with the Scope,
- it does not allow the *Contractor* to Provide the Works,
- it adversely affects any right of the *Project Manager*, the *Client* or the *Supervisor* or
- it does not provide sufficient detail to enable the *Project Manager* to understand how the Submission complies with the Scope.

Outcome of Acceptance Procedure

S310.16 The *Contractor* complies with or implements Submissions accepted by the *Project Manager*.

S310.17 Where the *Project Manager* accepts with comments, these comments are addressed and implemented into the Submission by the *Contractor* within four weeks. The *Contractor* notifies the *Project Manager* of this implementation but does not resubmit in accordance with the Acceptance Procedure.

S310.18 If the *Project Manager* does not accept any Submission, a resubmission is treated as a new Submission for the purposes of the Submission Schedule unless the *Project Manager* agrees otherwise.

S310.19 Unless stated otherwise, the *Contractor* does not proceed with the relevant work until the Submission has either been accepted or accepted with comment (where such comments have been implemented) by the *Project Manager.*

S310.20 Any Submission which the *Project Manager* has accepted or accepted with comments that requires later variation is resubmitted in accordance with the Acceptance Procedure for acceptance by the *Project Manager* as an addendum to the original Submission. Unless stated otherwise, any such Submission is not implemented unless it has been accepted in accordance with the Acceptance Procedure.

S310.21 Any Submission which the *Project Manager* has accepted or accepted with comments that requires later variation due to a construction related change is resubmitted in accordance with the Acceptance Procedure for acceptance by the *Project Manager* as an addendum to the original Submission. Unless stated otherwise, any such Submission is not implemented unless it has been accepted in accordance with the Acceptance Procedure, unless otherwise agreed with the *Supervisor* and *Project Manager*.

Documentation Management

S310.22 The *Contractor* compiles and maintains a register of the date of receipt, status and content of all Submissions and includes the register on the CDE.

S311 Certification Procedure

General

S311.1 The Certification Procedure applies to all Key Data and certification prepared or adopted in connection with any of the following

- the additional sub-stages identified in section S260,
- detailed design,
- construction activities or

- all other Data, where required by the Scope to be submitted in accordance with the Acceptance Procedure.

S311.2 The *Contractor* ensures that a Designer prepares or supervises the preparation of all Design Data in respect of the *works* (including the additional sub-stages identified in section S260 and detailed design).

S311.3 The *Contractor* ensures that the Certification Procedure is complied with by the appropriate Staff referred to therein, and that Staff are at all relevant times duly authorised and duly appointed to carry out such procedures and to sign the relevant Certificates.

S311.4 The *Contractor* ensures that all authorised signatories signing the Certificates clearly indicate their name and position held within their organisation, with each signatory being

- a Principal of their organisation and
- a chartered member of an organised engineering institute/institution of an appropriate discipline or equivalent.

Digital Certificates

S311.5 The *Contractor* submits all Certificates, together with supporting documentation, to the *Project Manager* in electronic format.

S311.6 The *Contractor* may propose changes to the model Certificates for consideration by the *Project Manager*. Within 12 weeks of the *starting date,* or the date specified in the Accepted Programme, the *Contractor* submits to the *Project Manager* electronic versions of the model Certificates, in a format agreed with and including the changes agreed with the *Project Manager.*

S311.7 The *Contractor* uses, and ensures that all subcontractors (at any stage of remoteness to the *Client*) use, digital signatures for all Certificates.

General Certificate

S311.8 The *Contractor* ensures that where a Submission does not relate to a design or construction activity, it is accompanied by a General Certificate.

Design Certificate

S311.9 The *Contractor* ensures that where a Submission relates to a design activity, it is accompanied by a Design Certificate.

Archaeological Certificate

S311.10 The *Contractor* ensures that where a Submission includes archaeological activities or impacts upon archaeology within Working Areas or neighbouring site archaeology; the submission is accompanied by an Archaeological Certificate.

Landscape and Architectural Certificate

S311.11 The *Contractor* ensures that where a Submission includes or impacts on landscape and architectural design; the submission is accompanied by a Landscape and Architectural Certificate.

Ecological Certificate

S311.12 The *Contractor* ensures that where a Submission includes ecological activities or impacts upon ecology within Working Areas or neighbouring site ecology; the submission is accompanied by an Ecological Certificate.

Multiparty Collaboration Certificate

S311.13 The *Contractor* submits a Multiparty Collaboration Certificate alongside all Submissions which require multiparty interface(s) between the *Contractor* and any other Main Works Contractors.

Enforcement Systems Certificate

S311.14 The *Contractor* submits an Enforcement Systems Certificate in accordance with section S700.

Construction Certificate

S311.15 The *Contractor* submits a Construction Certificate within four weeks of completion of each construction activity.

S311.16 For the purposes of the Acceptance Procedure, a construction activity means

- all construction activities that require certification in accordance with the DMRB during the period between Commencement of Construction and Completion of the whole of the *works*, unless otherwise agreed with the *Project Manager*,
- completion of Receptor Sites for Translocated Species (as defined in the Environmental Master Plan) and
- completion of Proposed Ancient Woodland Replacement (as defined in the Environmental Master Plan).

Sectional Construction Certificate

S311.17 The *Contractor* submits a Sectional Construction Certificate for each *section* upon Completion of each *section* of the *works*.

Takeover Certificate

S311.18 The *Contractor* submits a Takeover Certificate for each *section* of the *works* that is handed over to the *Client* or relevant Local Authority (via the *Project Manager*).

S316 Departures and Approval in Principle requirements

Departures

S316.1 The *Contractor* submits Departures in accordance with the “Departures Manual” (as published by the *Client*) (see link provided in Annex A). The *Project Manager* performs the roles and function of the ‘’Project Manager’’ as defined in the Departures Manual.

S316.2 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority’s requirements, with respect to Departures for Side Roads.

S316.3 Where the *Contractor* proposes to incorporate Departures (including Letter of no Objection Departures) within the design of the *works*, any such Departures are

- for assets which are or will become the *Client's* responsibility or are influenced by third party existing or new assets, subject to agreement by the *Client* (via the *Project Manager*) and
- for assets which are or will be the relevant Local Authority asset or are influenced by the *Client's* existing or new assets, subject to agreement by the relevant Local Authority and the *Project Manager*.

Departures are incorporated at the discretion of the *Project Manager* prior to commencement of the relevant construction activity.

S316.4 The *Contractor* ensures that any proposal to seek Departures are notified to the *Project Manager* at the earliest opportunity and the progress of each notified Departure is summarised by the *Contractor* in a report submitted to the *Project Manager* on a monthly basis.

S316.5 The *Contractor*

- unless the Scope or the *Project Manager* state otherwise, may progress the detailed design reliant upon the Departure prior to the *Project Manager's* acceptance of such Departure and
- does not commence the relevant construction activity prior to the *Project Manager*'s acceptance of such Departure.

Approval in Principle (AIP)

S316.6 The *Contractor* ensures that the necessary Approval in Principle (AIP) document(s) are submitted to the Technical Approval Authority (TAA) (via the *Project Manager*) in accordance with DMRB standard CG 300 ("Technical approval of highway structures"), (see link provided in Annex A).

S316.7 The *Contractor* consults with the TAA (via the *Project Manager*) and complies with the TAA requirements, regarding the AIP for Structures which become the responsibility of the *Client.*

S316.8 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, regarding AIP for Structures which become the responsibility of the relevant Local Authority.

S316.9 The *Contractor,* unless the *Project Manager* states otherwise, may submit the AIP to the relevant Local Authority (via the *Project Manager*) for its consideration.

S316.10 The *Contractor* submits a completed AIP for Structures to the TAA (via the *Project Manager*) for signed acceptance prior to submission to the *Project Manager* in accordance with the Acceptance Procedure.

S316.11 The *Contractor* maintains and provides to the *Project Manager* for information a register recording the names and original signatures of individuals authorised to carry out the various functions in accordance with DMRB standard CG 300.

S316.12 The *Contractor* agrees with the *Project Manager* the time periods for review by the TAA of each AIP.

The *Contractor* does not commence detailed design of a Structure until the AIP has been accepted by the *Project Manager*.

S316.13 The *Contractor* notifies the TAA (via the *Project Manager*) of all temporary works likely to, or having the potential to, affect any Structure or Geotechnical Activities and complies with DMRB standard CG 300. All Type P Temporary Works Structures are categorised as Category 3 Structure, unless agreed otherwise with the TAA (via the *Project Manager*).

S316.14 The *Contractor* maintains and provides to the *Project Manager* for information at each monthly progress meeting, as defined in section S850, a register recording the current status of all AIP submissions and the agreed time period of return by the TAA (via the *Project Manager*).

Railway Authorities

S316.15 The *Contractor* consults with the Railway Authority and complies with the Railway Authority's requirements, regarding "Form 001" (see link provided in Annex A) or additional forms or processes as required.

S316.16 Where the *works* for Structures are over, under or adjacent to railway lines, the *Contractor* submits to the *Project Manager* the relevant signed AIPs for the Trunk Road and Side Road and the signed Form 001 in accordance with the Acceptance Procedure, prior to commencement of the relevant detailed design.

S316.17 The *Contractor* ensures that the duration and submission dates are agreed with the Railway Authority and included within the *Contractor's* programme submitted for acceptance.

S318 Design co-ordination

General

S318.1 The *Contractor* ensures that the design is fully co-ordinated across all disciplines and takes account of all requirements and constraints. This includes the design management and design co-ordination of

- Plant and Materials,
- health and safety risks (identification, assessment, elimination or reduction throughout the design process),
- the engineering, the architecture and landscape design to ensure an integrated design that does not compromise the requirement for
    - the high-quality aesthetic design and
    - the functional, operation and maintenance requirements
- Consents,
- environmental and sustainability constraints and
- Working Areas and other constraints (including physical constraints).

S318.2 The *Contractor* co-ordinates all design interfaces with *Client* Parties and Others that result from the *works* including those interfaces identified in section S926.

S318.3 The *Contractor* Provides the Works such that the *works* are capable of being used with and do not adversely impact upon the carrying out or completion of any other works related to the Project (including those works carried out by Others and other Main Works Contractors).

Co-ordination with other Main Work Contractors

S318.4 The *Contractor* ensures all *works* that impact upon the other Main Work Contractors are agreed with the other Main Work Contractors in terms of aesthetics, functionality, operationality and maintainability. These activities include

- horizontal and vertical alignment,
- central reservation,

- fencing,
- environmental barriers,
- road restraint system (vehicle and pedestrian),
- drainage systems and service ducts,
- flood mitigation and protection,
- pavements including foundation and surface layers,
- kerbing,
- traffic signs (including road markings and road studs),
- road lighting columns and brackets, closed circuit television (CCTV) masts and cantilever masts,
- gantries,
- landscape and ecology,
- architecture,
- ITS and technology (including communication systems),
- emergency areas,
- Departures and
- road interface (including earthwork interfacing).

Design of such *works* is submitted to the *Project Manager* in accordance with the Acceptance Procedure and accompanied by the Multiparty Collaboration Certificate, prior to commencement of the relevant construction activity. The *Contractor* includes within the submission, a completed Multiparty Collaboration Form that provides evidence of such agreements with the other Main Work Contractors.

S318.5 At design interfaces, the *Contractor* ensures design consistency between the *Contractor's* design and the design carried out by the other Main Work Contractors.

S318.6 The *Contractor* shares and co-ordinates the Federated Model with the other Main Works Contractors in accordance with the requirements of section S1900.

Multiparty Collaboration Form

S318.7 The template of the Multiparty Collaboration Form is provided in Annex D.

S318.8 The *Contractor* determines the level of detail that is required within the Multiparty Collaboration Form with other Main Works Contractors based on the complexity of the interface such that it does not adversely affect the

- Completion of the whole of the *works,*
- Completion of any *section,*
- ability to achieve any Key Date and any key date defined in any other Main Works Contract and
- any works carried out by Others.

S318.9 The *Contractor* ensures that the completed Multiparty Collaboration Form is compatible with the Interface Control Document requirements set out in section S926.

S318.10 The *Contractor* identifies all Multiparty Collaboration Forms required within the submitted Submission Schedule description, in accordance with section S310.

S318.11 The *Contractor* notifies the *Project Manager* immediately of any interface issues that the *Contractor* is unable to resolve with Others and other Main Work Contractors.

Co-ordination with Others

S318.12 The *Contractor* co-ordinates the *works* and the integration of the *works* with the activities of Others.

S318.13 The *Contractor* carries out periodic meetings regarding interfaces with Others to resolve occurrences of any of the interface types set out in section S900 to avoid the materialisation of interface risk.

S319 *Client's* requirements

S319.1 The *Contractor* ensures the *works* comply with the following

- designed and built as a Category A Tunnel with no dangerous goods vehicle restrictions and
- provide emergency access and vehicle turn around facilities at the tunnel portals.

S320 *Client's* requirements (for the parts of the *works* to be designed by the *Contractor*)

General

S320.1 The *Contractor* ensures the detailed design is developed from and is consistent with the relevant sub-stages identified in section S260.

S320.2 The *Contractor* is responsible for the assessment, appraisal, design, supply, construction, commissioning and testing of the *works*, which is carried out

- to ensure compliance with the requirements of the Scope and
- in accordance with the Acceptance Procedure and the Certification Procedure.

S320.3 The *Contractor* ensures that the expressway element is to Level 3 as defined in DMRB standard GD 300 ("Requirements for new and upgraded all-purpose trunk roads (expressways)") (see link provided in Annex A).

S320.4 Table 5 provides the interface co-ordinates between the Main Works Contracts. The interface co-ordinates (x,y,z, bearings and gradient) provided are from the Reference Design to ensure the Main Works Contractors commence using the same interface co-ordinates. The *Contractor* is required to confirm and agree these interface co-ordinates with the neighbouring Main Works Contractors and Others). The *Contractor* submits the agreed interface co-ordinates in accordance with the Acceptance Procedure and accompanied by the Multiparty Collaboration Certificate, prior to commencement of the relevant construction activity.

Table 5 - Tunnel and Approaches Contract - Interface with Roads North of the Thames and Kent Roads Contracts

Chainage	Description	Coordinates				Horizontal Geometry	Vertical Geometry
		X	Y	Z (refers to above ordnance datum (AOD))	Bearing		
South Interface							
1+100 (central reserve string)	Start of interface (centre of central reserve)	567233.9136	171194.1034	-	N36°40'46.33"E	Straight section	No vertical profile was created for the central reserve
1+149.90 (southbound string)	Southern interface (centre of southbound carriageway)	567275.9644	171237.5867	55.82 m	N36°40'46.33"E	Straight section	Downhill gradient toward north - slope = -1.6%
1+160 (central reserve string)	Southern interface (centre of central reserve)	567269.7489	171242.2161	-	N36°40'46.33"E	Straight section	No vertical profile was created for the central reserve
1+166.37 (northbound string)	Southern interface (centre of northbound carriageway)	567263.5335	171246.8454	55.96 m	N36°40'46.33"E	Straight section	Downhill gradient toward north - slope = -1.6%
1+200 (central reserve string)	End of interface (centre of central reserve)	567293.6425	171274.2956	-	N36°40'46.33"E	Straight section	No vertical profile was created for the central reserve
North Interface							
7+500 (central reserve string)	Start of interface (centre of central reserve)	567173.5574	177340.6458	9.35 m	N12° 11' 13.81"W	Straight section	Uphill gradient toward north - slope = 1.3%
7+729.85 (central reserve string)	Change of profile (centre of central reserve)	567125.0347	177565.3157	12.45 m	N12° 11' 13.81"W	Straight section	Crest starting point - R=18200m L=336.2m
7+754 (central reserve string)	Northern interface (centre of central reserve)	567119.9365	177588.9215	12.76 m	N12° 11' 13.81"W	Straight section	Crest - R=18200m L=336.2m
8+000 (central reserve string)	End of interface (centre of central reserve)	567068.0044	177829.3774	14.11 m	N12° 11' 13.81"W	Straight section	Crest - R=18200m L=336.2m

S320.5 To note

- the X and Y coordinates refer to a global grid - British National Grid (ORD SURV GB) and
- the southern interface, vertical geometry is not allocated to the central reserve alignment as the carriageways diverge. There are separate alignments for the northbound and southbound carriageways.

Reference date

S320.6 In carrying out the design, the *Contractor* complies with any updates to the design standards and specifications referred to in the Scope up to and including the *reference date*, unless

- within the scope of the Departure with a Letter of No Objection from the SES or the relevant Local Authority (and which has been approved as a Departure) and only to the extent strictly required or
- the contract expressly requires the *Contractor* to implement a design standard or specification that was released after the *reference date*.

S320.7 The *Contractor* submits quarterly reports to the *Project Manager* for information, identifying any new or updated design standards and specification referred to in the contract or otherwise relevant to the Project (including the *Contractor's* assessment of the likely impact of updated design standards and specification on the design and associated *works* including programme).

The reports indicate any updates to standards and specifications that are referred to in the design that are referred to in paragraph S320.6 including the exceptions contained in bullet points 1 and 2 (inclusive). These quarterly reports commence on the *starting date* and end on the Completion Date.

Building Information Modelling (BIM)

S320.8 The *Contractor* is responsible for managing and ensuring the implementation of BIM standard methods, procedures and processes in accordance with section S1900.

S320.9 The *Contractor* uploads shared design information and models to the centrally hosted Common Date Environment in accordance with the requirements of section S1900.

Compliance with the relevant standards

S320.10 In carrying out the *works,* the *Contractor* complies with (see links provided in Annex A)

- for Trunk Roads
    - the Design Manual Roads and Bridges (DMRB) including Interim Advice Notes (IAN) and
    - the Manual of Contract Documents for Highway Works (MCHW)
- the Traffic Signs Manual and
- the requirements of the Scope.

S320.11 The *Contractor* ensures that access to the Operational Technology Specification Library (or any later replacement/revision) is obtained within two weeks of the *starting date*. The Operational Technology Specification Library is accessible via the following webpage https://highways.sharepoint.com/sites/OperationalTechnologySpecifications.

Access is granted on request through the following email address SSPlansRegistry@NationalHighways.co.uk.

Evidential trails

S320.12 The *Contractor* ensures that evidential trails are provided for the enforcement system in accordance with the “Evidential Trail Suite of Documents” (see link provided in Annex A) and “Speed Camera Policy & Approval - Index of Guidance Documents” (see link provided in Annex A).

The *Contractor* ensures that all HADECS3X enforcement Plant and Materials has Home Office Type Approval (HOTA).

Enforcement Group Requirements

S320.13 The *Contractor* coordinates with the other Main Works Contractors to ensure quarterly enforcement group workshops are held during the design, implementation and testing phases for the enforcement system, unless otherwise agreed with the *Project Manager*.

The *Contractor* agrees with the other Main Works Contractors on a rotating basis which Main Works Contractor

- chairs and arranges the workshop,
- provides a venue at a location that is agreed with the *Project Manage*r,
- sets the agenda (including any technical queries or other relevant information),

- identifies all attendees and agrees these with the *Project Manager*, two weeks in advance of each workshop,
- provides all workshop information (including agendas, minutes and actions) on the Project Common Data Environment (CDE) and where an attendee does not have access to the Project CDE, the *Contractor* sends the workshop information to the relevant party and
- ensures minutes include an abbreviated action list with assigned responsibilities and timescales for action(s).

S320.14 The enforcement group comprises of the

- relevant police forces (including the relevant enforcement authority),
- *Project Manager*,
- Main Works Contractors,
- *Client* including Safety, Engineering and Standards, National Compliance Team and Road User Safety Group and enforcement system specialist,
- *Client's* HADECS Specialist Contractors and Specialist Suppliers and
- relevant Local Authorities (including the enforcement authority).

S320.15 The *Contractor* ensures that these enforcement group workshops cover the design, operation and maintenance of enforcement systems and the

- compliance with the Home Office Type Approval (HOTA) and
- development of and compliance with the evidential trails

including any required alignment with other Main Works Contractors (MWC) and Others.

S321 *Client's* requirements (for the design of Roads)

Highways

General

S321.1 The *Contractor* complies with the additional requirements for Project Roads as set out in "Requirements for Project Roads" (HE540039-CJV-HGN-GEN-CON-HWY-00023), link provided in Annex A.

S321.2 The *Contractor* ensures that any temporary highways are designed as a permanent highway.

S321.3 Where the *Contractor* proposes to implement any parts of the existing highway network into the *works,* the *Contractor* ensures that such implemented parts are assessed and upgraded in accordance with the requirements of the Scope (as of the *reference date*), unless otherwise agreed with the *Project Manager*.

Design Standards

S321.4 Notwithstanding other provisions of the contract, the *Contractor* designs the Trunk Roads and Maintenance Tracks in accordance with the DMRB.

S321.5 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, regarding the design standards for Side Roads and Private Means of Access (where appropriate).

Design Speeds

S321.6 The design speeds for Trunk Roads are stated in “Requirements for Project Roads”.

S321.7 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority’s requirements, regarding the design speeds for Side Roads.

Cross-Sections

S321.8 The cross-sectional dimensions for Trunk Roads are stated in “Requirements for Project Roads”.

S321.9 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority’s requirements, regarding cross-sectional dimensions for Side Roads.

S321.10 Changes in cross-section between existing roads and the cross-section requirements of Project Roads are affected smoothly over a length sufficient for road users to naturally follow the alignment of the lane lines ahead and to negotiate and adjust position relative to vehicles in adjacent lanes.

S321.11 The cross-sectional dimensions for Structures are stated in “Requirements for Project Roads”.

Horizontal and Vertical Alignment

S321.12 The *Contractor* ensures that the horizontal and vertical alignment for all Trunk Roads, Side Roads, Private Means of Access, Maintenance Tracks, LA Maintenance Tracks and WCH Routes and otherwise extends to the limits shown in the Development Consent Order (DCO) (Books of Plans) and ties in with existing routes with a smooth transition.

Maintenance Tracks, LA Maintenance Tracks and Private Means of Access

S321.13 The *Contractor* ensures that Maintenance Tracks comply with the following

- the additional requirements for Project Roads as set out in “Requirements for Project Roads”,
- all surfaces are thin surface course in accordance with the DMRB, unless otherwise agreed with the *Project Manager*,
- have a maximum permissible vertical gradient of 8%, unless otherwise agreed with the *Client* via the *Project Manager*,
- provide access to all other areas that have an ongoing maintenance requirement,
- include spillage containment apparatus and
- provide turning heads where necessary to allow for the safe egress of maintenance vehicles and where the *Contractor* proposes to make use of either WCH Routes, Private Means of Access, or otherwise as Maintenance Tracks, these routes are constructed to satisfy the requirements of the Maintenance Tracks as well as the requirements for the respective WCH Routes and Private Means of Access.

S321.14 The *Contractor* consults (as appropriate) with the *Client* via the *Project Manager*, the relevant Local Authorities and landowners and complies with their requirements in respect to

- gates with locks,
- removable bollards and
- fences and otherwise

for areas that require operation and maintenance following Completion.

These measures are based on a risk assessment carried out by the *Contractor* at each location to ensure the security and safety of the area being operated and maintained.

These measures are co-ordinated (as appropriate) with the *Client* via the *Project Manager*, the relevant Local Authorities and landowners.

S321.15 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, regarding LA Maintenance Tracks and Private Means of Access as outlined in numbered appendix 1/15.

Junction Design

S321.16 The *Contractor* ensures that junctions on the Project Roads are designed for the notional design year of 2045 and the associated forecast traffic flows, as defined in 'appendix C Traffic Forecasting Package' of the Combined Modelling and Appraisal Report (ComMA) in the Development Consent Order (see link provided in Annex A).

S321.17 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, regarding junction design for Side Roads.

S321.18 The *Contractor* ensures that major junctions located on the Trunk Roads are provided with a grade-separated layout.

Closure and Stopping up of existing roads, accesses and otherwise

S321.19 Where closures and stopping up of existing roads, junctions, accesses and otherwise are required to Provide the Works, the design includes the removal of existing hard materials and other features followed by reinstatement in materials and levels to match the adjacent existing verge, with the inclusion of suitable drainage.

S321.20 The *Contractor* ensures that fencing and gates, associated with the closure of existing roads, junctions and accesses, incorporate the requirements of numbered appendix 1/15.

S321.21 The *Contractor* ensures that road markings, signing and studs are removed to a suitable distance in advance of the end of any road stopped up as part of the *works*. Where appropriate they are replaced with suitable new road markings and signing.

Carriageway Tie-ins

S321.22 The *Contractor* ensures that where the carriageway ties-in to the existing carriageway that there is a smooth transition in terms of horizontal and vertical alignment.

S321.23 The *Contractor* ensures that the tie-in design considers the unique requirements of the tie-in location, with reference to road widths, design speeds, alignment curvature and sight distances together with road markings, surface texture, signing and any other relevant design criteria.

S321.24 The *Contractor* ensures that the tie-ins to roads adjoining the Project Roads have minimum verge width, in accordance with the limits shown in DCO (Books of Plans) and thereafter the width tapers linearly to the existing verge width.

Visibility Envelopes

S321.25 The *Contractor* ensures that the design for visibility envelopes takes into consideration the location of road furniture, including the vehicle restraint system.

S321.26 The *Contractor* ensures that road and junction layouts have a suitable surface to permit cyclic maintenance, cutting of grass and other vegetation so that the visibility envelopes can be achieved.

S321.27 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's additional requirements, regarding visibility envelopes for Side Roads.

Walking, cycling and horse-riding (WCH) Routes

S321.28 The *Contractor* ensures that the design incorporates provision for the use of WCH Routes of either existing or new roads and new footways, footpaths, shared use routes, segregated footway and cycle tracks and bridleways, as shown on the relevant rights of way and access plans included in the DCO documentation and such provision provides the same level of connectivity as that shown in rights of way and access plans included in the DCO documentation, taking into account the existing tie-in requirements.

S321.29 WCH provisions are designed in accordance with the following (see links provided in Annex A)

- DMRB standard CD 143 ("Designing for walking, cycling and horse-riding"),
- LTN 1/20 ("Cycle infrastructure design"),
- Local Cycling and Walking Infrastructure Plans (Technical Guidance for Local Authorities),
- Sustrans Design Manual – Handbook for cycle-friendly design (2014) and
- British Horse Society advice notes.

S321.30 The *Contractor* applies the principles of 'Secured by Design' to the design of temporary and permanent WCH Routes and Underpasses, unless otherwise agreed with the *Project Manager*.

S321.31 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, regarding additional WCH requirements.

Road Restraint System (Vehicular and Pedestrian)

S321.32 The *Contractor* designs the road restraint system for Trunk Roads in accordance with DMRB standard CD 377 ("Requirements for road restraint systems") (see link provided in Annex A).

S321.33 The *Contractor* consults with the *Project Manager* and complies with the *Project Manager's* requirements, regarding the re-use of existing road restraint system into the *works*.

S321.34 Where reinforced soil Structures or other Structures utilising, precast soil retaining panels are provided in the design adjacent to the carriageway, the fixing of road restraint systems directly to these precast panels are not permitted.

S321.35 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, for road restraint systems (and their tie-in to the existing) for Side Roads.

Kerbs

S321.36 The specific requirements for Trunk Roads are as follows

- cut kerbs are to have a minimum length of 300mm and
- where straight kerbs are used to change direction of the kerb line, the kerbs are cut to produce a butt joint.

S321.37 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, regarding kerbs for Side Roads (including WCH Routes).

Central Reserve

Place of Relative Safety

S321.38 The *Contractor* ensures that

- from any entry point on to a mainline section, the maximum distance to the first place of relative safety does not exceed 1.2km,
- throughout a mainline section of road, a place of relative safety is provided at a maximum spacing of 1.2km and
- the places of relative safety are coordinated with the other Main Work Contractors at contract boundaries to ensure that a maximum spacing of 1.2km is achieved along the mainline section of road for the full extent of the Project

unless otherwise agreed with the *Project Manager*.

S321.39 The *Contractor* ensures that the central reserve on new Trunk Roads are constructed of 'hard' material suitable for the traffic overrun and minimal maintenance requirements.

S321.40 Where reinforced concrete barriers are laid side by side within the central reserve, the *Contractor* ensures sufficient number of weep holes are provided (including at each low point) to mitigate against standing water.

Fencing

S321.41 Notwithstanding the other provisions of the contract, the *Contractor* undertakes a risk assessment on all fencing provision to confirm its appropriateness to the location and adjacent land use. The *Contractor* ensures that the fencing is constructed, as a minimum, dependent on the characteristics of each specific area of construction.

S321.42 The *Contractor* ensures that all fencing complies with the DCO requirements.

S321.43 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, regarding fencing, walls, gates and environmental barriers or otherwise for Side Roads.

Side Roads

S321.44 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, for Side Roads, including

- the provision and reinstatement of bus lay-bys,
- site clearance,
- the provision, location and lighting of Traffic Signs,
- signing and marking of cycle facilities,
- maintaining existing sign information during construction of the *works*,
- the number and exact location of ducting,
- road studs and
- road markings.

S322 *Client's* requirements (for the design of Drainage)

General

S322.1 The *Contractor* with respect to managing construction of the work

- obtains all necessary Consents and meets the monitoring requirements of licenses and
- complies with the requirements of Environment Agency (EA) or Lead Local Flood Authorities (LLFA) Consents and discharges the conditions of such Consents.

S322.2 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, regarding drainage for Side Roads.

S322.3 The *Contractor* ensures that the continued and uninterrupted flow of all watercourses is maintained while Providing the Works.

S322.4 The *Contractor* prepares a 'Co-ordinated Drainage Design Report', that includes

- the highway drainage systems,
- the management of surface water and foul drainage,
- the treatment of runoff,
- pollution control,
- attenuation and infiltration,
- the management of flows from catchments external to the highway,
- independent drainage systems for highway and land drainage,
- the management of slope drainage for surface and near-surface flows,
- the management of sub-surface groundwater flows and
- the management and incorporation of existing drainage systems.

S322.5 The *Contractor* submits the 'Co-ordinated Drainage Design Report' to the *Project Manager* in accordance with the Acceptance Procedure and accompanied by the Multiparty Collaboration Certificate, prior to the commencement of the relevant permanent drainage detailed design.

S322.6 The *Contractor* ensures that the 'Co-ordinated Drainage Design Report'

- complies with the mitigation measures included in the DCO,
- complies with the relevant Local Authority requirements,
- complies with the EA requirements,
- demonstrates that the *works* do not result in an increase in the risk of flooding and improve upon the existing conditions,
- maintains or improves the quality of water entering the ground,
- provides a consistent approach to the drainage design as agreed with the other Main Works Contractors,
- provides a coordinated approach to drainage design across interfaces as agreed with the other Main Works Contractors,
- uses drainage treatment areas to create additional wetland and grassland habitats and
- increase levels of biodiversity.

S322.7 The *Contractor* does not discharge water from the Working Areas on either a temporary or permanent basis until it has consulted with all interested parties including

- EA,
- LLFA,
- other Statutory Bodies,
- relevant Statutory Undertakers,
- the *Project Manager* and
- adjacent landowners

and until it has complied with the requirements of all interested parties.

S322.8 The *Contractor* consults with the relevant Local Authority (as appropriate) and complies with the relevant Local Authority's requirements, for the use of drainage products and systems used on Side Roads and LA Maintenance Tracks.

S322.9 The *Contractor* ensures consistency in the design and procurement of road edge drainage solutions including surface water channels and outlets, bridge drainage, combined channel and pipe systems for surface water drainage, combined kerb and drainage units, linear drainage channels and grassed surface water channels.

S322.10 The *Contractor* defines drainage catchment areas in accordance with the DMRB and MCHW for Trunk Roads. The *Contractor* ensures drainage catchments are aligned to the highway's geometry and outfalls.

S322.11 The *Contractor* ensures that the design of drainage for Trunk Roads considers the best practices provided in the Construction Industry Research and Information Association (CIRIA) Report C753 "The SuDS Manual" (see link provided in Annex A). The *Contractor* ensures that the SuDS design for the Side Roads and LA Maintenance Tracks is in accordance with the requirements of the relevant Local Authority.

S322.12 The *Contractor* ensures that drainage on WCH Routes, Maintenance Tracks, LA Maintenance Tracks, Private Means of Access, and otherwise removes surface water and sub-surface water to at least 450mm below finished track and path levels (when in use), unless otherwise agreed with the Local Authority (as appropriate) and the *Project Manager*.

S322.13 The *Contractor* ensures that the minimum pipe diameter for all drainage systems in the design are 225mm, except for

- cross carriageway drainage, where the minimum diameter is 300mm and
- gully connections where the minimum diameter is 150mm

unless agreed otherwise with the *Project Manager* and the relevant Local Authority (as appropriate).

S322.14 The *Contractor* ensures that drainage is provided to prevent erosion and ponding, including in areas which would be detrimental to the safe operation of the carriageway or long-term stability of the *works*.

S322.15 The *Contractor* ensures that subsurface drainage is provided within the central reserve and verges of all new Trunk Roads and Side Roads in respect of road camber.

S322.16 The *Contractor* consults and agrees with all landowners, tenants and occupiers in respect of land drain connections. The *Contractor* ensures that landowners, tenants and occupiers are permitted to inspect severed land drains and their reconnections prior to backfilling.

S322.17 No manhole or catchpit covers are permitted within the road pavement of any Trunk Road or Side Road, unless otherwise agreed with the *Project Manager* and the relevant Local Authority (as appropriate).

S322.18 The *Contractor* ensures that all kerbed roads have a positive drainage system such as gullies or combined drainage kerbs, unless otherwise agreed with the *Project Manager* and the relevant Local Authority (as appropriate).

Trunk Road Specific Requirements

S322.19 The *Contractor* is to submit the drainage certification as per DMRB standard CG 502 ("The certification of drainage design") (see link provided in Annex A) to the *Project Manager* in accordance with the Acceptance Procedure.

S322.20 Rodding eyes are not permitted, unless otherwise agreed with the *Project Manager*.

S322.21 The maximum distance between access points on lengths of pipe are 90 metres. The maximum distance between access points on lengths of combined kerb and drainage units are 45 metres, unless otherwise agreed with the *Project Manager*.

S322.22 The *Contractor* ensures that the cut off drainage is provided to intercept water, field drains and slope drains and otherwise at the top of cuttings where the adjacent land falls towards the cutting, on cutting berms and at the bottom of embankments with a minimum one metre clearance between the proposed cutting and existing slope.

S322.23 Where the road is in cutting less than two metres below original ground level, cut off drainage at the top of the cutting may be omitted as long as there is a verge drain at the toe of the cutting.

S322.24 Where land drains are encountered and are permanently severed by the *works*, the *Contractor* ensures that such land drains are kept separate from the highway drainage pipe system and are appropriately reinstated.

S322.25 The *Contractor* makes allowance in the design, construction and completion for the areas throughout the Site (including Working Areas and the 'sites' as defined under the other Main Works Contracts) and adjacent areas which are susceptible to flooding in order to avoid inconvenience to adjacent landowners, tenants or occupiers. No increase to flood risk is permitted outside the permanent highway boundaries.

S322.26 Where the *Contractor* proposes to use linear drainage channels or slot drains, the *Contractor* demonstrates that there is no adverse impact upon

- whole life costs,
- future operational maintenance costs and
- Availability.

S322.27 Where combined surface and sub-surface drains are remote from the carriageway edge or behind the road restraint, the top surface of the filter material extends to finished ground level. The *Contractor* ensures verges are adequately designed to allow adjacent fencing next to filter drains. The *Contractor* ensures that foundations for road restraint systems (vehicle and pedestrian) and fences are outside of the footprint of the drainage system, unless otherwise agreed with the *Project Manager*.

S322.28 Roughness coefficients for pipes are in accordance with the requirements of DMRB standard CD 523 ("Determination of pipe roughness and assessment of sediment deposition to aid pipeline design") (see link provided in Annex A) with k_o selected in accordance with pipe age and condition and d_{50}=0.9mm (rural), unless otherwise agreed with the *Project Manager*.

S322.29 The minimum pipe velocity for pipes is as per DMRB standard CD 523, for rural location with k_o selected in accordance with pipe age and condition. Maximum velocity for longitudinal pipes is 3.5 m/s, unless otherwise agreed with the *Project Manager*.

Existing Drainage

S322.30 The *Contractor* does not reuse existing drainage materials without the *Project Manager's* agreement.

S322.31 Where the *Contractor* proposes existing drainage apparatus is either partially or wholly to be retained or incorporated into the *works*, the *Contractor* undertakes a drainage survey.

The *Contractor* ensures any necessary remediation works are incorporated into its proposals.

S322.32 The *Contractor* upgrades existing drainage systems which may be required as a result of changes in paved areas or where existing drainage does not meet current design standards, unless a Departure has been agreed.

S322.33 The *Contractor* maintains all existing foul and surface water drainage functionality from the *access date* until Completion.

S322.34 Saddles are only permitted for achieving connection to an existing drainage system such as repairs to existing gully connections and only where agreed with the *Project Manager*.

S322.35 All existing drainage pipework within one metre of carriageway formation level which become redundant as part of the *works*, are either removed from the Working Areas or grouted up, unless otherwise agreed with the *Project Manager*.

S322.36 All existing drainage pipework over one metre of carriageway formation level which becomes redundant as part of the *works* are completely in-filled with a suitable in-fill material.

Drainage Outfalls

S322.37 The *Contractor* ensures that pipes discharging to watercourses are provided with head walls to a design that has been agreed by the EA and LLFA (as appropriate) which is responsible for such watercourse.

S322.38 The *Contractor* ensures that all new outfalls incorporating surface water runoff from road pavements are provided with a shutoff system to facilitate operational and maintenance requirements, including accidental spillages.

Maintenance Tracks for drainage

S322.39 The *Contractor* ensures that provision is made to provide safe access to all drainage systems for inspection and maintenance purposes, including

- shut off valves,
- attenuation, storage, detention basins, swales and ditches or otherwise,
- aquatic benches,
- the base of the ponds and
- interceptors.

S322.40 The *Contractor* ensures that all attenuation and storage ponds are provided with Maintenance Tracks around the perimeter.

Drainage Culverts

S322.41 The *Contractor* ensures that culvert designs have a minimum internal dimension of diameter, width or height in accordance with the DCO.

S322.42 The *Contractor* ensures that, where an existing culvert is replaced or extended, the new culvert's dimensions and capacity are equal to or greater than the existing culvert.

S322.43 The *Contractor* ensures that all culverts include a mammal ledge or a dry culvert is provided as an alternative. The *Contractor* ensures that the ledge is a minimum 500mm wide, provided with a minimum 600mm headroom to the soffit of the culvert and in accordance with any additional recommendations of CIRIA C786 ("Culvert screen and outfall manual"), (see link provided in Annex A). The *Contractor* ensures that dry culverts are in accordance with the recommendations of CIRIA C786.

Pollution Control and Flood Prevention

S322.44 The *Contractor* takes all necessary measures to avoid any adverse effects on the surrounding area caused by flooding and pollution.

S322.45 The *Contractor* ensures that all proposed drainage networks on Trunk Roads are designed to meet DMRB standard CG 501 ("Design of highway drainage systems") (see link provided in Annex A), including appropriate provisions for climate change uplift. In addition, the *Contractor* ensures

- no surface flooding for 1 in 10 year return period for areas that flooding may occur like trapped sags
- for the approaches to the tunnel and cuttings, that there is no surface flooding for a 1 in 100 year storm return period + 40% climate change allowance for the critical storm event for a rainfall duration of up to 24 hours. The *Contractor* ensures any water generated on the open road is to be captured at an interceptor close to the portals unless otherwise agreed with the *Project Manager* and
- ponds and basins are designed for 1 in 100 years plus climate change flood peak discharge flow of the watercourse.

S322.46 The *Contractor* ensures that Trunk Roads and Maintenance Tracks culverts are designed to meet DMRB standard CD 529 ("Design of outfall and culvert details") for 1 in 100 years plus climate change.

S322.47 The drainage design complies with the flood studies report theory rainfall with intensities appropriate to the area in which the Project is situated, using a minimum of

- M5-60 = 19.8mm (rainfall depth for 60 minutes for a 5 year return period),
- r = 0.40 (ratio of 60 minutes to 2 day rainfalls for a 5 year return period) and
- 2minM5 = 4.0mm (rainfall depth for 2 minutes for a 5 year return period).

S322.48 The *Contractor* ensures that all storage ponds and infiltration basins (or equivalent)

- are sized to include for settlement of sediment and
- incorporate facilities for removal of sediment.

S322.49 The *Contractor* ensures that all wetlands (or equivalent) take into account ground water levels and are designed to have a minimum of one metre permanent water below the outlet level.

S322.50 The *Contractor* prepares a detailed flood risk assessment for the extent of the Working Areas in accordance with the DMRB incorporating the interface between the other Main Works

Contractors and submits this to the *Project Manager* in accordance with the Acceptance Procedure, prior to the commencement of the relevant construction activity.

S322.51 The *Contractor* ensures that the volume of compensatory flood storage capacity provided matches, or is greater than, the floodplain storage capacity lost to the *works* and other Main Works Contractor's *works*.

S322.52 The *Contractor* ensures that any compensatory flood storage capacity provided by the *Contractor* is hydraulically linked to the area where existing floodplain storage capacity has been lost.

Watercourse Diversions

S322.53 The *Contractor* ensures the *works* minimise, and in Providing the Works it minimises, the need to divert watercourses.

S322.54 The *Contractor* ensures that all water crossings under any Trunk Road or Maintenance Access Tracks (for the full extent including any hardstanding or trafficked areas) are enclosed in a structure, unless otherwise agreed with the *Project Manager*.

S323 *Client's* requirements (for the design of Geotechnics)

General

S323.1 The *Contractor* ensures that the geotechnical design for earthworks complies with DMRB standard CD 622 ("Managing Geotechnical Risk") (see link provided in Annex A).

S323.2 The *Contractor* develops a 'Co-ordinated Earthworks Strategy' within the Project to demonstrate the effective management of the earthworks balance. The *Contractor* submits the 'Co-ordinated Earthworks Strategy' to the *Project Manager* in accordance with the Acceptance Procedure, accompanied by the Multiparty Collaboration Certificate.

The *Contractor* updates the 'Co-ordinated Earthworks Strategy' when changes occur and when it is no longer current and resubmits to the *Project Manager* in accordance with the Acceptance Procedure, prior to commencement of the associated detailed design.

S323.3 Where the *Contractor* provides any ground improvement works, the works comply with the methods and systems of the relevant supplier guidance.

S323.4 The *Contractor* ensures that the design of earthworks slopes (including strengthened earthworks) does not use engineered 'hard' facings, unless otherwise agreed with the *Project Manager*.

S323.5 The *Contractor* maximises the use of Project (site) won material, where possible, to limit the use of imported fill material from outside of the Project.

S323.6 The *Contractor* ensures that where Class 3 (General Chalk Fill) is used in flood plains, consideration is given to fill degradation due to inundation.

S323.7 Grade Dc and Dm chalk is not permitted for use on highway embankment fill, unless otherwise agreed with the *Project Manager*.

S323.8 The *Contractor* includes erosion protection measures where Class 2 Fill (General Cohesive Fill) is used for carriageway embankments in flood plains.

S323.9 The *Contractor* ensures that all reinforcing elements, facings, systems or otherwise used in reinforced soil and anchored earth Structures (or equivalent) have a current British Board of Agrément (BBA) (or equivalent).

S323.10 The *Contractor* ensures mitigation measures to prevent preferential pathways for contaminants in soil, groundwater or in the gaseous phase are implemented in consultation and compliance with the Environment Agency (EA) and relevant Local Authority.

S323.11 The *Contractor* mitigates the potential of gas or vapour inhalation or exposure in areas of proven ground gas risk. The *Contractor* notes such mitigation measures in a 'ground gas risk assessment register'.

S323.12 The *Contractor* is responsible for the identification of contaminated land (including invasive non-native species) and ground water in accordance with the DCO within or adjacent to the extent of the Working Areas. In the event that the *Contractor* discovers areas of possible contaminated land or groundwater, the *Contractor* notifies the *Project Manager* and carries out all necessary procedures notifications and procedures in accordance with the DCO documentation.

S323.13 If the presence of contaminated land is confirmed, and contaminated materials are identified and classified, the *Contractor* complies with the requirements of the DCO documentation. The *Contractor* is responsible for the remediation and disposal of contaminated materials encountered within the Working Areas.

S323.14 The *Contractor* prepares a risk assessment to demonstrate that the *works* have no detrimental effect on any residual contamination within or adjacent to the Working Areas and to assess the risk from residual contamination within or adjacent to the Working Areas.

S323.15 The *Contractor* ensures sufficient soil infiltration rates and protection for groundwater sources when utilising drainage facilities incorporating ground infiltration techniques. The *Contractor* records and monitors groundwater levels and quality.

S323.16 The *Contractor* does not use the moisture condition value (MCV) rapid assessment procedure without the agreement of the *Project Manager*.

S323.17 The *Contractor* provides evidence to the TAA (via the *Project Manager*) that the proposed geotextiles have sufficient durability, prior to commencement of the relevant detailed design.

S323.18 Where ground anchors or soil nails are used, they are not permitted where they extend beyond the Order Limits in accordance with the DCO.

S323.19 The supply, installation and testing of ground anchors is to comply with BS EN 1537:2013 ("Execution of Special Geotechnical Works - Ground Anchors"), (see link provided in Annex A).

S323.20 The *Contractor* ensures that disused mine workings impacted by the *works,* including adjacent areas, are investigated, inspected, monitored, cleared, flushed, filled, capped or treated (as appropriate).

S323.21 The *Contractor* provides screening criteria, based on the sensitivity of controlled water receptors (designated aquifers, groundwater abstractions and surface waters (inland, coastal and estuarine waters)), for agreement to the TAA (via the *Project Manager*). As a minimum, the *Contractor* is to include the following criteria

- underlying geology,
- aquifer classification, groundwater abstractions and designated source protection zone (DSPZ) and
- proximity to surface water receptors.

S323.22 The *Contractor* is to include within its compiled Appendix 6/15 ("Limiting values for harm to human health and the environment") the additional requirements of Annex A ("Additions to Appendix 6/15"), link provided in Annex A.

Ground Investigations (GI)

S323.23 The *Contractor* undertakes any further GI (including long term monitoring) it deems necessary to complete the detailed design.

Ground Investigation Report (GIR)

S323.24 The *Contractor* prepares a GIR for the *works* in accordance with BS EN 1997-2:2007 ("Eurocode 7 - Geotechnical design - GI and Testing") (see link provided in Annex A). The first GIRs are submitted to the *Project Manager* in accordance with the Acceptance Procedure, with accompanying documentation within 12 weeks of the first *access date*.

Further revised GIRs, updated to take account of any supplementary GI's or other relevant additional information, are submitted in accordance with the Acceptance Procedure for acceptance by the *Project Manager* at appropriate intervals to inform the Geotechnical Design Report submissions as the execution of the *works* proceeds. The final GIRs are submitted in accordance with the Acceptance Procedure for acceptance by the *Project Manager* 12 weeks prior to Completion of *section* 1.

Geotechnical Design Report

S323.25 The *Contractor* prepares a Geotechnical Design Report for all earthworks, foundations, retaining walls, or other geotechnical design elements of the *works* in accordance with DMRB standard CD 622. The *Contractor* updates the Geotechnical Design Report and submits it in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*. The relevant construction activity is not commenced until the updated Geotechnical Design Report is accepted by the *Project Manager*.

Geotechnical Feedback Report

S323.26 The *Contractor* prepares a Geotechnical Feedback Report for all earthworks, foundations, retaining walls, or other geotechnical design elements of the *works* in accordance with DMRB standard CD 622 and submitted in accordance with the Acceptance Procedure for acceptance by the *Project Manager* within eight weeks after Completion of *section* 1.

Settlement

Settlement access road

S323.27 The *Contractor* designs the Tunnel Service Building access roads referred to as Maintenance Tracks in "Requirements for Project Roads" link provided in Annex A.

North Portal slab and highway embankment interface

S323.28 The *Contractor* submits a differential settlement regime (in the Design Data) between the boundary of the North Portal slab and the highway embankment at Tilbury to the *Project Manager* for acceptance with the detailed design of these works.

S324 *Client's* requirements (for the design of Pavements)

Pavement

General

S324.1 The specific requirements for Trunk Roads are as follows

- the surface course is a Thin Surface Course System (TSCS), as defined in Clause 942 of the Specification for Highway Works (SHW),
- the TSCS has road and tyre noise levels with a minimum level 2, as defined in Clause 942.34 of SHW, and Table 9/17 of Volume 1 of the MCHW (there are locations that required a lower noise surface level),
- the *Contractor* complies with the DMRB standard CD 225 ("Design for New Pavement Foundations") (see link provided in Annex A) and provides a continuity of drainage of the pavement foundation for areas of widening and construction and a down slope route from the sub-base to the subsurface drain,
- the design life requirement for any new, widened or online sections of pavement is a minimum of 40 years for Trunk Roads in accordance with the requirements of the DMRB standard CD 226 ("Design for new pavement construction") (see link provided in Annex A),
- the pavement design of these roads ensures that where the pavement of any of the existing roads affected by the *works* are incorporated, its residual life, derived from deflectograph testing surveys (carried out by the *Contractor* in accordance with DMRB standards CS 229 ("Data for pavement assessment"), CS 230 ("Pavement maintenance assessment procedure") and CD 227 ("Design for pavement maintenance"), is assessed and the total pavement construction provides a minimum of 20 year remaining residual life in accordance with the above DMRB standards CS 229, CS 230 and CD 227 (see links provided in Annex A),
- joints between existing and new construction are painted with a polymer-modified bond coat as defined in clause 920 of the specification for highway works (SHW). All longitudinal joints are situated outside of the wheel track zones in accordance with clause 903 of the SHW,
- the road pavement design traffic for all Trunk Roads complies with the associated forecast traffic flows, as defined in appendix C ("Traffic Forecasting Package") of the Combined Modelling and Appraisal Report (ComMA) (see link provided in Annex A) in the Development Consent Order and
- the *Contractor* removes, and where possible recycles into the *works*, all redundant areas of existing road pavement from within the Site.

S324.2 The *Contractor* prepares a 'pavement design report' in accordance with the requirements of the DMRB standard CD 226.

S324.3 The *Contractor* submits the 'pavement design report' to the *Project Manager* in accordance with the Acceptance Procedure and accompanied by the Multiparty Collaboration Certificate, prior to the commencement of the relevant permanent pavement detailed design.

S324.4 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, regarding the design of pavements for Side Roads.

S324.5 The access pavement construction type for Private Means of Access, are agreed with the relevant landowner in accordance with numbered appendix 1/15.

S325 *Client's* requirements (for the design of Lighting)

General

S325.1 The *Contractor* designs the lighting for the Trunk Roads and Maintenance Tracks in accordance with the DMRB.

S325.2 The *Contractor* consults with the relevant Local Authority (as appropriate) and complies with the relevant Local Authority's requirements, with regards to all details and aspects of lighting design in respect to Side Roads and LA Maintenance Tracks.

S325.3 Unless stated otherwise, permanent street lighting is not provided for Project Roads. The *Contractor* ensures that the final extents of the lit areas are kept to a minimum whilst complying with the recommendations of BS5489-1 ("Design of road lighting - Lighting of roads and public amenity areas. Code of practice"), BS5489-2 ("Code of practice for the design of road lighting - Lighting of tunnels") and TD501 ("Road lighting design") (link provided in Annex A), to reduce the environmental impact and energy use in accordance with the DCO and Lighting Appraisal Report (as provided in Annex A).

S325.4 Areas identified as requiring permanent street lighting include

- North Portal's parting zone and
- South Portal and LTC mainline southwards towards the A2 junction.

For all underpasses/short tunnels (between 25m and 200m in length), the *Contractor* carries out a look through percentage (LTP) assessment, to determine the need for introducing day time lighting in accordance with BS 5489-2:2016 and submits the assessment in accordance with the Acceptance Procedure, for acceptance by the *Project Manager,* prior to commencement of the relevant construction activity.

S325.5 The *Contractor* prepares a 'lighting strategy report' for lighting which appraises and identifies proposals for all road lighting required for the Project, including operational, maintenance and spares (which minimises the *Client's* need for multiple spare types across the Strategic Road Network).

The *Contractor* submits the 'lighting strategy report', in accordance with the Acceptance Procedure for acceptance by the *Project Manager,* accompanied by the Multiparty Collaboration Certificate, prior to the commencement of the relevant permanent lighting detailed design.

The *Contractor* updates the 'lighting strategy report' when changes occur and resubmits to the *Project Manager* in accordance with the Acceptance Procedure accompanied by the Multiparty Collaboration Certificate.

S325.6 The *Contractor* ensures that the 'lighting strategy report' report complies with the requirements of

- the Development Consent Order (DCO),
- the Scope,
- the relevant Local Authorities,
- the Statutory Undertakers and
- other Statutory Bodies

and contains the same level of detail and is consistent with the illustrative lighting strategy report, provided in Annex A.

S325.7 The *Contractor* ensures that the lighting solution (including the electrical Plant and Materials) is inter-compatible with the final asset owner.

S325.8 The *Contractor* does not reuse existing lighting without the *Project Manager's* agreement.

S325.9 Where the *Contractor* proposes existing lighting is either partially or wholly to be retained or incorporated into the *works*, the *Contractor*

- undertakes a survey,
- ensures any necessary remediation works are incorporated into its proposals for agreement by the *Project Manager* and
- obtains any necessary Departures to retain existing lighting in the *works*.

S325.10 For highways sections within tunnels of length greater than 200 metres, the *Contractor* provides day-time lighting in accordance with BS 5489-2:2016 Code of practice for the design of road lighting - Part 2: Lighting of Tunnels, including specific consideration for transition zones from external to internal light conditions.

Columns, Brackets and Lanterns

S325.11 The *Contractor* complies with TR30 ("Guidance on the Implementation of Passive Safe Lighting Columns and Signposts") (see link in Annex A), and DMRB, and submits a 'passive safety risk assessment' for *Project Manager* acceptance in accordance with the Acceptance Procedure, prior to commencement of the relevant construction activity.

S325.12 The *Contractor* ensures that all columns placed under or near overhead line equipment (OLE) are fold down columns, which are not obstructed.

S325.13 The *Contractor* does not position columns in the central reservation of Trunk Roads, unless otherwise agreed with the *Project Manager*.

S325.14 The *Contractor* ensures that columns are aligned vertically and the door is positioned on the opposite side of the column to oncoming traffic. The door faces away from shrubs and bushes and trees.

S325.15 Where columns are mounted on Structures and behind parapets, the access doors are fully accessible from the roadside above the upper height of the protective parapet and facing the maintenance personnel.

S325.16 The *Contractor* ensures that all doors are interchangeable between similar types of columns without adjustment.

S325.17 Where existing lighting columns are retained for the permanent works these lighting columns are not be used to support catenary cables, unless otherwise agreed with the *Project Manager*.

S325.18 The *Contractor* ensures that the design of columns on Trunk Roads comply with the DMRB standards and provide a surface area of 0.6 m^2 for all columns with a minimum of 0.3 m^2 at the top of the column to allow for a future provision of either a shield or other attachments.

S325.19 The *Contractor* ensures that columns located in verges, or other planted areas are provided with a strimmer guard sleeve to the column root, located with its top edge a minimum of 250mm above the relevant local finished ground level.

Luminaires

S325.20 The *Contractor* uses light-emitting diode (LED) light sources to provide maximum energy efficiency and minimum maintenance.

S325.21 The *Contractor* ensures that all luminaires procured for the *works* produce zero upward light and minimises back light in accordance with the Institute of Lighting Professionals (ILP) guidance note

GN01:2011 (“Guidance Notes for the Reduction of Obtrusive Light”) (see link provided in Annex A).

S325.22 The *Contractor* ensures that luminaires, including those present on traffic signs, are to have light sources with colour rendering index above Ra70 and a correlated colour temperature (CCT) of 3000K (with a 2 MacAdam Ellipse binning for the LED chips). If the lighting used on Side Roads utilises non-light-emitting diode (LED) light sources, the *Contractor* ensures that the luminaires presenting the traffic sign are to have a correlated colour temperature of 3000K (with a 2 MacAdam Ellipse binning for the LED chips).

S325.23 The *Contractor* ensures that Working Areas lighting is designed to reduce obtrusive light spilling beyond the Working Area with lighting units positioned so that they do not project any light into areas identified as habitat for light sensitive species.

S325.24 The *Contractor* ensures that construction lighting is powered directly from the Distribution Network Operator or solar/battery unless agreed otherwise with the *Project Manager*.

S325.25 The *Contractor* ensures that all permanent and non-permanent street, construction, security and sign lighting utilises low energy, high efficiency (greater than 150 luminaire lumens per circuit watt), long life luminaires (life expectancies greater than 50000 hours L_{80} B_{50}), with zero upward light (as per CIE 126-1997 ‘Guidelines for minimizing sky glow’, ILP GN01 ‘Guidance Notes for the Reduction of Obtrusive Light’ and CIE 150-2017 ‘Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations’).

S325.26 In line with the materials management plan (see section S208), the *Contractor* ensures that all lighting Plant and Materials are

- manufactured to allow a minimum of 90% of material to be recycled at the end of the lifecycle and
- delivered to the Working Areas in reusable transit containers which are returned to the relevant manufacturer/supplier.

Polystyrene packing is not permitted, unless otherwise agreed with the *Project Manager*.

S325.27 The *Contractor* while compiling appendix 14/4 (“Electrical Equipment for Road Lighting”), is to replace table 14/4 (Electrical equipment for road lighting) with Table 6 below.

S325.28

Table 6 - List of *Contractor’s* Luminaire Proposals

Table 14/4 – List of Contractor’s Luminaire Proposals			
Luminaire Reference	A	B	C (etc.)
Manufacturer			
Model			
Luminous Output			
Luminaire Circuit Wattage			
Optic Setting			
Weight (Kg)			
Windage Area			
Inclination			
Control Gear Type			
Control Protocol			
Remarks (etc.)			

Feeder Pillars

S325.29 The *Contractor* provides separate dedicated feeder pillars for the lighting of the parts of the Project Road that are operated and maintained by the *Client* and by the relevant Local Authorities.

Underground Ducting and Cabling

S325.30 Unless agreed otherwise with the relevant Local Authority or the *Project Manager* (as appropriate), the *Contractor* ensures that

- there is at least 150mm clearance between the cable ducts and services pipes belonging to Statutory Undertakers,
- there is at least 500mm clearance between lighting electrical cable ducts and communications cable ducts and
- there are 450mm by 450mm distribution chambers constructed at non-Trunk Road crossings (with a distribution chamber located in each verge).

S325.31 The *Contractor* deploys the following methods to minimise the risk of potential cable theft

- smart water markings,
- part buried cabling and
- shallow-buried inspection covers.

S325.32 If required by the other Main Works Contractors, the *Contractor* makes provision within its ducts for cabling provided by the other Main Works Contractors.

S325.33 If the *Contractor* requires the use of ducting provided by the other Main Works Contractors, it communicates such requirements using the Multiparty Collaboration Form, in accordance with section S318.

S325.34 The *Contractor*

- ensures cable and ducting for the Trunk Road are not constructed outside of the Trunk Road's highway boundary and
- ensures cable and ducting for the Side Roads are not constructed outside of the Side Road's highway boundary

unless otherwise agreed with the *Project Manager.*

Joints

S325.35 The *Contractor* replaces

- existing cables which are damaged by the *Contractor* for the full length of the damaged cable and
- new cables which are damaged for the full length of the damaged cable.

S325.36 Cable joints are not permitted, with the exception of where columns are mounted on concrete safety barriers. The *Contractor* uses jointed cables instead of loop in and out, unless agreed otherwise with the *Project Manager*.

Labelling

S325.37 The *Contractor* consults with the *Client* (via the *Project Manager*) and complies with the *Client*'s requirements, regarding labelling (maintenance asset number) requirements for the Trunk Road and other trunk roads.

S325.38 The *Contractor* ensures that any existing identification numbers or markings are removed or fully obliterated (without damaging the asset) before application of new numbers or markings.

Central Management System (CMS)

S325.39 The *Contractor* consults with the *Client* (via the *Project Manager*) and the relevant Local Authority (as appropriate) and complies with the *Client's* and the relevant Local Authority's requirements, regarding the CMS (provided to each asset owner) and submits proposals in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to commencement of the relevant construction activity.

S325.40 Each CMS is capable of operating the following functions

- controlling communications with base stations,
- hosting a database that stores information about and from each column,
- being a web server that hosts the user interface and
- configuration of remote base station and column mounted control and monitoring module.

S325.41 The *Contractor* provides full user training of each CMS to a maximum of six persons nominated by the *Project Manager* at a time to be agreed with the *Project Manager*.

S325.42 The *Contractor* ensures that each CMS is configured such as to permit only the *Client* or relevant Local Authority that is responsible for a given lighting column group to access and control those columns.

S325.43 The *Contractor* ensures that the user interface for a CMS central control system monitors the following for luminaires

- switch times,
- failure,
- day-burning,
- supply voltage,
- current,
- power factor,
- active power,
- cumulative energy,
- cumulative burning hours,
- mains number failures,
- mains low voltage and
- equipment malfunction by the generation of suitable fault codes.

S325.44 The *Contractor* ensures that testing and commissioning of each CMS covers the following

- geographical system coverage,
- security of power supplies and earthing requirements,
- lantern node installation and commissioning and
- integrated asset management information system.

S325.45 The *Contractor* ensures that all permanently installed street and sign light luminaires have individual wireless lighting CMS nodes, to fully integrate into the *Client's* and relevant Local Authority's existing CMS networks. For luminaire the CMS node is National Electrical Manufacturers Association (NEMA) socket mounted, for sign luminaires it is mounted internally, unless otherwise agreed with the *Project Manager*.

S325.46 The *Contractor* ensures that any underpasses or short tunnel (between 25m and 200m long) that require lighting are provided with

- a CMS node (located on a dedicated column, away from overhead obstructions, to allow remote monitoring and control of the lighting and
- presence detectors (covering both the approaches and interior) to reduce energy consumption on Side Roads, LA Maintenance Tracks and WCH Routes.

Traffic Signs

S325.47 The *Contractor* ensure that Traffic Signs in areas or adjacent to areas with street lighting are lit.

S325.48 The *Contractor* provides

- a separate power supply and lighting control for plate/plank Traffic Signs on gantries and
- a separate power supply and lighting control for Intelligent Transport System (ITS).

S326 *Client's* requirements (for the design of Intelligent Transport Systems (ITS))

General

S326.1 The *Contractor* consults with the *Project Manager* and Police and complies with the *Project Manager's* and Police's guidance and requirements, when providing average speed camera systems.

Transmission stations

S326.2 The *Contractor* provides space and infrastructure (including cable ducts and power) in an air-conditioned, secure room in both the North and South Tunnel Service Buildings for National Roads Telecommunications Services (NRTS) cable management and transmission equipment.

S326.3 The *Contractor* consults with the Telecommunications Services Provider (TSP) and complies with the TSP's requirements, regarding the design and layout of the transmission station and submits the agreed design and layout in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to the commencement of the relevant construction activity.

S327 *Client's* requirements (for the design of Structures)

General

S327.1 All Structures are to undergo a design check in accordance with DMRB standard CG 300 ("Technical approval of highways structures") (see link provided in Annex A).

S327.2 The *Contractor* complies with the requirements of section S928 for the design of the *works* for all Structures over, under or adjacent to railway lines.

S327.3 The *Contractor* consults with

- the Environmental Agency (EA),
- Natural England,
- relevant Local Authorities (where the watercourse is their responsibility) or
- other Statutory Bodies

with regard to the design, construction, completion and maintenance of all Structures adjacent to or over watercourses and complies with the requirements of all interested parties.

S327.4 The *Contractor* consults with the Apparatus Owners with reference to numbered appendix 1/16 and complies with their requirements in relation to the layout and location of Apparatus, over, through and adjacent to Structures, including the method of access to such Apparatus.

S327.5 The *Contractor* undertakes a suicide and self-harm risk assessment for all Structures and submits such assessment with the Approval in Principle (include such assessments with the general arrangement drawings for category 0 Structures). These assessments are submitted in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to the commencement of the relevant detailed design.

S327.6 The *Contractor* ensures that the suicide and self-harm risk assessment includes

- the likelihood of suicide and self-harming by jumping from the Structure,
- takes account of the suicide prevention strategy for England (see link provided in Annex A) and
- takes account of antisocial behaviour.

In the event that this risk assessment identifies any risks associated with unauthorised access, suicide or self-harming, then the *Contractor* is to implement additional measures (where reasonable) to restrict access to any areas where that risk has been identified.

S327.7 Requirements for testing and inspection of Structures are included in section S700.

Location and Description of Structures

S327.8 The location and description of Structures are included within the Development Consent Order (DCO), the exact locations are to be confirmed by the *Contractor* during detailed design.

S327.9 Additional requirements for Principal Structures are included in "Requirements for Principal Structures", link provided in Annex A.

S327.10 In the event that the *Contractor* proposes to alter the span or structural form from the preferred option in the previously accepted 'options report' (as defined in CG 300), the *Contractor* consults with the *Project Manager* and the TAA (via the *Project Manager*) and complies with the *Project*

Manager's and the TAA's requirements in respect of the appropriateness of the alternative proposal and other parameters for such alternative arrangement.

Parapets and Environmental Barriers

S327.11 The *Contractor* ensures all parapets and other road restraint systems on Structures including all vehicle parapets are in accordance with Series 400 of the MCHW, BS EN 1317 ("Compliant Road Restraint Systems") and DMRB standard CD 377 ("Requirements for Road Restraint Systems") (see links provided in Annex A).

S327.12 The *Contractor* ensures that all bridge vehicle parapets are designed in accordance with BS EN 1337-2 in ("Structural bearings - Sliding elements") (see link provided in Annex A). The *Contractor* ensures minimum containment level of N2 unless otherwise agreed with the *Project Manager* and relevant Local Authority (as appropriate).

S327.13 The *Contractor* ensures that parapet on bridges spanning over railways are in accordance with the relevant Railway Authority standards (see links in Annex A).

S327.14 The *Contractor* ensures that vehicle parapets are compatible with the vehicle restraint systems, to which they are connected.

S327.15 The *Contractor* ensures that all new pedestrian parapets (on wingwalls) and wingwalls are to extend a minimum of one metre beyond the top of the slope intersection to prevent the erosion of the crest or top of the embankment due to surface water or settlement exposing the end of the wingwall.

S327.16 The *Contractor* agrees the colour of the paint protection system with the *Project Manager* and relevant Local Authority (as appropriate).

S327.17 The *Contractor* ensures that all new stainless steel and aluminium parapets or handrails are vandal and theft resistant in agreement with the TAA (via the *Project Manager*) and the relevant Local Authority (as appropriate).

S327.18 Structures such as environmental barriers, lighting columns, signposts, gantry legs (and the like) are to be mounted outside the working width of parapets, unless otherwise agreed with the *Client* via the *Project Manager* and the relevant Local Authority (as appropriate).

S327.19 The *Contractor* ensures that the design of environmental barriers allows siting as close to the edge of the carriageway as possible to maximise their performance, taking account of all other requirements including

- required minimum verge widths and sight lines,
- reduction of the visual 'canyon' effect where long stretches of environmental barrier are close to the road edge,
- a minimum working space from the edge of the verge to ensure access to allow for maintenance and repairs and
- other requirements (such as lighting, signing, utilities and geotechnical constraints).

Structural Form

General

S327.20 All concrete wingwalls and retaining walls are to have a cantilevered coping. The minimum width of the cantilever is in accordance with the Construction Industry Research and Information Association (CIRIA) C543 ("Bridge detailing guide") (see link provided in Annex A), taking into consideration where the drips of water land, to ensure that the problem is not transferred to

another critical point (e.g. stone facing or concrete finish to the face of the wall). Where concrete walls are clad with stone, a concrete coping is to be provided which cantilevers beyond the face of the stonework and provides protection to the top of the stonework.

S327.21 The *Contractor* ensures that all wingwalls and retaining walls have a coping with a minimum level difference of 20mm or a constant inward 2.5% crossfall, the greater gradient takes precedence.

S327.22 Where the design of the *works* includes prefabricated elements including precast concrete beams or steel girders as main members in deck construction, the deck slab is to be made structurally continuous over intermediate piers to avoid movement joints.

S327.23 Where the *Contractor* proposes to use gabions to support or protect a highway asset operated or maintained by the *Client* post-handover, the *Contractor* demonstrates for the agreement of the *Project Manager*

- how the full inspection of the gabion (including hidden parts) is to be achieved and
- how damage to the gabion (including vandalism) is to be prevented.

The *Contractor* consults with the relevant Local Authority regarding the use of gabions to support or protect Local Authority highway assets and complies with the relevant Local Authority requirements.

S327.24 The *Contractor* ensures that all exposed internal and external walls of all walking, cycling and horse-riding (WCH) Underpasses and all other exposed surfaces on Structures assessed as being high-risk from graffiti are to have proprietary anti-graffiti coatings applied to their full area including any stone masonry facings.

S327.25 As part of the *Contractor's* assessment of uplift of buried parts of Structures due to buoyancy or heaving, the *Contractor* does not take into account the top one metre of soil above the Structure or part of the Structure under consideration, as measured from the proposed finished level.

S327.26 The *Contractor* ensures that the effects of support settlement and the effects of differential settlement between adjacent supports are in accordance with the recommendations of the Geotechnical Design Report. As a minimum, the following is adopted for differential settlement between bridge supports in the direction of the span

- 20mm when founded on spread footings and
- five millimetres for supports found on piles.

Structures Over Watercourses

S327.27 The *Contractor* ensures that Structures (including alterations to existing Structures) are designed to avoid alteration to existing flood conveyance and the encroachment into areas of known floodplain (including any design and assessment criteria in this Scope).

S327.28 Where Structures are exposed to the risk of flood water, the *Contractor* ensures that such Structures are designed in accordance with the criteria provided in DMRB standard CD 356 ("Design of Highway Structures for Hydraulic Action") (see link provided in Annex A), making due allowance for climate change in accordance with the latest EA advice.

S327.29 The *Contractor* ensures that Structures (including alterations to existing Structures) over watercourse are designed and assessed to accommodate a 1% annual exceedance probability flood flow, plus an allowance for climate change. This is to include consideration for freeboard including an assessment to determine the likelihood that the Structure could choke with debris, sedimentation and the effect on the watercourse up and down stream of the Structure to ensure it does not cause inundation of adjacent land under design flood conditions. The design and selection of clear span for watercourse Structures is such that the land adjacent and upstream of the Structures does not suffer inundation under design flood conditions.

S327.30 The *Contractor* ensures that where the soffit of bridges spans over flood zones, the soffit level of the bridge is above the design flood level plus a minimum freeboard allowance of 600mm.

S327.31 The *Contractor* ensures that watercourse Structures have safe access to allow for inspection and maintenance.

S327.32 Where it is proposed to modify existing Structures over a watercourse (including extending existing culverts), the *Contractor* ensures, as a minimum, that the existing hydraulic cross-section and span is maintained.

S327.33 The *Contractor* ensures that the horizontal and vertical clearances to watercourses for all Field Bridges are in accordance with the EA Standard Rules 2015 no.28 ("Installing a clear span bridge on a main river of up to 8 metres span and 4.2 metres width") (see link provided in Annex A).

Post-Tensioned Construction

S327.34 The *Contractor* ensures that the design and construction of post-tensioned concrete complies with the requirements and recommendations provided in the Concrete Society Technical Report No. 72 (“Durable Post-tensioned Concrete Structures”) (see link provided in Annex A), unless stipulated otherwise in the contract.

S327.35 The *Contractor* ensures that the suppliers and installers of prestressing tendons are fully certified in accordance with the UK Certification Authority for Reinforcing Steels (“CARES”) Certification Scheme for the supply and installation of post-tensioning systems in concrete Structures, in accordance with CARES Appendix 2a(i) (see link provided in Annex A) or equivalent.

S327.36 For the grouting of post-tensioning systems, the *Contractor* is, or ensures that any subcontractor (at any stage of remoteness from the *Client*) undertaking grouting works is, fully certified in accordance with the CARES Certification Scheme for Void Grouting of Post-tensioning System in Concrete Structures in accordance with CARES Appendix PT2 (a) v (see link provided in Annex A) or equivalent.

S327.37 For in situ construction using bonded tendons, the *Contractor* carries out a full-scale grout trial in accordance with the MCHW 1700 Series and the latest edition of the Concrete Society Technical Report No. 72

Gantries

S327.38 The *Contractor* ensures that the design of gantries is in accordance with DMRB standard CD 365 (“Portal and cantilever signs and signals gantries”) (see link provided in Annex A).

Structural Finish

S327.39 Four weeks prior to commencement of the relevant construction activity, the *Contractor* provides samples of the proposed finishes, unless agreed otherwise by the *Project Manager* or the relevant Local Authority (as appropriate), for the agreement of the relevant Local Authority and acceptance by the *Supervisor*.

Service Ducts

S327.40 Where verges are provided, the *Contractor* provides as a minimum two number of spare ducts (150mm diameter) in each verge of each Structure, unless otherwise agreed with the TAA (via the *Project Manager*) and relevant Local Authority (as appropriate).

S327.41 The *Contractor* ensures all apparatus carried by bridge decks are replaceable without disruption to, or removal of, the structural concrete or the waterproofing system.

S327.42 The *Contractor* ensures access chambers to apparatus are provided at each end of each Structure that carries such apparatus.

Verges, Side Slopes and Paved Areas

S327.43 The *Contractor* ensures the verges are designed to provide a smooth transition between the Structures and embankments.

Durability

General

S327.44 The *Contractor* ensures that all bridges are integral Structures (without joints) unless otherwise agreed in writing with TAA (via the *Project Manager*) and the relevant Local Authority (as appropriate).

S327.45 In-span discontinuities, generally referred to as half joints, are not permitted in bridge superstructures.

S327.46 Transition slabs can only be implemented where agreed with the TAA (via the *Project Manager*) and the relevant Local Authority (as appropriate). Where the implementation of transition slabs has been agreed, such transition slabs are to include only stainless steel reinforcement and the dowel bars connecting the transition slab to abutment (of grade 1.4436 or 1.4462 of BS EN 10088 (see link provided in Annex A)).

S327.47 Where the design of *works* includes transition slabs, the *Contractor* ensures that transition slabs are treated as part of the superstructure, with regard to the application of the waterproofing system and the provision of either articulation or movement joints.

S327.48 The *Contractor* ensures that embankment or cutting slopes under Structures have a protection system to mitigate the risk of erosion of the toe.

Steelwork

S327.49 The *Contractor* ensures the paint system is appropriate to the environment and access classifications in accordance with series 1900 of the SHW and meets the following minimum durability requirements

- no maintenance for at least 12 years,
- minor maintenance from 12 years up to 20 years and
- major maintenance after 20 years.

S327.50 Intermittent fillet welds are not permitted in the permanent works.

S327.51 The *Contractor* ensures the design of steelwork (including weathering steel) prevents the accumulation of water, dirt and debris.

S327.52 The *Contractor* ensures that exposed structural steelwork is not used in the buried substructures of the Structure, unless otherwise agreed with the TAA (via the *Project Manager*) and relevant Local Authority (as appropriate).

S327.53 The *Contractor* ensures that the reinforcement bridging joints, or items penetrating the concrete surface, and also items subject to chloride contamination, are of stainless steel grade 1.4436 or 1.4462 of BS EN 10088.

Qualifications of Parties Involved in Steelwork

S327.54 The *Contractor* is to comply with the requirements contained in section S1200 regarding the Register of Qualified Steelwork Contractors Scheme for Bridgeworks (RQSC).

Waterproofing

S327.55 The *Contractor* ensures that bridge deck waterproofing systems are in accordance with DMRB standard CD 358 ("Waterproofing and surfacing of concrete bridge decks"), have a current BBA Roads and Bridges Agrément Certificate and are capable of being non-destructively tested.

S327.56 The whole width of the bridge deck slab (between parapet upstands to a minimum height of 100mm above the top of the new deck slab) is to be waterproofed.

S327.57 In addition to those surfaces specified in the DMRB, the *Contractor* ensures that the following concrete surfaces are waterproofed or concrete impregnated (as appropriate to the location its being applied)

- all internal faces of abutment galleries,
- where buried box sections are proposed in the design (including accommodation Underpasses), the top surface of the bottom slab. This requirement does not apply to water carrying Structures and
- vertical faces of walls containing planting material on green bridges.

S327.58 Where mass concrete is placed on the top surface of a concrete slab that comprises of waterproofing, the *Contractor* ensures that the waterproofing system is installed below the mass concrete and an appropriate interface is provided to prevent relative slip between both systems.

Resin anchors

S327.59 The *Contractor* ensures

- that the design and construction of resin anchors complies with the requirements and recommendations provided in CIRIA C777 ("General 'Fixings – guidance on selection and whole-life management") (see link provided in Annex A) and
- the choice of resin is appropriate for the substrate material and its preparation, hole orientation, load type(s), installation and exposure conditions.

Where the *Contractor* requires agreement from the TAA (via the *Project Manager*) and relevant Local Authority (as appropriate) to use polyester resin anchors where holes contain or are under water, the *Contractor* provides details to the TAA (via the *Project Manager*) and relevant Local Authority (as appropriate), in accordance with the above referenced CIRIA guidance.

Maintenance and Inspection

S327.60 The *Contractor* ensures that bearings and expansion joints on Structures are accessible for inspection via abutment galleries (where appropriate), in accordance with DMRB standard CD 350 ("The design of highway structures") (see link provided in Annex A) and CIRIA C543 ("Bridge detailing guide") (see link provided in Annex A) with a minimum width of one metre and height of 1.8m, unless otherwise agreed with the TAA (via the *Project Manager*) and the relevant Local Authority (as appropriate).

S327.61 The *Contractor* ensures that expansion joints are watertight from the outside face of the parapet to the outside face of the other parapet. Any exceptions are in accordance with DMRB standard CD 357 ("Bridge expansion joints") (see link provided in Annex A). The *Contractor* ensures that the deck waterproofing system is compatible with the expansion joint system.

S327.62 Tension and uplift bearings are not permitted, unless otherwise agreed with the TAA (via the *Project Manager*) or relevant Local Authority (as appropriate).

S327.63 The *Contractor* is not permitted to use bearings and expansion joints on green bridges, unless otherwise agreed with the TAA (via the *Project Manager*) or relevant Local Authority (as appropriate).

S327.64 The *Contractor* ensures that where bridge bearings are used, the bridge bearing are replaceable without requiring the removal of any structural concrete or modification of structural steelwork.

S327.65 The *Contractor* ensures that a maximum of one lane above and below the bridge deck except where there is only one lane in either direction (narrow lanes are not permitted) is closed to traffic in each direction during replacement and maintenance of bearing and expansion joints.

The *Contractor* submits method statements and traffic management layout within its Approval in Principle in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to the commencement of the relevant detailed design.

S327.66 Where the bridge includes bearing and expansion joints, the *Contractor* incorporates provisions for jacking in its design of Structures. The *Contractor* ensures that jacking arrangements are clearly indicated within the Approval in Principle and on the detailed design drawings.

S327.67 The *Contractor* ensures that temporary jacking for bearing replacement is carried out from permanent structural supports, unless otherwise agreed with the TAA (via the *Project Manager*) and relevant Local Authority (as appropriate).

S327.68 The *Contractor* ensures safe access for the operation and maintenance at Structures including for the following purposes

- cleaning and painting,
- maintenance and inspection,
- jacking, removal or replacement of bearings,
- removal or replacement of movement joints and
- inspection of closed-cell and box members.

S327.69 Where voided elements of bridge Structures (e.g. box girder decks, voided piers, voided abutment stems, inspection galleries) are provided, the *Contractor* ensures there is sufficient size to allow for safe internal inspection and permit drainage, unless otherwise agreed with the TAA (via the *Project Manager*) and the relevant Local Authority (as appropriate). The *Contractor* ensures that access is provided in accordance with the following

- where practicable, access to the voids is from the underside of the bridge,
- access points are placed in such positions that allow convenient access and minimises the interface with traffic,
- all access points and access ways within the voids are suitably sized and designed to allow for the evacuation of a casualty on a stretcher, if necessary. The *Contractor* ensures there is provision for future maintenance access requirements, including the need to introduce equipment through the opening for the purpose of future inspection, maintenance and repair works within the void,
- specific emergency routes and exits are to be identified clearly by the provisions of signs and lighting,
- where access points to the voids are provided, they are located and detailed to minimise their visibility to passing traffic,

- access points to the voids are not permitted on surfaces that are visible on the main bridge elevation, with the exception of access doors and ancillary arrangements for accessing abutment inspection galleries,
- all permanent services and equipment are to be capable of withstanding prevailing environmental conditions, including, ingress of dust and water and the natural movement of the Structure,
- permanent access ladders or steps are provided at changes in level within the voids,
- access ladders and steps are to be provided with guardrails,
- all walking surfaces are provided with a non-slip surface coating (that is compatible with any waterproofing or paint system), to exclude details which create a risk of tripping and are to be self-draining,
- permanent lighting with permanent power supply is provided for all access routes and access chambers,
- lighting levels are a minimum of 30 lux. Additional emergency lighting is to be provided in the Structure along emergency routes having a minimum intensity of 0.2 lux and have a separate (single set) battery-operated power supply. Warning notices and signs are to be provided to all mains power boards and valves, where the operation may affect the safety of persons using the voids of any such Structure,
- all access points to galleries and voids are secured from unauthorised access by the provision of lockable steel doors or grills,
- public access to any facilities provided for bridge inspection or maintenance is prevented by means of suitable barriers and covers,
- minimises the requirement for confined space breathing equipment and
- the colonisation of accessible areas by plants and animals (including roosting and fouling) is prevented by the application of suitable measures.

S327.70 The *Contractor* ensures that level areas are provided in front of abutments to overbridges for non-integral Structures in accordance with the requirements of CIRIA C543.

S327.71 The *Contractor* incorporates access provisions for gantries with variable message signs (VMS) or advanced motorway indicator (AMI) technology, unless otherwise agreed with the *Project Manager*. No access facilities are required for gantries that contain only Advanced Direction Sign (ADS).

S327.72 The *Contractor* ensures that planted vegetation on the Structures

- does not overhang the carriageway below,
- does not shed in such a way that it can be blown or fall onto any carriageway or footway (or equivalent) below the Structure and
- is selected to minimise future operation and maintenance works.

Existing Structures

S327.73 Where existing Structures are incorporated into the *works* or impacted by the *works*, the *Contractor* consults with the TAA (via the *Project Manager*) and the relevant Local Authority (as appropriate) and complies with the TAA and relevant Local Authority's requirements including

- completion, submission and approvals of assessment Approval in Principle's in accordance with DMRB standard CG 300 and
- any required
    - remedial works and

- strengthening works

to such existing Structures to correct defects

- at,
- affected by or
- influencing

the interface of existing and new Structures as part of the *works*.

S327.73A The *Contractor* ensures the *works* do not adversely affect the behaviour and load carrying capacity of

- the existing Structures,
- the new Structures and
- the existing and new Structures acting together.

S327.74 The *Contractor* submits the completed assessment Approval in Principle in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to commencement of the relevant detailed design.

S327.75 Existing Structures that are abandoned or made redundant within the Site are demolished and removed by the *Contractor*, unless otherwise agreed with the TAA (via the *Project Manager*) and the relevant Local Authority (as appropriate).

S327.76 Where an existing Structure is demolished, the existing Structure is demolished to a minimum of one metre below finished ground level, unless otherwise agreed with the TAA (via the *Project Manager* and the relevant Local Authority (as appropriate). The remaining foundations are surveyed by the *Contractor* to avoid clashes with proposed foundations and the recorded information is included within the as-built drawings. Where the *Contractor* proposes to retain existing foundations for re-use, these will be assessed as part of the appropriate Approval in Principle.

S327.77 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, regarding existing Structures, including the minimum level of clearance to finished ground level.

S327.78 Surfaces exposed after the removal of existing waterproofing are inspected for either spalling or reinforcement corrosion and repaired in accordance with the series 2000 of the SHW.

S327.79 Areas contaminated with oil or grease or residue from the removed waterproofing system are cleaned with a suitable detergent.

S327.80 The *Contractor* ensures that the existing headroom beneath the Structures being widened are maintained unless agreed otherwise with the TAA (via the *Project Manager*), relevant Local Authority (as appropriate) and relevant asset owner (as appropriate).

Client's requirements (for the design of Tunnels)

Tunnel Systems

S327.81 The *Contractor* complies with section S2900.

Bored tunnel, North and South Portal permanent structures

S327.82 The *Contractor's* design includes the following load cases applied at the final ground level at any onshore location where these loadings may influence the Tunnels

- where the *Client* does not retain control of access and development, a uniform surcharge of 75 kPa as an allowance for the impact of potential future authorised development,
- where the *Client* does not retain control of access and development and the *Contractor* is advised of a known development by the *Project Manager*, the *Contractor* determines the actual surcharge from that known development to be used in the design (but no less than a uniform surcharge of 75 kPa),
- where the *Client* retains control of access and development, the *Contractor* uses the actual surcharge from known developments and
- where the *Client* retains control of access and development, a uniform surcharge of 30 kPa as an allowance for the impact of potential future authorised development

in accordance with the DCO.

Tunnel Loading

S327.83 The *Contractor* undertakes an assessment on shipping using the River Thames, and determines by risk assessment, to be included within the design of the tunnel. The *Contractor* consults with relevant Others to inform the assessment.

The *Contractor's* design caters for the *Client's* navigational risk assessment set out in paragraph S299.72.

S327.84 The *Contractor* designs the tunnel linings to accommodate a future increased load due to the river flood defences height being raised to 8.0m AOD (including any flood water). Methods of raising may include

- earth embankment,
- earth embankment with wall upstand,
- earth embankment with sheet pile and
- earth embankment with controlled modulus.

Scour Prevention

S327.85 The *Contractor* ensures its design prevents the need for scour protection measures in the River Thames.

Temporary works design life

S327.86 The *Contractor* determines the design life appropriate to each form of temporary works in accordance with BS 5975 'Code of Practice for Temporary Works Procedures and the Permissible Stress Design of Falsework' (see link provided in Annex A) and submits in accordance with the Acceptance Procedure, for acceptance of the *Project Manager*, prior to the commencement of the relevant construction activity.

Additional specific design loads

S327.87 The *Contractor* ensures all tunnel, ramp Structures and flood bunds protecting the tunnel are to be treated as Category 3 as defined in CG 300 (“Technical approval of highway structures”) (see link provided in Annex A.)

Cross passage ducts

S327.88 The *Contractor* ensures all cross passages (CPs) are provided with two redundancy sleeves for cables routings for future use, except where three redundancy sleeves are provided at CPs adjacent to the low point sumps. The positions and diameter of redundancy sleeves are agreed with the *Project Manager* during detailed design.

ITS

S327.89 The *Contractor* ensures the gantries upstream of each tunnel entry portal that are required for implementing traffic management are supported by uninterruptable power supplies.

LTC carriageway

S327.90 For contraflow operation of the tunnel, the *Contractor* provides for single lane crossovers between the tunnel portal and first upstream signal gantry. The cross-over design speed is 85A kph.

S327.91 For contraflow operation of the tunnel, the *Contractor* ensures all Intelligent Transportation Systems (ITS) such as automatic incident detection (AID) systems can be configurable for contraflow operation.

Water supply refill rates

S327.92 The *Contractor* ensures that at least one of the fixed firefighting system (FFFS) water storage tanks is capable of being refilled from empty in a maximum of eight hours. The *Contractor* is responsible for the communication and co-ordination with the relevant water company for water supply connections.

Power supply

S327.93 The *Contractor* designs within the limits of the incoming power supplies (for both temporary and permanent), which have been agreed between the *Project Manager* and United Kingdom Power Network (UKPN). The *Contractor* is responsible for the communication and co-ordination with UKPN for the power connections.

Fixed Firefighting Systems (FFFS)

S327.94 The *Contractor* develops the tunnel design to include a FFFS. The type of system is to be agreed with the tunnel design safety and consultation group as described in section S2900 and submitted in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to commencement of detailed design.

North Portal rising main and outfall

S327.95 The *Contractor's* design of all drainage infrastructure located in the vicinity of the North Portal considers and takes into account the earthworks as part of the landscape restoration proposals. The *Contractor* ensures

- that the integrity of such infrastructure is not affected (including compromised) by these works and
- that such infrastructure can be accessed and maintained at all times.

Emergency Service Helicopter Landing Areas

S327.96 The *Contractor* makes provision both during construction and in the permanent condition of the *works* at each end of the tunnel for a flat, unobstructed, stable area suitable for the landing of air ambulance emergency services. The *Contractor* agrees the location and details of such areas with the *Project Manager* in consultation with the emergency services.

Emergency areas

S327.97 When configuring each tunnel's approach and departure layout, the *Contractor* ensures that the tunnel approach and departure emergency areas are located as close as is safely feasible to the tunnel portals, with a target distance of 10 seconds travel time (at design speed) from the tunnel portals.

In determining the optimum location of an emergency area the *Contractor* considers the following constraints

- emergency areas are not located within 10 seconds travel time (at design speed) of the tunnel portals, unless agreed otherwise with the *Project Manager*,
- emergency areas do not conflict with the location of other infrastructure such as barriers, signs and signals,
- emergency areas are positioned such that vehicular use does not impede access or egress from the turnaround access points,
- emergency areas are positioned such that pedestrian access is not unduly impeded by Structures such as retaining walls,
- in the North Portal area the length of the culvert for the Main River is not extended beyond the length in the Development Consent Order (DCO) design,
- emergency area locations are compatible with the future provision of a Tilbury Junction as described in section S200 and
- emergency areas are positioned such that they do not negatively affect the detection accuracy of road user charging infrastructure.

The *Contractor* takes the following actions if doing so is necessary to optimise the location of the emergency area

- reconfiguring the emergency areas and turnaround access points,
- combining emergency areas and turnaround access points or
- incorporating emergency areas in the North Portal approach Structure.

Railway Authorities

S327.98 The *Contractor* develops a 'settlement mitigation strategy' for agreement of the Railway Authority, including instrumentation and monitoring (I&M), physical mitigation measures and track reinstatement measures. The mitigation strategy considers both short and long-term settlement.

The *Contractor* submits the 'settlement mitigation strategy' in accordance with the Acceptance Procedure, for acceptance of the *Project Manager*, prior to commencement of detailed design.

The *Contractor* mitigates the impact of its works on the Railway Authority's assets in accordance with the accepted mitigation strategy.

Tunnel Service Building (TSB)

TSB North and South

S327.99 The *Contractor* provides external lighting to the Tunnel Service Building parking and Compound areas as per BS EN 12464 (''Light and Lighting'') and BS 5489 (''Design of Road Lighting''), see link provided in Annex A.

S327.100 The welfare facilities in the Tunnel Service Buildings are to be designed to accommodate a number of 40 staff at any one time in each building.

S327.101 The *Contractor* ensures that there is sufficient storage within the TSBs to store all spares and equipment required to operate and maintain the tunnel equipment and any additional requirements of section S400.

TSB parking

S327.102 The *Contractor* makes vehicle parking provision that meets the *Client's* operational requirements including

- a minimum of six electric vehicle charging equipped parking spaces at each TSB (twelve in total) consisting of
  - three two-way electric vehicle charging points (six in total),
  - two electric vehicle charging points to be DC rapid charge capable with either a CHAdeMO and CCS connector (four in total), depending on the most appropriate type at the time of install as agreed with the *Project Manager* and
  - one electric vehicle charging point to be type 2 minimum 7kW AC connection (two in total) and
- all charging points to have an inbuilt locking mechanism when connected to vehicles.

Access roads

S327.103 The *Contractor* designs the Tunnel Service Building access roads so that they can accommodate all foreseeable operational scenarios. This includes scenarios that may require a hard verge solution to facilitate additional parking in an emergency or during a maintenance event requiring more vehicles than accommodated in the formal parking areas.

S327.104 In the event that the *Contractor* develops its proposal by utilising the underdeck space of the bored tunnel to accommodate Plant and Materials necessary for operating the tunnel, independent vertical access shafts are provided at each TSB to accommodate the routing of

- electrical ducts and cabling,
- routing of mechanical pipework and
- ventilation and cooling air.

S327.105 The *Contractor* provides spatial provision at each TSB, with external access, for third-party equipment including

- water metering equipment,
- NRTS equipment and
- Distribution Network Operator equipment.

S327.106 The *Contractor* provides spatial provision at each TSB to accommodate all electrical, mechanical, communications and control equipment required for the safe operation and maintenance of the tunnel.

S327.107 The *Contractor* provides water storage tanks at each TSB to supply tunnel fire hydrants and FFFS.

S327.108 The *Contractor* provides pumping equipment at each TSB to support the operation of the tunnel fire hydrant and FFFS.

S327.109 The *Contractor* provides TSB fire detection and alarm, fire extinguishing systems and an extinguishing gas storage area.

S327.110 The *Contractor* provides the following tunnel operation rooms at each TSB to meet the *Client's* needs and in compliance with the requirements outlined in section S2900 of the Scope

- control room,
- command room,
- incident room,
- security room and
- staff room.

S327.111 The *Contractor* provides the following maintenance operative rooms at each TSB

- briefing room,
- drying room,
- maintenance equipment room,
- gender-neutral
  - changing rooms,
  - showers and
  - WCs and
- staff welfare.

S327.112 The *Contractor* agrees the TSB layout, room sizes and facilities with the relevant stakeholders and the Project Manager and submits the agreed layout in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to commencement of detailed design.

S327.113 The *Contractor* consults and agrees with UKPN the accommodation needs for the substation and switchgear equipment at the North Portal and South Portal within the Tunnel Service Building. The *Contractor* complies with the specific UKPN requirements for such spaces when designing the building.

Underdeck Gallery

S327.114 The *Contractor* develops its proposals for the underdeck gallery and submits these in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to the commencement of detailed design. This includes

- proposals to accommodate Plant and Materials necessary for operating the tunnel,
- proposals to accommodate maintenance service vehicles,
- proposals for the number and dimensions of maintenance service vehicle crossovers and passing places in the underdeck space and at the North Portal and South Portal and
- proposals for the personnel and servicing equipment carrying capacity of the maintenance service vehicle and furthermore the drive mechanism (e.g. tyres, rail) and power of the vehicle.

S327.115 The *Contractor* provides the service vehicles required for operation of the tunnel. A minimum of six number vehicles, one per bore are to be stationed at each Tunnel Service Building and one backup vehicle per bore.

S327.116 The *Contractor* includes in its design submission for the underdeck gallery, a whole life cost assessment considering a service life of 60 years to show the proposed maintenance service vehicle is value for money considering the cost of supply, operation and maintenance.

S327.117 In the event the *Contractor* develops its proposal to accommodate Plant and Materials necessary for operating the tunnel in the underdeck gallery, maintenance access to the underdeck space is provided from ground level at each Tunnel Service Building. Such means of access include

- lift access (without a machinery room) for personnel and service equipment, with a minimum capacity of 2500kg,
- stairwell access, including provision for emergency evacuation of persons on a stretcher and
- clear shaft with overhead crane equipment incorporated into the building, sized for removal of the largest and heaviest equipment component.

S327.118 The underdeck access provision is to be the same at each Tunnel Service Building.

Third-party Utilities

S327.119 The *Contractor* accommodates Others' utilities as per the tunnel specification (HE540039-CJV-STU-S06-SPE-TUN-00001), provided in section S2700.

Architecture and Landscaping

S327.120 The *Contractor* complies with the 'Architecture and Landscape Performance Specification' provided in Annex A, including ensuring the landscape and building materials are selected to achieve no less than the minimum design life stated within the document.

Tunnel Flood Protection Level

S327.121 The *Contractor* ensures that the design storm for the tunnel portals is the 1 in 1000 year extreme flood event as defined by the Environment Agency for the Thames Estuary with climate change allowances up to and including the year 2129, and a 1000mm freeboard.

Flood bunds (if required by the design)

S327.122 The *Contractor* considers long term settlement in the design of flood bunds. The flood bunds are to be designed and constructed in such a way that no future maintenance is required to maintain the required tunnel flood protection level.

S327.123 The *Contractor's* design of all flood bunds considers the excavation and filling operations in land adjacent to the Site. The *Contractor* liaises with Others when designing flood bunds to ensure that the integrity of its flood bund designs are not compromised by Others' operations.

S327.124 At the North Portal, the *Contractor* interfaces with Others who are undertaking filling and landscaping to ensure that the *Contractor's* constraints have been communicated in advance of the filling and landscaping works being undertaken.

S327.125 The *Contractor* interfaces with Others who are undertaking filling and landscaping work adjacent to the Site so that the permanent boundary fencing can be installed in accordance with the Accepted Programme.

Security

North and South Portals security

S327.126 The *Contractor*, using the *Client's* Physical Security Execution Plan (see link provided in Annex A), develops a security strategy and design for the implementation of an effective permanent security build. This includes proposals

- for all associated infrastructure required for the protection of critical national infrastructure (CNI) and
- for all associated infrastructure required by the 'Network and Information Systems Regulations 2018' (see link in Annex A), given that the *Client* is an operator of essential services.

The *Contractor* submits this security design as part of the relevant AIP (as defined in section S316) in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, together with the security strategy prior to commencement of detailed design.

S327.127 The *Contractor* uses the principles of Defence in Depth and Crime prevention through environmental design for the permanent buildings, see links provided in Annex A.

S327.128 The *Contractor* develops the security system requirements using the Centre for Protection of National Infrastructure (CPNI) Operational Requirements (ORs) methodology (ORs Level 1 & 2) and submits this for acceptance by the *Project Manager*. See links provided in Annex A.

S327.129 The *Contractor* takes into consideration both the external and internal security requirements of the tunnels, TSBs, access roads and open areas within the Site. This includes

- video surveillance system infra-red/thermal imaging,
- integrated bio-metric access control system configurable for various clearance zones, including a backup redundancy system,
- perimeter fencing and lighting including infra-red system,
- perimeter and building intruder detection systems,
- anti-vehicle mitigation systems at identified points,
- automatic number plate recognition,
- perimeter detection systems,
- security communication systems, including intercom at access points and
- tunnel blast mitigation and protection.

The *Contractor* ensures the systems will be integrated with the LTC Tunnel System to allow remote monitoring and control.

Resilience Assessment Loads

S327.130 The *Contractor* uses the Client's Physical Security Execution Plan (see link in Annex A) and outputs from this in the development of their design.

Road User Charging (RUC) Elements

S327.131 The *Contractor* ensures that all RUC elements provided by the *Contractor* are completed a minimum of 6 months prior to Completion of *section* 2.

Gantries

S327.132 The *Contractor* provides four RUC gantries as shown on the indicative drawing HE540039-CJV-HMC-SZP_HC000000_Z-DR-EC-00003 provided in Annex A and confirms the exact location.

S327.133 The four RUC gantries (as per HE540039-CJV-HMC-SZP_HC000000_Z-DR-EC-00003) are person accessible super cantilever portal gantries and are suitable for mounting the RUC equipment onto.

S327.134 The RUC equipment, when fixed to the gantries, imparts a point load of up to 400kg (at any point) per vehicle lane.

S327.135 The *Contractor* provides the following on each RUC gantry in accordance with the requirements of the *Client* (via the *Project Manager*)

- an access hatch above every vehicle lane to enable the RUC Contractor's outrig equipment to be accessed from within the gantry,
- a cable management system,
- an electrical enclosure for the use of the RUC Contractor and
- a mounting plate for the future installation of a second electrical enclosure.

Example drawings DFFC-ATK-HW17-ML-DR-S-17034_Z1, DFFC-ATK-HW17-ML-DR-S-17083_Z1 and DFFC-ATK-HW17-ML-DR-S-17093_Z1 are provided in Annex A.

Maintenance Hardstandings

S327.136 The *Contractor* provides two concrete maintenance hardstandings, one located on the northbound side and one located on the southbound side, accessed from the Tunnel Service Building access road, unless otherwise agreed with the *Project Manager*.

The *Contractor* ensures that each maintenance hardstanding

- is positioned so that the cable length from the furthest point for RUC equipment on each RUC gantry to each of the RUC cabinets on the hardstanding is no more than 80m,
- is large enough to accommodate up to six RUC cabinets, a power supply cabinet and a NRTS Service Delivery Point (SDP) cabinet,
- includes the foundations for all cabinets within the hardstanding area to include ducts and chambers and
- facilitates a minimum 2m spacing between each cabinet.

S327.137 The RUC Contractor provides and installs the RUC cabinets onto the foundations provided by the *Contractor*.

S327.138 The *Contractor* designs the hardstandings such that cabinet doors will open freely, providing sufficient space between and around cabinets for safe working. The design of the hardstanding enables the cabinets to be operated and maintained without the use of temporary traffic management, unless otherwise agreed with the *Project Manager*.

S327.139 All cabinet foundations are provided in accordance with MCX 0140 (see link in Annex A) or as agreed with the *Project Manager*.

S327.140 The bases for each RUC cabinet are suitable to accommodate a cabinet of indicative size width 1200mm x depth 500m x height 1900mm.

Maintenance access vehicle parking

S327.141 The *Contractor* provides two spaces for vehicle parking, one within 200 metres of each maintenance hardstanding, accessed from the Tunnel Service Building access road.

S327.142 The *Contractor* provides an access route between each vehicle parking space and its associated maintenance hardstanding.

S327.143 The *Contractor* ensures each parking area is suitable for parking a 7.5 tonne vehicle.

Power supply

S327.144 The *Contractor* provides two power supplies and power supply cabinets, one at each maintenance hardstanding.

S327.145 The *Contractor* ensures each power supply cabinet and associated switch gear is separately connected to the tunnel power supply from the Tunnel Service Building by dedicated cables and a duct route which is not used for any other purpose.

S327.146 The *Contractor* provides a connection from the power supply cabinet to the NRTS SDP cabinet and terminates the power to allow the Telecommunications Service Provider (TSP) to power its SDP equipment.

S327.147 The RUC Contractor provides and installs power cables from the power supply cabinets to RUC cabinets and other RUC equipment.

S327.148 The power supply cabinet at each hardstanding is type 609 installed by the Contractor in accordance with MCX 0139 and MCX 0170 (see links provided in Annex A) or as agreed with the *Project Manager*.

S327.149 The power supply provision at each hardstanding is 10 kVA minimum.

S327.150 The *Contractor* supplies and installs power cables from the tunnel power supply to each power cabinet and from each power cabinet to the adjacent NRTS SDP cabinet.

Communications

S327.151 The *Contractor* provides two NRTS SDP cabinets, one at each maintenance hardstanding, to contain the NRTS SDP.

S327.152 The *Contractor* arranges with the TSP for the provision of SDPs at each SDP cabinet, delivering an ethernet service in accordance with the telecommunications and programme requirements of the *Project Manager*.

S327.153 The *Contractor* provides ducted cable routes between the NRTS SDP and RUC cabinet locations to allow the RUC Contractor to connect the RUC cabinets to the NRTS SDP cabinet.

S327.154 The *Contractor* provides a duct connection from each NRTS SDP cabinet to the longitudinal NRTS network ducts to allow NRTS to connect the SDPs into the wider communications network.

S327.155 The RUC Contractor provides and installs communications cables from the NRTS SDP cabinets to RUC cabinets and other RUC equipment.

S327.156 The NRTS SDP cabinet at each hardstanding is type 600, installed by the *Contractor* in accordance with the requirements of the TSP.

Ducted network

S327.157 The ducted network for power and communications cables is in accordance with the Specification for Highway Works (SHW).

S327.158 The ducted network provided by the *Contractor* includes

- a minimum of two ducts from the RUC cabinet foundations to the adjacent NRTS SDP cabinet,
- a minimum of six ducts from the cabinet bases at each hardstanding to each of the four RUC gantries and
- a minimum of four cable ducts between the four RUC gantries in each verge.

S327.159 A summary of RUC responsibilities on the Project is shown in Table 7 below.

Table 7 - RUC Responsibilities

item	the *Contractor*	RUC Contractor	TSP
parking areas	all		
hardstandings	all		

cabinet foundations	all		
ducts	all		
gantries (including cable management, access hatch, enclosures, mounting plates)	all		
cabling between hardstanding and RUC equipment on gantry		all	
cabling between SDP cabinet and RUC equipment		all	
cabling between power cabinet and RUC cabinet		all	
power cabinets including supplies and associated cabling	all		
SDP cabinets including cabling from power cabinet	all		
NRTS SDPs	procures		supplies and installs
RUC cabinets		all	
RUC equipment		all	

all = supply, install and commission

S328 *Client's* requirements (Architecture and Landscape constraints)

General

S328.1 The *Contractor* prepares a 'Co-ordinated Architecture and Landscape Design Report' that includes

- an integrated aesthetic design across all disciplines including the other Main Works Contractors,
- maintenance and management implications of the landscape design (including, safe access to all landscaped areas, future-proofing and long-term cost-effective solutions to achieving environmental, engineering and ministerial objectives),
- the integration of the *works* with the surrounding landscape and built environment,
- an outline strategy for the resourcing and procurement of planting stock,
- co-ordination of the architecture and landscaping design across interfaces with the other Main Works Contractors,
- key visualisations, consistent with the illustrative "LTC Visualisation Storyboard", see link provided in Annex A, for all bridges, abutments, viaducts and substantial landscape features,

- appropriate number of cross-sections at key interfaces (additional cross-sections are to be provided at the reasonable request of the *Project Manager*),
- architectural general arrangement drawings at appropriate scales and
- landscape general arrangement drawings at appropriate scales.

The *Contractor* submits the 'Co-ordinated Architecture and Landscape Design Report' and the Multiparty Collaboration Form in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to commencement of the relevant detailed design.

S328.2 The *Contractor* ensures that the 'Co-ordinated Architecture and Landscape Design Report'

- complies with the Development Consent Order (DCO) requirements (including consideration for the production of the LEMP),
- complies with the Scope requirements,
- complies with the relevant Local Authority requirements,
- complies with the statutory bodies requirements and
- provides a consistent approach to the architecture and landscape design as agreed with the other Main Works Contractors.

S328.3 The *Contractor* implements a landscape design which minimises the adverse impacts and delivers a multi-disciplined integrated design (including Structures earthworks, lighting, signs, safety barriers).

S328.4 The *Contractor* ensures each planting plot within the landscaping design has a unique identifying number.

S328.5 The *Contractor* liaises with the *Project Manager* in respect of the maintenance implications of the landscape design and ensures that the following requirements are met as a minimum

- the design is developed in a manner which ensures safe access and egress to all landscaped areas (without the need for traffic management unless otherwise agreed with the *Project Manager*),
- the design is future-proofed to reduce the need for maintenance, particularly with respect to the design of any water remediation and balancing features and
- the design offers long-term cost-effective solutions to achieve the environmental and engineering objectives.

S328.6 The *Contractor* submits any necessary applications to the statutory bodies with respect to materials, planting and aesthetics, and obtains Consents prior to commencing the relevant construction activity.

Design Specific Constraints

S328.7 The *Contractor* ensures the design complies with the Design Principles for architecture and landscaping contained in the Environmental Assessment Documents.

S328.8 The *Contractor's* detailed design is consistent with the design objectives and considerations aspirations in the "Lower Thames Crossing Design Guide", see link provided in Annex A.

S328.9 The *Contractor* demonstrates how its detailed design is consistent with the design objectives and considerations of the LTC design guide and submits its proposals to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, prior to commencement of the relevant construction activity.

A reason for not accepting the proposals is that it does not demonstrate that it is consistent with the design objectives and considerations in the LTC design guide.

S328.10 The *Contractor* provides a Chartered Landscape Architect or a Chartered Architect from the appropriate professional body. Any change to the appointed Chartered Landscape Architect or Chartered Architect, is submitted to the *Project Manager* for agreement.

S328.11 The *Contractor* submits 'key visualisations' consistent with the illustrative "LTC Visualisation Storyboard", see link provided in Annex A, for the following

- all bridges, abutments and viaducts and
- substantial landscape features

in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to the commencement of the construction phase.

S328.12 The *Contractor* makes submissions of the design (specifically the architecture and landscaping design) at regular intervals as agreed with the *Project Manager*, to the Highways England's Design Review Panel (HEDRP).

The *Contractor* ensures that each subsequent submission takes cognisance and addresses previous HEDRP comments throughout the development of the design. The *Contractor* submits to the *Project Manager* its proposals to resolve any HEDRP comments within four weeks of receipt of such comments.

Where the *Contractor* decides or proposes not to incorporate HEDRP comments in its design, it provides a detailed rebuttal to the *Project Manager's* agreement.

S328.13 The *Contractor* provides any information required by the statutory bodies and relevant stakeholders and submits a design compliance report in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, prior to commencement of the relevant detailed design and the relevant construction activity, summarising

- the progress made and any changes to the accepted approach within the associated landscape design,
- evidence of the proposal's compliance with the requirements of the DCO and
- any submissions for agreement by Others that are required at any point in the design development process.

S328.14 The *Contractor* ensures that all utilities (including incoming tunnel utilities), including service ducts, overhead power cables and pipes are, where possible, fully integrated

- within the Structures and Tunnel Service Buildings and
- not exposed (e.g. buried) so as not to affect such character and quality of the surrounding landscape.

S328.15 The *Contractor* ensures that any external substation compounds are integrated within the surrounding landscape, including provision of

- raised earthworks and mature planting to ensure the substation compounds are not visible to landowners and members of the public and
- alternative fencing or barrier to the substation compound.

S328.16 The *Contactor* ensures the landform design includes the following

- creation of smooth flowing contours which reflect, and which are in character with, the existing naturally occurring topography in terms of gradients, scale and form,
- integration with existing ground levels, Structures and planting,

- the tops and bottoms of embankments and cuttings in soft materials are rounded,
- creation of slope gradients which allow for re-establishment of suitable ground conditions where establishment of semi-natural vegetation is required and
- taking all opportunities to grade out embankment and cutting slopes to more closely resemble the surrounding natural topography and allow return to land to agricultural use, if required.

S328.17 Rock cuttings are formed to promote a natural appearance and natural regeneration in line with ongoing slope stability.

S328.18 The *Contractor* achieves the following aesthetic objectives to avoid or reduce adverse landscape and visual impacts

- where it is necessary to safeguard the Project Road against rock falls, consideration is first given to providing a wider verge. Rock traps lined with rock scree, using material from the cutting, are used where this is not possible. The *Contractor* avoids the use of netting or meshing of rock faces, unless otherwise agreed by the *Project Manager*,
- exploits the discontinuities and character of the natural rock mass, incorporating ledges and niches, to achieve as natural an appearance as possible, reflecting naturally occurring rock formations, strata and rugged terrain in the local area,
- using regularly spaced 'half barrels' created by pre-splitting of rock faces to remove the irregular naturalistic appearance, unless agreed otherwise with the *Project Manager* and
- by not providing smooth faces except where they occur within the natural bedding planes in the rock.

S328.19 Rock for use in stone landscape features such as free-standing walls, landscape retaining walls, rock features and boulders and areas of scree is Project (site) won material and sourced as locally as possible to the location of intended use. Reclamation of the rock and stone resource are carefully planned and managed accordingly. Excavation and quarrying techniques for rock cuttings are appropriate for each specific requirement for re-use of the rock.

S328.20 For walls and retaining walls, careful consideration is given to complementing the local vernacular in terms of the colour and texture of the rock to be used, the form of stone dressing and tooling techniques, block sizes and laying patterns, pointing, capping styles and use of drystone techniques where appropriate for free standing (non-retaining features).

S328.21 The *Contractor* complies with Forestry Commission Practice Note ("Using local stock for planting native trees and shrubs") (see link provided in Annex A), and uses plant materials that have been grown and supplied in accordance with the Flora Locale's Code of Practice (see link provided in Annex A). All species are propagated from generic material originating in the relevant bio-geographical area, unless otherwise agreed with the *Project Manager.*

S328.22 The *Contractor's* landscape design shows how the requirements for local provenance of plant material are met.

S328.23 The *Contractor* submits a completed Provenance Certificate (using the pro-forma contained in the Notes for Guidance Appendix 30/6: Planting of the MCHW) in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*. The *Contractor* provides an acknowledged Provenance Certificate from the relevant Local Authority in relation to Side Roads, in accordance with the Acceptance Procedure, for acceptance by the *Project Manager.*

S328.24 The *Contractor* submits a completed Provenance Certificate from the supplying nurseries in respect of the provenance of plant material in accordance with the Acceptance Procedure, for acceptance by the *Project Manager,* and to the relevant Local Authority (as appropriate).

S328.25 Where the *Contractor* uses a subcontractor (at any remoteness from the *Client*) for plant materials, the Provenance Certificate is amended to include an additional signature block (mutatis mutandis) for such subcontractor.

S328.26 The *Contractor* ensures that planting, seeding and aftercare works is carried out by a full member of the British Association of Landscape Industries (BALI) (or equivalent) and has good working knowledge of the local native plant species (including trees and shrubs).

S328.27 The general principle of collecting seeds, storage and re-use of existing soil is applied to maximise the scope for natural regeneration of existing local habitats and vegetation, and to minimise the need to apply seeds as far as possible.

The *Contractor* includes its proposals for such works in the 'Landscape Ecology Management Plan'.

S328.28 Temporary stockpiles and bunds are protected to prevent erosion and water and ground contamination.

Where temporary stockpiles and bunds are not protected by other suitable means, the *Contractor* ensures that seeding to stabilise the temporary stockpiles and bunds is applied to minimise erosion and water quality impacts.

S328.29 The *Contractor* ensures that the topsoil and subsoil depth thicknesses for planting areas is sufficient to ensure the establishment of the planting and the *Contractor* carries out any remedial subsoil treatment.

S328.30 The *Contractor* ensures that planting and seeding of any species are undertaken, using

- regional native species characteristics of the surrounding landscape and
- UK grown plants and seeds.

S329 *Client's* operational requirements (during PCF Stages 5 and 6)

General

S329.1 The *Contractor* ensures the *works* do not adversely affect the *Client* from achieving the criteria contained in the Road Investment Strategy 2 (RIS2) (see link provided in Annex A).

S329.2 The *Contractor* ensures that the *works* can be adequately, efficiently and safely maintained and operated.

Operational Workshops

S329.3 The *Contractor* arranges and co-ordinates operational workshops with the relevant *Client* directorates, Main Works Contractors, *Project Manager* and Others as a part of the development of the *Contractor*'s design.

S329.4 The *Contractor* commences the initiation of an operational workshop, to request information to facilitate the design process, as soon as reasonably practicable.

S329.5 The *Contractor* identifies and explains those elements of the *works* to the *Client,* Main Works Contractors, *Project Manager* and Others where the operational, maintenance and emergency safety is assured by the *Contractor* under the application of the Construction (Design and Management) Regulations 2015 (see link provided in Annex A).

S329.6 The *Contractor* ensures all revisions of the Risk Register, including all associated operational and maintenance risks, are presented at the operational workshops and shared with all attendees.

Operation and maintenance submissions during design

S329.7 The *Contractor* demonstrates how the operation and maintenance of the Project assets has been considered by submitting details, in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, alongside the relevant design and construction activities, of the following

- Plant and Material locations,
- security,
- weather protection,
- working space,
- electrical (and other services) isolation,
- visibility,
- lighting,
- ventilation,
- monitoring,
- lifting and manual handling,
- downtimes required and interruptions to normal service,
- cleaning,
- specialist tools and operation and maintenance equipment,
- strategic spares requirement and storage,
- consumables,
- emergency access and egress,
- unusual hazards or activities,
- access and maintenance points on all facilities that require access,
- maintenance activities and their frequency,
- preservation of products prior to installation during storage and
- cleaning.

S329.8 The *Contractor* prepares a ‘maintenance requirement plan’ in accordance with GM 701 (“Asset delivery asset maintenance requirements”) (see link provided in Annex A) and submits to the *Project Manager* for acceptance in accordance with the Acceptance Procedure and accompanied by a Multi Collaboration Certificate, prior to commencement of the relevant construction activity. The *Contractor* ensures that the ‘maintenance requirements plan’ is consistent with ‘assess management forward plan’.

Requirements for the operations technical leadership group (OpsTLG)

S329.9 The *Contractor* prepares a ‘operations OpsTLG paper’ in accordance with the relevant *Client’s* Project Control Framework (PCF) guidance (see link provided in Annex A) and submits the ‘operations OpsTLG paper’ in accordance with the Acceptance Procedure for acceptance by the

Project Manager, accompanied by the Multiparty Collaboration Certificate (where appropriate) and submitted four weeks prior to the relevant Stage Gate Assessment Review (SGAR) or interim SGAR.

S329.10 The *Contractor* ensures that the 'operations OpsTLG paper' is prepared using either the

- OpsTLG Paper Template for SGAR Stage 5 and 6 (see link provided in Annex A) or
- OpsTLG Paper Template for SGAR Stage 7 (see link provided in Annex A)

as appropriate for the relevant SGAR or interim SGAR.

S329.11 In addition to the requirements above at Sections S329.9 and S329.10, the *Contractor* ensures that the 'operations OpsTLG paper' at SGAR Stage 5 includes

- a summary of the operational and maintenance solution for each
  - trunk road (including junctions),
  - Structure (including geotechnical features) and
  - roadside technology,
- a summary of the integrated operation and maintenance solution,
- a summary of how the operational and maintenance solution complies with the
  - Development Consent Order (DCO) and
  - associated environmental requirements,
- reference and Project's Common Data Environment (CDE) links to the
  - relevant trunk road layout drawings (including junctions),
  - relevant Approval in Principle (AIP),
  - relevant Geotechnical Design Report (GDR),
  - relevant safety risk assessment,
  - relevant temporary traffic management plan,
  - relevant PCF products and
  - any other supporting information provided by the *Contractor* to inform the operational and maintenance solution.

S329.12 The *Contractor* ensures that where the operational and maintenance solution includes activity type categories A, B or C (as determined in accordance with GG 104) that these relevant 'activities' (as defined in GG 104) have been reviewed and accepted by the safety control review group (SCRG) or national safety control review group (NSCRG) (as appropriate), prior to presentation to the OpsTLG, unless otherwise agreed with the *Project Manager*.

S329.13 The *Contractor* ensures all operational and maintenance solutions at interfaces that impact upon the other Main Works Contractors are agreed with the other Main Works Contractors in accordance with section S318.

S329.14 One week prior to the preparation of all operations OpsTLG papers and supporting documentation, the *Contractor* notifies the *Project Manager* (with a link to the relevant location of such Data on the Project's CDE) to allow for helpful observation to be provided by the *Project Manager*, prior to the presentation to the OpsTLG.

S329.15 A reason for not accepting the 'operational OpsTLG paper' is that

- it is not accompanied by a OpsTLG endorsed Certificate of Compliance with the operations technical leadership group (OpsTLG) or

- the operational and maintenance solution has not been coordinated with the other Main Works Contractors (where applicable).

Requirements for the operations technical leadership group (OpsTLG) presentation and certification

S329.16 The *Contractor* presents the operational and maintenance solution to the OpsTLG

- three months in advance of the relevant SGAR or interim SGAR,
- ensuring that the 'operational OpsTLG paper' is provided to the OpsTLG 15 working days in advance of the presentation and
- the presentation is in accordance with the relevant Client's PCF guidance.

S329.17 The *Contractor* collaborates with the *Project Manager* to facilitate OpsTLG presentations or meetings.

S329.18 The *Client*

- chairs the OpsTLG meetings,
- maintains the OpsTLG workflow and
- notifies the *Contractor* one week in advance of each OpsTLG presentation or meeting.

The *Project Manager*

- leads the OpsTLG presentations and
- identifies all attendees in consultation with the *Contractor*, to represent the Project.

S329.19 The *Contractor*

- notifies the *Project Manager* of the need for an OpsTLG presentation or meeting and
- arranges a venue for the OpsTLG presentation or meeting at a location that is agreed with the *Project Manager*.

S329.20 The *Contractor* provides the *Project Manager* with the operational and maintenance solution (including any supporting information or additional information requested by the OpsTLG) two weeks in advance of each OpsTLG presentation or meetings.

S329.21 The *Contractor*

- attends all OpsTLG meetings where invited by the *Project Manager*,
- ensures the programme submitted for acceptance provides the required time for OpsTLG presentations or meetings, OpsTLG review and endorsement and
- ensure the appropriate Staff attend the OpsTLG presentations or meetings.

S329.22 The *Contractor* provides all OpsTLG presentation or meeting information (including agendas, minutes and actions) on the Project Common Data Environment (CDE) no less than eight working days prior to the OpsTLG presentation or meeting. The *Project Manager* prepares minutes within 10 working days of closing the presentation or meeting and include an abbreviated action list with assigned responsibilities and timescales for each action, as agreed during the OpsTLG presentation or meeting.

S329.23 The *Contractor* prepares a response paper to all OpsTLG recommendations made at each OpsTLG meeting, including proposed actions, and submits the response paper to the *Project Manager* for review and acceptance.

S330 Requirements of Others

General

S330.1 The *Contractor* complies with the requirements of Others in accordance with the Scope.

S330.2 The *Contractor* ensures and demonstrates that the design complies with the requirements of section S928.

Railway Authority

S330.3 The *Contractor* ensures that the design of the *works* complies with the requirements of the Railway Authority and any other relevant railway undertaker or owner or operator.

S330.4 The *Contractor* ensures that the design of the *works* for all Structures over, adjacent to or under railway lines is in accordance with the statutory requirements, the requirements of the Health and Safety Executive, the Office of Rail and Road and the relevant Railway Group Standards.

S330.5 Prior to the commencement of any *works* in the vicinity of any railway, the *Contractor* consults with the Railway Authority and complies with the Railway Authority's requirements.

S330.6 The *Contractor* consults with the Railway Authority and complies with the Railway Authority's requirements, regarding the demolition of the existing Structures (where applicable), dimensions and clearances, and construction restrictions or permits to work in the vicinity of the railway.

S330.7 Where the design of the *works* such as foundations to superstructure bridges spans over or adjacent to railway lines, the *Contractor* designs such *works* to reduce possessions

- during construction and
- operation and maintenance.

The *Contractor's* design minimises the need to access the Railway Authority's land for operational and maintenance requirements of such Structure.

S330.8 The *Contractor* ensures, where bridges span over railways, such bridges are designed to prevent the formation of icicles.

S330.9 The use of an underbridge unit, where overhead line equipment (OLE) is present, is not permitted for access to the soffit of bridge Structures spanning over the railway.

Where a Structure spans over a railway line, it is designed for the future provision and attachment of OLE. Where a Structure spans over an existing railway line with OLE, the OLE is not attached to the Structure without the agreement of the *Project Manager.*

Emergency services

S330.10 The *Contractor* consults with the relevant emergency services' requirements, in regard to

- public safety and
- crime prevention (including the application of anti-graffiti paint)

and complies with the relevant emergency services' requirements.

S340 *Client's* requirements (for the design of Equipment)

S340.1 The *Contractor* submits to the *Project Manager* a list of Equipment for which it intends to prepare designs for and their proposed checking categories. This list is issued to the *Project Manager* in

accordance with the *Contractor's* Accepted Programme taking due cognisance of long-lead procurement items and before commencement of the design of any Equipment. In preparing this list, the *Contractor* identifies the potential for risk and any approvals from Others that are required, such as the Local Authorities and Statutory Undertakers.

S340.2 The *Contractor* submits to the *Project Manager* for acceptance, a schedule of design interfaces between Equipment, the works and ground movement control, identifying which party within the design organisation is responsible for the design and checking of each aspect of the design.

S350 Road Safety Audit Requirements

General

S350.1 Notwithstanding requirements stated elsewhere in the contract, Road Safety Audits (RSAs) carried out on Trunk Roads are in accordance with DMRB standard GG 119 ("Road safety audit"), (see link provided in Annex A).

S350.2 The *Contractor* consults with the relevant Local Authority and complies with the relevant Local Authority's requirements, regarding RSAs for Side Roads. RSAs carried out on Side Roads are in accordance with DMRB standard GG 119, unless otherwise agreed with *Project Manager* and relevant Local Authority (as appropriate).

S350.3 For the purposes of the DMRB standard GG 119, the "Overseeing Organisation" is construed for the purposes of the contract as meaning

- in the case of Trunk Roads, the *Project Manager* or
- in the case of Side Roads, the relevant Local Authority and the *Project Manager*

and accordingly the final decision rests with them with respect to any issues in any RSA Response Report.

S350.4 The *Contractor* ensures that RSAs are undertaken at the stages defined in the DMRB standard GG 119 ("Road safety audit") (see link provided in Annex A),) with the exclusion of 'stage 1' (unless a repeat RSA is deemed necessary by the *Project Manager* and the relevant Local Authority (as appropriate)) and 'stage 4'. Additionally, the following stage applies

- interim Stage 2 RSA: Undertaken at an early phase of development of the detailed design as agreed with the *Project Manager*. The *Contractor* ensures that the detailed design incorporates the 'stage 1' RSA findings, recommendations and agreed RSA actions.

Road Safety Audit (RSA) process

S350.5 The RSA Team are an independent and separate organisation to the *Contractor,* procured by the *Client* to undertake the duties of the RSA Team (as defined in DMRB standard GG 119) across all Main Works Contracts.

S350.6 The *Contractor* ensures that an appropriate method of communication is agreed between the RSA Team, the design organisation and the *Contractor* (as described in DMRB standard GG 119). Any meeting between the design organisation, *Contractor* and the RSA Team is facilitated and chaired by the *Contractor.* The *Contractor* invites the *Project Manager* to attend such meetings.

S350.7 The *Contractor* prepares the RSA Brief in accordance with and as defined in DMRB standard GG 119, ensuring it has been co-ordinated with the other Main Works Contractors, to ensure a consistent approach across interfaces, accompanied by a signed Multiparty Collaboration Certificate.

S350.8 The *Contractor* submits the RSA Brief to the *Project Manager* for acceptance*,* four weeks prior to issue to the RSA Team. A reason for non-acceptance of the RSA Brief is

- it is unclear,
- the brief is insufficient,
- it does not demonstrate co-ordination and collaboration with the other Main Works Contractors or
- it does not contain sufficient information required by any standards, guidance or policies.

For Side Roads, the *Project Manager* co-ordinates and agrees the RSA Brief with the relevant Local Authority. The *Contractor* complies with the comments on the RSA Brief made by the relevant Local Authority.

S350.9 The *Contractor* ensures all RSA Response Reports (as defined in DMRB standard GG 119) are co-ordinated with the other Main Works Contractors at interfaces across the Main Works Contracts, accompanied by a Multiparty Collaboration Certificate prior to submission to the *Project Manager.*

S370 Whole Life Cost

S370.1 The *Contractor* Provides the Works in accordance with ISO 55000 Asset Management Standard (see link provided in Annex A).

S370.2 The *Client* has provided the following whole life cost model elements HE540039-CJV-GEN-GEN-MOD-OPS-00001, link provided in Annex A, for the Reference Design including

- maintenance costs and
- asset renewal costs

for the first 25 years following the Project Road entering into operation and maintenance.

S370.3 The whole life cost model elements are a baseline for the Project.

S370.4 The *Contractor* designs the Project Road, so the maintenance and renewal costs are within the whole life cost model elements provided by the *Client*.

S370.5 The *Contractor* reviews, adopts and implements the *Client's* whole life cost model.

S370.6 The *Contractor* prepares a *Contractor's* whole life cost model in compliance the *Client's* whole life cost model, ensuring the proposed design satisfies

- the baseline criteria in accordance with the Service Standards and
- the performance specifications for specified assets in accordance with the Scope.

The *Contractor* submits the *Contractor's* whole life cost model in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, and accompanied by a Multiparty Collaboration Certificate, prior to commencement of the relevant detailed design.

The *Contractor* updates the *Contractor's* whole life cost model to demonstrate each element of the design is in compliance with the *Contractor's* whole life cost model, and submits such updates in accordance with the Acceptance Procedure. The relevant construction activity is not commenced until the updated *Contractor's* whole life cost model is accepted by the *Project Manager.*

S370.7 The *Contractor* ensures that the *Contractor's* whole life cost model includes any enhancements or additions that have been agreed with the *Project Manager.*

S370.8 The *Contractor's* design complies with each element of the accepted *Contractor's* whole life cost model.

Asset management forward plan

S370.9 The *Contractor* submits to the *Project Manager* an asset management forward plan to support the whole life cost model elements at the following intervals

- the first iteration of the asset management forward plan is submitted prior to commencement of the relevant detailed design as part of the *quality statement*,
- the second iteration of the asset management forward plan is submitted at the end of detailed design,
- the third iteration of the asset management forward plan is submitted a minimum of six months prior to the Completion of *section* 1 and
- the final iteration of the asset management forward plan is submitted no longer than six weeks of correcting all notified Defects and completion of any outstanding landscaping works at Completion of *section* 1

in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*.

Between the first and second iteration, the *Contractor* ensures the asset management forward plan is kept updated to reflect ongoing detailed design changes.

S370.10 The *Contractor* provides the asset management forward plan using the indicative contents list in the asset management forward plan template provided in Annex A of the specified assets comprising of all elements of the *Contractor's* whole life cost model, for the following periods

- the first-year following Completion of *section* 1 (the Annual Asset Management Plan),
- the first five-years following Completion of *section* 1 (the Five-Year Asset Management Plan) and
- the first 30 years following Completion of *section* 1 (the 30 Year Asset Management Plan).

S370.11 The *Contractor* includes the following information in the asset management forward plan

- the outline patrols, inspections and survey strategies and plans including resources, skills, Plant and Materials including maintenance equipment requirements,
- the outline maintenance strategies and plans including resources, skills, Plant and Materials renewal requirements,
- an outline traffic management methodology and programmes of planned closures,
- the outline lifecycle renewals and equipment refresh regimes including resources, skills, Plant and Materials renewal requirements,
- the outline strategy for incident response, including resources, skills, Plant and Materials renewal/replacement requirements,
- datasheets, specifications and utilities consumptions for the assets and
- as an appendix to each iteration of the asset management forward plan, any additional information necessary to validate the financial data that has been submitted as part of the whole life cost elements Submissions, including manufacturers' warranties and maintenance regime recommendations.

S400 Completion

S405 Completion

S405.1 The work to be done by the Completion Date for the whole of the *works* is all the work required by the contract except for any works identified in the Scope that may be completed after Completion.

S405.2 Completion does not occur until the activities below are completed

- the *works* are assured in accordance with the requirements of section S600,
- all records in accordance with section S1500 are provided in accordance with the contract and where applicable accepted by the *Project Manager,*
- all applicable testing, inspection and commissioning records data (including certification) in accordance with section S700 and where applicable accepted by the *Project Manager,*
- the *Contractor* has given, and procured from a subcontractor (at any stage of remoteness from the *Client*) the warranties required by the contract,
- the Site is clear of all unused Plant and Materials, Equipment and other items to ensure free and unobstructed access by the *Client* and Others,
- all temporary hoardings and barriers are removed,
- the demobilisation of all site accommodation and welfare is complete,
- all strategic maintenance spares and tools are delivered by the *Contractor,* accepted by the *Project Manager*, and stored by the *Client* and correctly labelled and marked in accordance with the *conditions of contract* and Scope*,*
- the *Contractor* training of the *Client's* and Others' staff as detailed in section S415 is complete,
- the activities and documents in section S445 are completed and where applicable accepted by the *Project Manager*,
- the 'post-completion maintenance plan' and 'asset data documentation' is accepted by the *Project Manager* and
- 12 weeks before Completion of *section* 1 1A and 1B, a fully resourced landscaping aftercare programme, compliant with the requirements of the Scope is submitted for the acceptance of the *Project Manager*.

S410 Sectional Completion definition

S410.1 The work to be done by the sectional Completion Date for a *section* of the *works* is all the work included in the *section* with the exception of any parts of the *section* expressly stated to be completed after the sectional Completion Date in Table 1 below.

Table 1 - Requirements for Completion of *sections*

section	**Description**	**Requirements for Completion of each section**
(1)	mainline works and integrated testing	• all of the *works* (including *sections* 1A and 1B) described in the Scope to be complete except for those works identified in *sections* 2, 3 and 4 below.

(1A)	Roads South Works gas main diversion area	• all of the *works* described in the Scope to be complete except for those works identified in *sections* 2, 3 and 4 below.
(1B)	land swap and landscaping area	• all of the *works* described in the Scope to be complete except for those works identified in *sections* 2, 3 and 4 below.
(2)	end to end operational trialling	• all of the *works* described in the Scope to be complete except for those works identified in *sections* 3 and 4 below and • completion of trial operations obligations as described in section S700.
(3)	fault free running (post road opening performance testing)	• the correction of Defects identified during end to end operational trialling to be complete, • completion of fault free obligations as described in section S700 and • all of the *works* described in the Scope to be complete except for those works identified in *section* 4 below.
(4)	landscaping aftercare	• completion of the first five years of landscaping aftercare obligations (including any ongoing obligations required by Consents for long term monitoring) as described in the Scope, the third iteration of the Environmental Management Plan and the Outline Landscape and Ecological Management Plan as described in section S207 and • all materials as required by the contract accepted or agreed by the *Project Manager*.

S415 Training

S415.1 The *Contractor* provides the following training prior to the Completion of *section 1*

- a minimum period of 13 weeks to train the *Client's* operation and maintenance and Others' staff in the operation of the Plant and Materials and systems to achieve the Availability targets and
- a series of 'train the trainer' courses enabling the *Client* to train staff in the day to day operation of the system to better support the *Client's* resource planning.

S415.2 The *Contractor* produces and provides bespoke training programmes, taking cognisance of different roles, including

- management and supervisory personnel,
- control room personnel,
- on-road operational personnel,
- maintenance personnel,

- emergency services and
- other relevant stakeholders.

S415.3 The *Contractor* provides training

- for the *Client's* operation and maintenance staff and
- Others' staff

accommodating such staff's shift patterns.

S415.4 The *Project Manager* provides the *Contractor* with the number of *Client* personnel required to undertake the *Contractor's* training four weeks before any training is required.

S415.5 The *Contractor* submits a detailed 'training plan' for the different roles in paragraph S415.2 and submits it to the *Project Manager* for acceptance four weeks prior to the commencement of training. The 'training plan' includes provision for the following

- off-site classroom training,
- on-site classroom training,
- on-line training,
- hands-on training,
- refresher training,
- visits to sites already in operation or during commissioning and
- resource requirements for the *Client* and Others' personnel and discipline.

S415.6 A reason for not accepting the 'training plan' is that

- it does not include training for all assets incorporated into the *works*,
- the schedule does not allow attendees sufficient time to be trained or
- the syllabus does not comply with the Scope requirements for training.

S415.7 The *Contractor* provides training of all Plant and Materials and systems for the purposes of

- normal operations,
- routine maintenance and inspection,
- Defect diagnostics and rectification,
- incident and emergency operations,
- responding to, and operation of, the *works* during degraded systems availability and
- removal and renewal of Plant and Materials.

S415.8 The training for the tunnels system is carried out based on the latest configuration of the system(s) commissioned into service and is conducted so that all attendees gain competence in the use of all Plant and Materials and systems for the purposes of

- Plant and Materials control functions,
- Plant and Materials monitoring and action on alarms,
- operation of safety systems,
- operation of set-point adjustment and controls,
- fault or failure shutdown of Plant and Materials whilst in automatic mode,
- restarting of Plant and Materials following shutdown,

- operational function from supervisory control and data acquisition,
- operation of the main elements of Plant and Materials when the programme logic controller fails,
- total power failure during normal operation and auto start-up on restoration of power,
- access to, and removal of Plant and Materials for renewal,
- routine maintenance tasks,
- abnormal operational conditions,
- lifting arrangements and
- safety precautions to prevent injury or harm.

S415.9 The *Contractor* provides a course synopsis and any visual aid equipment required and ensures that training sessions are delivered by trainers with relevant experience.

The *Contractor* provides all relevant materials such that the *Client* can provide ongoing training to future personnel, by Key Date 1.

S415.10 The training includes operation of the systems, individual Plant and Materials, special tools and materials as specified in the relevant sections of the operation and maintenance manuals, drawings and specification.

S415.11 The *Contractor* combines on-site training and hands on training with testing and commissioning of Plant and Materials to create a training experience that is as close as practicable to the ongoing operation and maintenance of the *works*.

S415.12 The *Contractor* provides a trial operations and support plan in accordance with section S700.

S415.13 The *Contractor* provides to the *Project Manager*, by Key Date 1, a report demonstrating that all personnel have received the identified training requirements, as set out in the 'training plan'. The *Contractor* includes in the report evidence to demonstrate that all personnel have reached the agreed level of competency in each area. If the personnel have not reached the agreed level of competency, the *Contractor* repeats training in order to demonstrate competency of all personnel.

S420 Cleaning Arrangements

General cleaning requirements during construction

S420.1 The *Contractor* submits cleaning proposals to the *Project Manager* for acceptance, prior to commencement of the Construction Phase and updated when changes occur and resubmits the cleaning proposals for acceptance by the *Project Manager* in accordance with the Acceptance Procedure.

S420.2 The *Contractor* makes its own arrangements for a supply of clean water for flushing, cleaning and refilling operations.

S420.3 The *Contractor* disposes of silt and other solids arising from emptying and cleaning operations in accordance with its 'site waste management plan' and 'materials management plan'.

S420.4 Before any cleaning of culverts takes place, the *Contractor* seeks advice from the Environmental Clerk of Works on the possible presence of protected species, including the locations of sites of special scientific interest and s*pecial areas of conservation, and undertakes cleaning in accordance with this advice.*

S420.5 The *Contractor* takes account of any nature conservation interest relating to ditches, nature watercourses, wetland areas, balancing ponds and flood alleviation areas, particularly those

close to protected sites. The *Contractor* evaluates whether otters and other protected species are using these areas before undertaking any cleaning.

S420.6 The *Contractor* ensures the following

- gullies, catchpits, channel systems, soakaways and cattle grids are kept clean during construction,
- attenuation tanks and oil separators are cleaned every six months during construction,
- drainage grips are cleared during construction,
- drainage systems are cleansed every 12 months during construction,
- pumping stations are serviced every 12 months during construction,
- swales and culvert trash screens are kept clean during construction,
- expansion joints are cleaned every 12 months during construction,
- graffiti is removed during construction,
- vegetation that is causing (or may cause) blockages to drainage, structural damage or restrict access is removed during construction,
- debris, bird droppings and other detritus that is causing (or may cause) blockages to drainage or promotes (or may promote) corrosion or other deterioration is removed during construction,
- drain holes and drainage channels are cleared during construction to ensure that these all operate correctly,
- general dirt and debris is removed from bearings and bearing shelves and where appropriate, sliding and roller surfaces cleaned and re-greased every 12 months during construction,
- where necessary, pedestrian security and safety measures (e.g. mirrors, handrails, non-slip surface) are cleaned during construction,
- special finishes are kept clean and perform to the appropriate standards and
- all loose debris is removed during construction.

Final Clean Arrangements

S420.7 Prior to the Completion of section 1, and immediately prior to the *Project Manager's* inspection, the *Contractor* completes a final clean of the whole of the works as follows.

The *Contractor*

- removes grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior finished surfaces,
- polishes surfaces designated a shine finish,
- repairs, patches and touches up marred surfaces to specified finish, to match adjacent surfaces,
- replaces air-handling filters if units were operated during testing and commissioning,
- cleans ducts, blowers and coils, if air-handling units were operated without filters during testing and commissioning,
- vacuum cleans all interior spaces,
- vacuum cleans the interior of all panel cabinets, sensitive equipment boxes, and other enclosures and

- broom sweeps exterior paved surfaces and rake cleans other surfaces of the landscaping.

S420.8 Prior to Completion, the *Contractor* clears all surplus Equipment and Plant and Materials from the Site.

S420.9 The *Contractor* submits its final clean proposals to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, six weeks prior to Completion.

S420.10 Prior to Completion, the *Contractor* ensures the following

- Equipment and unused Plant and Materials are removed,
- filter drains are cleaned using methods that are compatible with the surface finish of the filter drain,
- jet kerb-block drains and slot drains are cleaned,
- gullies, attenuation tanks, oil separators, catchpits and interceptors are cleared and clean,
- road markings and road studs are visible and clean,
- temporary Structures, falsework and formwork are removed of all debris, including dirt, sand, gravel, rubbish and waste material are removed,
- Structures, non-structural elements and elements of the signing system are cleaned,
- debris, including dirt, sand, gravel, rubbish and waste material are removed,
- lighting is fully operational, safe and clean,
- drainage systems are clear and clean,
- pumping stations are serviced,
- swales and culvert trash screens are cleaned,
- expansion joints are cleaned,
- graffiti is removed,
- vegetation that is causing (or may cause) blockages to drainage, structural damage or restrict access is removed,
- debris, bird droppings and other detritus that is causing (or may cause) blockages to drainage or promotes (or may promote) corrosion or other deterioration is removed,
- drain holes and drainage channels are cleared to ensure that these all operate correctly,
- general dirt and debris from bearings and bearing shelves. Where appropriate, clean sliding and roller surfaces and re-grease is removed,
- all roads and pavements are swept and cleaned of mud and debris in line with section S200,
- pedestrian security and safety measures (e.g. mirrors, handrails, non-slip surface) are all cleaned and
- special finishes are clean and perform to the appropriate standards.

S420.11 After cleaning is complete the Completion inspection is carried out by the *Contractor*, *Supervisor* and, where necessary, the *Client's* representatives. The *Contractor* repeats the cleaning activities until the *Supervisor* accepts the same as complete.

S420.12 Not used.

S425 Security

Not used.

S430 Correcting Defects after Completion

General

S430.1 The *Contractor* requests that the *Project Manager* arranges for the *Client* to allow the *Contractor* access to and use of a part of the *works* that have been taken over if it is needed for correcting a Defect. The *Contractor* makes this request

- for *defects states* 1 to 5 in sufficient time to enable correction of the Defect within the applicable *defects correction period* or
- for non *defects states* 1 to 5, four weeks in advance of requiring access to undertake the defect correction works.

Correction of Defects post Completion of *section* 1

S430.2 The *Supervisor* may provide a priority order to the *Contractor* to correct Defects. The *Contractor* corrects Defects in accordance with such priority order and submits a corrective action plan in accordance with section S600.

If the nature of a Defect is such that a permanent correction cannot be corrected within the corresponding *defect correction period*, the *Contractor* proposes (as part of the corrective action plan) to the *Project Manager* and *Supervisor*

- the reasons why a permanent correction cannot be corrected within the corresponding *defect correction period*,
- its corrective action plan for implementing and a time-line for a permanent correction of the Defect and
- its corrective action plan for implementing a temporary Defect correction under which the Client can still operate the asset until the Contractor has permanently corrected the Defect.

Interim Defect correction measures are still subject to and are to be implemented within the corresponding *defect correction periods* as stated in the Contract Data. Such measures cover Defects including those that relate to control systems requiring temporary operational restrictions to be put in place.

The *Contractor*

- for *defect states 1 to 5* Defects, provides progress reports on the correction of Defects including details of the corrective actions being taken and resources being used to achieve the correction of such Defects to the timescales instructed by the Supervisor and
- for other Defects, provides a 'weekly progress report' on the correction of all Defects including details of the corrective actions being taken and resources being used to achieve the correction of such Defects (detailed per Defect including interim measures) before the end of the relevant *defect correction period*.

S430.3 The *Contractor* notifies the Supervisor when the *Contractor* considers that a Defect has been corrected.

S430.4 The *Contractor*

- ensures attendances by the required subcontractors
- advises the Project Manager, the Client, the Supervisor, and where necessary Others including Statutory Undertakers,
- ensures programs submitted for acceptance includes the planned activities for the correction of Defects,
- updating as-built information, operation & maintenance (O&M) manuals and other handover documents and
- keeping records of corrected Defects and supplying these to the Supervisor as evidence of Defects correction in addition to site inspections.

S430.5 The *Client* provides the *Contractor* access to any updated data post Completion of *section* 1 required by the *Contractor* to carry out such correction works.

S430.6 The *Contractor* agrees the access arrangements to correct the Defect with the *Project Manager*, the *Supervisor* and the *Client*.

S430.7 The *Contractor* submits to the *Project Manager* a copy of all data including, licenses, certifications, reports, through the Project Common Data Environment (CDE) as described in S1900 together with a written statement from the *Contractor* to the *Client* certifying that all Defect(s) have been corrected.

S435 Pre-Completion arrangements

S435.1 No later than four weeks prior to Completion (or the earlier transfer of the relevant assets to a Local Authority where the *Contractor* has agreed with the relevant Local Authority such earlier transfer of assets), the *Contractor* agrees with the *Project Manager* or Local Authorities (as appropriate) that any temporary arrangements detailed in the Detailed Local Operating Agreement (DLOA) and local operating agreement (LOA) (as appropriate) are no longer required. The *Contractor* submits evidence to the *Project Manager* that such arrangements are no longer required by the Local Authority.

S435.2 The *Contractor* prepares a detailed 'commissioning and handover plan' which addresses the requirements for Completion. The 'commissioning and handover plan' is issued to

- Others for agreement as instructed by the *Project Manager* and
- for the *Project Manager's* acceptance in accordance with the Acceptance Procedure

and includes details of

- dates for the completion of activities comprising the *works*,
- an integration programme with dates for the completion of work by Others,
- 'inspection, test and commissioning plans' and dates for the *works* in accordance with section S700,
- inspection and testing of work completed, covered up and tested before final inspection together with maintenance proposals until Completion of the whole of the *works*,
- Defect inspection,
- Defect correction programme including time for correction of Defects and an allowance for correction of defects by Others,
- provision for maintaining security and emergency access and egress detailed in section S215 up to Completion of the whole of the *works*,

- dates for submission of the handover documents detailed in section S445,
- proposals for the procurement and implementation of landscape aftercare post Completion of the whole of the *works*,
- dust mitigation management for prevention of dust migrating into tunnels and plant rooms during commissioning and
- compliance with the requirements of GG 182 Major schemes: Enabling handover into operation and maintenance to provide asset data and information (see link provided in Annex A).

S435.3 The Parties, *Supervisor*, *Project Manager* and Others carry out joint completion inspections of the *works* in accordance with the 'commissioning and handover plan'.

S435.4 The *Contractor* makes provision in its 'commissioning and handover plan' for time to correct Defects during this period as described in section S430 and any necessary re-inspection following correction. The *Contractor* also allows time for updating and modifying any documentation that is required.

S435.5 As part of the completion inspection, the *Contractor* provides the *Project Manager* with

- details of completion inspections to be carried out, required attendees including the Client Parties, subcontractors (at any stage of remoteness from the *Client*) or Others,
- all certificates, warranties and other evidence demonstrating that all statutory and regulatory approvals have been obtained,
- details of tests recently completed including certification requirements and test results for work covered up and copies as evidence,
- records of site cleanliness inspections, dust mitigation measures, removal of all temporary works, Plant and Materials and Equipment and making good for both permanent and temporary work,
- revision and acceptance of 'commissioning and handover plan' to incorporate identified Defects, time provision for correction of Defects, delivery of parts, Plant and Materials and Equipment and updating documentation and
- a Defect correction programme that aligns with the 'commissioning and handover plan' for acceptance by the *Project Manager.*

S435.6 When the *Contractor* considers that a *section* of the *works* is complete and ready to be taken over by the *Client*, the *Contractor* submits a takeover certificate, in line with section S311 and attached at Annex D, to the *Project Manager* for acceptance, for each *section* of the *works* as they are handed over to the *Client* or other body, for certification of take over.

S435.7 The *Contractor* provides all certificates in line with section S311.

S435.8 The *Contractor* ensures that a Geotechnical Feedback Report is provided in accordance with section S323.

S440 Use of the *works*

S440.1 No additional requirements or constraints for use of the *works.*

S445 Documents

Document Handover

S445.1 The *Contractor* provides the following documents and records prior to the Completion of *section* 1 and updates these prior to the Completion of each subsequent *section*

- documents, software or other information expressly referred to in the contract,
- Project Control Framework (PCF) products as described in the PCF Forward Plan, provided in Annex A,
- assessments, documents, drawings, Design Data or submissions delivered in accordance with the Acceptance Procedure described in section S300,
- documents relating to planning applications, Consents, refusals and appeals,
- records relating to any specialist or statutory inspections of the Working Areas,
- all other records, notices or certificates required to be produced or maintained by the *Contractor* pursuant to the contract (including any update to such contract),
- all testing and inspection data records in line with section S700,
- records of all Staff who are wholly or mainly engaged in the delivery of the *works,*
- all formal notices, reports or submissions made to or received in connection with section S600,
- manages developments in technology site data for the *works* through regular co-ordinated and collaborative forums, such as site data advisory groups,
- Health & Safety File (HSF) – the *Contractor* provides a completed HSF as required under the Construction (Design and Management) Regulations 2015 (CDM) (see links provided in Annex A),
- "as-built" drawings', "as-built" specifications' and all "final issue" construction drawings' in accordance with section S445 and
- records required by law (including in relation to health and safety matters and HSF's prepared pursuant to CDM Regulations) and all Consents, the Development Consent Order or otherwise.

As-Built Records

S445.2 The *Contractor* supplies to the *Project Manager* the following information in connection with "as-built" records

- '"as-built" drawings',
- all as built data for Structures in accordance with 'CG 302 As-built, operational and maintenance records for highway structures' of the DMRB, see link provided in Annex A,
- for all other design elements, other than as required by bullet point two, an electronic copy in .pdf format of each of the drawings including the landscape drawings (capable of being printed without loss of detail as an A1 size document) (unless otherwise agreed with the *Project Manager*) and to be clearly marked "As-Built Drawings",
- a 'construction report' identifying the types of Plant and Materials and construction methods that were used throughout the works. The 'construction report' includes
    - a summary of the information obtained by the laboratory or field tests on the road Plant and Materials employed in the works,

- comments on the remedial and corrective actions taken,
- discussion on methods of construction and the use of 'innovative' Plant and Materials and methods of construction,
- a statement setting out the problems and Defects encountered during the construction of the works and how such problems were overcome, or such Defects were corrected and
- a record of certification, quality assurance, external testing and otherwise for all Plant and Material

- a complete 'record of sampling and testing data for Plant and Materials' incorporated in the works in a combined .pdf format (unless otherwise agreed with the *Project Manager*). Each of the individual records include, in addition to the sampling and testing data
  - the date sampled or tested,
  - the supplier,
  - the source of material,
  - a statement of compliance or otherwise with the Scope and
  - "as-built" physical survey results, including co-ordinates and drawings of all permanent fence lines, including Accommodation Works fence lines.

S445.3 The *Contractor* ensures all "as-built" records described in paragraph S445.2 are consistently referenced to either chainage or specific location(s) within the works.

S445.4 Prior to the Completion of each *section* the *Contractor* also provides the following records

- notices, reports, results and certificates relating to the *works* and completion of the commissioning activities (including all documents related to the warranties),
- all 'operation and maintenance manuals' and a full record of all maintenance procedures carried out during the contract,
- Strategic Road Network's network management documentation, including the following information
  - all Intelligent Transport Systems Design Data to demonstrate compliance with the Scope,
  - handover documentation as required by Highway's England Specification MCH 1349 Process for Commissioning and Handover of Roadside Operational Technology, (see link provided in Annex A),
  - a set of as-installed drawings (accurately recording details of the infrastructure and traffic technology devices that have been installed) in accordance with MCH 1652 Communications Records Drawings Computer Aided Drawings Standard, (see link provided in Annex A) and
  - 'site records' and
- provides an updated EMP3 as described in section S207.

Document Submissions

S445.5 Within two weeks after the respective Completion of each *section*, the *Contractor* provides to the *Project Manager* a 'schedule of the documents' that are to be submitted to the *Project Manager* in accordance with section S1900.

S445.6 The *Contractor* consults with

- the relevant Local Authority, Railway Authority and
- Others affected by the *works*

and provides any additional documentation required at handover.

S450 Handover between Main Works Contractors

Not used.

S500 Programme

S500.1 The *Contractor* provides, reviews and submits for acceptance to the *Project Manager* the programme and all supporting documents (including narrative, histograms, resources and costs) in accordance with the contract.

S500.2 The *Contractor*

- works with the Client Parties, *Project Manager*, LTC Contractors and Others to develop and maintain the Project's integrated programme and
- ensures its programmes submitted for acceptance to the *Project Manager* align with the interface requirements referenced in sections S905 and S910.

S505 Programme requirements

S505.0 The programme

- is in a XER/XML and .pdf format,
- is compatible with the *Client's* version of Primavera P6 (v17.12) unless otherwise agreed with the *Project Manager*,
- is in accordance with the contract and
- identifies the critical path(s) and all key milestones identified in the Highways England Planning & Scheduling Manual and Appendices v 3.0 (see links in Annex A)

and is supported with a narrative, production metrics and histograms.

S505.1 The *Contractor* programmes the *works* taking into account the Contract Objectives.

Project Control Framework (PCF) Programme Requirements

S505.2 The *Contractor* includes in its programme for acceptance

- its Stage Gate Assessment Reviews (SGAR) dates,
- interim SGAR dates and
- PCF product timescales in line with the PCF described in section S255.

The *Contractor* programmes any PCF product reviews and sign offs in advance of the SGAR or interim SGAR in accordance with the PCF handbook.

S505.3 The *Contractor* supports the *Project Manager* in the preparation of information and materials required for the SGAR and independent assurance review in accordance with the PCF.

Programme

S505.4 The programme submitted to the *Project Manager* for acceptance is compliant with

- the *Client's* Planning and Scheduling Manual and Appendices v 3.1 (MPD-HEX-GEN-ZZ-MN-KK-06) and
- the Cost Breakdown Structure (CBS) and Work Breakdown Structure (WBS) unless otherwise agreed with the *Project Manager*
- all links are provided within Annex A.

S505.5 The *Contractor's* programme includes

- cost and resource loading and coding of activities to be in accordance with the C*lient's* WBS/CBS. The structure of WBS/CBS is mandated to Control Account level and is not altered without agreement by the *Project Manager*. At levels below the Control Account the structure of the WBS develops into suitable work packages,
- key resources e.g. Plant and Materials (including volumes) and Equipment,
- the total number of Staff,
- all deliverables required by the contract, including design deliverables, agreement and acceptance requirements, timeframes, agreements by Others and any seasonal restrictions,
- all interfaces with Others and submissions, developments, agreements and acceptances, allowing time for each stage of the process and allowances for resubmission,
- obtaining necessary Multiparty Collaboration Certificates alongside all submissions which require multiparty interface(s) between the *Contractor* and any other Main Works Contractors (MWC),
- all key milestones and interdependencies,
- the programme's critical path using the Critical Path Method (CPM),
- the following criteria
    - all activities have unique IDs,
    - all activities have clear descriptions,
    - all activity names are described using verbs,
    - all activities use the configured global calendars or Project calendars as agreed with the *Project Manager*,
    - all activities are fully logic-linked and not open-ended. Each activity has at least one predecessor and one successor, with the exception being the start and end of the *works*. If used, the rationale for open-ended activities is explained in the narrative,
    - all activities have a maximum duration of six weeks per activity – if activities extend beyond six weeks, this is explained in the narrative,
    - all activities up to Control Account level three of the CBS identify Staff and resource distribution, to facilitate Project forecasting and Earned Value analysis and all constraints are managed to minimise the impact on activities,
    - cost and resource loading and coding of activities using the WBS/CBS which is mandated to Control Account level and is not altered without agreement by the *Project Manager*. At levels below the Control Account the structure of the WBS develops into suitable work packages and
    - a breakdown of the Target Budget to allow a detailed planned value baseline curve to be created by the *Contractor* for Earned Value analysis,
- details of review and acceptance requirements for each activity, stating when and by whom,
- the dates when the *Contractor* plans to submit any deliverables required by the Scope,
- the dates for the arrival at Site of key Equipment and Plant and Materials as identified by the *Contractor*,
- the dates for any establishment of fabrication facilities and dates for the fabrication of Equipment and Plant and Materials,

- the dates of commencement of all permanent and temporary construction and installation activities,
- the dates of the Project's testing and commissioning process,
- the scope of subcontractors' work,
- all project workshops and meetings (including meetings with Others, *Client, Project Manager* and *Supervisor*) as described in the Scope,
- excessive lag or leads, defined as greater than five days or greater than 5% of activities, used in the programme and narrative,
- implemented and non-implemented change and corrective actions,
- a summary of the total number of expected Staff Providing the Works each week,
- identification of the timeframes for the preparation, submission, agreement and acceptance of each Consent (as appropriate), including, where required, the review periods for the *Project Manager, Client,* Others and the Consent granting body, allowing time allowances for the relevant organisations to prepare, review and submit the Consent Application and obtain approval of the Consent from the relevant granting body,
- aggregates C*ontractor* identified time risk allowances (TRA), clearly showing TRA in front of Key Dates and all Completion Dates. The TRA durations are evident in a dedicated P6 user-defined field included in XER and XML submissions to the *Project Manager* and
- the percentage of work complete for each activity.

The *Contractor* ensures all programme activities follow the *Client's* WBS Primavera P6 template.

S505.6 Alongside each programme submitted for acceptance, the *Contractor* provides a time-chainage programme detailing the linear construction works in a form which is compatible for use with the *Client's* version of TILOS software v10.3 (unless otherwise agreed with the *Project Manager*) to an appropriate level of detail agreed with the *Project Manager.*

S505.7 All programme submissions are titled, numbered and dated, with the programme data date visible within the Gantt chart.

S505.8 The *Contractor* submits a Main Works Contractor interface programme alongside the programme commencing and including month four after the *starting date*. The Main Works Contractor interface activities and milestones extracted from the programme are extracted from the programme submitted for acceptance. The *Contractor* ensures that the interfaces in the Main Works Contractor interface programme are coordinated with other Main Works Contractors and provides a Multiparty Collaboration Form in respect of the Main Works Contractor interface programme in accordance with section S318.

Contractor's Programme Hierarchy

S505.9 The *Contractor* maintains a hierarchy of programmes that support each other while keeping detail at the appropriate level within that hierarchy. The programme hierarchy is identified below, including performance graphs. Programmes created by the *Contractor*, relating to the *works* are made available to the *Project Manager*.

Level 1 Summary Schedule

S505.10 The *Contractor* submits a summary schedule to the *Project Manager* as part of the programme for acceptance. The summary schedule is the basis for developing and reporting contract schedules to management and key stakeholders from the *starting date* to Completion. The summary schedule is established in time-scaled format with no more than 200 activities and

contained on two sheets of A3 size. The summary schedule highlights the critical path, major milestone events and events relevant to the overall management of the *works*.

Level 2 Summary Design, Procurement, Manufacture and Fabrication, Archaeology, Construction and Commissioning Schedule

S505.11 The *Contractor* submits a summary design, procurement, manufacture and fabrication, archaeology, construction and commissioning logic-linked CPM network, which is a summary of the level three programme with each revision of the programme for acceptance by the *Project Manager*.

Level 3 Accepted Programme

S505.12 The Accepted Programme is used by the *Contractor* to direct its work by providing parameters for the more detailed implementation programmes and tools such as the *Contractor's* procurement schedule and *Contractor's* weekly work plan.

S505.13 The first Accepted Programme is the performance measurement schedule used to calculate Earned Value and derives the productivity metrics and curves.

S505.14 The *Contractor* shows all level 4 activities and deliverables in a developed logic-linked sub-network of the Accepted Programme.

Level 4 Archaeology Schedule

S505.15 The *Contractor* shows all archaeological activities and deliverables in a developed logic-linked sub-network of the Accepted Programme.

Level 4 Procurement Schedule

S505.16 The *Contractor* shows tender periods, packages, and lead in times and duration of the procurement for all subcontract works. This is to be provided in the document template provided in Annex A and described in paragraph S1205.4 forms a logic-linked sub-network of the Accepted Programme.

Level 4 Programme Performance – Production and Productivity Metrics and Graphs

S505.17 The *Contractor* prepares graphs to assist in demonstrating the viability of its programme in terms of Defined Cost, Fee, quantities, production rates and resources required to support the programme. The *Contractor* provides graphs derived from the *Contractor's* performance measurement schedule and the latest programme for acceptance (or most recent *Contractor's* programme submitted for acceptance for review by the *Project Manager*).

S505.18 The *Contractor* provides updated graphs as part of its programme submission for acceptance by the *Project Manager*. These graphs show the planned, actual, and forecast activities. The *Contractor* and *Project Manager* agree the format and number of these graphs. The minimum requirements are

- graphs showing bulk quantities (e.g. concrete poured, reinforcing bars: steel fixed, excavation: excavated material removal),
- resource usage graphs,
- Target Budget, cost and cash flow graphs,

- EVM graphs and
- an aggregated TRA usage graph.

Level 4 Commissioning and Handover Programme

S505.19 The *Contractor* produces a detailed commissioning and handover programme for the *works*. The *Contractor* submits this to the *Project Manager* in a logic-linked CPM format.

Level 4 Master Information Delivery Plan

S505.20 The *Contractor* produces a plan describing when all the data and information will be delivered. The *Contractor* provides the 'Master Information Delivery Plan' (MIDP) to the *Project Manager* for acceptance in line with the requirements of section S1900.

Level 4 Possession Programmes

S505.21 The *Contractor* produces detailed programmes for all *works* undertaken

- during rail possessions or blockades of operational railways and
- during closures of the Strategic Road Network.

These programmes include maximum time units of 1.0 hour unless agreed otherwise with the *Project Manager*. These programmes are subject to risk analysis by the *Contractor* to mitigate any risk that could impact the work being completed during the possession, blockade or closure.

Level 4 Weekly Work Plan

S505.22 The *Contractor* submits its weekly work plan in a format compatible with P6, unless otherwise agreed with the *Project Manager*.

S505.23 The *Contractor* issues weekly work plans, no later than 09:00 am every Monday. The weekly work plan comprises a four-week rolling programme (one week look back, and three weeks look ahead) covering day to day activities. The weekly work plan is resource loaded with critical labour, Equipment and Plant and Materials by discipline.

S505.24 The weekly work plan indicates timings of all hold points identified by the *Project Manager*, for tests and inspections by the *Project Manager*, the *Supervisor* or by Others who have the right of inspection.

S505.25 The *Contractor* provides to the *Project Manager*

- reasons for not meeting any planned activity start dates,
- any further information requested about the missed start dates,
- planned percentage completion,
- an explanation of reasons for any incompletion and
- details of any trends identified.

S510 Methodology statement

Programme Narrative

S510.1 The *Contractor* submits each programme accompanied by a narrative for review by the *Project Manager*. The narrative explains how the programme has been developed and includes details of

- programme overview, work sequences and phasing,
- Key Dates,
- critical path(s) and critical activities,
- the assumptions made in the development of the schedule,
- dependencies and interfaces,
- calendars used and restrictions applicable,
- the deployment of Equipment and Staff,
- the production rates and quantities used in determining durations e.g. earthworks, piling,
- the shifts assumed in determining durations,
- the breakdown of Staff requirements by trades,
- intended working hours,
- allocation and quantification of TRA including references to the Risk Register for the Project and risk mitigation measures being taken and
- substantiation and reconciliation of
    - programme leads and lags,
    - programme constraints,
    - projected levels of Staff (by trade) and
    - flows of resources including Plant and Materials and requirements.

S510.2 The *Contractor* addresses any comments and observations on the narrative and resubmits for review.

S515 Work of the *Client* and Others

S515.1 The *Contractor* coordinates and cooperates with the Client Parties, *Project Manager*, LTC contractors and Others and includes details of the order and timing of the work by the of the *Client* and Others in the Accepted Programme and any other revised programmes. The identified activities align with the requirements for sections S905, S910 and S926.

S520 Information required

S520.1 The *Contractor* liaises with Others to understand what information and constraints are required by the works of the *Client* and Others to be included into the Accepted Programme. The identified activities align with the requirements for sections S905, S910 and S926.

S521 Revised programme

S521.1 Any revised programme submitted by the *Contractor* demonstrates progress against the Accepted Programme and includes a narrative that describes implemented changes, critical path analyses to highlight variance against any Key Dates and if there are any outstanding changes pending acceptance.

S521.2 If the *Contractor* submits a revised programme, each submission is accompanied by a narrative which includes

- overall commentary of progress against the Accepted Programme,
- progress over the past month,
- detail of the forthcoming month,
- a record of changes,
    - o new activities,
    - o changed durations,
    - o changed logic,
    - o changed calendar assignments,
    - o changed assumptions,
    - o changes to resource or
    - o Staff allocation,
- comparison of Key Dates and Completion Dates against the baseline,
- impact of the work from the revised programme on the work of the *Client* and Others,
- critical path explanation,
- variance of critical path since the previous programme revision,
- identification of programme slippage,
- proposed mitigation for programme recovery,
- implemented changes in the period,
- non-implemented changes in the period and details of corrective actions and
- response to any *Project Manager* review comments.

S530 Compensation Event

S530.1 Not used.

S530.2 Not used.

S530.3 Not used.

S530.4 Not used.

S530.5 Not used.

S530.6 Not used.

S530.7 Not used.

S530.8 Not used.

S530.9 Not used.

S600 Quality Management

S600.1 The quality vision for the Project is 'Right first time will keep our people safer and reduce carbon. Nothing else is acceptable.

Delivery of right first time delivers the *Client's* outcomes and home safe and well ambition. A large proportion of accidents happen during rework and natural resources are wasted. Ultimately a culture of quality underpins the Project strategy and ambition.'

S600.2 The *Project Manager* has developed a set of quality principles which the *Contractor* adopts in Providing the Works (see links in Annex A).

Project guiding principles	Quality management principles
Leadership	
Use the Project status as a strategic UK programme to inspire people, build careers and be a great place to work.	The Project is the most recognised programme for quality performance and collaborative ways of working.
Supporting people to make the right decisions at the right time for the Project.	The use of lean tool kits such as collaborative planning means that all disciplines feed into and build an integrated Project.
Focus	
One team focussed on shared, common outcomes.	Delivery of the outcomes using common ways of working and an integrated commitments management tool.
Accept and use proven best practice, technology and innovation to the delivery ambition.	Enabling efficient outcome delivery using the digital quality management system and assurance systems.
Care	
Recognising the Project success is built on the success of people, suppliers, and partners.	The Project champions and showcases how a culture of quality underpins the LTC Execution Strategy and ambition.
Be a good neighbour and a responsible Project delivery organisation.	The Project openly demonstrates to its stakeholders how it has delivered what the Project promised.
Be conscious of the Project's role in delivering a sustainable solution for the road network, communities and the environment	Right first time is the most sustainable way to deliver an asset.

S600.3 The Project will adopt an 'ABC philosophy' towards quality management. A is for Assurance, B is for Business Improvement and C is for Control, as follows:

The ABC philosophy

Assurance	The Project IMS, audit, assurance.
Business Improvement	Continual improvement and lean value managemer and innovation
Control	Engineering control of the product the Project delivers.

The *Contractor* aligns its quality management system with the ABC philosophy.

S600.4 The *Contractor* ensures that all subcontractors (at any stage of remoteness from the *Client*) comply with relevant quality standards unless otherwise agreed with the *Project Manager*.

S600.5 The *Contractor* complies with the Project commitments and requirements included in the Project commitments and requirements tool.

S605 Quality Management System

S605.1 The *Contractor* develops, complies with and operates the following management systems specifically for the *works* (see links to reference documents in Annex A)

- quality management system complying with ISO 9001:2015 Quality Management Systems, and BSPD/ CEN/TS 16880: Service excellence - Creating outstanding customer experiences through service excellence,
- environmental management system complying with ISO 14001:2015 Environmental management systems,
- health and safety management system complying with quality management system complying with ISO 45001:2018 - Occupational health and safety management systems,
- collaboration framework complying with ISO 44001:2017 - Collaborative business relationships management,
- information management system complying with ISO 27001: Information Security Management and
- risk management system complying with ISO 31000:2009 Risk management.

S605.2 Where a body accredited by United Kingdom Accreditation Service (UKAS) (or another equivalent European Accreditation body full member agreed by the *Project Manager*) certifies a management system, the *Contractor* obtains certification from the relevant body within 12 months of the *starting date* and submits to the *Project Manager* a copy of each certificate within one week after it is obtained.

S605.3 The *Contractor* ensures that the management system scope, as defined on its UK Accreditation Service Certificate is appropriate and aligned to the delivery of the *works* (see links in Annex A).

S605.4 The *Contractor* submits all assessment or audit reports generated by the relevant accreditation body to the *Project Manager* within one week of receipt. The *Contractor* submits all associated responses and evidence generated as a result of the certification bodies assessments or audit to the *Project Manager* for information.

Certification plan

S605.5 The *Contractor* submits its ‘certification plan’ describing the steps that the *Contractor* takes to achieve certification of all the management systems for the *works.* The plan will be submitted to the *Project Manager* for acceptance within 10 weeks of the *starting date.* The *Contractor’s* ‘certification plan’ includes details on

- the certification bodies for each management system,
- the scope of each management system,
- proposed timescales for achieving certification of the management system,
- the areas of commonality between the management systems,
- a list of expected procedures that are applicable to each management system and
- the programme of activities that will be undertaken.

The *Contractor* submits the 'certification plan' to the *Project Manager* for acceptance.

A reason for not accepting the 'certification plan' is

- the proposed accreditation body is not recognised within the UK or Europe,
- the plan does not align with the *Client's* objectives and the Accepted Programme,
- the plan does not comply with the contract or
- the plan does not address each of the points required for a certification plan.

The *Contractor* and the *Project Manager* will work together to finalise the 'certification plan' and following acceptance, the *Contractor* will implement the 'certification plan' within the agreed timescale.

S605.6 Within the 'certification plan' the *Contractor* includes an internal audit schedule to the *Project Manager* for information.

Progress on 'certification plan' is reported on a monthly basis to the *Project Manager*, or at periods agreed between the *Project Manager* and the *Contractor.*

If the *Contractor* fails to meet the accepted 'certification plan', the *Contractor* proposes and submits the corrective actions to remedy the failure to the *Project Manager* for acceptance. Once accepted, the *Contractor* implements the corrective actions.

S605.7 On completion of the certification for the management systems, the *Contractor* submits, to the *Project Manager*

- the management systems through the Project Common Data Environment (CDE) as described in section S1900,
- any surveillance reports that are created by the certification bodies throughout the certification period and
- any plans developed to address findings detailed in the surveillance reports.

S605.8 The *Contractor* obtains certification from the relevant body within 12 months of the *starting date* and submits to the *Project Manager* a copy of each certificate within one week after it is obtained.

Quality Manager

S605.9 The *Contractor* provides a quality manager on the *starting date* who is responsible for

- developing and implementing the management systems for the contract ensuring consistency with the other Main Works Contracts,
- developing and providing quality training for Staff for inclusion in the site and project inductions and training for Staff with specific quality responsibilities,
- managing all relevant Staff with responsibilities for assuring that the requirements of the management systems are met,
- ensuring the provision and review of *Contractor's* 'Inspection and Test Plans' (ITPs) as described in section S700,
- undertaking internal and supply chain management system audits in accordance with the audit schedule,
- developing and implementing corrective action plans when Defects are notified,
- administering and accruing the Quality Management Point (QMP) system for measuring performance,
- advising and reporting to the *Project Manager* all quality issues relating to the contract and

- working with the *Project Manager* and the other Main Works Contractors' quality managers to ensure consistency and shared thinking across the Project.

S610 Quality Statement and quality plan

S610.1 The *Contractor* develops a quality plan that

- is sub-divided for design, construction and testing and commissioning,
- incorporates the requirements and commitments of the Quality Statement, and Agreed Negotiated Position,
- is sufficiently detailed to demonstrate how the *Contractor* achieves each of the commitments in the Quality Statement and Agreed Negotiated Position, the quality principles and the *Client's* objectives for the contract,
- describes how the *Contractor* complies with the Environment Agency's Monitoring Certification Scheme,
- specifies the procedures and processes
    - to Provide the Works,
    - to be followed by the *Contractor* in working with the other Main Works Contractors to develop an aligned approach for delivering and implementing the quality management systems required for the Project,
    - for developing the performance metrics of the *Contractor's* performance in Providing the Works and at Completion,
    - for tracking progress against quality objectives and quality outcomes,
    - describes how the *Contractor* will comply with the Environment Agency's Monitoring Certification Scheme,
    - for delivering continuous improvement and lean management techniques,
    - which it relies upon from other management systems including a list of all standards,
    - for recording, observing, managing and rectifying Defects and other observations,
    - for developing a risk based schedule for internal and external audits,
    - undertaking quality reviews on a monthly basis with the *Project Manager* to review the performance indicators and how
        - Project QMS is reported, monitors and measures performance,
        - Quality Management Points (QMPs) are to be managed,
        - the capacity, competency and compliance of Staff and resources (where appropriate) is measured and managed,
        - subcontractors are managed, including its capability, capacity and performance and
        - the quality of the *Contractor's* deliverables are managed, assured and controlled
- complies with
    - GG102 - Quality management systems for highway works and
    - ISO 10005:2018 Guidelines for Quality Plans

      (see links in Annex A)
- includes the policy statements and objectives for each management system and

- addresses the quality outcomes (across all disciplines) for the Project and demonstrates alignment between all Main Works Contracts.

S610.2 The *Contractor* submits the quality plan to the *Project Manager* for acceptance, in accordance with clause 4, accompanied by a Multiparty Collaboration Certificate, and within seven days following certification of each QMS (if the quality plan is revised following recertification). A reason for not accepting the quality plan is

- the plan does not demonstrate how the Quality Statement commitments and Agreed Negotiated Position are met,
- the plan does not align with the *Client's* objectives and the Accepted Programme,
- the plan does not comply with the contract or
- the quality assurance, measures and controls proposed are insufficient.

The *Contractor* addresses the reasons and submits a revised quality plan to the *Project Manager* for acceptance.

S610.3 The *Contractor's* ensures its quality plan updated when changes occur and is available via the Project's Common Data Environment (CDE).

S611 Submission acceptance by the *Project Manager*

S611.1 The response from the *Project Manager* to any of the *Contractor's* deliverables and submissions are as follows

- Accepted - The *Contractor*'s submission has been accepted with no comment from the *Project Manager,*
- Accepted with comments - The *Contractor* proceeds based on the 'accepted with comments' submission, and submits to the *Project Manager* evidence of addressing the *Project Manager's* comments within two weeks, unless another timeframe is agreed with the *Project Manager* or
- Not accepted - The *Contractor* does not implement any element of the submission. The *Contractor* addresses the *Project Manager's* comments and submits a revised submission for acceptance within the *period for reply*, unless another timeframe is agreed with the *Project Manager*.

S615 Samples

S615.1 The requirements for the submission and testing of samples are outlined in section S700.

S620 Standards and procedures

S620.1 The *Contractor* ensures all materials, workmanship, designs and assessments comply with the *Client's* standards and procedures (except as otherwise required by the Scope) current at the *reference date*, or as otherwise instructed by the *Project Manager*.

S660 Audits and Defects

S660.1 The *Contractor*

- ensures all audits comply with ISO 9001:2015 Quality management systems and ISO 19011:2018 Guidelines for auditing management systems (see links in Annex A) and
- develops a schedule of planned audits (internal and external).

The schedule of planned audits is submitted to the *Project Manager* within four weeks of the *starting date* and progress and outputs of the schedule are monitored and reported by the *Contractor* to the *Project Manager* at monthly intervals thereafter.

S660.2 The *Contractor* implements an audit approach that ensures all aspects of the *works* are audited.

The schedule of planned audits

- captures the frequency, methods, planning and resourcing of audits, determined using the following information
    - Project and programme level risk,
    - results from previous audits,
    - levels and types of change,
    - Defects,
    - performance against performance metrics,
    - the importance of the processes concerned,
    - health, safety and welfare,
    - environmental information,
    - customer complaints and customer satisfaction data and
    - outline escalation points for non-conformities.

The *Contractor* provides audit reports for each audit and makes them available on the Project Common Data Environment (CDE).

S660.3 The *Project Manager* may carry out audits of any of the *Contractor's* management systems from time to time.

S660.4 The *Contractor* provides and enables access within working hours and in compliance with health, safety and security requirements to any place where it or any subcontractor (at any stage of remoteness from the *Client)*, carries out any part of the *works* for the *Project Manager* to

- carry out audits,
- inspect work and materials and
- investigate whether the *Contractor* is Providing the Works in accordance with the contract including the quality plan.

S660.5 The *Contractor* provides all facilities and assistance necessary to enable effective and prompt audits and inspections.

S660.6 The *Project Manager* may instruct the *Contractor* to undertake additional audits of its quality management systems when the number of Quality Management Points (QMPs) in effect exceeds the Threshold Level.

S660.7 The *Project Manager* decides the location, frequency and extent of additional audits having regard to the root causes for the accrual of QMPs.

S660.8 On identification of a Defect, the *Contractor* notifies the *Project Manager* or *Supervisor* as soon as a Defect is found. Defects are reported using the 'Defects template' provided in Annex A.

S660.8A Where possible for Defects that are classed as either *defects states 1 or 2*, the *Client* and the *Client's* other contractors attempt to rectify the Defect prior to any notification to the *Contractor* of a Defect. The *Client*, *Project Manager* or *Supervisor* provides the *Contractor* with details of any actions taken (prior to the notification of a Defect to the *Contractor*) by the *Client* and the *Client's* other contractors to rectify the Defect.

S660.8B For *defects states 1 or 2*, if the *Client* and the *Client's* other contractors cannot institute a permanent correction to the Defect, but institute an interim correction to the Defect to enable the lane or bore to be reopened and remain open, the *Client*, *Project Manager* or *Supervisor* provides the *Contractor* with details of any actions taken to institute an interim correction (prior to the notification of a Defect to the *Contractor*) by the *Client* and the *Client's* other contractors to institute an interim correction to the Defect. The *Contractor* provides a permanent correction to the Defect.

S660.9 Unless the provisions of paragraph S660.9A applies, following notification of a Defect, the *Contractor*

- for non *defects state 1 to 5* Defects, submits within seven days,
- for *defects state 1 and 2* Defects resulting in a bore closure or two lanes closures with a bore,
  - related to Software Defects, submits within four hours or
  - for other Defects, submits within eight hours,
- for defects state 1 and 2 Defects resulting in a single lane closure only within a bore,
  - related to Software Defects, submits within eight hours or
  - for other Defects, submits within twelve hours,
- for *defect state 3* Defects, submits within twelve hours,
- for *defect state 4* Defects, submits within 24 hours and
- for *defect state 5* Defects, submits within 48 hours

(unless otherwise agreed with the *Project Manager*) a corrective action plan to the *Project Manager* for acceptance.

S660.9A For *defects states 1 or 2* where the *Client* and the *Client's* other contractors have instituted an interim correction to the Defect to enable the lane or bore to be reopened and remain open, following notification of a Defect the *Contractor*

- related to Software Defects, submits within 24 hours or
- for other Defects, submits within 48 hours,

(unless otherwise agreed with the *Project Manager*) a corrective action plan to the *Project Manager* for acceptance.

S660.10 The *Contractor* does not begin any corrective or preventative action(s) to address Defects until the *Project Manager* has accepted the corrective action plan.

A reason for not accepting the corrective action plan is

- it does not adequately specify actions required to ensure that the Defect does not recur,
- it does not adequately justify why a permanent correction of the Defect can not occur with in the *defects correction period*,
- where the permanent correction of the Defect is proposed not to be undertaken within the *defects correction period*, it does not adequately justify the timescales for undertaking a permanent correction of the Defect,
- the *Client* considers different interim measures could be implemented which better support the *Client's* operations,
- the *Client* considers it to further hinder the achievement of the MOR,
- it does not comply with the contract,

- does not meet the requirements of the accepted design,
- the time for completing the corrective and preventative action is unreasonable or
- it hinders the *Client* or Others.

S660.11 The *Contractor* corrects Defects and takes action to eliminate the causes of actual or potential Defects within a time which minimises the adverse effect on the *Client* or Others and in any event before carrying out any operation the same or similar as that in respect of which the Defect occurred.

S660.12 The *Contractor* notifies the *Project Manager* when the proposed actions are complete, and the Defect has been corrected. The *Contractor* provides verification evidence and information on the

- impact to the programme as a result of the Defect and its associated actions and
- details of the costs of rectifying the Defect and the actions including
  - rework,
  - materials,
  - additional resource,
  - logistics and
  - waiting time and
- reputational impact.

S665 Quality Management Points (QMPs)

S665.1 If the *Contractor* fails

- to comply with its management systems or
- to identify, notify to the *Project Manager* or the *Supervisor* or correct a Defect within the required or agreed timescales (as appropriate)

the *Contractor* accrues Quality Management Points (QMPs).

The QMPs are accrued from the date the failure occurred in accordance with the 'Quality Table' as provided in Annex N. The number of QMPs is reduced in accordance with the same table.

S665.2 The *Contractor* is responsible for managing and monitoring the QMPs and provides details of the QMPs on a monthly basis to the *Project Manager*. If the *Contractor* fails properly to accrue QMPs, the *Project Manager* instructs the *Contractor* to accumulate the applicable number of QMPs in accordance with the quality table. The QMPs accrue on the date the failure occurred.

S665.3 The *Contractor* maintains a register of the number of QMPs in effect, showing when points are accrued or removed. The *Contractor* ensures that the register of the number of QMPs in effect is available for the *Project Manager* to inspect at any time.

S665.4 A failure to comply with this section is treated as a substantial failure by the *Contractor* to comply with its obligations.

S665.5 If at any time the number of QMPs in effect under the contract is more than the Threshold Level, the *Contractor* and the *Project Manager* meet within one week to consider ways of reducing the number of QMP in effect to the Threshold Level or less and to avoid accruing further QMPs.

S665.6 The *Contractor* submits a 'QMP Action Plan' to the *Project Manager* for acceptance, within one week of the meeting. The 'QMP Action Plan' sets out the actions agreed in the meeting, which the *Contractor* proposes to take immediately to reduce the number of QMPs to the Threshold Level or less and to avoid accruing further QMPs.

A reason for not accepting the 'QMP Action Plan' is

- it does not address the agreed actions or
- it does not enable to *Contractor* to reduce the number of QMPs below the Threshold Level.

The *Contractor* submits a revised 'QMP Action Plan', addressing the agreed actions within two days.

S665.7 If the *Project Manager* does not accept the *Contractor*'s proposals or the *Contractor* does not take the agreed actions, the *Project Manager* issues a quality warning notice to the *Contractor*.

Within one week of receipt of the quality warning notice, the *Contractor* submits a report to the *Project Manager* setting out the actions which the *Contractor* has taken and what further or alternative actions they propose to take to reduce the number of QMPs in effect to the Threshold Level or less.

S665.8 Until the number of QMP is reduced to the Threshold Level or less, the *Contractor* takes actions from its report and submits weekly updates (unless directed otherwise by the *Project Manager*) to the *Project Manager*.

These weekly updates set out the actions taken, results of those actions and the actions still to be made.

S665.9 The *Project Manager* may instruct the *Contractor* to undertake additional audits of its management systems when the number of QMPs in effect exceeds the Threshold Level.

The *Project Manager* decides the location, frequency and extent of additional audits having regard to the root causes for the accrual of QMPs.

S665.10 A failure to comply with this section is treated as a substantial failure by the *Contractor* to comply with its obligations.

Monthly quality reviews

S665.11 The *Contractor* conducts monthly performance reviews with the *Project Manager*. These include

- performance against all performance indicators,
- outcomes of the monthly audits and inspections that have been conducted,
- review of accrued QMPs,
- Defects, levels of non-conformity and corrective actions,
- reviews of health, safety and wellbeing inspection reports to identify root causes and quality problems which may contribute to or cause health and safety risks and incidents,
- a review of the skills and employment metrics to identify and plan for forthcoming resource needs to Provide the Works in accordance with the Accepted Programme and
- checks to ensure inspection and test plans are current and are all in place.

The *Contractor* produces a quality review report as part of the monthly progress report as described in section S850.

Multi-Party Review Meetings

S665.12 In addition to the monthly quality reviews, the *Contractor* attends a quarterly performance review meeting with the *Project Manager* and other Main Works Contractors to address all aspects of

performance, trends and improvements with the purpose of sharing knowledge, discussing issues and identifying collective opportunities for performance improvement.

S665.13 The *Client* leads additional annual reviews to assess all aspects of *Contractor*'s performance and trends in performance indicators (PIs).

S670 Performance Review

Collaborative Performance Framework

S670.1 The *Client* uses the Collaborative Performance Framework to measure project performance across the whole Project. The *Project Manager* assesses the *Contractor's* performance actively against the current version of the CPF. The *Contractor* follows the processes set out in the current version of the CPF with the use of performance scores to drive improved performance.

S670.2 If the *Contractor*'s performance, as measured per the CPF (or any replacement for it) is below the *failure level*, it is treated as substantial failure by the *Contractor* to comply with its obligations.

S670.3 The *Contractor* self-scores its performance against each of the indicators in the CPF. The scores recorded by the *Contractor* against each CPF indicator are submitted to the *Client*'s Commercial Services Division inbox (CommercialIntelligence@highwaysengland.co.uk) no later than working day seven for schemes up to and including PCF stage five and working day 10 for schemes in PCF stages six and seven. Working day zero is the last working day of the month. The first CPF covers months one - three from the *starting date*, and after that are submitted quarterly.

S670.4 The *Contractor* assists the *Client* in the development of this measurement framework. The *Contractor* proposes and develops ways to improve the CPF. The CPF is updated by the *Client* every six months for continuous improvement purposes.

Balanced scorecard and performance metrics

S670.5 The *Client* has expected strategic outcomes for the Project and is developing a Balanced Scorecard (see link in Annex A) to demonstrate the achievement of these outcomes. Within the balanced scorecard, performance indicators (PIs) are specifically linked to the realisation of these outcomes. The *Project Manager* provides the Balanced Scorecard within four weeks of the *starting date*.

At each assessment date (up to Completion of *sections 1 and 2*) the *Contractor* measures and reports to the *Project Manager* on the PI's contained within the balanced scorecard under the following headings

- safety – best safety standards for roadworker and road user,
- delivery – ensuring sustainable delivery that is value for money,
- customers – putting Customers first,
- environment – ensuring environmental responsibility,
- economic – supporting economic development and
- people and communities – focus on people and places.

S670.6 Within six months of the *starting date,* the *Contractor* develops a series of leading and lagging quality indicators which form part of its management systems. The indicators include, the measurement, monitoring and reporting of the following

- amount of work completed right first time/first pass yield,

- work quality ratios, including work quality identified through inspections, verification, validation and testing activity,
- Defects including the Defined Cost of
    - failure,
    - appraisal,
    - prevention and
    - any lost opportunity
- the outputs of internal audits and quality reviews,
- the quality of outputs from subcontractors,
- the Defined Cost of poor quality including
    - cost of failure,
    - cost of appraisal,
    - cost of prevention,
    - cost of lost opportunity,
    - cost of schedule impact and
- any cost of reputational impact.

The *Contractor* develops leading and lagging quality indicators and supporting metrics which are compared with

- relevant health and safety,
- risk,
- schedule/programme,
- management and cost management metrics

to ensure the relationship between quality, time, cost, risk and safety is measured, monitored and managed.

The *Contractor* develops benchmarks within one year of the *starting date* and such benchmarks are tested on each anniversary of the *starting date*. After each benchmark the *Contractor* presents the outcome of the benchmarking exercise to the *Project Manager*. When instructed by the *Project Manager* the *Contractor* includes these benchmarks in its performance framework.

Staff Performance

S670.7 The *Contractor* promotes individual improvement of Staff through mentoring, coaching and training.

S670.8 The *Contractor* works with Staff, setting individual objectives and targets that align with the requirements of the *works*.

HSW Performance

S670.9 The *Contractor* attends regular performance, collaboration and co-ordination meetings with the *Project Manager* to continually improve HSW performance, share best practice and discuss the forthcoming HSW programme and events.

S670.10 The *Contractor* attends monthly and quarterly meetings with the *Project Manager*

- to discuss the output of the health and safety performance indicators, Construction (Design and Management) Regulations 2015 (CDM) metrics and Occupational Health Maturity Matrix,
- to discuss the outputs of the Supply Chain Maturity Matrix,
- to discuss outputs of the HSW performance indicators,
- to share innovation, visual standards and discuss a collaborative approach to Project stand-downs, initiatives and reward and recognition activities

and on completion of the meeting, the *Contractor* produces a summary of the meeting and submits any improvement actions to the *Project Manager* for acceptance.

S671 Continual improvement and Lean

S671.1 The *Contractor* ensures a culture of continual improvement, including lean management techniques, value management and innovation. The purpose is to ensure the Project delivers maximum value with minimum resources and negative impact for all parties. The *Contractor* operates processes for continual, improvement, lean management techniques, value management and innovation following the guidance in ISO 9004 Quality Management. These are set out in the following documents (see links in Annex A)

- Continual Improvement Lean Procedure (HE540039-CJV-GEN-GEN-PRO-PRO-00018),
- Lean Collaborative Planning Major Projects Minimum Standard v1.0 May 2020 (HE540039-HE-GEN-GEN-STD-DEL-00001),
- Lean Visual Management Major Projects Minimum Standard v1.0 May 2020 (HE540039-HE-GEN-GEN-STD-DEL-00002),
- Guide to Lean Collaborative Planning (HE540039-HE-GEN-GEN-GDE-DEL-00002),
- Guide to Lean Visual Management (HE540039-HE-GEN-GEN-GDE-DEL-00003) and
- Innovation management: engagement in improving best standards and technologies. Further defined by the *Client* on the Innovation Hub.

S671.2 Using the guidance and principles provided above, the *Contractor* demonstrates how continual improvement outcomes are measured and monitored throughout development and implementation of

- a ‘continuous improvement plan’ that includes measures for how lean principles are adopted,
- a systematic approach to improving processes and deliverables (defined as three separate Project Control Framework (PCF) products
    - Value Management Delivery Plan,
    - Value Management Workshop Report (see link in Annex A) and
    - Efficiency Register).

The *Contractor* submits these plans to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, four weeks prior to the relevant Stage Gate Assessment Review (SGAR) or interim SGAR.

S671.3 A reason for not accepting the continuous improvement plan or the PCF products is

- the plans do not align with the *Client*’s objectives or
- the plans do not demonstrate how the continuous and lean commitments are achieved.

S671.4 From the *starting date,* the *Contractor* appoints a person accountable for ensuring continual improvement and lean management skills and techniques are applied and reported back to the *Project Manager* and the *Client*. The *Contractor* ensures dedicated and available competencies to drive and deliver lean, value management and innovation deliverables, this includes a minimum of one person with

- documented experience of lean management on complex infrastructure or complex construction projects,
- undertaken appropriate supporting lean training and
- value management or efficiency management experience on complex infrastructure or complex construction projects.

Highways England Lean Maturity Assessment (HELMA)

S671.5 The *Contractor's* adoption of a continual improvement and lean culture is measured by an annual Highways England Lean Maturity Assessment (HELMA) (see link in Annex A). The *Contractor* achieves or exceeds an average HELMA score of 3.0 and above 2.0 on individual measures within a 12-month period.

S671.6 The *Contractor* shares knowledge of lean initiatives, innovations, value management activities and achievements through providing contributions to the Highways England Lean Tracker (see link in Annex A). The *Contractor* actively engages in events and knowledge sharing activities initiated by the *Client* or industry partners, including collaboration regarding research or innovations undertaken by the *Client* and *Project Manager.*

S671.7 The *Contractor* identifies, delivers and documents efficiencies that contribute to the Efficiency Target*.*

S671.8 The *Contractor* contributes to the Efficiency Target for the duration of the *works* and shares knowledge of potential efficiencies through quarterly updates to the *Project Manager* and *Client*. The *Contractor* keep the Efficiency Register up to date with any new efficiencies for consideration by the *Client.* If a new efficiency included in the Efficiency Register requires collaboration with another Main Works Contractor, the *Contractor* submits a Multiparty Collaboration Certificate to the *Project Manager* with the updated Efficiency Register. If the Efficiency Target is not met, the *Contractor* produces a corrective action plan to address the failure to meet the Efficiency Target in line with section S660.

S671.9 The *Contractor* updates a Value Management Delivery Plan in accordance with the Project Control Framework (PCF) (see link in Annex A) products related to value management, which is updated at the beginning of each Stage Gate Assessment Review (SGAR) period.

S671.10 The *Contractor* undertakes value management workshops in line with the *Client's* process of identifying efficiencies and value-adding opportunities. Captured processes are PCF products in the Value Management Workshop Report (see link in Annex A).

S671.11 The *Contractor* creates a Value Management Workshop Report in line with the *Client's* standards available on the Highways England Supply Chain Portal (see link in Annex A). The *Contractor* produces these reports at the end of each SGAR period.

S680 Training and competence of *Contractor's* Staff

S680.1 The *Contractor* ensures that only suitably qualified and experienced Staff are used to Provide the Works.

S680.2 The *Contractor* submits to the *Project Manager* information about the *Contractor*'s procedures for assuring the qualifications and experience of Staff when requested to do so by the *Project Manager*.

S680.3 The *Contractor* provides to the *Project Manager* records of training of Staff when requested to do so by the *Project Manager*.

S680.4 Before the *Contractor* or any subcontractor (at any stage of remoteness from the *Client)* commences any element of the *work*s, the *Contractor* confirms to the *Project Manager* that the Staff Providing the Works for the relevant element are suitably qualified and experienced to Provide the Works or are adequately supervised whilst Providing the Works.

S680.5 The *Contractor* provides further such summary statements to the *Project Manager* as additional Staff are introduced.

S680.6 Staff are required to have Construction Skills Certification Scheme (CSCS) cards appropriate to the trade / position, with all site supervisors having Site Supervisors Safety Training Scheme (SSSTS) (or EU equivalent) certification.

S680.7 For those roles where no suitable recognised qualifications and experience standards exist, the *Contractor* provides information on the selection criteria and method used to provide assurance of individual's qualifications and experience. These may include reference to the selection process used prior to employment, any subsequent appraisals of performance/qualifications and experience and any relevant training and experience.

S680.8 Through mentoring, coaching and training, the *Contractor* promotes individual improvement of Staff.

S680.9 The *Contractor* works with its Staff to set individual objectives and targets that are aligned with the requirements of the *works*.

S700 Tests and Inspections

S705 Tests and Inspections

S705.1 The *Contractor* complies with all testing and inspection requirements contained elsewhere in the Scope.

S705.2 The *Contractor* compiles and completes numbered appendix 1/5 in accordance with section S2705. Following “acceptance” or “acceptance with comment” in accordance with the Acceptance Procedure, the *Contractor* complies with this.

S705.3 A reason for not ‘accepting’ numbered appendix 1/5 (“Testing to be Carried out by the *Contractor*”) is that

- it does not comply with the Scope,
- the frequency of testing does not comply with the minimum recommended frequencies contained in the Specification for Highways Works,
- the mandatory tests required by the relevant product or execution standard are not identified,
- the proposed testing does not permit the verification of assumptions made during the design or
- the numbered appendix is incomplete.

S705.4 All testing and inspection works are self-certified by the *Contractor*. The *Contractor* ensures that the self-certification complies with the Scope and the Integrated Project Control Plan (IPCP) has been accepted by the *Project Manager*.

S705.5 The *Contractor* consults with

- the relevant Local Authorities,
- the Statutory Undertakers and
- other Statutory Bodies

and complies with their requirements regarding testing and inspection works (including provision of samples and any hold points) where the testing and inspection works affect such interested parties and includes these requirements within numbered appendix 1/5, ‘test and inspection strategy’ or applicable ‘test inspection plan’ and any programme submitted for acceptance to the *Project Manager*.

S705.6 The *Contractor* ensures that Staff nominated for undertaking sampling, inspection and testing activities are appropriately trained and competent to carry out the particular activities to which they have been assigned.

S705.7 The *Contractor* complies with the *Client’s* “Dynamic Object Orientated Requirements System Next Generation (DOORS NG) user Manual” (see link provided in Annex A.)

S705.8 The *Client* provides the *Contractor* with access to the *Client’s* DOORS NG database (see link provided in Annex A) within four weeks of the *Contractor’s* application for access.

S705.9 The *Contractor* ensures that

- all ‘test and inspection plans’,
- all test, inspection or sample requirements from numbered appendix 1/5,
- any other test specifications requirements,

- all test and inspection records and results (including the test result status) and
- details of any retest or Defect rectification

are recorded in digital format and uploaded on to the *Client's* DOORS NG database each week during the construction phase and the 'test and inspection phase' of the *works.*

S705.10 For all tests and inspections the *Contractor* carries out a test readiness review a minimum of one week prior to the applicable test or inspection.

S705.11 The *Contractor* notifies the *Supervisor* four weeks before the date of each test or inspection.

S705.12 The *Contractor* notifies the *Supervisor* one week before the date of each retest.

S705.13 The *Contractor* ensures that the *Supervisor* has unrestricted access to attend any test or inspection being carried out in respect of the *works* and provides any necessary training and personal protective equipment to give effect to this.

S705.14 The *Contractor* ensures that the *Supervisor* is given access to any site or workshop where Plant and Materials and Equipment are being manufactured, prepared or stored for use in the *works*.

S705.15 The *Contractor* ensures that the *Supervisor* and Others (where appropriate) are provided with a minimum of one week's notice for 'hold points' on Site and two weeks' notice for those off Site.

S705.16 The *Contractor* ensures all materials testing is carried out by a United Kingdom Accreditation Service (UKAS) accredited laboratory, using UKAS and the Environment Agency's Monitoring Certification Scheme (MCERTS) accredited tests.

S705.17 The *Contractor* is responsible for managing and ensuring that test and inspection records are retained to comply with section S400.

S710 Samples

S710.1 The *Contractor* provides samples in accordance with the requirements of the Scope and provides additional samples at the request of the *Supervisor*. This includes

- proposed manufactured items such as gantries and road restraint systems (vehicle and pedestrian),
- prefabricated items such as drainage and service ducts, signs, lighting columns and brackets and CCTV masts,
- samples of all standard finishes including concrete, paint and road surface course,
- mock-ups of proposed fabricated or constructed items and
- test panels and benchmarks of all standard finishes, including concrete and surface course, to be achieved during construction.

S710.2 The *Contractor* offers the *Supervisor* each sample for inspection. Samples are accepted by the *Project Manager* prior to undertaking the relevant *works* at the discretion of the *Supervisor*.

S710.3 The *Contractor* maintains a schedule of all samples, mock-ups and test panels indicating the

- planned date at which each sample is made available for inspection by the *Supervisor*,
- planned date at which the *Project Manager's* acceptance is required,
- parts of the Scope that it represents,
- parts of the *works* that it represents,
- unique reference number,

- secure location (accepted by the *Project Manager*) where the item is stored or located and
- sample proposal status by *Contractor* and the *Project Manager* acceptance status.

S710.4 A reason for not accepting the schedule of all samples, mock-ups and test panels is

- it does not cover all aspects of the *works*,
- it does not include dates the items are available,
- it does not include the item location and
- it does not include the item reference numbers.

S710.5 The *Contractor* protects, retains and makes available for inspection, by the *Project Manager* or *Client*, all samples until the Completion of *section* 2 and removes them afterwards.

S715 Management of tests and inspections and provision of samples

S715.1 The *Contractor's* inspection and test plans submitted to the *Project Manager* document how the *Contractor* protects the *works*, *Client's* assets, personnel and Others (and their assets). The *Contractor* stops any test if damage to any part of the *Client's* assets or Others' assets is likely to occur or if there is a risk of injury to personnel.

S715.2 The *Contractor* implements its operating procedures to control energisation of Plant and Materials while systems are under test.

S716 Test and Inspection Strategy

S716.1 The *Contractor* prepares a 'test and inspection strategy' report, that includes

- details of the *Contractor's* process for quality management (including self-certification) of the testing and inspection works in accordance with section S600,
- a testing and inspection organisation chart that aligns with the organisation chart required in accordance with section S800,
- a procedure for ensuring the test and inspection requirements of Others are managed and included in the 'test and inspection plans',
- a procedure for ensuring coordination and agreement with other Main Works Contractors (MWC) for testing or inspection works required at interfaces,
- a process for ensuring copies of all test and inspection plans, test specifications, records and results are uploaded onto the *Client's* DOORS NG database (see link provided in Annex A),
- a process of *Supervisor* notification for tests and inspections,
- a process for the correction of Defects resulting from non-compliant test or inspection result,
- a process for test and inspection readiness,
- reference to the 'test and inspection schedule',
- reference to the 'test and inspection plans' and
- reference to numbered appendix 1/5

and submits the 'test and inspection strategy' in accordance with the Acceptance Procedure and accompanied by the Multiparty Collaboration Certificate, for acceptance by the *Project Manager,* prior to commencement of the relevant construction activity.

S716.2 The *Contractor* ensures that the 'test and inspection strategy' report complies with the requirements of

- the Development Consent Order (DCO),
- the Scope and
- relevant Others.

S717 Test and Inspection Schedule

S717.1 The *Contractor* prepares a 'test and inspection schedule', that includes

- a three-month forecast of all 'test and inspection plans' that will be prepared for construction activities and
- timeframes for the preparation of 'test and inspection plans' and submission in accordance with the Acceptance Procedure

and submits the 'test and inspection schedule' in accordance with the Acceptance Procedure and accompanied by the Multiparty Collaboration Certificate, for acceptance by the *Project Manager* prior to commencement of the relevant construction activity.

S717.2 The *Contractor* updates and submits the 'test and inspection schedule' for acceptance by the *Project Manager* at the same time as it updates and submits each programme for acceptance by the *Project Manager* and submits the 'test and inspection schedule' in accordance with the Acceptance Procedure.

S717.3 The *Contractor* ensures that the 'test and inspection schedule' complies with the requirements of

- the Development Consent Order (DCO),
- the Scope,
- the relevant Local Authorities,
- the Statutory Undertakers,
- other Statutory Bodies,
- the 'test and inspection strategy' report that has been accepted by the *Project Manager* and
- the Acceptance Procedure.

S718 Test and Inspection Plans

S718.1 The *Contractor* prepares 'test and inspection plans', in accordance with the test and inspection schedule, that

- includes a summary of all test and inspections that are included within that plan',
- identifies who is responsible for facilitating any tests and inspections (on and off Site),
- includes the provision of samples,
- includes the method of recording results,
- includes details of the test and inspection requirements of Others (including how tests and inspections that require input from Others are managed and identify and include hold points) and

- includes coordination and agreement with other Main Works Contractors (MWC) for testing and inspection works required at interfaces

and submits the 'test and inspection plan' in accordance with the Acceptance Procedure accompanied by the Multiparty Collaboration Certificate for acceptance by the *Project Manager*, at least four weeks prior to commencement of the relevant test and inspection (as appropriate).

S718.2 The *Contractor* ensures that the 'test and inspection plans' comply with the requirements of

- the Development Consent Order (DCO),
- the Scope,
- Others and
- the accepted 'test and inspection strategy'.

S719 Specific Requirements for Technology

S719.1 The *Contractor* undertakes all testing and commissioning of all ITS Plant and Materials unless otherwise

- stated elsewhere in the Scope or
- stated within the accepted technology and systems commissioning plan.

The *Contractor* is responsible for all 'stages' A to E (as defined in MCH 1349 Process for Commissioning and Handover of Roadside Operational Technology (see link provided in Annex A)).

S719.1A The *Contractor* performs the roles and functions of the 'Scheme Manager' and 'Technology Manager' (as defined in MCH 1349).

Technology and systems commissioning plan

S719.2 Not used.

S719.3 The *Contractor* consults with the *Project Manager* and complies with the *Project Manager's* requirements regarding any additions or updates (including stakeholder engagement) and includes these requirements within the technology and systems commissioning plan.

S719.4 The *Contractor* prepares a technology and systems commissioning plan (also known as a Technology Commissioning Plan in DMRB standard GG 182 Major schemes: Enabling handover into operation and maintenance) and MCH 1349), to provide asset data and information (see link provided in Annex A), that

- is structured and compliant with the technology and systems commissioning plan PCF product guidance (as defined in ("Project Control Framework" (see link provided in Annex A)),
- complies with the requirements of DMRB standard GG 182,
- includes a procedure for ensuring coordination and agreement with other Main Works Contractors (MWC) for the commissioning and handover of ITS Plant and Materials and
- incorporates any additional stakeholder requirements (including programme and responsibilities).

The *Contractor* submits the technology and systems commissioning plan in accordance with the Acceptance Procedure and accompanied by the Multiparty Collaboration Certificate, for acceptance by the *Project Manager* prior to commencement of technology detailed design.

S719.5 The *Contractor* ensures that the technology and systems commissioning plan complies with the requirements of

- the Development Consent Order (DCO) and
- the Scope.

S719.6 Not used.

S719.7 Not used.

S719.8 Not used.

Evidential Trails

S719.9 The *Contractor* ensures

- that all evidential trails for enforcement are prepared and provided in accordance with the "Evidential Trail Suite of Documents" (see link provided in Annex A) and "Speed Camera Policy & Approval - Index of Guidance Documents" (see link provided in Annex A),
- at the end of scheme stage D (as defined by MCH 1349), the *Contractor* provides access to allow for an independent test and inspection of the permanent enforcement system by the *Client's* enforcement system specialist,
- provides access to allow for an independent test and inspection of the temporary enforcement system by the *Client's* enforcement system specialist, four weeks prior to the activation of temporary enforcement systems,
- that where the temporary enforcement systems are re-positioned during the construction phase, the temporary enforcement system is re-tested and inspected,
- the permanent speed enforcement solution is available for independent testing and inspection by the *Client*, by Key Date 1,
- upon completion of the independent testing and inspection the permanent speed enforcement solution, provides to the *Project Manager* a completed Enforcement Systems Acceptance Certificate, four weeks prior to Completion of *section 1* and
- upon completion of the independent testing and inspection the temporary (including modifications) speed enforcement solution, provides to the *Project Manager* a completed Enforcement Systems Acceptance Certificate, two weeks prior to activation of the temporary speed enforcement solution.

S720 Covering up completed work

S720.1 The *Contractor* does not cover up any part of the *works* that is the subject of a test and inspection, until that test and inspection (including test and inspection by Others) has been undertaken or where covering up is necessary to facilitate the test and inspection (unless agreed otherwise by the *Supervisor*).

S721 Spares

S721.1 The *Contractor* provides a schedule of spares to the *Project Manager* for acceptance 52 weeks before the Completion of *section* 1. The schedule of spares includes

- the spares requirements as defined in the Scope,
- the spares required to maintain availability and performance requirements and

- the dates the *Contractor* provides the spares.

S721.2 The *Project Manager* responds to the *Contractor's* submission and notifies the *Contractor* of the location within the United Kingdom that the spares are to be delivered to. A reason for not accepting the schedule of spares is

- that the spares do not comply with the Scope or
- that the spares do not allow the asset to meet the Project requirements.

S721.3 Once the *Project Manager* has accepted the schedule of spares, the *Contractor* provides the spares.

S721.4 The *Contractor* replaces all spares used, prior to the Completion of *section* 2.

S721.5 The *Contractor* submits operation and maintenance manuals to the *Project Manager* to achieve acceptance at least 4 months before Key Date 1. The operation and maintenance manuals include

- a description of the operation and maintenance manual works,
- details of each installed item including manufacturer, model number and any sub-type information such as colour,
- details of where the item is installed, either referring to drawings that have this information or including a contextual description,
- a contextual description of the operation information or reference to manufacturers' literature where this information can be found,
- contextual maintenance information or reference to manufacturers' literature that has this information,
- any drawings,
- any testing and commissioning information and
- manufacturers operation and maintenance information, product data sheets, safety data sheets or drawings.

S721.6 A reason for not accepting the operation and maintenance manual is

- it does not align with the Federated Model,
- it does not contain the final as-built information,
- it does not adequately cover Plant and Materials obsolescence,
- it does not contain an asset register or
- it is not signed off by the *Contractor's* assurance team.

S722 Testing and Commissioning Phases

S722.1 The *Contractor* undertakes a phased and hierarchical testing and commissioning approach with each sub-system tested individually before being integrated with its interfacing sub-systems.

S722.2 The *Contractor* carries out the testing off-site where possible and delivers to Site tested and configured systems, Plant and Materials. The Contractor develops, uses simulators and other test facilities, as well as utilising temporary control facilities and builds a dedicated systems integration test facility to connect all the systems prior to installation.

S722.3 Where the *Contractor's* systems interface with the wider *Client* systems (such as the *Client's* DYNAC platform), then the corresponding systems are integrated and tested prior to and during FAT to achieve integration. The testing requirements at the integration phase are set out in the

design phase by the *Contractor* and progressively developed to minimise risks of integration problems.

S722.4 The *Contractor* provides the *Client* and Others with the development, integration and testing releases of software applications to enable systems integration and testing.

S722.5 Where the LTC Tunnel System has an interface to *Client* systems such as DYNAC, then the *Contractor* works with the *Client* and Others to create a joint development and testing programme to support concurrent development of the interfaces on all systems in line with requirements in section S2900.

S722.6 There are six phases to the LTC Tunnel System testing and commissioning process

- phase 1: FATs,
- phase 2: static tests per system,
- phase 3: static integration tests,
- phase 4: dynamic integration testing,
- phase 5: trial operations and
- phase 6: fault free running (post road opening performance testing).

S722.7 The *Contractor* works with Others in order to commission, bring into use and integrate into the Project the *works*, evidencing and providing justification for progression through testing and commissioning phases.

Client's Project Testing and Commissioning Plan

S722.8 The *Contractor* develops and submits a tunnel systems testing and commissioning plan, in accordance with the *Client's* testing and commissioning plan, within 60 weeks of the *starting date* for the *Project Manager's* acceptance, in accordance with the Acceptance Procedure.

Testing and Commissioning Process

S722.9 Prior to the Completion of *section* 2, the *Contractor* carries out testing and commissioning to ensure that the various elements that make up the Project systems are integrated together, commissioned and demonstrated to deliver the *works*.

S722.10 The *Contractor* aligns testing and commissioning activities, consultation, deliverables and assurance with the requirements in section S2900 and the *Client's* Systems Integration Plan, see link provided in Annex A.

Phase 1: Factory Acceptance Tests (FAT) and Off-site integration tests

S722.11 The *Contractor* carries out FATs before delivery to Site of any system or item of Plant and Materials to verify that they (and their components) comply with the Scope requirements as reflected and agreed in test plans.

S722.12 The *Contractor* carries out off-site integration tests where possible, in a factory environment which allows its subcontractors (at any stage of remoteness from the *Client*) to test the LTC Tunnel System (previously factory tested) together to check that the interfacing aspects of the LTC Tunnel System function in accordance with the Scope.

S722.13 The *Contractor* makes use of simulation and off-site integration tests to prove functionality and interfaces before Plant and Materials are delivered to the Site.

Phase 2: Static Tests

S722.14 The *Contractor* undertakes static tests on all Plant and Materials following installation (including any relevant systems). The *Contractor* demonstrates via records and reports that the system functionality remains compliant with the Scope requirements and the FATs and that the final installation has been carried out in accordance with the design.

S722.15 The *Contractor* provides emulators of all interfacing systems where required to permit their interface testing to take place.

S722.16 The *Contractor* undertakes the static tests in a three-stage approach

- intermediate static tests (tests prior to energisation),
- pre-completion static tests (tests post component energisation) and
- system static tests (testing of sub-systems).

S722.17 **Intermediate static tests** - following successful completion of these tests, the *Contractor* issues an installation release notice to the *Project Manager* to certify that the commissioning lot (ComLot) can be safely energised. Static tests include cable testing, earth leakage checks, visual inspections of system installation quality and any other tests necessary to prove the safe installation.

S722.18 **Pre-completion static tests** - the *Contractor* carries out these tests when the components or sub-systems are energised. They serve to validate that the sub-systems function. The *Contractor* tests control schemes by simulation up to interface terminals. The successful completion of this phase results in the *Contractor* issuing a pre-commissioning certificate (PCC) for a sub-system to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

S722.19 **System static tests** - the *Contractor* carries out these tests when all constituent elements that comprise a system are connected to verify that the integrated system functions. This is to be undertaken hierarchically and agreed with the *Project Manager* prior to the commencement of the systems static tests. The successful completion of this phase results in the production of a partial acceptance certificate (PAC) for a sub-system or system to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

Phase 3: Static Integration Tests (SIT)

S722.20 The *Contractor* verifies and demonstrates through the static integration tests that, where necessary, Plant and Materials included within the *works* are integrated with Others' systems in accordance with the Scope.

S722.21 The *Contractor* carries out systems testing in accordance with its inspection and test plan. The *Contractor* submits system testing evidence to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

S722.22 Following completion of the contract level systems testing the *Contractor* proceeds to the ready for end to end and integration testing of the whole Lower Thames Crossing and commissioning Key Date.

Phase 4: Project Level Integrated Systems Testing and Commissioning (Dynamic Integration Tests)

S722.23 The *Contractor*, through the Project level integrated systems testing and commissioning, verifies end to end functionality and overarching performance of the integrated system. This includes where its *works* interface with components and systems belonging to the *Client* and Others.

S722.24 The *Contractor* works with relevant Others and the *Client* to demonstrate that the works are ready to open to traffic.

S722.25 18 weeks before the Completion Date for *section* 1, the *Contractor* produces a dynamic testing plan with Others and submits it to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

S722.26 The *Contractor* submits Project level integrated systems testing and commissioning evidence to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

S722.27 The testing and commissioning process is structured and testing activities sequenced in line with the requirements for Completion of *section* 2. Upon successful completion of dynamic testing, the *Contractor* submits handover evidence to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

Phase 5: Trial Operations

S722.28 The *Contractor* works with Others to support the *Project Manager* and the *Client* during trial operations to verify that the asset is reliably and safely functioning in accordance with the operational requirements in section S2900.

S722.29 During trial operations the *Contractor* carries out verification activities including

- control room and on-road exercises,
- emergency service familiarisation exercises,
- live emergency exercises with emergency services and other stakeholders,
- enabling controlled public use of the highway and
- preparations to enable road opening.

Phase 6: Fault free running (post road opening performance testing)

S722.30 Fault free running is a predefined period, defined in the contract, where the *Contractor* is to achieve continual system availability and fault free status of critical systems.

S722.31 Where a critical fault occurs, the Defect is repaired by the *Contractor* but fault free running is not achieved. If fault free running is not achieved, the fault free running phase is restarted at the end of the period defined in the contract. The fault free running phase is restarted up to three more times, after which the *Project Manager* instructs the *Contractor* regarding the next steps as defined in the contract.

S722.32 During the fault free running phase, the project is operated and maintained by the *Client*. The *Contractor* ensures that relevant staff remain mobilised to ensure that all Defects are resolved as they occur.

S722.33 The *Contractor* identifies relevant staff and submits these to the *Project Manager* for acceptance. The *Contractor* mobilises relevant Staff during the fault free running period such that critical faults

are responded to as they occur and rectified. The *Contractor* provides relevant Staff for the entire period of fault free running.

S722.34 The *Contractor* supports the *Client* to validate in operation that the *works* are reliably operating in accordance with the Scope. The *Contractor* demonstrates to the *Project Manager* that the *works* operate without a critical fault via fault logs of all critical systems over the fault free running period.

S722.35 The *Contractor* provides supporting staff and other resources required to support end-to-end testing for completed systems for the project, including back to any off-site control centres. Regarding interfacing systems, the *Contractor* inspects and tests up to the demarcation points specified in section S900 and identified in the *Contractor's* systems engineering interface management plan'.

S722.36 In accordance with section S400, the *Contractor* provides maintenance up to the point of take over. This includes any interim, planned preventative maintenance or Defect rectification maintenance, on Plant and Materials supplied by the *Contractor*, during or after localised testing by the *Contractor*, end-to-end testing by the *Contractor*, end-to-end testing with the involvement of the *Contractor* and Others or final commissioning by the *Client*. The provision of all spares as necessary and any replacement of these if drawn by the Contractor from those supplied to the *Project Manager* is the responsibility of the *Contractor* up to take over.

S723 Testing and Commissioning Implementation Strategy

Testing and Commissioning principles

S723.1 The *Contractor* plans, undertakes and provides evidence of testing and commissioning of the works to

- comply with the Scope,
- ensure factory and off-site integration testing is undertaken,
- support the testing certification process,
- ensure the testing and commissioning activities are logically sequenced to support the validation and verification of integration of systems in line with the Client's 'Systems Integration Plan' described in section S2900,
- ensure the testing and commissioning activities are planned and sequenced to meet the Key Dates,
- ensure that the testing of the interfaces between the Contractor and Others, are an integral part of all of the Parties' testing scopes,
- ensure that testing and commissioning activities are carried out and
- align with the 'Network performance criteria', see link provided in Annex A) and includes a strategy for provision of maintenance support, supply of spare parts and special tools to support take over.

S724 Management of Testing and Commissioning

S724.1 The *Contractor* creates a testing and commissioning organisation chart that links to the organisation chart provided in section S800 and submits for the *Project Manager's* acceptance, in accordance with the Acceptance Procedure, within 16 weeks of the *starting date*.

S725 *Supervisor's* procedures for inspection and watching tests

S725.1 As set out in the relevant plans.

S726 Testing and Commissioning Documentation

S726.1 The documentation developed to manage the testing and commissioning process is indicated below

- **testing and commissioning process** - the *Contractor* prepares the testing and commissioning process based on the requirements of the Scope. This informs subcontractors (at any stage of remoteness from the *Client*) of their testing and commissioning requirements in terms of regime, roles, responsibilities, evidence and testing sequence,
- **inspection and test plans** - the *Contractor* prepares the inspection and test plans in accordance with the testing requirements for Plant and Materials,
- **master commissioning logic** - the *Contractor* prepares the master commissioning logic, for acceptance by the *Project Manager*, in accordance with the Acceptance Procedure,
- **system split and ComLot definition** - the *Contractor* prepares the system split and ComLot definition which is used to prepare the master commissioning logic, for acceptance by the *Project Manager*, in accordance with the Acceptance Procedure,
- **attendance at FATs** - the *Contractor* makes all necessary arrangements for the attendance at FATs, and prepares the process for the identification, notification and witnessing of FATs by the *Supervisor* and Others and submits it for information to the *Project Manager*,
- **manufacturing certification** - the *Contractor* prepares the manufacturing certification, and prepares the process for the production and delivery of manufacturing certification by subcontractors and submits it to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure,
- **installation release notice (IRN)** - the *Contractor* prepares the IRN to be used by all subcontractors (at any stage of remoteness from the *Client*) which certifies that intermediate static tests on all ComLots have been successfully tested,
- **work authorisation document (WAD) procedure** - the *Contractor* prepares the WAD procedure to control access to energised areas or areas under tests. It is used by the *Contractor* to control access once ComLot IRNs are signed off,
- **pre-commissioning certificate to acceptance certificate** - the *Contractor* prepares all relevant commissioning and pre-commissioning certificates and it defines the methodology used by all subcontractors (at any stage of remoteness from the *Client*) for the preparation, issue and review of testing and commissioning certification from pre-commissioning certificate to acceptance certificate.
- **electromagnetic compatibility (EMC) and acceptance plan** - the *Contractor* prepares the EMC and acceptance plan alongside the test and inspection plans, for acceptance by the *Project Manager* in accordance with the Acceptance Procedure,

- **mechanical and electrical safety rules** - the *Contractor* prepares the mechanical and electrical safety rules as part of its lead testing contractor commissioning manual, in compliance with all applicable UK standards and regulations including those identified at detailed design. This document sets out the safety rules that apply to all activities on low voltage electrical systems and mechanical pressurised systems.

- **room availability procedure** - the *Contractor* prepares the room availability procedure alongside the test and inspection plans, for acceptance by the *Project Manager* in accordance with the Acceptance Procedure,

- **cyber security certification procedure** - the *Contractor* prepares the requirements of the cyber security certification including those produced by its subcontractors (at any stage of remoteness from the *Client*), for acceptance by the *Project Manager* in accordance with the Acceptance Procedure prior to commencement of phase 1, to ensure that system security risks are mitigated (including in a live environment) and those mitigations documented for approval by the *Client*. Details on the security tests are required, including expected results and back out plan, timings and decision points. The *Contractor* works with the *Client* to support the *Client's* independent security verification activity. Details on the independent security verification (e.g. IT health check) are to be agreed with the *Client*.

- **access control procedure** - the *Contractor*
    - prepares the access control procedure as part of the lead testing contractor commissioning manual and
    - provides cyber security intrusion testing and produces certificates

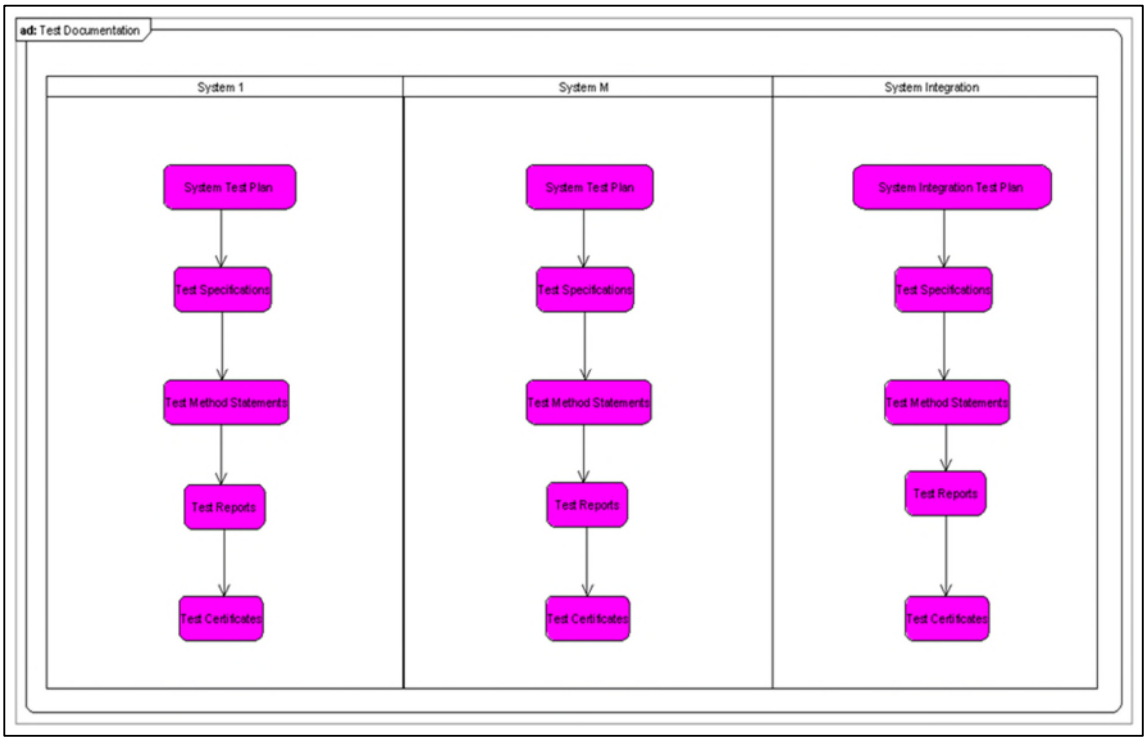
      for acceptance by the *Project Manager*, in accordance with the Acceptance Procedure, prior to commencement of phase 4.

- **notification of testing and commissioning activities to Others** - the *Contractor*
    - prepares the notification of testing and commissioning activities to Others for agreement by the *Project Manager* and
    - describes the process for advising Others of planned testing and commissioning for acceptance by the *Project Manager*, in accordance with the Acceptance Procedure, submitted 2 months prior to the relevant testing phase.

S727 Relationship of Test Documentation

S727.1 The *Contractor* produces test documentation as shown in Figure 3. This diagram illustrates that for any one system, a system test plan gives rise to a number of test specifications, test method statements, test reports and test certificates.

Figure 3 - Relationship of Test Documentation



S727.2 The *Contractor* is responsible for the management of safety, controlling access and co-ordinating the test and commissioning activities across the Working Areas and at each interface, unless otherwise stated in the Scope and in accordance with section S1100.

S727.3 The *Contractor* establishes and implements a lead testing contractor commissioning manual for the testing and commissioning of the live systems. This applies from the beginning of phase 2 of testing and commissioning up to take over at the end of phase 4. It specifies how access, energisations and testing activities are controlled safely.

S727.4 Phase 5 is carried out by the *Client*, supported by the *Contractor*. From this point, the infrastructure is under automated control and is operated by the *Client's* maintainers and operators in accordance with its safety management systems.

S727.5 Phase 6 is carried out by the *Client*, supported by the *Contractor*.

S728 Testing and Commissioning Certification

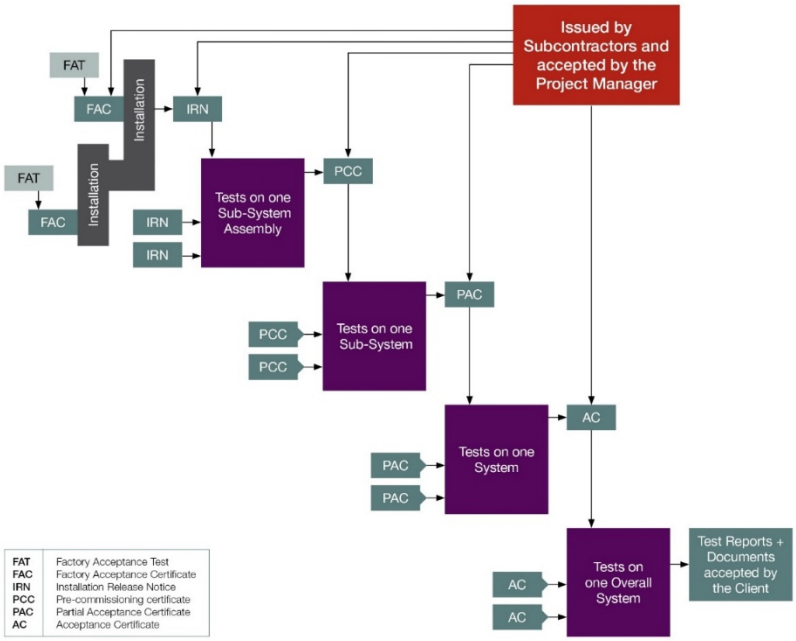
S728.1 The *Contractor* signs off the certificates produced by its Subcontractors. Figure 4 shows the certificates that are produced at each stage of testing. The certificates are accompanied by the test reports. The *Contractor* issues template certificates to its Subcontractors.

S728.2 All documentation related to tests carried out from phase 1 through to the end of phase 4 of testing and commissioning have been provided progressively by the *Contractor* and submitted to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

S728.3 The certification is tracked and recorded by the *Contractor* through the use of the Dynamic Object Orientated Requirement System Next Generation (DOORS NG) or a directly compatible product as part of the Project assurance process and provided to the *Project Manager* for information.

S728.4 The *Contractor* demonstrates compliance with the *Client* requirements via the DOORS NG database progressively across the design, development and testing phases.

Figure 4 - Testing and Commissioning Certification



S729 Integration Testing with the *Client's* and Others' Infrastructure

Integration Testing with Others

S729.1 Where integration with the systems provided by Others is required prior to the static integration testing phase, the interfacing system is brought to the system static test stage and a PCC/PAC or equivalent certificate issued by the *Contractor*.

S730 Building Up the Testing and Commissioning Sequence

Stage 1: Identification of all systems and sub-systems

S730.1 In accordance with section S2900 requirements the *Contractor* develops a logical and physical systems architecture which defines all systems and sub-systems within and interfacing to the *works*.

Stage 2: Identification of all system interfaces

S730.2 These interfaces are defined, categorised and managed in accordance with section S2900 requirements and the *Contractor's* 'systems engineering interface management plan'.

Stage 3: Development of interface specifications for system interfaces

S730.3 In accordance with requirements in section S2900 the *Contractor* develops interface control document (ICDs) encompassing system interface requirements for acceptance by the *Project Manager* in accordance with the Acceptance Procedure.

Stage 4: Division of systems and sub-systems into ComLot

S730.4 The *Contractor* identifies the systems and sub-systems and divides them into ComLots which are tested as the system is built up from components into sub-systems and systems. The *Contractor* ensures this process enables the unique identification of each part of the overall Project system and thus the progress of systems integration.

Stage 5: Definition of interfaces to be tested in the Project system

S730.5 The system interfaces identified and specified by the *Contractor* at stages 2 and 3 are assembled into a schedule of interface testing and submitted to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure. This testing falls into two groups

- off-site based testing and
- on-site testing.

S730.6 This schedule is incorporated into the Accepted Programme and provides a basis for the management of the integration testing. Depending on the test, the *Contractor* or Others is responsible for leading the interface test, its test plan, test results and following the test through to successful completion.

Stage 6: Development of test sequence

S730.7 Following identification of the ComLot and their interfaces, the testing activities (phases 1 to 4) per ComLot, sub-system and system are determined and linked together by the *Contractor*, using master programme logic to ensure that the sequences and interdependencies of activities are recognised.

S730.8 The *Contractor* develops its test sequences, submitted alongside the test and inspection plan, for acceptance by the *Project Manager*, in accordance with the Acceptance Procedure, in a series of diagrams that describe the logical order of the testing and this forms the commissioning logic diagram which also shows the dependencies between tests and the tie-in with the Accepted Programme.

Stage 7: Development of the testing and commissioning schedule

S730.9 The *Contractor* produces for the works, a testing and commissioning schedule based on the commissioning logic diagram and the Accepted Programme, for acceptance by the *Project Manager*, in accordance with the Acceptance Procedure.

S730.10 The *Client* produces an integrated testing and commissioning schedule for the whole of the Project and this is used for co-ordinating and managing testing and commissioning activities across all *boundaries of the site* and with Others.

Stage 8: Development of test plans

S730.11 The *Contractor* produces test plans for ComLots, its systems, system interfaces and the whole Project system. These reflect the build-up and integration of systems from its lots into systems and finally the whole Project system, for acceptance by the *Project Manager*, in accordance with the Acceptance Procedure, submitted 2 months prior to the relevant testing phase.

S730.12 The *Contractor* produces a single test plan to cover a single system, systems integration testing or dynamic testing but there are occasions where a single set of tests address a number of interfaces. Staff responsible for all the elements of the tests are identified in the test plans.

S730.13 The test specification for each system interface is based on the accepted interface control document, described in paragraph S730.3. The *Contractor* ensures that test specifications prove that the attributes of the interface have been achieved and that performance requirements have been met.

Stage 9: Testing and Systems Integration

S730.14 As the *Contractor* carries out testing of ComLots, sub-systems and systems, the results are recorded via test evidence and used to provide certification for the completion of a stage of testing, for acceptance by the *Project Manager*, in accordance with the Acceptance Procedure. The test results form part of a certified gateway process to ensure that the next stage of testing and systems integration is only undertaken when the activities of the previous test plan have been successfully completed and results provided.

S730.15 Following completion of the testing of systems, the *Contractor* carries out testing across system interfaces to check that the interface is as defined in the *Contractor's* interface control document.

S730.16 Following completion of systems integration testing, testing of the whole Project systems are undertaken in accordance with the test plans developed. This culminates in dynamic testing, during which road traffic runs on the project infrastructure under test conditions.

S735 Defects (in relation to Tests and Inspections and cross referenced with sections S430 and S660)

S735.1 Not used.

S740 Trial Operations

S740.1 The *Contractor* works with Others (including other Main Works Contractors (MWC)) to support the *Client* during *section* 2 trial operations to verify that the assets are functioning in accordance with the Scope.

S740.2 The *Client's* trial operations commence following completion of 'scheme stage' 5 (as defined in MCH 1349 Process for Commissioning and Handover of Roadside Operational Technology) (see link provided in Annex A)) for each Main Works Contract.

S740.3 The trial operations are undertaken by the *Client* Parties. The *Project Manager* provides the 'trial operations plan' to the *Contractor* 24 weeks in advance of the earlier of

- the Completion of *section 1* as shown on the Accepted Programme or
- the Completion Date of *section 1.*

The 'trial operations plan' includes details of the programme and type of trial operations.

S740.4 The *Contractor* consults with

- the *Client* (via the *Project Manager*),
- the Client Parties,
- the relevant Local Authority,
- the emergency services and
- other stakeholders identified in the Technology and Systems Commissioning Plan

and complies with their requirements to ensure that support is provided during the trial operations period.

S740.5 The *Contractor* provides a 'trial operations support plan' setting out how the *Contractor* supports the Client Parties in carrying out the trial operations that includes details and programme of

- trial operating centre exercises,
- on-road exercises (including incident response scenarios),
- maintainer exercises,
- trial emergency service exercises,
- trial exercise required by other stakeholders,
- controlled public use of the Project Roads and
- other performance and reliability activities in preparation for road opening.

This 'trial operations support plan' is prepared in consultation with

- the *Client* (via the *Project Manager*),
- the Client Parties,
- the relevant Local Authority,
- the emergency services,
- other stakeholders identified in the Technology and Systems Commissioning Plan.

The *Contractor* submits the 'trial operations support plan' in accordance with the Acceptance Procedure and accompanied by the Multiparty Collaboration Certificate, for acceptance by the *Project Manager*, 18 weeks in advance of the earlier of

- the Completion of *section 1* as shown on the Accepted Programme or
- the Completion Date of *section 1*.

S740.6 The *Contractor* ensures that a minimum of 10 personnel are based on Site (or at the operating centres) throughout the trial operation period, in accordance with the trial operations plan, unless otherwise agreed by the *Project Manager*. As minimum, the *Contractor* ensures that

- two of the personnel are available for management support roles and have the appropriate experience of trial operation management,
- two of the personnel are chartered engineers registered by the Engineering Council and members of the Institution of Engineering and Technology (IET) (or equivalent European body) and have the appropriate experience of highway technology services,
- two of the personnel are chartered engineers registered by the Engineering Council and members of the Institution of Civil Engineers (ICE) (or equivalent body) and have the appropriate experience of highway infrastructure,

- two of the personnel are chartered engineers registered by the Engineering Council and members of the Institution of Civil Engineers (ICE) (or equivalent body) and have the appropriate experience of highway Structures and
- two of the personnel are available for general support operations.

S740.7 During the trial operation period, in accordance with the trial operations plan, the *Contractor* ensures that

- temporary traffic management measures are maintained to ensure that roads subject to trial operations are closed to unauthorised users (authorised users will be advised by the *Supervisor* or *Project Manager*) in accordance with the trial operations plan, unless otherwise instructed by the *Supervisor*,
- undertakes any landscaping aftercare obligations in accordance with the accepted EMP3,
- temporary traffic management measures include for the safe re-entry of unauthorised vehicles onto the highway network,
- maintains the security and protection of the Site in accordance with section S215, unless otherwise agreed with the *Project Manager*,
- where instructed by the *Supervisor*, the temporary traffic management measures are removed or reinstated,
- a minimum of two experienced operatives are provided, with appropriate vehicles on a 24 hours a day, seven days a week basis whose sole responsibility is the operational supervision of the temporary traffic management measures and
- temporary traffic management measures are in accordance with section S240 and numbered appendix 1/17.

S760 Specific Requirements for Structures

S760.1 The *Contractor* ensures that prior to the commencement of any intrusive testing as part of the inspection and testing process above, a method statement is prepared for the proposed works (including for reinstatement or repair) that is agreed with the *Client* via the *Project Manager*, Railway Authority and relevant Local Authority (as appropriate).

S800 Management of the *works*

S800.1 Details included here support the *Client's* use of its data management systems and serve to provide a management tool for both Parties and Others.

S800.2 The *Contractor* ensures all management plans are updated at a frequency required to ensure the quality and effective integration of the *works* being delivered.

S800.3 The *Contractor* provides the required resources in accordance with, and to achieve, the Accepted Programme (or before acceptance of the first Accepted Programme) or the *Contractor's* programme submitted for acceptance.

Management Culture and 'Digital by Default'

S800.4 The *Project Manager* provides the LTC Execution Strategy, provided in Annex A, setting out the guiding principles, behaviours and values expected on the Project. The *Contractor* reviews the strategy and prepares a plan to outline how it aligns with the guiding principles of the strategy within its project execution plan detailed in section S825.

A reason for not accepting the plan is that

- it does not align with the guiding principles of the strategy,
- it does not demonstrate how
    - a collaborative culture is developed and adopted or
    - behaviours are developed and adopted or
- it does not provide the *Project Manager* with sufficient details as to how the guiding principles are to be delivered by the *Contractor*.

The *Contractor* implements the plan and ensures Staff adopt such behaviours and values in the performance of their role on the Project.

S800.5 The *Client's* ambition is to apply a 'digital by default' approach to project management and project controls integration in line with the government's digital strategy and guided by the LTC Digital Strategy (see links in Annex A). The *Contractor* develops processes for

- digital communications,
- automated digital data capture,
- automated digital data management and
- automated visualisations of the data (such as dashboards)

that support 'digital by default' including

- productivity and performance metrics for all areas of the scope,
- identification and analysis of trends in productivity and performance metrics,
- explanation of the root causes for trends in productivity and performance metrics with an identification of proposed changes, deviations or variances,
- any proposed corrective actions and
- opportunities to optimise effects

and submits these to the *Project Manager* within its project execution plan detailed in section S825.

S800.6 A reason for not accepting the processes is that they

- do not deliver 'digital by default' in line with the government's digital strategy and

guided by the LTC digital strategy or

- do not comply with the contract.

S800.7 The *Contractor* ensures that the manual handling of data and communications is not undertaken without the agreement of the *Project Manager*.

S800.8 The *Contractor* complies with the *Client's* Project Control Framework (PCF), B-EIR, EIR and data coding requirements to ensure project control data integration (management of scope, schedule, cost, invoicing, risk, resource, change, performance measurement and earned value metrics).

S800.9 The *Contractor* maintains transparency in data management and data flow in digital systems to facilitate easy access, retrieval, audit and use of information in day to day delivery.

S805 Project team – Others

S805.1 Not used.

S805.2 Not used.

S805.3 Not used.

S805.4 Not used.

S805.5 Not used.

S805.6 Not used.

S805.7 Not used.

S805.8 Not used.

S805.9 Not used.

S805.10 Not used.

Human resources data system

S805.11 The *Contractor* provides a fully functional electronic human resources (HR) data system(s) to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, within 32 weeks of the *starting date*, including the following functionality

- unique identifier reference for each Staff post,
- status of posts (filled, vacant or under offer or those under notice to leave the *Contractor*),
- creation of an organisation chart,
- a weekly workforce plan setting out planned versus actual resource levels per shift (reported on a monthly basis),
- tracking of status of recruitment for posts,
- details of Staff members including contact details and emergency contact details,
- records of training, skills and competencies required for each post,
- records of (each) Staff's training, skills and competencies including suitable, recognised and current qualifications and experience,
- report generation and exporting of data provided to the *Project Manager*, at intervals

agreed with the *Project Manager*, to enable reporting on all aspects of HR data including

- resourcing and recruitment,
- sickness,
- absences (including reasons),
- turnover,
- talent,
- skills requirements and any gaps in skills profile,
- equality, diversity and inclusion and
- training including budget monitoring and training completion,

- performance management (appraisal performance and outcomes),
- talent management reporting as agreed with the *Project Manager* and
- succession planning.

S805.12 The *Contractor* ensures that the data within the electronic data system is kept up to date on a weekly basis.

S805.13 The *Contractor* records each person entering a Working Area every day in accordance with section S220 and provides this information to the *Project Manager* as requested.

Organisation chart

S805.14 Not used.

S805.15 Not used.

S805.16 Not used.

S805.17 Not used.

S805.18 Not used.

S805.19 Not used.

S805.20 Not used.

S805.21 Not used.

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S805.73 Not used.

S805.74 Not used.

S805.75 Not used.

S805.76 Not used.

S805.77 Not used.

Tunnelling Manager

S805.78 The *Contractor* provides the tunnelling manager from the *starting date*. The responsibilities of the tunnelling manager include

- preparation of tunnel related safety documentation and daily review meeting process,
- preparation of work methods, risk assessments, inspection and testing related to Tunnel Boring Machine works and associated activities including
    - manufacture and fabrication,
    - transportation,
    - assembly,
    - launch,
    - operation and

    - dismantling and removal
- preparation of work methods, risk assessments, inspection and testing and sequencing for interfaces with the construction of cross passages,
- managing fit-out works,
- contributing to the *Contractor's* programme submitted for acceptance, specifically in relation to tunnelling activities,
- Plant and Materials and Equipment management,
- spoil and other waste management,
- overview of construction cost controlling,
- overview of all tunnel related reporting,
- overview of monthly payments to the subcontractors,
- assignment and co-ordination of personnel including liaison with tunnel foreman on labour allocation,
- management of subcontractors and suppliers,
- supports the *Contractor's* project manager in administering the contract and
- supports the *Supervisor* on all quality issues.

Mechanical, Electrical, Instrumentation, Control and Automation (MEICA) Manager

S805.79 The *Contractor* provides a mechanical, electrical, instrumentation, control and automation (MEICA) manager from the *starting date*. The responsibilities of the MEICA manager include

- leading the MEICA related works,
- assigning MEICA work and responsibilities to the MEICA engineers and supervisors,
- co-ordinating MEICA with other functional departments to complete all required installation and testing from component level through to integrated operation,
- leading the production of documentation including installation documents, test records, test procedures and other relevant documents required by the Scope,
- co-ordinating LTC Tunnel Systems engineering activities as defined in section S2900,
- supervising, directing, co-ordinating with, and managing subcontractors (at any stage of remoteness from the *Client*) on MEICA installation and commissioning activities and
- developing training materials intended for the *Client's* staff and the *Client's* contractors.

Optimised Contractor Involvement (OCI) Manager

S805.80 The *Contractor*

- provides an optimised contractor involvement (OCI) manager from the *starting date* to act as control point for all OCI activities and
- provides resources to ensure the OCI outcomes are achieved.

S810 Contract communication system

S810.1 The *Contractor* complies with the *Client's* communication and Information Systems requirements included in section S1900. For the purposes of contract administration, the *Client* uses contract event management and reporting system (CEMAR) for all formal contract administration records.

S810.2 The *Client* provides the *Contractor* with permissions for CEMAR to manage contractual correspondence, documents, drawings and data submissions, and for the storage of all such contract administration records.

S810.3 The *Contractor* makes all communications required under the contract via CEMAR unless the *Project Manager* has suspended its use or advised that it is not to be used.

S810.4 The *Contractor* ensures that e-mail is not used for formal contract correspondence but is acceptable as a means of forwarding correspondence.

S810.5 The *Client* provides licenses for the use of CEMAR for the contract. The *Contractor* proposes the number of CEMAR users needed, for agreement by the *Project Manager*. The *Client* provides access to CEMAR for the agreed users within three weeks of being notified by the *Project Manager*, unless for data security reasons the *Client* is unable to do so.

S810.6 The *Client* provides end-user training for the agreed Staff using CEMAR.

S810.7 The *Contractor* notifies the *Project Manager* of the date of Staff leaving or ceasing to use CEMAR.

S815 Commercial management procedures

Commercial (Information Management Systems)

S815.1 The *Client* uses PRISM as its cost and performance management software aligned to the commercial management requirements for the contract. This software is used to track and manage cost and to report Earned Value Management (EVM) performance.

S815.2 The *Contractor* provides, and ensures all subcontractors (at any stage of remoteness from the *Client*) provide, all cost and performance data in a format fully compatible with PRISM and aligned to the Work Breakdown Structure (WBS) and Cost Breakdown Structure (CBS), unless otherwise agreed with the *Project Manager*.

S815.3 The *Client* provides licences for the use of PRISM to the *Contractor* in accordance with section S837. The *Contractor* proposes the number of PRISM users needed in order to Provide the Works, for agreement by the *Project Manager*. The *Client* provides access to PRISM for the agreed users within three weeks of the agreement, unless for data security reasons the *Client* is unable to do so.

Commercial Information Requirements

S815.4 The *Contractor's* forecast of

- the lump sums,
- the total Defined Cost for the whole of the *works* (detailing the *Contractor's* risk allowance included within Defined Cost (identifying draw down of Risk Quota)),
- the forecast consumption of the Risk Quota (detailing the reasons why any Risk Quota is not to be consumed to Provide the Works) and
- lump sum Fee

takes into account the potential impact of early warnings and of compensation events whether they be at notified or implemented stage.

S815.5 Each quarter commencing on the *starting date* (aligned to the Project Reporting Calendar) the *Contractor* provides to the *Project Manager* a cost time phased profile (including the resource headcount profile) for the whole of the *works* up to and including Completion of the whole of the *works* aligned to the Accepted Programme (or the period up to the first Accepted Programme, the last programme submitted for acceptance). The cost time phased profile is detailed to the agreed PRISM cost/control (CBS) account reporting levels. The *Contractor* provides details on how this varies from the last submitted quarterly cost time phased profile against the latest submitted quarterly cost time phased profile, reporting upon the variances between the two.

S815.6 The *Contractor* reports monthly in accordance with Project Reporting Calendar using the information exchange requirements described in section S1900 to the *Project Manager* on the variance in the forecasts of the components of the Target Budget (lump sums, Defined Cost, Risk Quota, Risk Quota consumption and lump sum Fee) from the *starting date.* The *Contractor* includes this in the 'variance report'.

S815.7 The management of change to the Scope and *conditions of contract* is communicated using the CEMAR system. Any Scope change is only accepted by the *Project Manager* once it has been evidenced and agreed in accordance with the CEMAR system.

S815.8 The *Contractor* identifies any early warnings and compensation events aligned to the WBS and CBS within any submitted forecasts.

S815.9 The *Contractor* ensures that the 'variance report' includes

- the *Contractor's* forecast (see paragraph S815.4) and details of all Disallowed Costs incurred and
- the *Contractor's* forecasts of the Target Budget including any estimates of unimplemented compensation events and risk allowance (including Risk Quota and Risk Quota consumption) within the Target Budget

incurred in the month, demonstrating monies paid and accruals of liability. These are substantiated by records, which are accessible for review and audit by the *Project Manager* upon request.

S815.10 Without the prior agreement of the *Project Manager*, the *Contractor* does not move allocated Defined Costs budgets between control accounts. The *Contractor* ensures a record of change control of such reallocations.

S815.11 When providing estimates for forecasts and quotations for compensation events to the *Project Manager* to support the *Contractor's* forecast and *Contractor's* forecast of the Target Budget including any estimates of unimplemented compensation events, the *Contractor* provides a detailed breakdown of the cost components and cost profile aligned to the CBS and WBS and

corresponding schedule with an analysis of the impacts to cost and schedule for the items in bullet point one and two in paragraph S815.9.

S815.12 The *Contractor* reports on risk drawdown on the periodic basis agreed with the *Project Manager* and provides a risk analysis report including a waterfall chart for traceability for the items in bullet point one and two in paragraph S815.9.

S815.13 The *Contractor* provides detailed forecasts as set out in the items in bullet point one and two in paragraph S815.9 from the *starting date* until Completion of the whole of the *works* and submits them to the *Project Manager* for review. The *Project Manager* may return comments and the *Contractor* addresses those comments by the *period for reply*.

S815.14 The *Contractor* operates open book accounting and provides detailed records of costs incurred from its accounts and ledgers to support and evidence the actual cost incurred as and when required by the *Project Manager.* The *Contractor* makes available all records, Staff, subcontractors (at any stage of remoteness from the *Client*) and other required resource when required to meet this requirement.

Cash Flow Forecast

S815.15 With each payment application submitted to the *Project Manager*, the *Contractor* includes a 16 week lookahead cash flow forecast for all *works* to be undertaken, using the relevant contract payment conditions.

The *Contractor* identifies and provides details of any payments to be made in currencies other than the *currency of the contract* and includes details of the forecast exchange rates as part of the 16 week lookahead cash flow forecast.

The *Contractor* provides details on how this varies from the last submitted 16 week lookahead cash flow forecast against the latest submitted 16 week lookahead cash flow forecast, reporting upon the variances between the two.

S815.16 Each quarter commencing on the *starting date* (aligned to the Project Reporting Calendar) the *Contractor* provides to the *Project Manager* a cashflow forecast for the whole of the *works* up to and including Completion of the whole of the *works* aligned to the Accepted Programme (or the period up to the first Accepted Programme, the last *Contractor's* programme submitted for acceptance). The cash flow forecast is detailed to the agreed PRISM cost/control (CBS) account reporting levels. The *Contractor* provides details on how this varies from the last submitted quarterly cash flow forecast against the latest submitted quarterly cash flow forecast, reporting upon the variances between the two.

S815.17 On a monthly basis, the *Contractor* provides to the *Project Manager*, reports on the in-month and cumulative in-quarter variance of the latest submitted quarterly cash flow forecast and how they have performed in the current month, reporting upon the variances between the two.

S815.18 The *Contractor* attends quarterly performance review meetings with the *Project Manager* and other Main Works Contractors to share knowledge, discuss issues, and identify trends in performance indicators and opportunities for performance improvement. The *Project Manager* advises the *Contractor* of the frequency and structure of these meetings.

S816 Risk Management

S816.1 The *Client* recognises that the management of risk is crucial to the successful delivery of its objectives. As such a Project wide risk framework has been implemented to enable the effective and efficient management of risk within the *Client*'s organisation and within its supply chain. The *Contractor* develops and implements a risk and issues management process in line with 'ISO 31000 - Risk management: Principles and Guidance system' as described in section S600 (Quality) and the LTC risk and opportunity management plan (see links in Annex A).

S816.2 The *Contractor* develops a 'risk management process' which ensures that

- risks are systematically identified, understood, prioritised, and managed by the correct individuals consistently and efficiently,
- assurance is provided to the *Project Manager*, *Client* and Others that risks are understood and managed,
- all organisations are fully aligned with and demonstrably meet the requirements of the *Client*'s risk management framework and
- identified risks are reviewed and active consideration given as to whether a provision is to be made in the forecast of the total Defined Costs for the whole of the *works*.

The *Contractor* submits the risk management process to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure and accompanied by a Multiparty Collaboration Certificate, within 30 weeks of the *starting date*. A reason for not accepting the process is it

- does not comply with the Scope,
- does not demonstrate how Xactium is to be used,
- is not aligned with the requirements of ISO 31000 or
- is not aligned with the LTC 'Risk and opportunity management plan' (see link in Annex A).

S816.3 The *Contractor* utilises the Project risk management framework and uses the *Client's*

- risk management system - Xactium, to manage its data in accordance with the *Client's* risk and opportunity management plan,
- Risk Breakdown Structure for the coding of risks,
- risk scoring matrix as detailed in the *Client*'s risk and opportunity management plan,
- Project Control Framework,
- Major Project (MP) Risk Management Manual and
- Xactium user guide

all links are provided in Annex A.

S816.4 The *Client* and *Project Manager* use Xactium as its risk management database to record and update all risk data across the Project to identify risk, opportunities, and risk mitigation actions.

S816.5 When new risks or opportunities are raised, the *Contractor* demonstrates how it has arrived at potential risk impacts using project information e.g. the potential cost impact is linked to the project cost model and the schedule impact reflects both the Project and contract critical paths and float allowances.

S816.6 The *Contractor* ensures that risks that could impact on its ability to Provide the Works are systematically identified, understood, prioritised, and managed while being continually reviewed and communicated collaboratively with the *Project Manager* and other LTC contractors (as appropriate) on a monthly basis as described below.

S816.7 The *Contractor* provides to the *Project Manager* a monthly 'period end report' regarding risk including the following information

- full scope risk and opportunity estimated monetary value and profile over time for current and post-mitigated positions,
- commentary around the current and post mitigated estimated monetary value of the identified risks and opportunities, and what has driven the change in the period,

- the principal risks and opportunities, and how they are being managed,
- existing mitigation actions identified by the *Project Manager* or *Contractor* for review,
- commentary on progress on completing mitigation action,
- selected risks or opportunities for escalation to the *Project Manager* including options for mitigation and describing what decision is required,
- the number of risks and opportunities opened and closed in the period,
- how many risks, opportunities, mitigation or exploitation actions are overdue for review or delivery,
- explanatory narrative for any risks, opportunities, mitigation or exploitation actions overdue for a review for more than one reporting period,
- any changes required in time risk allowance with justification (and detailing relevant activities) and
- evidence that opportunities are being implemented and benefits maximised.

Project Risk Analysis

S816.8 The *Contractor* carries out quantitative schedule risk analysis (QSRA) and quantitative cost risk analysis (QCRA) on the first Accepted Programme to assess the confidence levels of achieving the programme and risk budget.

S816.9 The *Contractor* submits a report on the QSRA and QCRA results to the *Project Manager* on a quarterly basis for acceptance. This includes

- the assumptions made in carrying out the analysis,
- the modelling parameters,
- details of any duration uncertainty that has been applied (for the QSRA),
- audit trail of changes from the last accepted QSRA and QCRA and
- the probabilities and likely delays linked to activities in the programme (for the QSRA).

S816.10 A reason for not accepting the report is it

- does not meet requirements of the Scope or
- does provide sufficient detail for the *Project Manager* to understand it.

S816.11 To allow the *Project Manager* to carry out a Project level QSRA and QCRA, the *Contractor's* programme submitted for acceptance includes

- removal of all constraints and float unless justified,
- predecessor and successor activities for all activities except the first and last,
- identification of non-essential tasks,
- finish to start (FS) links or if other types of links are used, the *Contractor* lists them,
- positive lags only if they reflect a certainty or near certainty,
- activities rather than lags as these are visible (as opposed to invisible lags),
- no negative lags for risk modelling purposes and
- the calendars used and why.

The *Project Manager* notifies the *Contractor* of any further requirements within seven days of the *starting date*.

S820 *Contractor's* application for payment (AfP)

S820.1 No additional requirements other than those identified elsewhere within the Scope.

S825 Project execution plan (Project Management)

S825.1 The *Contractor* submits its 'project execution plan (PEP)' in accordance with section S3000, to the *Project Manager* for acceptance. The PEP describes how the *Contractor* manages and Provides the Works including

- a list of Deliverables to be developed and implemented,
- details of support required from the *Client*, in terms of governance, liaison and engagement,
- details of alignment with the guiding principles of the LTC Execution Strategy provided in Annex A,
- methodologies for mobilisation and delivery,
- a plan for phasing and sequencing activities,
- construction methodologies,
- carbon management,
- outline details of the supporting plans and procedures including
    - a 'HSW implementation plan' as described in section S1100,
    - a site 'security management plan' as described in section S215,
    - an 'information security management plan' as described in section S228,
    - the second iteration of the Environmental Management Plan (EMP2) as described in section S207,
    - the 'carbon management plan' and carbon reduction measures as described in section S209,
    - the 'stakeholder, communications and engagement plan' as described in section S865,
    - the interfaces matrix as described in section S926,
    - the 'Consents management plan' as described in section S929,
    - opportunities for innovation, efficiency and legacy outcomes including skills and employment and biodiversity enhancements, as described in section S254,
    - a 'procurement and subcontracting plan' as described in section S1200,
    - a 'logistics plan' and 'site specific travel plan' as described in section S299,
    - a 'traffic management plan' as described in section S240 and
    - the processes relating to *Client's* ambition for 'digital by default' as described in paragraph S800.5,
- the programme including commentary on proposed dates, activities, and the timeframes in the Contract Data Part 1,
- key dates for *Contractor, Client* and Others,
- dates for submitting proposals for early works required,
- resource planning,
- a cost management organisation structure including the roles and responsibilities for

managing subcontractors' (at any stage of remoteness from the *Client*) Defined Costs,

- support or services required from *Client* and Others which includes land access, information requirements, instrumentation, and monitoring,
- monitoring requirements which include noise, water, air quality, movement, traffic flow,
- identification of who the CDM duty holders are,
- an organisation chart structure that includes a role profile for each role required to Provide the Works and
- a plan for reporting progress.

When the supporting documents and procedures are accepted, then the *Contractor* updates the PEP to provide links to the accepted documents and procedures and remove the outline details.

S825.2 A reason for not accepting the PEP is that it contradicts any other requirements described in the contract.

Integrated project controls plan

S825.3 The *Contractor* submits the 'integrated project controls plan' (IPCP) to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure and accompanied by a Multiparty Collaboration Certificate, within four weeks of the *starting date*. The IPCP describes how the *Contractor* delivers an integrated solution that provides transparency and accessibility of data to the *Project Manager*. A reason for not accepting the IPCP is it does not comply with the Scope.

S825.4 The *Contractor* ensures that the IPCP aligns with the approaches, processes and procedures given in the *Contractor's* 'project execution plan'.

S825.5 The IPCP covers, as a minimum, the following topics

- commercial management,
- carbon management,
- risk management,
- change and baseline management,
- health, safety, and wellbeing reporting,
- performance measurement and management of all performance metrics,
- quality management,
- customer management,
- programme management and
- Deliverable management.

S825.6 The *Contractor* reviews and updates the IPCP with the *Project Manager* every three months, commencing six months after the *starting date*. The *Contractor* submits the updated IPCP to the *Project Manager* for acceptance.

S830 Provision of Cost Information

S830.1 A WBS incorporating a Cost Breakdown Structure (CBS) is prescribed by the *Client*. The *Contractor* submits cost information and financial information to the *Project Manager* in accordance with the *Client's* Cost Breakdown Structure (CBS).

S830.2 The *Contractor* keeps records of all Defined Cost including

- readily identifiable accounts and details for all monies paid out and incurred in respect of the addition to, alteration, diversion, protection, removal, or replacement of existing assets belonging to or used by Statutory Undertakers,
- readily identifiable accounts and details for all monies paid out and incurred in respect of Others,
- cash and bank transactions and reports,
- cost ledger transactions and reports,
- purchase ledger transactions and reports,
- sales ledger transactions and reports,
- subcontractor ledger transactions and reports,
- expenses transactions and reports,
- petty cash transactions and reports,
- capital expenditure reports,
- labour details and reports, including planned and actual by role,
- Staff's monthly pay details and reports and
- any costs paid by the *Client* on behalf of the *Contractor*.

S830.3 The *Contractor* provides the *Project Manager* with quarterly management accounts and reports for the documents and records detailed in paragraph S830.2.

S830.4 The *Contractor* ensures that any Defined Cost incurred or recovered in relation to insurance claims are recorded separately within the *Contractor*'s cost accounting system.

S830.5 The *Contractor* establishes financial systems that report the Defined Costs and AfPs and demonstrates to the *Project Manager* that these are complete, accurate and complies with the contract.

S830.6 The *Contractor* establishes controls to minimise the risk of fraud and misstatement of Defined Costs and subcontractor insolvency.

S830.7 Within the timeframe described in the *Contractor's* IPCP, the *Contractor* produces a 'cost management and accounts administration plan' and submits it for the *Project Manager*'s review and acceptance. The 'cost management and accounts administration plan' includes details of the *Contractor's* existing business and financial procedures, plans or other materials.

S830.8 The *Contractor* demonstrates that all project accounting is aligned to control accounts accepted by the *Project Manager* as described in section S815.

S830.9 The 'cost management and accounts administration plan' ensures that the *Contractor*'s accounts management procedure includes

- maintaining a cash book with detailed analysis,
- a cost ledger in which the *Contractor*
    - maintains a Defined Cost and commitment for payment ledger and reporting system,
    - codes all itemised cost entries in accordance with the Project's WBS and CBS system by each activity and by each activity main element of the Schedule of Cost Components,

- ensures all journals transferring Defined Cost from one cost centre to another are documented and reported to the *Project Manager* including a narrative explanation as to why the transfer has been made and
- codes all compensation events and Disallowed Costs in accordance with Project's WBS and CBS system

- purchase ledger in which the *Contractor*
  - processes invoices and credit notes – from receipt to payment including matching to goods received notes, Equipment hire returns, purchase orders, invoices held in query,
  - monitors spend against purchase orders and maintains detailed records for audit purposes,
  - retains all purchase order documentation and any changes thereto,
  - does not make any 'on-account' payments without the prior agreement of the *Project Manager,*
  - assesses accruals and provides an accrual record to the *Project Manager* as backup for its assessment of the amount due,
  - monitors debit and credit balances and
  - keeps monthly account statements of subcontractor costs
- capital expenditure under which the *Contractor*
  - monitors the effectiveness of purchase of Equipment against hire,
  - sets *Client* levels required for purchase of assets and
  - tracks depreciation, write-off, and damage
- Plant and Materials monitoring of
  - deliveries and removal of Plant and Materials including all checking and
  - wastage
- Equipment hires under which the *Contractor*
  - monitors Equipment on and off-hire dates,
  - uses detailed requisition documentation for work areas, operations and hire durations,
  - demonstrates that selection was made on open market rates, including quotes from different sources and narrative to support this decision,
  - maintains and reviews a live Equipment register, tracking delivery and removal thereof and
  - monitors and reports to the *Project Manager* on the effectiveness of hire against purchase of Equipment for all items where the *Contractor* proposes to long term hire (periods more than six months)
- sales ledger under which the *Contractor*
  - processes sales invoices,
  - records proceeds for temporary labour accommodation, scrap, assets and asset disposal, work for third-parties,
  - records pursuits of outstanding debtors and
  - provides for bad debt write-off
- subcontractor ledger including
  - monitoring of spend against subcontractor orders and produce records for audit

purposes,

- detailed monthly breakdown of subcontractor payments and evidence of payments to subcontractors,
- retention of all subcontractor order documentation and any changes thereto,
- retention of all relevant documentation and backup to payments,
- monitoring of compliance with the Income Tax (Construction Industry Scheme) Regulations 2005 (SI 2005/2045) including any required certificates and maintains a 'CIS register',
- subcontractor final accounts,
- effective management of back-to-back contracts with subcontractors and
- monitoring of internal company charges and fee on fee issues

- expenses including
  - monitoring of expenditure,
  - review of authorisation levels for expenses,
  - processing and payment of expenses and
  - declined expenses
- petty cash (including electronic payment) including
  - details of floats held,
  - cashier authorisation levels,
  - monitoring of petty cash expenditure and
  - processing and payment of expenses
- labour (direct and indirect) including
  - control of the take on of labour by the completion of detailed labour requisitions outlining trade requirement, work area and description and duration of operations together with originators name countersigned by the *Contractor*'s Project Director,
  - the *Contractor* submitting to the *Project Manager* for review, all approvals for labour intakes,
  - the *Contractor* providing a weekly labour attendance summary by trade for the contract and for each work location,
  - a Staff control system based on timesheets (linked back to *Contractor's* direct Staff in the accepted Organisation Chart and the headcount resource profile) authorised by the *Contractor's* project director's representative (the *Contractor* notifies the identities of the representatives to the *Project Manager* prior to the first *access date* and keeps it up to date as and when changes occur) and coded according to the agreed code of accounts. Prior to submission to the *Project Manager*, the *Contractor* ensures they are validated by the *Contractor's* Commercial Director. Timesheets to be monitored and checked against the swipe card and clock card attendance control records generated by the *Contractor,*
  - daily time and allocation sheets are reconciled weekly to clocked and booked hours,
  - provide when requested by the *Project Manager* payroll build-ups and information to support pay entitlements for Staff,
  - National Insurance contribution build-ups for Staff and

- approved overtime records and separation of normal hours and overtime hours

- Staff paid monthly including
  - information for such Staff's work locations and where ordinarily split between multiple locations provide details,
  - monitoring of attendance for all Staff involved who Provide the Works through production of weekly timesheets,
  - an attendance register for such Staff highlighting periods of study, sickness, absenteeism, annual leave to support AfPs,
  - utilisation of timesheets to code Staff cost according to the agreed code of accounts,
  - provision when requested by the *Project Manager* of payroll build-ups and information to support pay entitlements for Staff and
  - approved overtime records and separation of normal hours and overtime hours and

- other records including
  - details of all insurance payments received from insurers and
  - VAT returns.

A reason for not accepting the plan is it does not detail how the *Contractor* provides the information needed above.

Earned Value and Earned Schedule Reporting

S830.10 The *Project Manager* develops a Project wide cost management plan setting out the framework for cost management and the expectation for earned value and earned schedule reporting and provides it to the *Contractor* within 14 days of the *starting date*. The *Contractor* provides EVM performance against a standard WBS specified by the *Client* through the provision of the data in the *Client's* Information Systems (PRISM). This data includes information relating to subcontractors (at any stage of remoteness from the *Client*).

S830.11 The *Contractor* ensures its subcontractors make financial submissions in the same format.

S831 Provision for Costs Capture information

S831.1 The outline requirements for cost capture are detailed below to be supplied in accordance with section S830 include

- a bill of quantities structured and coded to the Work Breakdown Structure (WBS) with a six-column split (staff, labour, plant and materials, equipment, subcontract and other),
- resource rate build ups and schedules,
- subcontractor comparison sheets,
- full set of successful subcontractors' quotations,
- A summary of all successful subcontractors' quotations on a template provided by the *Project Manager* (see link at Annex A),
- full set of drawings used to price the tender,
- priced *Contractor*'s PCF stage 5 Early Warnings Register and
- *Contractor*'s rate card.

S831.2 Data to be supplied by the *Contractor* after the *starting date* includes

- initial order values for the order placed with subcontractors, summarised against the original quotation on the template provided and
- final outturn costs and the value of any change events summarised by subcontractor against the original subcontract order.

S832 Invoicing

S832.1 The *Contractor* ensures that the purchase order number that is provided by the *Project Manager* is included on each invoice it submits. The *Contractor* submits such records as requested by the *Project Manager* with each invoice in the format as required by the *Client.*

S832.2 The *Contractor* provides a WBS and CBS breakdown of the invoice in the format required by the *Project Manager* (see link in Annex A). A Cost Breakdown Structure is prescribed by the *Client* and is set link in Annex A. The *Contractor* ensures its data collection system has the capability to capture and code costs to CBS structure level 3 (on the current version or any replacement). The *Contractor* allocates costs to the level of detail CBS structure level 4.

S835 Data collection system

S835.1 The *Contractor* captures all costs within a data collection system configured to align with the *Client's* WBS CBS (see link provided in Annex A), as a minimum, for use on the contract in respect of applications for payment.

S835.2 The *Contractor* provides the *Project Manager* (and its team) access to its data collection systems from the *starting date*.

S835.3 If the *Client's* minimum requirements for the *Contractor's* data collection system set out in this section S835 are not met, the *Contractor* is required to effect such modifications or enhancements to its own data collection system, or those of its subcontractors (at any stage of remoteness from the *Client*), as are required, to meet the *Client's* requirements.

S836 Provision of electronic documents and data

S836.1 If information is to be exchanged electronically, the *Contractor* complies with the *Client's* procedures for electronic exchanges (see link at Annex A), including requirements contained in section S228, for safeguarding the connection and the format of transmitted data.

S836.2 For non-electronic exchange of information, the *Contractor* complies with the *Client's* procedures for non-electronic exchanges (see link at Annex A) for safeguarding the transmitted data.

S836.3 Electronically stored data is provided in a format capable of transfer to readily available equipment in general use as described in section S1900.

S837 Information Systems

S837.1 The *Contractor* complies with and uses the *Client's* Information Systems to share information and data.

S837.2 The *Client*'s Information Systems are in Table 8 or any revised systems notified by the *Project Manager*

Table 8 - *Client's* Information Systems

Capability	System	Number of licenses provided to the *Contractor*	Training provided to the *Contractor*
Risk management	Xactium	15	Yes
Schedule	Primavera P6	0	No
Cost management	PRISM	No limit	Yes
Contract management	CEMAR	No limit	Yes
Document management and record	Business Collaborator	5	Yes
Data analysis and reporting	PowerBI The *Project Manager* and *Contractor* use a Data Analytics and Reporting Platform, owned by the *Client* for reporting purposes. The Data Analytics and Reporting Platform provides live reports via dashboards incorporating third-party data or other data sources.	10 (read only access)	Yes
Health and safety management	AirsWeb or such other health and safety management system such as Highways Accident Reporting Tool (HART) as in use at the time.	The *Contractor* proposes the number of licenses needed in order to Provide the Works, for agreement by the *Project Manager*.	Yes
Design .management	ProjectWise	5	Yes
Geographical information	ArcGIS	Unlimited viewer licenses	Yes
Collaboration and integration	Office 365 The *Client* owns the Office 365 platform. The *Contractor* operates or utilises the Office 365 platform for • mail and calendaring,	N/A	No

	• collaborative authoring for work in progress, • file management for work in progress, • instant messaging, • video conferencing and • workflow automation.		
Stakeholder management	Dynamics 365	25	Yes
Commitments and Requirements Tool	DOORS Next Generation	The *Contractor* proposes the number of licenses needed in order to Provide the Works for agreement by the *Project Manager.*	Yes

S838 Disclosure of information

S838.1 The *Contractor* acknowledges that the *Client* may receive Disclosure Requests and that the *Client* may be obliged (subject to the application of any relevant exemption and, where applicable, the "Public Interest Test", link at Annex A) to disclose information (including commercial information) pursuant to a Disclosure Request. Where practicable, the *Client* through the *Project Manager* consults with the *Contractor* before doing so in accordance with the relevant code of practice. The *Contractor* responds to any consultation promptly and within any deadlines set by the *Client* and to the satisfaction of the *Client*. The *Contractor* acknowledges that it is for the *Client* to determine whether such information is to be disclosed.

S838.2 When requested to do so by the *Project Manager*, the *Contractor* promptly provides information in its possession relating to the contract and assists and co-operates with the *Project Manager* to enable the *Client* to respond to a Disclosure Request within the time limit set out in the relevant legislation.

S838.3 The *Contractor* promptly passes any Disclosure Request which it receives to the *Project Manager*. The *Contractor* does not respond directly to a Disclosure Request unless instructed to do so by the *Project Manager*.

S838.4 The *Contractor* acknowledges that the *Client* is obliged to publish information relating to the contract in accordance with Procurement Policy Note 01/17 entitled “The Transparency of Suppliers and Government to the Public” dated 16th February 2017 (or any later revision) (the “PPN”), (see link provided in Annex A) except to the extent that any information in it is exempt from disclosure pursuant to the Freedom of Information Act 2000 (see link provided in Annex A) and the Environment Information Regulations 2004. The *Client* consults with the *Contractor* before deciding whether information is exempt, but the *Contractor* acknowledges that the *Client* has the final decision.

S838.5 The *Contractor* acknowledges that the *Client* is obliged to publish the provisions of the contract in accordance with the Cabinet Office guidance entitled ‘Guidance on the transparency requirements for publishing on Contracts Finder’ (or any later revision) (see link provided in Annex A) except to the extent that in it is exempt from disclosure pursuant to the Freedom of Information Act 2000. The *Client* consults with the *Contractor* before deciding whether information is exempt, but the *Contractor* acknowledges that the *Client* has the final decision. The *Contractor* co-operates with and assists the *Project Manager* and *Client* to publish the contract in accordance with the *Client's* obligation.

S838.6 The *Contractor*

- co-operates with and assists the *Project Manager* to enable the *Client* to comply with its obligation to publish information in accordance with PPN 01/17 or any later revision,
- agrees with the *Project Manager* a schedule for the release to the public of information relating to the contract, by the *Client* in accordance with the terms of PPN 01/17,
- provides information to assist the *Client* in responding to queries from the public as required by PPN 01/17 and as required by the *Project Manager* and
- supplies the *Project Manager* with financial data relating to the contract in the form and at the times specified in PPN 01/17.

S840 Customer Relationship Management (CRM)

S840.1 The *Client* operates a customer relationship management (CRM) system for managing all stakeholder and Customer correspondence, using MS Dynamics 365. The *Contractor* uses the *Client's* CRM system for managing all stakeholder and customer correspondence, as described in section S865.

S840.2 The *Contractor* liaises with the *Project Manager* to ensure that appropriate *Contractor's* Staff receive CRM training. CRM training is provided by the *Client* and captured as part of the *Client's* onboarding process for Staff that require access to the CRM system.

S840.3 The *Contractor* complies with the *Client* protocols for the operation of the CRM system, including adhering to General Data Protection Regulations (GDPR) guidelines, as referenced in section S227. Staff that require access to the CRM system are provided with a Lower Thames Crossing Project email address within a defined timeframe. The *Contractor* issues requests to access the CRM system to the *Project Manager* and access is provided within three weeks of such request.

S845 Training for Information Management Systems

S845.1 The *Client* provides training to identified Staff for systems listed in section S837.

S845.2 The *Contractor* proposes a list of appropriate Staff to be trained for each system for agreement by the *Project Manager*. The *Contractor* liaises with the *Project Manager* to programme the training to optimise efficiencies.

S850 Meetings and Reporting

S850.1 The *Project Manager* provides the *Contractor* with the Project Reporting Calendar within one week of the *starting date*.

Monthly Progress Meeting

S850.2 The *Contractor* convenes and attends monthly meetings with the *Project Manager*. The *Contractor's* attendees appropriate to discuss the agenda items.

S850.3 The monthly meetings are held at a location to be agreed between the *Contractor* and the *Project Manager*.

S850.4 The *Contractor* submits an agenda and terms of reference for all meetings, including workshops, to the *Project Manager* for agreement four Working Days prior to the meeting.

S850.5 The *Contractor* includes imperative moments at the start of meetings. The *Client* focuses on three imperatives

- safety – the aim is that no one is harmed when travelling, working on the Strategic Road Network (SRN) and the Project.
- customer service – improving what it does which impacts those that use the roads and
- delivering the Roads Investment Strategy (see link provided in Annex A) – on time and efficiently.

S850.6 The *Contractor* ensures that customer service and health, safety and wellbeing issues are an agenda item at monthly progress meetings.

S850.7 The *Contractor* prepares and issues minutes of the meeting or workshop to the *Project Manager* for agreement within one week of the date of the meeting or workshop. The minutes include an action list with assigned responsibilities and timescales for action.

S850.8 The *Contractor* submits to the *Project Manager*, at least 2 working days in advance of the meeting, a 'monthly progress report' and accompanying data files to include the following information

- health, safety, and wellbeing (including CDM) issues,
- a quality review report in accordance with section S600,
- progress report for the period covered by the meeting,
- information related to Project and contract performance indicators,
- programme for the next reporting period highlighting Key Dates and key milestones,
- a progressed schedule demonstrating performance against baseline with actual start dates and finish dates and a narrative reason for deviation or mitigation actions,
- the forecast completion dates for all remaining or incomplete activities,
- any issues impacting Providing the Works including
    - quality,
    - customer service,
    - design,
    - cross contract interfaces and
    - construction
- insurance-related issues,
- certificates required by the contract and their status,
- confirmation of
    - the *Contractor's* forecast for the final Price for Work Done to Date for Completion of each *section* in accordance with the Control Accounts,
    - the *Contractor's* forecast of the total Defined Cost for the whole of the *works* in accordance with the Control Accounts,
    - the *Contractor's* forecast of the drawdown of Risk Quota for the whole of the *works* in accordance with the Control Accounts,
    - a gap analysis of the differences to the Target Budget including the *Contractor's* allowance for compensation events that have not been implemented and
- performance derived from earned value management for the current period and the cumulative performance with supporting narrative to explain cost and schedule

variances.

- key production quantities (including total, forecast and actual installed quantities) and productivity rates,
- payment schedule – agreement of compensation events,
- procurement of subcontractors,
- Customer complaints,
- Consents and environmental update
    - the Consents to be submitted in the following month,
    - Consents not submitted that were forecast to be submitted,
    - progress on the discharge of Consent conditions and
    - the Consent issues
- skills and employment metrics,
- carbon emissions information as required by section S209,
- details on planned headcount vs actual headcount of resources,
- Efficiency Register progress updates,
- Early Warning Register and
- media community liaison, publicity and advertising matters.

Safety control review group (SCRG) meetings

S850.9 The *Contractor* collaborates with the *Project Manager* to facilitate SCRG meetings.

S850.10 The *Project Manager*

- provides the SCRG secretariate duties,
- chairs the SCRG meetings,
- refers activity type C categorisations (as defined in GG 104) to the national safety control review group (NSCRG),
- maintains the SCRG workflow (records of all SCRG proceedings and forward lookahead),
- provides an agenda (including any other relevant information provided by the *Contractor*),
- identifies all attendees in consultation with the *Contractor* and
- notifies the *Contractor* one week in advance of each SCRG meeting.

S850.11 The *Contractor*

- notifies the *Project Manager* of the need for an SCRG meeting (including an executive summary of the matters arising for consideration),
- arranges a venue for the SCRG meetings at a location that is agreed with the *Project Manager* and
- notifies the *Project Manager* where matters arising impact upon other Main Works Contractors (to ensure the other Main Works Contractor(s) attendance at the relevant SCRG meeting)

four weeks in advance of each proposed SCRG meeting.

S850.12 The *Contractor* provides the *Project Manager* with the information relating to the matters arising (including any supporting information or additional information requested by the SCRG) two weeks in advance of each SCRG meeting.

S850.13 The *Contractor*

- ensures all information relating to the matters arising (including any supporting information or additional information requested by the SCRG) is presented at the SCRG meetings,
- attends all SCRG meetings when invited by the *Project Manager*,
- ensures the programme submitted for acceptance provides the required time for SCRG and NSCRG meetings, SCRG and NSCRG review and acceptance of 'activities' (as defined in GG 104),
- ensure the appropriate Staff attend the SCRG meetings,
- provides additional support (including meetings, production of papers and presentations) for 'activities' (as defined in GG 104) that are referred to the NSCRG and
- provides additional support as required by the SCRG or NSCRG to demonstrate compliance with the requirements of DMRB, major projects instruction (MPI), IAN, SHW, PCF and associated SCRG workflow.

S850.14 The *Contractor* provides all SCRG meeting information (including agendas, minutes and actions) on the Project Common Data Environment (CDE) within 15 working days of closing the SCRG meeting. The *Project Manager* prepares minutes within 10 working days of closing the meeting and include an abbreviated action list with assigned responsibilities and timescales for each action, as agreed during the SCRG meeting.

S855 Records and Reporting

S855.1 The *Contractor* keeps an electronic copy of all materials produced for the contract and provides the *Project Manager, Supervisor, Client* and the relevant Others with access to these on the Project Common Data Environment (CDE).

S855.2 The *Contractor* records any actual and forecast time and Defined Cost efficiencies that it has achieved or aims to achieve within an Efficiency Register. The *Contractor* updates and submits the Efficiency Register to the *Project Manager* for acceptance. A reason for not accepting the Efficiency Register is it does not comply with the criteria for an efficiency.

S855.3 The *Contractor* keeps an up to date electronic register of all qualifications held by its Staff and provides the *Project Manager* with access to this in accordance with section S805.

Records and reporting for Small Medium Enterprises

S855.4 For each Small and Medium Enterprise (SME) employed on the contract, as defined in Annex A, the *Contractor* reports to the *Client* each quarter from the *starting date* until Completion of the whole of the *works* and at the *defects date*

- the name of the SME,
- the class of SME (medium, small or micro),
- the value of the contract undertaken by the SME,
- the monthly amounts paid to the SME in the quarter and
- the aggregated value paid to the SME since the *starting date.*

S855.5 The *Contractor* acknowledges that the *Client* may

- publish the information supplied within section S855, along with the *Contractor*'s name and the name of the contract and
- pass the information supplied under the SME Report to any United Kingdom Government department who may then publish it along with the names of the SMEs, the *Contractor'*s name or the contract.

S855.6 The *Contractor* ensures that the *conditions of contract* for each subcontractor (at any stage of remoteness from the *Client*) who is an SME include

- a term allowing the *Client* to publish the information supplied under section S855 and
- obligations similar to those set out in section S855.

S855.7 The *Contractor* further ensures that the *conditions of contract* for each subcontractor include a requirement that the *conditions of contract* for any further sub-subcontractor engaged by the subcontractor who is an SME include obligations similar to those set out in section S855.

S865 Communications and Engagement Strategy

Objectives

S865.1 The *Contractor* co-operates and plans communications and stakeholder engagement with the *Project Manager* and the other LTC contractors before engaging with Others to ensure all parties maintain good relationships with Others.

Communications and Engagement Plan

S865.2 The *Project Manager* provides to the *Contractor* the Project 'communications and engagement strategy' on the *starting date*. The *Contractor* develops a 'communications and engagement plan' that aligns with and complies with this strategy.

S865.3 The *Contractor* submits to the *Project Manager* a 'communications and engagement plan' within its project execution plan detailed in section S825.

S865.4 The *Contractor*'s 'communications and engagement plan' includes

- a detailed programme of Community engagement, setting out how relevant planning authorities, communities, stakeholders and affected parties are engaged throughout the *works*,
- how stakeholders, communities and affected parties are identified (such as schools, places of worship, businesses and environmental organisation) and for each group the proposed methods and likely timing of consultation for each key stage of work. Such methods cover Community drop-in sessions, one-on-one meetings with key stakeholders as relevant, newsletters and leaflet drops (explaining forthcoming *works*),
- the *Contractor*'s process and procedures that demonstrate how it meets the requirements of the Scope and the *Project's* communications and engagement strategy,
- its process for internal digital communication channels,
- how the *Contractor* distributes communications both internally and externally,
- how communication specific commitments within the Development Consent Order (DCO) are discharged,
- the roles, responsibilities and contact information for the Staff involved in delivering the

'communications and engagement plan',

- a six-month programme of initial communication activities with Others (to become a live document, updated every two weeks whilst Providing the Works),
- engagement with planning authorities on Consents and permissions required for upcoming works, as described in section S900,
- key messages, communication channels and target audiences,
- reporting metrics to be used to monitor and report on communications performance,
- details of how the needs of Disadvantaged groups are met, including use of accessible media and appropriate formats for the visually impaired,
- a detailed programme of Community involvement through volunteering and educational activity (including “Science Technology Engineering and Maths” (STEM) programmes with local schools, colleges, and apprenticeship opportunities) in line with section S254 and
- a process by which community liaison group (CLG) are established and administered together with an initial schedule of planned meetings according to key work stages. CLG are to meet at least once a month from 12 weeks of the *starting date*.

S865.5 A reason for not accepting the 'communications and engagement plan' is

- It does not comply with the Scope,
- it does not align with other *Project* programme activities,
- it does not align with the Accepted Programme or
- it does not detail how the *Contractor* interfaces with Others.

S865.6 Once accepted, the *Contractor* implements and maintains the communications and engagement plan and updates it at least quarterly, or as agreed with the *Project Manager.*

Advance notification of *works*

S865.7 The *Contractor* provides advanced notification to parties that may be affected by the *works* including

- road users (including walkers, cyclists, and horse riders),
- local residents,
- commercial premises,
- local Community groups,
- Local Authorities,
- elected representatives,
- Consent granting bodies,
- business trade groups,
- Statutory Undertakers,
- educational institutions,
- health care providers,
- care homes,
- disability groups,
- transportation hubs (airports, ports, train stations),

- emergency services and
- funeral directors that use the Thamesview Crematorium.

S865.8 From the *starting date*, the *Contractor* provides and maintains a 12 week lookahead 'schedule of communication and engagement activities', issuing it to the *Project Manager* for information and review upon request.

S865.9 The 'schedule of communications and engagement activities' describes each community engagement activity and approach. The *Contractor* addresses any comments made by the *Project Manager* and updates the schedule.

S865.10 Where the *Contractor* is required to provide notice of *works* to obtain a Consent, the *Contractor* complies with section S900 which supersedes any conflicting requirements within section S865.

Information Sheets

S865.11 The *Contractor* produces 'information sheets' for each of the items on the 'schedule of communications and engagement activities'. The *Contractor* uses the 'Information Sheet template' provided in Annex A and does not amend the template without the agreement of the *Project Manager*. The template is subject to change and improvement in line with lessons learned.

S865.12 An 'information sheet' includes

- dates of work,
- duration of work,
- times of work,
- type of work,
- reasons for work,
- location of work,
- potentially affected roads,
- road diversion routes (where applicable),
- types of impact (for example potential for noise, dust and vibration) and
- appended to the 'information sheet'
    - imagery to show what the anticipated works will look like and
    - geographical information system in relation to the *works* to be uploaded to interactive maps on the *Client*'s website.

The *Project Manager* notifies the *Contractor* of the requested format for this information.

S865.13 To aid planning and programming, the *Contractor* submits each 'information sheet' and corresponding communications materials to the *Project Manager* for acceptance at least four weeks prior to undertaking the relevant work.

If reacting to an emergency, as defined in the 'incident management plan' in section S1100, the *Contractor* submits the 'information sheet' to the *Project Manager* for acceptance within a time scale that reflects the emergency but no later than 24 hours.

A reason for not accepting the 'information sheet' is that it does not contain sufficient detail to enable the *Project Manager* to understand the *Contractor's* response to the requirements of paragraph S865.12.

S865.14 Except in an emergency, the *Contractor* distributes the accepted 'information sheets' to the relevant Local Authority, as well as those who may be affected by the *works* at least two weeks

prior to undertaking the relevant works. These ‘information sheets’ are distributed in accordance with the accepted 'communications and engagement plan'. The *Contractor* does not allow subcontractors (at any stage of remoteness from the *Client*) to issue information without the prior agreement of the *Project Manager*.

S865.15 If reacting to an emergency, the *Contractor* distributes the accepted 'information sheets' to the relevant Local Authority, as well as those who may be affected by the *works*, as soon as possible after acceptance.

S865.16 The *Client* may use the 'information sheets' to share learning and publish updates on its website in relation to the *works*.

S865.17 If the *Contractor* changes how it Provides the Works, which impacts an accepted 'information sheet', the *Contractor* immediately updates the ‘information sheet' and resubmits this to the *Project Manager* for acceptance. The *Contractor* then redistributes the updated ‘information sheet’ to those that are affected.

Additional Communication Requirements for Road Closures

S865.18 In compliance with numbered appendix 1/17 and the *Contractor’s* 'traffic management plan', the *Contractor* displays temporary roadside signage

- during roadworks in the location of impacted roadworks and
- as close as possible to the start of the main roadworks (e.g. the first visible cones and taper) and in locations where a significant number of customers are joining the roadworks without a previous opportunity to see the billboards located near the start of the main roadworks.

S865.19 Using the 'information sheets' provided by the *Contractor*, the *Client* notifies the public of road closures.

S865.20 The *Contractor* submits a 'communications and stakeholder management report' to the *Project Manager* in accordance with the timescales detailed within the Project Reporting Calendar, using the Project’s Communications and Stakeholder Management Report template provided in Annex A. The template is subject to change and improvement in line with lessons learned.

Stakeholder Engagement

S865.21 The *Contractor* engages with Others during the *works* and coordinates with the *Project Manager* in the engagement with stakeholders including

- elected representatives,
- national and regional interest groups,
- business groups and
- the *Client*’s project sponsor(s).

S865.22 The *Contractor* works collaboratively with relevant Local Authorities, Others and LTC Contractors in the area to develop a collaborative plan for works and closures. The plan is used to keep Customers informed of works in the area and manage joined up and shared working for closures, roadworks and diversion routes, to minimise disruption.

S865.23 The *Contractor* collaboratively agrees an approach to sharing travel information across multiple services with relevant Local Authorities, local transport providers (including car, bus, coach, train and ports), and local travel information providers (including online, Google maps and satnav providers) to maximise opportunities to share information with Customers for a better end to end experience.

S865.24 The *Contractor* develops, within 100 weeks of the *starting date* and annually thereafter, a detailed programme of engagement and submits it to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, setting out how bespoke Customer groups are engaged whilst Providing the Works and coordinates with the *Project Manager* in the engagement with stakeholders including

- freight,
- haulage,
- ports,
- coach and bus and
- disability groups.

S865.25 From the *starting date*, the *Contractor* provides resources to undertake community relations activities including setting up local community groups that focus on identifying local risks and opportunities and facilitating mitigations and community social value initiatives. The *Contractor* demonstrates that the resources have the capability and experience of managing stakeholders in comparable circumstances.

S865.26 The *Contractor* consults with the *Project Manager* as soon as receiving any invitations to appear at public meetings or events related to the *works*. The *Contractor* attends the events if agreed with the *Project Manager*.

S865.27 The *Project Manager* keeps the *Contractor* informed of any Community issues and any public meetings being held to discuss Project issues.

S865.28 Using the CRM system referenced in section S840, the *Contractor* updates stakeholder engagement activity as it occurs. The *Contractor* logs details of

- emails and phone calls including time, date and individual,
- the dates for engaging with stakeholder groups,
- what was discussed at each engagement and
- any follow up correspondences with timeframes associated with the engagement.

These requirements are subject to change and improvement in line with lessons learnt.

S865.29 When required, the *Project Manager* organises and facilitates Community events, including face to face engagement. If necessary, the *Project Manager* invites the *Contractor* to Community events with two weeks' notice. When instructed by the *Project Manager*, the *Contractor* sends Staff with the relevant technical expertise to attend and present on the *works'* progress and construction activities.

Stakeholder Visits to Site

S865.30 When instructed by the *Project Manager*, the *Contractor* provides safe access to the Working Areas for media, stakeholders and the public. The *Contractor* provides visitors with the appropriate Personal Protective Equipment (PPE) that complies with the brand guidelines, the use of its facilities, project briefings and safety inductions. The *Project Manager* leads these visits in accordance with the *Contractor's* site safety procedures.

S865.31 The *Contractor* does not host its own visits to the Working Areas for media, stakeholders or the public unless prior agreement is given by the *Project Manager*.

S865.32 The *Contractor* provides temporary viewing platforms within 26 weeks of the first *access date* in order to provide safe viewing access for visitors. The number and location of the temporary

viewing platforms are agreed with the *Project Manager* and the *Contractor* ensures the platforms overlook the *works* and

- provides capacity to hold up to 20 individuals,
- includes protection for visitors from the poor weather,
- includes information within the platform about the construction of the *works*,
- provides inclusive access for all visitors and
- allows for PPE free access.

Public enquiries and complaints

S865.33 The *Client* operates a customer contact centre (CCC) to receive all public complaints and enquiries through a phone line and email account 24 hours per day, seven days per week. The *Contractor* provides the *Client's* CCC phone line and email address in the relevant communication as a single point of contact. The *Contractor* agrees with the *Project Manager* such relevant communication. The *Contractor*'s own helplines are not publicised in relation to the contract.

S865.34 The CCC attempts to resolve public enquiries and complaints at the source. The *Project Manager* notifies the *Contractor* if any complaints or enquiries require additional information from the *Contractor*.

S865.35 The *Contractor* provides, from the *starting date,* a person(s) responsible for responding to incoming enquiries and complaints aligning with the principles set out in the LTC Customer Plan see link in Annex A.

The *Contractor* ensures

- enquiries are responded to within five days unless agreed otherwise with the *Project Manager*,
- the five-day response target applies to all Customer correspondence received (with the exception of Parliamentary questions, ministerial correspondence and freedom of information requests). The five-day response target commences on the date first received by either the *Client's* Customer contact centre (CCC) or by the Project directly,
- complaints are responded to in line with the complaints process (as updated by the Scope) as soon as practicable and in any event within three weeks, unless agreed otherwise with the *Project Manager* and
- all correspondence sent to Customers complies with the "Highways England writing reactive customer correspondence guidance" (see link in Annex A), except for the timeframe for responding to correspondence which is stated in this paragraph S865.35

and provides

- sufficient resource to reflect peaks and troughs in the *works* activity and
- to the *Project Manager* and the CCC an out-of-office contact(s).

S865.36 The *Contractor* develops and implements a 'complaints procedure' for receiving and responding to complaints which

- aligns with the “Highways England Corporate Complaints Process” see link in Annex A and
- includes
    - a description of roles and responsibilities,
    - procedure for investigation of complaints,

- response times and method of response and
- recording corrective and preventive actions taken.

S865.37 The *Contractor* does not engage with complainants unless agreed or instructed by the *Project Manager*. The *Contractor* passes to the *Project Manager*

- the complaint,
- the factual history of the complaint,
- the complainants known contact details and
- actions taken or to be taken by the *Contractor* to mitigate the complaint.

S865.38 The *Contractor* uses the customer relationship management (CRM) tool to record and notify the *Client* of all enquiries, complaints, correspondence, as well as actions taken by the *Contractor*. Any correspondence or queries received direct by the *Contractor* about the *works* are logged using the CRM system referenced in section S840, on the day of receipt and no later than the next working day, if received outside normal working hours. The *Contractor*

- updates and responds to Customer enquiries in line with the LTC Customer Plan and
- Submits correspondence and complaint reasons to the *Project Manager* for agreement prior to issue.

S865.39 The *Contractor* submits to the *Project Manager* monthly correspondence reporting data as notified by the *Project Manager*.

S865.40 The *Contractor* liaises with the *Project Manager* to ensure that appropriate Contractor's Staff receive correspondence and My Customer My Call training, provided by the *Client.*

S865.41 The *Contractor* submits the 'complaints procedure' to the *Project Manager* for acceptance within 40 weeks of the *starting date*. A reason for not accepting the 'complaints procedure' is

- the proposed response times are not sufficient,
- not all roles and responsibilities are identified
- it is not aligned with the employee relations strategy described in section S253 or
- the procedure does not manage and mitigate complaints.

The *Contractor* reviews and updates (as necessary) the 'complaints procedure' each quarter to ensures it meets the requirements of section S865 and submits (if updated) the 'complaints procedure' to the *Project Manager* for acceptance.

Branding, Marketing and Publicity

S865.42 The *Contractor* complies with the *Client*'s visual identity specifications which include

- "Highways England's visual identity specifications: What you need to know" provided in Annex A,
- "Writing with Style: Highways England's tone of voice and style guide" provided in Annex A and
- "Highways England Complex Infrastructure Programme branding specifications for Lower Thames Crossing delivery team Oct 2019" provided in Annex A.

S865.43 The *Project Manager* may request the *Contractor* to assist with media events, publications, film or photography shoots and press visits to the Working Areas.

S865.44 The *Contractor* is encouraged to identify areas of delivery in the Project which it considers to be worthy of consideration and submission to industry award schemes.

S865.45 The *Contractor* does not undertake advertising related to the Project without agreement from the *Project Manager*.

S865.46 The *Contractor* does not develop independent logos or branding for the contract. The *Client's* branding is present and at the forefront of all contract-related information and communications materials, including signs, perimeter fencing, personal protective equipment, vehicle livery and stationery.

Digital Communications

S865.47 The *Project Manager* controls the distribution of content on the Project website, Project social media accounts, advertising and the graphic design of corporate materials.

S865.48 The *Project Manager* uses and updates the *Client*'s digital communication channels for Others impacted by the Project. This includes road users and residents and commercial premises.

S865.49 The use of digital channels by the *Project Manager* or *Client* does not supersede the responsibilities on the *Contractor* to notify and communicate with those affected by its *works.*

S865.50 The *Contractor* does not set up independent websites or social media channels related to the Project.

S865.51 The *Contractor* does not, unless agreed otherwise with the *Project Manager*

- issue digital press releases or other text, artists' impressions, filmed images, drawings, plans, computer aided design (CAD) data, photographs or similar relating to the *works,*
- publish any digital communications relating to the *works* or
- use images or text relating to the *works* for advertising and publicity purposes.

S865.52 The *Contractor* ensures Staff do not share any Project information on any website or social media platform without the prior permission of the *Project Manager*. This is made clear at the Project induction and reiterated at regular communication forums including at "tool box talks" and staff briefings.

Press and News Publications

S865.53 The *Project Manager* releases updates, news and stories to the public and stakeholders as necessary, using information provided by the *Contractor*. The *Contractor* highlights to the *Project Manager* any activities that require unique, innovative or interesting ways of working in order to help identify any positive news stories. All engagement to the media occurs through the *Client's* press office unless otherwise agreed with the *Project Manager.*

S865.54 Using the 'communications and engagement schedule of activities', the *Contractor* highlights a lookahead of potential stories about the *works* to the *Project Manager* within eight weeks of the *starting date* and updates the lookahead every 12 weeks thereafter. The *Contractor* provides content for these stories to the *Project Manager* in accordance with the lookahead.

S865.55 The *Contractor* does not, unless agreed otherwise with the *Project Manager*

- make any comment to the press regarding the *works*, give interviews, allow interviews to be given, or take part in any television, radio or web-based programmes relating to the *works*,
- allow any subcontractors (at any stage of remoteness from the *Client*) to make any

comment to the press regarding the *works*, give interviews, allow interviews to be given, or take part in programmes relating to the *works*,

- issue press, news releases or other text, artists' impressions, filmed images, drawings, plans, CAD data, photographs or similar relating to the *works*,
- publish any public communications, including internet communications, relating to the *works*,
- use site hoardings or notices, or allow them to be used, for the purposes of advertising or
- use images or text relating to the *works* for advertising or publicity purposes.

S865.56 The *Contractor* provides information to the *Project Manager* to respond to a media enquiry. The *Contractor* provides the required information as soon as possible (considering the nature and circumstances of the enquiry) and within 24 hours of the request, unless agreed otherwise with the *Project Manager*.

Site Hoarding

S865.57 The *Contractor* manages the display of information on public-facing site hoardings in accordance with the "Highways England Complex Infrastructure Programme branding specifications for Lower Thames Crossing delivery team Oct 2019" (HE540039-CJV-GEN-GEN-GDE-CMM-00001).

S865.58 The *Contractor*

- carries out amendments to the information displayed as soon as possible after receipt of notification of the amendment from the *Project Manager*, and in any event not later than two weeks after receipt,
- displays a plain English description of any Consent Applications and any dispensations that have been agreed by Local Authorities, including working hours, activities, noise control measures in place and a look-ahead of forthcoming works and updates this information at least monthly and
- does not use site hoardings or notices, or allow them to be used, for the purposes of commercial advertising.

S900 Working with the *Client* and Others

S905 Sharing the Working Areas with Others

S905.1 The *Contractor* co-operates with and shares the Working Areas with Others as identified in the interface arrangements described in

- the Scope, in particular section S1000 and section S1100,
- section S926 and the 'interface matrix' see link provided in Annex A and
- section S928 *third-party agreements*.

The Commitments Register

S905.2 The *Contractor* prepares and complies with the commitments register that details the commitments and requirements from the DCO to Provide the Works, prior to commencement of the relevant construction activity.

The *Contractor* ensures that the commitments register is compatible with and uploaded to DOORS NG.

S905.3 The *Contractor* updates the commitments register to include amended or additional commitments resulting from agreements with Others following the making of the Development Consent Order (DCO) by the Secretary of State.

S907 Road User Charging (RUC)

S907.1 The *Contractor* undertakes the detailed design of the road user charging (RUC) elements as described in section S300.

S907.2 The *Contractor* provides the RUC Contractor with

- access to RUC elements (including gantries, hard-standings, duct connections and energised power supplies and NRTS SDPs including for testing),
- access for the RUC Contractor's equipment used to install RUC's plant and materials and
- storage areas for the RUC Contractor's equipment and RUC's plant and materials.

S907.3 The *Contractor*

- co-operates with the RUC Contractor
- minimises vibration and controls the flow of vehicles to enable the RUC's plant and materials to be
  - installed,
  - tested and
  - maintained and
- provides the RUC Contractor
  - safe work areas and
  - with access arrangements and demarcation points to enable the RUC Contractor to test and maintain the RUC elements.

S910 Co-operation and Co-ordination

S910.1 The *Contractor* cooperates and coordinates with

- other LTC Contractors to achieve the Contract objectives described in section S105,
- local Highway Authorities to ensure that roadwork clashes are prevented,
- Others to develop all necessary processes, including procedures denoting responsibilities and any associated forms, certificates and documents to ensure the *works* are managed accordingly,
- the *Project Manager* and other LTC Contractors to co-locate Staff where appropriate and
- the *Project Manager* and the *Client* to share information, communicate openly, continuously share lessons learnt and achievements and enable embedded learning

to Provide the Works accordingly.

S910.2 The *Contractor* programmes the *works* in a manner that minimises the impact on the Customer by working in conjunction with the *Client's* major projects and the *Client*.

S920 Authorities and utilities providers

S920.1 The *Contractor* co-operates and co-ordinates the *works* with Local Authorities and utilities providers as identified in section S926 and section S928.

S925 Deed of Novation

S925.1 Where a deed of novation is required (see clause Z4.2 Assignment), the form of novation agreement is set out in Annex F.

S926 Interface Management

S926.1 The *Client* has identified some initial known construction interfaces between two or more organisations who are responsible for the delivery of the Project. These interfaces are outlined in the 'interface matrix' provided in Annex A, and supported by a series of interface drawings, where defined, provided in Annex A. The *Contractor* reviews, adopts and manages the 'interface matrix' and implements associated interfaces and updates it as additional interfaces are identified, following the requirements described in paragraph S926.5. The purpose of the 'interface matrix' is to aid co-ordination with Others, achieving the Contract objectives described in section S105. It states the activities and responsibilities at each interface and the timeframes.

S926.2 The *Contractor* also manages and agrees interfaces with Others who are not delivering part of the Project or are not identified on the 'interface matrix', in accordance with the interface requirements as described in paragraph S926.5.

S926.3 Within 15 weeks of the *starting date*, in accordance with the timescales in section S3000, the *Contractor* reviews the interfaces detailed within the 'interface matrix' and provides a list of areas of concern that the *Contractor* considers may warrant the raising of an early warning to the *Project Manager*.

S926.4 The *Contractor* is responsible for identifying additional interfaces. As additional interfaces are identified by the *Contractor*, the *Contractor* discusses the additional interface with the affected LTC Contractor. On conclusion of the discussion, the *Contractor* submits the updated 'interface matrix' and submits it to the *Project Manager* for acceptance. In the event an agreement cannot

be reached between the *Contractor* and the affected contractor, then the *Contractor* elevates the matter or issue to the Core Group for resolution.

S926.5 In developing and delivering the interface works, the *Contractor*

- collaborates with interfacing organisations in developing interface requirements, organises meetings and workshops to agree interface arrangements,
- attends all meetings and workshops if arranged by the *Project Manager* and Others relating to the development of interfaces,
- develops an 'interface control document' (ICD) as detailed within paragraph S926.6,
- notifies the *Project Manager* of any unresolved interface requirements and
- co-operates with and provides all assistance requested by the *Project Manager* in the development of interfaces.

Interface Control Document

S926.6 The *Contractor* details each interface and associated responsibilities of the interfacing organisations for the delivery, testing and commissioning during the delivery of the *works* within an ICD.

S926.7 An ICD template is provided in Annex A. The *Contractor* provides its proposals on how the exact details of the interfaces are agreed and provided in each ICD. The *Contractor* submits the ICD to the *Project Manager* for information and accompanied by a Multiparty Collaboration Certificate. The *Contractor* addresses any comments received from the *Project Manager* prior to implementing the relevant activity.

Drawing Register

S926.8 Interface drawings are provided within section S2700.

Interface Specifics

Statutory Undertakers' Works

S926.9 The *Contractor* is responsible for the Statutory Undertakers' works outlined in numbered appendix 1/16 and numbered appendix 2/2. The interfaces associated with the delivery of the Statutory Undertakers' works have been collated and defined as a general interface that would be re-occurring for each delivery of Statutory Undertakers' works. The general interface is described as a separate item within the interface matrix for each Main Works Contractor (MWC). The interface matrix is read in conjunction with numbered appendix 1/16 and numbered appendix 2/2. Any interface requirements that differ or are in addition to those stated within the general interfaces included in the interface matrix have been identified as a separate interface item.

S928 *Third-party agreements*

General

S928.1 The *Client* has obtained, obtains, may obtain the *third-party agreements* which Annex AA states that the *Client* is to obtain. The *Contractor* obtains any other agreements with third parties and submits such agreements to the *Project Manager* for agreement.

S928.2 The *Contractor*

- ensures the *works* complies with the *third-party agreements*,

- complies with *third-party agreements* in Providing the Works,
- discharges all obligations and responsibilities of the *Client* under each *third-party agreements* insofar as they relate to Providing the Works and the *works* or other obligations of the *Contractor* under the contract (including the obligations of the *Client,* its employees, agents and contractors),
- does not put the *Client* in breach or default of the provisions of any *third-party agreements* and
- does not make payment of any amounts properly due to the relevant third-party under a *third-party agreement*.

S928.3 The *Contractor* notifies the *Project Manager* within one week of any notice it receives relating in any way to the *works* that may affect an Others' asset(s) and supplies a copy of every such notice to the *Project Manager.*

S928.4 The *Contractor* does not undertake *works* that require a *third-party agreement* or an agreement with a third party until the agreement is in place.

S928.5 The *Contractor* supports the *Project Manager* by proposing opportunities to minimise cost incurred by Others in undertaking the *works*.

Third Party Estimates

S928.6 Within fourteen days of the *starting date*, the *Project Manager* provides the *Contractor* with the Accepted Third Party Estimates.

The *Contractor*

- manages and co-ordinates the delivery of the works and services to be undertaken by third parties so that it supports the delivery of the *works* and enables the *Contractor* to Provide the Works,
- manages, co-ordinates and works with the third parties to develop the cost and programme estimates for the works and services to be undertaken by third parties and
- on the first day of each month submits to the *Project Manager* for acceptance the current detailed estimates for the works and services to be undertaken by third parties along with
    - a detailed explanation for changes in the estimates for the works and services to be undertaken by third parties including earlier errors in the third party estimates, the impact of the *Contractor's* programme, design, method statements and
    - a detailed explanation of the changes in the forecast Defined Cost for the whole of the *works* corresponding to the changes in the estimates for the works and services to be undertaken by third parties.

S928.7 The Accepted Third Party Estimates are revised (upwards or downwards) in accordance with this section S928 to reflect the current detailed estimate for the relevant works and services to be undertaken by third parties.

S928.8 The Accepted Third Party Estimates are not increased to the extent that

- changes in the estimates for the works and services to be undertaken by third parties are due to the actions, inactions, omission or default of the *Contractor*,
    - to comply with
        - any *third party agreement* or Consent,
        - any statutory duty or

- the contract
  - to Provide the Works in accordance with the Accepted Programme or
  - causing interference with any legal right of others by any person employed by or contracted to the *Contractor*,
- the C*ontractor*'s proposals are not necessary for the *works* or efficient delivery of the *works* or
- when the change in the estimates for the works and services to be undertaken by third parties are due to the *Contractor*'s design, programme or method statements and there is not a corresponding reduction in the forecast Defined Cost for the whole of the *works* corresponding to the changes in the estimates for the works and services to be undertaken by third parties.

The Accepted Third Party Estimates are adjusted to the extent that the reduction in the forecast Defined Cost for the whole of the *works* equals such an increase.

S928.9 A reason for not accepting an estimate submitted by the *Contractor* under paragraph S928.6 is

- it does not comply with the Scope or
- it does not provide sufficient information to enable the *Project Manager* to understand such estimates and such changes.

S928.10 If an estimate submitted by the *Contractor* under paragraph S928.6 is not accepted, the *Project Manager* may notify the *Contractor* that it will make an assessment of an adjustment (if any) to the Accepted Third Party Estimates.

The *Project Manager* notifies the *Contractor* of such assessment and provides details of the assessment within seven days of non-acceptance of the *Contractor*'s submission under paragraph S928.6. If the *Project Manager* does not make its assessment within the time allowed, the *Contractor* addresses the reason for such non-acceptance in the next submission required by paragraph S928.6.

S928.11 Within fourteen days of the acceptance of any submission to the *Project Manager* under paragraph S928.6 or a *Project Manager*'s assessment under paragraph S928.9, the *Project Manager* confirms any revision or non-revision to the Accepted Third Party Estimates and the reasons for the revision or non-revision.

Railways

S928.12 The *Contractor*

- Provides the Works
  - in accordance with the procedures of the rail infrastructure owners and the train operating company or companies, and
  - to obviate or minimise disruption to the railway infrastructure and operation including any possessions needs
- acknowledges that railway infrastructure owners and the train operating company or companies only grant possessions in exceptional circumstances once adequate notice (typically two years) is provided,
- acknowledges that there are *works* that are on, above, below or adjacent to railway infrastructure and the operating railway,
- holds and maintains a 'Principal Contractor Licence' in accordance with the Network Rail standard NR/L2/INI/CP0070 (see link in Annex A),
- obtains relevant asset protection agreement and protective provisions,

- determines which of its *works* require possessions of the operating railway and
- obtains any necessary railway possessions required to Provide the Works.

S928.13 The *Contractor* ensures the *works* are separated from the existing railway infrastructure and operating railway in accordance with the infrastructure owners' and the train operating company or companies' procedures and requirements, with appropriate barriers, with as much of the *works* as practicable undertaken during normal working hours in accordance with the agreements signed or agreed between the *Client* and Railway Authority.

S928.14 Where *works* include the modification of existing and installation of new Structures adjacent to and under the existing railways, the *Contractor* works in accordance with the agreed Approval in Principle and with the relevant rail asset owner and operator.

S928.15 The *Contractor* obtains such agreements from the Railway Authority required to Provide the Works, including agreement

- to impact on railway assets and
- on processes and procedures for submissions, including concept design, detailed design, temporary works, instrumentation and monitoring and work package plan (for track access).

S928.16 The *Contractor* provides information on timescales, planning, procedures, impacts, frequency and other requirements in accordance with the procedures of the relevant infrastructure owners and the relevant train operating companies to comply with the commitments made by the *Client* (as listed in the Statement of Common Grounds (SoCG) or *third-party agreements)*.

S928.17 The *Contractor* refers to the standard Rules of the Route possession times applicable for each disrupted line for planning non-disruptive possessions.

Other Agreements

S928.18 The *Contractor* enters into any confidentiality agreements which may be required by any *third-party agreements.*

S929 Consents

Overview

S929.1 The *Contractor* obtains all relevant Consents and other approvals required to Provide the Works, including conditions and variations to the *Client's* Consents, unless instructed otherwise by the *Project Manager*.

S929.2 The *Contractor*

- does not start the relevant *works*, or any part of the relevant *works*, for which a Consent is required until the Consent has been agreed by the relevant Consent granting body and
- assists the *Client* in preparing Consent Applications where requested by the *Project Manager*. The *Contractor* assists, within timeframes as agreed with the *Project Manager,* with
    - the provision of relevant design drawings and sketches required for the Consent Application process,
    - the provision of relevant information, including technical and design details required for the Consent Application process,

- attendance at meetings where requested by the *Project Manager* or Consent granting body,
- the undertaking of the *works* in accordance with Consents obtained and taking account of all information or guidance imposed by any relevant Consent granting body in the granting of statutory Consents,
- the provision of evidence that Consents required for the *works* have been discharged by the *Contractor* and
- where the *Client* has stated it has partial responsibility for obtaining a Consent, the *Project Manager* provides confirms when that responsibility has been discharged. The *Contractor* references such confirmation in the relevant Consent reporting.

S929.3 The *Contractor* complies with all Consents.

Consents Management (Consent categories)

S929.4 The *Contractor* identifies all Consents that are required to Provide the Works regardless of the categories below.

S929.5 The *Contractor* classifies each Consent under a category. The *Contractor*'s classification of Consent categories is included in the 'Consents register' and is subject to acceptance by the *Project Manager*. The three categories are

- Category One Consents are those Consents which are obtained by the *Client* with or without the *Contractor's* assistance,
- Category Two Consents are those Consents which are submitted by the *Contractor* for review and acceptance by the *Project Manager*, prior to submission by the *Contractor* to the Consent granting body, unless instructed otherwise by the *Project Manager* and
- Category Three Consents are those Consents which are submitted by the *Contractor* to the Consents granting body without review or acceptance by the *Project Manager.*

S929.6 The 'Consents register' is updated with any additional Consents or a change to Consents requirements.

Category One Consents

S929.7 Category One Consents are those that the *Client* is obtaining, with or without the assistance of the *Contractor*.

S929.8 The *Project Manager* notifies the *Contractor* of any additional Category One Consents.

S929.9 For Category One Consents the *Contractor*

- when requested by the *Project Manager*
  - provides relevant drawings and other information to support the Consent Application and
  - attends meetings with the Consent granting body and Others and
- complies with and discharges the conditions of the Consent and notifies the *Project Manager* of the consequential impacts to the contract.

Category Two Consents

S929.10 The *Contractor* prepares the applications for Category Two Consents.

S929.11 For Category Two Consents the *Contractor* submits all Consents to the relevant consent granting body and

- meets with the *Project Manager* to discuss the need for a Category Two Consent,
- allows for pre-submission engagement with the Consent granting body and relevant stakeholders. The *Contractor* invites the *Project Manager* to all meetings required for a Consent documentation in respect of a Category Two Consent, providing two weeks' notice of any meetings with the Consent granting bodies,
- provides the *Project Manager* with the draft Consent documentation and supporting documents for review by the *Project Manager* five weeks prior to the planned submission date of the Consent Application, unless otherwise agreed with the *Project Manager.* Where a category two consent requires agreement by the Secretary of State, the submission timeframes are detailed in paragraph S929.12,
- reviews the *Project Manager's* comments and updates the Consent documentation where required. Revises the documentation and incorporates all *Project Manager's* comments into a final draft of the Consent documentation unless agreed otherwise by the *Project Manager*,
- submits a final draft to the *Project Manager* for agreement at least two weeks prior to the planned submission date of the Consent documentation. The *Project Manager* responds with comments within one week of receipt of the final draft,
- allows sufficient time for engagement with Consent granting bodies during the Consent Application process and for the determination of the Consent, to avoid delay or disruption to Providing the Works,
- prepares Consent documentation to the standard required for submission to facilitate Consent agreement,
- consults with and considers Consent granting body review comments on the Consent documentation,
- submits the final Consent documentation to the Consent granting body, unless otherwise requested by the *Project Manager*,
- negotiates any conditions on Category Two Consents with the relevant Consent granting body prior to a Consent decision notice to agree being given,
- uses best endeavours to resolve disagreements on conditions with the Consent granting body without the need for the *Contractor* to appeal against the Consent determination,
- checks the conditions are achievable in relation to the Accepted Programme and phase of works and if the conditions are not achievable, the *Contractor* notifies the *Project Manager* immediately and
- complies with and discharges the conditions of the Consent and notifies the *Project Manager* of the consequential impacts to the contract.

When the agreement of the Consent granting body has been received, the *Contractor* submits the Consent to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

S929.12 Where consent documentation requires the agreement of the Secretary of State, the *Contractor* prepares the consent documentation and undertakes the required consultation in accordance with the following timeframes

- the *Contractor* prepares an initial draft of the consent documentation for the *Project Manager's* review prior to the *Project Manager's* notification of the DCO under the Accepted Programme,

- the *Project Manager* provides the *Contractor* with comments on the initial draft within four weeks of receipt of the initial draft document,
- the *Contractor* updates the initial draft consent documentation following the *Project Manager's* notification of the DCO, incorporating all relevant requirements from the DCO documentation and comments from the *Project Manager* on the initial draft consent document,
- the *Contractor* provides the *Project Manager* with an updated draft of the consent documentation for agreement a minimum of four weeks prior to the proposed commencement of consultation with relevant parties specified in the DCO. The *Project Manager* provides comments to the *Contractor* within two weeks of receipt of the updated draft consent documentation,
- the *Contractor* provides the updated draft consent documentation to relevant parties for consultation as required by the DCO, allowing for a minimum six-week consultation period,
- the *Contractor* prepares a final draft consent documentation following consultation, including provision of a comment response summary detailing how comments have or have not been incorporated,
- the *Contractor* provides the *Project Manager* with a copy of the final draft consent documentation for review and agreement four three weeks prior to the submission to the Secretary of State for its agreement. The *Project Manager* provides comments within two weeks of receipt of the final draft consent documentation,
- the *Contractor* allows a minimum of eight weeks for the Secretary of State's review of the consent documentation and
- the *Contractor* addresses all comments from the Secretary of State and finalises the consent documentation for implementation in the *works*.

When the agreement of the Secretary of State has been received, the *Contractor* submits the Consent to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

Category Three Consents

S929.13 The *Contractor* undertakes all necessary activities to obtain all Category Three Consents. These activities include

- notifying the *Project Manager* of the need for a Category Three Consent,
- discussing Consent Applications in respect of Category Three Consents with the Consent granting body,
- submitting all Consent Applications in respect of Category Three Consents to the *Project Manager* for information prior to submission by the *Contractor* to the Consent granting body, unless otherwise instructed by the *Project Manager*,
- submitting Category Three Consents to the Consent granting body,
- obtaining confirmation from the relevant Consent granting body that it has received the Consent Application,
- negotiating any conditions on Category Three Consents with the relevant Consent granting body prior to a Consent decision notice to approve being given,
- on receipt, checking that any conditions are achievable and, if the conditions are not achievable, notifying the *Project Manager* immediately,
- using best endeavours to resolve disagreements on conditions with the Consent granting body without the need for the *Contractor* to appeal against the Consent determination,

- immediately notifying the *Project Manager* if a Category Three Consent is not granted and
- complies with and discharges the conditions of the Consent and notifies the *Project Manager* of the consequential impacts to the contract.

S929.14 When the agreement of the Consent granting body has been received, the *Contractor* submits the Consent to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

Consents Management Plan

S929.15 The *Contractor* prepares a 'consents management plan' and submits it to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure and accompanied by a Multiparty Collaboration Certificate, within 30 weeks of the *starting date*.

S929.16 The *Contractor* ensures that the 'consents management plan' includes

- the plan for co-operating and liaising with the *Project Manager* regarding Consents,
- the roles and responsibilities including the *Contractor's* consent manager,
- robust processes and procedures for the identification of Consents and the management and maintenance of the Consents register,
- processes and procedures for maintaining and updating the Consents register and to afford access to the *Project Manager* for review and acceptance of Consent Applications or submissions,
- processes and procedures for noting and tracking compliance with Consents including the date of discharge of commitments (such as tracking when notifications have been given and agreements have been obtained),
- processes and procedures for preparing Consent Applications,
- a list of third parties including principal contacts (where known at the time of preparation), to whom submissions are made and a process for updating this list as new third-parties are identified,
- a list of Others required to be consulted with during the preparation of the Consents, including those with a review function,
- processes and procedures for complying with and demonstrating how the Consent Applications and any conditions of the Consent are complied with and discharged in Providing the Works including briefing all relevant Staff on Consent requirements and monitoring of compliance through inspection and audit,
- processes and procedure for correcting defects for non-compliance with Consents, including reporting nonconformity to the *Project Manager* and Consent granting body,
- a co-ordination plan for working with the Others who are applying for Consents from a Consent granting body to whom the *Contractor* is also applying and
- a co-ordination plan for working in areas or on works that have been consented by the *Client* or by Others.

S929.17 The *Contractor* reviews, updates and maintains the 'consents management plan'. The *Contractor* re-submits the 'consents management plan' to the *Project Manager* for acceptance every six months after the accepted consents management plan, or

- following changes in statutory approvals requiring additional Consents,
- where the 'consents management plan' needs to be updated to comply with the procedure and process required by the Consent granting body or

- at the request of the *Project Manager*.

S929.18 A reason for not accepting the 'consents management plan'

- is it does not contain enough information to provide confidence to the *Project Manager* that the Consents process are managed appropriately,
- creates a significant risk to the Project's relationships with its stakeholders, including third parties and Consent granting bodies or
- does not contain all of the information required by the Scope.

Consents Register

S929.19 The *Contractor* prepares the 'Consents register', identifying all the Consents required to Provide the Works and their associated Consent category.

S929.20 The *Contractor* uses the Consents Register template provided in Annex A to produce and maintain the 'Consents register'.

S929.21 The *Contractor* submits the 'Consents register' to the *Project Manager* for acceptance within 30 weeks of the *starting date*, in accordance with section S3000.

S929.22. The *Project Manager* responds within four weeks. If the *Project Manager* fails to respond to the 'Consents register' within four weeks, then the *Project Manager* is deemed to have accepted the *Contractor*'s submission.

S929.23 The *Project Manager,* at its discretion, amends or does not accept categories of Consent identified by the *Contractor* in the 'Consents register'.

S929.24 A reason for not accepting the 'Consents register' is

- that it is not complete,
- there are Consents on the register that are not categorised or incorrectly categorised or
- that it is not realistic.

S929.25 The *Contractor* addresses all comments provided by the *Project Manager* prior to undertaking the relevant work, unless otherwise agreed by the *Project Manager*.

S929.26 The *Contractor* ensures that the relevant parts of the 'Consents register' are provided to the relevant Staff at least one week prior to undertaking the work.

S929.27 The *Contractor* keeps the 'Consents register' up to date and at the beginning of each month (and when requested by the *Project Manager*) submits it to the *Project Manager.*

Submissions to a Consent Granting Body

S929.28 The *Contractor* pays all fees and charges required for any Consent (including its agreement) unless such fees are identified in the Scope as being payable by the *Client*.

S929.29 The *Client* submits all Category One Consents to the Consent granting body. The *Project Manager* provides the *Contractor* with a copy of the Category One Consent agreement within one week of its receipt.

S929.30 For Category Two Consents and Category Three Consents the *Contractor*

- submits the Consent Application to the Consent granting body (for Category Two Consents the *Contractor* receives *Project Manager* agreement prior to submission to the Consent granting body),
- obtains confirmation from the relevant Consent granting body that it has received the Consent Application,
- provides to the *Project Manager,* copies of all Consent Application submissions and supporting information, including records of correspondence, meetings, assurances by the *Contractor* and commitments to or by Consent granting bodies,
- provides the *Project Manager* with a copy of the agreed Consent immediately upon receipt,
- maintains a record of the original submission and agreement and
- immediately notifies the *Project Manager* if a Category Two Consent or Category Three Consent is not granted.

S929.31 Where a Consent Application listed in Article 21(1) of Schedule 2, Part 2 of the DCO is refused by the consent granting body, the *Contractor* may submit a request to the *Project Manager* for the *Client* to submit an appeal to the Secretary of State in accordance with Article 21(2) of Schedule 2, Part 2 of the DCO for the *Project Manager's* agreement. The *Contractor* provides any additional information required by the *Project Manager* to support the *Client*'s appeal.

Modifications to agreed *works*

S929.32 If a change to the design of the *works* or Scope which already has a Consent is agreed or instructed by the *Project Manager*, then the *Contractor* prepares, submits and obtains agreement for any necessary additional Consents or variation to an existing Consent.

S929.33 The *Contractor* submits any revised Category 1 and 2 Consents (including all required supporting information) to the *Project Manager* for agreement, prior to submission of such Consents to the Consent granting body.

Documents and Records

S929.34 The *Contractor* provides the *Project Manager* with all records of Consents on the Project Common Data Environment (CDE) in accordance with section 1900 including

- copies of all communications with external stakeholders, including letters, e-mails, meeting minutes and telephone contact records,
- Consent documentation submitted to regulatory authorities or other consent granting bodies and
- Consent documentation received from regulatory authorities or other consent granting bodies.

S1000 Services and other things to be provided

S1005 Services and other things provided by the *Contractor* for the use by the *Client*, *Project Manager*, *Supervisor* or Others

Office Accommodation, Welfare Facilities, Access Roads and Car Parks

S1005.1 The *Contractor* provides office accommodation, welfare facilities, access roads and car parking facilities to accommodate the minimum requirements, as described in numbered appendix 1/1, to the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team).

Equipment

S1005.2 The *Contractor* provides Equipment, as described in numbered appendix 1/1 to the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team).

Progress Photography

S1005.3 The *Contractor* provides the *Project Manager* with recorded images capturing the progress of the *works* in accordance with the requirements set out in numbered appendix 1/22.

S1005.4 The *Contractor* submits a recorded images plan detailing how to achieve the requirements set out in numbered appendix 1/22 in accordance with the Acceptance Procedure, for acceptance by the *Project Manager*, eight weeks prior to the first *access date*.

S1005.5 The *Client* retains all rights to all recorded images taken on Site within the Working Areas or of the *works*. The *Contractor* provides access to the *Project Manager* to undertake its own videography and photography.

Site Vehicles

S1005.6 Refer to section numbered appendix 1/2 for details of the vehicle type, availability, maintenance and specification requirements. The *Contractor* ensures that such vehicles are not used for personal use.

S1005.7 The *Contractor* pays

- the ‘dart charge’ and
- the ‘lower Thames crossing’ charge

incurred by the *Client's* staff, the *Project Manager* (and its team) and *Supervisor* (and its team) for the use of the vehicles provided in the above paragraph. The *Contractor* establishes and uses a business account for the payment of each of the ‘dart charge’ and the ‘lower Thames crossing charge’ for all such vehicles.

S1010 Services and other things provided by the *Client*

S1010.1 If, at each *access date*, the *Client* makes available the relevant Plant and Materials for use by the *Contractor* in Providing the Works, the *Contractor* supplies the same quantity and quality of Plant and Materials to the *Client* at Completion of the whole of the *works* unless the *Project Manager* agrees otherwise.

I&M

S1010.2 The *Client* provides the *Contractor* with access to the web based dissemination system and the associated Equipment within seven days of the *starting date*.

The *Contractor* works with the outgoing service provider to transition the web based dissemination system and the associated Equipment to its control and provision. The *Contractor* ensures that the transition is completed within six weeks of the *starting date*. The *Contractor* operates and maintains the web based dissemination system and the associated Equipment once it is transitioned from the outgoing services provider for six months or such longer period as agreed with the *Project Manager* and provides access to the *Project Manager* (and its team) and the *Supervisor* (and its team).

The *Contractor* reviews and adopts the collected data.

If the *Contractor* wishes to alter or transform the web based dissemination system to a new solution it submits its proposals to the *Project Manager* for acceptance in accordance with the Acceptance Procedure. A reason for not accepting such proposals is

- it does not provide the *Project Manager* with sufficient information to understand how the proposed web based dissemination system will be correlated/benchmarked back to the existing web based dissemination system,
- it does not meet the requirements set out in scope section S125 of the pre-enabling works delivery agreement 1 between the *Client* and Balfour Beatty Civil Engineering Ltd (see link in Annex A) for the solution or
- it does not provide the *Project Manager* (and its team) and *Supervisor* (and its team) access to the new web based dissemination system.

The *Contractor* decommissions and removes (unless agreed otherwise by the *Project Manager*) the associated Equipment installed to monitor an asset

- no earlier than six months after Completion of *section* 1 or completion of the relevant asset and
- when the *Contractor* can prove a negligible relative change of the properties measured in the relevant asset

but no later than 12 months after the specific work activity have finished unless directed otherwise by the *Project Manager*.

The *Contractor* decommissions the web-based system when all the related monitoring Equipment is decommissioned.

S1010.3 The *Client* has commissioned Others to undertake a number of services and works in advance of the Contract Date. These include the following

- instrumentation and monitoring (I&M) baseline which includes noise and air quality,
- Utility Works as described in numbered appendix 1/16 and
- IVL is importing materials from other clients to an agreed level.

Information on these activities, where completed, is provided in the Site Information. The *Contractor*, where appropriate, reviews, adopts and develops the data provided in the Site Information.

When instructed by the *Project Manager*, the *Contractor* enters into a novation agreement with Others as necessary to transfer any relevant contracts from Others for any instrumentation and monitoring systems.

S1010.4 The *Contractor* agrees with the relevant stakeholders, in order to confirm any ongoing monitoring or additional installations required to support detailed design, construction and discharge of Consents and reporting requirements.

The *Client* hands over the groundwater and gas monitoring installations installed as part of the Phase 1, 2 and 3 ground investigations to the *Contractor* within seven days after the *access date*. The *Contractor* reviews, adopts and manages these installations and is further responsible for

- ongoing management of these installations throughout the construction period and
- decommissioning of these installations on completion of the relevant construction activities.

Utilities connections

S1010.5 Not used.

S1100 Health and Safety

Home Safe and Well

S1100.1 One of the desired outcomes of the *Client's* home safe and well approach (see link in Annex A), is no-one being killed or seriously injured when travelling or working on the Strategic Road Network (SRN) or new roads that are to form part of the SRN. The *Contractor* includes in quality management systems its processes and procedures to

- deliver this outcome in Providing the Works (whether on the existing SRN or the Project Road),
- to achieve the identified success factors and
- the *Client's* strategic vision

outlined in the home safe and well approach.

S1100.2 In Providing the Works, the *Contractor*

- complies with the health safety and wellbeing (HSW) requirements and intent of
  - DMRB including GD 101 - Introduction to the Design Manual for Roads and Bridges (DMRB),
  - HSW information provided in the *Client's* Raising the Bar guidance,
  - the *Client's* supply chain safety leadership group 'common intent' and 'lessons learnt' documents,
  - related *Client's* Project Control Framework (PCF) products as described in the PCF and in section S255 and
- aligns with the requirements and intent of the LTC Health Safety and Wellbeing Strategy

(see links in Annex A).

S1100.3 The *Contractor* compares the "common intent" and "Raising the Bar" initiative guidance with its HSW practices and provides a report to the *Project Manager* prior to the first *access date* detailing

- where the "common intent" or "Raising the Bar" guidance is more comprehensive than the *Contractor's* HSW practices, the *Contractor* produces a remedial plan for bringing its working practices up to this minimum standard and updates/amends the *Contractor's* management systems as identified by gap analysis and
- where the *Contractor's* working practices surpass those set out in the guidance, the *Contractor* provides details of these to allow the guidance to be updated for the benefit of all road workers.

LTC Health, Safety and Wellbeing Strategy

S1100.4 The approach for HSW for the Project is described in the *Client's* LTC Health Safety and Wellbeing Strategy (LTC HSW strategy) (see link in Annex A).

The *Contractor* develops a HSW management system including an 'HSW implementation plan' that aligns with the LTC HSW strategy and describes the actions the *Contractor* takes to provide proactive HSW leadership and identify, develop, manage and check HSW performance on the Project.

The *Contractor* employs a digital geospatial platform with geo-fencing and geo-location capabilities within four weeks of the first *access date*. All Staff, the *Project Manager* (and its

team), the *Supervisor* (and its team), vehicles and Equipment are visually represented in real time via the geospatial platform.

The *Contractor's* geospatial platform is compatible with the *Client's* geospatial platform (known as Onwave Locator (OWL), link provided in Annex A) and incorporates automated, bespoke reporting functionality and emergency management tools.

The *Contractor* provides unrestricted access to the *Contractor's* geospatial platform to the *Project Manager* (and its team) and *Supervisor* (and its team).

S1101 Health, Safety and Wellbeing (HSW) culture

Culture

S1101.1 The *Contractor* develops, promotes and embeds a culture where HSW is the first consideration, where everyone makes safe decisions and acts to mitigate risks wherever and whenever they occur. This is achieved by making sure that HSW considerations are integrated into the design, planning, construction, operation and maintenance of the *works* so that, no-one is injured or harmed when undertaking the *works* and its future operations and maintenance and ensuring

- safety is integral to the function of the SRN, its assets, operation and maintenance and
- members of the public, operations and maintenance workers are safe in the future when the SRN is in use.

Leadership

S1101.2 Strong and visible leadership is fundamental in HSW management, culture and performance. The *Client* is passionate about the quality of its leaders at every level of the organisation and supply chain. The *Contractor* provides demonstrable leadership to all its Staff and at all Compounds and worksites.

S1101.3 The *Contractor* appoints a director (as defined in the Companies Act 2006) who

- is dedicated to Providing the Works unless agreed otherwise by the *Project Manager*,
- is accountable for HSW including managing work related road risk and
- is an operational director with extensive practical experience of directing, delivering, managing and operating HSW on a day to day basis within construction, or equivalent, (as a site located person) for those sites

on the *starting date*.

Behavioural Based Safety programme

S1101.4 The *Contractor* develops a programme of both initial and refresher Behavioural Based Safety (BBS) improvement modules within 60 weeks of the *starting date* for its Staff.

The *Contractor* submits its programme to *Project Manager* for acceptance in accordance with the Acceptance Procedure. A reason for not accepting The programme is it does not cover the remaining Mobilisation Phase.

The *Contractor* delivers the accepted programme of BBS improvement modules to its Staff and the *Project Manager's* team and *Client* Project representatives that are to be enrolled onto the programme.

S1101.5 The modules are aligned to the Project vision and strategic goals and the visions and goals outlined in the *Client's,* home safe and well approach (see link in Annex A).

S1101.6 The *Contractor* develops training modules that demonstrate how BBS is integrated into the *Contractor's* HSW management system.

S1101.7 As a minimum, the *Contractor* undertakes quarterly HSW surveys of Staff, the *Client*, *Project Manager* (and its team) and *Supervisor* (and its team) on experiences of behaviour, culture and wellbeing (including stress levels), in accordance with section S253 The *Contractor* adjusts the frequency of these surveys depending on HSW data trends.

S1101.8 When applicable, the *Contractor* submits to the *Project Manager,* the collated and analysed results of such surveys with an identified action plan of improvement and progress as part of the 'monthly progress report' described in section S850.

S1101.9 The *Contractor* develops a separate supervisors' HSW module within 130 weeks of the *starting date* that includes a specific assessment of candidate aptitude, awareness, attitude, communication and interpersonal skills. This module focuses on the effect of decision making on-site HSW matters and the role of supervisors. The *Contractor* provides this to all supervisors (including those nominated by the *Project Manager*) for the duration of the *works.*

Just and Fair Culture

S1101.10 The *Contractor* operates a Just and Fair Culture. The *Contractor* includes the following in the HSW management system and 'HSW implementation plan' that describes

- how it communicates with Staff (for instance within the site induction),
- the leadership commitments to HSW outcomes,
- the behaviours expected of every member of Staff aligned with the *Client's* values and behaviours booklet,
- specific training for supervisors and managers, considering how to deal with exemplary and poor behaviours,
- measures for stopping work on HSW grounds and
- grounds for further action or discipline.

S1101.11 If the *Contractor* does not operate a Just and Fair Culture, the *Contractor* submits a plan for implementing a Just and Fair Culture process to the *Project Manager* for acceptance within 10 weeks of the *starting date*. A reason for not accepting the proposed process is it

- does not meet the requirements described in paragraph S1101.10 and
- does not include details on investigation, mitigation and prevention of reoccurrence in the event of a non-conformity or breach of HSW requirements.

Visual and Inclusive Communication

S1101.12 The *Client* aspires to create new standards of communicating HSW risks during design and construction that are inclusive and understandable to all. The *Contractor* develops ways of visually communicating HSW requirements and outcomes that demonstrate innovation and best practice. The *Contractor* actively seeks the input from Staff, the *Project Manager* (and its team), the Supervisor (and its team) and the *Client's* Project representatives in developing the visual and inclusive communication tools.

S1101.13 If an improvement has been made to an accepted process or activity derived through consultation with Staff, the *Project Manager*, other LTC contractors or wider industry or after an accident or incident has occurred, the *Contractor* also shares and communicates these outcomes using alerts and case studies.

Reward and Recognition

S1101.14 The *Contractor* ensures the Reward and Recognition Scheme, as described in section S253, includes HSW performance.

Health and Safety – charity-based incentive schemes

S1101.15 The *Contractor* adopts charity-based incentive schemes covering local and national charities and provides proposals to the *Client* or *Project Manager* for coordination. The *Contractor* provides an update on the charity-based incentive schemes on a quarterly basis to the *Project Manager*.

Management of Road Risk

S1101.16 The *Contractor* ensures that it has systems in place for the effective management of occupational road safety and road risk in accordance with guidance provided by the HSE or other relevant industry guidance and in line with paragraph S1101.18 (DfBB) below.

S1101.17 The *Contractor's* road safety management system has provision for assessing traffic management, driver competence and eligibility, driver safety training, vehicle maintenance and accident and incident investigation.

S1101.18 The *Client* supports and promotes the management of work related road risk (WRRR) in accordance with HSE guidance and through membership of the Driving for Better Business programme (see link in Annex A). Within 30 weeks of the *starting date* the *Contractor*

- registers as a member of The Driving for Better Business programme,
- develops and implements a driving for work policy including
    - compliance with HSE guidance,
    - application to all areas of the business,
    - application to all types of driving undertaken,
    - effective communication to Staff who may drive for business purposes and
    - a statement from its chief executive officer (CEO) or board director responsible for WRRR that outlines the importance attached to work-related road safety and
- includes in the HSW implementation plan, systems for assessing traffic management, driver competency, provision of training, vehicle maintenance, accident investigation and driver safety including
    - an effective system for measuring and monitoring activity including the frequency and severity of any collisions, together with driver and vehicle compliance. This includes as a minimum
        - records of traffic accidents and investigation results,
        - driver training or education supplied,
        - driver licence checking and relevant insurance checking,
        - employee policy acceptance and
        - where relevant vehicle checks and defect reporting.

S1101.19 The *Contractor* is accredited to or operates a fleet recognition scheme which raises the quality of fleet operations and demonstrates exemplary levels of best practice in safety, efficiency and environmental protection.

S1101.20 The *Contractor's* recognition scheme is, as a minimum, to the standards required by Silver membership of the 'fleet operator recognition scheme' (FORS) and incorporates all the requirements of the 'construction logistics and community safety' (CLOCS) standard.

S1101.21 The *Contractor* manages and operates and embeds within its vehicle fleet scheme the guiding principles of Kent and Essex County Council's Vision Zero Road Safety Strategy (see links in Annex A).

S1101.22 The *Contractor* ensures subcontractors (at any stage of remoteness from the *Client*) meet the requirements outlined in paragraphs S1101.16 to S1101.21.

S1101.23 The *Contractor* ensures subcontractors (at any stage of remoteness from the *Client*) meet the Driving for Better Business requirements.

Induction and onboarding

S1101.24 The *Contractor* develops induction and onboarding requirements stated within section S800.

S1102 Management of Health Safety and Wellbeing

Contractor's Health, Safety and Wellbeing Management System (HSW management system)

S1102.1 The *Contractor* implements a HSW management system from the *starting date* and submits it to the *Project Manager* for information within three weeks of the *starting date.* The *Contractor* ensures that the HSW management system

- is certified to BS EN ISO 45001: 2018 Occupational health and safety management system (see link in Annex A) in accordance with the requirements described in section S600 and
- includes a description and structure of how the HSW management system works.

Subcontractor's Health and Management System

S1102.2 The *Contractor* ensures that its subcontractors (at any stage of remoteness from the *Client*) operate a HSW management system aligned with the *Contractor's* HSW management system. Where a subcontractor does not hold its own accredited HSW management system, the *Contractor* ensures its HSW management system applies to such Staff.

Health Safety and Wellbeing (HSW) Implementation Plan

S1102.3 As part of the HSW management system, the *Contractor* develops a HSW implementation plan and submits it to the *Project Manager* for acceptance within 10 weeks of the *starting date*.

S1102.4 The HSW implementation plan demonstrates how the *Contractor*

- meets the requirements of section S1100,
- meets the aspirations and vision within the home safe and well approach (see link in Annex A),
- aligns with guiding principles of the LTC health safety and wellbeing strategy (see link in Annex A),
- ensures that subcontractors' (at any stage of remoteness from the *Client*) management systems, processes and procedures are in accordance with the Scope,

- complies with British Standards and best practice guidance as a minimum and sets out how it innovates to raise HSW standards in the construction sector. If there are proposals for any derogation from the British Standards or the requirements set out in the Scope, these are agreed by a suitably qualified senior member of the *Contractor's* leadership team and the director (see paragraph S1101.3) notified of such decision within 24 hours. The *Contractor* submits, a minimum of four weeks prior to undertaking the relevant work, the
    - derogation to British Standards to the *Project Manager* for information. If the *Project* Manager provides any comments to the *Contractor*, the *Contractor* considers such comments and
    - proposed derogation to the Scope to the *Project Manager* for agreement,
- describes the arrangements for identifying and managing all HSW issues including processes, procedures and documentation,
- includes procedures to demonstrate safe systems of working to prevent the realisation of the Project's fatal and construction risks within its HSW management system which are submitted for information to the *Project Manager*. The *Contractor* considers and addresses any comments made by the *Project Manager* in relation to the safe systems of work or any such procedures or processes,
- provides consistency of approach and interoperability across the Working Areas, allowing seamless movement of Staff between different sites,
- provides processes and procedures to ensure HSW when working with Others,
- interfaces and aligns with the *Client's* health and safety systems, policies, procedures and requirements,
- references the *Contractor's* HSW processes and procedures relevant to the *works*,
- sets out the *Contractor*'s arrangements to apply a Just and Fair Culture model,
- develops an overarching 'Emergency Preparedness Plan' (EPP) to describe actions, roles and responsibilities in response to emergency situations for the Site and specific 'Emergency Rescue Plans' for high risk activities,
- ensures that the EPP remains relevant throughout the *works* and carries out the modifications to these plans on an annual basis unless there are changes to work practices or site layout arrangements,
- sets out the emergency preparedness processes and scenario testing for managing and mitigating all fatal/construction risks,
- describes the arrangements for exclusion and restricted zones,
- identifies all deliverables required to manage HSW requirements,
- describes the roles and responsibilities of the resources required to implement the plan,
- the timeframe for submissions and
- any other actions required.

S1102.5 A reason for not accepting the HSW implementation plan is that

- it does not comply with the Scope including providing the information required in paragraph S1102.4,
- it does not set out the how the *Contractor* complies with the HSW requirements,
- it does not include sufficient details on how the *Contractor* manages Staff to enable the *Project Manager* to understand it and

- it does not include sufficient details on how the *Contractor* manages HSW of the *Client* (and its Project representatives), Others, the *Project Manager* (and its team) and *Supervisor* (and its team) to enable the *Project Manager* to understand it.

S1102.6 The *Contractor* ensures its HSW implementation plan is updated every three months and when there is a change in risk or working practice and submits to the *Project Manager* for information. Every six months the updated HSW implementation plan is submitted to the *Project Manager* for acceptance.

Risk Assessment and Method Statement (RAMS)

S1102.7 As part of the HSW management system, the *Contractor* implements a 'risk assessment and method statement (RAMS) procedure' as part of the HSW implementation plan describing how RAMS will be produced and briefed. For high risk activities, the *Contractor* submits the RAMs for acceptance by the *Project Manager* and proceeds when the RAMS has been accepted and comments addressed.

S1102.8 The *Contractor* provides method statements that meet health and safety guidance (HSG) 150 Health and Safety in Construction, 2006 standards.

S1102.9 The *Contractor* promotes the use of technology to supplement RAMS production and briefing meetings. The *Contractor* develops innovations that

- include the use of virtual and augmented reality and other visual aids demonstrating where benefits can be realised, using technology to enhance planning and understanding of risk on Site and
- includes Staff involvement, engagement and understanding.

S1102.10 The *Contractor* submits a monthly 'schedule of work activities' to the *Project Manager*. From the 'schedule of work activities', the *Project Manager* notifies the *Contractor* which RAMS may require to be submitted for acceptance due to their high risk profile.

S1102.11 The 'schedule of work activities' includes

- the RAMS that are produced throughout the forthcoming period considering any authorisations from Others,
- review periods for RAMS where activities are longer than four weeks in duration,
- an accurate look-ahead of three months, as a minimum, in accordance with the Accepted Programme,
- an indication of the relevant work activities that may impact on assets or properties owned or controlled by Others,
- a rating of the potential risks of work activities, as agreed with the *Project Manager*, classified as high, medium or low and
- details of RAMS that are required for high risk or high profile activities that require acceptance by the *Project Manager*.

If high risk RAMS are submitted to the *Project Manager* for acceptance, a reason for not accepting the RAMS is that

- it does not describe the high risk activity and potential risk and mitigation in adequate detail,
- it does not comply with the Scope,
- it does not demonstrate the individuals proposed are competent to undertake the activity,
- it does not clearly state the arrangements for briefing and

- it does not demonstrate the controls for the activity are adequate.

S1102.12 The *Contractor's* RAMS process ensures that any author of these documents and those briefing are competent, authorised, regularly assessed and specifically named on the *Contractor's* training and competency register. The *Contractor* ensures that all RAMS are prepared, reviewed and amended in consultation with the *Contractor's* immediate supervisors for the *works*. Relevant subject matter experts are consulted when producing risk assessments for high-risk activities.

The *Contractor's* RAMS are reviewed and re-briefed

- quarterly from point of first submission,
- where identified within an incident investigation or
- where legislation, standards or working practices change.

S1102.13 The *Contractor* carries out and records point of work risk assessments (POWRA) at the location prior to undertaking the relevant work and as a minimum on a daily or shift basis. The POWRA identifies things, situations, processes and activities that may cause harm, particularly to people.

Requirements for safety risk assessment

S1102.14 The *Contractor* ensures that safety risk assessments are in accordance with DMRB standard GG 104 Requirements for safety risk assessment (see link provided in Annex A) and submits the safety risk assessments in accordance with the Acceptance Procedure for acceptance by the *Project Manager*, accompanied by the Multiparty Collaboration Certificate (where appropriate) and submitted alongside the relevant design or construction activity.

S1102.15 The *Contractor* updates a safety risk assessment when changes occur or when a safety risk assessment is no longer current and resubmits the safety risk assessment in accordance with the Acceptance Procedure for acceptance by the *Project Manager* and submitted alongside the relevant design or construction activity.

S1102.16 The *Contractor* submits all proposed activity type categories A, B or C (as determined in accordance with GG 104) to the *Project Manager* for agreement (including review by the safety control review group (SCRG) or national safety control review group (NSCRG)). The *Contractor* does not submit the relevant safety risk assessment in accordance with the Acceptance Procedure until the category has been agreed.

S1102.17 A reason for not accepting a safety risk assessment is that

- it does not comply with the Scope,
- safety risk has not been coordinated with the other Main Works Contractors or
- the activity type A, B or C categorisation (as defined in GG 104) has not been agreed.

S1102.18 The *Contractor* ensures all safety risk interfaces that impact upon the other Main Works Contractors are agreed with the other Main Works Contractors.

Permits

S1102.19 The *Contractor* operates a permit to work process either independently or as part of other processes to which they pertain. Permits are operated in accordance with Health and Safety Guidance (HSG) 250 (Guidance on Permit-to-work Systems). As part of the permitting arrangements, the *Contractor* proposes innovations to the *Project Manager* in the use of smart permits linked to virtual and augmented models of the Site and Working Areas or point of work including

- monitoring and management of the asset data used to inform the permit,

- risk identification from visual walkthroughs,
- buildability and phasing linked to permit durations and
- monitoring permit issue, authorisation and cancellation in compliance with the relevant process requirements.

Incident Reporting

S1102.20 The *Project Manager* provides incident reporting contact details to the *Contractor* from the *starting date*.

S1102.21 The *Contractor* provides its incident reporting process as part of the HSW implementation plan.

S1102.22 The *Contractor* complies with GG 128 - Requirements for reporting incidents, events and undesirable circumstances: health, safety, wellbeing, structural and environmental (see link in Annex A) including any time periods required by GG 128.

S1102.23 The *Contractor* notifies the *Project Manager* of any incident that occurs that the *Contractor* considers is not within the remit of GG 128 and reports the incident as if the incident is in the remit of GG 128 if required by the *Project Manager*.

S1102.24 In addition to any requirements in the GG 128, the *Contractor* reports immediately to the *Project Manager* details of any serious incidents involving any person injured or killed within the Working Areas. The *Contractor* reports all incidents to the *Project Manager* by telephone and e-mail within two hours of occurrence (including the information covered by the short incident investigation form template). The *Contractor* records the incident on the *Client's* incident reporting systems. The *Contractor* notifies the *Project Manager* of any other incident within two hours of occurrence.

S1102.25 The *Contractor*, in all cases, notifies the *Project Manager* of the incident, prior to uploading to the *Client's* incident reporting system.

Additional Reporting Requirements for Principal Contractors

S1102.26 Where the *Contractor* is appointed as Principal Contractor under the contract, the *Contractor* complies with the following reporting requirements. Immediately after an incident occurs within the Working Areas resulting in the occurrences below, the *Contractor* reports brief details of the incident directly to the *Client's* Regional Operations Centre in line with the national inter-agency liaison officer procedures (NILO) requirements (see link in Annex A)

- an incident involving any of the *Client's* staff resulting in
  - death,
  - serious injury (as defined by HSE) or
  - other injury

sustained while undertaking duties in connection with the *works* and

- any collision or incident involving a vehicle belonging to the *Client*, winter service vehicle, any other works vehicle or any type of supply-chain vehicle, which strikes (or is struck by) a third-party vehicle (even if there is no injury or no damage to any party) while undertaking duties in connection with the *works*.

Incident investigation, reporting and follow-up

S1102.27 The *Contractor* develops and implements a process for root cause analysis, investigation and mitigation to prevent reoccurrence of HSW incidents. The *Contractor* submits the 'incident investigation process' to the *Project Manager* for acceptance as part of the 'HSW implementation

plan'. A reason for not accepting the 'incident investigation process' is that the process does not describe the way in which

- the details of the incident are captured,
- it aligns with GG 128,
- incident investigations, analysis and the mitigation is undertaken or
- corrective actions and learning is shared with Others and other LTC contractors.

S1102.28 Where a HSW violation occurs, the *Contractor* undertakes an incident investigation in accordance with the incident investigation process and prepares a report and submits it to the *Project Manager* for acceptance. A reason for not accepting the report is that

- it is not prepared in accordance with the incident investigation process or
- it does not contain sufficient detail to enable the *Project Manager* to understand the root cause of the incident and how the mitigation measures prevent the reoccurrence of the incident.

S1102.29 The *Project Manager* has the right to investigate any incidents wherever they occur. The *Contractor* provides the *Project Manager* with access to the Working Areas, facilities, Equipment, Plant and Materials, people and records of the *Contractor* and the subcontractors (at any stage of remoteness from the *Client*) for this purpose.

S1102.30 The *Contractor* provides a copy of all materials related to an incident to the *Project Manager* in accordance with the timescales set out in GG 128 - Requirements for reporting incidents, events and undesirable circumstances: health, safety, wellbeing, structural and environmental (see link at Annex A). Any materials that otherwise fail to be disclosed by the *Contractor* to the *Client* may be withheld by the *Contractor* provided the *Contractor*'s legal advisor confirms to the *Project Manager* that the materials are

- a confidential communication between the *Contractor* and its legal advisor for the purposes of seeking or giving legal advice that the legal advisors normally expect to be given legal privilege in the normal course of its business with the *Contractor* or
- a confidential communication between the *Contractor* or its legal advisers and third party where the communication came into existence with the dominant purpose of being used in connection with contemplated, pending or actual litigation in adversarial proceedings (as opposed to investigations or fact-finding inquiries).

S1102.31 If and when an incident occurs, the *Contractor*, in line with the *Client's* standards, determines if a formal investigation is required, and if required follows the notification, investigation and reporting procedures as defined in GG 128 or the Scope.

S1102.32 Investigations by the *Contractor* are undertaken by a competent person who has been trained in effective accident and incident investigation. The investigation report provides information on the circumstances surrounding the accident or incident and any remedial measures to be taken to prevent a recurrence. Relevant photographs and statements are provided as an integral part of the investigation report. The *Contractor* is to employ the use of immersive digital platforms virtual reality/augmented reality (VR/AR) to visually recreate the circumstances of a Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR), High Potential or incident deemed worthy of further investigation, as instructed by the *Project Manager*. This technology is to be used to enhance the learning and communications from investigations across the *Client* and *Contractor's* supply chains.

S1102.33 Where the *Contractor* is compiling the draft incident report, the *Contractor* discusses the findings of the draft report with the *Project Manager* prior to the production of the final draft.

S1102.34 The *Contractor* implements the recommendations arising from the incident investigations.

S1102.35 The *Client* classifies incidents as either one, two, three, or four with one being the most serious and four being a near miss or near hit, as explained below. The *Contractor* reports the incidents in line with the *Client's* incident criteria and does not amend an incident level unless accepted by the *Project Manager*.

S1102.36 The *Client's* criteria for level one incidents are

- an incident reportable under The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR) (see link in Annex A),
- injury to a member of the public (regardless of treatment required),
- overturn of Equipment in addition to the relevant clauses of RIDDOR 2013,
- any utility damage including existing damage upon exposure that resulted in injury or interruption to service,
- significant damage to traffic management where the site is occupied,
- a high potential near miss that under different circumstances could have caused death or serious injury,
- any incident requiring emergency service intervention,
- external events with the potential to significantly disrupt the *works* and the programme and
- a serious environmental incident which includes
    - significant pollution to land, air or water which has or may cause significant harm or damage leading to long term or irreversible impacts,
    - damage to designated ecological habitat or protected species,
    - damage to any historic environment asset of the highest significance e.g. a scheduled monument or grade one listed building,
    - breach of a Consent granted by an environmental regulator or carrying out works without a valid Consent where such a Consent is required and
    - a significant breach of waste management regulations or investigation of such by the authorities.

S1102.37 The *Client's* criteria for level two incidents are

- lost time incidents up to and including one week,
- an injury requiring medical treatment including hospitalisation,
- other high potential near misses not classified as level one,
- a suspicion of a criminal offence,
- an incident that endangers the safety of the general public,
- an incident that affects the physical security of the Working Areas and
- an environmental incident which includes
    - pollution to land, air or water which has or may cause harm or damage and is less severe than level one e.g. it has localised, short term and reversible effect,
    - damage to any historic environment asset other than described in a level one,
    - any breach of environmental regulation,
    - works significantly affecting the free flow of traffic and
    - receipt of and failure to respond to a statutory notice issued by a statutory body.

S1102.38 The *Client's* criteria for level three incidents are

- damage to Equipment, the *works* or the temporary works,
- minor injury resulting in minor first aid and no lost time,
- a security incident not described in level one or two,
- a small and local pollution incident which has been contained and cleaned up without wider effect on the environment e.g. small hydrocarbon spill over impermeable surface and
- specific complaints regarding health, safety or environmental practices from a member of the public.

S1102.39 The *Client's* criteria for level four incidents are

- near misses/near hits and
- an unsafe act.

S1102.40 The *Project Manager* has produced a 'Project Incident Management Plan' for LTC (HE540039-CJV-GEN-GEN-PLN-HSW-00010) which is provided within Annex A.

S1102.41 As part of the *Contractor's* HSW management system, the *Contractor* submits a project specific 'incident management plan' to the *Project Manager* for acceptance within four weeks of the *starting date*. A reason for not accepting the 'incident management plan' is that it does not comply with the requirements of paragraph S1102.42.

S1102.42 The *Contractor's* incident management plan, as a minimum

- complies with GG 128 - Requirements for reporting incidents, events and undesirable circumstances: health, safety, wellbeing, structural and environmental (see link in Annex A),
- aligns with the *Client's* 'Project Incident Management Plan',
- includes classification of incident severity in accordance with the Scope requirements,
- includes the management of observations including trending analysis and communication of information to the *Project Manager*,
- includes an incident notification flow chart including communication arrangements with the *Project Manager*, *Client* and Others,
- includes arrangements for strategic and tactical management of incidents including dealing with the emergency services, relevant statutory bodies and the media, along with the names and contact details of those responsible
- includes incident investigation, follow up, closure, sharing alerts and lessons learned and
- includes a short incident investigation form template for incidents.

S1102.43 For all level one and two incidents the *Contractor*

- notifies the *Project Manager* immediately and arranges a conference call (with a minimum capacity of 30 people) with the *Project Manager* within two hours of the incident to report the circumstances of the incident and agree the next steps,
- produces a draft report within two days of the incident and submits this to the *Project Manager* for information,
- presents to the *Project Manager* the findings of the investigation using the Serious Incident Review (SIR) template (provided in Annex A) within two weeks of the incident

(or otherwise instructed by the *Project Manager*) and submits the SIR to the *Project Manager* for acceptance and

- produces a final report and associated action plan within two weeks of the incident and submits it to the *Project Manager* for acceptance. Where this cannot be achieved, the *Contractor* agrees the timeframe with the *Project Manager.*

S1102.44 The *Contractor* produces a detailed investigation report for all incidents classed as level one or two or for any other incident instructed by the *Project Manager*. Detailed investigation reports are to include

- an overview and actual description of the incident,
- details of any personal injuries,
- details of any property or environmental damage,
- details of items involved,
- a record of the action taken at the time of the incident,
- analysis of the incident including immediate root and underlying causes,
- where relevant, a review of equipment, process or programme design,
- witness statement analysis,
- a Just and Fair Culture assessment,
- corrective or preventative actions,
- learning opportunities and recommendations and
- any additional attachments relevant to the investigation such as animations, photographs, witness statements and assessments.

S1102.45 Every level one or two incident investigation report is accompanied by an action plan and safety alert and is submitted to the *Project Manager* for acceptance.

S1102.46 A reason for not accepting the SIR or the incident investigation report is that

- it is not prepared in accordance with the incident investigation process,
- it is not prepared in accordance with paragraph S1102.44 or
- it does not contain sufficient detail to enable the *Project Manager* to understand the root cause of the incident and how the mitigation measures prevent the reoccurrence of the incident.

S1102.47 Not used.

S1102.48 The *Contractor*, where appropriate and dependent on the nature of the level three or four incident, completes a short incident investigation form identifying immediate root and underlying causes unless otherwise instructed by the *Project Manager*.

S1102.49 The *Contractor* submits all draft and final incident investigation documents to the *Project Manager* for acceptance prior to uploading them on to the *Client's* incident reporting system.

S1102.50 The *Contractor* uploads all safety alerts in incident reports to the Project Common Data Environment (CDE) as described in section S1900.

Incident statistics and Corporate Reporting

S1102.51 The *Project Manager* has developed a Project wide LTC HSW App for reporting all data relating to HSW performance metrics. A list of the HSW Metrics to be reported on the LTC HSW App is provided in Annex A.

The *Contractor* nominates Staff that require access to the LTC HSW App within one week of the *starting date* and the *Project Manage*r provides access and training for use of the LTC HSW App within one week of receiving the nomination list. Additional Staff can be added at any time with the agreement of the *Project Manager.*

S1102.52 The *Contractor* uploads the information to the LTC HSW App on a weekly basis in accordance with the project reporting calendar. On a monthly basis the *Contractor* produces a downloadable report for discussion with the *Project Manager* at the monthly progress review. The monthly report is uploaded to the Project Common Data Environment (CDE) in accordance with the Project Reporting Calendar.

S1102.53 The *Contractor*, if requested by the *Project Manager*, provides detailed reports of accident and incident statistics to the *Project Manager* in a format and at periods specified by the *Project Manager*.

S1102.54 Where no date is given for submission of a specific report the *Project Manager* notifies the *Contractor* of the date of submission.

S1102.55 The *Contractor* reports on the status of the HSW performance metrics and submits information as part of the monthly progress report described in section S850. This includes details of all HSW data, trends and analysis against the deliverables of the Scope. The *Project Manager*, on review of the *Contractor's* HSW performance, may agree additional HSW metrics.

S1102.56 From the *starting date*, the *Contractor* submits a quarterly 'Construction Design Management (CDM) Metrics report' to the *Project Manager* for information. The 'CDM Metrics report' gives the *Contractor* an opportunity to highlight Principal Designer, Designer and Principal Contractor compliance and innovation in relation to CDM.

S1102.57 From the *starting date*, the *Contractor* completes the *Client's* Supply Chain Maturity Matrix (SCMM) (see link in Annex A) quarterly and submits it to the *Project Manager* for information on the Project Common Data Environment.

S1102.58 If as part of the monthly progress reviews, the *Project Manager* determines that performance falls below expectation against the *Client's* health and safety performance benchmarking and HSW performance targets, the *Contractor*

- implements a programme of deep dives and formal audits to identify root causes,
- develops an improvement action plan with identified owners from the *Contractor's* senior leadership team and submits to the *Project Manager* for acceptance,
- assesses the effectiveness of the actions implemented and determines any further actions required to achieve the required performance levels and
- updates the improvement action plan with relevant evidence within the timescales agreed with the *Project Manager* and submits it for acceptance by the *Project Manager.*

S1102.59 A reason for not accepting an improvement action plan is that

- it does not provide the *Project Manager* with sufficient information to understand the actions to be undertaken or
- it will not address the underlying performance issues.

The *Project Manager* confirms when the implementation of the *Contractor's* improvement action plan has satisfactorily addressed the shortfall in performance.

Action to rectify breaches

S1102.60 The *Project Manager* notifies the *Contractor* if the *Contractor* is Providing the Works in a manner which constitutes a breach of any health, safety and welfare legislation or where a nonconformity or breach is raised against any of the following requirements

- the *Contractor's* HSW management system,
- the *Contractor's* HSW implementation plan,
- the subcontractors' (at any stage of remoteness from the *Client*) health and safety management systems or
- the *Client's* health and safety management system.

S1102.61 Where the *Contractor* has been advised by the *Project Manager* of a breach, the *Contractor* corrects the situation by the date specified by the *Project Manager*.

S1102.62 The notification by the *Project Manager* includes the nonconformities or breaches identified, by the *Project Manager* and outlines the necessary steps required of the *Contractor* to rectify the breach.

S1102.63 Where a nonconformity or breach has been identified the *Contractor*

- develops an improvement action plan with identified owners from the *Contractor's* leadership team and submits to the *Project Manager* in line with the requirements stated within section S600,
- updates the plan with relevant evidence of how it remedies the nonconformity or breach within the timescales agreed with the *Project Manager* and
- submits the plan to the *Project Manager* for acceptance.

S1102.64 A reason for not accepting the improvement action plan is

- it does not rectify the issue,
- it does not enable the *Contractor* to meet the Accepted Programme or
- it does not comply with industry best practice or legislation.

S1102.65 Once accepted the *Contractor* implements the improvement action plan. The *Project Manager* confirms when the *Contractor's* improvement action plan has satisfactorily addressed the shortfall in performance.

Emergency Preparedness Plans

S1102.66 The *Contractor* develops an overarching 'emergency preparedness plan' (EPP's) for the Working Areas. As an addendum to the EPP there is a description of the specific emergency requirements to be found at each Compound and worksite.

S1102.67 The *Contractor* develops emergency rescue plans (ERPs) for each relevant activity as required by legislation or the *Contractor's* procedures. Each ERP is submitted to the *Project Manager* for information prior to undertaking the relevant work. ERPs are appended to the relevant RAMS.

S1102.68 The *Contractor's* EPPs contain the following information for Compounds and worksites

- welfare layout drawings,
- assembly points,

- emergency escape routes,
- location of emergency response and treatment facilities and equipment,
- location of hydrants and drainage systems,
- identifies which members of Staff are required for emergency management by job title,
- emergency telephone numbers and out of hours contacts,
- arrangements for key communication with emergency services,
- routes to the relevant hospital considering the nature of the incident and arrangements for transportation,
- out of hours arrangements including the management arrangements for breaches of security,
- location of flammable and hazardous materials,
- location and management of critical third-party assets and infrastructure including gas water and electric,
- stricken or overturned Equipment recovery,
- identification of fatal and construction risk and management thereof such as tunnelling, major earthworks, marine activity, deep excavation and significant work at height,
- management of marine-related emergencies and required communication to the regulators and enforcement bodies where relevant,
- procedures for stopping works on safety grounds and arrangements for recommencement,
- the arrangements for emergencies occurring outside normal working hours (as defined by the Development Consent Order),
- all steps taken and resources deployed as a consequence of, or arising from, a declaration of a level one and two incident within the incident investigation report and
- details of the emergency arrangements for working in tunnel-like and marine-like environments.

The *Contractor* ensures emergency grab packs containing the above information are available at all entrances and exits.

S1102.69 The *Contractor* produces and implements emergency response drills to test the arrangements of the EPP and ERP's. The *Contractor* invites the *Project Manager* to attend planned drills and scenario tests.

S1102.70 Drills and scenario tests include testing the preparedness arrangements for routine and level one or two incident scenarios including provisions for

- first aid,
- fire and evacuation,
- tunnel evacuation and casualty rescue,
- utility strikes,
- casualty removal from shafts and excavations and
- major environmental incidents.

S1102.71 As a minimum drills and scenario tests take place

- monthly for fire evacuation,

- prior to activities with potential for fatal or construction risk and
- prior to changes in Compound or worksite footprint or resource.

S1102.72 The *Contractor* liaises with the emergency services to familiarise them with the layout of the Working Areas and associated hazards. The *Contractor* invites the relevant emergency services to attend emergency drills and tests.

S1102.73 The results of emergency response drills and tests are shared with the *Project Manager* within seven days of the activity.

S1102.74 The *Contractor*

- trains all Staff in incident management in accordance with their roles and responsibilities,
- ensures training records are stored on the training database,
- provides annual refresher training to active participants of the EPP and incident management, investigation and notification process and
- ensures that appropriate Staff are trained in the use of the *Client's* accident and investigation reporting system.

Safety of Personnel

S1102.75 The *Contractor* establishes and operates consultation arrangements in accordance with the HSW implementation plan.

S1102.76 As part of the HSW implementation plan, the *Contractor* outlines arrangements for supervision. The *Contractor* ensures supervisors

- are sufficiently numerous to ensure appropriate supervision is available for Staff at all times, as identified in the risk assessment process and based on resource profiles,
- assess the HSW risk profile of the activities planned for the next month considering
    - concurrent activities,
    - site environment,
    - Equipment availability and
    - any other relevant matter
- conduct weekly documented HSW tours of the Working Areas to ensure activities are being implemented as planned and
- raise the issues observed through the *Contractor's* escalation process and carry out the following
    - verification and mitigation of the issues raised by the site supervisors as part of its leadership tours and
    - provide feedback and closure of any issues raised to the site supervisors in the relevant engagement forums.

Health, safety and wellbeing (HSW) inspections and audit

S1102.77 As part of the HSW management system and HSW implementation plan, the *Contractor*

- develops a schedule for
    - inspections and HSW tours of the Working Areas,

    - internal and external HSW audits of how its management system is effectively being implemented and
    - ensuring that its subcontractors (at any stage of remoteness from the *Client*) implement and comply with HSW and environment management systems,
- ensures that it carries out scheduled weekly HSW inspections (as a minimum) for all Compounds and worksites and includes the *Project Manager* in the invitation,
- documents and reports the findings of all weekly HSW inspections and audits,
- ensures that persons undertaking inspections hold a suitable Site Management Safety Training Scheme (SMSTS) and Construction Skills Certification Scheme (CSCS) qualification for the task (see links in Annex A),
- notifies the *Project Manager* one week in advance of the date of the inspection to allow the *Project Manager* to participate in the inspections,
- uploads the report to the Project Common Data Environment (CDE) within 24 hours of completion,
- provides photographic evidence of action closeout,
- considers good practice as equally important as non-conformities and opportunities for improvement and
- ensures that the matters identified in the inspections are addressed.

S1102.78 The schedule of inspections and HSW tours has the flexibility to target inspections dependent upon the activities and HSW risk profile of the *works*. The *Project Manager* and *Client* are to be given the opportunity by the *Contractor* to collaborate and conduct joint inspections and leadership tours.

S1102.79 The *Contractor* establishes a schedule (using a rota system) where a company director and senior managers undertake leadership tours of the Working Areas on a monthly basis to demonstrate visible leadership and to lead messaging in HSW issues.

S1102.80 The *Contractor* includes a summary of the findings within the weekly and monthly progress reports described in section S850.

S1102.81 The *Project Manager* or *Contractor* challenges any activity undertaken where it considers there is an unacceptable risk to the health, safety and wellbeing of any person. Where in the opinion of the *Project Manager*, an unacceptable risk exists, the *Contractor* suspends the activity immediately, drafts a report within 24 hours of suspension, and submits to the *Project Manager* for acceptance in accordance with the Acceptance Procedure. The report documents the issue observed, identification of the root cause and the corrective or preventative actions being undertaken. The activity remains suspended until the *Project Manager* instructs the restart of the work.

Readiness Review

S1102.82 Readiness Review meetings are held between the *Project Manager* and the *Contractor* to ensure that all parties are prepared for the next phase of work. As a minimum Readiness Reviews take place prior to the

- first *access date*,
- mobilisation readiness for construction sites including welfare facilities,
- construction readiness prior to commencement of high-risk or major activities such as deep excavations, heading or major temporary works,
- energising and deenergising supplies to or through the Working Areas and

- other activities or phases as required by the *Project Manager*.

S1102.83 The Readiness Review is chaired by the *Contractor* and the *Contractor* presents documented evidence of readiness to the *Project Manager* for acceptance.

A reason for not accepting is that it does not identify the relevant risks and mitigation measures in sufficient detail for the *Project Manager's* understanding.

The *Contractor* does not undertake construction activity prior to the acceptance by the *Project Manager* of the report/presentation.

The items in the Readiness Review include

- status of management systems,
- management plans,
- submissions for acceptance required by regulation or the Scope,
- verification that subcontractors (at any stage of remoteness from the *Client*) meet the Scope requirements,
- CDM – appointments, notifications, the status of key documents such as CPP and PCI or HSF,
- arrangements for co-location with Others,
- welfare arrangements,
- HSW risk profile,
- emergency preparedness,
- timescales for project reporting understood and agreed,
- site inspection and inspection and test plans accepted,
- status of RAMS including a schedule of *works*,
- training, inductions and required competencies,
- traffic management arrangements,
- logistics plans and arrangements,
- site set-up in accordance with accepted plans required by Scope,
- health risk assessments and health surveillance arrangements,
- environmental protection provisions,
- Consents, including statutory, asset protection and property Consents,
- permanent design submissions for construction accepted,
- temporary works submissions accepted with appropriate category checks,
- accepted security arrangements for assets, personnel and cyber security and
- any other activity-specific items required.

S1103 Specific processes for the HSW system

Fatal Risk/construction management

S1103.1 The *Project Manager* has identified fatal and construction safety risks in this section S1103. The *Contractor* operates specific management arrangements for these fatal and construction safety

risks, which are above minimum industry and regulatory compliance standards and are aligned with best industry practice.

The *Contractor* operates safe systems of work for all fatal and construction risks and ensures

- the nature of the activity and the plan is commensurate with the complexity of the activity,
- individuals involved in the work (including those involved in multiple roles) are competent to undertake the activities and have accreditation to the relevant body for that activity,
- the briefing arrangements include proposed animations for planned complex operations and are shared with all individuals involved in the activity and
- weekly look-ahead meetings with site supervisors are undertaken to discuss controls required for planned operations.

S1103.2 The *Contractor* submits all processes relating to fatal and construction risk management to the *Project Manager* for acceptance two weeks prior to the commencement of the activity. A reason for not accepting a process is that

- it does not address the requirements of the Scope,
- it does not provide the *Project Manager* with sufficient detail to understand the process to effectively manage the risk,
- the individuals fulfilling roles, cited in the process, are not competent to undertake the activity,
- the arrangements for briefing are not clearly stated or
- the controls for the activity are not adequate.

S1103.3 No later than eight weeks prior to its establishment in accordance with the Accepted Programme, the *Contractor* submits its proposal to establish and implement a dedicated onsite training area to develop technical and personal skills in line with the requirements of the Scope (including section S253 and section S680) to the *Project Manager* for acceptance.

The proposals include areas for

- dedicated, all weather, outdoor areas for recreating the experience of on-site hazard identification of fatal and construction risks (highlighted in section S1103) and training in risk mitigation techniques and
- dedicated indoor areas for training including theoretical instruction on hazard identification and fatal and construction risks (highlighted in section S1103) and training in risk mitigation techniques.

The *Contractor* establishes the dedicated on-site training area three months prior to the commencement of site activity.

S1103.4 A reason for not accepting the establishment proposal is

- it does not comply with the Scope or
- it does not provide sufficient details to the *Project Manager* to enable it to understand how fatal and construction risks are to be taught and experienced in realistic and physical conditions.

Equipment (including items referred to as plant)

S1103.5 The *Client* recognises the risks inherent when operating and using Equipment (including items referred to as plant). The *Contractor* identifies and promotes processes that include all necessary

arrangements for the safe use of Equipment, demonstrating the arrangements for ensuring the safety of operators, site operatives and the public.

S1103.6 The *Contractor* includes within its process

- organisational and technological arrangements and Equipment that avoids and, where required, controls people and Equipment interface,
- Equipment, where available, that reduces or eliminates emissions,
- appropriate maintenance and inspection regimes,
- management of mobile Equipment,
- maintains a register detailing all Equipment,
- identifies the competency requirements for the Equipment operator and ensures that the operator has such competency and
- implements control measures that control exposure to occupational health risks such as noise, vibration, air quality and light.

Utility Avoidance

S1103.7 The *Contractor* has a dedicated team in place for the planning, management and undertaking of breaking ground activities. The *Contractor* ensures consistency in team membership and approach.

S1103.8 In Providing the Works, the *Contractor* establishes, manages and implements a process for utility avoidance as part of the HSW implementation plan in accordance with current industry best practice and guidance, including

- Publicly Available Specification 128:2014, (PAS 128:2014) (see link in Annex A),
- HSG 47 Avoiding Danger from Underground Services (see link in Annex A),
- HSE Guidance Note GS6 ‘Avoiding danger from overhead power lines’ (see link in Annex A),
- the Energy Networks Association (ENA) publication, ‘Look Out Look Up! A guide to Safe Use of Mechanical Plant in the Vicinity of Electrical Overhead Lines’ (see link in Annex A),
- T/SP/SSW/22 ‘Specification for safe working in the vicinity of National Grid high-pressure gas pipelines and associated installations – requirements for third-parties' (see link in Annex A) and
- SSW22_v1 ‘Specification for safe working in the vicinity of Cadent assets – requirements for third-parties’ (see link in Annex A).

S1103.9 The *Contractor* is a member of and utilises the toolkits available from the Utility Strike Avoidance Action Group (see link in Annex A).

S1103.10 Not used.

S1103.11 The *Contractor* operates a permit to dig process or similar that it reviews, assures, authorises and complies with.

S1103.12 The *Contractor* ensures that Staff performing duties of service avoidance managers, planners, permit issuers and those undertaking excavation works are competent to interpret the information provided by Statutory Undertakers and are able to assess, mitigate and manage the risk of excavation works as far as reasonably practicable. The permits are only issued for specific works and for those directly supervising and managing the excavation works.

S1103.13 The *Contractor* operates a utility avoidance training programme that includes

- Qualification and Credit Framework (QCF) Level 5 Diploma in Utility Mapping and Surveying for all surveyors and anyone marking the location of services on the ground or surface,
- QCF Level 5 Diploma in Utility Mapping and Surveying for all service avoidance managers, permit managers and co-ordinators and issuers including permit to dig, drill, break ground, excavate or similar intrusion into the ground, surface and subsurface,
- QCF Level 3 Certificate in Utility Mapping and Surveying for permit acceptors and supervisors of excavation, drilling or breaking ground works and
- a practical training programme based on the principles of HSG 47, 'Avoiding Danger from Underground Services', PAS 128 (Specification for underground utility detection, verification and location) and other applicable guidance for the staff involved with excavation activity.

S1103.14 The *Contractor* ensures that

- any Staff involved with excavation wear arc-resistant clothing to the necessary calorific protection values subject to the findings of its risk assessment,
- all excavator buckets used for excavation around known or suspected services are toothless and
- tools are insulated as required by risk assessment.

Unexploded Ordnance (UXO)

S1103.15 The *Client* has carried out preliminary surveys for the potential risk of UXOs and these are included in Annex A and Site Information.

S1103.16 The *Contractor* reviews, adopts and implements these surveys and establishes the need for complementary or additional surveys and risk assessments using the process advocated by the Construction Industry Research and Information Association (CIRIA) best practice (UXO - A Guide for the Construction Industry, CIRIA C681, 2009) (see link in Annex A), which is endorsed by the HSE.

Excavation Management

S1103.17 The *Contractor* includes a process for the management of excavations within its temporary works and risk assessment process which complies with British Standards and best practice guidance for excavation management including

- BS 5975 Code of Practice for Temporary Works,
- BS 8008: 1996+A1:2008 Safety Precautions and Procedures for the Construction and Descent of Machine-bored Shafts for Piling and Other Purposes,
- BS 5228-4 Noise and Vibration Control on Construction and Open Sites - Code of Practice for Noise and Vibration Control Applicable to Piling Operations and
- CITB Construction Site Safety – Health, Safety and Environmental Information (GE 700), Section 10 "Excavations"

(see links in Annex A).

S1103.18 The *Contractor's* risk assessment for excavation works includes details of the measures preventing unauthorised access at all times and displaying warning notices of the excavation.

Lifting

S1103.19 The *Contractor* ensures Staff involved in the planning, co-ordination, supervising, slinging, signalling and operation of lifting activities and Equipment hold the qualification for the relevant category of the construction plant competence scheme for Equipment operation and use.

S1103.20 In line with paragraph S1103.6, the *Contractor* develops specific lifting plans for all lifting activities and these are briefed to Staff involved in the lifting operations.

S1103.21 Where the *Contractor* identifies the requirement to undertake complex or unusual lifts, the *Contractor* arranges a Readiness Review meeting and report/presentation, for acceptance by the *Project Manager* no less than seven days prior to the activity.

The *Contractor* does not undertake construction activity prior to the acceptance by the *Project Manager* of the report/presentation.

Working at Height

S1103.22 The *Contractor* ensures that the hierarchy of control, within the Work at Height Regulations 2005 (WAHR 2005) (see link in Annex A), is employed when planning and undertaking work at height. The *Contractor* develops and implements a process to ensure the management of risk associated with working at height and mandates and implements a tethered tool policy.

S1103.23 The *Contractor* ensures

- Staff,
- the *Project Manager* (and its team),
- the *Supervisor* (and its team),
- Others (and its team) and
- the *Client* (and its Project representatives)

working at height are competent and have evidence that such personnel are accredited to a United Kingdom (UK) accreditation organisation and keep such records available for inspection by the *Project Manager*. The *Project Manager* may undertake checks and audits of the records at any stage during the *works*. For competencies that are not UK accredited, the *Contractor* develops an assurance programme and process to demonstrate compliance with the minimum standards within the UK.

The *Contractor* ensures such personnel undertaking working at height activities have the correct competencies with accreditation to

- Construction Industry Scaffolders Record Scheme for scaffold erection, supervision and inspection,
- Industrial Rope Access Trade Federation Association for rope access,
- International Powered Access Federation certified (or equivalent) for mobile elevating work platforms,
- demonstrable and assessed equipment specific training for edge protection installation,
- BS7121-5:2019 the Code of Practice for the Safe Use of Cranes, the Construction Plant-hire Association and Tower Crane Interest Group publications (see link in Annex A) for tower cranes,
- Prefabricated Access Suppliers and Manufacturers Association –for mobile tower erection and
- work at height awareness training for all those working at height.

The *Contractor* ensures any person without the correct competencies is not allowed to work at height.

S1103.24 The *Contractor* does not use cranes over 10 years old without the agreement of the *Project Manager*.

S1103.25 The *Contractor* ensures the 'Civil Aviation Authority' is consulted regarding the aviation warning lighting requirements of the crane based on its specific geographical location. The crane is lit in compliance with 'Civil Aviation Authority guidance' (see links in Annex A).

S1103.26 The *Contractor* has a justification process to control the use of ladders, ensuring all options have been considered and the use of the ladder is only permitted after a suitably authorised person in the *Contractor's* Staff has signed the justification. Ladder access within scaffolds is designed employing the hierarchy of control, see WAHR 2005.

S1103.27 *The Contractor* develops and implements bespoke emergency rescue plans (ERPs) as described in paragraph S1102.67 to demonstrate emergency preparedness for all work at height activities. The *Contractor* trials ERPs regularly during the *works*.

Holes and Voids

S1103.28 The *Contractor* develops and implements a process to ensure the management of risk associated with holes and voids so that the *Contractor* in Providing the Works

- eliminates the need for potentially hazardous holes and voids in Structures, where possible,
- reduces the risk by designing in either permanent or temporary protection,
- ensures all holes and voids are protected including holes, openings in floors, floor slabs, risers, inspection chambers, valve chambers, lift shafts, stairwells, manholes, storage tanks or any other type of opening where there is a risk of persons, Plant and Materials and Equipment falling through,
- identifies the size, location and type of holes and voids and determines the type of protection to be used to ensure protection for people and vehicles and
- ensures protection measures are maintained at all times and subject to documented inspection.

Confined Space

S1103.29 The *Contractor* develops and implements a process to manage risks associated with activities within confined space. The process ensures that work and entry into confined spaces are carried out safely and in accordance with the Confined Spaces Regulations 1997 (see link in Annex A).

S1103.30 The *Contractor* submits a bespoke ERP for confined space working, detailing the emergency arrangements within the task method statement, to the *Project Manager* for acceptance two weeks prior to undertaking the relevant work. The reasons for not accepting are described in paragraph S1103.2.

S1103.31 As a minimum, the *Contractor* ensures

- all confined space entrants are trained to a nationally recognised standard to perform self-rescue. Training includes the self-rescue equipment in use during the entry,
- all rescue team members including top-man are trained to a nationally recognised standard to perform rescue and
- all those managing and supervising confined space entries are trained to a nationally recognised standard to manage confined spaces.

Manual Handling

S1103.32 The *Contractor* develops and implements a process for manual handling and produces risk assessments that are specific to the task with specific emphasis on

- avoidance of the risk,
- reduction in the risk,
- communication of the risk by ensuring Staff have received relevant manual handling training prior to undertaking the relevant work and
- training for Staff consisting of relevant theoretical and practical components. Training is supplemented by 'on the job' coaching and assessment, considering physical and environmental factors, constraints and stretching and warming up.

Fire Prevention and hot works

S1103.33 The *Contractor* develops and implements a process to ensure fire prevention and to manage risks associated with hot works. In the process the *Contractor* sets out how activities are managed in compliance with

- Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation, published by the Fire Protection Association and
- HSG 168 Fire Safety in Construction.

See links in Annex A.

S1103.34 In Providing the Works, the *Contractor*

- appoints responsible persons at Compounds and worksites who are suitably qualified and experienced in fire safety,
- develops and implements a 'fire risk assessment' and 'fire management plan' for each Compound and worksite including highlighting the risks of arson,
- ensures that no burning of waste or other materials is carried out on Working Areas,
- removes from Working Areas at the end of each working shift and recycles where possible all
    - empty drums,
    - empty containers,
    - surplus or waste material and
    - used packing materials
- ensures that the use of any timber below ground is minimised and, if used, is treated for or protected against the risk of fire,
- removes all combustible materials encapsulating or protecting any packages, Plant and Materials or Equipment prior to being taken to underground/below ground locations and
- does not wrap, encapsulate or protect any packages, Plant and Materials or Equipment brought in and stored or installed in underground/below ground locations in combustible materials.

S1103.35 The *Contractor* liaises with the emergency services to comply with any requests to facilitate emergency response.

S1103.36 The *Contractor* ensures that no work involving flame-cutting, burning, welding, the use of a thermic lance or other heat-generating work is carried out unless under a hot work permit. Prior to the commencement of the activity, the *Contractor* ensures that

- specific RAMS are in place prior to commencing any hot works,
- use of Local Exhaust Ventilation (LEV) systems are in place,
- pre and post inspections of the work area are carried out,
- there is provision of fire-fighting equipment suitable for the hot work undertaken and
- fire watch persons are present during and post hot work.

Storage of Fuels and Substances

S1103.37 The *Contractor* develops and implements a process for storing fuels and substances that sets out how

- all flammable materials and dangerous substances are selected, stored and controlled in accordance with the relevant regulations and industry guidance for above and below ground work sites,
- meets the Control of Substances Hazardous to Health Regulations (COSHH) requirements and
- all material stores and skips are clearly labelled with contents, relevant Eurocodes, relevant British Standards and Hazchem ratings where appropriate.

S1103.38 Where the *Contractor* has not been able to eliminate the need for underground storage of flammable materials, the *Contractor*

- ensures that it does not store highly flammable materials,
- does not store any flammable or highly flammable materials except under a storage licence,
- issues a storage license which specifies the
    - quantities stored and
    - conditions and locations where storage is permitted
- has sufficient and appropriate firefighting equipment adjacent to any below ground fuel storage areas considering the effect on the atmosphere in the event of intentional or accidental discharge and
- has a suitable emergency warning system established and firefighting plans and teams to deal with any event.

Electrical Equipment

S1103.39 The *Contractor* develops and implements a process that ensures

- all electrical equipment complies with
    - BS EN 4363:1998 Specification for Distribution Assemblies for Reduced Low Voltage Electricity Supplies for Construction and Building Sites,
    - BS 7375:2010 Distribution of Electricity on Construction and Demolition Sites - Code of Practice and
    - BS8020:2011 Tools for live working

- supply systems are entered on the *Contractor's* 'temporary works register' and are 110v centre tapped to earth. If exceptionally higher voltage is required as part of temporary works, the cable is
    - metal armoured or sheathed,
    - either suspended or
    - buried below ground, appropriate to the transmission voltage, and marked and
- welfare, offices and other facilities comply with BS EN 7671:2018 Requirements for Electrical Installations Institute of Electrical Engineering Wiring Regulations Seventeenth edition

(see links in Annex A).

S1103.40 The *Contractor* ensures all electrically powered hand tools are guarded, marked with maximum speeds and provided with on and off and emergency stops and

- operate at 110 volts and are double-insulated or
- are battery-powered where possible.

S1103.41 For works in a tunnel (or equivalent) environment or where there is a risk of explosive gases being present, the *Contractor* ensures specific RAMS are in place that consider an appropriate power provision and use of adapted tools such as spark suppression power supply or air tools.

Demolition

S1103.42 The *Contractor* develops and implements 'demolition management plans', integrating a demolition risk assessment for each relevant activity, and submits to the *Project Manager* for information four weeks prior to undertaking the relevant work.

S1103.43 The 'demolition management plan' includes

- details on arrangements to ensure the stability of the structure throughout the demolition process,
- proposals to undertake an initial survey prior to demolition activity to identify hazards and constraints,
- how the risks arising from the initial survey are identified, managed and mitigated,
- how the *Contractor* integrates the co-ordination requirements within the Construction Phase Plan (CPP) described in section S1106 and
- details on how any demolition work is undertaken in accordance with
    - relevant demolition notices issued by HSE on their website,
    - BS 6187:2011 Code of practice for full and partial demolition,
    - ICE Demolition Protocol 2008 and
    - best practice from National federation of demolition contractors or equivalent

    (see links in Annex A).

Personal Protective Equipment

S1103.44 The *Contractor* complies with the personal protective equipment (PPE) and the *Client's* 'Branding specifications for Lower Thames Crossing' report reference provided in Annex A.

S1103.45 The *Contractor* provides PPE for Staff, the *Project Manager* (and its team), the *Supervisor* (and its team) and the *Client* (and its Project representatives). The *Contractor*

- procures PPE from companies who are members of the British Safety Industry Federation (BSIF) Registered Safety Suppliers (see link in Annex A) or similar scheme,
- provides PPE to a standard and quality acceptable to the *Project Manager,*
- develops a process for regular inspection of and training in the use and care of PPE,
- provides effective laundry facilities for PPE with specific consideration for deterioration and that are available to accommodate shift patterns, rotas and staff to facilitate the service and
- operates an electronic PPE issue process that records all PPE issued to all individuals and considers PPE selection in relation to the ergonomics and environmental aspects of the task.

S1103.46 In providing PPE to Staff, the *Project Manager* (and its team), the *Supervisor* (and its team) and the *Client* (and its Project representatives), the *Contractor*

- ensures that the PPE is provided in accordance with a task-specific risk assessment,
- ensures that hi-visibility tops cover the forearms unless the task-specific risk assessment requires otherwise,
- provides arc-rated PPE to a standard assessed within the task-specific risk assessment,
- ensures that high visibility trousers are mandatory unless the results of task-specific risk assessments determine otherwise. Such a derogation is assessed by the *Contractor* and submitted to the *Project Manager* for information a minimum of two weeks prior to undertaking the relevant work,
- provides safety helmets which comply with BS EN 397 (Industrial safety helmets) and BS EN 13688:2013 Protective clothing – General requirements. An exception is made for Sikhs' wearing turbans, who do not wish to wear a safety helmet on religious grounds. Helmet colours are determined by the standards set out by Build UK. Reflective markings and role-specific helmet decals are permitted,
- provides safety footwear with ankle support, metatarsal protection, steel or composite toe and midsole protection which meets the requirements of EN ISO 20345:2011 Personal Protective Equipment – Safety Footwear,
- ensures rigger boots and slip-on safety footwear are not used,
- provides eye protection that complies with BS EN 166 Personal Eye Protection – Standard, with a suitable level of impact protection, dependent on task,
- provides hand protection in accordance with a task-specific risk assessment and conforming to BS EN 343:2019 Protective clothing,
- provides weather-appropriate PPE,
- provides access to sunscreen lotion and
- ensures respiratory protective equipment is fit tested quantitatively

(see links in Annex A).

S1103.47 In providing PPE to visitors, the *Project Manager* (and its team), the *Supervisor* (and its team) and the *Client* (and its Project representatives), the *Contractor* complies with any additional requirements notified by the *Project Manager*.

S1103.48 The *Contractor* ensures

- shorts,
- skirts and

- dresses

and equivalent are not worn by Staff other than in an office environment.

S1103.49 The *Contractor*

- reviews developments in intelligent PPE three months prior to the first *access date* in accordance with the Accepted Programme and then at least once each quarter from the first *access date* and
- proposes innovations for intelligent PPE to the *Project Manager* after each review including an assessment of using such intelligent PPE.

The *Contractor* and *Project Manager* undertake an analysis to determine the implementation of any proposal on a trial basis and determine the implications for the Project prior to full implementation.

S1103.50 The *Contractor* makes a range of PPE available dependant on resource curve and task. PPE meets the demographical and diverse needs of Staff and is appropriate to the climate.

S1103.51 The *Contractor* ensures a range of sizes of applicable PPE (considering the demographical and diverse needs) is available for visitors, including school children and young adults.

S1103.52 The *Contractor* ensures hauliers and delivery drivers are made aware of and comply with PPE standards prior to arrival and arrangements are in place to monitor compliance.

Drug and Alcohol Testing

S1103.53 The *Contractor* develops a 'drug and alcohol procedure' and submits it to the *Project Manager* within eight weeks of the *starting date* for acceptance. The *Contractor* implements the submitted 'drug and alcohol procedure' prior to acceptance and along with any later amendments.

S1103.54 The *Contractor*'s 'drug and alcohol procedure' aligns with the *Client's* Project's Drug and Alcohol Procedure provided in Annex A and includes details of

- testing levels and chain of custody requirements,
- random testing of at least 50% of
  - Staff,
  - visitors,
  - the *Project Manager* (and its team),
  - the *Supervisor* (and its team) and
  - *Client* (and its Project representatives)

  per annum (pro-rata per month) in the Working Areas and other locations used to Provide the Works,
- a Just and Fair Culture and support systems for Staff who have notified of drug and alcohol misuse prior to the test,
- how testing accounts for all shift patterns,
- how testing accounts for religious or equivalent use of alcohol and
- the types of incidents that result in a 'for-cause' test. All level one and two incidents as defined in the Scope result in a for-cause test as a minimum.

Testing of visitors who are under the age of 18 is not undertaken without the agreement of the *Project Manager* and relevant guardians/supervisors.

S1103.55 A reason for not accepting of the 'drug and alcohol procedure' is that

- it does not meet the requirements of the Scope or
- it does not meet the testing level and requirements of the Project's drug and alcohol policy and procedures.

S1103.56 If the Staff failure rate exceeds 4.99% over a rolling 12-month period, the *Contractor* develops and implements an improvement plan within seven days of the Staff failure rate exceeding this level to reduce the failure rate to below 4.99% and submits a copy of the improvement plan to the *Project Manager* for information.

The *Contractor* stops the use of Staff to Provide the Works who have failed a drug and alcohol test until such times as they pass the relevant drug and alcohol test. Where a Staff member has pre-notified of a prescribed medicine, the *Contractor* redeploys the person to an appropriate role.

S1103.57 The *Contractor* advises the *Project Manager* of all drug and alcohol failures of visitors, the *Project Manager* (and its team), the *Supervisor* (and its team) and *Client* (and its Project representatives) on receipt of the results.

Fatigue

S1103.58 The *Client* recognises fatigue as a potentially fatal risk. The *Contractor* develops and implements a 'fatigue risk management plan' that aligns with the Office of Road and Rail guidance 'Managing Rail Staff Fatigue' (see link in Annex A), with a commitment to minimising fatigue of Staff and submits to the *Project Manager* for information within 20 weeks of the *starting date*. The *Contractor* demonstrates how it manages fatigue risk by ensuring

- identification and reporting of fatigue-related incidents,
- fatigue risk is calculated,
- Staff are educated on fatigue awareness,
- there is physical space to reduce fatigue,
- there is employee support provided through confidential phones lines and feedback forums,
- the roles and responsibilities for line managers and other identified roles are defined,
- fatigue risk exceedances are managed,
- fatigue assessments are conducted,
- the fatigue assurance process is implemented,
- hours are tracked and reviewed and
- training is provided to managers responsible for shift rostering.

S1104 Management of Occupational Health and Wellbeing (OHW)

Occupational Health and Wellbeing Plan

S1104.1 The *Project Manager* has developed a 'LTC occupational health and wellbeing plan' (see link provided in Annex A) which includes the five key components for occupational health and wellbeing provision on the Project.

S1104.2 The *Contractor* develops and implements an 'occupational health and wellbeing (OHW) plan' for Staff, visitors, the *Project Manager* (and its team), the *Supervisor* (and its team) and the *Client*

(and its Project representatives) working on the Project in alignment with the 'LTC occupational health and wellbeing plan'. As part of the 'OHW plan' the *Contractor* describes the OHW services used in Providing the Works including

- occupational health and wellbeing services including
    - site based OHW facility and
    - mobile OHW services,
- clinical services,
- the five key components to health management described in the LTC occupational health and wellbeing plan,
- first aid and mental first aid treatment,
- mental health and wellbeing awareness,
- occupational risk assessments and
- health risk assessments.

S1104.3 The 'OHW plan' describes how the *Contractor* ensures that

- it implements an OHW policy,
- it complies with legal and best practice,
- it provides the OHW service,
- it provides OHW resources to meet the demand of the shift patterns and work activities,
- it implements occupational health risk assessments,
- it implements health risk assessments,
- it addresses health considerations in the design development,
- it defines performance indicators for OHW including HSW performance metrics and provides information on the OHW of Staff,
- it inputs to the overall HSW reports described in section S1102,
- it defines how the benefits and cost-effectiveness of the OHW services are measured,
- it monitors trends in OHW service uptake and performance,
- it identifies the known adverse health and wellbeing effects, the nature and the frequency of health surveillance and biological monitoring techniques employed per role, task and environment,
- it defines mobilisation and exit strategy including data management and archiving of medical records and notes,
- it identifies initiatives that support the local community to improve their health and wellbeing,
- Staff are competent to undertake the duties for which they are responsible and arrange for appropriate clinical governance of their teams,
- OHW staff follow the Patient Group Directions legal framework if medicines are to be administered (see link in Annex A),
- occupational health clinical records are maintained and comply with systems in accordance with Data Protection Legislation to protect confidentiality,
- there is liaison with other OHW specialists,
- support and guidance on effective OHW management is provided to managers and

- a collaborative approach is established between the OHW services and other occupational health hygiene services. For all potential and actual work-related injuries or illnesses and exposure to hazards harmful to health that have exceeded the workplace exposure limit.

S1104.4 The *Contractor* submits the 'OHW plan' to the *Project Manager* for acceptance within four weeks of the *starting date*. A reason for not accepting of the 'OHW plan' is that

- it does not include the details described in paragraph S1104.3 or
- it does not include the specific details of OHW services that the *Contractor* is to provide.

S1104.5 The *Contractor* provides the OHW service in accordance with the OHW plan.

S1104.6 Where the *Contractor* identifies safety critical workers in Providing the Works, the *Contractor* provides a safety critical medical and reassessment following the requirements of the *Client's* Raising the Bar guidance (see links in Annex A).

Where Staff are not classed as safety critical workers, the *Contractor* provides an initial medical assessment with follow-up assessments at a frequency recommended by the OHSP and determined by the HSE Occupational health standards in construction guidance (see link in Annex A). The *Contractor*

- communicates any outcome of risk profiling and provides job descriptions to the OHSP and
- ensures the member of Staff is entered onto the level of health surveillance and biological monitoring as identified by regulations, role, task and environment.

S1104.7 All data is recorded electronically, in accordance with the *Contractor's* OHW requirements. At the request of the *Project Manager*, the *Contractor* anonymises data and submits it to the *Project Manager* for information.

S1104.8 The *Contractor* ensures that OHW health records are documented and stored for Staff in accordance with its ISO 45001 management system.

S1104.9 The 'OHW plan' details the *Contractor's* arrangements for ongoing support and rehabilitation and ensures any health surveillance activities are not a barrier to employment.

S1104.10 The *Contractor* conducts quarterly audits of the OHW system in line with section S660.

Occupational Health Risk Assessments

S1104.11 In the 'OHW plan', the *Contractor* defines the arrangements for production of suitable OHW risk assessments. Arrangements include

- the level of competence required to draft an OHW risk assessment,
- training and development of those required to manage and supervise the *works*,
- details of how assessments account for site specific hazards,
- details of how assessments consider demographics and diverse needs and
- details of how assessments are reviewed and implemented into site specific plans and methodologies.

Health Risk Management

S1104.12 In preparing the design, the *Contractor* includes a description of the hazard evaluation techniques employed, including identification, evaluation, avoidance and other mitigation in Providing the Works and within the *works*.

S1104.13 The *Contractor* consults and engages Staff on how OHW considerations have been incorporated in the

- design development,
- design decisions and actions and
- planning of the *works*

and are recorded and disseminated.

S1104.14 The *Contractor* assesses and measures workplace exposure of Staff, the *Project Manager* (and its team), the *Supervisor* (and its team), the *Client* (and its Project representatives) including for

- noise,
- vibration,
- musculoskeletal (prevention of injury and fatigue),
- carcinogens and mutagens,
- skin disorders,
- chemicals hazardous to health,
- dust and fumes,
- biological risks and
- radiation.

The *Contractor* demonstrates a continual reduction in the workplace exposure limits to Staff, the *Project Manager* (and its team), the *Supervisor* (and its team) and the *Client* (and its Project representatives) through the implementation of process improvements. The *Contractor* ensures it demonstrates a continual month on month reduction baselined against the 'Workplace exposure limits' (see link in Annex A) and reports this in the monthly progress reports, as described in section S850.

Occupational Health and Wellbeing Service

S1104.15 The *Contractor* ensures it is accredited to the SEQOHS accreditation scheme (see link at Annex A) or equivalent within six months of the *starting date*.

S1104.16 The *Contractor* provides an OHW service for Staff, the *Project Manager* (and its team), the *Supervisor* (and its team) and the *Client* (and its Project representatives). The OHW service includes

- prior to the first *access date*, an office based OHW facility,
- a site based OHW facility,
- mobile OHW services,
- clinical services,
- first aid treatment services and
- mental health and wellbeing awareness

and the *Contractor* ensures it is provided by Staff with proven skills, competency, experience and knowledge of OHW management on complex infrastructure projects.

S1104.17 The *Contractor* ensures

- the appropriate consents are obtained and the outcome of any person's OHW assessment is provided to the individual and the individual's employer and
- it does not receive any Personal Data from an OHW assessment for non-employees.

S1104.18 The *Contractor* completes the Project's Occupational Health and Wellbeing (OHW) Maturity Matrix, see link in Annex A, and submits it quarterly to the *Project Manager* for acceptance from the *starting date*. A reason for not accepting the OHW Maturity Matrix is that

- it is incompletely filled out,
- it does not identify OHW performance metrics or
- it does not align with the OHW plan.

The *Contractor* reviews every quarter its OHW Maturity Matrix and updates as necessary and submits any revised OHW Maturity Matrix to the *Project Manager* for acceptance.

S1104.19 The OHW service provides programmed visits to office locations and the Working Areas including Compounds and worksites to offer advice and guidance to Staff, including the *Project Manager* (and its team), the *Supervisor* (and its team) and the *Client* (and its Project representatives), on the availability of the OHW service.

OHW Facilities

S1104.20 The *Contractor* provides space within the Working Areas to facilitate delivery of the OHW service in accordance with Health Building Note 00-03: Clinical and clinical support spaces (see link in Annex A) to relieve the burden on local medical services. The OHW facilities include for site based, office based and mobile based service that provides

- security of OHW staff including controlled access to the facility,
- clinical treatment rooms to assess and treat minor injuries and ailments,
- screening rooms to undertake occupational health screening activities,
- reception and waiting area with drinking water dispensers,
- drug and alcohol testing facilities suitable for full chain of custody testing,
- considerations to confidentiality and infection control in design,
- provision for the safe storage, collection and removal of clinical waste,
- dedicated parking places for emergency services vehicles,
- appropriate, safe and secure storage for medicines and samples,
- the supply and installation of OHW equipment for OHW assessment, screening and consultation rooms,
- occupational health consumables, including drugs and alcohol test kits and health promotion information material,
- a facility capable of hosting visits from external outreach medical services and training,
- printers, scanners and shredders and
- a designated emergency telephone line.

Clinical Services

S1104.21 The *Contractor* provides clinical services as part of the OHW service and describes in the 'OHW plan' how it

- raises awareness of digital health solutions through general practice surgeries and other online doctor services (such as the National Health Service (NHS) website), enabling Staff, the *Project Manager* (and its team), the *Supervisor* (and its team) and the *Client* (and its Project representatives), to manage chronic health conditions whilst living away from home or undertaking shift work,
- ensures that all new Staff have the appropriate pre-placement medical assessment in relation to their roles and the activities that they will be undertaking on site whilst considering any Reasonable Adjustments (as defined in the Equality Act 2010, as amended from time to time) in accordance with legislation,
- provides the opportunity for voluntary annual wellbeing assessments,
- undertakes drug and alcohol testing and fitness to work medical assessments,
- provides case management for newly diagnosed and pre-existing health issues,
- delivers a health surveillance programme,
- provides a business continuity plan for management of disease, including infectious outbreaks, in the workplace,
- provides information and coaching on lifestyle improvement,
- provides a proactive and preventative approach to mental health, including stress management and resilience,
- supports first aiders, mental health first aiders and emergency services,
- promotes positive mental health and manages and prevents a crisis,
- provides early intervention for physical and mental health conditions,
- provides a collaborative and effective emergency response with the *Contractor's* security teams, the OHW staff and the emergency services and
- provides a first aid and treatment service for minor injuries and ailments.

First Aid and Treatment Services

S1104.22 Not used.

S1104.23 The *Contractor* provides first aid and other emergency medical support to LTC Contractors within the Working Areas until the emergency services attend if needed.

S1104.24 The *Contractor* works with the other Main Works Contractors to develop a methodology to calculate the time and cost savings associated with Staff, the *Project Manager* (and its team), the *Supervisor* (and its team) and *Client* (and its Project representatives) attending a site OHW service (identifying Defined Cost and other costs separately) in comparison to the potential loss in productivity if the National Health Service was utilised instead.

From the first *access date*, the *Contractor* calculates the cost savings each month and reports in the monthly report, as instructed within paragraph S1102.55, the cost savings achieved, both aggregate savings and monthly savings.

Mental Health and Wellbeing

S1104.25 As a part of the OHW service, the *Contractor* develops and implements a programme of mental health and wellbeing activities described in the 'OHW plan' submitted to the P*roject Manager* for acceptance. As a minimum it includes details on

- provision of mental health awareness training for all engaged on supporting or delivering the *works*,
- the provision and promotion of an employee assistance programme to Staff,
- awareness of relevant employee assistance programmes to the *Project Manager* (and its team), the *Supervisor* (and its team) and *Client* (and its Project representatives),
- the promotion of awareness of alternative resources for advice and guidance,
- provision of additional mental health awareness training for all managers and line managers to assist them in managing and supporting an individual with a mental health issue,
- tools and initiatives available to develop positive mental health,
- the monitoring of sickness and other absence, including presenteeism,
- implementing and monitoring the HSE Stress Management Standards (see link in Annex A),
- monitoring and recording in accordance with data protection requirements,
- the provision of crisis counselling in the event of traumatic incidents,
- occupational health campaigns and national events,
- how the mental health core standards are met as outlined in the Thriving at work: a review of mental health and employers (see link in Annex A) and
- membership and registration to a scheme such as Mates in MIND (see link in Annex A), and Building Mental Health (see link in Annex A).

The *Contractor* addresses any comments that the *Project Manager* raises in relation to the OHW plan.

S1105 Supply Chain Maturity Matrix (SCMM)

S1105.1 The *Contractor* implements and updates the Supply Chain Maturity Matrix (SCMM) provided in Annex A.

S1105.2 The *Contractor,* as a minimum, carries out annual reviews of the SCMM and implements the resulting action plans to maintain continual improvement.

S1105.3 If the *Contractor* (or where there is a joint venture, each Consortium Member) does not have an agreed "Supply Chain Maturity Matrix Action Plan" ('SCMM Action Plan') with the *Client,* the *Contractor* (or each Consortium Member) delivers a "SCMM Action Plan" and submits it to the *Project Manager* not later than six weeks following the *starting date*. The process to be followed is set out in the "SCMM Process" (see link in Annex A).

S1105.4 The "SCMM Action Plan" is based on the "Supply Chain Maturity Matrix" ('SCMM') and the associated implementation plan(s) produced by the *Contractor* (or each Consortium Member).

S1105.5 The "SCMM Action Plan" details specific actions to be taken under the contract by the *Contractor* (or each Consortium Member) and its subcontractors (at any stage of remoteness from the *Client*) in order to support delivery of the improvements identified in the implementation plan(s) for the *Contractor* (or each Consortium Member).

S1105.6 The *Contractor* (or each Consortium Member) updates their "SCMM Action Plan" in line with and to support delivery of the improvements identified in, the implementation plan(s) and on each anniversary of the Contract Date. The annual updates are based on the updated SCMM and implementation plan(s) produced by the *Contractor* (or each Consortium Member).

S1105.7 The *Contractor* (or each Consortium Member) keeps a controlled copy of the "SCMM Action Plan" available for inspection by the *Client* at all times.

S1105.8 The *Project Manager* notifies the *Contractor* (or a Consortium Member) if at any time the *Client* considers that the "SCMM Action Plan"

- does not comply with the requirements of the contract or
- is not capable of delivering the improvements identified in the implementation plan(s).

S1105.9 Following such notification, the *Contractor* (or each Consortium Member) reviews the "SCMM Action Plan" and reports to the *Project Manager* setting out proposed changes. If the *Project Manager* accepts the proposals, the "SCMM Action Plan" is changed within agreed timescales.

S1105.10 If the *Contractor* fails to take the actions detailed in the Quality Table in relation to the SCMM Action Plan, the *Contractor* accrues Quality Management Points (QMP) from the date when the failure is identified in accordance with the Quality Table. The number of QMP is reduced in accordance with Annex N.

S1106 Construction (Design and Management) Regulations 2015 (CDM) compliance

S1106.1 The *Client* fulfils the duties of the CDM client in accordance with the Construction (Design and Management) Regulations 2015 (CDM) (see link at Annex A).

S1106.2 The *Contractor* fulfils the duties of Principal Contractor and Principal Designer in accordance with CDM (unless advised otherwise by the *Project Manager*) and complies with L153 and meets the PCF requirements (see links in Annex A).

S1106.3 The *Contractor* provides the *Project Manager* with evidence of the following

- that individuals have been assessed as having the individual skills, knowledge, experience and training, where appropriate,
- organisational capability,
- progress in completing actions and
- compliance with the 'CDM coordination plan'.

CDM coordination plan

S1106.4 The *Contractor* develops and implements a 'CDM coordination plan' and submits it to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure and accompanied by a Multiparty Collaboration Certificate, within 12 weeks of the *starting date*. A reason for not accepting the 'CDM coordination plan' is

- it does not demonstrate to the *Project Manager* how the *Contractor* complies with its duties under the Construction (Design and Management) Regulations 2015 (see link in Annex A),
- it does not comply with the Scope or
- it does not demonstrate to the *Project Manager* how the *Contractor* meets

- PCF requirements,
- The Common Standards,
- Supply Chain Safety Leadership Group Common Intent documents and
- Raising the Bar guidance documents

(see links in Annex A).

The *Contractor* complies with the submitted plan, and any later updates, whether or not it is accepted by the *Project Manager*.

S1106.5 The 'CDM co-ordination plan' contains details of how the *Contractor* manages interfaces with the *Client* and Others and other Main Works Contractors on matters relating to CDM and describes arrangements to ensure co-operation and coordination of activities and duties including

- how the pre-construction phase will be managed, monitored and coordinated,
- specifics for the Working Areas,
- descriptions of how each party, including the *Project Manager,* are represented at coordination meetings,
- setting the agenda and frequency of co-ordination meetings,
- aligning the construction phasing with the Accepted Programme ,
- detailing the coordination of interfaces with Main Works Contractors and Others as described in section S926,
- detailing the *Contractor's* arrangements for sharing welfare, security, emergency co-ordination and access and egress to and through the Working Areas,
- the *Contractor's* procedures for taking over and handing back parts of the Working Areas to the *Client* or Others,
- alignment with the Accepted Programme and interfaces relating to the coordination of works with Others,
- alignment with the Completion requirements as described in section S400 and
- compliance with
  - L153,
  - PCF requirements,
  - The Common Standards,
  - Supply Chain Safety Leadership Group Common Intent documents and
  - Raising the Bar guidance documents

(see links in Annex A).

S1106.6 The *Project Manager* notifies the *Contractor* when Others have been appointed (or agreed) by the *Client* to undertake works or CDM duties on or adjacent to the Working Areas informing them of the arrangements and limitations of any such agreement.

The *Contractor* works with LTC Contractors and Others (including where the *Contractor* becomes aware of them directly) to develop the CDM coordination plan and confirms to the *Project Manager* which organisations are responsible for control of site welfare, security, emergency co-ordination and access and egress and submits it to the *Project Manager* for agreement.

Pre-construction information

S1106.7 The *Project Manager* provides available PCI via the Project Common Data Environment to the *Contractor*.

The *Contractor* undertakes the following duties with regards to PCI for the *works*

- assesses the adequacy of PCI information provided by the *Project Manager* to see if there are significant gaps and shares this with the *Project Manager,*
- provides PCI information to its subcontractors and Others prior to commencement of design or construction works and informs the *Project Manager* when this takes place,
- ensures the PCI information provided is in accordance with
    - L153 and
    - PCF requirements

  (see links in Annex A)
- maintains and updates the PCI in the Project CDE as described in
    - section S1900 and
    - the *Client's* Exchange Information Requirements (EIR) (see link in Annex A)

and informs the *Project Manager* of the PCI updates on a monthly basis.

Construction Phase Plan (CPP)

S1106.8 The *Contractor* develops one overarching Construction Phase Plan (CPP) for the *works*

- in accordance with L153,
- PCF requirements and
- takes into account pre-construction information (PCI)

(see links in Annex A).

S1106.9 The *Contractor*

- submits the CPP to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, within 44 and 120 weeks of the *starting date* and
- reviews and updates the CPP
    - every six months after the first *access date*,
    - after an accident or incident and
    - changes in working practices or site layout

and submits it to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

S1106.10 A reason for not accepting the CPP is

- it does not demonstrate to the *Project Manager* how the *Contractor* complies with its duties under CDM,
- it does not comply with the Scope or
- it does not demonstrate to the *Project Manager* how the *Contractor* meets the PCF requirements.

The *Contractor* complies with the submitted plan, and any later updates, whether or not it is accepted by the *Project Manager*.

S1106.11 Not used.

Health & Safety File (HSF)

S1106.12 The *Project Manager*

- enables access to any available existing health & safety file (HSF) information. The *Contractor* prepares the HSF in accordance with CDM Regulations 2015,
- may require the *Contractor* to include additional requirements and in such instances the *Contractor* prepares and includes these additions within the HSF and
- provides the *Contractor* with an HSF template of contents within six weeks of the *starting date.*

The *Contractor* complies with

- the additional requirements issued by the *Project Manager,*
- the EIR and the B-EIR,
- L153 – Managing health and safety in construction (CDM Regulations 2015 guidance),
- PCF requirements,
- *Client* duty requirements of Others receiving HSF and
- maintains the HSF until it, or the relevant part, is passed to
  - the *Project Manager* in Stage Gate Assessment Review (SGAR) 7,
  - the *Project Manager* upon request and
  - the relevant Other on takeover of such assets transferring to the relevant Other.

Following passing of the HSF in full or part to the *Project Manager* and Others, the *Contractor* provides information for the HSF to the *Project Manager* and the relevant Others following any changes that occur.

S1106.13 The *Contractor* keeps, reviews, updates and maintains the HSF from the *starting date*. The *Contractor* submits its process for reviewing, updating and maintaining the HSF to the *Project Manager* for acceptance within 44 weeks of the *starting date.* A reason for not accepting the process is

- it does not comply with the Scope,
- it does not comply with the EIR,
- it does not comply with the B-EIR, or
- it does not comply with the *Project Manager's* instructions.

S1106.14 The *Contractor* provides a HSF co-ordinator from the *starting date*. The responsibilities of the *Contractor's* HSF co-ordinator include

- reviewing, updating and maintaining the HSF on a monthly basis or when changes necessitate a more frequent update and
- submitting the updated HSF with a detailed description of amendments monthly to the *Project Manager*.

Welfare and Site Set-Up

S1106.15 The *Contractor* provides the offices and welfare facilities necessary to Provide the Works.

S1106.16 The *Contractor* submits its design proposals for welfare and office provisions together with setup standards for each Compound and worksite, to the *Project Manager* for acceptance, in accordance with the timeframe for the *Contractor's* 'project offices and welfare facilities plan' stated in section S299.

S1106.17 The *Contractor* categorises its Compounds and worksites into small, medium and large as defined below

- small - those that require construction activity over a relatively short duration less than a year, undertaken during normal working hours or sporadic out of hours. Typically, the footprint is less than 1500m^2 with limited storage and office facilities,
- medium - typically locations with construction activity over one to three years with periods of extended working hours and an above ground footprint of 1500m^2 up to 15,000m^2 with material storage areas and office facilities and
- large - ground footprints of 15,000m^2 or more that are likely to be in place for several years. The majority of large Compounds will have extended periods of working with hub or main project offices, welfare and storage facilities.

The definitions are not exhaustive and depend upon the duration of occupation, frequency of change, square meterage, storage requirements and the assessment results in accordance with the *Contractor's* 'security management plan' and the *Client's* Physical Security Execution Plan (see link in Annex A).

S1107 *Contractor's* Roles and Responsibilities

S1107.1 The *Contractor* is responsible for and carries out the HSW activities and management within the Working Areas.

S1107.2 In Providing the Works, the *Contractor* co-ordinates, co-operates and interfaces with regard to HSW requirements, with LTC Contractors, the *Client* (and its Project representatives), the *Project Manager* (and its team), the *Supervisor* (and its team) and Others and

- implements best practice standards and benchmarks HSW performance and behaviour,
- takes part in, and contributes to HSW events, meetings and campaigns and
- participates and engages in the *Client's* steering group forums.

S1107.3 The *Contractor* collaborates with other LTC Contractors to ensure there is no unnecessary replication of any medical assessments that an individual has undertaken including

- safety critical medicals,
- health surveillance and
- drug and alcohol tests

as an access pre-requisite to relevant working areas.

S1107.4 The *Contractor* ensures

- it is registered with TunnelSkills (members of the National Specialist Training Forum for the UK tunnelling industry) within four weeks of the starting date and
- its training and development programme for the works aligns with the Skills, Knowledge, Attitude, Training and Experience (SKATE) matrix (see link in Annex A).

HSW Team

S1107.5 The *Contractor* provides a team of suitably qualified and experienced HSW manager(s) and adviser(s) who are

- dedicated to Providing the Works unless agreed otherwise by the *Project Manager*,
- responsible for HSW and

- operational staff with extensive practical experience of directing, delivering, managing and operating HSW on a day to day basis within construction, or equivalent, (as site located persons) for those sites

from the *starting date.* The *Contractor* submits the names of each HSW team member, together with their curriculum vitae, to the *Project Manager* for acceptance within four weeks of the *starting date*. A reason for not accepting the person is

- it does not have a proven track record of previous relevant experience on major projects,
- in respect of manager roles, it does not have recognised health and safety competence including a post-graduate degree in Occupational Health and Safety (OHS) or equivalent Level 6 qualification or equivalent from a recognised awarding body or appropriate demonstrable field-based experience or
- in respect of the adviser role, it does not hold the National Examination Board in Occupational Safety and Health (NEBOSH) diploma (or higher) or equivalent with demonstrable experience and further qualifications aligned to the Scope.

S1107.6 Health and safety manager(s) are responsible for

- the day to day management of the HSW management system,
- the delivery of the 'HSW implementation plan',
- the reporting of HSW performance metrics and other indicators,
- the investigation and reporting of incidents and
- undertaking audits and inspections of the Working Areas, including Compounds and working sites.

S1107.7 Health and safety adviser(s) are responsible for advising and supporting the HSW manager in

- the day to day management of the HSE management system,
- the delivery of the 'HSW implementation plan',
- the investigation and reporting of incidents and
- undertaking audits and inspections of the Working Areas, including Compounds and working sites.

S1107.8 The *Contractor* appoints an occupational hygienist responsible for educating, directing and advising the *Contractor* on the health hazards in construction material, processes and the consideration of human factors in design review meetings. The occupational hygienist

- develops an ill-health prevention strategy,
- delivers leadership engagement workshops,
- demonstrates maturity in health in design,
- guides on best practice to reduce ill-health by design,
- collaborates with other OHW specialists and
- attends the relevant design reviews, studies and associated meetings to
    - advise on matters of ill-health prevention and
    - participate in the development of other HSW documentation.

Training and Development

S1107.9 The *Contractor* ensures training for HSW is in accordance with section S253.

S1107.10 In addition to discipline-specific training described in the Scope, the *Contractor* ensures that

- Staff engaged in Providing the Works
  - obtain the relevant Construction Skills Certification Scheme card or equivalent United Kingdom-based scheme appropriate to the role they are undertaking and
  - sign up to the passport scheme (which is endorsed by the *Client*) when required by the *Project Manager*
- all site operatives, supervisors, managers, the *Client* (and its Project representatives), *Project Manager* (and its team) and *Supervisor* (and its team) have training appropriate to the task and role that they are undertaking,
- site supervisors hold a Construction Industry Training Board (CITB) Site Safety Supervisor Scheme qualification or equivalent,
- site managers hold a CITB Site Manager's Safety Training Scheme qualification or equivalent,
- Designers' (as defined in CDM 2015) have
  - appropriate level of membership of a relevant professional institution or body for their role,
  - health safety and wellbeing in design training
  - training for designers under CDM, and
  - where the role is appropriate, CDM duties for principal designers training and the *Client's* competency assessment known as HCPT005.9 Principal Designers Organisational Competence Assessment (see link provided in Annex A).

S1107.11 The *Client* views the Project as an opportunity to develop people skills and training as a legacy to the highways and construction industries. The *Contractor* produces and maintains all training and development records and provides these records on the Common Data Environment.

S1200 Subcontracting

S1205 Restrictions of requirements for subcontracting

S1205.1 The *Contractor* submits a procurement and subcontracting plan to the *Project Manager* for acceptance in accordance with section S3000. The procurement and subcontracting plan describes the processes and procedures for procuring all Equipment, Plant and Materials and subcontractors.

S1205.2 The 'procurement and subcontracting plan' includes the following procedures and processes to be followed for the procurement of Equipment, Plant and Materials and subcontractors including

- cascading flow down requirements to subcontractors (at any stage of remoteness from the *Client)*,
- the establishment of selection criteria and methodology for the procurement of Equipment, Plant and Materials and subcontractors,
- the establishment of the criteria and justification for any single-source procurement,
- compliance with paragraph S1205.7 for competitive tendering,
- the establishment and maintenance of the *Contractor*'s 'Procurement schedule' (see link in Annex A) as described in paragraph S1205.4,
- proposals for measuring the different types of employment of staff in Providing the Works including a ratio of direct employment, labour-only services and subcontractor numbers,
- engagement with and how opportunities are maximised for small and medium-sized enterprises,
- engagement with businesses to ensure visibility and information of contract opportunities for
    - small and medium sized enterprises (SMEs),
    - businesses local to the Project and
    - national organisations
- providing upskilling and training to subcontractors (at any stage of remoteness from the *Client)* to improve effectiveness and efficiency in Providing the Works and contributing to the reduction of the *Contractor*'s *carbon target*, subcontractor's and Project's carbon target as updated in accordance with paragraph S209.29, accepted proposals in accordance with clause Z135 and relevant agreed and instructed Enhancements as described in section S209,
- how subcontractors (at any stage of remoteness from the *Client*) contribute to the reduction of the *Contractor*'s *carbon target* and Project's carbon target as updated in accordance with paragraph S209.29, accepted proposals in accordance with clause Z135 and relevant agreed and instructed Enhancements,
- for cost reduction through innovation and efficiencies,
- demonstration that the tenders received are value for money,
- establishing supply chain resilience including
    - capacity analysis of potential Key Subcontractors, identifying potential risks to the availability and capacity to carry out work to meet the Accepted Programme and if necessary identification of alternative subcontractors and alterations to the 'Procurement schedule' (see link in Annex A) to mitigate such risks,

- on-going (post subcontract award) performance monitoring providing validation of the suitability, capability and capacity of subcontractors (at any stage of remoteness from the *Client*) in Providing the Works with such validation covering both financial and non-financial performance including, where necessary, implementation of corrective actions and
- performance monitoring of subcontractors and reporting in the monthly progress review meeting

- how enhanced procurement measures are deployed to engage Key Subcontractors and
- to prevent, mitigate and manage supply chain failure risk.

S1205.3 A reason for not accepting the procurement and subcontracting plan is that it

- does not contain detail on who, what, why and how subcontracts are procured in the plan or
- it does not contain the processes or procedures described in paragraph S1205.2 and how these are achieved.

In the case of the first submission of the procurement and subcontracting plan, the *Project Manager* replies within four weeks of the date of submission. Any further revisions of the procurement and subcontracting plan are responded to by the *Project Manager* within the *period for reply*.

S1205.4 The *Contractor* completes the 'Procurement schedule' in the form set out in Annex A within 12 weeks of the *starting date*. The ‘Procurement schedule’ aligns with the requirements in section S500 and covers, as a minimum, the following elements

- procurement gateways and award details for all packages, purchase orders, subcontracts, supplies and service orders,
- review and acceptance of subcontractors for packages that are considered Key Subcontractors. Subcontractors (at any stage of remoteness from the *Client*) that are appointed for packages that have programme criticality, and are otherwise regarded (by the *Project Manager*) as strategically or technically important to Providing the Works in accordance with the Accepted Programme are deemed Key Subcontractors,
- budget allocations (total of the prices or equivalent) and cost flow by financial year against each of the planned packages,
- whether the *Contractor* is seeking the *Project Manager’s* agreement to not publish a package on CompeteFor,
- whether packages are to be denoted a *works subcontract and*
- whether the scope of packages are covered by any Category Purchase Agreements (CPA).

Where these activities have been completed during previous phases the *Contractor* evidences the completion of such activities for the *Project Manager's* review.

S1205.5 The *Contractor* maintains and submits the ‘Procurement schedule’, see link in Annex A, on a monthly basis to the *Project Manager* for acceptance. The ‘Procurement schedule’ is an accurate record of the status of the *Contractor’s* proposals for subcontracts creating a Key Subcontractor. If at any point the *Contractor* becomes aware that a subcontractor (at any stage of remoteness from the *Client*) or supplier that is to be appointed under a subcontract or supply agreement and which is or would become a Key Subcontractor, the *Contractor* updates the ‘Procurement schedule’ and immediately submits this to the *Project Manager* for acceptance.

For subcontracts that are proposed to be placed within the first month the *Contractor* submits an initial ‘Procurement schedule’ within seven days of the *starting date* to the *Project Manager* for acceptance.

A reason for not accepting the 'Procurement schedule' is that

- it does not comply with the Scope,
- it is incomplete, incorrect or inaccurate or
- the *Project Manager* identifies additional subcontracts leading to a Key Subcontractor.

S1205.6 The *Contractor* submits the proposed contract for each subcontract (at any stage of remoteness from the *Client*) (prior to seeking quotations) to the *Project Manager* for acceptance, and for the purposes of clause 26.4 (where main Option C, D, E or F applies) this paragraph S1205.6 is the *Project Manager*'s instruction to the *Contractor* to make the submission. The *Contractor* does not seek quotations prior to the acceptance of the *Project Manager*.

S1205.7 Except as required by an operational requirement of a CPA, the *Contractor* obtains a minimum of three competitive quotations for the appointment of any subcontractor with a value in excess of £10,000. Where a subcontractor

- is a *design consultant* or a *works subcontractor* the requirements of paragraph S1205.7 do not apply to the appointment of such subcontractors and
- is an Associated Company and it is agreed that work subcontracted to it is assessed as if the work had been subcontracted, the *Contractor*
    - submits to the *Project Manager* for agreement that such a subcontract represents value for money in accordance with the requirements of the Scope including paragraph S1205.2 and
    - does not award the subcontract until the *Project Manager* has agreed that the subcontract represents value for money.

S1205.8 The *Contractor* includes a provision in all subcontracts stating that it does not deduct retention from any amount due to the subcontractor and procures that its subcontractors (at any stage of remoteness from the *Client*) do the same.

The *Contractor* does not include, and procures subcontractors (at any stage of remoteness from the *Client*) do not include in any further subcontract (at any stage of remoteness from the *Client*), a requirement to provide a performance bond or equivalent, unless agreed otherwise by the *Project Manager*.

S1205.9 The *Contractor* ensures that all subcontractors (at any stage of remoteness from the *Client*) are Named Suppliers.

S1205.10 The *Contractor* may propose to the *Project Manager* that a subcontractor (at any stage of remoteness from the *Client*) is not a Named Supplier. A reason for not accepting the *Contractor*'s proposal is that it is practicable for the subcontractor (at any stage of remoteness from the *Client*) to be a Named Supplier.

S1205.11 The *Contractor* ensures that all subcontracts (at any stage of remoteness from the *Client*)

- Where Option Y(UK)1 is used, enable the use of the Project Bank Account and
- use an NEC form of contract.

S1205.12 The *Contractor* ensures that all subcontracts (at any stage of remoteness from the *Client*) for Designers include a provision to allow the *Client* to enforce the obligation to provide a *Subcontractor undertaking to the Client*.

S1205.13 The *Contractor* may propose to the *Project Manager* that a subcontract (at any stage of remoteness from the *Client*) does not use a NEC form of contract. The *Contractor* does not appoint a subcontractor (at any stage of remoteness from the *Client*) using a contract form other than NEC unless the *Project Manager* has accepted the *Contractor*'s proposal. A reason for not accepting the *Contractor*'s proposal is that an NEC contract has not been used when it is

practicable for the subcontract (at any stage of remoteness from the *Client*) to be an NEC form of contract, or that the subcontract (at any stage of remoteness from the *Client*) does not include a provision to allow the *Client* to enforce the obligation to provide a *Subcontractor undertaking to the Client*.

S1205.13A The *Contractor* ensures its proposed subcontracts with

- a *tunnel boring machine supplier*,
- a *slurry treatment plant supplier* and
- a *tunnel lining mould supplier*

include a requirement that they pay back any advance payments less any agreed cancellation charges immediately upon termination of the contract or following notification to the *Contractor* from the *Project Manager* that a notice to proceed to Construction Phase is not to be issued for any reason.

The *Project Manager* notifies the *Contractor* if a notice to proceed to Construction Phase is not to be issued for any reason. Such advance payments less any agreed cancellation charges are included in the next amount after such notification.

S1205.13B The *Contractor* submits its proposed subcontracts termination provisions for

- a *tunnel boring machine supplier*,
- a *slurry treatment plant supplier* and
- a *tunnel lining mould supplier*

detailing the termination mechanism and termination payments (including any agreed cancellation charges together with their calculations).

The *Contractor* ensures that termination provisions minimises the costs to the *Client* and maximises the return of any payments made to such suppliers if the contract is terminated or a notice to proceed to the Construction Phase is not given for any reason.

The *Contractor* submits to the *Project Manager* for agreement the termination mechanisms and termination payments (including any agreed cancellation charges together with their calculations) for the proposed subcontracts with

- a *tunnel boring machine supplier*,
- a *slurry treatment plant supplier* and
- a *tunnel lining mould supplier*.

S1205.14 A reason for not accepting the subcontract is that

- where Option Y(UK)1 is used, it does not enable the use of the Project Bank Account,
- it does not align with the risk transfer of the contract,
- in the opinion of the *Project Manager* it has too high a risk transfer to the proposed subcontractor,
- it does not allow the *Contractor* to Provide the Works or
- it does not comply with the contract.

S1205.15 The *Contractor* ensures that any subcontract is capable of being novated to a replacement contractor, unless agreed otherwise by the *Project Manager*.

S1205.16 The *Contractor* may propose to the *Project Manager* that a subcontract is not capable of being novated to a replacement contractor. The *Contractor* does not award such a subcontract that is not capable of being novated to a replacement contractor unless the *Project Manager* has

accepted the *Contractor*'s proposal. A reason for not accepting the *Contractor*'s proposal is that it is practicable for the subcontract to be novated to a replacement contractor.

S1205.17 When requested by the *Project Manager*, the *Contractor* executes, and procures a subcontractor executes, an agreement provided in Annex Q of the Scope or such other form the *Client* may reasonably require to novate the benefit and burden of a subcontract to a replacement contractor.

Structural Steelwork

Steelwork Contractor Competence Requirements

S1205.18 The execution of all structural steelwork including the execution of new steelwork, any modification of existing steelwork including the dismantling, strengthening, upgrading, replacement, repair and re-erection of existing steelwork, and all temporary steelwork including that required for the execution of permanent steelwork for bridgeworks, footbridges, sign gantries and other similar Structures is to be undertaken by a steelwork contractor with the necessary technical capability and competence for the general type and value of work to be undertaken.

This requirement is satisfied by registration and audit to the "Bridgeworks Register of the Register of Qualified Steelwork Contractors Scheme" for the type and value of the work to be undertaken (see link at Annex A).

This requirement may also be satisfied, if necessary, through evidence of the required technical capability and competence which may be by registration and audit under an approved equivalent registration scheme, provided that the evidence demonstrates corresponding levels of technical capability and competence for the type and value of the work to be undertaken to that demonstrated through appropriate registration to the "Bridgeworks Register of the Register of Qualified Steelwork Contractors Scheme".

The *Contractor* submits details of the required technical capability and competence to the *Project Manager* for acceptance.

A reason for not accepting the *Contractor* has the necessary technical capability and competence is

- the required level of technical capability and competence for the general type and value of the work to be undertaken has not been demonstrated through appropriate registration to the "Bridgeworks Register of the Register of Qualified Steelwork Contractors Scheme" for the general type and value of the work to be undertaken,
- the required level of technical capability and competence for the general type and value of the work to be undertaken has not been demonstrated as being at least equivalent to that demonstrated through appropriate registration to the "Bridgeworks Register of the Register of Qualified Steelwork Contractors Scheme",
- the necessary technical capability and competence has not been demonstrated to enable the *Client* to meet its obligation to satisfy the general assumptions stated in BS EN 1990:2002+A1:2005 Eurocode. Basis of structural design (see link at Annex A), relating to the competence of those undertaking execution of the work or
- the evidence presented to demonstrate technical capability and competence does not comply with industry best practice.

The *Contractor* may propose to the *Project Manager* for acceptance, that the *Contractor* or its subcontractor (at any stage of remoteness from the *Client*) demonstrates the necessary technical capability and competence for the general type and value of work to be undertaken prior to commencement of the relevant works. If the *Contractor* or subcontractor (at any stage of remoteness from the *Client*) does not demonstrate the necessary technical capability and competence, the *Contractor* appoints a subcontractor (at any stage of remoteness from the *Client*) able to demonstrate the necessary technical capability and competence for the general type and value of work to be undertaken.

S1205.19 Enquiries about the Register of Qualified Steelwork Contractors are to be made to:

The Register of Qualified Steelwork Contractors

4 Whitehall Court

London

SW1A 2ES

National Highway Sector Scheme 19A (NHSS 19A) Requirement

S1205.20 The corrosion protection of structural steelwork is to be undertaken by the *Contractor* with an independently certified quality management system complying with National Highway Sector Scheme 19A (NHSS 19A) 'The Corrosion Protection of Ferrous Materials by Industrial Coatings' covering the scope of work to be undertaken (see link at Annex A).

This requirement may also be satisfied, if necessary, by the *Contractor* having an independently certified quality management system complying with ISO 9001:2015 Quality management systems (BS EN ISO 9001) (see link at Annex A) for corrosion protection work, provided that it can be demonstrated that the quality management system is at least equivalent in respect of quality management measures to those required to meet NHSS 19A requirements for the scope of work to be undertaken.

The *Contractor* submits details of the required NHSS 19A registration or BS EN ISO 9001 certification to the *Project Manager* for acceptance.

A reason for not accepting the NHSS 19A registration or BS EN ISO 9001 certification is

- the NHSS 19A registration or BS EN ISO 9001 certification does not cover the scope of work to be undertaken,
- the quality management system is not independently certified as complying with NHSS 19A or BS EN ISO 9001,
- the BS EN ISO 9001 quality management system is not at least equivalent in respect of quality management measures to those required to meet NHSS 19A requirements,
- the BS EN ISO 9001 quality management system does not require at least equivalent levels of competence of personnel undertaking specific corrosion protection activities to those required to meet NHSS 19A requirements,
- the quality management system does not enable the *Client* to meet its obligation to satisfy the requirements stated in BS EN 1990:2002+A1:2005 (see link at Annex A), relating to appropriate quality management measures being in place for the execution of the work or
- the quality management system does not comply with industry best practice.

The *Contractor* may propose to the *Project Manager* for acceptance, that the *Contractor* or its subcontractor (at any stage of remoteness to the *Client*) achieves the required NHSS 19A registration or BS EN ISO 9001 certification prior to commencement of the relevant works. If the *Contractor* or subcontractor (at any stage of remoteness from the *Client*) does not achieve the required NHSS 19A registration or BS EN ISO 9001 certification within the required timescale, the *Contractor* appoints a subcontractor (at any stage of remoteness from the *Client*) with the required NHSS 19A registration or BS EN ISO 9001 certification to undertake the works.

National Highway Sector Scheme 20 (NHSS 20) Requirement

S1205.21 The execution of all structural steelwork including the execution of new steelwork, any modification of existing steelwork including the dismantling, strengthening, upgrading, replacement, repair and re-erection of existing steelwork, and all temporary steelwork including that required for the execution of permanent steelwork for bridgeworks, footbridges, sign gantries and other similar Structures is to be undertaken by a steelwork contractor with an independently

certified quality management system complying with National Highway Sector Scheme 20 (NHSS 20) 'The Execution of Steelwork in Transportation Infrastructure Assets' covering the scope of work to be undertaken (see links at Annex A).

This requirement may also be satisfied, if necessary, by the steelwork contractor having an independently certified quality management system complying with BS EN ISO 9001 for the execution of steelwork, provided that it can be demonstrated that the quality management system is at least equivalent in respect of quality management measures to those required to meet NHSS 20 requirements for the scope of work to be undertaken.

The *Contractor* submits details of the required NHSS 20 registration or BS EN ISO 9001 certification to the *Project Manager* for acceptance.

A reason for not accepting a NHSS 20 registration of BS EN ISO 9001 certification is

- the NHSS 20 registration or BS EN ISO 9001 certification does not cover the scope of work to be undertaken,
- the quality management system is not independently certified as complying with NHSS 20 or BS EN ISO 9001,
- the BS EN ISO 9001 quality management system is not at least equivalent in respect of quality management measures to those required to meet NHSS 20 requirements,
- the BS EN ISO 9001 quality management system does not require at least equivalent levels of competence of personnel undertaking specific execution activities to those required to meet NHSS 20 requirements,
- the quality management system does not enable the *Client* to meet its obligation to satisfy the requirements stated in BS EN 1990:2002+A1:2005, relating to appropriate quality management measures being in place for the execution of the work or
- the quality management system does not comply with industry best practice.

The *Contractor* may propose to the *Project Manager* for acceptance, that the *Contractor* or its subcontractor (at any stage of remoteness to the *Client*) achieves the required NHSS 20 registration or BS EN ISO 9001 certification prior to commencement of the relevant works. If the *Contractor* or subcontractor (at any stage of remoteness from the *Client*) does not achieve the required NHSS 20 registration or BS EN ISO 9001 certification within the required timescale, the *Contractor* appoints a subcontractor (at any stage of remoteness from the *Client*) with the required NHSS 20 registration or BS EN ISO 9001 certification to undertake the works.

Landscape aftercare

S1205.22 The *Contractor* provides proposals for the procurement of a landscape aftercare subcontractor for acceptance by the *Project Manager*. The *Contractor* provides details of the scope of works for the landscape aftercare in line with the Outline Landscape and Ecological Management Plan. A reason for not accepting the *Contractor*'s proposals for the procurement of a landscape aftercare subcontractor is that the proposals do not comply with the Scope.

S1205.23 The *Contractor* ensures that any subcontract (at any stage of remoteness from the *Client*) includes a provision to disallow defined cost in such subcontract (at any stage of remoteness from the *Client*) which is

- Off-Payroll Working Rules Costs and
- any Off-Payroll Working Rules Costs forming part of
    - the cost of people under section 1 of the schedule of cost components whether employed by the *Contractor* or any other person including by any subcontractor (at any stage of remoteness from the *Client*),
    - subcontractor costs under section 4 of the schedule of cost components incurred by any subcontractor (at any stage of remoteness from the *Client*) or

- the cost of plant and materials including design of Plant and Materials carried out by any subcontractor (at any stage of remoteness from the *Client*).

S1206 Fair payment

S1206.1 The *Contractor* includes in the contract with each subcontractor

- a period for payment of the amount due to the subcontractor not greater than 19 days after the date on which payment becomes due under the contract. The amount due includes payment for work which the subcontractor has completed from the previous assessment date up to the current assessment date in the contract,
- a provision requiring the subcontractor to include in each subcontract the same requirement, except that the period for payment is to be not greater than 23 days after the date on which payment becomes due under the contract,
- a provision requiring the subcontractor to assess the amount due to a subcontractor without taking into account the amount paid by the *Contractor* and
- a provision requiring each further stage subcontract to contain provisions to the same effect as these requirements, with the intention that all subcontractors (at any stage of remoteness from the *Client*) are to be paid within 30 days after the date on which payment becomes due under the contract.

S1206.2 The *Contractor* notifies non-compliance with the timescales for payment

- to the *Client*,
- to the *Project Manager* and
- through the Efficiency and Reform Group Supplier Feedback Service (see link at Annex A).

The *Contractor* includes this provision in each subcontract and requires subcontractors to include the same provision in each subcontract with the intention that all subcontractors (at any stage of remoteness from the *Client*) include the same provision.

S1206.3 A failure to comply with this section is treated as a substantial failure by the *Contractor* to comply with its obligations.

S1210 Acceptance procedures

Structural Steelwork

S1210.1 In this section S1210 a Relevant Subcontract is a subcontract for the supply (whether including fabrication, delivery or installation or not) of any significant steel materials, steel-related products or steel-related elements (excluding Equipment and fixings) that are

- used to Provide the Works or
- incorporated or left in the *works,* which the *Contractor* has not already awarded before the *starting date*.

In this section S1210 a Relevant Subcontractor is a Subcontractor appointed under a Relevant Subcontract.

S1210.2 The *Contractor* advertises any Relevant Subcontract in accordance with Procurement Policy Note (PPN) 11/16 “Procuring Steel in Major Projects - Revised Guidance” which updates PPN 16/15 (see link at Annex A) unless the *Project Manager* agrees that to do so is disproportionate to the nature and value of the Relevant Subcontract.

S1210.3 The *Contractor* awards any Relevant Subcontract on the basis of the most economically advantageous tender (as defined in the Public Contracts Regulations 2015, see link provided in Annex A) following a fair, transparent and competitive process proportionate to the nature and value of the Relevant Subcontract. The *Contractor* conducts the financial assessment of any Relevant Subcontract tenders on a whole life cost basis in accordance with section S370.

S1210.4 The *Contractor* submits the proposed assessment criteria, assessment methodology and scoring methodology for any proposed Relevant Subcontract to the *Project Manager* for acceptance before advertising any proposed Relevant Subcontract.

S1210.5 A reason for the *Project Manager* not accepting the submission is that the proposed assessment criteria, assessment methodology or scoring methodology

- are not transparent (as defined in the Public Contracts Regulations 2015),
- do not allow equal treatment of all tenderers (as defined in the Public Contracts Regulations 2015),
- do not comply with the principles of the "UK Steel Charter" with its supporting guidance where this is relevant to the *Client* commercial activities and consistent with the relevant regulations, (see link at Annex A),
- do not reflect Crown Commercial Services' publication "Steel procurement in major projects – Guidance on the application of social issues" (see link at Annex A) or
- do not comply with the contract.

S1210.6 Before advertising any proposed Relevant Subcontract, the *Contractor* submits to the *Project Manager* for acceptance

- the proposed Relevant Subcontract in full and
- a report demonstrating how the proposed Relevant Subcontract meets all the obligations and requirements for a Relevant Subcontract under the contract.

S1210.7 A reason for the *Project Manager* not accepting the proposed Relevant Subcontract is that it does not meet the obligations or requirements of the contract.

S1210.8 The *Contractor* submits to the *Project Manager* for acceptance the name of the proposed Relevant Subcontractor and a report demonstrating

- how the proposed appointment complies with the contract,
- how the proposed Relevant Subcontractor demonstrates and meets the assessment criteria and
- how the assessment methodology and scoring methodology have been complied with.

S1210.9 A reason for the *Project Manager* not accepting the proposed appointment of a Relevant Subcontractor is that

- the tender assessment does not comply with the accepted assessment methodology or scoring methodology,
- the tender assessment does not demonstrate how the Relevant Subcontractor meets the assessment criteria,
- the Relevant Subcontractor's appointment does not allow the *Contractor* to Provide the Works or
- the Relevant Subcontractor's appointment does not comply with the contract.

S1210.10 In procuring all Relevant Subcontracts, the *Contractor* takes into account

- compliance by the Relevant Subcontractor with
  - health and safety legislation and the protection of any staff involved in any production or manufacturing process of any steel material or steel product,
  - welfare legislation or
  - employment legislation
- the carbon footprint of any steel materials or steel products used in or to Provide the Works so as to minimise any carbon emissions,
- the social integration of disadvantaged workers or members of vulnerable groups among the staff performing the contract and used to Provide the Works, such as the long-term unemployed (defined as people who have been unemployed for 12 months or more),
- the Relevant Subcontractor's commitment to provide training in the skills needed to perform any Relevant Subcontract or to Provide the Works, such as the hiring of apprentices and
- the whole life cost and cost-effectiveness of any steel materials or steel products used in or to Provide the Works, including the cost (measured over the life-cycle of the material or product in question) of
  - transport or transportation,
  - insurance,
  - assembly and disposal and
  - use, including
    - the cost of energy and other resources,
    - maintenance costs and
    - costs associated with environmental impacts, including the cost of any emissions in its production or manufacture.

S1210.11 The *Contractor* provides to the *Project Manager* all information necessary to demonstrate the use of steel in the *works.* Information that may be required to meet reporting requirements to DfT, BEIS and Cabinet Office includes

- communications in relation to all steel procurements,
- the value of each procurement,
- content,
- contractual arrangements,
- award criteria and evaluation methodology and
- the quantity of raw steel provided by UK suppliers and non UK suppliers.

Other specific requirements and constraints

S1210.12 Not used.

S1215 Contracts Finder and CompeteFor

S1215.1 The *Contractor*

- ensures all subcontracts (at any stage of remoteness from the *Client*) are advertised on CompeteFor (see link provided in Annex A),
- ensures each advert provides a full and detailed description of the subcontract opportunity with each of the mandatory fields being completed on CompeteFor,
- ensures feedback to all applicants is provided within seven days of completing the assessment of the application and prior to commencing the tender and
- within seven days of an award of a subcontract (at any stage of remoteness from the *Client*)
    - ensures CompeteFor is updated with details of the successful subcontractor and
    - ensures feedback is provided to the unsuccessful tenderers.

S1215.2 The *Contractor*

- makes proposals for reporting subcontract tenders and tenderers for agreement by *Project Manager* within six weeks of the *starting date* and
- manages detailed records and data of the tender and tenderers and reports to the *Project Manager* in the agreed format each month. The report includes the following
    - description of opportunities raised,
    - value of awards,
    - number of awards,
    - details of the companies tendering and those that are successful including turnover, small medium enterprise, location, employee profile data and business ownership diversity data and
    - feedback provided to tenderers.

S1215.3 The requirements of this section S1215 do not apply to subcontracts placed under a Category Purchase Agreement (CPA).

Contracts Finder

S1215.4 Where the Target Budget is £5,000,000 or more at the Contract Date or where Option X22 is used when the Target Budget is agreed or assessed in accordance with X22, the *Contractor*

- subject to paragraphs S1215.6, S1215.7 and S1215.8 advertises on Contracts Finder all subcontract opportunities arising from or in connection with Providing the Works above a minimum threshold of £25,000 that arise before Completion,
- within 90 days of awarding a subcontract to a subcontractor, updates the notice on Contracts Finder with details of the successful subcontractor,
- monitors the number, type and value of the subcontract opportunities placed on Contracts Finder advertised and awarded in its supply chain prior to the Completion and provides reports on this information to the *Project Manager* in the format and frequency as specified by the *Project Manager* and
- promotes Contracts Finder to its suppliers and encourages those organisations to register on Contracts Finder.

The calculation of £5,000,000 in this paragraph is in accordance with footnote 1 to Procurement Policy Note 01/18: Supply Chain Visibility (see link at Annex A) based on an advertised subcontract value, averaged over the life of the advertised subcontract

S1215.5 Each advert referred to in paragraph S1215.4 provides a full and detailed description of the subcontract opportunity with each of the mandatory fields being completed on Contracts Finder by the *Contractor*.

S1215.6 The obligation at paragraph S1215.5 only applies in respect of subcontract opportunities arising after the Contract Date.

S1215.7 The *Contractor* may propose to the *Project Manager* for agreement that a specific subcontract is not advertised on Contracts Finder. The *Contractor* provides a detailed reason for not advertising the specific contract. The *Contractor* provides further detail when requested by the *Project Manager*. If agreed by the *Project Manager*, the *Contractor* is relieved from advertising that subcontract opportunity on Contracts Finder.

S1215.8 In respect to Relevant Subcontracts, the *Contractor* also complies with section S1210.

S1216 Advertising Subcontracts in accordance with the Contract Regulations 2015

S1216.1 Not used.

S1220 Subcontracting Incentivisation

S1220.1 The *Contractor* ensures that each subcontract includes incentive schemes that enables the subcontractor to contribute to and benefit from the incentive schemes in clauses 54, Z119, Z134 and Z135.

S1220.2 The *Contractor* may propose to the *Project Manager* that a subcontract does not have incentive schemes in accordance with paragraph S1220.1. Unless paragraph S1220.3 applies, the *Contractor* does not award a subcontract which does not have incentive schemes in accordance with paragraph S1220.1 unless the *Project Manager* has accepted the *Contractor*'s proposal. A reason for not accepting the *Contractor*'s proposal is that

- the subcontract is to be with a subcontractor which is a Key Subcontractor or
- total of the prices (as defined under the subcontract) is valued at £1,000,000.00 or higher, excluding VAT, at the subcontract's contract date (as defined under the subcontract).

S1220.3 The *Contractor* may award a subcontract which does not have incentive schemes in accordance with paragraph S1220.1 where

- the subcontractor will only subcontract on the subcontractor's own terms and conditions and it is evidenced to the *Project Manager* or
- the subcontract is to be with a Category Supplier.

S1230 Subcontracting Risk Allocation

S1230.1 The *Contractor* ensures that each subcontract includes a risk allocation that is

- similar to the contract and
- reflective of the value of the subcontract.

S1230.2 The *Contractor* may propose to the *Project Manager* that a subcontract does not have a risk allocation that is

- similar to the contract and
- reflective of the value of the subcontract.

Unless paragraph S1230.3 applies, the *Contractor* does not award a subcontract which does not have a risk allocation that is

- similar to the contract and
- reflective of the value of the subcontract

unless the *Project Manager* has accepted the *Contractor*'s proposal. A reason for not accepting the *Contractor*'s proposal is that the subcontract is to be with a subcontractor which is a Key Subcontractor.

S1230.3 The *Contractor* may award a subcontract which does not have a risk allocation that is

- similar to the contract and
- reflective of the value of the subcontract

where

- the subcontractor will only subcontract on the subcontractor's own terms and conditions or
- the subcontract is to be with a Category Supplier.

S1240 Collaborative Procurement Hub (CPH)

S1240.1 Operating at a Project level the *Client*, the *Contractor*, the other Main Work Contractors and other key stakeholders from the integrated client team (collectively the CPH members) work together to optimise supply chain procurement, logistics and supplier performance for the benefit of the Project. The main purpose of this forum, which meets monthly, is

- to collect and share demand data to identify improvement opportunities for acceptance by the *Project Manager*, i.e., through sharing resources, elimination of waste in processes and improved alignment to delivery of the *Client's* objectives,
- to identify and develop mitigation plans in response to supply chain risk and capacity constraints for acceptance by the *Project Manager*,
- to identify opportunities and develop business cases for joint or collaborative procurement activities including utilising the Category Purchase Agreements for acceptance by the *Project Manager*,
- to share knowledge, good practice and continuous improvement opportunities across the Main Work Contractors and extended supply chain where appropriate and
- to identify innovations and promote these with the CPH members and the *Client* where they could have wider beneficial applications across the *Client's* organisation.

S1240.2 Within six weeks of the *starting date,* the *Contractor*

- participates in an initial CPH meeting led by the *Client* between CPH members to develop the terms of reference for agreement by the *Project Manager* and
- participates in monthly CPH meetings and works collaboratively with the CPH members to deliver the CPH purpose and objectives set out in the agreed terms of reference.

S1240.3 A reason for the *Client* not accepting the *Contractor's* opportunities, plans or business cases submitted through the CPH is that it

- is incomplete, incorrect or inaccurate,
- does not realistically reflect the timing requirements for the procurements identified or
- does not comply with the Scope.

S1241 Assessment of Defined Cost of work subcontracted to Associated Companies

S1241.1 If the *Contractor* proposes that the Defined Cost of work subcontracted to an Associated Company is assessed as if the work had been subcontracted, the *Contractor* demonstrates to the *Project Manager* that

- the subcontract represents a genuine arm's length commercial arrangement,
- there are appropriate systems and procedures in place to operate and manage the subcontract at arm's length as a genuine arm's length commercial arrangement,
- the proposed Associated Company's fee and other commercial terms are reflective of a fair and competitive market rate or are value for money and represent costs, fees or other commercial terms that would be/are charged to other "tier one contractors",
- there are no refunds or reverse payments or similar from the proposed Associated Company to the *Contractor* or other Associated Companies,
- it is not an unincorporated joint venture containing the *Contractor* or a Consortium Member and
- it is not a Design Consultant but excluding
    - a subcontractor (at any stage of remoteness from the *Client*) that provides the design for,
        - temporary works,
        - Equipment or
        - an item of Plant and Materials (but not the integration of such item into the works)

      only and
    - a subcontractor (at any stage of remoteness from the *Client*) that provides the design for the permanent works where design account for less than 20% of the total of the prices of such subcontract,

including by providing support information in respect of the above. The *Contractor* provides any further information and clarifications requested by the *Project Manager*.

S1241.2 For such agreed Associated Companies (including those listed in the *approved associated companies schedule*)

- the *Contractor* ensures
    - the management and delivery of such subcontracts is fully documented (including notes of any verbal communications) and
    - that the *Project Manager* is able to inspect, review and copy all such documents and
- the *Contractor's* (or where relevant the Consortium Member's) director (as defined by the Companies Act 2006 or equivalent) responsible for finance certifies on completion of the final account of the relevant subcontract that there has been no (and will not be any)

refunds or reverse payments or similar from the Associated Company to the *Contractor* or to other Associated Companies and procures the same certification from the Associated Company.

S1250 Average speed enforcement camera system maintenance subcontract

S1250.1 The *Contractor* provides and procures the necessary maintenance for any permanent average speed enforcement camera system for the Maintenance Period from the achievement of the conditions for Key Date 1 to ensure that it remains operational and ensures that it remains within its 'Home Office type approvals' and in a condition that enables the police to enforce speed limits.

For the end of the Maintenance Period, the *Contractor* arranges for the maintenance contract to be novated to the *Client* or another contractor of the *Client* (as directed by the *Project Manager*) unless directed otherwise by the *Project Manager*. The effective date and time of the novation is to be 23.59.59hrs on the last day of the Maintenance Period.

S1250.2 Before procuring any permanent average speed enforcement camera system, the *Contractor* consults with the *Project Manager* on

- the procurement of such average speed enforcement camera system including details of the assessment approach to deliver value for money to the *Client*, including whole life cost in consideration of the ongoing maintenance and
- the form of the maintenance contract including its conditions of contract, scope, payment system and duration (which may be longer than the Maintenance Period) of the maintenance contract (including the provisions that become operable on any novation to the *Client*) to ensure that it is acceptable to the *Client* and capable being novated to either the *Client* or another supplier of the *Client*.

The *Contractor* addresses the *Project Manager's* comments in the drafting of the proposed subcontracts before submitting them to the *Project Manager* for acceptance in accordance with the Acceptance Procedure.

A reason for not accepting the proposed subcontracts is that

- it does not address the *Project Manager's* comments.

S1300 Title

S1305 Marking

S1305.1 To prepare Equipment, Plant and Materials which are outside the Working Areas for marking, the *Contractor*

- marks the Equipment, Plant and Materials in the location they are stored so as to show that its destination is the Working Areas and that they are the property of the *Client* (upon marking by the *Contractor*) and
- provides to the *Supervisor*
    - evidence that the title to the Equipment, Plant and Materials has passed to the *Contractor* free of all liens, charges, options, encumbrances, rights, claims and other interests of any third party and
    - a schedule identifying
        - a unique number and bar code,
        - the locations where the relevant Equipment, Plant and Materials are stored until they are brought within the Working Areas and
        - the value of each item of the Equipment and Plant and Materials stored.

S1305.2 The *Contractor* ensures that any Equipment, Plant and Materials stored outside of the Working Areas are stored so that

- it is not damaged and
- it is safe and secure.

S1305.3 The Plant and Materials which are outside the Working Areas which are identified for payment are all Plant and Materials outside the Working Areas which is to be paid by the *Client* in accordance with clause Z131.

S1310 Materials from excavation and demolition

S1310.1 The *Client* is to retain title to materials arising from excavations and demolitions for incorporation within the Project unless described otherwise in the Scope.

S1310.2 The *Contractor*

- notifies the other Main Works Contractors of the materials arising from excavations and demolitions which are not required for the *works* and
- enables other Main Works Contractors to remove materials arising from excavations and demolitions from the Working Areas which are not required for the *works*.

S1400 Acceptance or procurement procedure

S1400.1 There are no specific acceptance or procurement procedures other than those cited in section S1200 and the Acceptance Procedure.

S1500 Accounts and records

S1505 Additional records

S1505.1 The *Contractor* keeps records of any rebate, credit, discount or buy-back which is payable or attributed to the *Contractor* either solely, or proportionately, for the works or services provided by a subcontractor (at any stage of remoteness from the *Client*). Upon request by the *Project Manager,* the *Contractor* provides such records for inspection within one week.

S1510 Cost verification

S1510.1 The *Contractor* ensures a copy of all Defined Cost information is held within the Working Area and notifies the *Project Manager* of its location. The *Contractor* allows the *Client* (or a forensic cost verification consultant engaged by the *Client*) to remove data relating to the assessment of Defined Cost (including Personal Data) from the Working Areas to verify the Defined Cost incurred.

S1510.2 The *Contractor* allows the *Project Manager* full access to information pertaining to Defined Cost and procures the same from any subcontractor (at any stage of remoteness from the *Client*).

S1510.3 The *Client* ensures that data removed from the Working Areas for verification is adequately protected against the risk of accidental, unauthorised or unlawful processing, destruction, loss, damage, alteration or disclosure.

S1510.4 The *Contractor* obtains agreement from the data subject for the removal of Personal Data from the Working Areas for verification.

S1520 Records and audit access

S1520.1 The *Contractor* keeps documents and information obtained or prepared by the *Contractor* and any subcontractor (at any stage of remoteness from the *Client*) in connection with the contract for a period of 12 years after the last *defects date*.

S1520.2 The *Contractor* permits the *Client* and the Comptroller and Auditor General to examine documents held or controlled by the *Contractor* or any subcontractor (at any stage of remoteness from the *Client*).

S1520.3 The *Contractor* provides such oral or written explanations as the *Client* or the Comptroller and Auditor General considers necessary.

S1520.4 This section S1520 does not constitute a requirement or agreement for the purposes of section 6(3)(d) of the National Audit Act 1983 (see link in Annex A) for the examination, certification or inspection of the accounts of the *Contractor*.

S1600 Parent Company Guarantee

S1600.1 The form of Parent Company Guarantee is provided in Annex B. See clause Z11.

S1600.2 If the entity that is to provide the Parent Company Guarantee is not a company incorporated in and subject to the laws of England and Wales, the *Contractor* provides a legal opinion in support of a Parent Company Guarantee.

S1600.3 Any legal opinion provided by the *Contractor* in support of a Parent Company Guarantee from a company not incorporated in and subject to the laws of England and Wales includes (among others) the following matters

- is addressed to the *Client* on a full reliance basis,
- the liability of the lawyers giving the opinion is not to be subject to any exclusion or limitation of liability,
- confirmation
    - that the Controller is a corporation duly incorporated in the relevant jurisdiction, validly existing and in good standing under the laws of the jurisdiction in which it is incorporated,
    - that the Controller has full power to execute, deliver, enter into and perform its obligations under the Parent Company Guarantee,
    - that all necessary corporate, shareholder and other action required to authorise the execution and delivery by the Controller of the Parent Company Guarantee and the performance by it of its obligations under it have been duly taken,
    - that execution by the proposed signatories in accordance with the method of execution proposed constitutes valid execution by the Controller, the execution and delivery by the Controller of the Parent Company Guarantee and the performance of its obligations under it does not conflict with or violate
        - the constitutional documents of the Controller,
        - any provision of the laws of the jurisdiction in which it is incorporated,
        - any order of any judicial or other authority in the jurisdiction in which it is incorporated or
        - any mortgage, contract or other undertakings which is binding on the bidder or its assets
    - that (assuming that it is binding under English law) the Parent Company Guarantee constitutes legal, valid and binding obligations of the Controller enforceable in accordance with its terms,
    - that notification of any other formalities to be complied with under local law which is necessary to enforce the Parent Company Guarantee in the Controller's place of incorporation, including (for example) notarisation, legalisation or registration of the Parent Company Guarantee,
    - that notification of whether withholding is required to be made by the Controller in relation to any monies payable to the *Client* under the Parent Company Guarantee,
    - of whether the *Client* is deemed to be resident or domiciled in the foreign jurisdiction by reason of its entry into the Parent Company Guarantee,
    - that the Controller and its assets are not entitled to immunity from suit, pre-judgment attachment or restraint or enforcement of a judgment on grounds of sovereignty or otherwise in the courts of England and Wales in respect of proceedings against it in relation to the Parent Company Guarantee
- the legal opinion issued to the *Client* is given for the benefit of the *Client*, and any actual transferee or assignee of the *Client* where functions of the *Client* are taken over by the relevant entity by way of statutory transfer or by any other means required by the Secretary of State in order to enact the transfer of the functions of the *Client* and
- the legal opinion can be provided and disclosed to the following *Client* parties (on a non-reliance basis)
    - the Department for Transport,

- the Cabinet Office,
- the HM Treasury,
- the *Client*'s professional advisers, auditors and insurers and
- any person required pursuant to any applicable law and their officers and directors as applicable.

S1700 Undertakings to the *Client* or Others (Option X8)

S1700.1 The *Contractor* is directed to section S900 for the requirements to Others with regards to the *works*.

S1700.2 Not used.

S1700.3 Prior to the Completion of *section* 2, the *Contractor* provides the undertaking in the form specified in Annex U or such other form as the *Client* may require.

S1705 Undertakings to Others

S1705.1 Except as required for Temporary Accommodation works, prior to the Completion of *section* 1, the *Contractor* provides the *undertakings to Others* in the form specified in Annex UA, with such amends or in such other form as the *Client* may reasonably require.

S1705.2 For works associated with Temporary Accommodation, within seven days of the commencement of the relevant construction of the works and services instructed under clause Z136, the *Contractor* gives to the relevant Temporary Accommodation Third Party, an *undertaking to Others* in the form stated in Annex UB (or as modified in accordance with this section S1705. The *Contractor* ensures that three copies of the draft *undertaking to Others* are

- issued to the relevant Temporary Accommodation Third Party first, for it to affix its common seal and necessary signatures (or such other completion method agreed by the *Project Manager*),
- recovered by the *Contractor* for it to affix its common seal and necessary signatures (or such other completion method in accordance with the Companies Act 2006) and
- issued to the *Project Manager* for it to arrange for the *Client* to affix its common seal and necessary signatures (or such other completion method in accordance in accordance with the Companies Act 2006)

in sufficient time to enable it to give the *undertakings to Others* within the required seven days.

S1705.3 If the Temporary Accommodation Third Party advises the *Contractor* that it does not wish to have the *undertakings to Others* as a specialty and would prefer to have the *undertakings to Others* as a simple contract (both as set out in the Limitation Act 1980) then the *Contractor*

- provides confirmation from the Temporary Accommodation Third Party to the *Project Manager* and
- proposes the necessary changes to the *undertakings to Others* to the *Project Manager* for agreement, in the form stated in Annex UB.

once the *Project Manager* has agreed the necessary changes, arranges for the *undertakings to Others* to be completed in accordance with paragraph S1705.2.

S1705.4 If the *Project Manager* advises the *Contractor* that the Temporary Accommodation Third Party is a tenant and a landlord (or equivalent parties) or other multi party beneficiary, the *Client* makes the necessary changes to the *undertakings to Others* in the form stated in Annex UB to reflect such a beneficiary. Once the *Client* has made the necessary changes, the *Project Manager*

passes the modified *undertakings to Others to* the *Contractor* and it arranges for the *undertakings to Others* to be completed in accordance with paragraph S1705.2.

S1710 Subcontractor undertaking to Others

S1710.1 Prior to the earlier of

- the Cross Contract Integration Milestone, or
- such Design Consultant commencing its design in the instances that a Design Consultant is appointed after the Cross Contract Integration Milestone,

the *Contractor* procures that the relevant subcontractors (at any stage of remoteness from the *Client*) provide a *Subcontractor undertaking to Others* in the form specified in Annex UC, with such amends or in such other form as the *Client* may reasonably require.

S1710.2 The *Contractor* ensures that all subcontracts (at any stage of remoteness from the *Client*) include a provision to allow the *Client* to enforce the obligation to provide a *Subcontractor undertaking to Others.*

S1715 Subcontractor undertakings to the *Client*

S1715.1 Upon award of a subcontract to a Design Consultant, the *Contractor* procures that the Design Consultant provides a *Subcontractor undertaking to the Client* in the form specified in Annex UC, with such amends or in such other form as the *Client* may reasonably require.

S1715.2 The *Contractor* ensures that all subcontracts (at any stage of remoteness from the *Client*) for Designers include a provision to allow the *Client* to enforce the obligation to provide a *Subcontractor undertaking to the Client.*

S1800 Transfer of Rights

S1805 *Contractor's* rights over material prepared for the design of the *works*

S1805.1 The *Contractor* acquires no rights over material prepared for the design of the *works*.

S1810 Other rights to be obtained by the *Contractor*

S1810.1 The following definitions apply for the purposes of section S1800.

Affiliate is in relation to a body corporate, any other entity which directly or indirectly Controls, is Controlled by, or is under direct or indirect common Control with, that body corporate from time to time.

Central Government Body is a body listed in one of the following sub-categories of the Central Government classification of the Public Sector Classification Guide, as published and amended from time to time by the Office for National Statistics

- Government Department,
- Non-Departmental Public Body or Assembly Sponsored Public Body (advisory, executive, or tribunal),
- Non-Ministerial Department,
- an Executive Agency of one of the above and

any body corporate that is a wholly-owned subsidiary of one of the above.

Client Background IPR is IPR owned by the *Client* before the Contract Date or created by the Client independently of the contract, and Crown copyright which is not available to the *Contractor* otherwise than under the contract, but excluding IPRs owned by the *Client* subsisting in the Client Software.

Client Software is software which is owned by or licensed to the Client (other than under or pursuant to the contract) and which is or will be used by the Contractor in order to Provide the Works.

Client System is the *Client's* computing environment (consisting of hardware, software and telecommunications networks or equipment) used by the *Client* or the *Contractor* in connection with the contract which is owned by the *Client* or licensed to it by a third-party and which interfaces with the Contractor System or which is necessary for the *Client* to receive the works.

Commissioning Date for *relevant works* is the day on which the commissioning of relevant works is successfully completed and its *relevant work conditions* are met.

Confidential Information is

- information, including all Personal Data, which (however it is conveyed) is provided by the disclosing Party in connection with the contract that relates to
    - the Disclosing Party Group or
    - the operations, business, affairs, developments, IPRs, trade secrets, know-how and personnel of the Disclosing Party Group
- other information provided by the disclosing Party in accordance with the contract that is clearly designated as being confidential or equivalent or that ought reasonably to be considered to be confidential (whether or not it is so marked) which comes (or has come) to the Recipient's attention or into the Recipient's possession in connection with the contract,
- discussions, negotiations and correspondence between the disclosing Party or any of its directors, officers, employees, consultants or professional advisers and the Recipient or any of its directors, officers, employees, consultants and professional advisers in connection with the contract and all matters arising therefrom and
- information derived from any of the above

but not including any information which

- was in the possession of the Recipient without obligation of confidentiality prior to its disclosure by the disclosing Party,
- the Recipient obtained on a non-confidential basis from a third-party who is not, to the Recipient's knowledge or belief, bound by a confidentiality agreement with the disclosing Party or otherwise prohibited from disclosing the information to the Recipient,
- was already generally available and in the public domain at the time of disclosure otherwise than by a breach of the contract or breach of a duty of confidentiality or
- was independently developed without access to the Confidential Information.

Contractor Background IPR is IPR owned by the *Contractor* or a third party before the Contract Date or created by the *Contractor* or a third party independently of the contract, which is, or will be, used before or after the defects date to Provide the Works (including its design, testing, implementation), its maintenance operation and improvement, but excluding IPRs owned by the *Contractor* and subsisting in the Contractor Software or by any third party in Third Party Software.

Contractor Equipment is the hardware, computer and telecoms devices and equipment used by the *Contractor* or subcontractors (at any stage of remoteness from the *Client*) (but not hired, leased or loaned from the *Client*) for Providing the Works.

Contractor Software is software which is proprietary to the *Contractor* (or an Affiliate of the *Contractor*) and

- which is or will be used by the *Contractor* for the purposes of Providing the Works,
- which is or will be used by the *Client* for the purposes of maintaining, operating or improving the works and
- including the software specified as such in the Software Schedule.

Contractor System is the information and communications technology system used by the *Contractor* in implementing and performing the *works* including the Software, the Contractor Equipment, configuration and management utilities, calibration and testing tools and related cabling (but excluding the Client System).

Control is the possession by a person, directly or indirectly, of the power to direct or cause the direction of the management and policies of the other person (whether through the ownership of voting shares, by contract or otherwise) and **Controls** and **Controlled** are to be interpreted accordingly.

Deposited Software is the Software, the Source Code of which is to be placed in escrow as required by the *Project Manager* and notified to the *Contractor* from time to time including as identified in the Software Schedule.

Disclosing Party Group is where the disclosing Party is

- the *Contractor*, the *Contractor* and any Affiliates of the *Contractor* and
- the *Client*, the *Client* and any Central Government Body with which the *Client* or the *Contractor* interacts in connection with the contract.

Documentation is descriptions of the works, the *Contractor's works* solution, performance measures, details of the Contractor System (including (i) vendors and versions for off-the-shelf components and (ii) source code and build information for proprietary components), relevant design and development information, technical specifications of all functionality including those not included in standard manuals (such as those that modify system performance and access levels), configuration details, test scripts, user manuals, operating manuals, process definitions and procedures and all such other documentation as

- is required to be supplied by the *Contractor* to the *Project Manager* under the contract,
- would reasonably be required by a competent third-party capable of Good Industry Practice contracted by the *Client* to develop, configure, build, deploy, run, maintain, upgrade and test the individual systems that Provide the Works or make use of the *works*,
- is required by the *Contractor* in order to Provide the Works and
- has been or is generated in order to Provide the Works.

Good Industry Practice is at any time the exercise of that degree of care, skill, diligence, prudence, efficiency, foresight and timeliness which would be reasonably expected at such time from a skilled and experienced person or body engaged in services similar to the *works* to a customer like the *Client*, such supplier seeking to comply with its contractual obligations in full and complying with any applicable laws.

Indemnified Person is the *Client* and each and every person to whom the *Client* (or any direct or indirect sub-licensee of the *Client*) sub-licenses, assigns or novates any Relevant IPRs or rights in Relevant IPRs in accordance with the contract.

IPRs Claim is any claim against any Indemnified Person of infringement or alleged infringement (including the defence of such infringement or alleged infringement) of any Relevant IPRs save for any such claim to the extent that it is caused by any use by or on behalf of that Indemnified Person of any Relevant IPRs, or the use of the Client Software by or on behalf of the *Contractor*, in either case for a purpose not reasonably to be inferred from the Scope or the provisions of the contract.

Object Code is software and data in machine-readable, compiled object code form.

Open Source Software is software that has its source code made available subject to an open-source licence under which the owner of the copyright and other IPRs in such software provides the rights to use, study, change and distribute the software to any and all persons and for any and all purposes free of charge.

Recipient is the Party which receives or obtains directly or indirectly Confidential Information.

Relevant IPRs is IPRs used to Provide the Works or as otherwise provided and licensed by the *Contractor* (or to which the *Contractor* has provided access) to the *Client* or a third-party in the fulfilment of the *Contractor's* obligations under the contract including IPRs in the Specially Written Software, the Contractor Software, the Contractor Background IPRs and the Third Party Software but excluding any IPRs in the Client Software and the Client Background IPRs.

Software is Specially Written Software, Contractor Software and Third Party Software.

Software Supporting Materials are

- the Documentation, Source Code and the Object Code of the Specially Written Software and
- all build instructions, test instructions, test scripts, test data, operating instructions and other documents and tools necessary for maintaining and supporting the Specially Written Software.

Software Schedule is the *software schedule* unless later changed in accordance with the contract.

Source Code is computer programmes and data in an eye-readable form and in such form that it can be compiled or interpreted into equivalent binary code together with all related design comments, flow charts, technical information and documentation necessary for the use, reproduction, maintenance, modification and enhancement of such software.

Specially Written Software is any software (including database software, linking instructions, test scripts, compilation instructions and test instructions) created by the *Contractor* or by a subcontractor (at any stage of remoteness from the *Client*) or other third-party on behalf of the *Contractor*) specifically for the purposes of the contract, including

- any Contractor Background IPRs that are embedded in or which are an integral part of such software and
- any modifications or enhancements to Contractor Software or Third Party Software created specifically for the purposes of the contract.

Third Party Software is software which is proprietary to a third party (other than an Affiliate of the *Contractor*) and

- which is, or will be, used by the *Contractor* for the purposes of Providing the Works,

- which is, or will be, used by the *Client* for the purposes of maintaining, operating or improving the *works* and
- including the software specified as such in the Software Schedule (including Open Source Software).

For the operation of the contract, software includes firmware.

S1810.2 All Intellectual Property Rights in

- Client Background IPR and
- Client Software

are and remain the property of the *Client* or the Crown, and the *Contractor* does not acquire any right, title or interest therein or thereto.

S1810.3 The *Contractor* hereby assigns to the *Client*, with full title guarantee, title to and all rights and interest in the Specially Written Software (except for any Contractor Background IPR contained therein) or procures that the first owner of the Specially Written Software assigns them to the *Client* on the same basis.

S1810.4 All IPRs in

- Contractor Background IPR and
- Contractor Software

are and remain the property of the *Contractor*, and save as set out in the contract neither the *Client* nor the Crown acquire any right, title or interest therein or thereto.

S1810.5 The *Contractor* waives or procures a waiver of any moral rights in any copyright works assigned to the *Client* pursuant to the contract.

S1810.6 The *Contractor* grants to the *Client* licences to use (to include the right to load, execute, store, transmit, display and copy (for the purposes of archiving, backing-up, loading, execution, storage, transmission or display) modify, copy, reproduce, share and develop the

- Contractor Software,
- Contractor Background IPR and
- Third Party Software

for any purpose relating to the works and their maintenance, operation, modification and for any purpose relating to the exercise of the *Client's* (or any other Central Government Body's) business or function.

The licences carry the right to grant sub-licences on the same terms and are freely transferable to third parties (including third party contractors engaged by the *Client* in connection with the *works*) without the *Contractor's* consent and continue notwithstanding the determination (for any reason) of the *Contractor's* engagement under the contract.

S1810.7 The *Contractor* delivers to the *Project Manager* the Specially Written Software in both Source Code and Object Code forms together with relevant Documentation and all related Software Supporting Materials as necessary to meet its obligations under the contract and upon request by the *Client* at any time, and provides updates of the Source Code and of the Software Supporting Materials promptly following each new release of the Specially Written Software, in each case on media that is acceptable to the *Project Manager*. The *Contractor* acknowledges and agrees that the ownership of the media referred to in this paragraph vests in the *Client* upon their receipt by the *Project Manager*.

S1810.8 In respect of any sub-licence of the rights granted to the *Client* under paragraph S1810.6, if requested by the *Contractor* the sub-licensee executes a confidentiality undertaking in favour of

the *Contractor* or third-party owner of the relevant rights in such reasonable form as the *Contractor* requires and the *Project Manager* accepts.

S1810.9 The *Contractor* informs the *Project Manager* of all Specially Written Software that constitutes a modification or enhancement to *Contractor* Software or Third Party Software.

S1810.10 The *Client* grants to the *Contractor*, or procures the direct grant to the *Contractor* of, a royalty-free, non-exclusive, non-transferable, revocable licence to use all Client Software and Client Background IPR reasonably required by the *Contractor* in order to Provide the Works. Any such licence is granted for the duration of the contract only and solely to enable the *Contractor* to comply with its obligations under the contract.

S1810.11 If an IPRs Claim is made, or the *Contractor* anticipates that an IPRs Claim might be made, the *Contractor*, at its own expense and sole option, either

- procures for the *Client* or other relevant Indemnified Person the right to continue using the relevant item, which is subject to the IPRs Claim or
- replaces or modifies the relevant item with non-infringing substitutes provided that
    - the performance and functionality of the replaced or modified item is at least equivalent to the performance and functionality of the original item,
    - the replaced or modified item does not have an adverse effect on any other services, or the Client System or the Contractor System,
    - there is no additional cost to the *Client* or relevant Indemnified Person and
    - the terms and conditions of the contract apply to the replaced or modified *works*.

S1810.12 If the *Contractor*

- procures a licence or
- modifies or replaces an item

in accordance with paragraph S1810.11 but this has not avoided or resolved the IPRs Claim, then

- the *Client* may treat this IPRs Claim as the *Contractor* having substantially hindered the *Client* or Others and
- without prejudice to the indemnity set out in paragraph clause Z13.5, the *Contractor* is liable for all reasonable and unavoidable costs of the substitute items and services including the additional costs of procuring, implementing and maintaining the substitute items.

S1815 Escrow

S1815.1 The *Contractor* deposits, and procures that each owner of the Deposited Software deposits, not less than fourteen (14) days following the relevant Commissioning Date or at such other times as the *Project Manager* may require, the Source Code of such part of the Software that consists of Deposited Software, in escrow.

S1815.2 The escrow is with a specialist software escrow company accepted by the *Project Manager*. The escrow will be on the basis of a single beneficiary escrow agreement/ multi licensee escrow agreement/Software as a Service with the level of verification being full/entry[2] modified as necessary, and where applicable, to be consistent with the provisions of paragraph S1815.4.

[2] Note to tenderer: Escrow arrangement will be dependent upon the software solution proposed.

S1815.3 The *Contractor* ensures that (and procures that each owner of the Deposited Software ensures that) the deposited version of the Source Code is the current version of the Deposited Software and that the deposited version is kept up-to-date as the Deposited Software is modified or upgraded. The *Contractor* provides a copy of any escrow provider's verification report for any Deposited Software to the *Project Manager* within 7 days of the deposit being made.

S1815.4 Where Deposited Software includes Specially Written Software, without prejudice to the provisions of paragraph S1810.2, the *Contractor* ensures there are no restrictions on the release to the *Client* of Specially Written Software from escrow, which is released whenever required by the *Client* and without payment of any release fee, unless the *Project Manager* has agreed otherwise.

S1815.5 Where the *Contractor* is unable to procure compliance with the provisions of paragraph S1815.2 in respect of any Third Party Software that is Deposited Software, it provides the *Project Manager* with written evidence of its inability to comply with these provisions and agrees with the *Project Manager* a suitable alternative to escrow that affords the *Client* the nearest equivalent protection. The *Contractor* is excused from its obligations under paragraph S1815.2 only to the extent that the *Contractor* and the *Project Manager* have agreed on a suitable alternative.

S1815.6 In circumstances where the *Client* obtains the release of the Source Code from escrow, the *Contractor* hereby grants (and procures that any owner of Deposited Software grants) to the *Client* a perpetual, worldwide, assignable, royalty-free, irrevocable and non-exclusive licence (including a right to grant sub-licences) to use and support (which includes the right to load, execute, interpret, store, transmit, display, copy (for the purposes of loading, execution, interpretation, storage, transmission or display), modify, adapt, enhance, reverse compile, decode and translate) the Source Code version of the Deposited Software to the extent necessary for the receipt of the *works*, the maintenance, operation and modification of the *works* and for any purpose relating to the *works* or exercise of the *Client's* (or any other Central Government Body's) business or function. The licence granted under this paragraph S1815.6 survives the termination or expiry of the contract and cannot be terminated by the *Contractor* or its assignees or any third-party.

S1815.7 Three (3) months prior to the Completion of *section* 1, the *Contractor* enters (and procures any subcontractor (at any stage of remoteness from the *Client*) enters) into novation agreements for

- all escrow agreements for Deposited Software to novate the escrow agreement to the Client and
- all Software maintenance agreements for the Software to either the *Client* or a *Client's* contractor as directed by the *Project Manager*

in the form specified in the Scope (or such other form as the *Client* may reasonably require).

The effective date for any novation agreement is the day of Completion of *section* 2 or an earlier date as instructed by the *Project Manager*.

S1900 Information Model Requirements (Option X10)

S1900.1 The Lower Thames Crossing (LTC) digital strategy 2.0 provided in Annex A includes

- establishing the building blocks to enable effective information management and use of technology throughout the Project's life cycle and
- the use of a Digital Twin for operation

and the *Contractor* is guided by the LTC digital strategy.

S1900.2 The *Contractor* Provides the Works in accordance with

- "The Construction Playbook, Policy 5 (December 2020)",

- the ISO 19650 suite of standards,
- the *Client's* Exchange Information Requirements (EIR) and the associated standards referenced within the EIR,
- the *Client's* Business Exchange Information Requirements (B-EIR), which includes a set of additional business information requirements,
- the *Client*'s asset data management manual (ADMM) and
- the *Client*'s information management system and associated documents including
    - 'Interface Specification',
    - data modelling,
    - ontology and
    - data assurance.

See links provided in Annex A.

S1900.3 The *Contractor* coordinates with the other Main Works Contractors to ensure quarterly information management group workshops are held, unless otherwise agreed with the *Project Manager*.

S1900.4 The *Contractor* agrees with the other Main Works Contractors which Main Works Contractor, on a rotating basis

- chairs and arranges the workshop,
- provides a venue at a location that is agreed with the *Project Manager*,
- sets the agenda (including any technical queries or other relevant information),
- identifies all attendees and agrees these with the *Project Manager*, two weeks in advance of each workshop,
- provides all workshop information (including agendas, minutes and actions) on the Project Common Data Environment (CDE) and
- ensures minutes include an action list with assigned responsibilities and timescales for action(s).

S1900.5 The *Contractor* ensures that these information management workshops include

- details of compliance with the EIR and Information Execution Plan,
- progress on the Federated Model,
- escalation issues from fortnightly design review meetings,
- proposals to leverage emerging technology,
- sharing of best practice and
- potential issues and opportunities for improvement.

S1905 Project Common Data Environment (CDE)

S1905.1 The *Client* provides a centrally hosted Project CDE.

S1905.2 The *Project Manager* provides defined workflows and conventions for the Project CDE and provides these to the *Contractor* on the *starting date*.

S1905.3 The *Contractor*

- uses its own ISO 19650 compatible systems,
- uploads its Information Model onto the Project CDE in line with the EIR and the EIR timescales and
- uses the defined workflows and conventions provided by the *Project Manager* for its own systems used to Provide the Works and the Project CDE.

The *Contractor* ensures that occupational health and wellbeing (OHW) records are documented and stored in accordance with section S1100. The *Contractor* does not record OHW records on the Project CDE.

Project Information Model

S1905.4 The *Contractor* coordinates and cooperates with the *Project Manager* and the other Main Works Contractors to develop an integrated, collaborative approach to building the Project's Project Information Model (PIM) for agreement of the *Project Manager*.

S1905.5 The *Contractor* uploads information updates once every 14 days to the PIM using the Project's CDE throughout the *works* and includes information relating to

- design,
- construction and
- handover to operation.

For works in *section 4* the information updates are uploaded once every 28 days to the PIM.

S1905.6 The *Contractor* ensures its PIM updates are accessible for relevant Others and enables the sharing of data and information for core activities including requirements for

- project controls and assurance,
- health, safety, and wellbeing (HSW),
- Construction (Design and Management) Regulations 2015 (CDM) information,
- security,
- quality control procedures (inclusive of Defect management),
- carbon performance, baseline impacts and monitoring,
- environmental management,
- stakeholder engagement,
- land access,
- legacy outcomes,
- Consents and commitments,
- integrated asset database analysis and reporting, including dashboards,
- geospatially co-ordinated design (including clash detection/avoidance),
- 3D geometrical information,
- 4D phased simulation of construction sequences,
- 5D quantification and accurate cost scheduling,
- planning the operation and maintenance of assets,
- utilities planning,

- construction operations and
- handover records and maintenance documentation.

S1905.7 The *Contractor* submits its proposals for visualisation and animation of the PIM content to the *Project Manager* for agreement.

Federated Model

S1905.8 The *Contractor* provides a Federated Model that

- is in accordance with the EIR and B-EIR,
- includes models representing the entire range of assets for the *works*,
- includes design asset content and structured data,
- includes composite geometrical and alphanumerical content,
- is in .IFC format,
- is verified against the workflows and information delivery plans and
- is checked against the specifications as described in the EIR and B-EIR.

S1905.9 The *Contractor* uploads the Federated Model to the Project CDE in accordance with the EIR.

S1905.10 The *Project Manager* provides a central design issue tracker on the *starting date* and the *Contractor* records potential interface clashes that may impact on the other Main Works Contractors on the central design issue tracker on the Project CDE. The *Contractor* ensures that this central design issue tracker includes cross references to the applicable Multiparty Collaboration Form(s).

S1905.11 The *Contractor* holds fortnightly design review meetings with the *Project Manager* in line with the EIR for all Federated Model content. These meetings include discussion on

- general progress updates,
- the design issue tracker,
- the risk of clashes in asset content,
- proposed actions for resolution and
- escalation issues for the quarterly information management workshop.

Asset Information Model

S1905.12 The *Contractor* ensures that the PIM is the basis for the Asset Information Model (AIM) at Completion.

S1905.13 The *Contractor* provides the PIM (and updates as applicable) on the Project CDE prior to Completion as described in section S445.

Portal for *Client*

S1905.14 The *Contractor* provides a proposal for a web-based portal where live and historic contract and operational performance can be viewed and submits this to the *Project Manager* for acceptance in accordance with section S3000. The *Contractor* agrees the format of the web-based portal with the *Project Manager*. The *Contractor* ensures the web-based portal

- is in accordance with the B-EIR,

- includes the ability to present information such as
    - constraints of the DCO including noise, air quality and transport routes,
    - location and proximity of resource, plant and material,
    - major or high potential health, safety and wellbeing (HSW) incidents,
    - performance of major Equipment including fleets of Equipment and the Tunnel Boring Machine and
    - productivity at work package level indicating non-productive time and root cause
- is accessible using single sign-on,
- issues automated alerts including HSW incidents and major Equipment productivity rates,
- allows historical and aggregated data to be selected and viewed and
- is optimised for multi-device viewing, including tablet, PC or conference room screens.

A reason for not accepting the proposal is that

- it does not comply with the B-EIR or
- it does not present information in a format that can be understood.

S1905.15 The *Contractor* provides read-only access to the web-based portal. The *Project Manager* provides a list of names and contact details to the *Contractor* of those who are to be provided access to the portal. The *Contractor* provides training on how to use the portal to those named individuals.

S1910 Deliverables

S1910.1 The *Contractor* develops the information modelling solution and produces an Information Execution Plan (IEP) and a business information execution plan (B-IEP) using the Information Execution Plan (IEP) template and Business Information Execution Plan (B-IEP) template provided in Annex A.

S1910.2 The *Contractor* produces an IEP and a B-IEP that

- complies with the requirements stated in section S1900,
- aligns with the pre-appointment iep and pre-appointment b-iep and addresses any comments on such document from the *Project Manager*,
- includes how the information management aspects of the contract including the Exchange Information Requirements (EIR), Business Exchange Information Requirements (B-EIR) and information management system are carried out,
- includes processes and procedures for
    - ensuring that the Building Information Modelling (BIM) approach aligns with ISO 19650 (see link in Annex A),
    - defining the level of information need for all asset elements including geometrical and non-geometrical content,
    - describing how the content is incorporated into the Asset Information Model (AIM),
    - meeting the asset schema requirements as described in the EIR,
    - describing how subcontractors provide information, BIM and GIS capability and
    - includes processes and procedures for using geospatial information

- includes a master information delivery plan (MIDP) and task information delivery plans (TIDPs) both of which define the levels of detail and accuracy for asset content and
- includes how information is exchanged between the *Client*, the *Project Manager,* the *Supervisor* and other LTC Contractors via the Project CDE.

S1910.3 The *Contractor* ensures that the MIDP

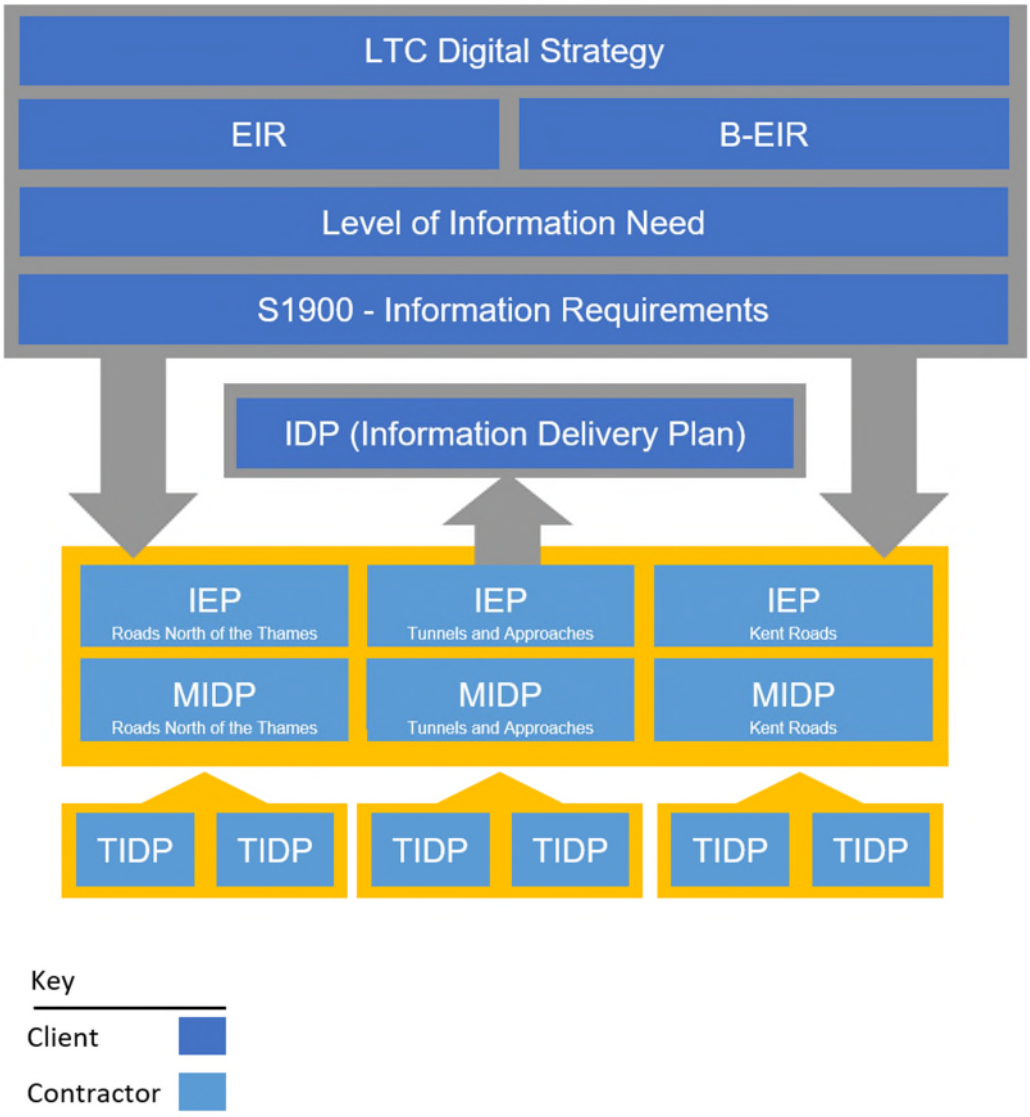
- aligns with the *Contractor*'s Accepted Programme,
- contains the detail of what submissions are required to Provide the Works*,*
- contains when the submissions are required to Provide the Works,
- includes a responsibility matrix as described in the EIR,
- includes the level of information need as described in EIR,
- is the compilation of all the 'task information delivery plans' (TIDPs) and
- is kept up to date with any changes in the individual TIDPs that support it.

S1910.4 The *Contractor* ensures that each TIDP describes the discipline suite of deliverable content for specific phases and activities, including

- business data as described in B-EIR,
- geometrical information in proprietary formats or open data formats,
- alphanumerical information in open data formats and
- documentation in open data formats.

S1910.5 Figure 5 provides a diagrammatic view of the hierarchy of the Information Model deliverables.

Figure 5 - Hierarchical view



S1910.6 The *Contractor* includes progress on information management delivery as part of the monthly progress report described in section S850.

S1910.7 The *Contractor* provides to the *Project Manager* for agreement its proposals to leverage the emerging technology identified in the IEP and B-IEP within 40 weeks of the *starting date*.

S1910.8 The *Contractor* updates its proposals following quarterly information management workshops and submits the updated proposals to the *Project Manager* for agreement.

S2000 Performance bond (Option X13)

S2000.1 The form of Performance Bond is provided in Annex T. For further details see clause X13.

S2100 Advanced payment to the *Contractor* (Option X14)

S2100.1 The form of Advance Payment Bond is provided in Annex V. For further detail see clause Z120.

S2200 The *Contractor's* design (Option X15)

S2205 Constraints on use of material

S2205.1 The *Contractor* does not use the material provided by it under the contract for other work.

S2210 Form of documents to be retained

S2210.1 Documents are to be retained in its original format and in a format that allows continued access by the *Client*.

S2210.2 The *Contractor* provides a proposal to the *Project Manager* for acceptance for its plan and programme to retain material.

S2210.3 A reason for not accepting the proposal is that it will not allow the *Client* continued access to material.

S2300 Retention (Option X16)

S2300.1 Not used.

S2400 Low performance damages (Option X17)

S2400.1 Not used.

S2405 Key Performance Indicators (X20)

S2405.1 Not used.

S2600 Project Bank Account (Option Y(UK)1)

S2600.0A The objective of the parties in effecting amendments to the NEC4 Option Y(UK)1 ensures Tier Two Suppliers and Tier Three Suppliers are beneficiaries of the Project Bank Account without being required to sign a Joining Deed or the Trust Deed, in order to increase sign up by Tier Two Suppliers and Tier Three Suppliers and reduce the associated administration. The *Contractor* procures subcontractors of tier four and below sign a Joining Deed to the Trust Deed in order to benefit from the Project Bank Account.

S2600.1 The *Contractor* complies with paragraph S1205.6.

S2600.2 The *Contractor* ensures that any deeds associated with the Project Bank Account are issued to the relevant parties and are provided to the *Client* to apply original signatures and the common seal to prevent any payment issues. The *Contractor* liaises with the *Project Manager* to agree the date that the *Contractor* submits the deed(s) to the *Client* for signature.

The parties acknowledge and agree that, subject to clauses Y1.5A and Y1.5B, the Tier Two Suppliers and Tier Three Suppliers are beneficiaries to the trust created by the Trust Deed and are entitled to receive payments from the Project Bank Account (PBA) without signing a Joining Deed or the Trust Deed.

S2600.3 The *Contractor* ensures that

- there is one original copy of a deed for each party to the deed,
- it issues the original copy of a deed to the *Project Manager* for the attachment of the *Client's* common seal and
- each original copy of the deed has original signatures from the relevant authorised signatories.

S2605 Adding a Named Supplier

S2605.1 The *Contractor* ensures that any Named Supplier signs the Joining Deed provided in Annex A and the Trust Deed provided in Annex A.

S2610 Project Bank Account Tracker

S2610.1 The *Contractor*

- registers for access to the Project Bank Account Tracker, "the PBA Tracker" (see link in Annex A) and
- completes and submits to the *Project Manager* on a monthly basis
    - a fully populated PBA Tracker detailing payments made by the *Contractor* to its subcontractors (at any stage of remoteness from the *Client*) and
    - detailed PBA statements and payment runs required to reconcile payment dates and amounts to the application breakdown in the PBA Tracker for each
        - subcontractor (at any stage of remoteness from the *Client*) paid directly from the Project Bank Account ("PBA supply chain") and
        - subcontractor (at any stage of remoteness from the *Client*) not paid directly from the Project Bank Account ("non-PBA supply chain").

The *Contractor* ensures any data relating to other clients is redacted from the main account statement before submission in .pdf format.

S2610.2 The *Contractor* explains all variances from the previous month and submits further information to the *Project Manager* in response to any queries raised, within five days.

S2610.3 The small and medium enterprises (SME) percentage is calculated from the full application for payment value as submitted by the *Contractor*.

S2610.4 Time in the PBA Tracker is measured in calendar days.

S2610.5 The *Project Manager* monitors the tracker for the time it takes the *Contractor* to pay its subcontractors (at any stage of remoteness from the *Client*) through the PBA, following the deposit of funds into the PBA.

S2610.6 The *Client* calculates the related performance score

- from the date the funds have been deposited into the PBA or
- from the weighted date as set out in the Collaborative Performance Framework v4.7.1 (CPF) (see link in Annex A) when funds are deposited into the PBA across multiple dates

that covers the amount due to subcontractors (at any stage of remoteness from the *Client*) joined to the PBA.

S2610.7 If any data or evidence is missing or still required (if not covered in the tracker), audits are undertaken by the *Project Manager* with the subcontractors (at any stage of remoteness from the *Client*) to verify that they are paid within contractual time frames.

S2610.8 The *Client* may carry out audits on subcontractors (at any stage of remoteness from the *Client)* to assess payment performance to the Named Suppliers.

S2610.9 Where the *Contractor* transfers monies from other accounts into the PBA this is stated on the bank statement.

S2700 Tunnels Specifications

S2700.1 The *Contractor* complies with the

- Specification for Tunnelling Works - Tunnels,
- Specification for Tunnelling Works - Precast Concrete Segmental Linings,
- Specification for Tunnelling Works - Sprayed Concrete Linings,
- Specification for Tunnelling Works - Spheroidal Graphite Iron Linings,
- Specification for Tunnelling Works - Cast in Situ Concrete Works,
- Specification for Tunnelling Works - Waterproofing,
- Specification for Tunnelling Works - Durability design specification for structural concrete - Permanent Works and
- Specification for Tunnelling Works - Slurry & Multi-Mode Tunnel Boring Machines.

S2700.2 Where high pressure compressed air working is considered possible, the *Contractor* complies with the 'Specification for Tunnelling Works - High Pressure Compressed Air Working'.

Lower Thames Crossing

S2700 – Specification for Tunnelling Works - Tunnels

DATE: 11/11/2020

VERSION: P03

Lower Thames Crossing

Specification for Tunnelling Works - Tunnels

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1 Introduction

1.1 Background

1.1.1 This document forms part of a suite of specifications that provide the minimum requirements for the works. It is to be read in conjunction with the Scope and the rest of the tunnelling suite of specifications, namely

- Specification for Tunnelling Works - Precast Concrete Segmental Linings,
- Specification for Tunnelling Works - Sprayed Concrete,
- Specification for Tunnelling Works - Spheroidal Graphite Iron Linings,
- Specification for Tunnelling Works - Cast in Situ Concrete Works and
- Specification for Tunnelling Works – Waterproofing.

1.1.2 The bored tunnel works are defined as works carried out between each headwall of the bored tunnels including

- main bored tunnel linings,
- connections to cross passages,
- cross passage linings and
- internal loadbearing structures.

1.1.3 The cut and cover tunnel works are defined as works carried out between the headwalls (and including the headwalls) of the bored tunnels and the portals.

1.1.4 In referring to the Specification for Tunnelling, 3rd Edition, British Tunnelling Society and Institution of Civil Engineers, when applied to the Scope the following substitutes are made

- “Engineer” is replaced with *Project Manager*,
- “Designer” is replaced with *Contractor* and
- “Employer” is replaced with *Client*.

2 Standards and References

2.1.1 Below are non-exhaustive lists of standards and references relating to the tunnels. These are in addition to the DMRB and MCHW which are not listed here but are considered part of the standards to be utilised where applicable.

Table 2-1 British Standards

Code	Title	Notes
BS 4449:2005+A3:2016	Steel for the reinforcement of concrete	
BS 5896:2012	Specification for high tensile steel wire and strand for the prestressing of concrete	
BS 8500-1:2015+A2:2019	Concrete – Complementary British Standard to BS EN 206: Method of specifying and guidance for the specifier.	Incorporating Corrigendum No.1 Amendment +A2:2019
BS 8500-2:2015+A2:2019	Concrete – Complementary British Standard to BS EN 206: Specification for constituent materials and concrete.	Amendment +A2:2019
BS 8666:2005	Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete	Incorporating Amendment No.1

Table 2-2 Eurocodes

Code	Title	Notes
BS EN 1990:2002 +A1:2005	Eurocode 0: Basis of structural design	See CD350 for additional guidance
NA to BS EN 1990:2002 + A1:2005	UK National Annex to Eurocode 0 Basis of structural design	See CD350 for additional guidance
BS EN 1991-1-1:2002	Eurocode 1: Actions on structures. General Actions. Densities, self-weight, imposed load for buildings	
NA to BS EN 1991-1-1:2002	UK National Annex to Eurocode 1: Actions on structures. General Actions. Densities, self-weight, imposed load for buildings	
BS EN 1991-1-5:2003	Eurocode 1: Actions on structures. General Actions. Thermal actions	
NA to BS EN 1991-1-5:2003	UK National Annex to Eurocode 1: Actions on structures. General Actions. Thermal actions	
BS EN 1991-1-6:2005	Eurocode 1: Actions on structures. General Actions. Actions during execution	

NA to BS EN 1991-1-6:2005	UK National Annex to Eurocode 1: Actions on structures. General Actions. Actions during execution	
BS EN 1991-1-7:2006 +A1:2014	Eurocode 1: Actions on structures. General Actions. Accidental actions	
NA+A1 to BS EN 1991-1-7:2006+A1:2014	UK National Annex to Eurocode 1: Actions on structures. Part 1-7: Accidental actions	See CD350 for additional guidance.
BS EN 1991-2:2003	Eurocode 1: Actions on structures. Traffic loads on bridges	See CD350 for additional guidance.
NA to BS EN 1991-2:2003	UK National Annex to Eurocode 1: Actions on structures. Traffic loads on bridges	See CD350 for additional guidance.
BS EN 1992-1-1:2004 + A1:2014	Eurocode 2: Design of concrete structures– Part 1-1: General rules and rules for buildings	
NA + A2:2014 to BS EN 1992-1-1:2004 + A1:2014	UK National Annex to Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings	
BS EN 1992-2:2005	Eurocode 2: Design of concrete structures – Part 2: Concrete bridges – Design and detailing rules	
NA to BS EN 1992-2:2005	UK National Annex to Eurocode 2: Design of concrete structure – Part 2: Concrete bridges – Design and detailing rules	
BS EN 1992-3:2006	Eurocode 2: Design of concrete structures – Part 3: Liquid retaining and containment structures	
NA to BS EN 1992-3:2006	UK National Annex to Eurocode 2: Design of concrete structure – Part 3: Liquid retaining and containment structures	
BS EN 1993-1-1:2005 + A1:2014	Eurocode 3: Design of steel structures – Part 1-1 General rules and rules for buildings	
NA + A1:2014 to BS EN 1993-1-1:2005 + A1:2014	UK National Annex to Eurocode 3: Design of steel structures – Part 1-1 General rules and rules for buildings	
BS EN 1994-1-1:2004	Eurocode 4: Design of composite steel and concrete	

	structures – Part 1-1 General rules and rules for buildings	
NA to BS EN 1994-1-1:2004	UK National Annex to Eurocode 4: Design of composite steel and concrete structures – Part 1-1 General rules and rules for buildings	
BS EN 1994-2:2005	Eurocode 4: Design of composite steel and concrete structures – Part 2 General rules and rules for bridges	
NA to BS EN 1994-2:2005	UK National Annex to Eurocode 4: Design of composite steel and concrete structures – Part 2 General rules and rules for bridges	
BS EN 1997-1:2004+A1:2013	Eurocode 7: Geotechnical design – Part 1 General rules	
NA+A1 to BS EN 1997-1:2004+A1:2013	UK National Annex to Eurocode 7: Geotechnical design – Part 1 General rules	
BS EN 1997-2:2007	Eurocode 7: Geotechnical design – Part 2 Ground investigation and testing	
NA to BS EN 1997-2:2007	UK National Annex to Eurocode 7: Geotechnical design – Part 2 Ground investigation and testing	
BS EN 1998-1:2004 + A1:2013	Eurocode 8: Design of structures for earthquake resistance – Part 1 General rules, seismic actions and rules for buildings	
NA to BS EN 1998-1:2004	UK National Annex to Eurocode 8: Design of structures for earthquake resistance – Part 1 General rules, seismic actions and rules for buildings	

Table 2-3 Product standards referenced in British Standards or Eurocodes

Code	Title	Notes
BS EN 206:2013	Concrete – Specification, performance, production and conformity	
BS EN 1317-1:2010	Road Restraint Systems – Part 1 – Terminology and general criteria for test methods	

BS EN 1317-2:2010	Road Restraint Systems – Part 2 – Performance classes, impact test acceptance criteria and test methods for safety barriers	
BS EN 1317-3:2010	Road Restraint Systems – Part 3 – Performance classes, impact test acceptance criteria and test methods for crash cushions	
DD ENV 1317-4:2002	Road Restraint Systems – Part 4 – Performance classes, impact test acceptance criteria and test methods for terminals and transitions of safety barriers	
BS EN 1317-5:2007+A2:2012	Road Restraint Systems – Part 5 - Product requirements and evaluation of conformity for vehicle restraint systems	
Draft prEN 1317-7	Road restraint systems - Part 7: Performance classes, impact test acceptance criteria and test methods for terminals of safety barriers	
PD CEN/TS 1317-8:2012	Road restraint systems - Part 8: Motorcycle road restraint systems which reduce the impact severity of motorcyclist collisions with safety barriers	
BS EN 10080:2005	Steel for the reinforcement of concrete – Weldable reinforcing steel - General	
BS EN 15050:2007 + A1:2012	Precast concrete products – Bridge elements	

Table 2-4 BSI published documents

Code	Title	Notes
PD 6688-1-1:2011	Recommendations for the design of structures to BS EN 1991-1-1	
PD 6688-1-4:2015	Background paper to the UK National Annex to BS EN 1991-1-4	
PD 6688-1-7:2009 +A1:2014	Recommendations for the design of structures to BS EN 1991-1-7	
PD 6688-2:2011	Recommendations for the design of structures to BS EN 1991-2	
PD 6687-1:2010	Background paper to the UK National Annexes to BS EN 1992-1 and BS EN 1992-3	

PD 6687-2:2008	Recommendations for the design of structures to BS EN 1992-2:2005	
PD 6695-1-9:2008	Recommendations for the design of structures to BS EN 1993-1-9	
PD 6695-1-10:2009	Recommendations for the design of structures to BS EN 1993-1-10	
PD 6695-2:2008 + A1:2012 Incorporating Corrigendum No.1	Recommendation for the design of bridges to BS EN 1993	
PD 6696-2:2007 + A1:2012	Background paper to BS EN 1994-2 and the UK National Annex to BS EN 1994-2	
PD 6694-1:2011	Recommendations for the design of structures subject to traffic loading to BS EN 1997-1	

Table 2-5 Execution standards referenced in British Standards or Eurocodes

Code	Title	Notes
BS EN 1090-1:2009+A1:2011	Execution of steel structures and aluminium structures - Part 1: Requirements for conformity assessment of structural components	
BS EN 1090-2:2018	Execution of steel structures and aluminium structures. Technical requirements for the execution of steel structures	
BS EN 1090-3:2008	Execution of steel structures and aluminium structures – Part 3: Technical requirements for aluminium structures	
BS EN 13670:2009 Incorporating corrigenda October 2015 and November 2015	Execution of concrete structures	
BS EN14651:2005+A1:2007	Test method for metallic fibre concrete - Measuring the flexural tensile strength (limit of proportionality (LOP) residual)	

Table 2-6 Other documents

Code	Title	Notes
CIRIA C760	Guidance on embedded retaining wall design	
CIRIA C766	Control of cracking caused by restrained deformation in concrete	
-	Specification for Tunnelling, 3rd edition; The British Tunnelling Society and The Institution of Civil Engineers, 2010	
-	ICE Specification for Piling and Embedded Retaining Walls, 3rd edition; The Institution of Civil Engineers, 2016	
BS 6164:2019	Health and safety in tunnelling in the construction industry. Code of practice	
-	Tunnel Lining Design Guide, The British Tunnelling Society and The Institution of Civil Engineers, 2004	
	fib Model Code for Concrete Structures, 2010	
RILEM TC 162-TDF	Test and design methods for steel fibre reinforced concrete	
PAS 8810:2016	Tunnel design – Design of concrete segment Tunnel design – Design of concrete segmental tunnel linings – Code of practice; The British Standards Institution 2016	
-	ITA Working Group 2; Guidelines for the Design of Segmental Tunnel Linings	
-	fib Bulletin 83 Precast Tunnel Segments in Fibre Reinforced Concrete	
2008-Efectis-R0695	Fire testing procedure for concrete tunnel linings, 2008-Efectis-R0695, Efectis Nederland, 2008	

3 Performance requirements

3.1 General

3.1.1 The Tunnels are sized to accommodate the spatial requirements detailed in the Scope.

3.1.2 The Tunnels are constructed to the build and alignment tolerances required by the Scope.

3.1.3 The Tunnels are provided with the design life noted in Table 5-1 in this specification and the durability design specification for structural concrete in section S2700.

3.1.4 The Tunnels are provided as

a. a Category A Road Tunnel in accordance with the 'Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009' and

b. a category AA Road Tunnel in accordance with CD 352.

3.1.5 The Tunnels are provided in accordance with

a. the non-exhaustive list of standards in Section 2, its accompanying national annex and published document where appropriate, including any amendments and corrigenda issued since first publication and

b. United Kingdom national annexes (UK NAs) that accompany BS EN documents and contain information on nationally determined parameters (NDPs are adopted).

3.1.6 The *works* (unless otherwise agreed with the *Project Manager*) are provided in accordance with the guidance and recommendations contained in

a. the 'Joint Code of Practice for Risk Management of Tunnel Works in the UK' produced by the Association of British Insurers and the British Tunnelling Society,

b. BS 6164:2019 'Health and safety in tunnelling in the construction industry. Code of practice',

c. 'Tunnel Lining Design Guide', the British Tunnelling Society and the Institution of Civil Engineers and

d. PAS 8810 'Design of Concrete Segmental Tunnel Linings – Code of Practice'.

3.1.7 Construction of the bored tunnels is undertaken using closed face tunnelling techniques.

3.1.8 Crack limit for permanent linings, in the bored tunnels is limited to 0.2mm, unless otherwise agreed with the *Project Manager*.

3.1.9 Water tightness is in accordance with the Specification for Tunnelling Works – Tunnels.

3.1.10 In situ concrete linings are in accordance with the Specification for Tunnelling, 3rd Edition, British Tunnelling society and Institution of Civil Engineers unless noted otherwise in the Scope.

3.1.11 Waterproofing systems are in accordance with the Specification for Tunnelling, 3rd Edition, British Tunnelling Society and Institution of Civil Engineers, unless where noted otherwise in the Scope.

4 Spatial Requirements

4.1 General

4.1.1 The maximum diametric deformation of the bored tunnels due to any load or tolerances is one percent (1.0%) of the tunnel internal diameter.

4.1.2 The highway requirements within the Tunnels are in accordance with section S321 and the requirements for Project Roads.

4.1.3 The Tunnels are provided in accordance with CD352 and CD127 of the Design Manual for Roads and Bridges.

4.1.4 Additional vertical clearance to Plant and Materials of 270mm is provided beyond the requirements of CD352. The additional clearance applies over the full extent of the carriageway and hard strips. The additional clearance extends over as much of the walkway as practicable.

4.1.5 Access to maintainable Plant and Materials and associated infrastructure is provided from the service gallery and emergency access and egress is provided from the main carriageway unless otherwise agreed with the *Project Manager*.

5 Design Life

5.1 General

5.1.1 The design working life is in accordance with the durability design specification for structural concrete included in the Scope. Table 5-1 below highlights particular parts of the tunnel works.

Table 5-1 Design Working Life

Part	Design Life
bored tunnel segmental lining	120 years
permanent portal structure	120 years
cross passage openings and lining	120 years

internal primary structures	120 years
Temporary Works (See paragraph 5.1.2)	10 years
lining waterproofing systems	120 years

5.1.2 Where 10 years is not applicable, the *Contractor* determines the design life appropriate to each form of Temporary Works and proposes the findings to the *Project Manager* for agreement.

6 Fire Resistance

6.1 General

6.1.1 The Tunnel design accommodates the following when subject to the design fire

a. allow for safe user escape and

b. limit structural damage, irreversible deformation and prevent progressive collapse.

6.1.2 The main tunnel lining and any primary structural elements exposed to tunnel traffic are provided with passive structural fire protection for a design fire represented by

a. the Rijkswaterstaat (RWS) time-temperature fire curve described by Table 6-1 (RijksWaterStaat (RWS) Fire Curve),

b. a peak temperature of one thousand three hundred and fifty (1350°C) degrees centigrade and

c. a fire duration of one hundred and twenty (120) minutes.

6.1.3 The resistance of the main tunnel to the design fire is demonstrated by undertaking fire tests in accordance with Efectis Nederland Report 2008-Efectis-R0695 ‘Fire testing procedure for concrete tunnel linings’.

6.1.4 The detailed design concrete mix and accessories are incorporated into the fire tests.

6.1.5 Cross passages are provided with a minimum fire resistance period of four hours for the standard cellulosic temperature-time fire curve as defined in ISO 834, if effective fire separation from the main bored tunnel and the design fire is provided for a minimum of two hours.

Table 6-1 RWS time-temperature fire curve

Time (min)	Temperature (°C)
0	20

3	890
5	1140
10	1200
30	1300
60	1350
90	1300
120	1200
Ref: Efectis Nederland Report 2008-Efectis-R0695 'Fire testing procedure for concrete tunnel linings'	

6.1.6 Plant rooms incorporated into the Tunnel are provided with a minimum passive fire resistance period of 2 hours for a standard cellulosic temperature-time fire curve as defined in ISO834.

6.1.7 Polypropylene fibres in accordance with the Specification for Tunnelling Works - Precast Concrete Segmental Linings are incorporated into the main tunnel lining design.

6.1.8 The dosage of polypropylene fibres in the mix design is verified during fire testing.

7 Water Tightness

7.1 General

7.1.1 The tunnels are compliant with the water tightness and leakage criteria noted in Table 7-1

Table 7-1 Water tightness and leakage criteria

Part	**Water tightness criteria[1]**
Main tunnels	Tunnel Class 3 above and below carriageway level. (Class 2 where a risk of frost is present)
Cross Passages	Tunnel Class 3
Plant room areas[2]	Tunnel Class 2
[1] As defined in Clause 508.2 of the BTS-ICE "Specification for Tunnelling" [2.] Where a plant room in a part with a less onerous criteria, the plant room tunnel class takes precedence	

7.1.2 The leakage criteria for water resistance of the tunnel is achieved on average over any one hundred (100) metre length of tunnel.

7.1.3 For any ten (10) metre length of tunnel the localised leakage rates for water resistance of the tunnel do not exceed twice the average leakage rates.

7.1.4 The *Contractor* measures water inflows concurrent with construction to confirm compliance with the Scope.

7.1.5 The method of measuring water inflows allows the isolation of non-conforming zones.

7.1.6 The Contractor implements correction of Defects concurrent with construction.

7.1.7 The *Contractor* measures water inflows 12 weeks prior to completion of section 1.

7.1.8 The *Contractor* submits

- proposals for measurement for water inflows to the *Project Manager* for acceptance in accordance with the Acceptance Procedure 4 weeks prior to any proposed measurement and
- proposals for correction of Defects required to meet the *Client's* requirements in accordance with section S600.

7.1.9 Post installed drip trays are not permitted.

7.1.10 The design of water resistance measures cater for the effects of long term ground movements, increases or decreases in groundwater level and movements associated with the construction of adjacent structures. The design accommodates potential changes in the water table which may lead to drying out and the leakage of seals.

7.1.11 Junctions between segmental lining and cast in situ concrete are protected by a suitable combination of hydrophilic strips and re-injectable systems.

7.1.12 Segmental linings are provided with sealing gaskets and caulking grooves.

7.1.13 Where boltholes pass between the sealing gaskets and the intrados of the lining bolts incorporate grommets and hydrophilic washers to have equivalent performance to the gasket system.

7.1.14 Where concrete deck structures supporting the main carriageway and access ways are incorporated into the design, these are in accordance with MCHW 2000.

8 Ground Movement

8.1 General

8.1.1 The *Contractor* determines the forecasted range of ground movement associated with Providing the Works and the *works*, along with

- demonstrating that the environmental effects of the tunnelling induced ground movement have been considered and taken account of in design,

- drawing attention to those zones where the implementation of the design is likely to cause ground movement,
- assessing the risks of damage associated with the design to investigate alternatives and modify the design as necessary or
- if avoidance is not possible, designing protective measures against the likely damage, which measures could include settlement mitigation such as compensation grouting that could themselves have effects requiring assessment.

8.1.2 The *Contractor* prepares a ground movement and settlement assessment specification and submits to the *Project Manager* for acceptance in accordance with the Acceptance Procedure.

8.1.3 The *Contractor* submits an instrumentation and monitoring strategy to the *Project Manager* for acceptance in accordance with the Acceptance Procedure.

This includes proposals for

- validating the *Contractor's* design,
- verifying the predicted ground movement due to the *works* and determining the effects which ground movement will have on adjacent assets,
- determining the impact of the *works* on third party assets,
- establishing a monitoring base for reading sufficiently in advance of the *works* to ensure underlying and seasonal environmental trends are understood and
- triggering the implementation of contingency plans if the results of monitoring so indicate.

8.1.4 Ground movement is monitored in accordance with the *Contractor's* ground movement and settlement assessment specification and the instrumentation and monitoring strategy.

9 Geotechnical Aspects

9.1 General

9.1.1 The *Contractor* reviews, adopts and uses the geotechnical and hydrogeological data available and the *Contractor* carries out additional investigations where it deems necessary.

9.1.2 During tunnelling activities, forward probing is carried out where appropriate.

9.1.3 When tunnelling

- using open face excavation,
- within areas of ground treatment,
- within changes in geology or where the mode of excavation is changing,

the ground ahead of the face is probe drilled to investigate and prove the ground to be encountered and to search for water sources. Excavation of the face does not proceed without probe drilling in such circumstances. All probe drilling is carried out through a blow-out preventer/stuffing box anchored and sealed into a stable structure capable of resisting the ambient water pressure should water be encountered.

9.1.4 During all open face tunnel excavations, the *Contractor*

a. undertakes geological mapping of the tunnel face as soon as practical after excavation is complete and safe to do so,

b. takes photographs of the exposed excavation,

c. details any groundwater inflow or seepage,

d. prepares a weekly summary report of geological records along the tunnel alignment including as a minimum face logs, probe drilling results and photographic records of the excavated surface,

e. prepares and maintains a geological long section ensuring it is up to date at all times and

f. submits records to the *Project Manager* within 24hrs.

9.1.5 The *Contractor* carries out all underground works in dry conditions.

9.1.6 The *Contractor* controls ground water in accordance with the Scope.

10 Loading

10.1 General

10.1.1 The Tunnels accommodate all loads that could occur over the design life of the structure including

a. short and long-term ground loading and hydrostatic loads,

b. loading during construction,

c. explosion (vehicle/ transported goods),

d. fire (vehicle/ transported goods),

e. flooding,

f. sunken ship/marine based loading,

g. seismic events,

h. accidental actions from vehicles in the tunnel, e.g. collisions or errant vehicles and

i. future developments in accordance with section S300.

11 River Interface

11.1 General

11.1.1 The tunnels design (including the cross passages) takes cognisance of future channel morphology over the design life of the structure.

11.1.2 The riverbed level is based on latest bathymetric survey results and subsequent surveys carried out as deemed necessary by the *Contractor*.

11.1.3 The Tunnel design accommodates future flood levels as required by the Scope.

12 Bored Tunnel Lining

12.1 General

12.1.1 Segmental linings minimise the use of bolted connections.

12.1.2 All bolts above road level are removed where the following apply and demonstrated by the *Contractor*

a. they are not required for structural stability and

b. bolts represent a long-term safety hazard

c. unless agreed otherwise with the *Project Manager*.

13 Openings

13.1 General

13.1.1 Bored tunnel linings are not cut unless otherwise agreed by the *Project Manager*.

14 Cross passages

14.1 General

14.1.1 Ground and ground water conditions at proposed cross passage locations are verified by local probing.

14.1.2 Ground water controls are in accordance with the Scope.

14.1.3 Cross passages are located to avoid impact to third party assets unless otherwise agreed by the *Project Manager*.

14.1.4 All cross passages are provided with 2No. redundancy ducts for future cable/service routing between each main tunnel bore. At cross passages adjacent to the low point sumps, 1No. further additional redundancy ducts (3No. in total) are provided. The positions and diameter of redundancy ducts is agreed with the *Project Manager*.

15 Third Party Utilities

15.1 General

15.1.1 The *Contractor* provides 1 No. cable tray to accommodate 3 No. fibre optic cables between the north and south Tunnel Service Buildings (TSB) through the tunnel for cables to be fitted at a later date. The final layout and arrangement of cable routes, duct and tray sizes are agreed with the *Project Manager* during detailed design.

15.1.2 The *Contractor* provides 3 No. cable ducts, each suitable for 1 No. third party fibre optic cable to be installed at a later date. These are provided from the northern Tunnel Service Building (TSB) in-floor cable space to a cable chamber adjacent to Station Road, Tilbury and from the southern TSB in-floor cable space to a cable chamber adjacent to A226 Gravesend Road. Cable chambers are located at a maximum of 200m intervals along duct routes. The final layout and arrangement of cable routes and duct sizes is agreed with the *Project Manager* during detailed design.

15.1.3 The *Contractor's* design accommodates access to third party utility routes for future installation/development and maintenance activities. Access arrangements are agreed with the *Project Manager* during detailed design.

15.1.4 Where possible, third party cable routes are designed to minimise the need for working at height.

15.1.5 The cable trays include suitable support/attachment mechanisms throughout the cable routes.

15.1.6 All third party cable routes and general arrangements are submitted to the *Project Manager* for acceptance during detailed design.

15.1.7 Post fixed polyester based chemical anchors are not permitted within the Tunnels.

national highways

Lower Thames Crossing

S2700 – Specification for Tunnelling Works - Precast Concrete Segmental Linings

DATE: 11/11/2020

VERSION: P03

Lower Thames Crossing

Specification for Tunnelling Works - Precast Concrete Segmental Linings

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1 Introduction

1.1 Background

1.1.1 This works specification defines the performance requirements for the supply and manufacture of the precast concrete lining segments for the bored tunnels.

1.1.2 This document forms part of a suite of specifications that provide the minimum requirements for the tunnelling works. It is to be read in conjunction with the Scope and the rest of the tunnelling suite of documents including

a. Specification for Tunnelling Works – Tunnels,

b. Specification for Tunnelling Works - Sprayed Concrete Linings,

c. Specification for Tunnelling Works - Spheroidal Graphite Iron Linings,

d. Specification for Tunnelling Works - Cast In Situ Concrete Works and

e. Specification for Tunnelling Works – Waterproofing.

1.1.3 Before the relevant construction activity, the *Contractor* proposes a system for identifying the date when each segment in the tunnel was cast, which mould the segment is from and where the segment is placed, whilst ensuring a smooth intrados, for agreement with the *Project Manager*.

1.2 Performance Requirements

1.2.1 The performance requirements for concrete and constituent materials comply with the relevant parts of the Specification for Highway Works unless stated otherwise within this specification and the *Contractor's* durability study in accordance with the durability specification for concrete works.

1.2.2 Precast concrete segments are in accordance with the Specification for Tunnelling Works - Durability design specification for structural concrete – Permanent Works.

1.2.3 Steel fibres are subject to an Attestation and Verification of Constancy of Performance (AVCP) System1 or System1+.

1.2.4 The frequency of production testing of concrete takes into consideration the accuracy and variability of the test methods and is such that not more than a single day's production is at risk of rejection due to non-compliance of a single test value.

2 Submittals

2.1 General

2.1.1 The *Contractor* submits a risk assessment and method statement before commencing segment production to the *Project Manager* for acceptance. The method statement details proposals for production and quality control.

2.1.2 The method statement includes details of the concrete and constituent materials as well as the number of moulds, cycle times, curing regime, stacking, handling and transport of segments.

2.1.3 The *Contractor* demonstrates within the method statement continuity of supply of all necessary segments to meet the Accepted Programme. This includes a buffer storage proposal linked to planned production rates for both segments and TBM progress.

2.1.4 The *Contractor* submits a monthly schedule to the *Project Manager* giving a casting and procurement programme, as appropriate for the subsequent four months, or other duration agreed with the *Project Manager*, to take account of current stocks and the requirements of the Accepted Programme.

3 Fire testing Segments

3.1 General

3.1.1 The *Contractor* ensures that all tunnel construction activities do not exceed the fire load detailed in the Rijkswaterstaat (RWS) time-temperature fire curve.

3.1.2 The *Contractor* arranges for the fire testing of segments representative of the permanent works. The specified fire curve is the RWS time-temperature fire curve. The test apparatus and procedures follow those used in the Efectis fire testing procedure for concrete tunnel linings (Report No. 2008-Efectis-R0695) described in the Specification for Tunnelling Works - Tunnels.

3.1.3 Fire testing is carried out on the mix design and reinforcement used for the manufacture of concrete segments.

3.1.4 Fire tests on segments are undertaken using the maximum hoop load determined by the *Contractor* in its design.

3.1.5 The fire tests are deemed successful if the residual strength of the segment can withstand the maximum design loads as determined by the *Contractor*.

3.1.6 The *Contractor* ensures explosive spalling is minimised.

4 Materials

4.1 General

4.1.1 All materials specified in the works are non-combustible and do not emit toxic fumes. In all cases, materials are self-extinguishing, have low flammability, low smoke and low toxicity except where otherwise agreed with the *Project Manager*.

4.2 Concrete

4.2.1 All concrete is produced and controlled in accordance with the relevant clauses of BS EN 206 and BS 8500 Parts 1 and 2, or the *Contractor* proposes alternative controls of at least an equivalent standard for agreement. Certificates are submitted to demonstrate compliance with BS EN ISO 9001: Quality Management Systems Requirements.

4.3 Cement

4.3.1 Under no circumstances is high alumina cement be incorporated in the *works*.

4.4 Silica Fume

4.4.1 Silica fume (SF) is in accordance with BS EN 13263. The use of SF is not mandatory, but if used, the dosage does not exceed 10% by weight of total binder content.

4.5 Water

4.5.1 Where mains water is not available, the *Contractor* arranges for an adequate supply of suitable water. Water for use with cement and manufacture of concrete, including curing, is tested and shown to be in accordance with the standards. Sampling, testing and assessment of suitability accords with BS EN 1008.

4.5.2 Chloride, sulphate (including acid soluble sulphates) and acid-soluble alkali (as equivalent Na2O) contents of water are determined and considered when establishing the total content of these substances in a concrete mix.

4.5.3 The temperature of water for concrete is not less than 5°C and not more than 40°C.

4.6 Aggregates

4.6.1 The *Contractor* complies with BRE Digest 330.

4.6.2 Recycled and marine aggregates are not allowed.

4.6.3 High and extreme reactivity aggregates are not allowed, aggregates are in accordance with SHW 1704 (5).

4.6.4 Aggregates incorporated into the concrete mix are either limestone or granite, unless otherwise agreed by the *Project Manager*.

4.6.5 Aggregates are clean, hard, dense and free from earth, clay loam and soft clay, shaley or decomposed stone, organic matter, friable particles, shell fragments and other impurities.

4.6.6 Representative samples of each of the aggregates proposed for use in the *works* will be subject to petrographic examination to BS 812-104:1994. The examination demonstrates that the aggregates are clean hard and durable and do not contain hollow shells, iron pyrites, iron oxides, mica, shale, coal or other laminar, soft, porous or deleterious materials.

4.7 Admixtures

4.7.1 Water-reducing admixtures in liquid form complies with BS EN 206 and BS EN 934.

4.7.2 Admixtures

- used are appropriate to segmental tunnel linings and have been previously used successfully for the same use and
- are covered by BS EN standards

unless agreed otherwise by the *Project Manager*.

4.7.3 Admixtures containing chlorides are not used, unless agreed otherwise by the *Project Manager*.

4.7.4 The storage of admixtures is in accordance with the manufacturer's recommendations. Admixtures which have exceeded the use-by date are not used and removed from the Working Areas.

4.7.5 Admixtures are only introduced using calibrated Equipment.

4.7.6 The addition of all admixtures during the sequence of batching concrete is implemented to optimise the dispersion and performance of the concrete mix.

4.8 Concrete Mix Requirements

4.8.1 The concrete mix is in accordance with Table 4-1.

Table 4-1 Concrete Mix

requirement	Schedule
design life of structure	• 120 years
minimum compressive strength class of concrete	• C50/60

requirement	Schedule
allowable binder combinations (1)	• CEM I + 25-35 % FA (+ 0-6 % silica flume), or • CEM I + 66-80% GGBS (+ 0-6 % silica flume) (4) or • other binder combinations as agreed with the *Project Manager.*
minimum binder content (kg/m3)	• 360 or • minimum binder content for other binder combinations as agreed with the *Project Manager*
max free water-binder ratio	• 0.40 or • max free water-binder ratio for other binder combinations as agreed with the *Project Manager*
required additives	• for SFRC segments only: 30-40kg/m³ steel fibres (2)
	• 1 - 2kg/m³ Polypropylene fibres(3)
max. aggregate size (mm)	• 20
chloride content class	• SFRC segments: Cl 0.30 • bar reinforced segments: Cl 0.10
peak concrete temperature limit	• 70°C (OPC + ≥60% GGBS, or OPC + ≥30% FA) • 65°C (OPC + <60% GGBS, or OPC + <30% FA) or • peak concrete temperature limit for other binder combinations as agreed with the *Project Manager*
consistency class	• at *Contractor's* discretion
water penetration limit	• 10mm

Notes

(1) The unit [%] refers to % by weight of total binder content

(2) Volume to be determined by relevant structural testing.

(3) Volume to be determined by fire tests.

(4) If the alumina content of the GGBS exceeds 14%, the tricalcium aluminate (C3A) content of the Portland cement fraction does not exceed 10%

(5) Steel fibres to be omitted from test samples for chloride migration testing.

4.9 Steel Fibres

4.9.1 Steel fibres for reinforced concrete conform to BS EN 14889-1.

4.9.2 Steel fibres have a minimum aspect ratio of 67:1 and minimum length of 50mm.

4.9.3 The minimum tensile strength for steel fibres is 1100 MPa.

4.10 Polypropylene

4.10.1 Micro synthetic fibres are made from polypropylene, are monofilament and comply with the requirements of BS EN 14889-2.

4.10.2 Micro synthetic fibres are used to mitigate explosive spalling and are not used for structural performance.

4.10.3 The maximum diameter of the polypropylene fibres is 32µm.

4.10.4 The fibre type, coating, diameter, length and dosage meet the performance requirements set out in the Efectis fire testing procedure for concrete tunnel linings, RWS report no. 2008-Efectis-R0695.

4.10.5 Only 100% virgin polypropylene monofilament fibres containing no reprocessed materials are used.

4.11 Bar reinforcement

4.11.1 Cold reduced steel wire complies with the provisions outlined in BS 4482 and ISO 10544.

4.11.2 Tying wire is 1.6mm diameter soft annealed mild steel and when fixed does not project into the concrete cover.

4.11.3 Reinforcement is stored under cover in a manner that it is protected for aggressive and potentially deleterious elements.

5 Pre-Production Requirements - Trial Mixes, Gaskets and Moulds

5.1 General

5.1.1 The test and inspection strategy (see section S700) includes

- details of the gasket manufacturer's procedures to ensure compliance with the specification at factory acceptance and site acceptance stages,
- testing of mixes for segments,

- verification that the dimensional accuracy of segment moulds is within tolerance prior to every pour unless otherwise agreed by the *Project Manager*,
- verification of the dimensional accuracy of segment moulds by an independent testing house
    - o before initial use,
    - o after five uses and
    - o then checked no less than every 100 uses

  unless otherwise agreed with the *Project Manager* and
- preliminary concrete testing in accordance with BS EN 12350-1 and BS 1881-125 and flexural testing in accordance with BS EN 14651 carried out prior to segment production, to confirm the concrete design mix satisfies all requirements of the *Contractor's* design.

5.1.2 The results of the tests are detailed in a report (testing process set out in a method statement), with the objectives clearly set out including design parameters, mix designs tested and deliverables.

5.1.3 The *Contractor* uses trials to confirm the design values are achieved and establish the quality control requirements for fresh and hardened concrete properties used for the manufacture of the tunnel segments.

5.1.4 The *Contractor* ensures fibre rupture and residual flexural strength failure do not occur.

5.1.5 The *Contractor* demonstrates that the hardened concrete properties are not adversely affected by the proposed production curing regime, when compared with standard cured test results.

5.1.6 For each series of tests, at least one set of samples is manufactured and cured in accordance with the appropriate standard for cubes, cylinders or beams and at least one set of samples is recovered from trial segments manufactured and cured identically to the proposed production curing regime.

5.1.7 The method of sampling and compaction of steel fibre reinforced concrete for test samples ensures that the orientation and distribution is representative of the concrete in the segments.

5.1.8 The fractured faces of all flexure and tensile test specimens are examined, ensuring random distribution of the visible fibres.

5.1.9 During pre-production testing this assessment of fibre distribution is carried out by the *Contractor* at least three times in the presence of the *Supervisor*, unless agreed otherwise. A photographic record is taken and specimens showing compliant fibre distribution retained as a benchmark

for subsequent assessments. The *Contractor* submits pre-production testing results to the *Supervisor* for acceptance.

Segment production does not begin until all pre-production testing results are accepted by the Supervisor.

5.1.10 The *Contractor* repeats pre-production testing in the event of any change to the constituents or constituent proportions of the mix and complies with paragraph 5.1.9 and does not use the changed mix until accepted by the *Supervisor*.

5.1.11 The minimum number of test specimens from each trial batch is shown in Table 5-1. The results of tests on three (3) consecutive trial batches cast separately complies with the following requirements.

Table 5-1 Testing Criteria

test	no	method	compliance criteria
consistency	3 samples	slump test BS EN 12350-2	• ± 10mm where the target value is equal or less than 40mm • ± 20mm where target value is between 50mm and 90mm • ± 30mm where the target value is equal or greater than 100mm
concrete density	3 samples	BS EN 12390-6	• ± 30 kg/m^3 of target value
air content fresh concrete	3 samples	BS EN 12350-7	• ± 4.0% by volume
steel fibre content test	3 samples	BS EN 14721:2005	• lower limit – 5% by mass
compressive strength test	for each mix a set of 12 samples (cubes or cylinders) is made from each of 3 consecutive batches. Three from each set of 12 are tested at 7 days, three at 28 days, three at 56 days, and 3 at the instruction of the *Supervisor*.	BS EN 12390-3	• the compressive strength of each cylinder tested meets or exceeds the specified characteristic strength. The average compressive cylinder strength, from tests on all 3 batches, meets or exceeds the specified characteristic strength.

test	no	method	compliance criteria
tensile splitting strength test	4-cylinder samples, testing at 28 days.	BS EN 12390-6	• the tensile splitting strength of each cylinder tested exceeds the specified characteristic value. The average tensile splitting strength, from tests on all 3 batches, exceeds the specified characteristic value by at least 0.5N/mm^2.
beam flexural strength test	4 beam samples, testing at 28 days	BS EN 14651	• the limit of proportionality (LOP) value of each prism tested exceeds the specified characteristic value. The average LOP value from tests on all 3 batches exceeds the specified characteristic value by at least 0.6N/mm^2. • the $f_{R,1}$ value of each prism tested exceeds the specified characteristic value. The average $f_{R,1}$ value, from tests on all 3 batches, exceeds the specified characteristic value by at least 1.8N/mm^2. • the $f_{R,4}$ value of each prism tested exceeds the specified characteristic value. The average $f_{R,4}$ value, from tests on all 3 batches, exceeds the specified characteristic value by at least 1.4N/mm^2.
water penetration test	3 samples (cubes or cylinders), testing at 56 days	BS EN 12390-8	• maximum depth of water penetration of each sample is not greater than 10mm.
chloride migration coefficient (steel fibres to be omitted from SFRC segment mix)	3 samples, testing at 28 maturity days	NT Build 492	• limitations are in accordance with the *Contractor's* durability assessment.

6 Inspection and testing during production

6.1 General

6.1.1 Inspection and testing of constituent materials and identity testing for strength and density are carried out by the *Contractor* in accordance with the requirements of section S700 and Table 6-1 below.

Table 6-1 Production Testing Requirements

test	frequency	method	compliance criteria
consistency	1 sample every load of delivery	slump test BS EN 12350-2	• ± 10mm where the target value is equal or less than 40mm • ± 20mm where target value is between 50mm and 90mm • ± 30mm where the target value is equal or greater than 100mm
	3 samples every load of delivery	vebe test BS EN 12350-3	• ± 3 second or ± one-fifth of the target value whichever is greater
compactability test	3 samples every load of delivery	compacting factor BS EN 12350-4	• ± 0.03 of the target value • ± 0.04 of the target value only for consistence testing from initial discharge from truck mixer
steel fibre consistency test	3 samples every load of delivery	flow table test BS EN 12350-5	• ± 10mm of the target value • ± 20mm of the target value only for consistence testing from initial discharge from truck mixer
fresh concrete temperature	every batch	calibrated thermometer	• ≤32°C
concrete density	on the mixes from which the specimens for the compressive strength tests are produced	BS EN 12390-6	• ± 30 kg/m^3 of target value
air content	1 sample / production day	BS EN 12350-7	• ± 5.0% by volume

test	frequency	method	compliance criteria
water/cement ratio	1 determination per day	BS EN 206	• + 0.02 of target value
minimum cement content	1 determination per day	BS EN 206	• - 10 kg/m^3 of target value
steel fibre content of fresh concrete	1 determination per day	BS EN 14721	• lower limit - 5% by mass
compressive strength test	12 test samples (cubes or cylinders) are taken from every 8 rings of production. 3 from each set of 12 are tested at an age of 7 days, 6 at 28 days and three at 56 days.	BS EN 12390-3	• the mean of the strength of a set of three specimens is taken as the test result. When the difference between the three cube or cylinder strengths divided by their mean exceeds 15%, the test results are disregarded.
beam flexural strength test (sampling for flexural strength testing is carried out together with the sampling for compressive strength testing)	stage 1: 1 set of 3 beams for the first two rings (~ 50m3) cast, testing at 28 days continues at current stage until test results satisfy compliance criteria. stage 2: 1 set of 3 beams for every 8 rings (~ 200m3) cast for a minimum length of 170m (85 rings), testing at 28 days continues at current stage until test results satisfy compliance criteria. stage 3: 1 set of 3 beams for every 16 rings (~ 400m3) cast or 1 set of 3 beams once per calendar week if there are more than 5 production days within 7 consecutive calendar days.	BS EN 14651-5	• the mean of the strength of a set of three specimens is taken as the test result. When the difference between the three cube or cylinder strengths divided by their mean exceeds 15%, the test results are disregarded. • the average limit of proportionality (LOP) value obtained from any 4 consecutive tests exceeds the characteristic LOP value by a value equal to the current margin and the LOP value obtained from any individual test is not less than the characteristic LOP value less the current margin. Current margin is defined as a value equal to 1.64 times the standard deviation. • the average $f_{R,1}$ value obtained from any 4 consecutive tests exceeds the characteristic $f_{R,1}$ value by a value equal to the current margin and the $f_{R,1}$ value obtained from any individual test is not less

test	frequency	method	compliance criteria
	Testing is repeated at 28 days.		than the characteristic $f_{R,1}$ value less the current margin. Current margin is defined as a value equal to 1.64 times the standard deviation. • the average $f_{R,4}$ value obtained from any 4 consecutive tests exceeds the characteristic $f_{R,4}$ value by a value equal to the current margin and the $f_{R,4}$ value obtained from any individual test is not less than the characteristic $f_{R,4}$ value less the current margin. Current margin is defined as a value equal to 1.64 times the standard deviation.
tensile splitting strength (sampling for tensile splitting strength testing is carried out together with the sampling for compressive strength testing)	stage 1: 1 set of 3 cylinders for the first two rings (~ 50m3) cast, testing at 28 days continues at current stage until test results satisfy compliance criteria. stage 2: 1 set of 3 cylinders for every 8 rings (~ 200m3) cast for a minimum length of 170m (85 rings), testing at 28 days continues at current stage until test results satisfy compliance criteria. stage 3: 1 set of 2 cylinders for every 16 rings (~ 400m3) cast or 1 set of 3 cylinders once per calendar week if there are more than 5 production days within	BS EN 12390-6	• the mean of the strength of a set of specimens is taken as the test result. When the difference between the three cube or cylinder strengths divided by their mean exceeds 15%, the test results are disregarded. • the average tensile splitting strength obtained from any four (4) consecutive tests exceeds the characteristic tensile splitting strength by a value equal to the current margin and the tensile splitting strength obtained from any individual test is not less than the characteristic tensile splitting strength less the current margin. Current margin is defined as a value equal to 1.64 times the standard deviation.

test	frequency	method	compliance criteria
	7 consecutive calendar days. Testing is repeated at 28 days		
permeability	a set of four batches of three core samples are taken from the first ring of production. The cores are taken from test panels produced in segment moulds and subjected to the same curing regime used for production. Each batch of cores is taken from individual segments. The test sample include the cured surface. Thereafter permeability testing is carried out on 4 batches of 3 cores taken every 50 rings.	BS EN 12390-8	• depth of penetration of water < 10mm

7 Fabrication

7.1 Moulds

7.1.1 All moulds are

- of rigid steel construction,
- manufactured so they do not deform,
- robustly constructed,
- tightly jointed and properly maintained such that the dimensions of the segments are always within the specified tolerances and
- in use sealed by tape, sealing compounds or watertight by design to prevent leakage of water or mortar during placement.

7.1.2 At least 28 days before commencing mould manufacture, the *Contractor* submits drawings and details of the proposed moulds and details of the working methods of the fabrication to the *Project Manager* for acceptance.

7.1.3 The Contractor ensures that detailed procedures are in place to ensure the quality control of the segment moulds at each stage of their manufacture.

7.1.4 All formed surfaces of the mould have a machined steel finish to N10 or higher as defined in Table 2 of BS1134: Section 1.

7.2 Filling of Moulds

7.2.1 Before placing concrete, the moulds are clean and free from defects.

7.2.2 Mould release oil is removed prior to placing any reinforcement.

7.2.3 The concrete is placed directly into the moulds as soon as possible after mixing and compacted to produce dense homogeneous and void free concrete.

7.3 Cast in fixings

7.3.1 For cast-in fixings the *Contractor* selects materials that meet the design life required for the exposure conditions and submits these details to the *Project Manager* for agreement.

7.3.2 The *Contractor* ensures, by testing, that all lifting sockets have an adequate factor of safety (as defined in BS EN 1992/CEN/TR 15278) for all handling. Tested segments are not incorporated in the works.

7.4 Grout Holes and Plugs

7.4.1 Grout holes are designed to allow drilling through to inspect the primary grout and undertake back grouting if required and terminate at least 50mm short of the extrados of the segment.

7.4.2 Each grout hole includes a threaded socket cast into the segment into which a grout nozzle is securely threaded. The internal diameter is not less than 50mm. A watertight threaded grout plug designed to resist the groundwater pressure and grout pressure is provided for all grout holes that are used for back grouting or inspection.

7.4.3 Sockets are arranged so that the grout plug does not protrude into the tunnel, beyond the intrados of the segment.

7.5 Segment Identification

7.5.1 The following information is cast (indented) in to the internal (concave) surface of all segments

a. *Client* and contract number,

b. mould number,

c. production date in the format dd/mm/yyyy,

d. ring type and diameter e.g. left hand taper or right-hand taper and

e. segment type e.g. bar or fibre reinforced.

7.5.2 The *Contractor* proposes a marking system at joint locations designed to ensure that each segment is incorporated into the *works* in the correct orientation.

7.6 Dimensional Tolerances – Segments

7.6.1 The *Contractor* ensures the segments meet the following tolerances

a. arc lengths of circumferential joint faces: ±1mm,

b. inner edge along the length of segments: ±1mm,

c. outer edge along the length of segments: ±1mm,

d. segment thickness: +3mm, -1.5mm,

e. width of segment: ±1mm,

f. square: diagonal dimension ±1mm from design dimension,

g. flatness of sides (circumferential joint face): 0.25mm feeler gauge not passing beneath a 1.5m long straight edge,

h. circumferential joint faces to be parallel to theoretical planes along any radial line: ±0.5mm from theoretical plane with rate of deviation not exceeding 0.6mm/m,

i. square of circumferential joint face to inner face of segment: ±0.3mm,

j. square of bearing surface in radial joint faces to inner face of segment, relative to theoretical angle: ±0.1mm with a rate of deviation not exceeding 0.6mm/m,

k. square of bearing surface in radial joint faces in a plane parallel to the axis of the tunnel: 0.3mm from theoretical plane with a rate of deviation not exceeding 0.6mm/m,

l. twist of inner face of segment relative to the face at any chosen position: ±1mm,

m. deviation of radial joint faces from mean surface ±0.25mm feeler gauge not passing beneath a 1.5m straight edge,

n. diameter of bolt holes: +1mm, -0.2mm,

o. bolt hole and dowel positions: ±0.5mm,

p. bolt holes to be perpendicular to theoretical circumferential planes: ±20 minutes of arc,

q. gasket groove depth: +0.5mm, -0mm,

r. gasket groove width: ±0.5mm,

s. gasket groove position: ±0.5mm from specified position and

t. all jointing surfaces are manufactured to tolerances that avoid high spots and other defects that may lead to damage and cracking.

7.7 Dimensional Tolerances - Rings

7.7.1 Two test rings are constructed on a flat and level base in a form and sequence representative of the construction arrangement in agreement with the *Project Manager*. The following dimensions are achieved

a. measured internal diameter (ID) and pitch circle diameter (PCD) deviation from theoretical is the lesser of ±0.2%ID or ±6mm,

b. deviation from measured ID and PCD is the lesser of ±0.1%ID or ±3mm,

c. lips between adjacent segments across the radial joint are less than 3mm and

d. steps between adjacent segments across the circumferential joint are less than 3mm.

7.7.2 The base ring is retained as a master ring. Checks are made against the master ring at intervals not exceeding 0.5% of segment production or at any time when repeated damage to tunnel rings indicates the segments may be out of tolerance.

7.7.3 A record is maintained by the *Contractor* of the segments cast in each mould and all dimensional checks in such a way that any mould that becomes distorted or which casts faulty segments or is associated with systematic damage during ring build is withdrawn from use immediately, until proved satisfactory.

7.7.4 The *Contractor* keeps a record of the measurements for each measured segment for inspection.

7.8 Radial Joints – Connections

7.8.1 The connections between precast concrete segments across the radial joints are bolted during construction.

7.8.2 All bolts and cast-in sockets are single assembly and factory produced proprietary products. All bolts have rolled threads and the material is selected to meet the performance requirements for the design life, consistent with the *Contractor's* durability assessment report.

7.8.3 All radial bolts above axis are removed after grouting to prevent bolts falling on the operational roadway.

7.8.4 All bolts and fixings left in place are designed to ensure they have no detrimental impact on the design life of the tunnel and to be consistent with the *Contractor's* durability assessment report.

7.8.5 The design capacity of the radial bolt connections is sufficient to retain the design compression in the radial joint gaskets on release from the segment erector.

7.8.6 The load torque of the radial bolt connections is sufficient to achieve design compression in the radial joint gaskets.

7.8.7 Guide rods if used are cylindrical rods made of recycled plastic (polyethylene / polypropylene) and are placed in the radial joints. They are bonded to the segments with adhesive recommended by the manufacturer and following the procedures of the adhesive manufacturer.

7.9 Circumferential Joints – Connections

7.9.1 The design tensile capacity of the circumferential joint connectors is sufficient to retain the design compression in the circumferential joint gaskets when released of a Tunnel Boring Machine's shove rams.

7.10 Gaskets

7.10.1 All precast concrete segments have EPDM (ethylene propylene diene monomer) gasket system.

7.10.2 The *Contractor* designs, supplies and installs the gaskets to restrict water ingress into the tunnels to the performance levels specified in the Specification for Tunnelling Works Section 7. If caulking is required, the *Contractor* complies with the Specification for Tunnelling, 3rd edition, British Tunnelling Society.

7.10.3 The gaskets are designed such that the projected residual compressive stress in the EPDM material at 120 years is not less than 65% of the short-term compressive force of the fresh material.

7.10.4 The EPDM gasket is designed for the range of expected exposure conditions encountered.

7.10.5 The *Contractor* designs the gasket and gasket groove to allow for the use of joint packings.

7.10.6 The gaskets are in a continuous loop around the segments.

7.10.7 The *Contractor* designs the ring arrangement to eliminate cruciform joints.

7.10.8 The manufacturing tolerances are matched to the segment production tolerances.

7.10.9 The *Contractor* protects completed segments from weather, handling and storage damage.

7.11 Fixing of Reinforcement

7.11.1 The capacity of spacers to hold the reinforcement securely in position during preparation and concreting is without detriment to concrete placement, compaction, durability or any surface finish.

7.11.2 Links are taut so that bars are braced, and the inside of their curved parts are in contact with the bars being connected.

7.11.3 Steel reinforcing bars and fabric reinforcement are kept clean and free from pitting, loose rust, mill scale, oil, grease, earth, paint, chlorides or any other contaminant which may impair the bond between the concrete and the reinforcement.

7.11.4 Any reinforcement exposed to contamination, including by chlorides, release agent, groundwater or surface water is thoroughly cleaned prior to fixing and if necessary, before concreting.

7.11.5 Any water used in the cleaning process, is clean fresh water.

7.11.6 Unless otherwise specified the minimum lap lengths and effective anchorage lengths for bars under stress are full tension lap lengths in accordance with BS EN 1992-1- 1:2004.

7.11.7 Laps in adjacent bars are staggered unless otherwise agreed by the *Project Manager*.

7.12 Performance testing - sealing strips and gaskets

7.12.1 The *Contractor* carries out tests to demonstrate the water tightness of the assembled system considering the maximum construction tolerance.

7.12.2 The gasket testing includes construction tolerances for both straight joints and 'T' joints.

7.12.3 The gaskets are tested at a pressure at least two times the maximum hydrostatic head pressure or greater if required by the *Contractor's* design.

7.13 Fabrication Tolerances

7.13.1 The following tolerances are the maximum acceptable

a. dents and bulges and defects do not exceed 3 mm in depth or height or extend across the surface over more than 180 mm distance,

b. blowholes outside the gasket groove do not exceed 12 mm lateral dimension and 3mm depth,

c. where fabrication tolerances are exceeded, repairs to these features are carried out in accordance with this specification,

d. segments with blowholes or any other defect in or adjacent to the gasket groove are rejected and

e. all surfaces are sound and Defect free. If a Defect occurs, only repairs in accordance with Table 7-1 and Table 7-2 are permitted.

Table 7-1 Guideline for Chamfer/Recess Repairs

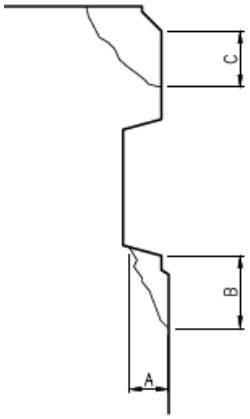
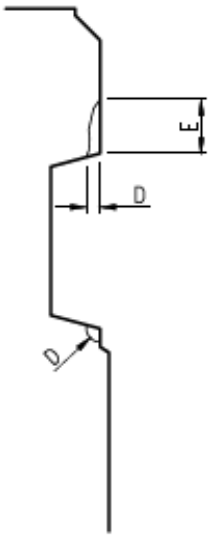
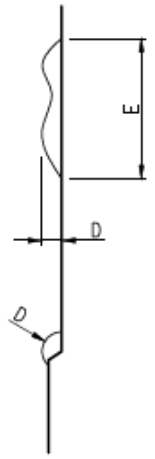
category	action	description	figure
minor	no repair	• A < 3mm • B < 10mm • C < 10mm	
medium	repair with a material agreed with the *Supervisor*	• 3mm ≤ A ≤ 10mm • 10mm ≤ B ≤ 30mm • 10mm ≤ C ≤ 16mm	
major	reject	• A > 10mm • B > 30mm • C > 16mm	

Table 7-2 Guideline for Blowhole Repairs

category	action	description	figure
minor	no repair	• gasket bed o class F1 finish with no blow holes > 5mm (E) and 2mm deep (D) • contact surface o <12mm wide (E) and 3mm deep (D) • intrados o <12mm wide (E) and 3mm deep (D) < 3mm o B < 10mm o C < 10mm	
medium	repair with a material agreed with the *Supervisor*	• gasket bed o all blow holes > 5mm (E) and 2mm deep (D) • contact surface o >12mm wide (E) and 3mm deep (D) • intrados	

category	action	description	figure
		o >12mm wide (E) and 3mm deep (D)	
major	reject	• gasket bed o depth > 10mm • contact surface o depth > 30mm • intrados o depth > 30mm	

8 Workmanship

8.1 Inspection of Segments

8.1.1 The *Contractor* adopts the following segment inspection hold points

a. after demoulding,

b. after installation of gasket, if different from a. above,

c. prior to storage,

d. on removal from storage (and on arrival at the Working Area, if relevant),

e. at the latest time where access is practicable prior to transport into a tunnel bore,

f. immediately prior to erection,

g. on completion of annular grouting and

h. prior to casting internal structures or covering up.

8.1.2 The *Contractor* ensures that all segments meet the fabrication tolerances above and do not exceed the values listed in paragraph 7.1.13 and, if required, are repaired prior to transportation from the casting location.

8.1.3 All worked/towelled/unformed surfaces are steel float finished with only the minimum of surface working. The finish achieves a smooth level uniform surface to the required tolerances.

8.1.4 The *Contractor* assesses any damage observed after receipt of the segments at a Tunnel Boring Machine location for significance and submits details of proposed corrective action in accordance with section S600.

8.1.5 The *Contractor* investigates any repetitive damage at any of the hold points above and submits details of proposed corrective action in accordance with section S600.

8.1.6 The *Contractor* submits a segment inspection report on a weekly basis to the Project Manager.

8.2 Damaged segments

8.2.1 The *Contractor* ensures that no segments with damage or defects in excess of section 7 are incorporated in the *works*.

8.2.2 The *Contractor* indelibly marks, quarantines and removes from site any segments that cannot be repaired in accordance with the accepted repair procedures.

8.3 Repair of Damaged Segments

8.3.1 No less than 30 days prior to commencement of casting of segments, the *Contractor* submits its repair procedures for damaged segments to the *Project Manager* for acceptance.

8.3.2 The *Contractor's* procedures for repair employ proprietary repair compounds and methods for each category of damage or defect expected, agreed by the *Supervisor*.

8.3.3 The *Contractor's* procedures for repair includes photographs of the types of damage and the method of repair.

8.3.4 The *Contractor* ensures that repairs do not have an adverse effect on the long-term performance of the lining.

8.3.5 The *Contractor's* procedures for repair include details of how repairs are documented and recorded.

8.3.6 The *Contractor* reviews its casting procedures on a daily basis to ensure repeat failures do not occur. If repeat failures occur, the *Contractor* ceases casting of segments (unless agreed otherwise by the *Project Manager*) reviews and updates its casting procedure to remove the cause of repeat errors and submits any revised procedures to the *Project Manager* for acceptance.

8.3.7 The *Supervisor* may reject any segments considered not complying with the Scope.

8.4 Curing

8.4.1 The *Contractor* is responsible for curing concrete to achieve the 120 year design life taking account of the durability assessment requirements.

8.4.2 The *Contractor* ensures that any curing compound does not affect the performance of the gaskets.

8.4.3 The *Contractor* demonstrates in pre-production and production testing that, where steam curing is used, it does not adversely affect the hardened concrete properties.

8.4.4 The *Contractor* ensures that steam curing jets where used are not applied directly onto the concrete segments or segment moulds.

8.4.5 The temperature rise in any one 15-minute period of steam curing does not exceed 6°C.

8.4.6 The *Contractor* ensures that the maximum temperature of concrete during steam curing does not exceed the peak temperatures noted in Table 4-1.

8.4.7 The *Contractor* ensures that, on completion of the steam curing period, during and after demoulding, all segments are adequately protected from thermal shock or differential cooling.

8.5 Demoulding

8.5.1 The Contractor ensures that segments are not de-moulded until the concrete has achieved the strength required by the Contractor's design.

8.5.2 Segments are not removed from storage at the casting facility or incorporated into the works until they have achieved the 28-day characteristic cube strength required by the Contractor's design.

8.5.3 The Contractor ensures that any release agent used to assist de-moulding does not affect the performance of the gaskets.

8.6 Handling and Stacking

8.6.1 The *Contractor* ensures that the method of handling and stacking does not induce stresses in the segments that exceed the *Contractor's* design.

8.6.2 Spacers are used between stacked segments, but the spacers are not cast into the segment and are easily removed.

8.6.3 Gaskets are not loaded or damaged by stacking operations.

Lower Thames Crossing

S2700 – Specification for Tunnelling Works - Sprayed Concrete Linings

Lower Thames Crossing

Specification for Tunnelling Works - Sprayed Concrete Linings

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1 Introduction

1.1.1 This specification defines the minimum requirements for sprayed concrete linings (SCL) formed as part of the bored tunnelling works.

1.1.2 Bored tunnelling works refer to works carried out between the headwalls of the bored tunnels as part of the main crossing.

1.1.3 This specification is read in conjunction with the Scope, in particular the sections relating to tunnelling works, namely

a. Specification for Tunnelling Works – Tunnels,

b. Specification for Tunnelling Works – Precast Concrete Segmental Linings,

c. Specification for Tunnelling Works – Spheroidal Graphite Iron Linings,

d. Specification for Tunnelling Works – Cast in Situ Concrete Works and

e. Specification for Tunnelling Works – Waterproofing.

1.1.4 SCL works are carried out in accordance with the Specification for Tunnelling, 3rd Edition, British Tunnelling Society and Institution of Civil Engineers unless stated otherwise in this specification.

2 Performance Requirements

2.1 General

2.1.1 The *Contractor* constructs all primary sprayed concrete tunnel linings on a continuous 24 hours a day 7 days a week basis and has detailed excavation support procedures in place for stoppages and shut-down periods.

2.1.2 The *Contractor* submits details of all Equipment to be used for the mixing, pumping and application of sprayed concrete to the *Project Manager* for agreement.

2.1.3 All Equipment to be used for the mixing, pumping and application of sprayed concrete is kept in good working order.

2.1.4 The *Contractor* ensures that standby Equipment (for mixing, pumping, application, backup excavation equipment and extra excavator/drill rig/jumbo at surface along with all accessories (buckets, breakers, etc)) and Plant and Materials is available at all times including for an emergency.

2.1.5 The *Contractor* provides standby backup power sources including uninterruptible power supply (UPS) to enable the sprayed concrete cycle to be completed in the event of a power failure.

2.1.6 The *Contractor* ensures a consistent, continuous supply of sprayed concrete with sufficient back up in readiness for an emergency.

2.1.7 Where a factory-blended mix stored on site within a silo is proposed as an emergency backup supply, full details of the equipment, mix composition and procedures for assessing the quality of the concrete are submitted for acceptance to the *Project Manager* in accordance with the Acceptance Procedure. This also includes management of stock shelf life, control of consistence and water content of the basic mix.

2.1.8 The *Contractor* ensures that back up supply of concrete is stored according to manufacturer's instructions and no material is used beyond its use by date.

2.1.9 Sprayed concrete is applied by robotic manipulator in a series of passes to form a homogeneous layer of the thickness as required by the *Contractor's* design unless agreed otherwise by the *Project Manager*.

2.1.10 The *Contractor* ensures sufficient sprayed concrete is mixed and is available on the work location prior to commencing excavation.

2.1.11 The *Contractor* uses the wet process for the application of sprayed concrete, unless agreed otherwise by the *Project Manager*.

2.1.12 The *Contractor* provides standby Equipment and Plant and Materials for the application for the wet process of applying sprayed concrete.

2.1.13 The *Contractor* has standby Equipment and Plant and Materials available for the application of dry sprayed concrete for primary linings where the ground is locally unsuitable for the wet method.

2.1.14 The *Contractor* establishes personnel exclusion zones, control measures and training around areas such as unsupported ground, where sprayed concrete has not reached the required strength, and Equipment operational zones.

2.1.15 The *Contractor* uses measures such as physical barriers and warning notices and entry is managed via a permitting system controlled by a person in charge to ensure personnel do not enter exclusion zones.

2.1.16 The *Contractor* defines personnel exclusion zones on the detailed design and issued for construction drawings. Entry is managed via a permit system accepted by the *Project Manager*. A reason for not accepting the *Contractor's* proposed system is that it does not prevent safety risks to personnel.

2.1.17 The applied sprayed concrete exhibits no sagging and ensures full encapsulation of all embedded items, where installed, without voids in accordance with section 6.7.

2.1.18 The *Contractor* records the location, mix design, accelerator dosage rates, strength parameters and time and size of all SCL falls both during and after spraying on a SCL fall register and uses this to inform exclusion zone requirements. The register is reviewed at the shift review group (SRG) meetings.

2.1.19 All falls of sprayed concrete are classified as incidents and are reported in accordance with section S1100.

2.1.20 The *Contractor* undertakes a fire risk assessment. Where there is a risk of fire, the *Contractor* demonstrates that the sprayed concrete lining meets the fire performance requirements of Specification for Tunnelling Works - Tunnels.

2.1.21 Sprayed concrete primary linings are built to the *Contractor's* design as follows

a. the *Contractor* defines the tolerances on its detailed design drawings,

b. the *Contractor* prepares a method statement for remedial trimming or filling to achieve the tolerances,

c. the *Contractor* constructs SCL structures to the required tolerances and in accordance with the *Contractor's* design,

d. the *Contractor* ensures the tunnels are constructed so that the impact of ground movement on third party assets does not exceed acceptable limits and the Scope and

e. the *Contractor* assesses the impact of ground movement on the works and third party assets and monitors to confirm movements are as predicted.

2.1.22 Sprayed concrete linings meet the following performance requirements and tolerances

a. sprayed concrete linings (primary and secondary) are sized to provide the finished internal tunnel and diameters detailed in the Scope or by the *Contractor's* design,

b. the design life of 120 years and water tightness and leakage performance requirements,

c. for sprayed concrete lined tunnels, the centreline does not depart from the design position by more than ±30mm for tunnels up to and including 5m diameter and ±75mm for tunnels greater than 5m diameter,

d. for sprayed concrete lined tunnels no part of the internal profile of the lining departs from its design position by more than 50mm and meets the minimum internal diameter,

e. the rate of change of final primary lining with respect to its theoretical position does not exceed 10mm/m or less if required by the waterproofing system and

f. no point exceeds the tolerance on the space proofing drawings.

3 Materials

3.1 General

3.1.1 The *Contractor* submits any proposals for the use of alternative innovative materials to use along with evidence and testing procedures to the *Project Manager* in accordance with the Acceptance Procedure.

3.1.2 All constituent materials are stored in accordance with the manufacturer's recommendations.

3.2 Cement and cementitious additives

3.2.1 All cement complies with the following requirements

a. metakaolin is attestation and verification of constancy of performance (AVCP) system 1 or system 1+ and meets the performance requirements of the Contractor's design,

b. the *Contractor* uses non-caustic, alkali-free accelerators and

c. cementitious materials deleteriously affected by moisture are not used in the works.

3.3 Silica fume

3.3.1 Silica fume is either a water-based slurry or densified dry powder.

3.3.2 The *Contractor* verifies the quality of the silica fume as required taking account of the amount of sprayed concrete applied and the risks inherent in the structure.

3.3.3 The *Contractor* demonstrates that the content of silica fume meets the performance requirements of the *Contractor's* design.

3.3.4 The *Contractor* provides details of how the correct dispersal and dosage of the silica fume is ensured.

3.4 Aggregates

3.4.1 Aggregates comply with the requirements and guidance in BS EN 12620 and PD 6682 for natural aggregates and BS EN 14487-1 and the grading curve requirements for the *Contractor's* design.

3.4.2 The *Contractor* undertakes pre-construction trials for each sprayed concrete type and application.

3.4.3 The *Contractor's* pre-construction trials determine the required proportions and tolerance limits for single sized aggregates.

3.4.4 The *Contractor* ensures that all sprayed concrete complies with the accepted grading envelopes established as part of the pre-construction trials.

3.4.5 Single sized aggregate fractions are stored separately where not pre-blended.

3.4.6 Aggregates are hard and dense and free from earth, clay, loam and soft, clayey, shaley or decomposed stone, organic matter and other impurities.

3.4.7 The *Contractor* tests the aggregate for alkali aggregate reactivity (AAR) with the cementitious materials and admixtures (including accelerators) using BRE digest 330 or ASTM C1260 accelerated mortar bar method or accepted equivalent.

3.4.8 The maximum water absorption of the combined aggregate determined in accordance with BS EN 1097-6 does not exceed 3%.

3.4.9 The moisture content of the aggregate is determined for all mix designs and the quantity of added water adjusted to take account of the moisture present in the aggregate and water from all other sources including liquid admixtures and silica fume slurry.

3.4.10 Aggregates are stored in covered bins to control moisture content.

3.4.11 The grading and moisture content of individual fractions of aggregates are checked and recorded daily by the *Contractor*.

3.5 Admixtures

3.5.1 Admixtures comply with the following as appropriate EN 934-2, EN 934-5 and EN 934-6.

3.5.2 The *Contractor* uses admixtures that are designed for sprayed concrete and have been used in successful sprayed concrete applications, unless otherwise agreed by the *Project Manager*.

3.5.3 Dosages are in accordance with the manufacturer's recommendations. The *Contractor* verifies its design using pre-construction trials.

3.5.4 The *Contractor*

- obtains confirmation from the manufacturer of each admixture, that the required characteristic properties, consistency and continuity of supply is maintained until the Completion of *section* 1,
- ensures SCL used in a cross passage uses consistent admixtures and there are sufficient admixtures available before the commencement of spraying operations to ensure continuity of material and
- if used on the main tunnels, ensures SCL used has consistent admixtures and there are sufficient admixtures available before the commencement of spraying operations to ensure continuity of material within the whole of the main tunnel.

3.5.5 The *Contractor* stores and uses admixtures in accordance with the manufacturer's recommendations paying particular attention to temperature fluctuations and frost.

3.5.6 The *Contractor* obtains confirmation of the stability and compatibility of admixtures with other admixtures and sprayed concrete constituents from the manufacturer. This is verified by pre-construction trials.

3.5.7 The addition of all admixtures during the batching sequence is adjusted to optimise dispersion and performance in the concrete mix.

3.5.8 Admixtures are free of chlorides such that the percentage of chlorides does not exceed 0.1 percent by weight.

3.6 Set accelerators

3.6.1 Set accelerators are liquid alkali-free (pH 2.5 to 8.0 and an alkali content of less than one per cent by weight Na2O equivalent).

3.6.2 Sodium silicate (waterglass) and potassium or sodium aluminate based accelerators are prohibited.

3.6.3 The *Contractor* determines the minimum dosage of set accelerator to achieve the early strength properties required by its design and verified by pre-production trials and determines the maximum allowable dosage by weight of the cementitious material.

3.6.4 Caustic accelerators are prohibited.

3.6.5 The *Contractor* selects accelerators to ensure that for the chosen dosage the reduction in 28-day compressive strength compared to the concrete mix with no accelerators does not exceed 25% and there is a progressive gain in sprayed concrete strength from 28 days to 90 days. This is verified by testing.

3.6.6 The *Contractor* undertakes tests to confirm that its design parameters are being achieved during sprayed concrete production. The *Contractor* undertakes these tests on at least a monthly basis or a shorter duration if required.

3.6.7 The frequency of testing is increased if the forward projection of trend analysis of test results or performance indicates that the sprayed concrete falls below the *Contractor's* design requirements. The *Contractor* investigates and rectifies the causes of loss of performance and reports this to the *Project Manager*. The *Contractor* maintains a high frequency of testing until the trend analysis indicates the design requirements will be met consistently.

3.6.8 The *Contractor* undertakes trials with the selected accelerators and the range of likely dosage values to confirm that the impact on strength and set parameters for different dosages is compatible with its design.

3.6.9 The *Contractor* tests set accelerators delivered to the worksite for their reaction at least once every two months in accordance with this specification, or where tests or performance deviate from the accepted design parameters.

3.7 Hydration control admixtures

3.7.1 Admixtures may be used to control the hydration of the mix as appropriate to enhance logistical requirements and expedite construction.

3.7.2 The optimum dosages of these admixtures and compatibility with other activating admixtures are determined by pre-construction trials, both in terms of maintaining workability over the required wet concrete mix storage time and the early and later age strength development of the sprayed concrete.

3.8 Fibres

3.8.1 Steel and polypropylene fibres comply with the requirements of BS EN 14889-1 and BS EN 14889-2.

3.9 Water

3.9.1 Water complies with the requirements of BS EN 1008.

3.10 Steel reinforcement

3.10.1 Reinforcement complies with the requirements of the Specification for Tunnelling Works -Durability design specification for structural concrete – Permanent Works in section S2700.

3.11 Face dowels, soil nails and rock reinforcement

3.11.1 Face dowels, soil nails and rock reinforcement are in accordance with the *Contractor's* design.

3.12 Spiles

3.12.1 Spiles are in accordance with the *Contractor's* design.

3.13 Pipes for grouted pipe arches

3.13.1 Pipe canopy tubes are in accordance with the *Contractor's* design and drilled in place and filled with cement grout in advance of excavation. The *Contractor's* design specifies minimum overlap/embedment with subsequent pipe arch canopy and maximum spacing at distal-end.

3.13.2 The *Contractor* ensures any joints in adjacent canopy tubes are staggered and have moment and shear properties compatible with the *Contractor's* design and construction sequences.

3.13.3 The *Contractor* submits details of the Equipment and procedures for canopy tube installation to the *Project Manager* for acceptance in accordance with the Acceptance Procedure, prior to installation of any canopy tubes.

3.13.4 The *Contractor* ensures that any grout used to fill the canopy tubes or the annulus between the tube and pre-drilled holes has achieved the strength required by the *Contractor's* design prior to excavation beneath the tubes. Toolbox items are held and accessible on site at all times.

4 Personnel

4.1 Competence

4.1.1 The *Contractor* provides evidence to demonstrate that all Staff used for sprayed concrete (including excavation) have the required skills and competence to undertake works including

a. an organisation chart and CVs and

b. processes and procedures to ensure that all Staff are skilled and competent and that skills and competence are maintained and monitored throughout Providing the Works.

4.1.2 The *Contractor* ensures nozzle operatives have proven competence for using high-capacity robotic manipulators for the application of sprayed concrete in tunnelling projects and are certified in accordance with EFNARC Nozzleman Certification Scheme, ACI 506R-03 (USA) or equivalent National Standards. The competence of nozzle operatives is continually assessed, including analyses of data from fallouts of sprayed concrete (section 2.1.18 and 2.1.19) and recorded annually.

5 Submittals/Approvals

5.1 Materials certification

5.1.1 The *Contractor* demonstrates that all sprayed concrete constituent materials comply with the relevant British and European Standards and meet the requirements of the *Contractor's* design.

5.2 General submissions

5.2.1 The *Contractor* submits all documentation including specifications and inspection and test plans in accordance with the Scope.

5.2.2 The *Contractor* submits the following documentation before sprayed concrete is included in the works

a. method statements and instrumentation and monitoring plans for acceptance in accordance with the Acceptance Procedure,

b. sprayed concrete mix design, trials and tests results,

c. details for ensuring control of sprayed concrete thickness, profile and position to the design tolerances,

d. automatic survey of and electronic display of excavation and sprayed profiles for each primary lining advance for review at the SRG,

e. templates of the required excavation support sheet (RESS) for the primary lining advance that are reviewed at the SRG meetings,

f. details of proposed monitoring system and equipment,

g. details of all relevant subcontractors (at any stage of remoteness from the *Client*) involved in spraying operations,

h. inspection and test plans (ITPs) detailing roles and responsibilities and methodologies for checking and assuring the quality of works and

i. action plans and incident management plans.

5.3 Shift Review Group

5.3.1 A SRG process is implemented for all primary lining advancement in accordance with the *Contractor's* instrumentation and monitoring plan. The process includes limits for SCL tunnel advances based on the observed conditions and ground movements. The process also sets the red, amber, green (RAG) trigger levels system for observed movements where there is unsupported or partially supported ground.

5.4 Required Excavation Support Sheet (RESS)

5.4.1 The *Contractor* ensures the RESS is signed by design representatives (as described in section S305), the *Contractor* and the *Supervisor*. A signed copy of the RESS is available at each working face. The *Contractor* complies with the RESS process as described in section S305.

5.5 Geotechnical Recording

5.5.1 The *Contractor* deploys sufficient geotechnical Staff with relevant experience to log all the tunnel faces exposed during the advancement of tunnels using SCL.

5.5.2 The *Contractor* deploys sufficient geotechnical Staff with relevant experience and competence (in accordance with section 4.1) The *Contractor* is responsible for establishing the criteria and templates for face logging, longitudinal cross sections and providing additional data for the geotechnical model and submitting these to the *Project Manager* for acceptance in accordance with the Acceptance Procedure prior to any SCL tunnels being constructed.

5.5.3 The *Contractor* complies with the requirements of BS 5930.

5.5.4 The *Contractor* logs each face from a position of safety beneath fully supported ground and at a safe distance from the tunnel face.

5.5.5 The *Contractor* allows adequate time in the construction cycle for the geotechnical logging without conflicting activities.

5.5.6 The *Contractor* combines the geotechnical face records with probing records and prepares geological long sections and a plan of all excavations on a daily basis for presentation to the SRG meeting.

5.5.7 Records include the following as a minimum

a. annotated face sketch of geology and any geological features,

b. a detailed geotechnical description of the materials in accordance with BS 5930,

c. details of any groundwater inflow or seepage including location, quantity and pressure if being monitored,

d. details of discontinuities,

e. a photograph of the face and any features,

f. details of any obstructions or manmade features encountered,

g. location of probe holes in the face,

h. observations of excavation stability and

i. the signed RESS for the relevant section.

5.6 As-built records and drawings

5.6.1 The *Contractor* submits the following as-built information to the *Project Manager* within 21 days of tunnel drive completion

a. all submissions to the SRG and

b. as-built drawings showing the position and details of all installed support prepared from the BIM model.

6 Testing

6.1 General

6.1.1 The *Contractor* keeps a detailed record of all sampling and testing carried out. The format of the record is submitted to the *Project Manager* prior to the commencement of SCL tunnel lining construction.

6.1.2 The *Contractor's* design defines the range of temperatures that it sprays concrete for the tunnel including the maximum and minimum temperature of the wet mix concrete.

6.1.3 The *Contractor* ensures that the temperature of the concrete is kept within this range throughout the batching, delivery and at the point of spray application, for both the trials and the application of all sprayed concrete.

6.1.4 The *Contractor* prepares procedures for monitoring the ambient temperature and controlling the temperature of the constituents and concrete throughout the production cycle that caters for the range of ambient temperatures including winter and summer prior to the commencement of the SCL tunnel lining construction.

6.1.5 The *Contractor* does not incorporate sprayed concrete in the works until the required trials (including pre-construction testing) have been successfully completed.

6.2 Development of mix design

6.2.1 The *Contractor* develops the design for each type of sprayed concrete mix as follows

a. production of a suitable base concrete and

b. production of sprayed concrete from the base concrete.

6.2.2 The base concrete has a target mean 28 day compressive strength in excess of the required characteristic sprayed concrete strength at 28 days by an appropriate margin as agreed with the *Project Manager*, in accordance with the accepted *Contractor's* design.

6.3 Pre-construction testing

6.3.1 The *Contractor* undertakes constituent material testing and sprayed concrete trials prior to the application of sprayed concrete in the works. Trials by nozzle operatives comply with the minimum requirements for competency.

6.3.2 The *Contractor* uses the same equipment, personnel, processes and constituent materials for the trials as used in the works.

6.3.3 The trials accurately reflect the range of conditions expected during construction, particularly in relation to ambient and concrete temperature and maximum transit times.

6.3.4 The temperature and consistence of the concrete are monitored at the batching plant and at the face. Adequate levels of lighting and visibility are maintained throughout spraying, both during trials and production.

6.3.5 The *Contractor* undertakes a trial for each type of sprayed concrete to be used in the works.

6.3.6 The *Contractor* undertakes trial construction of all radial joints between sprayed concrete of different ages to confirm the integrity of joints.

6.3.7 The *Contractor* demonstrates that the method for constructing the joints, produces concrete of the same quality as the standard section of sprayed concrete.

6.3.8 Cores are taken to assess rebound, voids, bond and water penetration at joints for both trials and during production.

6.3.9 The *Contractor* provides copies of the test reports to the *Project Manager* within three days of completion of each phase of the tests.

6.3.10 The *Contractor* repeats the pre-construction testing in the event of

a. failure to meet the specified requirements or the *Contractor's* design,

b. change in the mix proportions, source or consistency of any of the constituent materials and

c. problems arising during production application.

6.4 Fresh concrete testing

6.4.1 The *Contractor* carries out fresh concrete testing as detailed below using the test methods in BS EN 14488-1 and submits results to the *Project Manager* prior to trial panel or works production.

6.4.2 The *Contractor* undertakes testing in accordance with BS EN 14488-7 Method B, to confirm the content of steel fibres and polymer macro fibres in fresh concrete. The minimum sample is 10kg.

6.4.3 The *Contractor* establishes a consistence class during the trials that is appropriate to the application procedure, equipment and any hydration control and other admixtures used to stabilise the concrete mix.

6.4.4 The proposed consistence class is submitted to the *Project Manager* on trial completion and prior to SCL being constructed in the works.

6.4.5 The *Contractor* ensures that sprayed concrete used for the trial and production of the works is in accordance with accepted consistence class.

6.4.6 The setting time is in accordance with the *Contractor's* design.

6.4.7 Setting times are measured and recorded during the trials in accordance with BS EN 196-3:1995.

6.4.8 The *Contractor* maintains the *Contractor's* design's setting times throughout production.

6.4.9 The *Contractor* proposes the tolerances on the target values for the parameters determined during the trials.

6.5 Trial panel production

6.5.1 The *Contractor* prepares test panels using the trial mix in accordance with BS EN 14488-1.

6.5.2 The vertical edges of the mould have parallel sides at 90 degrees to the back face to facilitate coring perpendicular to the spray direction.

6.5.3 The concrete is sprayed into the panels so that it adheres to the back form, is fully compacted and exhibits no sagging.

6.5.4 The *Contractor* sprays test panels in a manner that simulates sprayed concrete application on the tunnel side wall (vertical wall), the tunnel crown (overhead) and shoulder, midway between the side wall and crown.

6.5.5 The *Contractor* records the time at which each sprayed concrete panel is completed. The panels are stored and effectively sealed by polythene sheet or similar without disturbance at a temperature of +20°C (±5°C) for 18 hours prior to moving. The panels are not exposed to direct sunlight until the time of sampling.

6.5.6 The *Contractor* records the amount of aggregate and fibre rebound by weight that occurs during the spraying of each test panel and expresses this as percentage of the panel weight.

6.5.7 The levels of rebound established during the pre-construction trials are used to control and monitor the levels of rebound produced in the execution of the works.

6.5.8 The *Contractor* modifies the process or changes the materials if the amount of rebound exceeds site trials.

6.5.9 The *Contractor* sprays at least one test panel for the worst-case rebar and fabric reinforcement density.

6.5.10 The *Contractor* prepares trial panels to test bond strength between layers of sprayed concrete that simulate the work construction sequences.

6.5.11 Each sample is marked with an appropriate reference mark and the date and time of sprayed concreting and recorded.

6.6 Trial panel sampling

6.6.1 For all hardened sprayed concrete sampling, the *Contractor* obtains representative test specimens in accordance with BS EN 12504-1 and BS EN 14488-1. Locations where unrepresentative high rebound may occur, such as the edges of panels, are avoided.

6.6.2 The *Contractor* obtains cores for 1, 7, 28, 56 and 90 day compressive strength tests in accordance with BS EN 12504-1 one day after spraying the panels and stores them in water in accordance with BS EN 12390-1.

6.6.3 Beams for flexural strength testing (BS EN 14488-3) are sawn vertically from test panels no earlier than one day after spraying and are stored in water in accordance with BS EN 12390-1.

6.6.4 The *Contractor* ensures that cores tested at the same age come from different panels.

6.6.5 The *Contractor* obtains the water permeability samples one day after spraying and wrap and store in plastic until the time of testing.

6.7 Trial panel testing of hardened sprayed concrete properties

6.7.1 Compressive strength testing is carried out in accordance with BS EN 12504-1 and the *Contractor's* ITP. The minimum amount of testing is indicated in Table 6-1. Cores have a nominal diameter of 50 or 100mm.

Table 6-1 Compressive strength test from trial panels

test and direction of core	**testing age (days)**				
	1 (+/- 2 hours)	7	28	56	90
compressive strength in direction of spray	3 No. plus 1 No. reserve	3 No. plus 1 No. reserve	3 No. plus 1 No. reserve	3 No. plus 1 No. reserve	3 No. plus 1 No. reserve
compressive strength	3 No.	3 No.	3 No.	3 No.	3 No.

perpendicular to direction of spray	plus 1 No. reserve	plus 1 No. reserve	plus 1 No. reserve	plus 1 No. reserve	plus 1 No. reserve

6.7.2 The Contractor undertakes tests in accordance with the Contractor's ITP. The minimum schedule of testing is shown in Table 6-2.

Table 6-2 Minimum schedule of testing for hardened concrete

property tested	test method	comments
early age strength development	BS EN 14488-2	• testing between 1 and 12 hours, on at least three panels (note 1)
fibre content	BS EN 14488-7 Method A	• paragraph **Error! Reference source not found.**
density	BS EN 12390-7	• on samples with acceptable excess voids
residual strength class	BS EN 14488-3	• paragraph **Error! Reference source not found.**
ultimate flexural strength	BS EN 14488-3	• paragraph **Error! Reference source not found.**
first peak flexural strength	BS EN 14488-3	• paragraph **Error! Reference source not found.**
permeability	BS EN 12390-8	• paragraph **Error! Reference source not found.**
bond strength	BS EN 14488-4	• paragraph **Error! Reference source not found.**
encapsulation of reinforcement	visual assessment	• full depth cores from trial panels.
excess voids	BS EN 12504-1 NA 4.2	• not to exceed 3%. Photographic record (see notes in BS EN 12504-1 NA 4.2)
drying shrinkage	ASTM C157	• including an initial period of seven

property tested	test method	comments
		days curing in water (requirement ASTM C341)
elastic modulus	BS EN 12504-1	• one test is required from each accepted mix

6.7.3 For BS EN 14488-2 tests, the *Contractor* validates that the relationship with cube or core strengths is in accordance with its design.

6.7.4 The *Contractor* submits full details of any proposed alternative test methods (e.g. Barcelona test to UNE 83515-2010 but with measurement of circumferential displacement) together with evidence to demonstrate that the method provides equivalent control over the quality, properties and safety of the concrete lining.

6.7.5 The *Contractor* uses the results to establish control values and appropriate tolerances for hardened sprayed concrete in the *works* consistent with its design. The control values are used to assess compliance for the sprayed concrete.

6.7.6 Trials are undertaken of proposed alternative test methods to compare the results with the specified test methods. The trials include at least six separate batches of each proposed mix design (including the accelerator dose), tested to the specified and proposed methods.

6.7.7 The results of the trial, including the arithmetic mean and coefficient of variation of each test parameter are submitted to the *Project Manager* for information.

6.7.8 Moulds have one open end into which the spraying is directed. After over filling the moulds the excess is immediately trimmed. The equipment, operatives and mix (including accelerator dose) are the same as those providing works. The specimens are protected from disturbance for 24 hours and damage and moisture loss until testing. The beams are orientated such that moulded faces are in contact with the test rig platens.

6.8 Sampling of hardened production sprayed concrete

6.8.1 The *Contractor* provides a sampling and testing plan identifying the location and type of specimens to be taken from the *works* and submits this to the *Supervisor* prior to any sampling of works concrete.

6.8.2 Samples recovered from the works are obtained in equal numbers from the crown, axis and invert locations and a photographic record kept of each sample and sample location.

6.8.3 The *Contractor* takes cores through joints to demonstrate their conformance with its design and submits the results to the *Supervisor*.

6.8.4 The *Contractor's* repairs of core sample locations have the same properties as the sprayed concrete lining.

6.8.5 Cores are obtained as close to 24 hours after spraying in the *works* as practicable and stored in accordance with BS 12390-2 until tested.

6.8.6 The *Contractor* undertakes a minimum of 50 per cent of core tests for compressive strength, density, excess voids and permeability on cores taken from sprayed concrete placed in the works and the remainder on test panels.

6.9 Production testing – General

6.9.1 Production testing is carried out in accordance with BS EN 14487-1 inspection category 3.

6.9.2 The *Contractor* undertakes a minimum of three tests unless specified otherwise. The test results are the average of the three individual tests.

6.9.3 The *Contractor* increases the frequency of tests where the tests do not meet the specified requirements of its design.

6.10 Compressive strength test and sprayed concrete strength test

6.10.1 Cores for compressive strength in accordance with BS EN 12504-1 are taken through the full thickness of the sprayed concrete for primary linings and nominally two thirds the thickness for secondary linings to avoid damage to any water proof membrane and tested in accordance with Table 6-1 in the direction of spray.

6.10.2 Visual inspection is carried out on all test samples to confirm the sprayed concrete is dense, homogeneous and has no aggregate segregation or imperfections or defects.

6.10.3 The compressive strength of sprayed concrete is acceptable if the results comply with the minimum performance requirements set out by the *Contractor* from pre-construction trials and are in accordance with its design.

6.11 Flexural strength, residual strength class and flexural toughness

6.11.1 The *Contractor* determines flexural strength and residual strength class by testing beams cut from panels prepared as for pre-production trials or directly from sprayed concrete trials.

6.11.2 The panels are sprayed in the vertical position adjacent to the tunnel face, in accordance with BS EN 14488-1. The test method is in accordance with BS EN 14488-3.

6.11.3 Sprayed concrete is acceptable if the results meet the *Contractor's* design performance requirements and

a. no single value of flexural strength is less than 75 per cent of the average result for each test and

b. no single test beam has a stress versus deflection curve which falls below the next lower residual strength class (with the exception of beams specified for Class S1) from BS EN 14487-1, Table 2.

6.12 Bond tests

6.12.1 The *Contractor* undertakes a bond test (comprising the average of six test specimens from the crown, shoulder, axis, knee and invert from same general area of the works) at the frequency given in BS EN 14487-1.

6.12.2 Bond test values are assessed in accordance with BS EN 14487-1 and the minimum requirements of the *Contractor's* design.

6.12.3 Where there is a delay exceeding 12 hours between layers then the interface between layers is prepared in accordance with BS EN 14887-2, Section 9.1. The inter-layer bond is assessed by both hammer soundness and bond testing. The bond strength requirement is not less than 1.0 MPa.

6.13 Permeability tests

6.13.1 The *Contractor* undertakes permeability tests at the frequency given in BS EN 14487-1. One test comprises at least 3 specimens.

6.13.2 The maximum depth of water penetration is 25mm.

6.13.3 Sprayed concrete is acceptable if the average permeability test result (at least three samples) is less than the specified maximum depth of water penetration and no individual sample exceeds the maximum depth of penetration given in BS EN 14487-1 by more than 50 per cent.

6.14 Consistency

6.14.1 The *Contractor* tests every load of concrete for consistency against the target value in accordance with the criteria in BS 8500-1.

6.14.2 For fibre reinforced sprayed concrete, slump tests are carried out in accordance with BS EN 12350-2 or flow tests in accordance with BS EN 12350-5 are acceptable if suitable reference parameters have been established by comparison of the design mix to the results of a vebe test according to BS EN 12350-3.

6.15 Fibre content

6.15.1 Conformity is obtained if the mean value of measured fibre content in fresh concrete from a set of at least 6 samples is not lower than Vf – 10 % by mass, where Vf is the target value for the fibre content specified according to preconstruction testing.

6.15.2 Conformity of steel fibre content in hardened concrete is obtained if the mean value from a set of at least 6 samples is not lower than Vf – 15 % by mass, where Vf is the value obtained from preconstruction tests of sprayed concrete.

6.16 Failure to meet requirements

6.16.1 In the event that the results of any test not comply with the specified requirements of the *Contractor's* design, the test procedures are first checked to confirm the validity of the non-compliance.

6.16.2 The *Contractor* determines and records the extent and impact of a Defect on the works, including strength, durability and water tightness, in accordance with the Durability design specification for structural concrete – Permanent Works in section S2700 and raises this at the next SRG meeting.

6.16.3 Prior to applying further sprayed concrete, the *Contractor* propose measures to avoid re-occurrence of the Defect in accordance with section S600.

6.16.4 If the *Contractor* considers that a Defect could lead to a collapse or other major incident, the *Contractor* implements emergency measures to stabilise the excavation immediately.

7 Workmanship

7.1 Batching and mixing

7.1.1 The supply of sprayed concrete is from a supplier with United Kingdom accreditation service (UKAS) accreditation.

7.1.2 Batching plants have integral automated fibre addition and supply sprayed concrete to the accuracy defined in BS EN 14487-2. The method of fibre addition demonstrates consistent dispersal of the correct dose of fibres throughout the concrete without fibre clumping.

7.1.3 Records of batching are maintained for all the sprayed concrete produced and are made available to the *Project Manager*.

7.1.4 All measuring Equipment is zeroed daily and calibration is carried out at least every two weeks or sooner when the autographic records indicate batching errors.

7.1.5 The *Contractor* measures the moisture content of all aggregates in accordance with BS 812-109, at the start of each sprayed concrete production shift. If the moisture content is not in accordance with the *Contractor's* design, the *Contractor* uses an alternative testing method in accordance with BS 812-109. Aggregate is sampled in such a way as to ensure the sample is representative of the moisture condition of the aggregate in the sprayed concrete.

7.1.6 The *Contractor* adjusts the volume of water added to the mix to take account of the moisture content of the aggregate as measured and

achieves a consistent water / cement ratio not exceeding the maximum permissible identified by the *Contractor's* design.

7.1.7 Aggregate bins are designed and maintained by the *Contractor* to ensure no contamination or intermingling of the single size aggregate fractions.

7.1.8 Regular checks are made to ensure that complete mixing is consistently achieved.

7.1.9 For each sprayed concrete mix design the *Contractor* proposes a maximum time between batching and spraying based on the trials, for agreement by the *Project Manager*.

7.1.10 Sprayed concrete mix that exceeds this agreed maximum time is not used and is not incorporated in the *works*.

7.2 Transport and storage

7.2.1 The *Contractor* transports sprayed concrete using Equipment that ensures the wet material is continuously agitated and free from segregation.

7.2.2 The *Contractor* undertakes a trial to demonstrate that the method of transport using the longest expected time under the most onerous climatic conditions between batching and spraying is appropriate. The *Contractor* undertakes tests to confirm the concrete properties remain in accordance with the *Contractor's* design and in accordance with section 6.3.

7.3 Profile and thickness control

7.3.1 The *Contractor* controls the tolerances of the sprayed concrete lining to achieve the thicknesses and profiles required by its design.

7.3.2 The excavation profile, sprayed concrete thickness and sprayed concrete profile is controlled by remote surveying techniques to meet the tolerances.

7.3.3 The *Contractor's* design takes account of the rate of gain of strength of sprayed concrete when determining the thickness of interim layers.

7.3.4 Profile and thickness control techniques are undertaken remotely and do not require entry into personnel exclusion zones.

7.4 Excavation

7.4.1 The *Contractor* excavates the profile in order to accommodate the primary lining, secondary lining and allows for all construction tolerances, the convergence, regulating layer and waterproof layer.

7.4.2 Any over-excavation is backfilled with sprayed concrete.

7.4.3 The *Contractor's* design and methods of working minimise the ground movement to ensure that the structural integrity of existing surface and sub-surface infrastructure is not adversely impacted.

7.4.4 No excavation commences

- without an accepted RESS and

- until the sprayed concrete equipment and a sufficient amount of wet mix concrete to support the excavated profile is available for immediate use.

7.4.5 The *Contractor's* design

- details the different excavation sequences and support measures required for the anticipated ground conditions and
- details the means of ground water management and control measures for sprayed concrete construction.

7.4.6 The *Contractor* designs

- the joints in the primary lining so that they are staggered relative to the secondary lining,
- all sprayed concrete lining joints to ensure they can be constructed to achieve full integrity and structural continuity across the joints and
- the additional support measures, including instrumentation, monitoring and inspection to be used in the event of face instability or a stoppage, greater than the accepted excavation cycle.

7.4.7 Excavation formations and sprayed concrete inverts are protected against wear or deterioration in accordance with the *Contractor's* design.

7.5 Sprayed concrete application

7.5.1 The *Contractor* provides methods for the control of ground water ingress and measures to prevent it adversely affecting the *works*.

7.5.2 The *Contractor* ensures the substrate is clear of loose material and is sufficiently prepared to ensure adhesion of the sprayed concrete to the substrate.

7.5.3 No rebound materials are incorporated in the *works*.

7.5.4 The *Contractor's* design provides pressure relief holes to prevent the build-up of hydrostatic pressure behind the lining where required.

7.5.5 The temperature of the mix before placing is as per the *Contractor's* design.

7.5.6 Spraying is not undertaken when ambient temperature is below 5°C unless measures are taken to monitor and regulate the temperature and ensure strength development of the concrete in accordance with *Contractor's* design.

7.6 Sprayed concrete surface

7.6.1 The *Contractor* ensures that sprayed concrete to be used satisfies the durability requirements including any internal surface requirements.

7.6.2 The *Contractor*, where sheet or spray applied waterproof membranes are used, ensures

- where a regulating layer is required, it meets and
- the surface finish meets

the waterproofing manufacturer's instructions and is steel fibre free.

7.7 Spraying onto waterproofing membranes

7.7.1 The application of sprayed concrete onto the waterproofing membranes is in accordance with the recommendations of the membrane manufacturer and Specification for Tunnelling Works – Waterproofing in section S2700.

7.7.2 Where a smoothing layer is required after the application of the sheet membrane, the substrate is suitably prepared to prevent debonding.

7.8 Spraying onto sprayed waterproofing systems

7.8.1 The application of sprayed concrete onto the sprayed waterproofing layer is in accordance with the recommendations of the waterproofing manufacturer and Specification for Tunnelling Works – Waterproofing in section S2700.

7.9 Sprayed concrete application on frozen ground

7.9.1 In the event that ground freezing techniques are necessary, the *Contractor* develops a design, sprayed concrete mix design and method including pre-production tests.

7.9.2 The *Contractor* determines the thickness of sprayed concrete that is adversely affected by ground freezing and takes this into account in its design.

7.10 Curing of sprayed concrete linings

7.10.1 The *Contractor* submits the methods and materials for curing primary sprayed concrete lining to the *Project Manager* for acceptance in accordance with the Acceptance Procedure.

7.10.2 The *Contractor* undertakes trials for permanent works sprayed concrete to demonstrate the effectiveness of the curing methodology.

7.10.3 Curing is in accordance with BS EN 14487-2, except that sprayed concrete in consequence class 3 structures under exposure classes other than XC1, is cured until the strength has reached at least 70% of the specified compressive strength class.

7.11 Additional support measures

7.11.1 The *Contractor* designs a series of additional support measures to be used in conjunction with sprayed concrete lining techniques to cater for variations in ground conditions and tunnel behaviour.

7.11.2 The *Contractor* provides details of additional support measures to the *Project Manager*.

7.11.3 The implementation of the additional support measures is determined by the *Contractor* to stabilise the ground conditions and subject to ratification by the SRG and recorded on the RESS.

7.11.4 Any reduction in additional support measures once implemented is determined by the SRG and recorded on the RESS prior to implementation

7.11.5 The *Contractor* ensures that Equipment required for the implementation of the additional support measures is always available in the tunnel.

7.11.6 The *Contractor* determines and provides the additional support measures required.

8 Equipment

8.1 General

8.1.1 The sprayed concrete system supplies air, water and other constituents free from contamination by material deleterious to sprayed concrete. The *Contractor* tests a minimum of once a shift to ensure that the air supply is clean, dry and oil-free. A moisture trap and filter to prevent contamination is installed in the supply line from the compressor.

8.1.2 Equipment for sprayed concrete is thoroughly cleaned at least once per shift. The spray nozzle components are checked daily for wear and, where necessary, replaced.

8.1.3 The Equipment incorporates a suitable metering and regulating device for the addition of liquid accelerating admixtures with the air stream at the nozzle to ensure a consistent dosage in accordance with the *Contractor's* design.

8.1.4 The Equipment allows application of sprayed concrete to all surfaces with the nozzle at the distances from the surfaces to be sprayed in accordance with this specification. Equipment which does not provide a uniform mixture and flow of materials during spraying or results in banding and other defects is not used.

8.1.5 The *Contractor* submits its proposals to reduce dust and rebound to as low as reasonably practicable, by selection of appropriate Equipment, Plant and Materials, process design, by means of additional ventilation, water sprays and by maintaining Equipment in good order.

8.2 Automatic dosing

8.2.1 All dosing is carried out automatically and not by hand.

8.2.2 All Equipment provided for the wet mix process incorporates the following

a. a memory programmable control system to coordinate and control all functions of the machine including the dosing of all admixtures. The

system is capable of printing out comprehensive records of all dosing quantities and concrete throughput for all the sprayed concrete works and

b. an integrated proportioning unit to dispense admixtures at the specified dosages controlled by the throughput of concrete. The Equipment is capable of delivering admixtures such that the accepted dosages are dispensed to an accuracy of 0.5 percent of the required dosage and calibrated and operated in accordance with the manufacturer's instructions.

8.2.3 If any machine does not meet the requirements of this paragraph 8, its use is suspended.

8.2.4 The *Contractor* provides copies of calibration records to the *Project Manager* when requested.

8.2.5 The *Contractor* ensures manual calibration checks on the accelerator dosage are undertaken in accordance with the accepted ITP which provides visual evidence of compliance.

8.2.6 Measures to manage and prevent modification of the designed dosages are demonstrated.

8.3 Remote controlled spraying

8.3.1 Remote controlled spraying Equipment is provided with sufficiently long reach to allow the operator to observe the nozzle at all times during spraying from a safe distance and provide the operator with full and effective control of the nozzle articulation and other functions.

Lower Thames Crossing

S2700 – Specification for Tunnelling Works - Spheroidal Graphite Iron Linings

DATE: 11/11/2020

VERSION: P03

Lower Thames Crossing

Specification for Tunnelling Works - Spheroidal Graphite Iron Linings

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1 Introduction

1.1 Background

1.1.1 This document forms part of a suite of specifications that provide the minimum requirements for the bored tunnel works as part of the Project. It is to be read in conjunction with the Scope and in particular the rest of the tunnelling suite of documents, namely

a. Specification for Tunnelling Works – Tunnels,

b. Specification for Tunnelling Works – Precast Concrete Segmental Linings,

c. Specification for Tunnelling Works - Sprayed Concrete Linings,

d. Specification for Tunnelling Works - Cast in Situ Concrete Works and

e. Specification for Tunnelling Works – Waterproofing.

1.1.2 This specification details the material and workmanship for spheroidal graphite iron (SGI) tunnel segments incorporated into the bored tunnels and the cross passages, including opening sets.

1.2 Performance Requirements

1.2.1 All SGI linings meet the performance requirements of the Scope.

1.2.2 All SGI linings are in accordance with the *Contractor's* design in order to meet the performance requirements of the *works*, including

a. structural performance,

b. durability,

c. fire resistance,

d. water tightness and

e. aesthetics.

1.2.3 Where SGI segments are removed as part of Providing the Works (e.g. at opening sets), they are designed and supplied with means for safe removal.

1.2.4 SGI linings are designed in accordance with Specification for Tunnelling Works, 3rd Edition, British Tunnelling Society and Institution of Civil Engineers 2010, unless where stated otherwise in this specification.

2 Materials

2.1 Castings

2.1.1 SGI linings comply with BS EN 1563, EN-GJS-600-3 or greater unless otherwise agreed by the *Project Manager*. The *Contractor* confirms by testing, the minimum 0.2% proof stress and all test results are supported by the appropriate documentation.

2.1.2 Castings are sound, clean and free from defects.

2.2 Caulking

2.2.1 Caulking material for all SGI segments is lead strip.

2.2.2 The *Contractor* ensures

- the water-tightness of the lining is in accordance with the Specification for Tunnelling Works – Tunnels and
- minimises the number of joints in the lead caulking.

2.3 Grout Plugs

2.3.1 Grout plugs for threaded grout holes are malleable cast iron screw plugs conforming to BS EN 10226-1.

2.3.2 A manufacturer's certificate is supplied with each consignment of plugs illustrating that they conform to the *Contractor's* design and Specification.

3 Submittals

3.1 General

3.1.1 The *Contractor* is responsible for the manufacture, supply and installation of the SGI linings.

3.1.2 The *Contractor* employs a manufacturer that specialises in the production of SGI linings. The *Project Manager* accepts the manufacturer based on verification of their competence, experience and ability to manufacture and deliver linings of this type.

3.1.3 The *Contractor* submits an inspection and testing plan (ITP) for SGI linings to the *Project Manager* for acceptance, in accordance with section S700, prior to the commencement of production.

3.1.4 The *Contractor* submits, as part of the ITP, details of the certification used by the manufacturer to demonstrate that the SGI tunnel segments comply with the Scope including chemical composition, strength, elongation, hardness and physical properties.

3.1.5 The *Contractor* ensures that the *Supervisor* has a minimum of 14 (fourteen) days' notice for all test-sampling and testing.

3.1.6 At least 28 (twenty-eight) days before the start of production of the SGI segments, the *Contractor* submits detailed pattern drawings for each segment type in accordance with the Acceptance Procedure.

3.1.7 The *Contractor's* submissions also include copies of all delivery notes. All delivery notes include the weight of each type of segment.

4 Testing

4.1 General

4.1.1 Testing is in accordance with the Scope and Specification for Tunnelling, 3rd Edition, ICE and BTS.

4.1.2 For each type and size of tunnel lining ring for pre-production castings and castings included in the first five production rings, the *Contractor* carries out the following tests to confirm the castings are free from internal defects

a. spectrographic examination of each pour to determine the percentage composition of materials,

b. ultrasonic testing of all critical points, as selected by the *Supervisor*, using equipment and methods agreed by the *Supervisor*,

c. microstructure examination of material from at least 5% of castings, selected at random or as directed by the *Supervisor*,

d. where required due to inconclusive testing or as indicated by the *Supervisor*, the *Contractor* carries out further examination by X-ray, sectioning techniques or other means agreed by the *Supervisor*,

e. hardness tests on at least 5% of castings, including those in c) above and

f. tensile tests to establish a statistical correlation of hardness, strength and microstructure to ensure compliance with BS EN 1563.

4.1.3 If the tested segments pass the non-destructive testing described in 4.1.2 above, these and the other pre-production castings can be included in the permanent works.

4.1.4 For each type and size of tunnel lining ring for production castings, the *Contractor* carries out the following tests to confirm the castings are free from internal defects

a. spectrographic examination of each pour to determine the percentage composition of materials,

b. ultrasonic testing of all critical points, as selected by the *Supervisor*, using equipment and methods agreed by the *Supervisor*,

c. microstructure examination of material from at least 5% of castings, selected at random or as directed by the *Supervisor*,

d. where required due to inconclusive testing or as indicated by the *Supervisor*, the *Contractor* carries out further examination by X-ray, sectioning techniques or other means agreed by the *Supervisor*,

e. hardness tests on at least 5% of castings, including those in c) above and

f. tensile tests to establish a statistical correlation of hardness, strength and microstructure to ensure compliance with BS EN 1563.

4.1.5 Any castings not complying with the Scope are not used to Provide the *Works* or incorporated into the works. The *Contractor* does not repair any casting without the agreement of the *Supervisor*.

4.2 Preproduction Testing

4.2.1 Prior to bulk manufacture, the *Contractor* casts five complete rings for inspection.

4.2.2 All segments are checked for dimensional consistency including tolerances and weights against the *Contractor's* drawings and Scope.

4.2.3 Prior to bulk manufacturing

a. the *Contractor* prepares control plans to ensure the interchangeability of segments for the *Project Manager's* acceptance and

b. the *Contractor* undertakes trial assembly for the acceptance of the *Project Manager*.

4.2.4 The trial ring determines the master ring for bulk production and demonstrates that the fabrication and erection tolerances specified in the Scope are achieved.

4.3 Production Testing

4.3.1 During production, the Supervisor selects at random the rings to be built onto the master ring in accordance with paragraph S204.6 of the BTS Specification.

5 Fabrication

5.1 Marking and identification of castings

5.1.1 A unique marking system is specified by the *Contractor* for agreement by the *Project Manager* before casting starts.

5.1.2 Markings are cast onto the inner face of the skin of each segment or key, to include as a minimum

a. the internal diameter of lining,

b. the type of segment (e.g. O – Ordinary, T – Top, X – Special or taper),

c. the *Client's* mark as agreed with *Project Manager*,

d. the indication of the manufacturer,

e. date of the casting and mark identifiying the casting with the appropriate test sample and

f. design weight of segment in kilograms.

5.1.3 The lettering on the skin is not less than 50mm high and projects a minimum of 2mm from the surface. On solid keys the letting is a minimum of 20 mm high and incised.

5.2 Machining, drilling and bolting

5.2.1 All machining is carried out before any coatings are applied. All castings have the radial and circle joint flanges machined to correct form and dimensions defined by the *Contractor's* design.

5.2.2 Machining is to grade N10 as defined in Table 2 of BS 1134-1.

5.2.3 The machined faces of segments are plane and the radial flanges are square to the circle flanges or at such other angle, within the tolerances specified in the BTS Specification.

5.2.4 Machined surfaces are protected immediately after machining by the *Contractor's* specified coating.

5.2.5 Where countersinks are required, they are machined concentric with the bolt holes.

5.2.6 Bolt holes in radial flanges are circular, gang or jig drilled. Bolt holes in circumferential flanges may be either cored or drilled.

5.2.7 Where castings are bolted together prior to arrival in the worksite to provide segments for erection, the *Contractor* ensures that such connections are suitable for the delivery and erection of the segments without distortion or damage to the assembled unit.

5.3 Steel templates

5.3.1 Before the commencement of segment production, substantial steel templates of a design acceptable to the *Project Manager* are provided and fitted with plugs of a length sufficient to pass entirely through bolt holes.

5.3.2 All segments are templated until the *Contractor* is satisfied and certifies to that effect that setting up of the segments for machining and drilling produces consistently accurate segments.

5.4 Coatings

5.4.1 The *Contractor* proposes a coating for machine surfaces to the *Project Manager* for agreement, prior to commencement of the relevant activity.

5.4.2 Non machined surfaces are blast cleaned to a minimum grade SA2.5 of BS EN ISO 8501-1. All remaining residues and dust are removed after blasting.

5.4.3 All segments are shop painted with a zinc phosphate high build primer applied by airless spray to a minimum dry film thickness of 75 microns, colour grey or as otherwise agreed with the *Supervisor*. Machined faces are protected as per the *Contractor's* design.

5.4.4 After the segments are installed and before any additional measures are applied to the internal face of the lining, the tunnel is cleaned with a high-pressure spray, using potable water, for an examination of the coating by the *Supervisor*. If damage to the coating layer is observed, the *Contractor* submits their remedial proposals in accordance with section S600.

6 Workmanship

6.1 Caulking

6.1.1 Longitudinal joint caulking is in one continuous length across a ring.

6.1.2 Lead is hammered into a clean caulking groove using pneumatic or electric percussive hammers with a range of blades to match as-built groove width.

6.1.3 Retightening of the lead caulking is carried out in locations where leakage occurs. Before retightening commences, the *Contractor* ensures that the surface of the lead is thoroughly clean and dry. Power tools are not used for retightening of the lead unless otherwise agreed with the Project Manager.

6.1.4 Where water leakage persists after retightening has occurred, the joint is cleaned out to the satisfaction of the *Project Manager* and re-caulked using new lead of suitable dimensions, to achieve the specified water tightness.

7 Installation

7.1 Fire Protection – General

7.1.1 The *Contractor* submits a fire protection proposal in accordance with the Acceptance Procedure, before the manufacturing of the linings is commenced.

7.1.2 Passive fire protection measures are installed such that the designed internal diameter or clear space/envelope is not impeded.

7.2 Fire Protection measure – Shotcrete/mortar

7.2.1 Before installation of the passive fireproofing measures onto the inner face of the lining, the inside of the tunnel is cleaned and any required repairs to the coatings are completed.

7.2.2 A fish plate shear connector or similar is fixed into each panel of the SGI segment. The fish plates are secured to the SGI lining, but do not penetrate the skin.

7.2.3 Additional passive fire layers are anchored to the shotcrete layer as per the *Contractor's* design.

7.2.4 The final surface layer has a steel float finish.

7.3 Fire protection measure – Intumescent Paint

7.3.1 Intumescent paint system is shop painted to the internal face of the segments as per the *Contractor's* design.

7.3.2 The system is applied with a minimum of two coats.

7.3.3 The paint system achieves the required fire protection rating as per the Scope.

7.3.4 After installation the internal face is cleaned and any defects are corrected in accordance with section S600.

8 Tolerances

8.1 General

8.1.1 Tolerances for the manufacture, installation and construction are in accordance with the Specification for Tunnelling, 3rd Edition, British Tunnelling Society and Institution of Civil Engineers unless noted otherwise in this specification.

8.1.2 Overall geometrical tolerances for SGI tunnel linings are as follows

a. line and level; 1% of the theoretical finished internal diameter with a minimum of ±35mm and maximum of ±50mm and

b. deformation under load: such that the *Contractor's* design internal diameter or clear space is unimpeded.

national highways

Lower Thames Crossing

S2700 – Specification for Tunnelling Works - Cast in Situ Concrete Works

DATE: 11/11/2020

VERSION: P03

Lower Thames Crossing

Specification for Tunnelling Works - Cast in Situ Concrete Works

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1 Introduction

1.1.1 This specification defines the minimum requirements for cast in situ (CIS) concrete works carried out within the tunnels.

1.1.2 CIS concrete works within the tunnels refer to concreting works cast within the main crossing tunnels, considered between the headwalls.

1.1.3 This specification is read in conjunction with the Scope and the rest of the tunnelling suite of documents, namely

a. Specification for Tunnelling Works – Tunnels,

b. Specification for Tunnelling Works – Precast Concrete Segmental Linings,

c. Specification for Tunnelling Works – Sprayed Concrete Linings,

d. Specification for Tunnelling Works – Spheroidal Graphite Iron Linings and

e. Specification for Tunnelling Works – Waterproofing.

2 Performance Requirements

2.1 General

2.1.1 In situ concrete works are in accordance with the Scope with particular reference to the following specifications

a. Specification for Tunnelling Works – Tunnels and

b. Specification for Tunnelling Works - Durability design specification for structural concrete – Permanent Works.

2.1.2 In situ concrete works are in accordance with the *Contractor's* design which meets the performance requirements for the works, including

a. structural performance,

b. durability,

c. water tightness and

d. aesthetics.

2.1.3 In situ concrete cover and concrete mix composition are in accordance with the *Contractor's* durability assessment report.

2.1.4 Fire resistance and water tightness are in accordance with the Specification for Tunnelling Works – Tunnels.

2.1.5 In situ concrete works are carried out in accordance with the relevant parts of the Specification for Highways Works unless otherwise required by this Specification.

3 Submittals

3.1 General

3.1.1 The *Contractor* submits the following documents for acceptance in accordance with the Acceptance Procedure a minimum of 8 weeks prior to commencement of concreting works

a. an organisational chart,

b. comprehensive specifications, method statements and an assurance plan for ensuring the quality of the works is consistent with the Scope and the *Contractor's* durability assessment report (as required by the Specification for Tunnelling Works - Durability design specification for structural concrete – Permanent Works),

c. evidence that the proposed material sources can achieve the required production rates for the Project,

d. concrete mix details demonstrating acceptable performance and compatibility of the proposed material combinations in accordance with the Specification for Tunnelling, 3rd Edition, British Tunnelling Society. Sufficient information is provided for proprietary mixes to demonstrate sustainability and durability and

e. reinforcement details as required by the Specification for Tunnelling, 3rd Edition, British Tunnelling Society.

3.1.2 The *Contractor* submits CVs of relevant Staff for in situ concrete works to the Project Manager for agreement.

3.2 Contractor's Specifications

3.2.1 The *Contractor's* specifications include detailed proposals relating to all aspects of concrete production including transportation, placement, compaction, finishing and curing. In addition, each specification

a. identifies the specific tests that are carried out to demonstrate each design mix is suitable for the proposed placement method,

b. includes details as to how each concrete property is to be controlled during production within the proposed programme and timing constraints and

c. includes cross referencing to the numbered appendices, containing specific information and requirements in accordance with the Specification for Highway Works (SHW) and the Scope.

3.2.2 Durability requirements are incorporated into the *Contractor's* specifications.

3.3 Trial Sections

3.3.1 The *Contractor* undertakes trial sections to demonstrate compatibility with the intended construction methods including pumping distance where appropriate and suitability of the mix.

3.3.2 The *Contractor* ensures the inspection and testing plan includes details of the trial sections for the acceptance of the *Project Manager* and provides sufficient notice to enable their representatives to be present at the construction of the trial section.

3.3.3 Trial sections are produced in accordance with the *Contractor's* design using samples of the Plant and Materials and Equipment typical of those proposed for use in the works and incorporates reinforcement typical of the configuration to be used in the works.

3.3.4 For secondary linings, the *Contractor* submits proposals for trial sections in accordance with the Acceptance Procedure. As a minimum, these are cast against similar conditions and environmental conditions to those forecast in the permanent works and with a section thickness and height equivalent to axis level as per the *Contractor's* design.

3.3.5 The trial wall incorporates waterproofing membranes as if it were an in situ sample of a section of cast concrete tunnel lining. Temperature probes are cast into the wall to measure the temperature at the centre of the element and gradient across the wall section over the period of concrete curing.

3.3.6 The trial walls are cast at suitable locations outside the tunnel and do not form part of the permanent works.

3.3.7 The trial walls are subject to the same curing regime and environmental conditions as if they were a section of cast in situ tunnel lining. This includes the use of spray on curing membranes if proposed.

3.4 Method Statements

3.4.1 Method statements are prepared and submitted in accordance with the Acceptance Procedure. These contain full details of the proposed works for the following construction activities

a. preconstruction trials,

b. curing and protection,

c. cold and hot weather concreting,

d. early age thermal cracking,

e. batching and mixing,

f. transport, handling and compaction,

g. large pours,

h. complex pours,

i. joints including watertightness,

j. reinforcement storage, fixing and coupling,

k. formwork/falsework construction and striking,

l. post-tensioned construction,

m. inspection and testing,

n. repairs and

o. emergency responses.

3.4.2 Method statements contain full specification requirements including the following

a. intended Equipment, including stand-by provision,

b. hold-points for inspection and testing,

c. response to non-conformities and emergencies,

d. references to health, safety and wellbeing, environmental protection and quality assurance and control,

e. working procedures,

and comply with the Scope.

3.5 Working Procedures

3.5.1 Full details of working procedures, including inspection and test plans (ITPs) and construction method statements prepared by the *Contractor*, are submitted no less than one month before commencement of CIS activities and updated monthly.

4 Concrete Requirements

4.1 General

4.1.1 The *Contractor* undertakes initial testing and preconstruction trials to confirm that the concrete is appropriate and meets its design, detailed specifications, construction methods and durability requirements.

4.1.2 Where aggressive ground conditions have been identified or where there is a risk the concrete could be exposed to aggressive ground water, this is accounted for in the *Contractor's* durability design in addition to all other exposure conditions in accordance with the Specification for Tunnelling Works - Durability design specification for structural concrete – Permanent Works.

4.1.3 All concrete mixes are tested to determine compliance as required by BS EN 206, BS8500-1 and BS8500-2.

4.1.4 Marine dredged or recycled aggregates are not to be used in cast in situ concrete works.

4.1.5 Preconstruction testing examples are provided in Table 4-1. The scope of testing is developed by the *Contractor* to encompass the intended methods and expected conditions.

Table 4-1 Preconstruction test examples

required concrete properties		example of possible construction method	comment	required tests
high flow, and extended placement times	• flow rate • viscosity and filling ability • passing ability • segregation resistance • reduced bleed • reduced washout	internal tunnel liner / secondary lining	some mechanical compaction may be possible via vibrators mounted externally on forms	• slump test. • L-Box Test (if self-compacting concrete uses) • workability loss over the placement period • ASTM C1712 Rapid Assessment of Static Segregation Resistance • bleed to ASTM C232
fibre reinforced concrete	• placing, compaction, finishing and strength	secondary lining placed by pump	fibre dispersal and residual flexural strength to BS EN 14845-2	• consistence (and retention) compressive and flexural strength
architectural concrete	• placing, compaction and finishing	edge beam, facing concrete	finish may vary under different ambient conditions	• consistence (and retention) bleed compressive strength • colour
AACM concrete	• placing, compaction and handling characteristics	mass concrete	PASS8820 provides guidance for reference	• consistence (and retention) and compressive strength.

Testing replicates the range of expected placement conditions and methods and is designed to provide confidence in the proposed concreting works and that the concrete properties proposed are achieved.

The following variables are considered and appropriate sensitivity analysis included in the preconstruction testing

a. temperature,

b. reinforcement density,

c. minimum dimensions,

d. mixing regime,

e. transport and duration,

f. placement method and duration,

g. finishing and curing methods and

h. batching tolerances on water content.

4.1.6 If any of the following situations arise, the trials and tests are repeated

a. change in the process, Plant and Materials, timings, placement conditions,

b. placement issues and

c. Defects.

4.2 Concrete Production

4.2.1 At delivery no water or admixture is added to any concrete.

4.2.2 No remixing of partially hardened concrete with or without additional cement, aggregate or water is allowed.

4.3 Reinforcement

4.3.1 All hot rolled and cold worked steel bars, steel wire and steel mesh reinforcements are in accordance with SHW clause 1712.

4.3.2 Where steel fibres are incorporated into cast in situ concrete, they are in accordance with the Specification for Tunnelling Works – Sprayed Concrete linings.

5 Workmanship

5.1 In situ concrete linings - general

5.1.1 All surfaces in contact with the in situ concrete lining are thoroughly cleaned and scaled of all loose or defective material.

5.1.2 The surfaces of waterproofing membranes are cleaned to remove foreign materials.

5.1.3 For concrete placed in flowing water or underwater concrete, the *Contractor* complies with the requirements of SHW 1700 clause 12/14.

5.1.4 The *Contractor* prevents the build-up of water pressure behind uncured concrete lining.

5.1.5 An accepted representative trial section, as detailed in the inspection and testing plan (ITP), is constructed prior to concreting.

5.2 Curing

5.2.1 The minimum curing requirements for in situ concrete works are in accordance with MCHW 1710 (5) and the curing class to BS EN 13670 unless noted otherwise in this specification.

5.2.2 Concrete for secondary in situ linings is not placed when the temperature at the works location is below, or likely to fall below, 5°C before the section of the work can be completed unless agreed otherwise with the *Project Manager*.

5.3 Transporting, placing and compacting of concrete

5.3.1 Transporting, placing and compacting of concrete is in accordance with SHW 1710 (3) unless noted otherwise in this specification.

5.3.2 Mixed concrete is conveyed to its position in the *works* as rapidly as possible by pumping, agitator cars or as otherwise agreed through the accepted method statements.

5.3.3 Concrete is transported and placed within 2 hours of production, or as agreed with the *Project Manager*, through trial sections and method statements.

5.3.4 Concreting operations do not displace reinforcement or formwork or damage the faces of formwork.

5.3.5 Placing is not commenced until

- the fixing and condition of reinforcement,
- items to be embedded and
- the condition of the containing surfaces including formwork and existing concrete

have been accepted by the *Project Manager* unless noted in the *Contractor's* inspection and test plan.

5.3.6 Concrete is placed while still sufficiently plastic for adequate compaction and is carefully worked around all reinforcement and embedded fixtures and corners of the formwork.

5.3.7 The size and sequence of pours is arranged to minimise internal and external restraint and associated thermal and shrinkage cracking. Detailed measures to mitigate the risk of early-age cracking are set out by the *Contractor* in its method statements.

5.3.8 Concreting of any part of the *works* is carried out in one continuous operation and sufficient labour and equipment including reserve equipment are kept available on site to ensure this. Infill panels are not to be used unless otherwise agreed by the *Project Manager*.

5.3.9 For pumping and pneumatic transport of concrete the details, layout and method of operation of the equipment to be used are included in the method statements.

5.3.10 The *Contractor* retains on the site a complete record of the concreting work showing the time, date and location of concrete placed in each part of the *works*. This record is available for inspection by the *Project Manager*.

5.3.11 Concrete is placed to minimise the risk of and of entrapping air or leaving voids.

6 Formwork

6.1 General

6.1.1 Formwork is in accordance with SHW clause 1710 (2) unless noted otherwise in this specification.

6.1.2 All formwork is designed

- to withstand the placing and compaction of concrete and the effects of weather and
- to prevent injury to workers, in built lifting points are incorporated where required.

Formwork is not tied to or supported by reinforcement. Falsework is designed in accordance with the recommendations of BS EN 1991-1-6 and BS EN 13670.

6.1.3 The *Contractor* submits a method statement incorporating the method and system proposed in accordance with the Acceptance Procedure. The relevant Construction Activity does not commence until the method statement has been accepted.

6.1.4 Following the *Contractor's* inspection of the formwork, it confirms to the *Supervisor* the formwork dimensional tolerances such that the completed works meet the requirements of this specification and the *Contractor's* design prior to any concrete pouring/placing.

6.1.5 On formwork to external faces of concrete which are permanently exposed, all horizontal and vertical formwork joints are arranged so the joint lines form a uniform pattern on the face of the concrete.

6.1.6 Faces of formwork in contact with concrete are free from adhering foreign matter, projecting nails, splits and other defects. All formwork is clean and free from standing water, dirt, shavings, chippings and other foreign

matter. Formwork joints are sufficiently watertight to prevent the escape of grout or the formation of blow holes or other blemishes on the face of the concrete.

6.1.7 Formers for all chases, grooves, recesses and chamfers are securely fixed as part of the formwork. No part of the concrete work is cut away for any such item or for any other reason unless detailed in the method statements.

6.1.8 All edges have a minimum 25mm chamfer or 30mm radius. The cover depth is not less than the specified minimum cover at the chamfer or radius.

6.1.9 Before any concrete is placed, all formwork is examined cleaned out and the reinforcement checked.

6.2 Tunnel lining formwork

6.2.1 The formwork is sized to accommodate the spatial requirements of the *Contractor's* design, including allowable tolerances and ensuring the minimum internal clear space required and theoretical section thickness can be achieved.

6.2.2 The *Contractor* confirms the formwork dimensional tolerances and includes this in the method statement submitted in accordance with the Acceptance Procedure.

6.2.3 Longitudinally curved tunnel linings, in plan or elevation, are formed as a series of straight chords provided the minimum thickness and the required internal dimensions of the lining are maintained. The design of the formwork is such that the intrados of the lining at the ends of chords forms a continuous smooth surface, free from steps and fins.

6.2.4 The design of formwork and travelling tunnel shutters provide safe working areas, access and walkways needed for the operation and maintenance of the formwork.

6.2.5 Holes are provided in the formwork so that embedded grout and vent pipes are inserted in a regular fixed pattern. The formwork around the holes is adequately reinforced and provided with suitable threaded bosses to accept couplers for locating and fixing the grout or vent pipes. When not in use the holes are closed with grout tight plugs fitting flush with the finished surface of the concrete.

6.2.6 Formwork is provided for the top surfaces of sloping work where the slope exceeds 1:2½ and is anchored to enable the concrete to be properly compacted and to prevent flotation, care being taken to prevent air being trapped.

6.2.7 Measures to prevent entrapment of air and water at the form surface of sloping formwork is included in the method statement.

6.3 Striking formwork

6.3.1 Falsework and formwork are removed without damaging the concrete, to suit the requirements for its curing and to prevent restraint that arises from elastic shortening, shrinkage or creep.

6.3.2 Prior to the relevant Construction Activity, the *Contractor* proposes the criteria for formwork striking for each element and form of construction and a minimum notice period for the Contractor's intention to strike formwork for acceptance by the *Project Manager* in accordance with the Acceptance Procedure. Formwork is not removed within the minimum period noted in SHW, clause 1700 (4) unless otherwise agreed by the *Project Manager*.

6.3.3 Formwork, falsework and centring are not removed, or loads applied to concrete until the *Contractor* has demonstrated that the concrete has gained sufficient strength to withstand the stresses induced.

6.3.4 Where the timing for removal of formwork is based on in situ concrete strength, this is determined for each specific element, in accordance with CIRIA Report 136, using the following

a. maturity calculated from temperature measurements using an appropriate maturity (temperature and time) calculation function,

b. non-destructive or partially destructive testing. Rebound hammer measurements are not to be used as a means of assessing strength prior to formwork stripping and

c. samples stored alongside the formwork or subject to temperature matched curing in accordance with BS 1881-130.

6.3.5 Where there is a risk of cracking due to formwork striking resulting in excessive thermal or shrinkage stresses, the formwork is retained until such risks are mitigated.

7 Reinforcement

7.1 Fixing of reinforcement

7.1.1 Fixing tolerances are in accordance with the SHW, clause 1728 (3) unless noted otherwise below

a. for secondary tunnel linings cast against formwork Δ_{cdev} = 10mm minimum and

b. for primary structural elements cast against sprayed concrete or waterproofing membranes against sprayed concrete linings, Δ_{cdev} = 50mm minimum.

7.1.2 Minimum concrete cover to reinforcement is not less than the minimum cover required by the structural design and by the *Contractor's* durability design.

7.2 Surface condition

7.2.1 Steel reinforcement surface condition is in accordance with the SHW, clause 1715.

7.2.2 If any reinforcement becomes corroded or contaminated to the point where the bond may be affected, the *Contractor* either replaces the reinforcement or cleans the bars surface by grit blasting or other means accepted by the *Project Manager*.

7.3 Laps and joints

7.3.1 Laps and joints are in accordance with the SHW, clause 1716.

7.3.2 Laps and anchorage length are in accordance with BS EN 1992 and the UK National Annex.

7.3.3 Laps and effective anchorage lengths for bars under stress are calculated based on a full stressed bar unless otherwise accepted by the *Project Manager*.

7.3.4 Bar reinforcement laps and detailing requirements are in accordance with BS EN 1992-1-1 and the UK National Annex unless noted otherwise.

7.3.5 Mechanical couplers are used in accordance with the manufacturer's recommendations and evidence is available to demonstrate that adequate coupling of bars can be carried out in the field conditions to obtain full bar strength at coupling.

7.3.6 Where mechanical couplers are used, the specified minimum cover to reinforcement is maintained at all locations and sufficient clear space is maintained to not impede concreting activities.

7.4 Welding reinforcement

7.4.1 Welding of reinforcement is in accordance with clause 1717 of the SHW.

7.4.2 Welding or reinforcement is not incorporated into the *works* without an accepted method statement and written agreement by the *Project Manager*.

7.5 Fibre reinforcement

7.5.1 Fibre reinforcement is in accordance with the Specification for Tunnelling Works – Sprayed Concrete linings.

7.5.2 In testing, the sample moulds are filled by direct discharge from the truck and compacted such that the orientation and distribution of the fibres is representative of the concrete being sampled. All fibre reinforced concrete test specimens are compacted by vibrating table and not by rodding/tamping or internal poker vibrators.

7.6 Construction Joints

7.6.1 Construction joints are in accordance with SHW 1710 (1) unless noted otherwise in this Specification.

7.6.2 Concreting is carried out continuously up to construction joints.

7.6.3 The *Contractor* specifies the positions of all construction joints, including details and tolerances on drawings for acceptance by the *Project Manager*.

7.6.4 The *Contractor* ensures before casting, that the joints are adequately prepared with waterproofing details in accordance with its design. Any waterstops or similar details are in position and adequately fixed so as to avoid displacement during concreting.

7.6.5 Where the joint is defective after striking of formwork, the *Contractor* investigates and remedies in accordance with section S600.

7.6.6 The use of abrasive blasting or mechanically operated percussive tools are not used to remove laitance unless otherwise agreed by the *Project Manager* and the use of air/water jets while the concrete is still green are utilised where practicable. Surface retarding agents are prohibited.

7.6.7 Where transverse joints include longitudinal joints, they are to stagger by at least 300mm unless otherwise agreed by the *Project Manager*.

7.6.8 Where new concrete is to be jointed to existing concrete by grouted or chemically anchored reinforcing bars, they are installed in accordance with the manufacturer's recommendations.

7.7 Movement Joints

7.7.1 The *Contractor* designs and specifies locations and details for movement joints and submits these in accordance with the Acceptance Procedure.

7.7.2 Proprietary movement joint materials are stored, handled and installed in accordance with the manufacturer's recommendations.

7.7.3 Any grooves in the secondary lining left by the removal of crack inducers are filled with an accepted, non-flammable compressible material in accordance with the Scope.

7.7.4 Joint fillers are installed in accordance with the manufacturer's recommendations.

7.8 Concrete Surface Finish

7.8.1 Formed surfaces are finished in accordance with

a. the SHW, clause 1708,

b. the *Contractor's* design,

c. durability and performance requirements and

d. the accepted trial panel.

7.8.2 Following construction, all formed surfaces are adequately protected from construction traffic and subsequent damage.

7.8.3 Unformed surfaces are finished in accordance with

a. the SHW, clause 1708,

b. the *Contractor's* design and

c. durability and performance requirements.

7.8.4 Slip resistant surfaces are finished to U3 in accordance with SHW, clause 1708 (4). Slip resistant granules are trowelled into the surface of the concrete in accordance with the manufacturer's recommendations. Alternatively, the slip resistance is achieved by floating and trowelling in accordance with BS8204-2.

7.8.5 Following construction, all surfaces are protected to prevent damage including from construction traffic and subsequent damage.

8 Inspection and testing

8.1 General

8.1.1 Inspections and testing are in accordance with SHW, clause 1727.

8.1.2 Hardened concrete surfaces are subject to inspection, dimensional checks and testing as proposed by the *Contractor* and in accordance with the Scope. The findings of the inspection are documented and reported to the *Supervisor* within 24 hours and any Defects corrected in accordance with section S600. No treatment of any kind is applied to the concrete unless it complies with the Scope.

8.2 Remedial action

8.2.1 Remedial action is undertaken by the *Contractor* in the event of a Defect in accordance with section S600, including

a. characteristic strength,

b. dimensional tolerances,

c. surface appearance and

d. curing and cracking.

8.2.2 In the event of a Defect, the *Contractor's* durability assessment report and method statements include proposed remedial actions. The remedial actions are in accordance with the *Contractor's* design and consistent with the required durability and other performance requirements for the *works*.

8.3 Concrete repairs

8.3.1 All repairs are designed and executed in accordance with BS EN 1504.

8.3.2 Trial repairs are undertaken to demonstrate that the proposals meet the requirements of the Scope.

8.3.3 All repairs are in accordance with the manufacturer's instructions, documented and photographed.

9 Tolerances

9.1 General

9.1.1 Tolerances are such that the *Contractor's* final internal dimensions as determined in the *Contractor's* design are achieved.

9.1.2 Overall geometrical tolerances for cast in situ tunnel linings are as follows

a. line and level; 1% of the theoretical finished internal diameter with a minimum of ±35mm and maximum of ±50mm and

b. deformation under load such that the *Contractor's* design internal diameter or clear space is unimpeded.

9.1.3 The *Contractor* ensures that the fixing of reinforcement includes sufficient tolerance such that the minimum cover is achieved throughout the *works*.

Lower Thames Crossing

S2700 – Specification for Tunnelling Works - Waterproofing

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Lower Thames Crossing

Specification for Tunnelling Works -Waterproofing

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1 Introduction

1.1 Background

1.1.1 This document forms part of a suite of specifications that provide the minimum requirements for the tunnel works. It is to be read in conjunction with the Scope and the rest of the tunnelling suite of documents, namely

a. Specification for Tunnelling Works - Tunnels,

b. Specification for Tunnelling Works - Precast Concrete Segmental Linings,

c. Specification for Tunnelling Works - Sprayed Concrete Linings,

d. Specification for Tunnelling Works - Spheroidal Graphite Iron Linings and

e. Specification for Tunnelling Works - Cast in Situ Concrete Works.

1.1.2 This specification details the material and workmanship requirements for sheet and spray applied waterproof membranes within the bored tunnels as part of tunnel lining waterproofing systems.

1.2 Performance Requirements

1.2.1 Waterproofing systems are included in the *Contractor's* design to ensure the lining type achieves the required water tightness criteria in the Specification for Tunnelling works – Tunnels and the Scope.

1.2.2 The waterproofing system is effective for the maximum head of external water pressure identified in the *Contractor's* design.

1.2.3 The suitability of the *Contractor's* proposed spray-applied waterproofing membrane for the works is demonstrated by either

a. showing previous relevant performance in similar conditions for other projects or

b. carrying out appropriate trials.

Both with the agreement of the *Project Manager*.

2 Materials

2.1 Materials general

2.1.1 No part of any component of the system contains either substances classified as category 1, 2 or 3 carcinogens, mutagens or teratogens (substances toxic to reproduction) or substances classified as respiratory or skin sensitizers (potential occupational allergens) in accordance with

the Classification, Labelling and Packaging (CLP) Regulation 2008 (EC/1272/2008).

2.1.2 The *Contractor* uses materials that are not classified as hazardous according to the CLP Regulation 2008 (EC/1272/2008).

2.1.3 All waterproofing system products are transported and stored according to the manufacturer's instructions.

2.1.4 The *Contractor* demonstrates that all materials that come into contact with the ground and ground water have Environment Agency (EA) approval.

2.1.5 Spray membrane systems include waterproofing linings formed in situ and cured in place.

2.1.6 Selected spray membrane systems permit the safe construction of the secondary lining (cast in situ or sprayed) without the reduction in waterproofing properties.

2.1.7 Selected spray membrane systems do not increase the fire load or release hazardous materials during construction.

2.2 Geotextile fleece

2.2.1 The *Contractor* installs the geotextile fleece in accordance with its design.

2.2.2 The geotextile fleece used with the waterproof sheet membrane meets the membrane manufacturer's requirements.

2.2.3 The geotextile fleece proposed is of uniform thickness and surface texture.

2.3 Fleece fixing disks

2.3.1 The geotextile fleece is fixed to the substrate with non-projecting fleece fixing discs.

2.3.2 The fleece fixing discs are manufactured of the same compound as the sheet waterproofing membrane or a compatible compound so as to allow the welding of the membrane to the surface of the disks.

2.3.3 The polymer discs are of a sufficient diameter to secure the fleece to the substrate with a single shot-fired nail.

2.3.4 The shear resistance of the nails and discs are less than the resistance of the welded connection and membrane to prevent stress transfer.

2.4 Sheet waterproofing membrane

2.4.1 The sheet waterproofing membrane consists of a continuous impermeable heat-welded sheet of one of the following materials

a. soft polyvinyl chloride (PVC) unreinforced and

b. flexible polyolefin (FPO/TPO) unreinforced.

2.4.2 The sheet waterproofing membrane has a uniform thickness and surface texture and is supplied in such dimensions that result in the minimum of on-site seam welds and trimming/cutting.

2.4.3 Where reinforced concrete is to be placed against the sheet waterproofing membrane, a signalling layer that does not adversely affect the seam welds is provided on the exposed surface of the waterproofing membrane, to give a visual indication of any mechanical damage.

2.5 Sheet membrane protection layer

2.5.1 The Contractor uses a sheet membrane protection layer when using a sprayed concrete secondary lining.

2.6 Water barriers

2.6.1 Externally placed water barriers are of a material which can be welded to the sheet waterproofing membrane. All joints are made with moulded or prefabricated intersection pieces properly jointed in accordance with the manufacturer's instructions.

2.7 Grout injection tube systems

2.7.1 Grout for injection tubes is acrylic resin only and is compatible with any membrane proposed by the *Contractor*.

2.7.2 Injection tube systems are suitable for acrylic grout and are suitable for flushing and multiple re-injections. If the tubes are grouted, the *Contractor* ensures these are flushed after grouting and left available for re-use. The system is compatible with the membrane proposed by the *Contractor*.

2.7.3 Not used.

2.7.4 The *Contractor* demonstrates to the *Supervisor* the internal diameter is sufficient to allow the flow of proposed injection grout over the full length of the tube.

2.8 Drainage strips

2.8.1 Drainage strips are sized for the anticipated inflow of water. They are a minimum of 500mm in width and have dimples or surface relief features such that water is directed along the strip to a collection point.

2.8.2 Drainage strips have a geotextile or plastic mesh backing to permit bonding with the subsequently applied geotextile fleece.

2.9 Spray applied waterproofing membrane

2.9.1 Materials are prepared in accordance with the manufacturer’s instructions. No site batching variations are to be undertaken unless otherwise agreed by the *Project Manager*.

2.9.2 Prior to undertaking waterproofing works, the *Contractor* submits evidence to the *Project Manager* to demonstrate the successful use of proposed spray applied waterproofing system in the same ground conditions, for a

similar water tightness criterion and subject to similar or more onerous hydrostatic pressure.

2.9.3 The selected waterproofing system is incorporated into pre-construction trials to demonstrate its suitability for the proposed works.

2.9.4 Where separate application layers abut, a minimum overlap of 300mm is provided unless a larger dimension recommended by the manufacturer.

3 Submissions

3.1 General

3.1.1 The *Contractor* demonstrates compliance with the relevant European and British Standards and other requirements of the specification including from the manufacturers for all proposed materials prior to starting waterproofing works. Any change in materials or manufacturer requires new documentation to be provided.

3.1.2 The *Contractor* includes certificates of compliance in all method statements.

3.2 Method statements

3.2.1 The *Contractor* submits method statements to the *Project Manager* for acceptance for every type of waterproofing system to be used.

3.2.2 The method statements are submitted to the *Project Manager* in accordance with the Acceptance Procedure not less than six weeks before the commencement of the relevant construction activity.

3.2.3 Method statements are submitted for the following

a. waterproofing field trials and

b. installation.

3.2.4 Method statements confirm the stages of installation, the materials and systems to be used, testing regime, key personnel and the control procedures to be adopted to ensure that the requirements of the specification, manufacturers requirements and the *Contractor's* design are met.

4 Workmanship – Sheet membrane Waterproofing Systems

4.1 Management of water ingress

4.1.1 The *Contractor* controls the inflow of water that could adversely impact the installation of sheet waterproofing membrane.

4.1.2 The *Contractor* submits method statements for all aspects of waterproof installations to the *Project Manager* for acceptance.

4.2 Preparation of substrate

4.2.1 Where necessary, the substrate surface is coated with a regulating layer before the commencement of the waterproofing works to meet the membrane supplier's requirements for surface evenness and to prevent damage to the membrane from protruding steel fibres.

4.2.2 The substrate surfaces are prepared in accordance with the membrane manufacturer's instructions and all contaminants (including soil, oil and grease) are removed.

4.2.3 The *Contractor* proposes methods for repairing damaged or spalled surfaces, voids and cracks with depths greater than 25mm to the *Project Manager* for acceptance. The repair is not undertaken

- prior to the inspection of the proposed repair area by the *Supervisor* and
- without the *Supervisor* being present to the repair being undertaken

unless otherwise agreed with the *Supervisor*. Core holes are backfilled with mortar and flush with the sprayed concrete surface.

4.2.4 Any fixtures in the substrate used for construction purposes are removed and the projecting portion of any support elements is cut off and patched so they are flush with the face of the substrate surface.

4.3 Injection channels

4.3.1 The *Contractor* provides details of the proposed injection channel system in accordance with the Acceptance Procedure.

4.3.2 Injection channels are installed at construction joints and locations as required by the *Contractor's* design.

4.3.3 Injection channels are fixed and in direct contact with the substrate along their full length in accordance with the manufacturer's instructions.

4.3.4 The injection channel system, including the method of installation and fixing, is compatible with the subsequent construction method for secondary linings.

4.3.5 The injection channel system is tested by flushing with water prior to the installation of the secondary lining.

4.3.6 Injection channels are filled with water, not under pressure, and sealed during installation of the secondary lining. The water is released, and the injection channels are flushed with water on completion of the secondary lining.

4.3.7 Injection points are located to avoid clashes with rebar or embedded objects and to ensure they are accessible for future use.

4.3.8 Injection only takes place if water is leaking through the joint.

4.3.9 Injection channels are flushed with water after injection to enable reinjection at a later date.

4.3.10 The *Contractor* uses the trial section of tunnel lining to demonstrate that the injection channels work when encased in concrete in the most onerous configuration required in the works.

4.4 Geotextile fleece layer

4.4.1 The *Contractor* ensures the installed fleece is in close contact with the substrate and supported in accordance with the manufacturer's recommendations.

4.4.2 The *Contractor* installs fleece fixing discs in accordance with the manufacturer's recommendations.

4.5 Sheet waterproof membrane

4.5.1 A regulating layer is applied to steel fibre reinforced concrete lining to prevent the fibres puncturing the membrane.

4.5.2 The *Contractor* installs and tests sheet membranes in accordance with the manufacturer's recommendations.

4.5.3 No relevant construction activities are carried out in the vicinity of the sheet membrane installation process that could adversely affect its installation, contaminate or damage the membrane.

4.5.4 The sheet waterproof membrane is welded to the fleece fixing discs installed with the geotextile fleece.

4.5.5 Waterproof membranes installed in the tunnel invert are protected immediately after testing.

4.5.6 Joints between waterproof membrane sheets are double welded in accordance with the manufacturer's recommendations.

4.5.7 All welded joints are pressure tested in accordance with manufacturer's recommendations. The *Supervisor* is present for this testing, unless otherwise agreed with the *Supervisor*.

4.5.8 Sheet membranes are compartmentalised according to the *Contractor's* design of the secondary lining pour.

4.5.9 Protrusions either through or into the sheet waterproof membrane layer are not permitted unless specifically designed for with appropriate water barriers to prevent leakage.

4.6 Sheet membrane protection layer

4.6.1 The *Contractor* installs a sheet membrane protection layer and attaches it to the sheet waterproof membrane in accordance with the manufacturer's recommendations. The method of attachment is a system that does not puncture or impact the integrity of the waterproof membrane.

4.7 Water barriers

4.7.1 Water barriers are installed at all construction joints, contraction joints and expansion joints and other locations as required by the *Contractor's* design.

4.7.2 Externally placed water barriers are welded to the sheet waterproof membrane in accordance with the manufacturer's recommendations.

4.7.3 Water barriers are located such that concrete pour joints fall in the centre between the ribs of the water barrier.

4.7.4 During the installation of the water barriers the *Contractor* ensures that the membrane surface is clean and free from water.

4.7.5 Water barriers are secured in their correct positions during the concrete pour. No holes are made through any water barrier except where provided for by the manufacturer. Concrete is fully compacted around the water barrier with no voids or porous areas.

4.7.6 Water barriers are detailed to form a complete uninterrupted 3D network in order to avoid the risk of water tracking along the water-bar and penetrating at points of discontinuity.

4.7.7 At junctions between the main bored tunnel lining and cross passages, the *Contractor* ensures that any waterproofing system (membrane or spray) has integrity and is suitably detailed to satisfy water tightness criteria throughout the interface.

4.8 Membrane contact grouting

4.8.1 Grouting pipes and injection tubes are located in the crown of the tunnel/cross passage and are positioned to avoid interference with rebar or embedded objects.

4.8.2 Grouting pipes and injection tubes are protected from damage before and during secondary lining installation.

4.8.3 Grouting only takes place when the secondary lining has achieved the strength required by the *Contractor's* design.

4.9 Installation of secondary concrete linings

4.9.1 The *Contractor* ensures the sheet waterproofing membrane is not damaged.

4.9.2 The *Contractor* provides a membrane protection layer, where required, in accordance with the manufacturer's recommendations.

4.9.3 The *Contractor* installs the secondary lining reinforcement, if required, using a method that does not require protrusions or penetrations into the waterproof membrane.

4.9.4 The waterproofing membrane and other items of the waterproofing system are clean from dirt, debris and concrete spill prior to installation of the secondary concrete lining.

5 Workmanship – Spray applied Waterproofing Systems

5.1 Preparation of substrate

5.1.1 The substrate surfaces are prepared in accordance with the manufacturer's instructions.

5.1.2 The *Contractor* ensures the substrate is thoroughly cleaned prior to application to remove all contaminants (including soil, oil, loose particles and grease).

5.1.3 The *Contractor* controls water ingress as required by the manufacturer of the sprayed membrane system.

5.2 Application

5.2.1 The *Contractor* applies the membrane according to the manufacturer's instructions using skilled, competent and trained personnel.

5.2.2 The *Contractor* does not undertake activities in the area where spraying is carried out until the membrane is sufficiently cured in accordance with the manufacturer's recommendations.

5.3 Equipment

5.3.1 The *Contractor* uses the equipment according to the manufacturer's recommendations.

5.4 Secondary lining construction

5.4.1 The *Contractor* installs the secondary lining immediately after the sprayed membrane has sufficiently cured and in accordance with the manufacturer's recommendations.

national highways

Lower Thames Crossing

S2700 – Specification for Tunnelling Works - Durability design specification for structural concrete – Permanent Works

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Lower Thames Crossing

Specification for Tunnelling Works - Durability design specification for structural concrete – Permanent Works

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1 Introduction

1.1 Background

1.1.1 This document is the durability specification which defines the framework for the *Contractor* to document the durability and required design life of the permanent concrete elements of the bored tunnel, cross passages, portals, ramps and tunnel service buildings.

1.1.2 The *Contractor* undertakes a durability study and submits a concrete durability assessment report (DAR), limited to structural concrete within the permanent works, to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure. The DAR documents how the *Contractor's* design meets the specified design life.

1.1.3 The DAR

- includes all types of concrete, including unreinforced concrete, reinforced concrete, steel fibre reinforced concrete and spray-applied concrete,
- addresses all deterioration mechanisms affecting the structural concrete within the permanent works throughout their entire design life, including during construction, including potential frost-exposure during construction phase,
- contains selection criteria for construction materials aligned to section S209, which provides guidance on concrete composition from a sustainability perspective, concrete cover thickness, and related durability testing during pre-testing, mock-up and production to ensure that the specified design life is documented and
- addresses contaminants including road-salts and the like that would accelerate deterioration.

1.1.4 The *Contractor* addresses ground and groundwater composition and proposes exposure classes to respond to these. Considering chemical exposure, guidance in BRE Special Digest 1 on concrete in aggressive ground [1] and BS 8500-1 [2] is followed to determine the related design exposure classes.

1.2 Structures

1.2.1 Primary structural concrete elements to be covered by the DAR are listed in Table 1-1.

1.2.2 The list below is non-exhaustive and it is the responsibility of the *Contractor* to revise and complement the list provided.

Table 1-1 List of structural concrete elements to be covered by the DAR (the list is non-exhaustive)

structure	structural element
bored tunnel	segmental tunnel lining
	road deck
	pump sump
	cross-passages
portals	retaining walls
	base slab
	beams
	roof slab
	intermediate slabs
	piles
	sump (retaining walls, slabs, dividing walls)
ramps	retaining walls
	anti-recirculation wall
	base slab
	piles
tunnel service buildings	foundation
	slabs
	walls

2 Durability Study

2.1 Design life

2.1.1 The design life for permanent concrete works, excluding road works and concrete barriers, is 120 years in accordance with the Scope.

2.1.2 The primary approach to durability design relies on high quality concrete. For traditional reinforced concrete structures, the primary approach for durability design relies on a combination of sufficient concrete cover thickness and high-quality concrete.

2.1.3 For traditional reinforced (i.e. carbon steel reinforcement bars) permanent concrete structures with 120 years design life, the DAR includes performance-based durability modelling with regard to reinforcement corrosion due to chlorides or carbonation, e.g. *fib* Bulletin 34 or similar. Guidance for the implementation of performance-based durability design approaches in the UK is given in [3]. For other deterioration mechanisms, industry standard e.g. BS 8500, or industry guidance e.g. BRE Digest 330 and "CD350: Design manual for roads and bridges" [4] are used for design.

2.1.4 For steel fibre reinforced permanent concrete structures with 120 years of design life, the *Contractor* proposes a method for documentation of the specified design life with regard to fibre-corrosion considering state-of-the-art knowledge and international guidelines. For other deterioration mechanisms, industry standard e.g. BS 8500, or industry guidance e.g. BRE Digest 330 and "CD350: Design manual for roads and bridges" [4] can be used for design.

2.1.5 If proprietary products are used, the durability verification may be based on the manufacturer's data where this has been validated by an independent laboratory (ISO 9001 certified) capable of carrying out relevant accredited testing.

2.2 Durability Study

2.2.1 The DAR includes

- for performance-based durability modelling of concrete structures, with regard to reinforcement corrosion, the relevant design criterion that describes the serviceability limit state (SLS) is set as the end of the initiation phase, i.e. de-passivation of reinforcement,
- if a probabilistic performance-based durability design approach is used, the probability of failure does not exceed 10% at the end of the design life (i.e. corresponding to a reliability index $\beta \geq 1.3$),
- the performance-based durability design approach for chloride-induced reinforcement corrosion provides a limit on chloride ingress, e.g. the maximum chloride migration coefficient, and the concrete cover thickness. This property (limit on chloride ingress) is specified in the concrete specification and used as a quality control measure during pre-testing, mock-up and production testing,
- the performance-based durability design approach for carbonation-induced reinforcement corrosion, if this deterioration mechanism is decisive, yields a limit on carbonation, e.g. the minimum carbonation resistance coefficient and the concrete cover thickness. This property (limit on carbonation) is specified in the concrete specification and used as a quality control measure during pre-testing, mock-up and production testing and
- the requirements to concrete covers and concrete mix compositions with regard to reinforcement corrosion as given in BS 8500 [2] are not applicable for structures with a 120-year design life.

2.3 Durability strategy and planning

2.3.1 The Contractor produces the materials described in Table 2-1.

Table 2-1 List of key documentation to produce as part of the durability design

project stage	documents
design	concrete durability assessment report
pre-testing and mock-up	concrete durability verification report (pre-construction)
12 weeks prior to the Completion of *section 1*	concrete durability verification report (birth-certificate, i.e. As-built Documentation)

3 Other items

3.1 Exposure conditions

3.1.1 The *Contractor* states all the relevant input parameters regarding environmental conditions in the DAR. These parameters are the basis for the specification of exposure conditions and subsequent durability design.

3.1.2 All environmental information included in the DAR is referenced to reliable sources from local/regional data in the UK. Examples of local data sources include

a. environmental conditions and climate data may be accessed, for example, from the UK National Meteorological service [5]. Long-term variations in temperature and precipitation and long-term increases or decreases in sea water levels are assessed with due consideration of the expected design life of the structures, e.g. based on UK Climate Projections (UKCP) from [6] and

b. soil and groundwater conditions may be collected from site information that has been reviewed and adopted by the *Contractor* but the *Contractor* also carries out its own geotechnical investigations in due time before commencement of the relevant permanent works. Additional data may be found, for example, in the British Geological Survey database [6].

3.2 Deterioration mechanisms

3.2.1 The *Contractor* includes in the durability study a complete analysis (including assessment of likelihood, consequence and deterioration rate) of the potential deterioration mechanisms affecting all the permanent concrete structures of the works.

3.2.2 The deterioration mechanisms are assigned based on the prevailing local environmental conditions (assessed as described in paragraph 3.1), as well as to the Plant and Materials (including carbon steel reinforcement,

carbon steel fibres, stainless steel reinforcement etc.) used for each structural element.

3.2.3 A list of possible deterioration mechanisms is given in Table 3-1.

Table 3-1 List of possible deterioration mechanisms (non-exhaustive list)

category	deterioration mechanisms
deterioration of reinforcement (e.g. reinforcement corrosion)	chloride-induced reinforcement corrosion
	carbonation-induced reinforcement corrosion
	stray current-induced reinforcement corrosion
deterioration of concrete matrix	sulphate attack
	acid/chemical attack
	delayed ettringite formation (DEF)
	alkali aggregate reaction (AAR)
	freeze/thaw attack
	abrasion/erosion
	hydrocarbon attack

3.3 Materials and design aspects

3.3.1 This section describes the material and design aspects that the *Contractor* specifies in the documents given in Table 2-1.

3.3.2 If galvanized steel reinforcement is used, any possible beneficial effect of the galvanization is not considered in the durability design unless otherwise agreed with the *Project Manager*.

3.3.3 Possible cathodic protection cannot be regarded as a primary protection measure within the durability design for the permanent reinforced concrete structures. Cathodic protection is only considered as a redundancy measure within the durability design and only provisions for cathodic protection are considered.

3.3.4 Epoxy coating of carbon-steel reinforcement is not allowed.

3.3.5 Alternative reinforcement materials such as glass fibre reinforced polymers (GFRP) can be considered as structural reinforcement from the durability perspective, under the condition that the product has a British Board of Agrément certificate or equivalent international certificate.

3.3.6 Proposals to use other innovative solutions, e.g. ultra-high-performance concrete for road decks are accompanied by factual evidence of suitability for the design life and in operation, e.g. accelerated test data or historic evidence of performance in an equivalent application.

3.3.7 The *Contractor* submits departures from standards in accordance with section S300 for any materials which are not compliant with the DMRB and SHW.

3.3.8 In addition to the minimum concrete cover determined for each structural concrete element either by performance-based modelling and codes and standards, the minimum concrete cover for traditional reinforced (i.e. carbon steel reinforcement) concrete elements is increased, i.e. by a safety element $\Delta cdur,_{\gamma}$ BS EN 1992-1-1 [7], under the following conditions

a. climate change impact: 5 mm

b. inaccessible areas (in exposures XD, XS, XC3/4): 5 mm

3.3.9 The values of $\Delta cdur,_{\gamma}$ as given in paragraph 3.3.8, are not considered if stainless steel reinforcement is used.

3.3.10 Dimensional construction tolerances consider both permissible construction variation and required operational tolerances. Allowance in design for cover deviation $\Delta cdev$ (as specified in BS EN 1992-1-1 [7] and BS 8500-1 [2]) is at least

a. precast: 5 mm

b. in-situ (cast against formwork): 10 mm

c. in-situ (cast directly against blinding): 25 mm

d. in-situ (cast against soil): 75 mm

3.3.11 Deviation (i.e. reduction) from the tolerances above is only allowed if argumentation is given for adequacy of the tolerance (e.g. for precast elements, sufficient accuracy of the tolerance monitoring system is ensured and non-conforming members are rejected).

3.3.12 Any benefit of surface impregnation of concrete structures as a durability enhancement measure is ignored within the durability design.

3.3.13 Any benefit from claddings or other surface finishes of concrete structures as a durability enhancement measure is ignored within the durability design.

3.3.14 Waterproofing (if used) is not considered for durability verifications with regard to reinforcement corrosion.

3.4 Minimum content of documentation

3.4.1 The DAR includes

a. detailed description of the structural elements covered and their design life requirements,

b. definition of all the materials covered and the required material performance,

c. definition of the serviceability limit state for durability for each element of the *works* to meet the design life requirements,

d. description of the exposure conditions for each structural element of the *works*,

e. description of relevant deterioration mechanisms affecting each structural element of the *works*,

f. description of the durability strategy for each of the deterioration mechanisms, including the main characteristics of the materials and design,

g. measures to avoid early-age cracking,

h. assessment of the possibility/need for additional protection to each structural element of the *works*,

i. description of repair measures to address foreseeable construction defects for all structural elements of the *works* and

j. description of the inspection, monitoring and assessment requirements for all structural elements of the *works*.

3.4.2 The durability verification report (DVR) (pre-construction) includes results from testing of the chloride migration coefficient and the carbonation resistance coefficient during pre-testing and mock-up.

3.4.3 DVRs (birth certificate) are prepared at a time no later than 12 weeks prior to the Completion of *section* 1. The DVR includes As-built Documentation to provide proof of implementation of durability design measures specified in the DAR and concrete materials and execution specification, including concrete cover measurements, documentation of concrete composition and quality, etc. reference is given to *fib* Bulletin 93 [8] for further details regarding the content of that report.

3.4.4 The *Contractor* specifies the plan for submission of the DAR and other key documents (e.g. see Table 2-1). The DAR and the DVR follow the timeline given in Table 3-2.

Table 3-2 Timeline for submission of key documents part of the durability study

documents	submittal to *Project Manager*	remarks
stage 1 DAR	eight weeks after *starting date*	
stage 2 DAR	four weeks prior to commencement of detailed design	stage 2 DAR can include updates to exposure conditions, changes to the design, changes to the material etc.
DVR (pre-construction)		test results from actual concrete mix designs, see paragraph 3.4.2

documents	submittal to ***Project Manager***	remarks
DVR (birth certificate)	no later than 12 weeks prior to Completion of *section 1*	

References

[1] BRE, “BRE Special Digest 1: 2005 - Concrete in aggressive ground, Third Edition,” BRE Bookshop, Watford, 2005.

[2] British Standards Institute, “BS 8500-1:2015+A1:2016, "Concrete – Complementary British Standard to BS EN 206. Part 1: Method of specifying and guidance for the specifier",” British Standards Institute, 2016.

[3] Concrete Society, “CS176, Performance-Based Durability Design for Concrete.,” Concrete Society, 2019.

[4] Highways England, “CD350 Design manual for roads and bridges – The design of highway structures (rev. 0),” Williamsleatag, 2020.

[5] Met Office, “UK National meteorological service,” 20 05 2020. Online. Available: www.metoffice.gov.uk.

[6] British Geological Survey database (BGS), “British Geological Survey database (BGS),” 20 05 2020. [Online]. Available: www.bgs.ac.uk.

[7] British Standards Institute (BSI), “BS EN 1992-1-1:2004+A1:2014. Eurocode 2: Design of concrete structures. General rules and rules for buildings,” BSI, 2014.

[8] (fib), International Federation for Structural Concrete, “Birth Certificate and Through-Life Management Documentation,” fib, 2020.

Glossary

term	explanation
AAR	alkali aggregate reaction
DAR	durability assessment report
DEF	delayed ettringite formation
DVR	durability verification report

Lower Thames Crossing

S2700 – Specification for Tunnelling Works - Tunnelling – Slurry & Multi-Mode Tunnel Boring Machines

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Lower Thames Crossing

Specification for Tunnelling Works - Tunnelling – Slurry & Multi-Mode Tunnel Boring Machines

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1 Introduction

1.1 General

1.1.1 This section of the Scope details the *Client's* minimum requirements for the supply and operation of Tunnel Boring Machines (TBMs) including slurry TBMs and multi-mode TBMs for the construction of the bored tunnels.

a. Slurry TBMs are designed to permit removal of spoil from the face by slurry pumps and pipes in closed mode operation.

b. Multi-mode TBMs are designed to permit removal of spoil from the face by screw conveyor, where the material is deposited and diluted in the slurryfier box allowing for suitable hydraulic transportation though slurry pumps and pipes in closed mode operation.

Where a tunnel boring machine solution is proposed for cross passages, this specification applies unless otherwise agreed with the *Project Manager*.

1.1.2 A TBM diameter is sufficient to accommodate the *Contractor's* segmental tunnel lining thickness, grout annulus, sealing system and shield thickness and to achieve the minimum internal diameter specified in the Scope.

1.1.3 A TBM for the main drive is supplied new and all TBMs comply with all applicable regulations, British and European standards.

1.1.4 TBMs are designed taking due account of the ground conditions to be encountered.

1.1.5 The *Contractor* is responsible for the design, specification, procurement, operation, performance, transportation, delivery, assembly and removal (from the Working Areas) of the TBMs.

1.1.6 The *Contractor* develops a *Contractor's* TBM specification for the procurement and supply of the TBMs that demonstrates compliance with the Scope together with any other requirements the *Contractor* considers necessary to meet the requirements of the contract.

1.1.7 Any departures proposed by the *Contractor*, from the Scope, are subject to an instruction from the *Project Manager* under clause 14.3 of the *conditions of contract*. In its submission of any such departures to the *Project Manager*, the *Contractor* demonstrates by risk assessment that its proposals incur no greater health, safety and wellbeing and project risks than the requirements of the Scope.

1.1.8 The *Contractor* defines

- the factory acceptance tests (FAT) for the TBMs to pass in the *tunnel boring machine supplier's* premises before leaving the TBM manufacturing facility and

- the site acceptance tests (SAT) for the TBMs to pass before commencement of initial drive tunnelling and during the initial driving period to demonstrate compliance with the specification.

1.1.9 The *Contractor* submits a list of these tests together with the *Contractor's* TBM Specification referred to in section 1.1.6 to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, prior to awarding the subcontract to the *tunnel boring machine supplier*. A reason for not accepting the testing criteria is

- it does not demonstrate how the TBMs meet the requirements of the Scope or
- it does not demonstrate how the TBMs meet the *Contractor's* specification.

The *Contractor* does not place the subcontract until the FAT and SAT tests have been accepted by the *Project Manager*.

1.1.10 The *Contractor* submits details to ensure that the TBMs as manufactured, operated and maintained achieve the outputs specified within the Accepted Programme and the measures applied to ensure compliance by the *tunnel boring machine supplier*. These details are submitted to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, prior to awarding the subcontract to the *tunnel boring machine supplier*.

The *Contractor* does not place the subcontract until the details have been accepted by the *Project Manager*.

1.1.11 The *Contractor* does not modify the TBMs or any of its systems (including interlocks) without prior consultation with the *tunnel boring machine supplier* and without undertaking a risk assessment.

1.1.12 The *Contractor* maintains a record of all modifications and additions to the TBMs made prior to and during tunnelling including reasons for the change and includes this record as an appendix to the TBM operations and maintenance manual. The revisions to the appendix are submitted to the *Project Manager* on a monthly basis for acceptance.

1.1.13 The *Contractor* selects Equipment (including Equipment which is consumed) and methods to minimise the amount of maintenance and replacement required to reduce risks to the health, safety and wellbeing of all personnel. The *Contractor* provides a whole life analysis for the TBMs and back-up to demonstrate that the proposed Equipment (including Equipment which is consumed) and methods provide a health, safety and wellbeing risk which is ALARP in relation to the operation and maintenance of the TBMs in addition to meeting the specified performance requirements.

1.1.14 The *Contractor* prepares a TBM management plan that addresses the issues identified in the template in Appendix B and the procedures required to transport, deliver, install, operate, maintain and remove (from

the Working Areas) the TBMs and submits this to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

1.2 Scope of supply

1.2.1 The procurement and supply of the TBMs includes, as a minimum, the following elements

a. design of the TBMs and backup Equipment and *Contractor* input during manufacture,

b. an independent Category 3 design check as set out in section S300 of specific structural elements of the TBMs (including tail-skin, cutterhead, shield, erector bridge, back-up system, any containing fixation points of pipe extension system where used or where sudden pressure spikes could result in structural failure of the TBMs and back-up Equipment and where used the rail transport system including track work crossings where there is potential instability due to eccentric loading),

c. manufacture and supply of the TBMs and its back-up Equipment,

d. any tests to confirm design assumptions,

e. an ergonomic assessment of the operation, maintenance, assembly and preliminary tests in the factory including the grouting system,

f. the attendance of relevant Staff and the *Supervisor* at the manufacturer's premises during the factory assembly and commissioning work on the TBMs and back-up Equipment. The relevant operatives carry out inspections as part of the factory acceptance tests and sufficient time is included in the manufacturing and delivery programme to allow errors to be corrected whilst the TBMs are in the factory,

g. the provision of electronic operation and maintenance manuals in English together with four paper copies at the time of delivery of the TBMs to the Working Areas,

h. the provision of technical assistance by the TBM manufacturer at the Working Areas during the TBMs' assembly and launch covering all disciplines of the technology incorporated into the TBMs,

i. the overseeing by the TBM manufacturer of all commissioning and acceptance tests are to be witnessed by the *Contractor*,

j. the provision of technical assistance by the TBM manufacturer during the tunnel start-up until the specified performance is demonstrated as

being achieved and as necessary thereafter to assist the *Contractor* in achieving the required performance and efficiency in operation throughout each tunnel drive,

k. the training of a sufficient number of the *Contractor's* allocated key operators, engineers, production personnel and maintenance staff for each TBM by the TBM manufacturer at the manufacturer's facility during the period of final testing of the TBMs and its back-up Equipment to enable the *Contractor* to certify the operators as trained prior to the tunnel drive commencing,

l. the provision, by the *Contractor*, of a comprehensive list of spare parts for each TBM and its associated back-up and a consignment of spares,

m. the *Contractor's* supply agreements to ensure sufficient spares are always at the Working Area to replace worn and broken parts with the minimum of delay,

n. the provision by the manufacturer of technical assistance during the TBMs' dismantling operations and

o. the assurance that the TBM manufacturer's representatives attend health, safety and wellbeing meetings, design meetings and all meetings that establish and integrate the construction Equipment and procedures from the commencement of design to the completion of TBM tunnelling and removal of the TBMs.

2 Design, Manufacture and Working Area support

2.1 Design and manufacture

2.1.1 The *Contractor* submits the following to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, during the design period for the TBMs

a. the designs, design assumptions (including the basis of those), drawings, specifications and design certificates and Category 3 check certificates of the TBMs' structural elements and the back-up system structural elements including pipe extension system fixation points where used or where sudden pressure spikes could result in structural failure and the related method statements, to demonstrate compliance to this specification,

b. a schedule of TBM and back-up design submissions, which include all information necessary to demonstrate compliance with this specification and

c. a detailed TBM programme for the design, manufacture, factory testing and transport to and assembly in the Working Area of the TBMs. The programme aligns with the Accepted Programme.

2.2 Health, safety and wellbeing

2.2.1 The design and operation of the TBMs complies with BS 6164 2019, section S1100 and this specification in relation to health, safety and wellbeing.

2.2.2 The *Contractor* designs, manufactures and provides each TBM in such a way as to minimise the risks to the health, safety and wellbeing of personnel who manufacture, install and commission, operate, maintain and decommission the TBMs in accordance with the Construction (Design and Management) Regulations 2015 and all other applicable UK legislation relating to health, safety and wellbeing.

2.2.3 The *Contractor* provides sufficient lighting, space and uninterrupted access for maintenance.

2.2.4 All single doors including electrical and mechanical cabinet doors which open into the access and egress walkways have their hinges on the tunnel face side so they push to close during an evacuation from the face.

2.2.5 All cabinets are placed at positions where they do not interfere with the main TBM walkway and emergency escape route.

2.2.6 The *Contractor* conducts a hazard and operability study (HAZOP) during the design of the TBMs in order to evaluate problems that represent health, safety and wellbeing risks to personnel or equipment or prevent efficient operation. The HAZOP is conducted with a suitably experienced and demonstrably competent multi-disciplinary team (HAZOP team) which includes operatives with recent experience of TBM operation in similar ground conditions. The results of the HAZOP are used in the design of the TBMs. The *Project Manager* is sent the results of the HAZOP within seven days of completing the HAZOP.

2.2.7 The HAZOP addresses all foreseeable risks related to the TBMs' delivery, installation, operation, removal and maintenance including addressing the following elements

a. a designated access walkway which is straight and level throughout the TBMs and back up and lines up directly with the line and level of the installed tunnel walkway. This walkway

i. is extendable to the face of the machine,

ii. is bridgeable across the building area,

iii. is kept clear of Equipment installation,

iv. is designed to sufficient width and height to present no obstruction in an emergency evacuation,

v. provides clear access for a stretcher to remove a casualty from the air lock and anywhere on the TBM backup to the shaft bottom or portal,

vi. utilises all the available space to achieve a walkway that exceeds minimum requirements where practical and safe to do so and

vii. has handrails for its full length,

b. the TBM electrical system including the risk of electrical shock and fire, electrical Equipment fault and damage, loss of power supplies and fire suppression systems. Earth leakage protection is provided to a continuous earth cable separately installed as a TBM advances,

c. the TBM backup systems including high pressure fluid systems are designed and detailed to minimise the risk of leakage in close proximity to heat and electrical sources, occurrence of naked flame and danger from moving machinery. All cables are uniquely labelled/ marked and laid clearly separate to hydraulic hoses within a TBM and its backup Equipment,

d. the *Contractor* designs the TBMs, backups and ventilation systems to minimise the generation of noise,

e. the *Contractor* undertakes a noise assessment of all Equipment including ventilation and takes noise measurements in the factory to demonstrate that noise levels do not exceed acceptable levels,

f. a TBM control cabin, rooms provided for eating and drinking, first aid room, welfare facilities, office and refuge are insulated so as not to exceed sound level of 50dB within the cabin and rooms. These spaces are provided with adequate air conditioning to control temperature and are provided with adequate lighting,

g. segment transport and erection including the moving of tunnel lining segments through the TBM backup to the segment erector, the offloading and turning of segments, the handling of segments to the erector, the loading of the segment erector, the dangers to personnel arising from the segment erector and access to all bolts and dowels between the tunnel lining segments,

h. safe methods of work to be developed for any access into the build area including any prior to completion of ring build,

i. the minimisation of ramps and changes of rail direction within the confines of the TBM backup Equipment,

j. a traffic light system is provided within the TBM back-up to ensure the control of trains/multi-service vehicles (MSVs) through the back up. The traffic light system is controlled by a dedicated banksman and the traffic light system fails to red if the banksman drops the controller. This is to include a lighting system (such as rope lighting) in the back up where red indicates standstill, green inbye towards the TBMs and blue outbye towards the pit bottom. The dead man's handle can be omitted provided

   i. the driver/operator of the train/MSV has a clear line of sight,

   ii. the route for the train/MSV through the backup is a designated personnel exclusion zone (except when maintenance is being undertaken and the traffic lights are turned to red) and

   iii. all personnel entrances along the route are gated with an interlock that turns the signal to red in the event a gate opens.

k. if trains on rails are used, a powered 'Manchester Gate' is provided, opening outbye, to block all entry by rolling stock into the TBM back-up and all rolling stock or MPVs are stopped at the rear of the back-up before the gate is powered open to enable vehicle entry; where MSVs are used the braking distance on maximum gradients with wet surface are applied and the use of a 'Manchester Gate' is not mandatory,

l. spring shut man access gates provided at entry points from the walkway to ensure the gates are closed when not being used. The spring shut gates open outwards into the walkway to avoid being struck by moving Equipment and towards the rear of the TBMs. The gates and handrails have meshed guards and handrails to limit access to dedicated gates into the rolling stock area within the TBM backup. These are clearly signed and are provided to stop/ control entry of personnel into the area when the rolling stock is present or moving. The hinges on all gates are on the inbye end of the gate,

m. start and operation of cutterhead in maintenance mode and in normal operation,

n. operation and maintenance of the TBMs and backup including surveying, the erection of the extendable ventilation duct and provision of safe working platforms and access ways,

o. man entry into the mixing and bubble chambers and safe working methods for maintenance of the cutter head including its ventilation during free air entry,

p. the demarcation of personnel from tunnel trains and rolling stock servicing the tunnel advance,

q. the slurry system including pumps, pipes and connections and operation, access and maintenance,

r. compressed air working from an air lock incorporated into the TBMs conforming to the latest Work in Compressed Air Regulations 1996, BSEN 12110 and BSEN 16191 that includes working at pressures > 3.5 bar as set out in the Scope,

s. the grouting system,

t. the testing for gases, oxygen levels, CO2, CH4, CO, NO, NO2 and H2S. The presence of CH4 in any concentration will isolate the Equipment immediately whilst maintaining ventilation and emergency lighting. A shutdown sequence is in place to isolate the equipment. All other abnormalities alarm only with a clear indication on the TBMs' console that the anomaly exists. All gas anomalies are recorded and also alarm at the surface to alert the supervision management of the situation,

u. TBMs' assembly, repair, servicing and maintenance and dismantling,

v. lifting systems including all necessary anchor points are provided for all Equipment or for adding additional Equipment during the tunnel drives such as rail which cannot be safely manually handled,

w. the location of emergency stop buttons, conveyor pull wires and lock-offs for Equipment,

x. the operation of the TBMs in normal and maintenance modes,

y. the operation of the TBMs following an accident or an emergency,

z. dedicated train/MSV man-rider access and egress station for TBMs' crew,

aa. control of spillage from the hydraulic mucking system,

bb. dust suppression and dust particle measuring using strategically placed dust sampling instruments,

cc. the risk of inundation from the face or the ground surface,

dd. the screw conveyor and

ee. the *Contractor* undertakes a HAZOP including the ring build area, the 'Manchester Gate', where fitted, conveyors, operation of the shove rams, erector rotation segment handling and magazine indexing and provides measures and procedures to prevent these operations causing injury.

2.3 Energy efficiency

2.3.1 The *Contractor* minimises the energy usage of the TBMs during operation and includes energy efficiency proposals in the TBM detailed design report. The proposals provide evidence that adequate measures to minimise energy consumption during tunnel operations have been incorporated into the TBM design. The *Contractor* submits embedded carbon records for the TBMs to the *Project Manager*.

2.4 Working Area support

2.4.1 The *Contractor* procures that the *tunnel boring machine supplier* provides

a. technical representatives experienced in the assembly, operation and repair of similar TBMs who are present during the assembly, decommissioning and removal of the TBMs and are available for consultation during operation when required,

b. facilities for the checking, calibrating and easy replacement of measuring instruments that are directly related to tunnelling including slurry flow, face pressure and level meters, air pressure meters, slurry density meters, grout volumes and grout injection pressures and earth pressure cells on the screw conveyor and ensures that the TBMs cannot operate without these measures,

c. a training programme for the TBM operation and maintenance Staff including, as a minimum, the operation of the slurry plant and associated pumps and screens, TBM driving, hydraulic and electrical maintenance and specialist training for the TBM computer systems to include operation of the TBMs in normal, maintenance, degraded, accident and emergency modes,

d. spares in accordance with a list of recommended consignment spares that the *Contractor* retains in the Working Area. The list is derived from a risk assessment undertaken jointly by the *tunnel boring*

machine supplier and the *Contractor* based on their direct experience of using similar machines in similar ground conditions. The risk assessment identifies which parts are likely to wear out, the anticipated life span of the parts, their ease of replacement and the level of appropriate spares required in the Working Area. The *Contractor* maintains the spares at the Working Area in support of the TBMs and slurry plant operations at the accepted percentage availability defined in section 12,

e. a list depicting the lead time of spares not held on the Working Area and

f. as constructed 3D model and drawings (in accordance with section S1900) including a set of 3D drawings showing space constraints of the TBMs, technical documentation and details of planned maintenance requirements (including the necessary training for maintenance personnel and operatives) prior to commencing TBMs operation including updated operational and maintenance manuals – all of which are detailed in the training regime above.

2.4.2 In advance of the physical manufacture of the machine, the *Contractor* provides a 3D model that allows a virtual reality walkthrough of the TBMs to verify access for operation, maintenance and replacement of components, evacuation and clear sight lines for the erector operator and the segment magazine operator.

3 TBM design parameters

3.1 General description

3.1.1 The specific details of the tunnels are

a. the *Contractor* allows the tolerance required to ensure the minimum internal tunnel clearance profile is achieved. Failure to achieve this results in the need to rebuild the tunnel to achieve the necessary clearances and alignment and

b. for any departures from the tunnel alignment the *Contractor* proposes the correction radii in all planes to the *Project Manager* for acceptance in accordance with the Acceptance Procedure.

3.2 Ground movement

3.2.1 The *Contractor* designs and operates the TBMs to minimise ground movement and ensures that the back calculated volume loss does not exceed one percent unless a lower volume loss is

a. specified in the Scope,

b. identified by the *Contractor's* detailed design assessments to protect third party infrastructure and

c. required by asset owners to limit damage and risk to specific assets to acceptable levels.

3.2.2 The *Contractor* maintains an accurate reconciliation of excavated material, grouting volumes and pressures to demonstrate that no voids caused by the tunnelling process have been left outside the segmental lining. This reconciliation is completed for every shift and uses an agreed chainage system that is easily transferrable to the surface (i.e. ground level). The *Contractor* also identifies any locations where excessive volumes of grout injection indicate the presence of pre-existing voids.

3.2.3 Automatic spoil mass or volume checks are undertaken using the logged data together with reconciliation records for the previous 24 hours of tunnel advance and verification tests of the accuracy. These are to be provided to the shift review group (SRG) including the slurry density and calculation of the weight of excavated material and the grouting volumes and pressures.

3.2.4 The *Contractor* arranges an independent category 3 check of the reconciliation relating to the excavated material and grout injection volumes during the first 500m of tunnelling using the TBM data.

3.2.5 The *Contractor* provides a category 3 check of the completed tunnel records eight weeks after completion of the tunnel driving to include confirmation that no voids resulting from tunnelling remain in the ground.

3.2.6 The *Contractor* establishes and implements TBM operating principles to meet the following requirements including

a. continuous monitoring of the excavation using slurry density meters to automatically measure and record the amount of material excavated per unit of advance compared with the theoretical excavation weight. Over-excavation causes an alarm to activate in the subsurface TBM control cabin, the surface TBM control room and procedures are in place to inform the instrumentation and monitoring coordinator (IMC) (or equivalent nominee) of over excavation,

b. automatic measuring and recording of the pressure and volume of grout continuously injected per ring advance,

c. a method of reconciling the requirements of (a) and (b) above and determining if there is a risk of voids being left in the ground as a continuous automatically generated record with a graphical visual display,

d. an indication of lower or higher grout volumes raises an alarm in the TBM control cabin and the surface TBM control room and directly inform the IMC,

e. spaceproofing for and a method of proof drilling and back grouting to ensure no voids are left behind the tunnel lining,

f. a method of injecting, measuring and logging the volume and pressure of support fluid in the annulus between the shield body and cut bore, to mitigate the risk of ground movement where required to limit ground movement for specific asset(s),

g. a method of measuring the face pressure at the crown, shoulder, axis and knee level of the cutting face with alarms and automated cut out in the event of over-pressure or rapid loss,

h. a method of viewing and recording the level of slurry in the cutter head mixing and bubble chamber during excavation and inspecting prior to interventions in the head and

i. automatically recording and storing data generated on the TBMs and presents a graphical summary for review after each shift.

3.2.7 The TBMs are designed to support the face by balancing the face pressure with the pressure applied by the slurry in the slurry circuit and compressed air (where used), whilst retaining the rate of tunnel advance and removal of excavated material by the slurry system.

3.2.8 The slurry face pressure and density when using multi-mode is capable of rapid adjustment to provide effective face support to suit changes in ground and groundwater conditions.

3.2.9 Ground movements are monitored during the tunnel drives to ensure compliance with the requirements documented in section S300.

3.2.10 TBM operating parameters relating to the control of ground movement are continuously recorded and provided in real time to the subsurface TBM control cabin, the surface TBM control room and the monitoring control area in a form that can be rapidly interpreted to allow optimum control of ground movement.

3.3 Materials supply and slurry spoil removal

3.3.1 The *Contractor* transports the materials excavated by the TBMs using slurry pipes to the surface treatment plant.

3.3.2 A method of preventing slurry leakage into the tunnel during pipe extensions is provided by the *Contractor*. Valves are installed at intervals along the tunnel to limit the impact of a damaged/ruptured pipe.

3.3.3 The *Contractor* designs and ensures the slurry system

a. withstands the abrasive wear from the flints and transport of chalk and excavated material slurry,

b. facilitates the inspection, maintenance and replacement of pipes and pumps, the *Contractor* carries out regular pipe thickness surveys with increased frequency at high wear zones e.g. bends and pipes are of a quality so that replacement is not required for the duration of tunnelling,

c. withstands the normal operation and any surcharge pressures it may be subjected to,

d. is easily rotated using roller brackets and

e. withstands accidental impact loads determined by the risk assessment.

3.3.4 The slurry circuit includes a proprietary slurry density meter or similar device specifically designed to facilitate accurate weighing of excavated material to check the actual mass excavated against the theoretical weight per ring of advance.

3.3.5 The density meters are accurate with maximum error of + / - 1.5 percent by weight of solids between charge and discharge slurry measurements.

3.3.6 The *Contractor* arranges for regular calibration verification checks on the density meters. The frequency is determined by change in ground conditions and by agreement with the *Project Manager*.

3.4 Design methods and checking

3.4.1 The TBMs' structure is designed in accordance with the following requirements

a. the *Contractor* submits a TBM scheme design report outlining assumptions to the *Project Manager* for acceptance in accordance with the Acceptance Procedure, prior to commencing the TBM design calculations,

b. the TBM scheme design report includes all design assumptions, loading conditions (paying particular attention to the quality of high stress/strain components), elements of the TBMs and back up to be covered in the calculations and the methods of analysis. The TBM scheme design report is accompanied with the *Contractor's* TBM specification,

c. the TBMs' structural elements and back up including the cutter-head, main bearing, TBM shield body, any multi-mode screw conveyor, slurry system, segment erection system, back-up gantries, back-up sledges and chassis and rail crossing and rail support systems are designed using finite element (FE) methods or other structural analysis software. The software name together with examples of

similar use are provided in the absence of verification by hand calculations,

d. the TBM design calculations consider loading conditions applicable during TBMs' assembly, launch, operation, retrieval and dismantling,

e. the design of the main load bearing structural elements of the backup and where relevant any rail crossings and rail support systems are subject to an independent (category 3) design check,

f. the TBM design calculations and category 3 checks are undertaken by competent personnel who have previous experience of designing slurry TBMs and associated elements thereof. The CVs of the proposed design engineers and the proposed category 3 checking organisation are included in the TBM scheme design report,

g. a TBM detailed design report is submitted at the end of the TBM design phase. This includes calculations together with input parameters, numerical and annotated graphical output from any computer programmes or FE methods used for the design, design and category 3 check certificates,

h. the detailed design submission is accompanied by a 3D model of the TBMs and back-up. The *Contractor* uses the TBM model for clash detection, ergonomic studies of the operation and maintenance of the TBMs and review of evacuation routes and

i. the design maximises the use of modularised components, designed taking full cognisance of transportation and site constraints contained in the Scope.

3.5 TBM body

3.5.1 The TBM body is designed to withstand all loads and forces imposed by the overburden and all loads and forces arising from operating the TBMs, including normal, degraded, accidental and emergency modes. Particular consideration is given to the loads and forces arising from operations to correct misalignment.

3.5.2 The deformation of the TBM body under all loading conditions, including a prolonged stoppage, is limited to allow the lining to be built to the correct geometry. A category 3 check is carried out on the tail-skin to ensure that deformation does not prevent building of the tunnel lining.

3.5.3 In a slurry TBM the front bulkhead has a remotely operated door to close the opening between the two chambers to allow work in the crusher area at atmospheric pressure.

3.6 The TBM cutter head

3.6.1 The cutter head structure and main bearing with its support system are rated to absorb the maximum forces envisaged during TBM operation. These forces are accounted for in the structural finite element analysis of the TBM body structures for normal operation and for circumstances where the full power may need to be used in the event the TBMs become stuck, resulting in maximum shove loading and maximum cutter head torque. Allowance is also made for forces experienced from articulation and retracting the head.

3.7 TBM launching

3.7.1 The TBMs are designed to suit the constraints of the launch Working Area.

3.7.2 The *Contractor* designs the TBMs and the back-up Equipment to facilitate a short duration, fully programmed and sequenced TBM launch including the progressive installation of the back-up Equipment in the tunnel together with umbilical or similar connections designed to avoid excessive back pressures due to the depth of the launch chambers.

3.7.3 The *Contractor* assembles the TBMs at the location that presents ALARP health and safety risks.

3.7.4 The *Contractor* provides a method statement and associated risk assessment clearly showing the principles of the method of TBMs' assembly and launch including temporary works. The method statement accompanies the TBM detailed design report (see section 4.2).

3.8 TBM removal

3.8.1 The TBMs are designed for the relevant removal scenarios that the *Contractor* deems appropriate to address the risk, namely

a. the TBMs are received into a pre-prepared TBM structure for sequential dismantling in segments using minimal hot works and

b. hot works and the supply of gasses are the subject of a detailed method statement. The method statement is provided to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, prior to undertaking the work.

3.8.2 The *Contractor* ensures that the pressures caused by the face fluid and ground water are considered during junctioning and that a facility is in place to ensure that the extrados of the TBMs and tunnel lining are properly sealed and that the face pressure is fully contained on breakthrough.

3.8.3 The *Contractor* provides a method statement and risk assessment clearly showing the envisaged method of dismantling including temporary work and temporary supports required to facilitate dismantling is supplied with

the TBMs. The method statements are provided with the TBM detailed design report.

3.8.4 The method statements demonstrate how the surrounding ground and the TBMs' components are supported at all stages and how damage to the permanent works is prevented.

4 Specification of the TBMs

4.1 General requirements

4.1.1 The TBMs are of the slurry pressure balance or multi-mode type. The machines are capable of supporting the prevailing hydrostatic and slurry pressures as determined by the *Contractor*.

4.1.2 The TBMs are constructed to enable strip down for transportation and disassembly and welded to minimise non-welded construction.

4.1.3 The TBMs' components are designed to facilitate transport, assembly and dismantling operations.

4.1.4 An industrial vacuum cleaner is provided on the TBMs for use in the removal of dust from the TBMs and back-up Equipment.

4.1.5 The TBMs' spoil is pumped in slurry pipes to a surface slurry treatment plant. The pumping system and treatment plant are sized to match the TBMs' instantaneous advancement rates and the spoil conditions. For tunnels constructed in chalk this is based on the spoil being formed from 100% fines with particle size < 40 microns and for 24-hour seven day a week TBM production. For tunnels constructed in other materials this is based on precedent experience or testing.

4.1.6 The slurry treatment plant has sufficient slurry storage to allow off-line treatment of fines to prevent sludge build up within the slurry circuit and to allow tunnel production to meet the requirements of this specification.

4.1.7 Spoil processed by the treatment plant reduces the moisture content of the spoil to suit the management and disposal requirements in the Scope, where required, reducing the moisture content to allow transportation by ships and barges or other suitable means as dry material.

4.1.8 The pumping system and slurry treatment plant are capable of sustaining the TBM performance requirements as set out in section 12.

4.1.9 The *Contractor* demonstrates to the *Project Manager* that the spoil removal and treatment system (including the pumping system and separation plant) has the capacity to match the performance of the TBMs and the requirements of the spoil transportation method. The details are included in the TBM scheme design report. This is undertaken prior to placing an order for the manufacture of the spoil removal and treatment system.

4.2 Shield configuration

4.2.1 The TBMs and back-up system are designed so it can be divided into sections for transport, as necessary, allowing for Working Area lifting, assembly, removal and any specific Working Area constraints and traffic and transport route restrictions and any consent requirements.

4.2.2 The *Contractor* prepares a method statement to demonstrate that the launch method principles are safe and efficient and provides the method statement to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, before commencing TBM manufacture.

4.2.3 The *Contractor's* method statement confirms piece sizes and weights of major components and the transport, assembly, installation and removal procedures.

4.3 Front of TBM

4.3.1 The front of the TBMs incorporates as a minimum

a. a bulkhead designed to act as a pressure vessel to withstand the expected hydrostatic working pressures determined by the *Contractor's* detailed design together with any additional machine induced pressures during operation,

b. a sufficient number of sleeves fitted with shut off valves and stuffing boxes spaced around the periphery for ground treatment and forward ground treatment passing through the cutter head arms. The arrangement direction and positioning of the sleeves allows for drilling and the formation of a treated zone of sufficient diameter and dimensions at a suitable distance in front and outside of the TBM cutter head face to enable head intervention for inspection and maintenance. The sleeves allow for the insertion of freeze pipes to allow localised freezing of the ground. The design ensures that the required drilling pattern can be accommodated through and beyond the arms of the cutter head,

c. an air lock is provided which includes two compartments, with a four-man main compartment. The air lock is designed to withstand the maximum hydrostatic pressure for testing purposes. The air lock is equipped to operate at the maximum hydrostatic pressure determined by the *Contractor*. The air lock conforms with the latest hyperbaric regulations as set out in BSEN 12110 and BSEN 16191,

d. a method for facilitating interventions. The *Contractor* submits a method statement to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, demonstrating how cutter head interventions are managed utilising the compressed air system if required. The *Contractor* ensures there is a sufficient air

supply and reservoir to deal with a sudden loss of air into the ground during an intervention. The final entry door into the plenum/mixing chamber is fitted with a latch to keep it open during interventions and there is special consideration to safe man access within the chamber and to the ventilation of the chamber if free air entry is utilised,

e. a materials lock designed to withstand the maximum hydrostatic pressure with provision for mechanical handling and transport of tools, cutters and other items through the TBMs, air lock and into mounting position. The method of transporting items though the TBMs into the mounting position is demonstrated during the factory testing and commissioning and documented in the TBM detailed design report,

f. penetrations capped off with valves through the bulkhead at crown, axis, knee and invert for de-watering the plenum/ mixing chamber at the rate required to cope with the ground water inflow predicted by the *Contractor* and used to design the TBM dewatering system. The crown penetration is expected to be used to add air during the drawdown of the water prior to face entry,

g. penetrations for the insertion of essential services including electricity, hydraulics, water, high pressure compressed air, grout and pumped concrete, tested for compressed air entry. The air lock door is kept clear when interventions are undertaken in free air to allow immediate closure of the lock door in an emergency and when personnel are not present at the face during intervention time,

h. provision for fluid transfer (oil, grease) to the cutter head and main bearing,

i. provision for probe drilling during closed mode working with a gland and shut off valve. The probe drilling Equipment is located in a suitable position to provide clear access for operation and where it does not obstruct the walkway or maintenance areas,

j. provision of low pressure compressed air pipes to balance the tunnel face pressure and permit personnel access for maintenance and inspection,

k. a CCTV camera mounted at the top of the bulkhead behind a glass window to provide continuous monitoring of the excavation chamber. The window is cleaned by a pressure water jet. It also allows the plenum to be viewed prior to interventions,

l. the camera images are visible within the subsurface and surface TBM control cabins and in the monitoring control area(s) and are continuously recorded on the *Contractor's* monitoring database. The video recordings are submitted to the *Project Manager* every month. Upon request from the *Project Manager*, sections of the recording can be saved for information purposes,

m. charge and discharge slurry pipes,

n. rock crusher(s) to reduce flint and rocks to a suitable size for transport in the slurry discharge system or remove them by other suitable methods,

o. on a multi-mode machine, a screw conveyor for multi-mode operation that is retractable from the plenum and sealed with pressure gate to allow for free air maintenance,

p. the whole of the slurry contact surfaces are optimised to minimise wear from what is determined from the *Contractor's* geotechnical assessment or for tunnels in chalk to cater for the greater of this or potentially more than 15 per cent flint content,

q. slurry pressure measuring devices,

r. a breathing air regulation system,

s. geoelectrical real-time ground prediction via a non-intrusive focused-electrical induced polarisation ground prediction technique, permanently operating while TBM tunnelling and

t. determines the health, safety and wellbeing risk for cutter tool exchanges (including options for use of robotic assistance) and takes actions to reduce it to ALARP (including where appropriate the use of robotic assistance).

4.4 TBM body

4.4.1 The *Contractor* demonstrates that the shove ram forces are sufficient for the envisaged ground conditions and water pressure, compatible with the *Contractor's* segmental tunnel lining design and includes this in the TBM detailed design report.

4.4.2 The TBMs incorporate as a minimum

a. couplings to the ram shoes permitting articulation and square contact with the lining. The shove rams are spaced around the shield so that their shoes bear directly on only one segment and not on adjacent segments. They allow for the variations in the position of the tunnel segment key required to control the tunnel alignment. All rams/groups

of rams have linear transducer stroke measuring linked to the steering and guidance computers,

b. shove ram shoes fitted with flexible rubber or similar material sweepers to displace hands and feet and prevent entrapment,

c. a reversible cutter head to control the machine roll to ±50mm measured across the axis,

d. shove ram controls that include a sequential relax feature to prevent high bending moments transferring into the shove ram rods and bearings due to cutter head torque reaction during each stroke. The maximum torque to be applied to the tunnel lining is compatible with the segmental tunnel lining design,

e. provision to correct roll,

f. a port system through the skin for the injection of anti-friction lubricants, non-active grouts or mortars, bentonite or similar into the annulus between the TBMs and the ground to fill the annulus prior to the TBM shoving and concurrently ring grouting. The design is included in the TBM detailed design report,

g. a TBM annulus grouting injection system that is fully operational and linked to the monitoring system which provides a continuous record of the volume and pressure over time for each ring. The injection ports are fully linked to a manifold supply system that is subjected to FAT,

h. articulation joints (where provided) are fitted with a sealing system designed for the maximum hydrostatic pressure and any machine induced pressures with appropriate safety factors. The system is grease lubricated and purged with the ability to replace the front seal in-situ as a minimum,

i. dewatering pumps and pipes provided to remove the maximum flow rate determined by the *Contractor's* assessment of the geology, hydrogeology and geotechnical information to deal with the risk of inundation,

j. lighting to a minimum of 300 lux in the Working Area and greater where the *Contractor* considers this to be necessary,

k. safe access for operatives and maintenance personnel,

l. a dual communications system, providing coverage to all areas on the tunnel profile and

m. fixed and hard wired or internet-based gas detection along the TBMs' inputting to the subsurface and surface TBM control cabins and in the monitoring control areas. The data from these is recorded on the *Contractor's* monitoring database. Included is an airflow monitor placed to measure the airflow from the tunnel ventilation and sequential shutdown in relation to the detection of explosive gases.

4.5 Tail skin grouting

4.5.1 The tail skin incorporates

a. a two-component grouting system suitable for the ground conditions with support as necessary from the supplier during commissioning and the first 500m of tunnelling with a call off following this period,

b. the two component grouting system provides a constant pressure continuous tail skin grouting system for the annular grouting of the segmental tunnel linings with quick setting gel grout utilising "A" & "B" mixtures through working and reserve ports arranged in the tail skin in accordance with section 7. The system proposed by the *Contractor* is to be included in the TBM detailed design report,

c. multiple grout injection ports arranged symmetrically around the tail skin. Each port is duplicated to provide redundancy,

d. either

   i. ports designed to keep mixture "B" accelerator and the cement slurry "A" mixture separate until they are mixed at the point of injection behind the segmental lining. The "B" mixture injector is retractable for cleaning purposes and is self-cleaning at the end of each grout cycle or

   ii. ports designed to keep mixture "B" accelerator and the cement slurry "A" mixture separate until just short of the tail skin where they are mixed and then injected behind the segmental lining. The "B" mixture injectors are retractable for cleaning purposes and are self-cleaning at the end of each grout cycle with high pressure water provided this is supported by evidence of satisfactory performance,

e. a grouting system to facilitate operation and maintenance and effective cleaning with water flush or another cleaning agent,

f. a grouting system provided with clear uninterrupted and well-lit access for the maintenance of the system and the removal and replacement of pipes and system components. The Contractor

demonstrates this prior to delivery of the TBMs to the assembly Working Area by undertaking a factory trial removal and replacement of the system on the assembled machine,

g. circular grout tubes with full bore valves in front of the wire brush protection ring to allow jetting out. When the jetting nozzle is retracted the valve is closed to prevent material travelling back down the cleaned tube into the tail skin. Other arrangements may be acceptable subject to provision of evidence of satisfactory performance,

h. interlocks installed between shove rams and grout injection,

i. a tail skin grouting system that ensures that both pressure and the rate of flow of grout to each port are controlled and continuously monitored and logged. Each grout port is supplied by an individual peristaltic or screw pump,

j. automatic recording of the pressure and volume of grout injected. The grout volume is automatically reconciled with the excavated material quantity recorded by the density meters for each ring advance to warn of the potential for voids. The reconciliation of excavated material quantities and grout volumes is recorded in the *Contractor's* monitoring database,

k. a tail seal system incorporating a minimum of three rows of seals rated to withstand the maximum hydrostatic pressure and any TBM induced pressures as determined by the *Contractor's* detailed design. The *Contractor* makes provision for the installation of an additional seal to the face side of the seal block to be fitted in an emergency and a facility is installed to enable this including an adequate provision for shove ram length to accommodate the revised position of the seals and

l. a tail seal greasing system that distributes fibrous tail seal grease with independent flow through multiple ports located between seal rows. The tail seals are continuously fed with grease whenever the TBM advances. The design facilitates maintenance and replacement of the tail seal grease pipes and ports by reducing manual handling of grease barrels.

4.5.2 The *Contractor* identifies the area of greatest risk and designs the tail skin grouting system to prevent grout contamination of the tail seal and includes details in the TBM detailed design report.

4.5.3 The first grease fill of the tail seal brushes is carried out by hand or pump stuffing using higher density grease than required during tunnelling.

4.5.4 Tail seals other than the rear seal are replaceable from within the tunnel during a drive. The *Contractor* submits a method statement for replacing these seals to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

4.6 Cutter head, main bearing and sealing system

4.6.1 The cutter head structure is designed to provide mechanical support to the excavated tunnel face. It incorporates the necessary abrasion protection features to enable the TBMs to be able to complete excavation of the tunnels through the expected range of geological and hydrogeological conditions.

4.6.2 The cutter head incorporates

a. cutting tools appropriate for the expected geological conditions with a proven track record in these conditions. These are hard faced and designed for optimum wear resistance. The *Contractor* provides details of the proposed layout of the cutter head tools on the head in the TBM detailed design report,

b. TBM cutters and other associated cutting tools with tungsten carbide inserts or other proven material suitable for the geological conditions and abrasivity of the ground. They have their exposed bodies wear protected with hard face welding and button carbide inserts,

c. a cutter head and cutting tools designed to take into account the abrasive ground conditions and furnished with a manual and simple wear detection system to give warning of early potential wear before head damage results,

d. wear and temperature indicators fitted to outer and face cutters and the cutter head face. Wear of the disc cutters is monitored by a proven wear detection system such as a button head built into the TBM cutting head and include temperature measurement where appropriate. The wear detection system alarms in the subsurface TBM control cabin and the surface TBM control room. Wear alarms are recorded on the *Contractor's* monitoring database,

e. disc cutters (if proposed) of a type that rotate in the mixed strata to avoid flats being worn on the cutter ring. The disc cutters are provided with a proven wear detection and rotation monitoring system that alarm in the subsurface TBM control cabin and the surface TBM control room. Wear alarms are recorded on the *Contractor's* monitoring database,

f. in addition to the 'normal' slurry muck transport the cutting wheel and front chamber incorporate additional slurry circuits to reduce the potential for spoil blockage in the face and chamber,

g. a rotary fluid coupling for transfer of hydraulic fluids and grease,

h. cutting tools that are designed to be replaced from the rear face of the cutter head with access from the plenum chamber. A mechanical handling system is provided to transport the tools and other equipment through the TBMs, material lock and into position within the plenum chamber,

i. replaceable wear protection plates and weld on tools arranged in a pattern for the entrapment of spoil to protect the cutter head structure,

j. an indexing facility to allow probe drilling and ground treatment drilling through the apertures within the cutter head and for cutter tool replacement,

k. bi-directional cutting to control roll,

l. the ability to retract the cutter head from the face for tool inspection and replacement moving either the cutter head or the cutter head and front shield body. Rearward movement of the rear shield skin and tail skin is not permitted,

m. a cutter head designed to suit the expected ground conditions and to manage the flow of excavated spoil, including that above groundwater level approaching the South Portal. It provides adequate ground support and incorporates good spoil flow features particularly within and through the centre section of the head. Apertures in the cutter head are sized to allow the passage of flints or other expected hard material of a size that can be handled by the crusher,

n. a facility for fully supporting the face in the event there is a prolonged stop of the TBM advance and available for implementation. This depends on the design of the cutterhead, the geology to be encountered and the procedures the *Contractor* intends to implement in order to mitigate face collapse,

o. a physical means of confirming gauge cutting provided from the free air side of the TBM body,

p. a method of pre-setting the cutter head to index cutter head arms into the desired tool change position without the need to open the air lock entry door and

q. an adjustable copy cutter with means of detecting the stroke and the arc through which it is selected or an alternative method for over cutting to negotiate the specified tunnel curves and any correction curves for TBM steering.

4.6.3 The *Contractor* includes full details of the cutter head together with justification of the aperture size in the TBM detailed design report.

4.7 Main bearing

4.7.1 The main bearing has a rating of not less than 10,000 hours B10 life based upon the assumed loadings defined by the *Contractor*. The bearing is a three-row axial, radial and counter axial roller bearing with integral drive gear. The *Contractor* includes lifecycle calculations for the main bearing and drive pinions against the given load cases in the TBM detailed design report.

4.7.2 The lubrication circuit for the bearing raceways and gear drives is provided with a facility for monitoring lubricant contamination and has readily accessible sampling points. The monitoring is completed through the operation of the filter. The system is designed so that in the event of lubricant contamination an alarm sounds in the subsurface TBM control cabin.

4.7.3 The TBMs are designed so the main bearing can be removed rearward from the front bulkhead and a new bearing inserted with the least disturbance to the TBMs' configuration and back-up system.

4.7.4 The *Contractor* prepares a method statement to demonstrate how the main bearing can be removed and replaced in the event of a main bearing failure during tunnelling operations together with a programme outlining the duration of each phase of the operation including the procurement and delivery of spare parts and submits this to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, within the TBM detailed design report.

4.7.5 The *Contractor* confirms the lead time for the supply of a replacement main bearing in the TBM detailed design report.

4.8 Cutter head drive train

4.8.1 The cutter head drive train meets the following minimum requirements

a. the *Contractor* determines the proposed torque and speed graphs and includes these in the *Contractor's* TBM detailed design report,

b. main drive gearboxes and motors have a rating of not less than 10,000 hours B10 life for the given load cases selected for the main bearing by the *Contractor* and

c. indirect water cooling of the main drive motors and gearboxes through outer jackets are provided. The *Contractor* includes the design of the

cooling circuits and details of the components in the TBM detailed design report. Cooling water is provided through a circulatory system remote from the mains supply and cooled on the surface through a cooling stack or other suitable method. The *Contractor* uses appropriate additives to address the risk of water contamination and Legionnaires' disease and similar. The *Contractor* carries out water tests for contamination on a regular basis and provides these to the *Project Manager* when they are completed.

4.8.2 The *Contractor* mitigates the risk of a gearbox or drive pinion failure causing damage to the main bearing gear final drive. The pinions meshing with the main gear have bearing supports on each side of the pinion to limit bending moments.

4.8.3 The *Contractor* includes details of the gearbox drive pinions and support bearings in the TBM detailed design report.

4.9 Main bearing sealing system

4.9.1 The main bearing sealing systems meet the following requirements

a. the outer and inner main bearing sealing systems are of a proven design capable of protecting the bearing for life of 10,000 B10 working hours. The sealing system comprises a series of labyrinths and multiple lip seals that have been proven competent for the duties required. They are rated to withstand the potential hydrostatic pressure determined by the *Contractor* and any machine-induced pressures in excess of this considering the expected wear during the working life. The design accommodates this pressure drop through the outer and inner sealing systems. The calculation of seal pressures is included in the TBM detailed design report,

b. the design provides for exchanging both inner and outer sealing systems from within the tunnel in the event that the seals fail,

c. the sealing system has facilities to monitor its performance. In the case where "total loss" grease is used for lubrication, support of the seals and a means of adequate sampling is provided. In the case where oil is used to lubricate and support the seals, the *Contractor* incorporates a filter circuit to remove any debris and water contamination with the facility to cool and sample the oil,

d. all component parts of the sealing system are flushed clean prior to assembly and this is followed by flushing of the fully assembled system. Records of the flushing sample analysis are included in the TBMs' FAT documentation,

e. on arrival and prior to assembly in the Working Area, the sealing systems are inspected,

f. the design of the sealing system is proven in service in similar conditions and

g. details of where the system has previously been used, the tunnel drive lengths and the pressures encountered are included in the TBM detailed design report.

4.10 Removal of excavated material

4.10.1 Slurry tunnelling machines are designed to permit removal of spoil from the face by slurry pumps and pipes in closed mode operation.

4.10.2 Multi-mode machines are designed to permit removal of spoil from the face by screw conveyor, where the material is deposited and diluted in the slurryfier box allowing for suitable hydraulic transportation though slurry pumps and pipes in closed mode operation.

4.11 Rock crusher

4.11.1 Where the ground investigation data identifies or where it is known that there is a risk of rock or hard materials occurring a proven design of rock crusher(s) is provided to crush rocks and hard materials to a size suitable for transport through the slurry system. The crusher(s) are capable of being serviced from the rear face of the forward bulkhead in free air conditions. The rock crusher(s) form part of the slurry discharge system to ensure that all large rock pieces are reduced to a pumpable size.

4.11.2 As a minimum the crushers are capable of handling an excavation solids volume to match the performance of the TBMs as set out in section 12 of this specification.

4.11.3 The *Contractor* reviews the geotechnical investigation information including boreholes and laboratory tests, precedent information from other projects and determines the maximum dimensions and strength of the flints and other hard materials within the face.

4.11.4 The *Contractor* designs the crushers to cater for these materials and undertakes tests on representative samples of the flints in the chalk and any other expected hard materials and demonstrates that the crusher is capable of crushing these materials anticipated to be encountered in the tunnel face.

4.11.5 The *Contractor* includes the crusher details in the TBM detailed design report.

4.12 Screw conveyer

4.12.1 The design of the screw conveyor includes support calculations by finite element analysis to ensure fatigue failure is prevented and to verify assumed efficiencies, the sealing and drive components and the torque

and speed characteristics of the screw. The *Contractor* demonstrates that the dimensions and design of the screw conveyor are appropriate for ground conditions and TBM performance requirements as set out in section 12.

4.12.2 The screw conveyor meets the minimum requirements defined below and together with the bulkhead gate(s) is capable of withstanding the maximum hydrostatic and any machine intensified pressures. The screw conveyor has the following features

a. replaceable wear protection including bolt-on auger plates on the periphery and the wearing face of the screw and weld-on wear resisting steels in hit and miss longitudinal strips over the full length of the casing to reduce wear to the components,

b. bearing seals rated to withstand the maximum hydrostatic pressures determined by the *Contractor* together with any additional intensified pressures within the system. The *Contractor* includes the justifications of the design pressures in the TBM detailed design report,

c. a bearing and gearbox assembly spaced to provide a gap between the seals and the gearbox to prevent contaminants being forced into the gearbox in the event of seal failure,

d. an auger designed as one piece. Where joints are required, they are fully welded following assembly. The integrity of 100% of the auger welded joints is confirmed by non-destructive testing with a permanent record of the testing,

e. a screw conveyor of centre shaft design. A ribbon type screw design is not permitted,

f. a slurryfier box that includes a crusher to regulate the size of rock pieces for transportation in the slurry discharge pipes. The slurryfier dilutes the screw conveyor spoil for transportation through the discharge slurry pipes,

g. drive motors and gearboxes with a minimum design life of 10,000 working hours,

h. injection nozzles (or alternatively injection ports) positioned along the screw casing to allow injection of spoil conditioning as required,

i. a minimum of two earth pressure monitoring devices positioned along the screw to read the pressure drop over the length before the slurryfier box,

j. the provision of sufficient inspection hatches positioned along the screw casing for the removal of boulders and inspection of the screw and

k. a screw casing constructed to allow full replacement and repair of the leading section.

4.12.3 The design of the screw conveyor incorporates the following

a. a watertight guillotine gate at the bulkhead end of the screw conveyor interlocked with the screw slide cylinders,

b. a watertight guillotine gate at the discharge end of the screw conveyor that activates during power loss through an accumulator providing immediate closure,

c. a lock off system that prevents the guillotine gate being activated when maintenance is being undertaken on the screw. The operation of the lock off is subject to a protocol included in the TBM operation and maintenance manual so that the guillotine gate closure system is not de-activated when there is a risk of inundation,

d. a means of withdrawing the front part of the screw auger from the mixing chamber and the closure of a bulkhead guillotine gate,

e. a means of closing the guillotine discharge gate at the discharge end of the conveyor during operation to control screw pressures during operation and the volume of discharge and

f. the *Contractor* demonstrates during the FAT that the screw auger can be withdrawn from the mixing chamber and the bulkhead guillotine gate closed without fouling other parts of the TBMs.

4.12.4 The installed power, diameter, speed and capacity of the screw conveyor is included in the TBM detailed design report.

4.12.5 The screw conveyor torque and speed are monitored, recorded and displayed so that the operator can continually determine the efficiency of the excavation cycle.

4.13 Slurry circuit

4.13.1 The slurry circuit is designed to be compatible with the TBM performance requirements set out in section 12.

4.13.2 The slurry system is equipped as a minimum with

a. a means of measuring discharge slurry densities and velocities suitable for the monitoring requirements in section 5,

b. a system which measures the excavated spoil mass and compares with the theoretical mass per ring of excavation and alarms if this is out of balance,

c. a charge and discharge slurry pipe extension system including the necessary pipe handling facilities. The extension system is equipped with a sump and discharge pumping system to prevent slurry spillage into the tunnel invert,

d. non return valve system and or manually operated gate valves, with the valves most adjacent to the TBM being remotely operable, fitted to tunnel pipes at regular intervals to prevent slurry spillage into the tunnel when extending the pipes or to reduce spillage in the event of a pipe burst,

e. devices to retain the slurry in the discharge pipes during extensions,

f. electrically programmable pump controllers to regulate and maintain the slurry circuit pressure,

g. bypass and re-circulating controls in the TBM slurry circuit,

h. isolation valves to allow replacement of pipe sections/ components (for example, pumps) and

i. a method for reversing the flow through the cutting chamber to flush out blockages.

4.13.3 The *Contractor* designs the slurry system to cater for anticipated spoil including the highly abrasive and high strength flints and cobbles and associated abrasive materials that the Contractor determines from the geotechnical information and other precedent information.

4.13.4 The *Contractor* and tunnel boring machine supplier jointly carry out a risk assessment based on previous experience of similar systems in similar ground conditions to identify which components are subjected to high wear and require frequent maintenance and replacement.

4.13.5 The *Contractor* implements mitigation measures in response to the items raised in the risk assessment, including the provision of spares and providing good access to high wear components to enable maintenance and replacement. The risk assessment and mitigation measures are included in the TBM detailed design report.

4.13.6 The *Contractor* designs the slurry main system to facilitate the planned removal and replacement of high wear components with minimum down time.

4.13.7 The *Contractor* has available appropriate spares for replacement of components including pumps, pipes and specials.

4.13.8 The *Contractor* includes its proposed planned maintenance manual including its planned preventative maintenance schedule in the TBM detailed design report.

4.13.9 The system is able to cope with the considerable peat layers (and ground gas) expected in the early stages of driving from the North Portal. Provision is made for easy access cleaning/de-clogging of the slurry treatment plant. If the *Contractor* chooses twin slurry treatment plants, flows are designed to be switchable between plants.

4.13.10 The system is designed to cope with any *Contractor's* installed ground treatment.

4.14 Segment erector

4.14.1 The segment erector is equipped with a single pick up head of semi-rotary type with sufficient axial movement to pick up a segment from the feed magazine and to dismantle built tunnel rings for tail seal repair and maintenance.

4.14.2 The segment erector has the following

a. an erector capable of lifting segments from the invert to the crown and placing them in position within the ring. It has a positive engagement interlock and a factor of safety of three. Should a vacuum system be adopted the vacuum pad applies a factor of safety of three for lifting the heaviest segment assuming a maximum of 0.8 of absolute vacuum. This requirement applies to all vacuum lifting devices,

b. an erector provided with sufficient torque to generate the force required to achieve closure of the segment cross joint gasket, when operated against the mass of the segment,

c. an erector head provided with a single or double tapered shear pin designed to impart the cross joint closing force and transmit this force via a replaceable plastic sleeve into the segment without causing damage to the segment and to prevent damage to the vacuum pads. This may be located with the grout socket if required,

d. dual laser pencils fixed to the erector which accurately guide the erector shear pin into the segment by aligning to dimples cast into the trailing edge of the segments. Clear indication of engagement is also provided,

e. automatic measurement of the tail gap between the tail skin and segment extrados linked to the guidance system to allow the correct ring taper and orientation to be selected. A manual override is provided,

f. provision of adequate access platforms and a safe means for the measurement of plane and for the insertion of packers to correct for plane,

g. provision of sufficient clockwise and anti-clockwise rotational movement (minimum +/- 190 degrees) spaced equally about the invert of the tunnel,

h. provision of a means of safe transfer of power cables and hoses from static to rotation section by reel,

i. provision of proportional control of main movements,

j. provision of a pick-up head with the ability to move the segment in all directions and rotations sufficient to properly erect the segments,

k. provision of a radio remote control at a location that provides the operator with clear visibility of all erector movements. The control is fitted with dual enabling buttons to prevent inadvertent operation. The control includes selection and control of individual or groups of shove rams for use during the segment erection and indication of shove ram retraction position to aid ring building. A description of the ring building process is to be provided to the *Project Manager* prior to excavation,

l. provision of audio-visual warnings fitted to all moving Equipment in accordance with regulations,

m. an erector remote control fitted with an interlock that prevents the segment being positioned beyond the ring intrados before the shove rams have been retracted to prevent clashing with a part-built ring. All erector cable or radio controls fail to safe in the event of a fault occurring within the control circuits. Under no circumstances does the erector make uncontrolled movements in the event of an electrical fault,

n. the erector remote control is the only control able to operate the erector and replacement controls only become operational when the old control has been made inactive,

o. the erector remote control unit is configured to ensure none of the functions including the vacuum release buttons on the control panel are active until the warning light on the panel has been extinguished by using the emergency stop reset,

p. vacuum release button(s) are provided with safety features that prevent inadvertent operation. This includes the possibility of double button vacuum release,

q. a remote control with a “relax” facility that releases stored energy within the erector before disengaging the vacuum system to prevent damage between the erector shear pin(s) and the concrete segment. The rotational speed is capable of being varied,

r. an integral bearing and sealed drive system rated for 10,000 hours B10,

s. safe working areas provided for tunnelling personnel to stand during the erection of the segments including erection in the invert area where segments are indexed forward,

t. provision of clear visibility for the erector operator of the segment pick up from the magazine and the ring build process,

u. provision of platforms for the ring bolting/ fixings that provides safe access to all the tunnel segment bolt positions including insertion of bolts/ fixings into the forward segment cross joints,

v. a vacuum system fitted with a pressure sensing device that detects loss of vacuum and prevents operation and lifting of segments, in the event that the vacuum fall below a safe level,

w. safety interlocks that transfer total control of the shove rams from the subsurface TBM control cabin to the erector operator during the ring erection process and

x. control of the segment magazine during ring build functions with the facility to release control to the segment transfer crane operator during magazine loading.

4.15 Erector bridge

4.15.1 The length of the bridge is sufficient to ensure the annular grout has gained sufficient strength to support the load from the bridge support.

4.15.2 The bridge transfers all services including electricity, hydraulic hoses and pipes, ventilation air, cooling fluids, dewatering pipes, slurry pipes and control services through the build area to the TBMs.

4.15.3 Where the erector bridge acts as the towing beam for the back-up system the design incorporates a suitable factor of safety. The towing beam has an articulated towing connection to the TBMs with load indicators. The load indicators have an interlock with the shove rams which stop the shove if the loads exceed the working load.

4.15.4 The design provides adequate space to ensure safe access and clear uninterrupted well-lit visibility and segregate personnel from moving Equipment.

4.15.5 Platforms provide safe access for segment erection bolting and packing insertion to correct for plane. Safe access for bolting, fixings and other operations is demonstrated during trials as part of the FAT at the *tunnel boring machine supplier's* premises.

4.15.6 A platform is provided for proof grouting within the TBM backup facility.

4.15.7 The bridge structure has hydraulically steerable bogies fitted with solid nylon wheels running on the tunnel lining. A railed system with mechanical handling facilities may also be used.

4.16 Segment magazine

4.16.1 The segment magazine receives tunnel lining segments from the transfer crane and indexes them forward to the pick-up position of the segment erector.

4.16.2 The magazine has the following features

a. a minimum capacity for one ring of segments,

b. it is able to present the segments to the erector without causing damage to the segments or the sealing gaskets,

c. it is provided with a work procedure, method and appropriate equipment to allow the removal and replacement of damaged segments from the erector area using a vacuum, where possible, or other means in the event it is not possible to use the vacuum. The performance of this system is demonstrated by trials at the *tunnel boring machine supplier's* premises,

d. has a means of propulsion either from the erector bridge or independently,

e. be provided with wheels or skates supporting the structure that run directly on the tunnel lining segments,

f. be designed to ensure the loads on the segments do not exceed the bearing capacity of the annular grout taking account of the fastest achievable rate of tunnel advance,

g. provides access through itself to enable invert grouting and

h. prevents entrapment between moving and stationary elements.

4.16.3 Control of the magazine functions are interlocked and controlled by the erector operator during ring building and the magazine and segment off-loader operator during magazine loading.

4.16.4 Indexing segments into the segment build area by the transfer crane operator includes facilities to provide the operator with clear line of sight into all Working Areas.

4.16.5 The operators are positioned at a fixed station with clear sight of movements.

4.16.6 All functions are dual operation as part of the remote-control consoles.

4.17 TBM control cabin

4.17.1 The TBMs have a TBM subsurface control cabin and a surface control room. For details of the latter see section 4.18.

4.17.2 The TBM subsurface control cabin

a. is used to drive the TBMs,

b. is air-conditioned and located at the front end of the back-up system and accommodates Staff plus one representative of the *Supervisor*/*Project Manager*,

c. contains all the remote controls and visual displays necessary for the safe operation of the TBMs and back-up facilities and

d. is equipped with monitors with links to video cameras to observe as a minimum

i. the tunnel lining build area,

ii. the segment supply magazine,

iii. the level of spoil in the plenum,

iv. train and gantry interface area,

v. slurry circuit mimic board showing status of circuit operation and

vi. the entry to the man lock and within the plenum during an intervention.

4.17.3 Video feeds are

- transmitted to the surface control room and are available for viewing by the *Supervisor*/*Project Manager* upon request and
- recorded and uploaded to the Project Common Data Environment (CDE) within seven days of the recording.

4.17.4 The data acquisition system monitoring all the operational parameters of the TBMs and its systems including the slurry circuit are transmitted via secure high capacity data cable to the surface control room. This will be

able to provide all the same information on the TBM control screens that are only visible in the cabin.

4.17.5 The operational parameters and records are captured by the *Contractor's* monitoring database.

4.18 TBM surface control room

4.18.1 An air conditioned TBM surface control room is provided with the same or equivalent visual displays as the subsurface TBM control cabin. Multiple facilities are provided within the same control room.

4.18.2 The surface control room has the ability to instruct the tunnelling to stop through direct communication with the subsurface TBM control cabin in accordance with a protocol developed by the *Contractor* and provided to the *Project Manager* in the event that the surface control room identifies that the tunnelling operation is causing an unacceptable risk including leaving voids behind the tunnel lining.

4.18.3 The visual displays provide a constant record and view of the excavated volume, grout volume and real time ground settlement monitoring.

4.18.4 The surface control room is manned by the direct employees of the *Contractor* with appropriate experience of the tunnelling activities on a 24/7 basis during tunnel construction.

4.19 Slurry circuit operation

4.19.1 The slurry circuit controls are directly linked to the TBM advance and operational status and are electronically displayed to show the circuit status recording the spoil volume per ring of each TBM advance both in the TBM control cabin and surface control room and the monitoring control area.

5 Monitoring

5.1 TBM operational control and monitoring data acquisition system

5.1.1 The *Contractor* provides a TBM operational control and monitoring data acquisition system.

5.1.2 All the TBM data is captured on the *Contractor's* monitoring database. The Contractor includes the proposed accuracy measurements in the TBM detailed design report.

5.1.3 The monitoring system records and reports the key information that ensures the reliable and safe operation of the TBMs.

5.1.4 The monitoring system also records all necessary parameters to ensure that ground movements are kept within the specified limits.

5.1.5 The monitoring system records in real time and reports all of the parameters listed in Table 1 below and the Scope as a minimum.

5.1.6 The system allows pre-programming of target values of TBM control parameters and monitor adherence to those values.

5.1.7 The TBM operating parameters are recorded and made available in real time in the monitoring control areas and captured by the *Contractor's* monitoring database.

5.1.8 All data is made available for the shift review group (SRG) meetings.

5.1.9 The *Contractor* trains the *Project Manager* (and its team) to use the system.

Table 1 - TBM parameters

parameter	units
progress	
ring no.	number
start excavation	dd/mm/yy hh:mm
finish excavation	dd/mm/yy hh:mm
net stroke	metres
instantaneous advance rate – in real-time graphical format	mm/min
position (easting, northing, elevation to project grid)	metres
chainage	metres
horizontal alignment control	mm from design
vertical alignment control	mm from design
TBM	
overbreak ram extension (if used)	mm
slurry pressure at crown, shoulder, axis & knee	MPa
thrust ram pressure	MPa
thrust ram stroke	mm
thrust ram speed	mm/min
copy cutter stroke (if used)	mm
copy cutter position (if used)	°
articulation ram stroke (all rams)	mm
articulation angle (vertical)	°
articulation angle (horizontal)	°
pitch	°
roll	°
cutter head rotation speed	rpm
cutter head rotation direction	CW/CCW
cutter head torque	kNm
power used	kW

parameter	units
temperature of drive motors	°C
slurry circuit	
face slurry pressure	MPa
compressed air pressure	MPa
slurry density (supply and return)	kg/m^3
slurry flow (supply and return)	litres / minute
environmental monitoring	
oxygen/ oxygen deficiency	%
carbon monoxide (CO)	ppm
carbon dioxide (CO_2)	%
methane (CH_4)	%LEL
hydrogen sulphide (H_2S)	ppm
sulphur dioxide (SO_2)	ppm
nitrogen dioxide and nitrous oxide (NO_2 & NO)	ppm
humidity	%RH
real time continuous dust monitoring supported by dust monitoring utilizing laboratory analysis	mg/m^3
temperature	°C
ventilation air flow velocity	m/s
face treatment	
volume of air	m^3/s
air pressure	MPa
vacuum erector	
operation of the vacuum activation button	dd/mm/yy hh:mm
operation of the segment definition sensors	dd/mm/yy hh:mm
vacuum sensor over 80%	dd/mm/yy hh:mm
vacuum sensor below 80%	dd/mm/yy hh:mm
vacuum pump on or off	dd/mm/yy hh:mm -on/off
erector head key table position	
grouting system	
volume of grout in tank	m^3
weight of grout in tank	tonne

parameter	units
tail grout injection pressure (all ports)	MPa
tail grout injection volume (individual ports and total)	m^3
compressed air	
records of compressed air lock usage and pressures during an intervention including	
air pressure	MPa
air temperature	°C
volume supplied	m^3
air lock usage	
pressures within compartments and TBM chamber	MPa
volume of water removed	m^3
screw conveyor where relevant for a multi-mode machine	
screw pressure	MPa
screw rotation speed	Rpm
screw torque	kNm
bulkhead gate open / closed	
discharge gate open/ closed and %age open	
earth pressure cells along the screw	MPa

5.2 Cutter Head

5.2.1 The following parameters, as a minimum, are monitored and recorded in relation to operation of the cutter head

a. position of cutter head in project coordinate system,

b. control of rotational direction, speed and index position,

c. cumulative record of operating hours,

d. main bearing and its sealing system contamination condition including oil flow, oil pressure, oil temperature, filter analysis. Where filter blockage is measured the contaminate is analysed to establish the bearing condition by analysis of metal parts per million,

e. power and torque,

f. an alarm linked to torque, shove rams and bubble or slurry face pressure sensors to shove rams. This includes low level slurry pressure detection and prevention of excavation if the slurry pressures fall below a predetermined setting,

g. isolation of drive for interventions to the cutter head,

h. wear and temperature indicators and alarms and

i. compressed air pressure and volume mode and control for tunnel face pressure.

5.3 TBM front body section

5.3.1 The following parameters, as a minimum, are monitored and recorded

a. control of the articulation rams/shove rams/groups of rams for stroke and guidance systems where fitted,

b. shove ram/groups of rams control and selection with proportional pressure feature when shoving,

c. slurry pressure sensors and interlocks,

d. steering control and link to guidance system,

e. control of the air lock and systems,

f. control of the slurry circuit and multi-mode screw conveyor and

g. control of TBM roll.

5.4 TBM rear body section

5.4.1 The following parameters, as a minimum, are monitored and recorded

a. shove rams for stroke and guidance systems,

b. shove ram control and selection with proportional pressure feature when shoving,

c. fast retraction or extension of individual or groups of rams when ring building and

d. interlock and transfer to erect mode.

5.5 Tailskin and associated equipment

5.5.1 The following parameters, as a minimum, are monitored and recorded in relation to the rear shield

a. tail seal grease delivery, indicating distribution, pressure and warnings,

b. grout volume and pressure delivery interlocked with advance rate and shove rams,

c. proof drilling to confirm the effectiveness of the through tail grouting and

d. back grouting to ensure no voids are left in the ground behind the linings.

5.6 Slurry circuit

5.6.1 The slurry system monitors as a minimum

a. the density of the slurry entering and returning together with the pumped volume enabling automatic calculation of the weight and volume of material excavated per metre of tunnel advance,

b. the condition of the pumps and the condition and wear of pipes at locations where the *Contractor* considers there is a high risk of wear,

c. the charge slurry pressure and flow,

d. control of the rock crusher and

e. the slurry by-pass circuit for re-circulation during TBM stoppages both on the TBMs and in the pit bottom.

5.6.2 The following parameters, as a minimum, are monitored and recorded in relation to the operation of the screw conveyor for a multi-mode TBM

a. speed, torque, earth pressure and link to the control system,

b. the injection of spoil conditioning fluids – volume and pressure,

c. theoretical spoil volume measurement/ ring recorded for comparison, this is available in real time throughout the advance,

d. gates open/closed and, in addition, percentage open for back gate (top of screw conveyor) and

e. slurryfier box speed and torque of contra-rotating grader/crusher.

f. Segment erector

5.6.3 The following parameters are monitored and recorded in relation to operation of the segment erector

a. number of the ring being erected,

b. position of leading edge of ring in project coordinate system,

c. interlock to allow individual or group operation of shove rams when segment erecting,

d. safe lifting alarms,

e. vacuum monitoring for segment lifting and

f. automatic segment identification to position the key and ring interlocked with tail to segment extrados measurement.

5.7 Erector bridge

5.7.1 The following parameters are monitored and recorded in relation to the erector bridge

a. the back-up towing forces with alarm for high pressure and cut-out of shove rams for excessive pressure/roll/twist and

b. trial of a non-intrusive measurement of the annulus between segment extrados and the ground to check any voids due to over-break or lack of grouting.

5.8 Guidance and control system

5.8.1 During forward movement of the TBMs, the guidance system provides the following minimum “real-time” data for the TBMs, with reference to the designed tunnel alignment at the machine head

a. station (chainage),

b. horizontal / line displacement,

c. vertical / level / grade displacement,

d. left or right lead at axis level,

e. overhang or look-up / pitch at axis level and

f. main axis rotation (roll).

5.8.2 The information is presented in numerical and graphical form, refreshed every 20 seconds or at shorter intervals. The precision of each measurement is as stated in the Table 2 below.

Table 2 - Precision of position measurements

data	accuracy
station (chainage)	+/- 5mm
horizontal displacement	+/- 2mm
vertical displacement	+/- 2mm
left or right lead	+/- 0.1mm/m
overhang or look-up	+/- 0.1mm/m
main axis rotation (roll)	+/- 0.1mm/m

5.8.3 The data is presented in real time on displays in the TBM subsurface control cabin, the TBM surface control room and in the monitoring control areas. The data is recorded in the *Contractor's* monitoring database.

5.8.4 The tunnelling system is designed to maintain a clear space for the guidance system and laser beam and theodolite survey checks, irrespective of the TBMs' orientation.

5.8.5 The guidance system includes the following functions

a. the guidance system operates continuously. The system is designed to undertake a real time check of the position of the TBM cutter head and tail skin relative to the theoretical alignment entered into the guidance system on an hourly basis and this is recorded in the TBM database. Any discrepancy or trend that exceeds the tolerance is alarmed in the sub surface TBM control cabin and surface control room,

b. the guidance system alarms when the tunnel alignment is predicted to go out of tolerance,

c. automatic checks carried out at regular frequencies sufficient to prevent the TBMs going offline or an additional independent non-manual check is initiated at the commencement of each shift,

d. TBM position relative to surface topography, surface and subsurface infrastructure with real time movements is indicated,

e. the guidance system is self-checking, has redundancy in essential components, generates and records appropriate status messages for delivery when remotely or locally interrogated and alerts the operator to fault conditions immediately when they occur,

f. the guidance system has an uninterrupted power supply system to prevent data loss in the event of loss of primary power and

g. the guidance system, including cabling and connectors, is capable of a sustained, safe operation within the onerous tunnel construction environment which includes dust, water, high humidity, large temperature ranges, varying quality of power supply and sustained vibration.

5.8.6 If the guidance system stops working an interlock prevents the TBMs advancing.

5.8.7 The *Project Manager* has access to the TBM control cabins, the TBM control room and the monitoring control areas.

5.8.8 The *Contractor* trains the *Project Manager* (and its team) to use the system.

5.8.9 Facilities are provided on the TBMs to download the data for electronic transmission and for obtaining hard copy paper printouts, independently of the current display.

5.8.10 Data is recorded in a medium unaffected by primary power loss in a store of sufficient capacity to hold the entire tunnels production records.

5.8.11 The *Contractor* provides a TBM guidance system that keeps the tunnel within the accepted tolerance and computes the correction curve required to return the TBMs tangentially to the designed tunnel alignment (DTA) throughout the forward movement of the TBMs.

5.8.12 The guidance system computes and displays the necessary corrections to the current attitude of the TBMs which are applied during the course of the next forward movement.

5.8.13 In the event the TBMs are driven out of tolerance the correction curve re-alignment is designed by the *Contractor* and submitted to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, before it is implemented.

5.8.14 The guidance system facilitates construction of the tunnel lining so that it follows, and does not bind into, the TBM tail-skin.

5.8.15 The system provides data defining the plane of the circumferential joint of the leading edge of the tunnel lining with respect to the DTA and actual TBM axis.

5.8.16 The guidance system predicts the horizontal and vertical displacement of the TBMs at suitable intervals in front of the TBMs to assist in understanding steering requirements.

5.8.17 Laser measurement of the tail skin to segment extrados gap is inputted into the guidance system.

5.9 Environmental conditions

5.9.1 Control and monitoring of environmental conditions include the following

a. a gas detection system to monitor for oxygen deficiency and gasses including CO_2, CO, H_2S, NO, NO_2, SO_2 and CH_4. The data acquisition unit includes provision for the monitoring of tunnel gas alarms throughout the tunnel to provide early warning to the TBM operator of potential gas danger,

b. fire protection systems,

c. CCTV monitoring of Working Areas,

d. electrical power,

e. temperature,

f. humidity,

g. dust monitoring,

h. inundation of the cutter-head chamber,

i. ventilation air supply (including failure) and

j. noise monitoring.

5.9.2 All control and monitoring of environmental conditions are supported by an uninterrupted power supply system and resilient communications capable of relaying data under all operational modes (normal, degraded, accident and emergency) to surface operators with additional warning communication to cross passages under construction.

5.10 Grouting check

5.10.1 The *Contractor* carries out proof drilling to confirm there are no voids behind the segmental lining. Proof drilling is carried out from the first back up gantry.

5.10.2 Proof drilling patterns are submitted to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

5.10.3 Where a risk of voids is indicated by the spoil reconciliation the *Contractor* undertakes back grouting immediately to ensure the voids and the annulus around the lining is filled with grout.

5.10.4 A permanent record of proof drilling and grout take are captured on the *Contractor's* monitoring database.

5.11 Data format

5.11.1 The *Contractor* includes the format of all data in the TBM detailed design report.

5.11.2 The *Contractor* assigns unique identification for each parameter to allow comparison with other project monitoring systems.

5.11.3 The format complies with the association of geotechnical and geo-environmental specialists (AGS) format as defined in 'Electronic Transfer of Geotechnical and Geo-environmental Data (Edition 3.1) including addendum May 2005'. The specification is available from the AGS web site: http://www.ags.org.uk.

5.11.4 The data provides full details of all measured parameters together with commentary on variations in the parameters and the performance of the TBMs.

5.11.5 The data is formatted to be unique to each ring advance and referenced in 3-D coordinates to the Project grid and tunnel datum.

5.12 Frequency

5.12.1 The *Contractor* designs the TBM instrumentation and monitoring system so that all parameters are measured simultaneously and related to the time (yyyy-mm-dd hr:min) and the tunnel chainage.

5.12.2 The *Contractor* includes the frequency of monitoring in the TBM detailed design report.

6 Back-up systems

6.1 General

6.1.1 The *Contractor* designs and provides the back-up system and the transport system so that its performance and availability match the specified TBM performance.

6.1.2 Loading from the back-up on to the segmental lining takes account of the rate of gain of the grout strength and ensures there is no segment damage.

6.1.3 The back-up system is fitted with nylon wheeled, hydraulically steerable bogies on all supports running tangentially on the tunnel lining or a rail system with mechanical handling facilities.

6.1.4 The TBM magazine and segment off loader is provided with clear sight lines unobstructed by rolling stock whilst travelling and operating the cranes.

6.1.5 The *Contractor* provides a refuge chamber sufficient to accommodate the number of persons identified to be at risk of fire or smoke hazards in the tunnel including the entire TBM personnel, loco drivers, surveyors, fitters, engineers, electricians and six additional persons. The *Contractor* undertakes a risk assessment to determine the size of the refuge chamber. The sizing of the refuge chamber is included in the TBM detailed design report.

6.1.6 The chamber complies with the requirements of BS 6164 2019, the international tunnelling and underground space association (ITA) guidelines for provision of refuge chambers in tunnels under construction and other relevant standards. This takes account of the number of people in the tunnel at shift changeover if this is done underground.

6.1.7 The *Contractor* limits the number of persons allowed in the tunnel to the capacity of the refuge chamber outlined in section 6.1.5 above.

6.1.8 The backup design has sufficient clearance within it enabling the safe passage of Equipment and personnel.

6.1.9 The *Contractor* ensures the backup has fully compliant welfare facilities for the number of people working on the TBMs including hot and cold running water (including a continuous supply of drinking water), four unisex flushing toilets with sanitary disposal, messing facilities with microwave and refrigerator, eye wash stations, first aid facilities and drying facilities. The facilities are kept clean and in full working order at all

times and located at a convenient location within the TBM backup. The welfare facilities are included in the TBM scheme design and TBM detailed design report.

6.1.10 The *Contractor* provides an office of minimum plan dimensions of 3m x 2m with a desk and two chairs for the *Supervisor's* and *Project Manager's* engineers. It also contains IT connection and telephone to the surface.

6.1.11 The *Contractor* provides a workshop of sufficient dimensions to accommodate all tools, Equipment and high wear component spares for the maintenance of the TBMs.

6.1.12 The TBM back-up incorporates an area for proof drilling and back grouting operations.

6.1.13 The *Contractor* considers the laying of the tunnel road deck concurrent with TBM operation and incorporates the system within the back-up system or separately and independent of the TBM back-up.

7 Grouting system

7.1 General

7.1.1 The annular void between the tunnel lining extrados and the excavated ground is grouted by means of injection ports located within the tail skin of the TBMs using a constant pressure grout injection system in accordance with section 4.5.

7.1.2 The grouting system is installed on the back-up gantries.

7.1.3 The grout consists of a part "A" constituent which consists of the bulk cementitious element of the grout and part "B" which consists of the accelerator.

7.1.4 A minimum of two rings worth of grouting constituents are available at the TBMs sufficient to fill the annulus of two rings at any time. A piped system can be used to provide an equivalent level of supply.

7.1.5 The grouting station is located such that the grout operator has visibility and control of the operation and displays of all flows, pressures and other relevant parameters. These parameters are duplicated in the subsurface TBM control cabin, the surface control room and the monitoring control area. Grouting is a continuous process throughout the advance stroke.

7.1.6 Grout liquid and accelerator are fed by separate supply lines and only mixed at the injection port.

7.1.7 The injection nozzles are self-cleaning.

8 Electrical specification

8.1 Standards

8.1.1 All TBM electrical installations comply with all relevant regulations and with all relevant British and European standards.

8.1.2 The following list of relevant regulations and standards is non-exhaustive and without limitation

a. BS 6164:2019 Code of practice for health and safety in tunnelling in the construction industry,

b. BS EN 12336:2005+A1:2008 Tunnelling machines. Shield machines thrust boring machines, auger boring machines, lining erection equipment. Safety requirements,

c. Electricity at Work Regulations 1989,

d. BS 7671:2008+A1:2011 Requirements for electrical installations. IET Wiring Regulations. Seventeenth edition,

e. PD 5304 Guidance on safe use of machinery,

f. BBS EN 12100:2010 Safety of machinery. General principles for design. Risk assessment and risk reduction,

g. BS 7430:2011 Code of practice for protective earthing of electrical installations,

h. BS EN 60204-1:2006+A1:2009 Safety of machinery. Electrical equipment of machines. General requirements,

i. BS EN 60204-11:2000, IEC 60204-11:2000 Safety of machinery. Electrical equipment of machines. Requirements for HV equipment for voltages above 1000 V a.c. or 1500 V d.c. and not exceeding 36 kV,

j. BS EN 60204-31:1998 Safety of machinery. Electrical equipment of machines,

k. BS EN 60204-32:2008 Safety of machinery. Electrical equipment of machines. Requirements for hoisting machines,

l. BS EN 60204-33:2011 Safety of machinery. Electrical equipment of machines. Requirements for semiconductor fabrication equipment,

m. BS 7375:2010 Distribution of electricity on construction and demolition site. Code of practice,

n. BS EN 60529:1992 Specification for degrees of protection provided by enclosures (IP code) including 09/30214184DC Degrees of protection provided by enclosures (IP code). Proposal on IPX9 "High pressure water test",

o. BS 6724:1997+A3:2008 Electric cables. Thermosetting insulated, cables for voltages of 600/1000 V and 1900/3300 V, having low emission of smoke and corrosive gases when affected by fire,

p. BS EN 60034-19 Rotating electrical machines of particular types or for particular applications. Generators to be driven by reciprocating internal combustion engines. Requirements for resistance to vibration,

q. BS EN 60898-1:2003+A13:2012 Electrical accessories ± Circuit breakers for overcurrent protection for household and similar installations. Circuit-breakers for a.c. operation,

r. BS EN 60898-1:2003+A12004 Electrical accessories. Circuit breakers for overcurrent protection for household and similar installations. Circuit-breakers for a.c. operation and

s. BS EN 60898-2:2006 Electrical accessories. Circuit-breakers for overcurrent protection for household and similar installations. Circuit-breakers for a.c and d.c. operation.

8.2 Electrical system

8.2.1 The *Contractor* provides electrical systems that incorporate the features and capabilities described below and submits the voltages of the various power supply systems within the TBM scheme design report. This includes the proposed main TBM feed from the surface, the supply from the main transformer on the TBM backup to the lighting and other electrical systems and Equipment on the TBMs and the method proposed for providing power supply to the lights immediately behind the advancing TBMs that are not fed directly from the surface. The following are included

a. the TBMs are equipped with sulphur thermistors (SF6) or vacuum high voltage disconnection switches and dual HV to 415V, dry type, air cooled or inert oil filled transformers, with primary adjustable tappings,

b. control Equipment enclosures conform to a minimum of BS EN 60529 IP55 and all control components are of the same manufacture wherever possible,

c. all miniature circuit breakers (MCBs) or moulded case circuit breakers (MCCBs) used will conform to BS 60898 set with a safe fault trigger level that do not electrocute personnel,

d. motors are totally enclosed, water or fan cooled to BS 5000 and are equipped with conventional overload protection and thermistors embedded in the motor windings to be used for fault trips to prevent the motors burning out or risk of fire. This is relevant for all motors

that are above 15kW, with those below requiring protection from overload, short circuit and phase failure. The system alarms in the subsurface TBM control cabin and surface control room. Electrical main drive motors are water-cooled,

e. the motor starting methods are selected so as to ensure that large starting currents are avoided and motors are equipped with lockable isolators where supplies are remote,

f. the cables used for distribution around the machine have the following characteristics

   i. low smoke zero halogen (LSZH/LSOH),

   ii. PVC cables are not permitted,

   iii. high oxygen index,

   iv. minimum acid and corrosive gas emission,

   v. good resistance to oil, abrasion and heat,

   vi. power cables have earth cores and armouring or are suitably protected by physical means,

   vii. all cables are screened,

   viii. a cable handling system is required to ensure that flexible cables to the head of the TBMs are supported without unnecessary slack in the cable and

   ix. cable runs are accessible and protected,

g. the use of these cables conforms to BS 7375,

h. the TBMs are equipped with a flexible trailing cable contained on a powered reeling drum,

i. pilot and earth monitoring of the TBM supply cable are provided,

j. the *Contractor* ensures there is sufficient lighting to all areas particularly where there are workstations together with emergency battery powered back up lighting to enable evacuation in a power cut,

k. rope lighting is provided to guide people through the TBMs in an emergency,

l. emergency lock-off stop buttons are provided adjacent to moving parts,

m. means of connecting and disconnecting the machine for cable extensions are provided without causing loss of essential services required to maintain safety. Dual supplies are provided as necessary,

n. all switchgear transformers and protection Equipment including power on indication, power metering and phase rotation indication are provided,

o. appropriate power factor correction Equipment to ensure that the power factor of the entire electrical load for the construction works is not lower than 0.9 lagging,

p. clear uninterrupted and well-lit access is provided clear of obstructions for isolation and arrangements made so that the main power supply can be cut off in an emergency,

q. main cable runs are segregated from control and communication cables and all cables are laid separate from hydraulic hoses,

r. The TBMs and all the TBM gantries are earthed through the mains supply pilot core. A means of monitoring the connection of the TBMs to tunnel earth is provided and the power supply cut out if this is broken,

s. where more than one transformer is utilised to supply the TBMs, a means of transferring load under outage conditions is provided and the transformers sized accordingly,

t. audible and visual warnings are provided at the start of all moving parts of the TBM Equipment where appropriate. These include

    i. TBM cutter head,

    ii. TBM pump system,

    iii. TBM shove rams in excavation and ring building modes,

    iv. segment erector,

    v. segment magazine,

    vi. segment cranes,

    vii. rail or services cranes and

    viii. tunnel train/MSV entry and exit from the TBM back-up and

u. a back-up power supply is provided to allow critical activities on the TBMs to be completed and maintain essential services to the refuge

chamber and air lock and to leave the TBMs, segment erector and Equipment in a safe shutdown position including the ventilation, pumps and lighting in case of a power failure. This can be in the form of a generator on the machine capable of supplying power for the ventilation, pumps and lighting at the face in case of power failure. The air lock is rated to IP66.

8.2.2 All electrical enclosures are a minimum IP55 (if not possible alternative arrangements are made to provide secondary enclosure). The IP rating for power transformers is not less than IP55. If this is not practicable due to space restrictions, enclosures to a lower IP rating are acceptable providing additional external measures adequately protect the transformer from the environmental conditions, including water ingress due to burst water hoses or washing down activities that might reasonably be expected in the area.

8.2.3 Midel 7131 ester based dielectic fluid filled, resin cast or air-cooled transformers are permitted or equivalent but not oil cooled.

8.2.4 Power transformers are resin cast or equivalent and the windings arranged in a segregated manner (to UK mining standard) to minimise the possibility of short circuits between phases.

8.2.5 Safety interlocks are provided between power supply isolators and access to enclosures.

8.2.6 Each cable is secured with a gland to enclosures to ensure positive earth continuity using appropriate seals to maintain the integrity of the IP rating of the enclosures.

8.2.7 The TBMs are an equipotential zone within which all exposed conductive parts and extraneous metalwork are maintained at substantially the same potential by bonding.

8.2.8 Individual circuits are provided with over current earth fault and short circuit protection.

8.2.9 Equipment is readily accessible but located out of danger from being damaged by moving machinery or materials.

8.2.10 Distribution boards are well laid out and maintenance friendly, with segregation between busbars and outgoing cables. Busbars are shrouded.

8.2.11 Where more than one transformer is to be used, interconnections with the busbars are via a bus-section switch interlocked in such a way that the two supplies cannot be paralleled (i.e. only two of three switches can be closed) and the fault rating of the busbars deal with the worst-case conditions.

8.2.12 Spare circuit breakers are provided to allow expansion of the system.

8.2.13 Circuit protection is simple and reliable.

8.2.14 Earth fault supplies are monitored with indication of failure.

8.2.15 Grading of earth fault protection

a. 750mA, 750ms - main distribution,

b. 300mA, 300ms - sub distribution,

c. 100mA, 100ms - fixed plant and

d. 30mA instantaneous socket outlet.

8.2.16 Every circuit breaker has a locking facility.

8.2.17 Terminal shrouds are be fitted to all live terminals.

8.2.18 Gland plates are bottom entry preferably. Where side entry is used a water cover is fitted. No top entry is used.

8.2.19 All socket outlets have Residual Current Device (RCD) protection of 30 milli-ampere (mA) instantaneous.

8.2.20 For power tools and lighting the voltage does not exceed 55 volts to earth and in confined or damp locations does not exceed 25 volts to earth.

8.2.21 Earth loop monitoring is provided in the design of circuits controlling the supply to low voltage socket outlets.

8.3 Control system

8.3.1 All systems are robust and designed to prevent accidental damage and fail to safe. Careful attention is paid to cabling to ensure damage does not cause inadvertent operation.

8.3.2 The control systems comply with BSEN 292/ BSEN 60204.

8.3.3 Screened cores are used in cabling and earthed down at both ends at terminations.

8.3.4 24 volt control circuits are used for moving Equipment (for example, cranes) and designed to ensure that closing a circuit breaker does not start its motor.

8.3.5 All control circuit trip relays are latch type (for example, thermistors) or latch indication (for example, overload).

8.3.6 Relay banks and terminations are segregated from power supplies.

8.3.7 Plant stop relays are designed to fail to safe.

8.3.8 All wires and cables are individually numbered and tagged.

8.3.9 Where possible all control circuits and components are standardised.

8.3.10 Monitored pre-start alarms are installed for main plant systems.

8.3.11 Programmable logic controllers (PLCs) are provided with clean segregated supplies.

8.3.12 PLC software is fully protected from unauthorised access with enforced authorisation for change.

8.3.13 Solenoid valves are sealed from oil and water ingress and be readily tested.

8.3.14 Remote pendant controls incorporate a 'dead man's' facility.

8.3.15 All safety critical functions are handled outside PLCs.

8.4 Motors

8.4.1 Cutterhead motors are to be rated to IP67. Other electric motors are IP55 rating. All motors have 20 percent latitude above the full load requirement and fitted with overload cut-outs and trips. Cable link boxes are readily accessible.

8.5 Emissions

8.5.1 The *Contractor* arranges for the complete TBMs and back-up systems to be tested for electrical emissions in conformance with “The Amended Consolidated EMC Directive reference 2004/108/EC” and issued with Conformité Européene conformance certification. This information is provided to the *Project Manager*.

9 Hydraulic specification

9.1 Main hydraulic drive systems

9.1.1 The main hydraulic drive systems of the TBMs include

a. cutter head auxiliary functions (for example copy cutters),

b. articulating ram functions,

c. shove rams,

d. segment erector,

e. segment magazine,

f. screw conveyor and

g. auxiliary back-up functions.

9.1.2 All hydraulic components are suitable for operations using the specified hydraulic fluid (HFDU) working at the maximum working pressures and tested to the maximum design pressure.

9.1.3 The TBM design report identifies the working pressure and the maximum pressure under special control.

9.1.4 All hydraulic systems comply with ISO/Deutsches Institut für Normung e.V. (DIN) technical standards including

a. DIN 24346 Hydraulic fluid power - hydraulic systems; general rules for application,

b. DIN EN ISO 4413 Hydraulic fluid power - General rules and safety requirements for systems and their components,

c. DIN ISO 1219-1 Fluid power systems and components - Graphic symbols and circuit diagrams - Part 1: graphic symbols for conventional use and data-processing applications and

d. DIN ISO 1219-2 Fluid power systems and components - Graphic symbols and circuit diagrams - Part 2: circuit diagrams.

9.1.5 The *Contractor* lists the standards used against the components in the TBM detailed design report.

9.2 Hydraulic oil

9.2.1 Only synthetic hydraulic fluids type HFDU (biodegradable, fire resistant, polyesters) are permitted within the TBMs' hydraulic systems.

9.2.2 The *Contractor* obtains approval from the *tunnel boring machine supplier* for all oils and grease and materials used on the TBMs.

9.2.3 The *Contractor* obtains approval from the Environment Agency for tail seal grease and materials in contact with or with the potential to be in contact with the ground water.

9.3 Particular requirements

9.3.1 All circuits are equipped with pressure test and gauge points. All circuits are purged and sample tested for cleanliness prior to operation.

9.3.2 All hydraulic tanks as a minimum

a. are provided with manual valves to allow instantaneous isolation of individual circuits in the event of substantial leakage. A manual sequential shutdown is implemented in the event that a leak occurs, with a monitoring system indicating a potential leak,

b. are provided with high and low level oil warnings and cut-outs,

c. have easily accessible removable manholes to allow for tank cleaning,

d. have filters to prevent contamination from airborne dust on all tank breathers,

e. have high temperature cut out in excess of 60 degrees centigrade,

f. have oil containment trays fitted under tanks,

g. have pressure lines with 10 microns size filtration and return lines with 25 microns,

h. have an offline water separation with either 7 microns filtration, centrifuge package or vacuum package or combination of all and

i. have a hydraulic tank filling via a filter.

9.3.3 All main hydraulic circuits are supplied with devices to monitor

a. the pressure in the system,

b. the oil temperature and

c. the condition of pressure and return line filter elements.

9.3.4 Hydraulic piping is rigid metal tubing wherever possible.

9.3.5 The use of flexible steel reinforced hose is kept to a minimum.

9.3.6 Wherever possible valves are provided in hydraulic circuits to allow removal and repair of components without stopping the operation of the TBMs.

9.4 TBM shield articulation for alignment control

9.4.1 Active type: oil pressure does not exceed the maximum that both the TBM system and the segments are designed for taking account of intensification due to the cutting and pushing forces.

9.4.2 Passive type: oil pressure does not exceed the maximum that the TBM system is designed for taking account of intensification from the towing forces.

9.4.3 Shove rams have three modes of operation

a. shove mode defines the maximum oil working pressure in bars, allows the rams to be selected to operate for high and low shove pressure and defines the maximum working pressure under special conditions (defined in the TBM design report and TBM operations and maintenance manual) that the shove ram pressure can be increased to,

b. fast retract mode for ring building and

c. segment erection mode. In segment erection mode the working pressure is variable to balance the face pressure with the nominal maximum being defined (this is an active pressure).

10 Safety

10.1 Regulations

10.1.1 The design and manufacture of the TBMs and back-up systems comply with all applicable relevant Codes of Practice relating to safety and relevant British and European standards including those described below.

10.1.2 The *Contractor* complies with

a. Tunnelling machinery. Safety Standards BS EN 16191 2014,

b. BS EN 12336:2005+A1:2008 Tunnelling machines. Shield machines, thrust boring machines, auger boring machines, lining erection equipment. Safety requirements,

c. BS EN 12110: 2002 +A1:2008 Tunnelling Machines-Air Locks-Safety Requirements,

d. 10/30234293 DC BS EN 12110. Tunnelling machines. Air locks. Safety requirements (the new specification under review),

e. BS 6164:2019 Code of practice for Safety in tunnelling in the construction industry,

f. BTS “Guide to the Work in Compressed Air Regulations 1996” of 2012,

g. ITA Report No 10 Joint ITA / BTS CAWG “Guidelines for Good Working Practice in High Pressure Compressed Air” ITA Working Group No5 Health & Safety in Works of Feb 2012,

h. EH40/2005 Workplace exposure limits Second Edition 2011,

i. BS EN ISO 9000:2005 Quality management systems. Fundamentals and vocabulary, and BS EN 9000:2008 Quality management systems. Requirements,

j. BS EN 60079 Electrical apparatus for potentially explosive atmospheres including relevant sections of the following:

   i. BS EN 60079-0:2012 Explosive Atmospheres. Equipment. General requirements,

   ii. BS EN 60079-1:2007 Explosive atmospheres. Equipment protection by flameproof enclosures "d" including 11/30247086DC Explosive atmospheres. Part 1. Equipment protection by flameproof enclosures “d”,

   iii. BS EN 60079-5:2007 Explosive atmospheres. Equipment protection by powder filling "q" including 12/30267444DC Explosive atmospheres. Part 5. Equipment protection by powder filling” q”,

   iv. BS EN 60079-6:2007 Explosive atmospheres. Equipment protected by oil immersion "o",

v. BS EN 60079-7:2007 Explosive atmospheres. Equipment protection by increased safety "e",

vi. BS EN 60079-10-1:2009 Explosive atmospheres. Classification of areas. Explosive gas atmospheres,

vii. BS EN 60079-10-2:2009 Explosive atmospheres. Classification of areas. Combustible dust atmospheres,

viii. BS EN 60079-11:2012 Explosive Atmospheres. Equipment protection by intrinsic safety “I” including 09/30212062DC Explosive atmospheres. Part 11. Equipment protection by intrinsic safety "i",

ix. BS EN 60079-13:2010 Explosive atmospheres. Equipment protection by pressurized room "p",

x. BS EN 60079-14:2008 Explosive atmospheres. Electrical installations design, selection and erection including 12/30269297DC Explosive atmospheres. Electrical installations design, selection and erection,

xi. BS EN 60079-15:2010 Explosive atmospheres. Equipment protection by type of protection "n,

xii. BS EN 60079-17:2007 Explosive atmospheres. Electrical installations inspection and maintenance including 12/30268608 Explosive atmospheres. Electrical installations inspection and maintenance,

xiii. BS EN 60079-18:2009 Explosive atmospheres. Equipment protection by encapsulation "m",

xiv. BS EN 60079-19:2011 Explosive atmospheres. Equipment repair, overhaul and reclamation,

xv. BS EN 60079-20-1:2010 Explosive atmospheres. Material characteristics for gas and vapour classification. Test methods and data,

xvi. BS EN 60079-25:2010 Explosive atmospheres. Intrinsically safe electrical systems,

xvii. BS EN 60079-26:2007 Explosive atmospheres. Equipment with equipment protection level (EPL) Ga,

xviii. BS EN 60079-28:2007 Explosive atmospheres. Protection of equipment and transmission systems using optical radiation,

xix. BS EN 60079-29-1:2007 Explosive atmospheres. Gas detectors. Performance requirements of detectors for flammable gases,

xx. BS EN 60079-29-2:2007 Explosive atmospheres. Gas detectors. Selection, installation, use and maintenance of detectors for flammable gases and oxygen,

xxi. BS EN 60079-29-3 Explosive atmospheres. Part 29-3. Gas detectors. Guidance on functional safety of fixed gas detection systems including 12/30247700DC Explosive atmospheres. Part 29-3. Gas detectors. Guidance on functional safety of fixed gas detection systems,

xxii. BS EN 60079-29-4:2010 Explosive atmospheres. Gas detectors. Performance requirements of open path detectors for flammable gases,

xxiii. BS EN 60079-30-1:2007 Explosive atmospheres. Electrical resistance trace heating. General and testing requirements,

xxiv. BS EN 60079-30-2:2007 Explosive atmospheres. Electrical resistance trace heating. Application guide for design, installation and maintenance,

xxv. BS EN 60079-31:2009 Explosive atmospheres. Equipment dust ignition protection by enclosure "t" including 12/30261858DC Explosive atmospheres. Equipment dust ignition protection by enclosure "t",

xxvi. BS EN 981:1996+A1:2008 Safety of machinery. System of auditory and visual danger and information signals,

xxvii. BS EN 60034-9:2005 Rotating electrical machines. Noise limits,

xxviii. BS EN ISO/IEC 17050-1:2010 Conformity assessment. Supplier's declaration of conformity. General requirements,

xxix. BS EN 61310-1:2008 Safety of machinery. Indication, marking and actuation. Requirements for visual, acoustic and tactile signals,

xxx. BS EN 1012:2010 Compressors and vacuum pumps; Safety requirements. Air compressors,

xxxi. BS EN 1012-2:1996+A1:2009 Compressors and vacuum pumps. Safety requirements. Vacuum pumps,

xxxii. BS EN ISO 1688-1:2009 Acoustics. Recommended practice for the design of low-noise machinery and equipment. Planning and

xxxiii. BS EN ISO / TR 11688-2:2001 Acoustics. Recommended practice for the design of low-noise machinery and equipment. Introduction to the physics of low-noise design.

10.1.3 The *Contractor* includes in its TBM design report how it has complied with

a. Health and Safety at Work Act 1974,

b. The Health and Safety at Work etc. Act 1974 (Application to Environmentally Hazardous Substances) (Amendment) Regulations 2009,

c. The Management of Health and Safety at Work Regulations 1999,

d. The Management of Health and Safety at Work (Amendment) Regulations 2006,

e. The Workplace (Health, Safety and Welfare) Regulations 1992,

f. Tunnelling machinery. Safety Standards BS EN 16191 2014,

g. The Health and Safety (Display Screen Equipment) Regulations 1992,

h. The Provision and Use of Work Equipment Regulations 1998,

i. The Lifting and Lifting Equipment Regulations 1998,

j. The Work at Height Regulations 2005 (as amended) and The Work at Height (Amendment) Regulations 2007 and Correction 4/11/11,

k. The Noise at Work Regulations 2005,

l. The Control of Vibration at Work Regulations 2005,

m. The Control of Noise at Work Regulations 2005,

n. The Health and Safety (Safety Signs and Signals) Regulations 1996,

o. The Dangerous Substances and Explosive Atmospheres Regulations 2002,

p. The Control of Substances Hazardous to Health Regulations 2002 including Amendments of 2003, 2004,

q. BS EN 12336:2005+A1:2008 Tunnelling machines. Shield machines, thrust boring machines, auger boring machines, lining erection equipment. Safety requirements,

r. BS EN 12110: 2002 +A1:2008 Tunnelling Machines-Air Locks-Safety Requirements,

s. 10/30234293 DC BS EN 12110. Tunnelling machines. Air locks. Safety requirements (the new specification under review),

t. BS 6164:2019 Code of practice for Safety in tunnelling in the construction industry,

u. The Work in Compressed Air Regulations 1996,

v. BTS “Guide to the Work in Compressed Air Regulations 1996” of 2012,

w. ITA Report No 10 Joint ITA / BTS CAWG “Guidelines for Good Working Practice in High Pressure Compressed Air” ITA Working Group No5 Health & Safety in Works of Feb 2012,

x. The Construction (Design and Management) Regulations 2015,

y. The Personal Protective Equipment at Work Regulations 2002,

z. The Regulatory Reform (Fire Safety) Order 2005,

aa. The Regulatory Reform (Fire Safety) Subordinate Provisions Order 2006,

bb. EH40/2005 Workplace exposure limits Second Edition 2011,

cc. BS EN ISO 9000:2005 Quality management systems. Fundamentals and vocabulary, and BS EN 9000:2008 Quality management systems. Requirements,

dd. BS EN 60079 Electrical apparatus for potentially explosive atmospheres including relevant sections of the following:

    i. BS EN 60079-0:2012 Explosive Atmospheres. Equipment. General requirements,

    ii. BS EN 60079-1:2007 Explosive atmospheres. Equipment protection by flameproof enclosures "d" including 11/30247086DC Explosive atmospheres. Part 1. Equipment protection by flameproof enclosures “d”,

iii. BS EN 60079-5:2007 Explosive atmospheres. Equipment protection by powder filling "q" including 12/30267444DC Explosive atmospheres. Part 5. Equipment protection by powder filling “q”,

iv. BS EN 60079-6:2007 Explosive atmospheres. Equipment protected by oil immersion "o",

v. BS EN 60079-7:2007 Explosive atmospheres. Equipment protection by increased safety "e",

vi. BS EN 60079-10-1:2009 Explosive atmospheres. Classification of areas. Explosive gas atmospheres,

vii. BS EN 60079-10-2:2009 Explosive atmospheres. Classification of areas. Combustible dust atmospheres,

viii. BS EN 60079-11:2012 Explosive Atmospheres. Equipment protection by intrinsic safety “I” including 09/30212062DC Explosive atmospheres. Part 11. Equipment protection by intrinsic safety "i",

ix. BS EN 60079-13:2010 Explosive atmospheres. Equipment protection by pressurized room "p",

x. BS EN 60079-14:2008 Explosive atmospheres. Electrical installations design, selection and erection including 12/30269297DC Explosive atmospheres. Electrical installations design, selection and erection,

xi. BS EN 60079-15:2010 Explosive atmospheres. Equipment protection by type of protection "n”,

xii. BS EN 60079-17:2007 Explosive atmospheres. Electrical installations inspection and maintenance including 12/30268608 Explosive atmospheres. Electrical installations inspection and maintenance,

xiii. BS EN 60079-18:2009 Explosive atmospheres. Equipment protection by encapsulation "m",

xiv. BS EN 60079-19:2011 Explosive atmospheres. Equipment repair, overhaul and reclamation,

xv. BS EN 60079-20-1:2010 Explosive atmospheres. Material characteristics for gas and vapour classification. Test methods and data,

xvi. BS EN 60079-25:2010 Explosive atmospheres. Intrinsically safe electrical systems,

xvii. BS EN 60079-26:2007 Explosive atmospheres. Equipment with equipment protection level (EPL) Ga,

xviii. BS EN 60079-28:2007 Explosive atmospheres. Protection of equipment and transmission systems using optical radiation,

xix. BS EN 60079-29-1:2007 Explosive atmospheres. Gas detectors. Performance requirements of detectors for flammable gases,

xx. BS EN 60079-29-2:2007 Explosive atmospheres. Gas detectors. Selection, installation, use and maintenance of detectors for flammable gases and oxygen,

xxi. BS EN 60079-29-3 Explosive atmospheres. Part 29-3. Gas detectors. Guidance on functional safety of fixed gas detection systems including 12/30247700DC Explosive atmospheres. Part 29-3. Gas detectors. Guidance on functional safety of fixed gas detection systems,

xxii. BS EN 60079-29-4:2010 Explosive atmospheres. Gas detectors. Performance requirements of open path detectors for flammable gases,

xxiii. BS EN 60079-30-1:2007 Explosive atmospheres. Electrical resistance trace heating. General and testing requirements,

xxiv. BS EN 60079-30-2:2007 Explosive atmospheres. Electrical resistance trace heating. Application guide for design, installation and maintenance,

xxv. BS EN 60079-31:2009 Explosive atmospheres. Equipment dust ignition protection by enclosure "t" including 12/30261858DC Explosive atmospheres. Equipment dust ignition protection by enclosure "t",

xxvi. The Supply of Machinery (Safety) Regulations 2008 and The Supply of Machinery (Safety) (Amendment) Regulations 2011,

xxvii. BS EN 981:1996+A1:2008 Safety of machinery. System of auditory and visual danger and information signals,

xxviii. BS EN 60034-9:2005 Rotating electrical machines. Noise limits,

xxix. BS EN ISO/IEC 17050-1:2010 Conformity assessment. Supplier's declaration of conformity. General requirements,

xxx. BS EN 61310-1:2008 Safety of machinery. Indication, marking and actuation. Requirements for visual, acoustic and tactile signals,

xxxi. BS EN 1012:2010 Compressors and vacuum pumps; Safety requirements. Air compressors,

xxxii. BS EN 1012-2:1996+A1:2009 Compressors and vacuum pumps. Safety requirements. Vacuum pumps,

xxxiii. BS EN ISO 1688-1:2009 Acoustics. Recommended practice for the design of low-noise machinery and equipment. Planning and

xxxiv. BS EN ISO / TR 11688-2:2001 Acoustics. Recommended practice for the design of low-noise machinery and equipment. Introduction to the physics of low-noise design.

10.1.4 The *Contractor* lists the standards used for the design of the TBMs, the back-up system and the slurry system in the TBM scheme design report.

10.2 Fire prevention

10.2.1 The *Contractor* and the *tunnel boring machine supplier* jointly undertake a fire hazard assessment to identify and mitigate all potential fire sources including limited and controlled storage of flammable and COSHH materials the assessment is included in the TBM detailed design report.

10.2.2 Not used.

10.2.3 Subject to the conclusions of the hazard assessment, the TBMs and back-up systems as a minimum are provided with

a. a fire suppression system suitable to mitigate the risks identified in the hazard assessment,

b. emergency plunger buttons at suitable locations to activate a fire alarm,

c. electrical cabinets and enclosures fitted with automatic fire suppression systems,

d. manual fire suppression systems in areas identified to have a high fire risk,

e. hand held extinguishers provided with colour coded covers in suitable locations,

f. a means of rapidly shutting off fresh air ventilation to the tunnel face, after the area has been evacuated,

g. operation and training manuals for use by the *Contractor* and all personnel,

h. hydraulic hoses complying with BS EN 853 / ISO 1436. The hose covers are flame retardant and conform to the requirements of USMSHA. All hydraulic hoses are fitted with swaged end connections, re-usable fittings are not permitted,

i. gas monitoring for oxygen deficiency and gasses including CO2, CO, H2S, NO, NO2, SO2 and CH4,

j. smoke detection and rate of temperature rise monitoring,

k. low density foam generators or adequate alternative fire suppression system to be located at high fire risk areas with either automatic or manual operation in the event of fire,

l. spraying nozzles installed at the rear and centre of the back-up system to create a water mist screen in case of fire in the TBMs,

m. essential services protected in the event of a fire so that they remain operable during all tunnelling operations for a period of 2 hours unless a longer period is determined by the *Contractor's* risk assessment. The essential services are

   i. emergency power supplies,

   ii. all fire suppression systems,

   iii. TBM emergency lighting,

   iv. environmental monitoring systems,

   v. all controls and tunnel communications and

   vi. the security of the air supply and control systems to the man lock remaining operable in all emergencies including a fire.

10.2.4 Essential services are checked weekly for correct operation.

10.3 Cutter head control and interlocks

10.3.1 As part of the TBM detailed design report the *Contractor* identifies the maintenance operations when the TBM cutter head is to be prevented from moving. The Contractor includes in the TBM operations and maintenance manual, the maintenance operations that require the TBM cutter head from being prevented from moving.

10.3.2 The TBM cutter head is prevented from moving prior to and during the entry.

10.3.3 An interlock is provided between the subsurface TBM control cabin and the air lock so that direct slow movement (inching) of the cutter head for maintenance operation can be undertaken from the air lock. The direct slow movement of the cutter head is provided to facilitate cutter tool changes.

10.3.4 The *Contractor* instigates a system to ensure that all personnel have evacuated the cutter head and front chamber before any movement is undertaken.

10.3.5 The cutter head drive has a fail to safe braking to prevent inadvertent movement.

10.3.6 The *Contractor* provides a method statement for cutter head interventions in the TBM detailed design report.

10.4 Interlocks (general)

10.4.1 The status of interlocks is recorded in the control and monitoring system.

10.4.2 All interlocks are protected against stray signals that could cause inadvertent operation.

10.4.3 Interlocks installed on the TBMs are continuously monitored automatically and in the event of an alarm failure the Equipment protected by the alarm fails to safe.

10.5 Shove rams, erectors and interlocks

10.5.1 The shove rams are controlled from the subsurface TBM control cabin during the excavation cycle and from a remote portable station equipped with the segment erector controls during the ring building cycle.

10.5.2 An interlock is provided between the TBM operator controls and segment erector operator controls such that the control of the shove rams can only be by the segment erector controls during segment erection. The system ensures the TBM operator cannot move the shove rams during segment erection.

10.5.3 The *Contractor* provides a control system to prevent the accidental release of vacuum. As a minimum, the vacuum is controlled by a dual switch arrangement to prevent accidental release of vacuum. These switches where not covered are given additional protection measures built into the remote control. A light is provided on the console to show the vacuum is on. The light extinguishes whenever the safe vacuum pressure is not achieved.

10.5.4 The erector remote control includes control of individual shove rams or groups of shove rams during erector operation and include specific operational features as required by the *Contractor* to assist in the safe ring building. This feature includes interlock between shove ram retraction and erector segment index so that the segment does not collide with the retracting shove rams.

10.5.5 The erector remote control includes control of the segment feed magazine during erector operation or an alternative fixed control station at the

forward end of the magazine. Control is switched between erector operation and magazine loading stations to prevent inadvertent operation. The location of the controls has clear sight for the range of permitted movement.

10.5.6 All erector load-holding functions are fail to safe. Rotational drives are fitted with fail safe brakes with appropriate systems for checking the brakes.

10.5.7 The segment erector is fitted with audible safe lifting alarms once segment lifting has been selected.

10.5.8 An interlock is provided to prevent shove ram extension if the grout delivery through the tail skin is interrupted, blocked or the difference between the theoretical volume of grout and actual volume of grout injected is greater than 10%. The system incorporates a method of automatically data logging and measuring volume and pressure of grout injected per tunnel lining ring.

11 Quality assurance requirements

11.1.1 The TBM scheme design report indicates the approach and structure of the detailed quality plan for the design and supply of the TBMs and includes

a. all quality assurance and quality control procedures which are to be used in the design, manufacturing, commissioning and maintenance of the TBMs. The procedures include design checks, inspection and test plans and details of steel plate identification and all testing, weld testing and welding procedures,

b. a list of all the codes of practice, standards and specifications that the *Contractor* proposes and highlights any departures from the Scope,

c. quality assurance audit proposals,

d. a statement detailing the records that the *Contractor* proposes to keep and those that the *Contractor* proposes to supply, the time during which they are prepared and the subsequent period and manner in which they are stored and

e. inspection and testing plans in accordance with section S700.

11.1.2 Prior to commencement of the TBM detailed design, the quality plan includes the processes and procedures for the design of the TBMs, in accordance with section S600.

11.1.3 Where two TBMs are used for the construction of the main bored tunnels, the *Contractor* updates and maintains the quality plan to incorporate all changes to the TBM related procedures including any lessons learned from launch and initial driving from TBM 1 - included for launch of TBM 2.

11.1.4 The *Project Manager* may conduct compliance audits on the activities relating to the design and supply of the TBMs, based on ISO 19011 'Guidelines for quality and/or environmental management systems auditing'. Throughout the audit process the *Contractor* provides suitably qualified Staff to assist the audit team.

11.1.5 Prior to critical elements of the tunnel drive, including launch, commencing normal production with backup installed and before crossing third party assets, the *Contractor* undertakes a readiness review. If the readiness review indicates the *Contractor* is not ready, the relevant Construction Activity is not undertaken until such times as when a new readiness review confirms the *Contractor* is in a position to undertake the relevant Construction Activity.

12 Performance requirements

12.1 General

12.1.1 The *Contractor* demonstrates in the TBM detailed design report that the TBMs comply with the minimum performance requirements described in this specification, the *Contractor's* specification and that the TBM advance rate meets the *Contractor's* Accepted Programme. The minimum performance requirements for elements of the tunnelling cycle are demonstrated within the first 250m of the tunnel and are as follows

a. the instantaneous rate of tunnel advance is a minimum of 50mm/min for a duration of 90 seconds and is achieved on each of 12 consecutive rings,

b. the time for retraction and extension of rams between completion of the propulsion stroke and the start of the tunnel ring erection is no more than five minutes and

c. the time to build one ring from completion of shove stroke to completion of the ring build is a maximum of 45 minutes.

12.1.2 A cyclogramme of tunnelling operations, including all operations connected with the TBM advance is included in the TBM detailed design report.

12.2 Machine availability

12.2.1 The TBMs achieve a minimum of 95% machine availability excluding planned maintenance periods.

12.2.2 Availability is the time when the TBMs and all associated systems are ready for use and are expressed as: Availability A= [100 (T-P)] / T. Where T = the time period measured. P = the time the machine is unable to work.

12.2.3 The *tunnel boring machine supplier* provides all service components and personnel to assist the *Contractor* in achieving the TBM performance and availability requirements throughout the duration of the tunnel drives. To

maximise TBM availability and performance, the *Contractor* ensures that the *tunnel boring machine supplier* provides the following to the *Contractor*

a. Maintenance, advice and supervision to the *Contractor*,

b. daily monitoring of Equipment and early warning of maintenance requirements,

c. training of operatives and maintenance Staff,

d. a TBM operations and maintenance manual detailing the design life of major components in order to establish a spare parts provision and a preventative maintenance regime and

e. consignment spares held on the Working Areas or in a readily available location to ensure the TBM availability. They comprise project critical items of spare and wear parts as derived from a risk assessment undertaken jointly by the *tunnel boring machine supplier* and the *Contractor* based on their direct experience of using similar machines in similar ground conditions.

12.3 TBM operation and reporting

12.3.1 The *Contractor* prepares a TBM performance report for each tunnel drive and proposes the coding allocation of activities for assessing and presenting TBM cycle times and submits these to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, prior to the start of tunnelling operations.

12.3.2 The TBM performance report is based on the information extracted from the *Contractor's* monitoring database used to store and process the information from the TBM control systems on a continuous 24/7 basis.

12.3.3 The monitoring database accurately records the time and timing in actual time of the principal TBM operational activities for each bored tunnel drive for the duration of the tunnel drives.

12.3.4 The *Contractor* uses this data to provide the *Project Manager* with a record of the TBM cycle time for ring build including difficulties in the cycle to support the TBM performance report.

12.3.5 TBM cycle time data and analysis are available in the subsurface TBM control cabin, the surface TBM control room and the monitoring area.

12.3.6 The *Contractor* prepares and submits before noon of the following day a detailed daily TBM performance report from the data in the *Contractor's* monitoring database.

12.3.7 The daily report includes

a. when the TBMs are operational and in service sub-divided into categories including movement or operation of the

i. cutter-head,

ii. thrust rams,

iii. slurry pumping system,

iv. screw conveyor and

v. slurry treatment plant.

b. downtime when the TBMs are not operational due to TBM planned maintenance, component malfunction/repair/upgrade and subdivided into categories for lost time including

i. segment erection,

ii. electrical fault,

iii. communication fault,

iv. flooding,

v. water supply,

vi. grouting breakdown,

vii. density measurement error,

viii. ventilation difficulties,

ix. construction train or MSV issues,

x. track malfunction or maintenance, services extension,

xi. slurry system,

xii. any PLC fault,

xiii. processing plant and

xiv. safety measures.

12.3.8 Each minute of time during the 24-hour cycle are accounted for such that the demarcation of all the recorded time equals the 24 hour cycle.

12.3.9 Where necessary the above categories are subdivided to allow the causes of loss of time to be identified.

12.3.10 The *Contractor* includes actions for addressing the causes for loss of time in the report.

12.3.11 The report also includes

a. actual rings built in a shift and compares this to the planned number of rings to be built,

b. a comparison between the actual TBM operating parameters and the values set by the shift review group (SRG) in the daily TBM advance plan (DTAP) and

c. the quantity of material excavated compared to the theoretical and the consequence in terms of the Accepted Programme.

12.3.12 The SRG reviews the TBM performance report and provides comment prior to its completion and submission to the *Project Manager*.

12.3.13 At the end of each seven-day period, a weekly summary of the daily reports is presented summarising all of the above.

12.3.14 An overall summary on a monthly basis with the primary findings is included in the *Contractor's* monthly report.

S2700 - Specification for Tunnelling Works - High Pressure Compressed Air Working

Introduction

1. A record of discussions between the *Client* and the health and safety executive (HSE) on high pressure compressed air working and guidance from these discussions is provided in Annex A.

2. There needs to be facilities on the TBMs to undertake any compressed air working interventions in the cutterhead for inspection, maintenance and other purposes, that may be required by the *Contractor's* methodology. The anticipated pressure range is from atmospheric pressure to approximately 6 bar. As such the pressure range potentially requires low pressure (less than 0.7 bar), intermediate pressure (0.7 to 3.45 bar) and high-pressure exposure techniques (3.45 bar and above) to be used. The *Contractor* submits proposals for working in compressed air safely in each of these three pressure bands using appropriate exposure techniques to the Project Manager for acceptance in accordance with the Acceptance Procedure. A reason for not accepting the proposals is that agreement from the HSE has not been achieved.

3. The *Contractor* complies with all applicable UK standards, regulations and guidance including those identified at detailed design and those referenced in them, to which reference are made are as follows

    a. BS EN 12110:2014[3],

    b. BS EN 16191:2014[4],

    c. BS 6164:2019 “Health and safety in tunnelling in the construction industry – Code of practice”,

    d. BTS Guide to the Work in Compressed Air Regulations 1996, ("The Guide") – July 2021 revision,

    e. ITA/BTS CAWG Report No 10 “Guide to good working practice in high pressure compressed air work” V3 March 2018, ("Report 10") and

    f. ITA Report No 20 of April 2019 “Guide to ITA/BTS CAWG Report 10 for Clients and others not familiar with high pressure compressed air work”

    (see links in Annex A).

4. The Guide applies to work in the low and intermediate pressure bands. The Guide and Report 10 both apply to the high-pressure band.

5. For low or intermediate pressure exposures, the *Contractor* selects appropriate procedures to ensure they provide a safe system of work

[3] Note to Participants – this is currently being revised into two parts.
[4] Note to Participants – this is currently being revised.

including decompression procedures for those who are entering and working in compressed air.

6. The *Contractor* proposes

    - appropriate decompression regime(s) and emergency decompression regime(s) for use with the relevant breathing mixture(s) and

    - a means to demonstrate that the chosen regime(s) meet(s) the effectiveness criteria in the guidance text to the *Project Manager* for acceptance in accordance with the Acceptance Procedure. A reason for not accepting the proposals is that agreement from the HSE has not been achieved.

7. New or unproven decompression tables are not used without the agreement of the *Project Manager*. Once agreed for use, the *Contractor* ensures their effectiveness and obtains HSE agreement.

8. The *Contractor* submits a protocol based on the use of physiological monitoring, for demonstrating the effectiveness of any decompression table proposed to the *Project Manager* for acceptance in accordance with the Acceptance Procedure. The protocol is based on the use of Doppler monitoring in accordance with the British Tunnelling Society Compressed Air Working Group (BTS CAWG) guidance (see link in Annex A). A reason for not accepting the protocol is if it is considered new, unproven or not aligned with the BTS CAWG Doppler protocol.

9. The monitoring follows the recommendations in “Consensus guidelines for the use of ultrasound for diving research” by Møllerløkken A, Blogg SL, Doolette DJ, Nishi RY, Pollock NW. and published in Diving and Hyperbaric Medicine. 2016 March; 46(1):26-32 (see link in Annex A).

10. The prohibition on smoking and alcohol in the Work in Compressed Air Regulations 1996 (WCA Regs) (see link in Annex A) is extended to electronic cigarettes/vaping and non-prescription drugs.

11. The requirements to provide welfare facilities in the WCA Regs also applies to those using saturation exposure techniques.

Section 1 General Requirements

1. If the *Contractor* decides to use compressed air working at any pressure as part of the temporary works proposals, then it is responsible for making all statutory notifications required by the WCA Regs in such time as to achieve the Accepted Programme.

2. The *Contractor* submits statutory notifications in accordance with paragraph 1 above in sufficient time to allow the Acceptance Procedure and enable the *Contractor* to gain acceptance prior to any relevant construction activity taking place. The *Contractor* does not undertake any relevant construction activity until it has gained acceptance or agreement.

3. Notwithstanding the requirement to work in accordance with Report 10 and The Guide, the *Contractor* justifies its compressed air work in the context of its safe system of work.

4. In the event that the *Contractor* decides to incorporate compressed air working as part of the work proposals, the *Contractor* acts as compressed air contractor (CAC) as set out in the WCA Regs and The Guide. Any subcontractor appointed to undertake compressed air works is a Key Subcontractor.

5. The *Contractor* provides

    - the decompression tables to be used for air only exposures and oxygen decompression at pressures of 3.45 bar(g) and below and

    - provides a full justification of its choice of these tables along with evidence that they meet the effectiveness criteria set out in The Guide and are safe

    to the *Project Manager* for acceptance in accordance with the Acceptance Procedure. A reason for not accepting the proposals is that agreement from the HSE has not been achieved.

6. The *Contractor*

    - provides tables to be used following mixed gas non-saturation and saturation exposures and provides sufficient justification for its choice and

    - as part of its application for an exemption under the WCA Regs, sets out the derivation of the tables chosen and provides all evidence necessary including that they meet the effectiveness criteria set out in The Guide and are safe

    to the *Project Manager* for acceptance in accordance with the Acceptance Procedure. A reason for not accepting the proposals is that agreement from the HSE has not been achieved.

7. The *Contractor* may submit to the *Project Manager* for agreement, an alternative set of effectiveness criteria, a detailed technical justification of the alternative criteria and a demonstration of their equivalence to those in clause 11.8 of The Guide.

    When required by the *Project Manager*, the *Contractor*

    - undertakes mathematical modelling of some or all of the decompression tables proposed, to demonstrate that in theory, their effectiveness meets the criteria in clause 11.8 of The Guide. Protocols for the modelling are agreed with the *Project Manager* and

- undertakes statistical analyses of the results obtained from decompression tables proposed to demonstrate their safety and effectiveness. Protocols for any analysis are agreed with the Project Manager.

8. As part of the exemption application process or otherwise, the *Contractor* may be required to undertake hyperbaric trials in accordance with Report 10 clause 3.6. to demonstrate the safety and effectiveness of the tables proposed. Protocols for the trials are agreed with the *Project Manager*.

9. As part of the exemption application process or otherwise, the *Contractor* undertakes any trial runs as described in Report 10 clause 3.7, to demonstrate the safety and effectiveness of the decompression tables proposed and submits these to the *Project Manager* for acceptance in accordance with the Acceptance Procedure. A reason for not accepting the proposals is that agreement from the HSE has not been achieved.

10. The *Contractor* submits to the *Project Manager* a schedule of the proposed physiological monitoring of personnel undertaking compressed air work at any pressure taking into account the guidance in Report 10 and The Guide. The schedule covers any initial demonstration of the effectiveness of the tables along with ongoing routine monitoring to demonstrate their continuing effectiveness and enhanced monitoring following any incident or abnormal occurrence. The *Contractor*, as part of its application for an exemption under the WCA Regs, sets out a full justification of the monitoring to be undertaken and how it will be sufficient to demonstrate the effectiveness of decompression in accordance with the protocols set out in clause 11.8 of The Guide. Changes in monitoring protocols instigated by the contract medical adviser (CMA) are deemed to be covered by this item.

11. The *Contractor* prepares and submits to the *Project Manager* for information within 3 months of completion of tunnelling a report summarising the hyperbaric work undertaken in both anonymised and unanonymised versions. The report sets out the decompression tables used, the results of any modelling, statistical analyses and trials undertaken- for air-only exposures a table of single exposure risk factors and the number of exposures concerned, a similar table for non-saturation mixed gas exposures, a summary of saturation exposures, the results of the physiological monitoring and any decompression illness experienced along with the treatment given. The *Client* may publish the report, part of the report or a summary in an anonymised form. For further requirements see clauses 9.1 - 9.5 of Report 10.

    Note: the derivation and calculation of single exposure risk factors is set out in The Guide.

12. The contract does not contain any restrictions on the hours of work which the *Contractor* may adopt for work in compressed air, noting that a fatigue risk assessment will be carried out. The *Contractor* is responsible for ascertaining any restrictions placed by others and allows for these.

13. The *Contractor* submits to the *Project Manager* for acceptance in accordance with the Acceptance Procedure, proposals for carrying out head and TBM interventions for inspection, maintenance and repairs in 'free air' or atmospheric conditions. This could include the use of robots or accessible cutterheads.

14. The *Contractor* commences reporting for compressed air working from commencement of pre-start medicals. These reports are submitted in accordance with the requirements in section S2700.

15. The *Contractor* submits evidence of the HSE exemption certification to the *Project Manager* for information.

Section 2 – Organisation of the works in high pressure compressed air (HPCA), planning and delivery

1. The *Contractor* makes provision for undertaking work in compressed air at pressures up to approximately 6.0 bar(g) using saturation techniques involving the breathing of non-air gas mixtures including the provision of surface facilities in accordance with Report 10 along with transfer under pressure between the surface facilities and the TBM as well as any emergency provisions required by Report 10. The *Contractor* also makes provision for air only and non-saturation mixed gas exposures as it considers necessary for construction of the tunnel works.

2. The *Contractor* ensures that the design of the TBMs do not incorporate any feature which would prevent such work from being undertaken at a later date.

3. The *Contractor* ensures the design of the TBMs allows for the subsequent installation of any specialist modifications necessary for high pressure compressed air interventions to be undertaken along with any associated control equipment and services (power, gas, water etc.).

4. The *Contractor* ensures the design of the TBMs makes allowance for the space envelope required for the passage of a pressurised transfer shuttle as part of the transfer under pressure process through the TBMs as well as the movement of it from the transport vehicle in the tunnel on to the TBMs along with movement of the shuttle to a position from which it can be docked with the TBM personnel lock. Allowance is also made for the space required for any Equipment including any lifting or hoisting required to move the shuttle.

   Note:

   1) hereafter a "pressurised transfer shuttle" is referred to as a "shuttle"

   2) for information on "transfer under pressure" hereafter referred to as "TUP", see ITA Report No 20

5. The *Contractor* ensures the design of the TBMs includes the capability to clamp a shuttle to the personnel lock.

6. The *Contractor* ensures the design of the TBMs includes sufficient working space for those required to control and undertake non-saturation and saturation exposures via the personnel lock.

7. The *Contractor* ensures the design of the TBMs includes an intermediate chamber as described in clause 4.1 et al of Report 10.

8. The *Contractor* ensures the design of the TBMs includes sufficient penetrations through airlocks and bulkheads for high pressure non-saturation and saturation exposures to be undertaken. Details of penetrations are outlined in the proposals for the TBM supply including the personnel lock penetrations.

9. The *Contractor* instructs the *tunnel boring machine supplier* of the critical dimensions and weight of the shuttle. The *Contractor* ensures the TBMs are designed to accommodate the shuttle.

10. When the *Contractor* commences its submissions process to the HSE for HPCA exemption, the *Contractor* provides details of the proposed appointee for the role of CMA (WCA Regs Regulation 9) under 'key personnel' with information such as CVs, submitted to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure. The *Contractor* procures that the CMA applies for appointment under the WCA Regs to undertake the statutory medical examinations required under these regulations.

11. The *Contractor* identifies any hyperbaric specialist (responsible for the hyperbaric strategy) it intends to engage for advice on all aspects of the high pressure compressed air work. The Contractor provides details of these persons proposed for this role to the *Project Manager* for acceptance. Specialist hyperbaric support personnel are considered as 'key personnel'.

12. The *Contractor* produces an organisation chart for the management of the compressed air work. The chart is informed by, but does not necessarily mirror the roles set out in The Guide and Report 10 however, the *Contractor* justifies any deviations. The chart is accompanied by details of those proposed for each role on the chart. They are considered as 'key personnel' and details, such as CVs along with details of their skills, knowledge, training and organisational capabilities are submitted to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

13. The *Contractor* proposes an appointee for the role of person in charge of the compressed air work for agreement with the *Project Manager*.

14. The *Contractor* ensures that all those involved in compressed air working have the following minimum standards of English, based on the Council of Europe Language Assessment Framework

    - understanding – listening – C2,

    - understanding – reading – C1,

- speaking – spoken interaction – C2,
- speaking – spoken production – C2 and
- writing – C1.

Section 3 – Safe Systems of Work and Operational Procedures

1. The *Contractor* commissions an independent design check (Category 3) on the structure of the TBMs and on any pressure vessels for human occupancy on the TBMs or for use as part of the hyperbaric operations on site. The check procedure follows the requirements of BS 6164:2019 clause 6.4. The intermediate chamber can be subject to fluctuating pressure loads but not considered to be a pressure vessel for human occupancy.

2. The *Contractor* provides TBMs which conform with the requirements of BS EN 16191 to undertake the tunnelling. Before fabrication begins the *Contractor* provides the *Project Manager* for comment, with detailed information on the design of the TBMs including the intermediate chamber, the protected space envelope for future transfer of the shuttle through the TBMs and all associated Equipment including for lifting or hoisting, the provisions made for docking a shuttle to a personnel lock on the TBMs along with provision for working space for those engaged in supervision, control or undertaking compressed air work. Likewise, it provides the *Project Manager* with information on any protected paths through the TBMs for compressed air, breathing mixture, power and communication services. This information includes drawings and a 3-D virtual reality model of the TBMs.

3. The *Contractor* provides to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, detailed information on

    a. the design of the TBMs including the intermediate chamber,

    b. the space envelope for transfer of the shuttle through the TBMs,

    c. all associated Equipment including for lifting or hoisting,

    d. the provisions for docking a shuttle to a personnel lock on the TBMs along with the working space for those engaged in supervision and

    e. control or undertaking compressed air work.

4. The *Contractor* also provides proposals for the safe system of work covering the movement of a shuttle between a surface habitat and the TBMs along with the provision of compressed air, breathing mixture, power and communication services etc. to the shuttle during transit.

5. The *Contractor* provides procedures for cutterhead entry. The *Contractor* provides details of the proposed frequency of head inspections and maintenance stops, including the first intervention, for each TBM. The *Contractor* provides a full technical justification of the proposed face entry

procedures including information on the assessment of face stability, hyperbaric procedures to be undertaken and alternatives to face interventions under hyperbaric conditions as required to support any application for an exemption and satisfy the requirements of the Scope and relevant regulations.

6. The *Contractor* provides a fire risk mitigation policy and safe system of work, including sufficient details of its intended procedures for hot work in the cutterhead including the selection of fuel gas, if appropriate. The *Contractor* provides a full technical justification of the proposed hot work procedures under hyperbaric conditions, as part of the overall fire risk mitigation policy required to support any application for an exemption and satisfy the requirements of the relevant regulations. The *Contractor* also provides a full description of the ventilation system to be used including to remove toxic gas and fume from the cutterhead.

7. Explosives are not used in the cutterhead.

8. The *Contractor* provides a CCTV system to allow the activity in the working chamber and the condition of the tunnel face to be observed at the personnel lock control panel. The Contractor also provides a CCTV system to allow the activity in the intermediate chamber to be observed at any control panels.

9. The *Contractor* may propose the use of alternative methods for interventions using hollow spokes, robotics or similar.

Section 6 – Plant, Equipment and Gas Supply

1. As a minimum, the Equipment

    - to be provided is as set out in The Guide, BS EN 12110, BS EN 16191, and the Scope and

    - to be provided for saturation operations is as set out in The Guide, Report 10, EN 12110, BS EN 16191 and the Scope.

    The *Contractor* provides a preliminary list of all Equipment required for the compressed air operations within 4 weeks of the starting date.

2. The *Contractor* submits proposals to the *Project Manager*, for acceptance in accordance with the Acceptance Procedure, for one or more habitats on the surface to accommodate those undertaking saturation exposures.

3. The shuttles conform with the requirements of the Scope.

4. The *Contractor* ensures that the life safety critical nature of high pressure compressed air work is fully recognised in its proposals for Equipment including gas supplies and utility support services. To this end the *Contractor* incorporates the principles of redundancy, diversity and avoidance of common mode failure in its design as well as undertaking failure modes and effects analysis of the whole hyperbaric system.

5. The *Contractor* ensures that all surface coatings in air locks, habitat and shuttles are of a low flammability type which emits as low levels of volatile organic compounds (VOCs) as possible. Provision is made for the installation of VOC scrubbers in any habitat and shuttles.

6. The *Contractor* ensures that all services and backup services including compressed air, gas, power, communications and environmental control are provided in accordance with the standards on the surface, during transfer under pressure in the tunnel and on the TBMs.

7. As part of the exemption application process or otherwise, the *Contractor* prepares a schedule for the formal planned inspection, maintenance and testing procedures for all Equipment, including on the surface and underground, required for hyperbaric operations, taking account of the maximum foreseeable working pressure. The guidance in IMCA D 018 (see link in Annex A) is considered. This system also takes account of statutory requirements for the inspection and testing of pressure systems. All records, reports and certificates generated from planned and unplanned maintenance work is lodged in an electronic archive accessible on the Project Common Data Environment (CDE). The Contractor fully develops the system in accordance with its safe system of work and provides full information on the system to support any application for an exemption and satisfy the requirements of the relevant regulations.

8. Prior to any submission to the HSE and as part of the detailed design of the TBMs, the *Contractor* provides to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, information

    - on the masks proposed to be used for mixed gas breathing along with their cleaning, maintenance, and storage,

    - on the umbilicals to be used for mixed gas breathing along with their cleaning, maintenance, and storage,

    - on the means by which the alignment of a shuttle is adjusted and maintained to ensure that a pressure tight seal can be achieved on docking with a habitat or personnel lock and

    - on the proposed communications system between the control panels and those working in the cutterhead.

9. The *Contractor* ensures that any connective trunking conforms with the requirements of the Scope.

10. Prior to any submission to the HSE and as part of the detailed design of the TBMs, the Contractor provides the *Project Manager* with information on the proposed *procedures* for moving a shuttle between a habitat on the surface and a personnel lock on the TBM. Procedures cover normal circumstances and reasonably foreseeable emergencies. The *Contractor* fully develops these procedures and provides method statements and risk assessments in

accordance with its safe system of work, addresses any comments from the *Project Manager*, supports any application by the Contractor for an exemption and satisfies the requirements of the WCA Regs.

11. The *Contractor* ensures the ability to continue to supply power, compressed air, breathing mixtures and other essential services to the habitat or tunnel is not disrupted by external threats such as public/bank holidays, labour disputes, loss of grid power/utilities supplies, flooding or adverse/severe weather events. The risk assessment for the emergency procedures includes the foreseeable range of internal/external threats.

12. The *Contractor* ensures that any colour coding used to mark cylinders, pipework etc. containing mixed gas conforms to BS EN 1089-3:2011 (see link in Annex A).

13. The *Contractor* ensures there are primary and secondary supplies of breathing mixture available at the habitat and airlocks and shuttles. The *Contractor* also ensures there are independent emergency supplies of breathing mixture available. Emergency supplies come from different manufacturers/producers/suppliers and the different manufacturers/producers/suppliers of gas to site from those used for primary or secondary supply are agreed with the *Project Manager*. Other more detailed requirements on gas supply and formulation of breathing mixtures are set out elsewhere in the Scope.

14. The *Contractor* demonstrates to the *Project Manager* how all pipework, valves, gauges etc. for oxygen or mixed gas transmission meet the requirements of the Scope.

15. The *Contractor* demonstrates to the *Project Manager* how the compatibility and cleanliness of pipework, valves, gauges etc. for use with oxygen and mixed gas is in accordance with the Scope.

16. The *Contractor* ensures that the levels of carbon monoxide and carbon dioxide in the atmosphere of any pressure vessel for human occupancy do not exceed the levels set out in BS EN 12021 (see link in Annex A) for pressures below 3.5 bar(g) and the requirements of NORSOK U100 (see link in Annex A) when mixed gas is being used. The oxygen concentration does not go below a PO2 of 0.2 bar. As part of this the *Contractor* demonstrates to the *Project Manager* that scrubbers are provided in accordance with the Scope.

17. The Contractor submits a gas management plan to the Project Manager for acceptance, in accordance with the Acceptance Procedure, including

    - proposals and justification for the quantities of gas to be stored on site (including in the tunnel and in the Working Areas outside the tunnel) and the quantity to be provided,

- the method of supply on site (including in the tunnel and in the Working Areas outside the tunnel) for primary, secondary and emergency gas supplies for typical non-saturation and saturation exposures taking account of the guidance in Report 10,
- quantities for foreseeable emergency scenarios,
- proposals and justifications for the breathing rates assumed, metabolic consumption rates, compartment flushing and leakage, again taking account of the guidance in Report 10,
- schematic site layout drawings and gas distribution diagrams,
- proposals for the identification, marking, storage and handling of gas or gas mixture to prevent accidental misuse,
- proposals and justification for the quantities of gas for each habitat,
- proposals and justification for the quantities of gas for each shuttle,
- confirmation that all gas or breathing mixtures are sampled on delivery to site (including in the tunnel and in the Working Areas outside the tunnel) and again immediately prior to use to confirm their composition is as intended and
- information including drawings showing the intended gas storage facility on site (including in the tunnel and in the Working Areas outside the tunnel) and its operation.

18. As part of the gas management plan, the *Contractor* identifies the intended provider of breathing mixtures along with details of the quality assurance procedures to be implemented in respect of gas purity and accuracy of the mixing procedures along with the procedures to be taken by the *Contractor* on site (including in the tunnel and in the Working Areas outside the tunnel) between the point of delivery to site and point of connection to the personnel lock, shuttle or surface habitat. The *Contractor* also submits details of how continuity of supply is ensured to the *Project Manager* for acceptance in accordance with the Acceptance Procedure.

19. The *Contractor* submits proposals to the *Project Manager*, for acceptance in accordance with the Acceptance Procedure, for reclaim and re-use of helium. Helium reclaimed from surface habitats is addressed separately to that from shuttles and personnel locks etc. The *Contractor* is not bound by the restrictions in clause 6.42 of ITA Report 10 in respect of helium reclaim systems in the tunnel when closed circuit reclaim systems are proposed. The *Contractor* includes examples where they have employed reclaim on previous projects and the benefits that accrued. Preliminary figures for gas savings and the financial benefits that may accrue for the Project are included.

20. The *Contractor* submits for information to the *Project Manager* details of any on-site gas mixing operations proposed along with information on the quality assurance measures associated with it.

21. The *Contractor* provides online gas analysis for information to the *Project Manager* in accordance with the Scope.

22. The *Contractor* submits the procedure to be adopted to ensure cleanliness and hygiene of the surface habitat to the *Project Manager* for acceptance in accordance with the Acceptance Procedure.

23. The *Contractor* submits to the *Project Manager*, for acceptance in accordance with the Acceptance Procedure

    - drawings showing the intended layout of that part of the site compound dedicated to compressed air surface operations,

    - how its integrity and security is ensured and

    - an indication of the route to be taken by the shuttle from the habitat to the tunnel and the intended means of transport.

24. The *Contractor* submits to the *Project Manager* for acceptance in accordance with the Acceptance Procedure

    - an outline schedule of tests to be undertaken to demonstrate the pressure integrity of all PVHOs and their associated pipework, etc. and

    - a schedule of the functional tests and audits to be undertaken to demonstrate the operational capability and compliance with specification of all surface installations, each shuttle and the personnel locks on each TBM.

    The tests cover both the standalone situation and every possible combination of docking.

25. The *Contractor* also submits, to the *Project Manager* for acceptance in accordance with the Acceptance Procedure, a schedule of proposed trials to demonstrate that the Transfer Under Pressure (TUP) procedure can be undertaken safely. Copies of all trials, protocols and results are submitted to the *Project Manager* and *Supervisor* for information. The *Supervisor* indicates in advance which trials and audits they wish to witness.

26. The series of trials of the TUP procedure are to be undertaken including

    - an unmanned and unpressurised trial and progresses through an unmanned but pressurised trial,

    - a manned but unpressurised trial and culminating in a manned and pressurised trial and

- trials of the emergency procedures associated with TUP.

The trials demonstrate the capability to undertake TUP safely within the timescales proposed.

Section 7 – Occupational Health

1. The *Contractor* submits outline proposals to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, for the arrangements for the provision of medical supervision of and assistance to the compressed air work at any pressure including details of the personnel involved. The information provided covers medical lock attendants, medical personnel covering any surface habitat and personnel to render emergency medical services in the compressed air environment in the event of a medical intervention being required there.

2. The *Contractor* submits outline proposals to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, for an occupational health monitoring and surveillance scheme for those working in compressed air at any pressure. It sets out proposals for complying with the requirements for the provision of occupational health advice along with ensuring statutory medical fitness to work, contained in the WCA Regs. The *Contractor* provides detailed information on the proposed occupational health monitoring scheme in support of any application for exemption or to satisfy the requirements of the WCA Regs.

3. No one enters the cutterhead unless the temperature can be maintained below 36oC. The *Contractor* submits to the *Project Manager* for acceptance in accordance with the Acceptance Procedure how this temperature criteria is achieved.

4. The *Contractor* provides information to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, on the proposals for first aid and emergency medical response at any pressure in the personnel locks, shuttles, working chamber and habitat taking due account of the guidance in Report 10. The *Contractor* ensures it can justify the proposals to support any application for exemption or to satisfy the requirements of the WCA Regs.

5. The *Contractor* provides details of the intended provision of medical equipment for the treatment of those in saturation both in the habitat and on the TBMs for acceptance by the *Project Manager*, in accordance with the Acceptance Procedure. All Equipment is safe to operate under pressure and is certified by the manufacturer as being capable of functioning as intended at 6 bar(g). The *Contractor* complies with the guidance in Report 10, unless agreed otherwise with the *Project Manager*.

6. The *Contractor*

    - provides details of the procedures to be used for treating decompression illness (DCI) or possible DCI arising from both non-saturation and saturation exposures and

    - provides the procedures and criteria for determining when the casualty is fit to return to work

    to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

    The *Contractor* reports all cases of DCI and associated medical conditions to the *Project Manager* within 24 hours. The *Contractor* ensures it can justify the proposals to support any application for exemption or to satisfy the requirements of the WCA Regs.

Section 8 – Hyperbaric Procedures

1. The *Contractor* submits details of breathing mixtures proposed, which comply with the limits stated in Clauses 8.2 and 8.3 of Report 10, to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

2. The *Contractor* may also propose to depart from the limits set in Report 10 and if so, includes a justification of any proposed departure from the limits stated in Clauses 8.2 and 8.3 of Report 10. All the work involved in this clause is submitted to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

3. The *Contractor* ensures that no compressed air work at any pressure is undertaken which involves breathing nitrogen at a partial pressure of nitrogen exceeding 3.6 bar. When undertaking saturation exposures, the partial pressure of nitrogen is restricted to 2 bar.

4. The *Contractor* submits details of the various exposure techniques to be used and the conditions under which each exposure technique would be used to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

5. The *Contractor* submits an indicative schedule of the anticipated working pressures along the tunnel alignment to complement the information on proposed exposure techniques to the *Project Manager* for information.

6. The *Contractor* details proposals for the proposed range of pressures and excursion/intervention times for saturation exposures using mixed gas and the decompression procedures to be used and submits these to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure. The *Contractor* ensures than no one undertakes a saturation exposure longer than 28 days from initial compression to end of final decompression. The *Contractor* ensures that someone having undertaken a saturation exposure

spends an equivalent time or longer at atmospheric pressure before that person is again subject to further exposure to compressed air.

7. The *Contractor* provides an outline schedule of information linking intended storage pressures and tunnel chainage along with a justification of its proposals to the *Project Manager* for acceptance in accordance with the Acceptance Procedure.

8. The *Contractor* provides, for information, to the *Project Manager* details of the proposed daily shift pattern along with a schedule of living activity in the habitat.

9. The intervention or excursion duration in saturation is calculated from initial lock-off from the habitat until the final lock-on to the habitat and personnel are ready to transfer back into the habitat. The *Contractor* ensures that

    - the maximum duration is normally 8 hours in any 24-hour period and
    - no more than one intervention or excursion per day (24 hours) is undertaken

    unless the intervention or excursion time are increased with the agreement of the CMA to a maximum of 10 hours where TUP times exceed 1 hour each way.

10. The work period during any intervention or excursion in saturation does not exceed 6 hours. For saturation exposures, the *Contractor* ensures that all personnel in the manlock has a 30 minute "mask off" break within every period of three hours whilst working on the TBMs.

11. The *Contractor* takes into account in determining its decompression procedures that starting the final decompression whilst bubbles are present can be a significant factor in initiating DCI. The *Contractor* ensures that any bubbles formed during excursions have totally resolved and there is a period of rest at storage pressure before starting final decompression.

12. During any decompression, the *Contractor* ensures that appropriate air breaks are incorporated in the oxygen stages of any decompression regime used. The ratio is 20 to 30 minutes of oxygen breathing interspersed with 5 minutes breathing air or as required by the decompression schedule being used.

13. The *Contractor* provides duplicate supplies of oxygen for decompression purposes to any personnel lock or shuttle in which oxygen decompression can be undertaken.

14. The *Contractor* provides suitable accommodation including showers, adequate privacy for those undergoing physiological monitoring and other welfare facilities for workers required to remain on site following decompression.

15. The *Contractor* ensures that the oxygen volume concentration in any habitat, chamber, shuttle or personnel lock is kept below 23% by volume for fire safety reasons.

Section 9 - Record Keeping

1. The *Contractor* keeps all health records and records of compressed air working as required by the WCA Regs, The Guide and Report 10. Records are kept for 40 years in an electronic format using readily available business software.

2. The *Contractor* distributes the records on completion of the *works* in accordance with the requirements of the WCA Regs, The Guide and Report 10. The *Contractor* makes records available to the *Project Manager* promptly on request for the purpose of any proceedings brought against the *Client*.

3. The *Contractor* ensures that suitable arrangements are made for any records of medical examinations or treatments undertaken to be kept for 40 years.

4. The *Contractor* ensures that the doppler monitoring records are retained for the duration of the contract period and defects period.

Section 10 – Emergency Procedures and Fire

1. The *Contractor* submits to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, emergency procedures to address all likely emergencies which could arise from work in tunnelling operations and includes the compressed air works. Before tunnelling work starts, the *Contractor* produces desk studies for all likely emergency incidents and carries out trials to demonstrate the adequacy of the studies, unless otherwise agreed by the *Project Manager*. Once tunnelling is underway, the *Contractor* undertakes a programme of emergency exercises to further demonstrate the effectiveness of the procedures and produces a report for acceptance by the *Project Manager*, in accordance with the Acceptance Procedure.

2. As part of the planned response to emergencies, the *Contractor* produces and submits procedures for accelerated emergency decompression from saturation to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

3. As part of the planned response to emergencies at all pressures, the *Contractor* submits proposals to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, for mitigating the fire risk and for fire suppression measures to meet the requirements of BS 6164:2019, BS EN 16191:2014, BS EN 12110:2014, clauses 10.3 - 10.8 of Report 10 and The Guide.

4. As part of the planned response to emergencies at all pressures, the *Contractor* submits its proposals for the provision of emergency assistance in the hyperbaric environment including the involvement of the emergency

services and emergency medical assistance to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

5. As part of the planned response to emergencies at all pressures, the *Contractor* submits its proposals for undertaking exercises to trial the emergency procedures to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

6. As part of the planned response to emergencies at all pressures, the *Contractor* submits its proposals for the training of personnel in emergency procedures and for the provision of any site-based emergency rescue team to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure.

Section 11 - Training

1. The *Contractor* submits proposals to the *Project Manager* in order to ensure the competence (including skills, training, knowledge, experience and qualifications) of the following

    a. all those involved in hyperbaric operations at any pressure,

    b. crew training,

    c. rescue team training,

    d. first aid and responder training and

    e. facility management and maintenance training

    for acceptance, in accordance with the Acceptance Procedure.

Section 12 – Docking Flange

1. The *Contractor* ensures that

    - the personnel lock or shuttle is fitted with a length of trunking 800 mm internal diameter and 30 mm wall thickness,

    - the trunking terminates in a docking flange,

    - the flange is formed as an upstand around the end of the trunking as shown in Figure 2 in section 12 of Report 10,

    - the upstand is 30 mm high by 30 mm wide giving an overall external diameter across the flange of 920 mm and

    - the flange upstand is shaped as shown in Figure 2.

2. The *Contractor* is responsible for selecting appropriate materials and undertaking all relevant design, calculation, fabrication and pressure tests to ensure the flanges are safe for use.

3. All designs are subject to finite element analysis and third-party checking (category 3 as defined in the DMRB).

Appendices

Appendix A - Requirements for Habitat

1. Habitat space

The habitat provides living accommodation, sleeping accommodation along with hyperbaric toilet/washing/showering facilities for those in saturation. The number of chambers along with their size, layout and number of compartments depends on the complexity of the saturation operations being undertaken and thus the number of occupants to be accommodated. When saturation exposures are being undertaken concurrently on more than one TBM, separate chambers are provided for the saturation workers on each TBM. It is permissible for the chambers to be interconnected via a wet pod.

The habitat has a minimum headroom of 2.2m above the deck plate or chamber invert. If no deck plates are used the chamber invert is covered in a non-slip material bonded to the shell.

The engineering design principles, construction, fitting out and equipping of the habitat and emergency chamber follows the requirements for airlocks intended for use with mixed gas in accordance with EN 12110:2014 and EN 13445 parts 1 – 5 and the Scope (see link in Annex A).

Each chamber has a capacity of at least 4 persons. The habitat provides at least $4m^3$ of useable volume per person. The volume is divided between the living and sleeping compartments which is separated by a non-flammable ventilated privacy partition.

The living compartment contains seats and a folding table. The sleeping compartment contains bunks at least 2.0m x 0.7m. One compartment is long enough to accommodate horizontally, a person on a stretcher of 2m minimum length.

The habitat compartments are designed for easy cleaning. Surfaces are coated in an appropriate material which is fire retardant and a low emitter of VOCs. The colours are chosen to optimise illumination but with user comfort in mind.

At least one of the compartments of the habitat forms an entry compartment as in accordance with EN 12110:2014 unless entry can always be achieved through the wet pod.

There is a means of docking a shuttle directly to at least one compartment of each living chamber or, where a wet pod is provided, there is the capability to dock at least one shuttle via the wet pod for every living chamber connected to the wet pod.

2. **Supply lock**

   There is a supply lock for transferring food and consumables etc. into each compartment and the wet pod. It is large enough to allow for the passage of scrubber filters and other consumables for use in the habitat.

3. **Wet pod**

   The hyperbaric toilet/washing/showering facilities are in a separate chamber (wet pod) to the living/sleeping chamber. The wet pod is also capable of providing emergency life support to the occupants of any living/sleeping chamber connected to it until they can be evacuated to the medical/emergency chamber. It is possible to isolate the wet pod by a pressure resisting door from any other chamber connected to it. The wet pod has a separate supply lock for transferring food, consumables etc.

   The wet pod provides the same headroom as a living chamber. A minimum useable volume of around $6m^3$ is required. Docking flanges conform with this specification.

   The requirements for atmospheric monitoring and scrubbing of gaseous contaminants in living/sleeping chambers apply equally to the wet pod.

4. **Emergency chamber**

   There is a separate standalone medical/emergency chamber. This chamber has an entry lock for personnel not in saturation to enter/leave. The chamber has a docking flange conforming to this specification.

   The emergency chamber has a living compartment meeting the dimensional requirements for living compartments. It also has a sleeping compartment. The emergency chamber is large enough to accommodate the occupants of the largest living chamber of any habitat on site. The emergency chamber is equipped with hyperbaric toilet/shower/washing facilities. There is a table in the living compartment which can be used as a treatment table in the event of a medical emergency.

   The emergency chamber can be in the same building as the habitat(s) but is in a separate fire protected compartment. That compartment is fire separated from the rest of the building by a fire wall with a 60-minute minimum fire resistance. Where life support services and environmental control services come from the same installations as the habitat(s), one installation is on the same side of the fire wall as the emergency chamber. Otherwise, the emergency chamber is in a separate building of similar specification to the main building.

5. **Control panel**

   There is a control panel from which the pressure, temperature and humidity of all chambers and wet pod (if fitted) can be monitored and controlled. The supply of air, breathing mixture or oxygen to any chamber or manifold is monitored and

controlled from there. One set of controls for the fire suppression system is readily accessible at the panel.

There are voice communications with compartment occupants along with the capability to observe living compartments and medical treatment compartments from the panel. There are two air outlets to which breathing masks for the operators can be connected at the panel.

The chambers are designed so that any valves or gauges directly mounted on them can be operated or viewed from floor level - see “zones within field of vision and actuation areas – standing” in EN 894-4 (see link in Annex A). Where valves or gauges cannot be operated or viewed from floor level, raised platforms are provided. Raised platforms are designed to prevent falls from them.

It is always possible to monitor and control the life support and environmental control systems for the emergency chamber from within the same fire protected compartment as the chamber.

6. **Chamber environment control**

The heat exchange medium is water. There are at least two environmental control units supplying the hot and cold water to a habitat or emergency chamber. Each unit is capable of supplying the entire habitat or chamber on its own.

Each compartment has at least two heating/cooling devices. The environment in any compartment is maintained at a temperature which is considered comfortable by the occupants in the range 22 to 33^{o}C and between 40% and 60% relative humidity or other such limits as agreed between the occupants and the CMA.

Noise in a chamber is kept to a minimum with the noise in the sleeping quarters not exceeding 60 dB(A) with the partition door shut.

7. **Buildings incorporating habitat facilities**

The habitat comprises one or more pressure vessels for human occupancy (PVHOs) acting as hyperbaric living chambers and housed in a weatherproof structure set within a secure compound.

The habitat is housed in a building which provides a stable thermal environment along with the utilities and services required for life support to the habitat. The building also provides office and welfare accommodation for the life support and medical teams supporting the habitat along with associated washing/showering/toilet facilities. It houses the environmental control equipment, potable water filtration plant and waste disposal facilities for the habitat. Food preparation and laundry facilities for the habitat are required and can be co-located in the habitat building. Materials for the buildings are selected to minimise fire risk and fire loading. The floor is constructed from a solid material. The building is sufficiently large to allow free movement and access

including access for operation, shuttle movement, maintenance and casualty removal. The building and all work surfaces in it are designed to be easy to keep clean.

8. **Secure compound**

The habitat building and gas storage area is located within a secure compound with access restricted to personnel connected with the HPCA work. In addition to the requirements of paragraph 6.41 of ITA Report 10, the secure compound is lit at night.

The compound and gas storage area has a hard standing on which delivery vehicles and forklift trucks can operate.

Requirements for the gas storage facility are set out in 6.40 of ITA Report 10.

The compound is protected against flooding.

Access to the compound from the main site access is by an all-weather roadway with signage as necessary. The *Contractor* assesses the need for access control as well as CCTV surveillance of the compound, bearing in mind the need to ensure rapid access for emergency vehicles.

9. **Water supply**

Potable water supplied to the complex has been sourced directly from the public mains water supply. As an additional precaution against bacteriological infection, water is passed through a UV steriliser before being used in the complex or supplied to the compartments.

10. **Gas supply and distribution panel**

Gas supply lines from the storage area to the habitat building are protected from inclement weather, impact, over-height vehicle and fire damage.

A gas distribution panel is securely mounted in the habitat building. The panel is supplied with gas from the primary, secondary and emergency gas supplies in the gas storage facility. From the panel, gas is supplied under control by the control panel to each compartment of the habitat. Any risk of common mode failure in the construction or operation of the panel is assessed and mitigated.

It is possible to shut off each incoming gas supply line at the panel. Separately it is possible to shut off an individual gas supply to an individual chamber, as well as each outgoing supply line to a compartment. Gas supplying the panel has already been regulated to a maximum pressure of 40 bar.

In addition to any supply of gas from the distribution panel, there are separate connections directly between the gas storage area and the emergency chamber control panel for emergency gas supplies.

11. **Power supply**

    There is a power supply and back-up power supply to the habitat building which feeds all electrically powered equipment. Additionally, any safety critical equipment in the habitat has its own uninterruptible power supply capable of operating the equipment for at least 24 hours in the event of total power loss.

12. **Protection against fire**

    The habitat building and emergency chamber building, if separate, each has a water mist or sprinkler system protecting all internal spaces and any enclosed roof space.

    The requirements of EN 12110:2014 and Report 10 in respect of fire suppression in chambers are complied with. Additionally, at least one appropriately sized hyperbaric fire extinguisher is provided in each compartment.

    The Project fire risk assessment extends to the habitat and emergency chamber building along with the gas storage area.

    There is a fire suppression system covering the gas store.

    Any vehicles used regularly for the handling of gas cylinders in the storage compound meet the requirement of BS 6164:2019 cl 24.6 and are fitted with an on-board fixed fire suppression system as required by BS 6164:2019 cl 13.3.3.

13. **Chamber atmosphere monitoring**

    The chamber atmosphere is monitored. A respirable atmosphere is maintained through removing contaminants by chemical scrubbing with recirculation and make up including metabolic oxygen as required. The scrubbing system also provides ventilation circulation flow in each compartment.

    Levels of atmospheric contamination in a compartment do not exceed those applicable in saturation diving. Guidance can be found in the current edition of Norwegian Standard U 100 “Manned underwater operations”.

    Where scrubbers are fitted there are at least two scrubber units per gas scrubbed, in any compartment. Each scrubber is capable of servicing the compartment on its own. At least one spare scrubber cartridge is kept in a compartment for each type of scrubber. Scrubbers for CO and CO2 may be a combined unit or separate units for each gas. Where necessary a scrubbing system to remove VOCs is available in each chamber. The exposure limits in HSE publication EH75/2 are adhered to.

    Where necessary an odour scrubbing system is provided.

    The following alarms are available at the control panel for each compartment

    - an audible and visible high and low O_2 alarm and

- an audible and visible high CO and CO_2 alarm.

14. **Communications**

    There are voice communications between the control panel and each compartment. In addition, there is the capability for CCTV monitoring of each compartment, however privacy in sleeping areas is respected.

    There is Wi-Fi connectivity via a router mounted outside the habitat. Tablets, phones etc. are not charged inside the habitat.

15. **Gas storage and reclaim**

    Requirements for the gas storage facility are set out in 6.40 of Report 10. The *Contractor* puts forward proposals for a helium reclaim system for the habitat. Reclaimed helium is either returned to the gas mixing plant for reuse or the exhaled breathing mixture is scrubbed, analysed, reconstituted and reinjected into the breathing mixture circuit upstream of the personnel lock control panel on the TBM. In this case, analysis includes O_2, CO, CO_2, N_2 and VOC content. The reclaim system does not adversely affect the performance of the breathing mixture supply system. All pipes, hoses, fittings etc. connecting the reclaim system to the habitat follows the guidance in this document.

16. **Maintenance and certification**

    The *Contractor* sets up and maintains a planned preventative inspection, certification and maintenance (PPICM) system for all hyperbaric equipment on the contract including on the TBMs. Extensive relevant guidance on the frequency of inspection and the competence required to undertake such inspection of hyperbaric plant and equipment is set out in the IMCA publication D 018 “Code of Practice for The Initial and Periodic Examination, Testing and Certification of Diving Plant and Equipment Rev. 1 – June 2014” and IMCA publication D 053 “DESIGN for the Hyperbaric Reception Facility (HRF) forming part of a Hyperbaric Evacuation System (HES)” Rev. 0.1 – October 2018 (see link in Annex A).

    All documentation relating to the habitat, emergency chamber, shuttles and personnel locks are recorded in the system along with details of planned and reactive work carried out on them.

    All PVHOs in the habitat are to be tested in accordance with the requirements of BS EN 13445 and copies of the test certificates are lodged in the PPCIM system. Periodic inspection and testing of airlocks and shuttles in use are also covered by the PPICM system.

    All pipework carrying gas or fluids to/from the habitat or emergency chamber is functionally pressure tested after assembly to 1.5 times their normal working pressure and are shown to be leak tight. Test certificates are lodged in the PPCIM system.

All pipework carrying oxygen or a gas mixture with more than 23% oxygen by volume is oxygen cleaned to IEC/TR 60877:1999 (see link in Annex A). Certificates of cleanliness are lodged in the PPCIM system.

Calibration certificates for all gauges and gas analysis equipment are lodged in the PPCIM system.

A commissioning/compliance audit of the hyperbaric system to confirm that all necessary pipework, valves, gauges, controls/control functions, ancillary systems etc. have been installed and are known to be tested and functional is undertaken on site before the habitat, emergency chamber along with any shuttle or TBM personnel lock is occupied under pressure for the first time.

A functional test at maximum pressure/maximum flow is undertaken on site before the habitat, emergency chamber along with any shuttle or TBM personnel lock is occupied under pressure for the first time. Test certificates are lodged in the PPCIM system.

Appendix B - Technical appendix: requirements for mixed gas use in personnel locks and shuttles

1. Introduction

Personnel locks intended for the use of non-air breathing mixtures including saturation techniques conform with the requirements of EN 12110:2014 and the requirements of this appendix.

Shuttles are considered to be mobile personnel locks with mixed gas capability. The guidance in this appendix for personnel locks along with the additional guidance specifically for shuttles are followed.

2. General requirements

2.1 Design pressure

Personnel locks are designed, fabricated and tested in accordance with EN 12110:2014 and EN 13445 parts 1 – 5.

2.2 Pressure relief valve

Compartment shell valves on penetrations feeding pressure relief valves are secured in the open position.

2.3 Pipes, hoses, valves and gauges etc.

BS EN 12110:2014 gives general guidance on pipes, hoses and valves for personnel locks.

2.4 Pipework

Pipework for oxygen or mixed gas is fabricated from aluminum nickel silicon brass (copper alloy) tube to EN 12449 CW 700R (see link in Annex A), or austenitic stainless steel with a chromium nickel content of >22%, or from copper tube conforming to EN 13348 (see link in Annex A).

Pipework is jointed using compression fittings which are compatible with the material of the tube being used. Double ferrule fittings are required unless otherwise agreed with the *Project Manager*.

Pipework components withstand a burst pressure of at least 4 times the maximum working pressure of the fluid contained and pipework assemblies are functionally tested to 1.5 times maximum working pressure.

2.5 Hoses

The burst pressure of hoses is at least five times the maximum working pressure of any gas they carry or four times the maximum pressure for any liquid they carry. Hose installations are functionally tested to 1.5 times maximum working pressure.

Self-sealing quick couplings if used conform to ISO 7241 series A (see link in Annex A) and are compatible with contents and for their intended purpose. Self-sealing quick couplings have a design pressure of 4 times the working pressure.

2.6 Valves

For airlocks rated at 5 bar or over, any pipe of 15 mm diameter or more for the normal (non-emergency) outflow of gas from the chamber has an automatic shut-off valve

Servo-operated valves - have a manual override or bypass.

2.7 Gauges

Mirror scale gauges are used for controlling the compression and decompression of persons. They have a minimum scale diameter of 150 mm and are capable of being read to an accuracy of 0.05 bar. They are accurate to 0.25 % of full-scale readout. There is a means of isolating a mirror scale gauge to allow for its removal or for calibration purposes.

2.8 Pressure regulators

Pressure regulators are fitted to all oxygen or mixed gas supply lines to reduce the pressure to the minimum required for undertaking the *works* safely, in accordance with the gas management plan.

2.9 Gas analysis

Gas analysis equipment is fitted to personnel locks both upstream and downstream of the control panel. Intermittent analysis capability is required upstream whilst continuous capability is required downstream. All connections include a means of isolation to allow for their removal or calibration.

2.10 Protection against inlet line breaks

For protection against sudden pressure loss in the event of line break, all inlet lines of 15 mm diameter and over, are fitted with cut off devices on both sides of the pressure shell to close the line. Those inside the shell are fitted next to the shell and are self-acting for example flap valves or non-return valves. Those fitted outside are normally fitted within three fitting’s length of the penetration and are protected against mechanical damage.

This requirement does not apply to the fire-fighting system.

Penetrations are clearly marked with the purpose of the pipeline passing through.

Outflow lines over 15 mm diameter are fitted with excess flow detection and prevention. This does not apply to pressure relief valves.

2.11 Control functions

Shuttles have a pressure gauge outside each compartment showing the pressure in the compartment.

Shuttles have separate valves outside each compartment for controlling the compression and decompression of the compartment. In order for it to be possible to operate the valves whilst observing the corresponding gauge, valves are within 1m of the gauge displaying the pressure in the compartment. Valves and gauges are mounted on a control panel.

The valves and gauges are lit with an intensity of 200 lux at the valve or gauge display in accordance with EN 894-2.

2.12 Fire protection

Personnel locks are constructed from materials and components selected to minimize their flammability under increased air pressure and which are of low toxicity when burning.

There is a water spray or water mist system discharging into each compartment of personnel locks. It is possible to operate it from inside or outside of the compartment. The system design is based on the performance requirements for the main compartment of a personnel lock.

Water spray systems comply with EN 16081:2011 + A1 2013 (see link in Annex A) but with the following amendments to it – (EN 16081 cl 5.8). All parts of the system are coloured or marked in such a way that they are immediately distinguishable from all other systems on the air lock; (cl 5.10) conveying of the extinguishing medium is done by a permanently-on gas pressure tank system exclusive to the extinguishing system; (cl 5.12) the “permanently-on” pressurising medium is a gas which is respirable within the normal operating range of the chamber; (cl 5.13) the required supply of extinguishing medium is calculated to ensure at least 2 minutes of flow of the extinguishing medium. The system when wet tested using water, in accordance with 6.3.2 meets the requirements of that clause. A hot test is not undertaken.

Water mist systems meet the requirements of NFPA 99 (see link in Annex A). They conform to the requirements of this clause in respect of marking. They are operated by means of a permanently-on gas pressure tank system exclusive to the extinguishing system containing a gas which is respirable within the normal operating range of the chamber. The required quantity of extinguishing medium and gas to discharge it is calculated to ensure at least 2 minutes of flow of the extinguishing medium. The system when wet tested using water, in accordance with 6.3.2 meets the requirements of clause 6.3.2 of EN 16081:2011 + A1 2013.

There is a device for measuring the pressure of the pressurising medium and for displaying it at the control panel for the lock.

The fire extinguishing system also includes either a hand-held extinguisher or a water hose inside the lock. All fire-fighting equipment is suitable for the maximum working pressure of the air lock.

Fire-fighting and other emergency provisions are provided at the control panel. The external activation control of the fire-fighting system is at the control panel or similar easily accessible location.

It is possible to reduce the pressure in each compartment of the personnel lock from 2 bar to atmospheric pressure in not more than 2 min in the event of fire by means outside the airlock.

2.13 Electrical equipment

It is possible to connect the shuttle when stationary on the TBMs to the TBM power supply. All electrically powered equipment on the shuttle is controlled from the control panel. Electrical installations in shuttles are earthed.

2.14 Emergency power supply and lighting

Shuttles have an emergency self-contained power supply capable of powering all life support critical equipment on it for 12 hours. The power supply is located outside the shuttle but mounted within the protective frame.

The emergency power supply comes into operation automatically when required. Lighting levels are 15 lux in each compartment of the shuttle at seat level and at least 100 lux at any control panel.

2.15 Control panel operation

Instructions for the functional operation of the control panel of a personnel lock is provided by the manufacturer. Instructions for procedural operation of the control panel are the responsibility of the *Contractor*.

2.16 Number of compartments

Shuttles consist of two directly interconnected compartments, a main compartment and an entrance compartment. It is possible to use the entrance compartment as an entry lock in an emergency.

2.17 Dimensional requirements

The *Contractor* advises the tunnel boring machine supplier of the size and weight of the shuttle. Otherwise for TBM design purposes, for information a typical shuttle can be fitted within a frame which is 1.75 m wide, 1.75 m high and 5.0 m long excluding wheels and lifting attachments. The all-up weight in use does not normally exceed 10 tonnes. Shuttles and their protective frames meet the following requirements.

Table 2 Dimensional requirements

personnel lock	**main compartment**	**entrance compartment**
minimum cross-sectional dimension	1.5 m diameter	as main compartment
minimum length	see immediate paragraph below	compartment door opens clear of seats
minimum number of persons	3	2
minimum volume per person	1 m3	1 m3

The shuttle is able to accommodate a casualty on a stretcher (of at least 1.85 m length) in the main compartment and clear of the closing door. Where fitted, the entry compartment accommodates 2 persons and still allows the outer compartment door to open/close.

2.18 **Seats**

Seats are either in a single line or staggered so as not to be directly opposite each other.

2.19 **Door openings, dimensions**

When transfer under pressure is being undertaken the doors of a personnel lock used for docking, are 800 mm in diameter. There is a single observation window in the door.

2.20 **Floor coverings**

The floor of the shuttle has a non-slip covering bonded to it.

2.21 **Trunking**

Personnel locks used for saturation exposures need to be fitted with trunking and a docking flange as shown in section 12 of Report 10. The trunking is long enough to permit the unobstructed operation of the docking clamp and interlock.

Trunking, flange or clamp are considered part of the pressure vessel to which it is attached and are designed, fabricated and tested accordingly.

2.22 **Gas supplies from tunnel**

Any system for supplying a personnel lock with mixed gas for compression or breathing from the TBMs meets the requirements of BS EN 16191 and any additional requirements of the Scope.

The requirements of this appendix only apply from immediately upstream of the gas analysis point on the supply side of the control panel and via the panel to the lock.

For shuttles, this guidance applies from the external services connection panel on the protective frame. Feeds to the shuttle include main and emergency mixed gas supply and a single supply of compressed air.

3. General principles for gas supply

Back flow is prevented by non-return valves in each gas supply line.

Cross connection between the supply of oxygen, breathing mixture or compressed air is prevented by design of the fittings. Interchange of masks for breathing mixture/compressed air with those for oxygen is prevented by design of the fittings.

Ideally the initial regulation of pressure is undertaken adjacent to the point of supply on the TBMs however, the pressure of the gas arriving at the control panel does not exceed 40 bar.

3.1 Breathing mixture supply

For any personnel lock compartment intended for use with mixed gas there is a primary, secondary and emergency breathing mixture supply. The primary and secondary supplies feed a common inlet manifold. The emergency supply feeds a separate inlet manifold. These manifolds provide separate main and emergency breathing mixture supplies via the control panel for compression of each compartment of the personnel lock.

Breathing mixture is also supplied from the respective inlet manifolds via the control panel to separate main and emergency manifolds in each compartment of the personnel lock, to which masks can be connected.

For any shuttle, there is a main and emergency breathing mixture supply to the shuttle control panel. From the control panel there are separate supplies to each compartment of the shuttle for pressurising that compartment. There are also separate supplies to manifolds in each compartment to which masks can be connected.

3.2 Compressed air supply

There is a supply of compressed air to the shuttle control panel and from the panel to each compartment of the shuttle for compression of the compartment.

For the shuttle only, there is also a supply of compressed air via the control panel which can be switched to supply the manifold supplying the masks instead of mixed gas. The changeover valve has two clearly marked positions only and it is not possible to make the changeover without two separate actions. Again, backflow is prevented by non-return valves.

3.3 Decompression oxygen supply

The *Contractor* may opt to have a supply of oxygen for decompression purposes. If so, oxygen is supplied via separate manifold with overboard dump

capability. Interchange of masks between mixed gas/air with oxygen is prevented by design of the fittings.

At the *Contractor's* discretion, there is capability to supply other gas mixtures for decompression purposes through the control panel to the manifold supplying oxygen for decompression purposes.

3.4 Metabolic oxygen make-up

Any personnel lock intended for use with mixed gas requires a metabolic oxygen make up supply. The metabolic oxygen is from a separate source to oxygen for decompression purposes. The metabolic oxygen supply is from a source mounted externally on the personnel lock. The flow is controlled from the control panel and the discharge is into a ventilation stream in the lock.

There is a metering device to prevent excess metabolic oxygen discharge into the personnel lock compartment.

3.5 Mixed gas inlet flow controls

Immediately upstream of the control panel on each mixed gas inlet supply, there is a shutoff valve and further upstream a non-return valve.

Upstream of the valves there is a sampling point for a gauge indicating the pressure of the incoming supply and for an analyser indicating the composition (% oxygen by volume and % helium by volume) of the incoming supply. The data from the gauge and analyser is displayed on the lock control panel. The connection point to the tunnel gas supply is upstream of the gauge and analyser.

> Note: A gas analyser can potentially service more than one inlet supply as continuous monitoring of each supply is not always required.

There is a slow acting device to release pressure safely and bleed off gas from each supply line downstream of the shutoff valve.

3.6 Manifolds for mask connections

Each manifold to which masks can be connected in a personnel lock or shuttle compartment has at least one spare connection point. All connection points are self-sealing and are capable of being capped when not in use.

The failure of one connection point does not result in the failure of all connection points simultaneously.

4. Design of breathing mixture supply pipework

4.1 Breathing mixture supply for compression

The breathing mixture supply for compression of a compartment is sufficient to compress the compartment at a rate of 2 bar per minute for the first minute and 1 bar per minute thereafter.

4.2 Breathing mixture supply to masks

The breathing mixture supply to a manifold is designed in accordance with EN 14931 (see link in Annex A) to provide a nominally flow of 75 l/min at working pressure to each connection point. The total supply flow rate to the manifold may be reduced by the simultaneity factors “coefficient K” in table 3 of cl 4.7.1 of EN 14931.

4.3 Helium reclaim

A helium reclaim system may be installed at the *Contractor’s* discretion. The reclaim system does not adversely affect the performance of the breathing mixture supply system. All pipes, hoses, fittings etc. connecting the reclaim system to the personal lock or shuttle follows the guidance in this document.

4.4 Flushing of trunking

Where trunking is fitted to a personnel lock, there is the capability to flush with air or breathing mixture as required. Control of flushing operations may be from the panel or locally at the trunking. There is a gauge to indicate the pressure in the trunking, at the trunking. There is also a slow acting valve for venting the trunking.

4.5 Breathing mixture supply to intermediate chamber

Breathing mixture is supplied to separate manifolds in the intermediate chamber to which the umbilicals to be used in the working chamber of the TBMs can be connected. Main and emergency breathing mixture supplies are provided via the personnel lock control panel from the respective inlet manifolds supplying that control panel. There is the capability at the control panel to undertake continuous on-line gas analysis of both supplies.

4.6 Alternative layout.

Where space constraints require it on a shuttle, an alternative pipework layout may be provided that an equivalent or greater level of reliability, functionality and control can be demonstrated with the proposed layout. The ability of the lock attendant to exercise informed control over all functions from the control panel is not compromised.

5. Control functions and information – personnel locks

The following control functions, capabilities or information is available at the control panel of the personnel lock

a. the pressure and the composition (O_2 and He as % by volume) in each inlet supply line from the TBM gas supplies,

b. valves to control the flow downstream of the panel in each supply line to each compartment,

c. valves to control the de-pressurisation of each compartment as well as the intermediate chamber,

d. valves to control the flow downstream of the panel in each supply line to the intermediate chamber,

e. continuous readout of the pressure and composition (O_2 as % by volume and partial pressure, He as % by volume) downstream of the panel in each supply line to each compartment of the personnel lock and the intermediate chamber,

f. high and low oxygen level alarms for each supply line with the capability to adjust alarm points at the panel,

g. the pressure in the intermediate chamber,

h. mirror scale gauges to indicate the pressure in each compartment and for the main compartment of the lock there is also a mirror scale gauge with a maximum full-scale deflection of 2 bar,

i. the O_2 and He concentrations (O_2 as % by volume and partial pressure, He as % by volume) in each compartment,

j. the CO and CO_2 concentrations (as partial pressure) in each compartment,

k. the flow rate of gas being discharged from each compartment,

l. the temperature and humidity in each compartment,

m. time both as real time and elapsed time with a display in hours, minutes and seconds, battery backup or clockwork,

n. voice communications with each compartment with helium speech unscrambler capability,

o. views of the interior of main compartment and intermediate chamber using CCTV and

p. data recording device capable of recording the pressure and composition of compartment atmosphere including humidity, along with supply to each umbilical at 20 sec intervals.

When requested by the user, an electronic system for controlling pressure during decompression may be fitted.

Valves and analysers may be physically located at the control panel or operated remotely from the control panel.

The following control functions and control information is available at the trunking or optionally at the control panel at the discretion of the *Contractor*

a. the pressure in each supply line,

b. pressure in the trunking,

c. valves to control the flow in each supply line to the trunking,

d. valves to control the de-pressurisation of the trunking and

e. the microphone is arranged in the compartment centre at a seated person's head level.

6. **Ventilation and contaminant removal**

When operating in non-saturation mode, there is equipment for ventilating the personnel locks with fresh air. There is a supply of air at a rate of at least 50 l/min per person, measured at the chamber pressure. There is a device to monitor ventilation rate. If automatically controlled, the ventilation is performed with pressure variations less than ± 0,05 bar. The ventilation equipment is so designed that this range of fluctuation can also be achieved manually.

When operating in saturation mode, there is an electrically operated device in each compartment for scrubbing carbon monoxide and carbon dioxide from the compartment atmosphere. There are standby devices of similar capacity in each compartment. It is also possible to remove volatile organic compounds from the chamber atmosphere.

Note: the scrubbing system may be used when operating in non-saturation mode as an alternative to ventilation.

Appendix C - Technical Appendix: Shuttles - minimum requirements due to mobility

General

1. This appendix sets out requirements for shuttles arising from their mobility. These requirements are in addition to those in Appendix B. The requirements of BS EN 12110:2014 as extended or amended by the contract applies to shuttles.

Oxygen breathing system (including all gas mixtures with more than 25% oxygen)

2. Where at the *Contractor's* discretion the shuttle has the capability for the use of oxygen decompression, the requirements of BS EN 12110:2014 as extended or amended by the Scope apply.

Docking clamp

3. A clamping device is fitted to the shuttle capable of forming and maintaining a pressure tight seal between the docking flange on the shuttle and the docking flange on a personnel lock or habitat. The clamp is prevented from opening when the trunking is pressurised, by a robust mechanical interlock mounted on the shuttle and activated by pressure in the trunking. The clamp can be power operated however it is always possible to open or close the clamp manually such as in the event of failure of the powered system. The interlock is clearly visible and it is immediately identifiable when the clamp is or is not in the locked position.

4. The clamp is considered part of the pressure system and is designed, fabricated and tested accordingly.

Alignment devices

5. There is the facility to accurately align the shuttle with the TBM lock and the habitat to facilitate clamping. The facility can either be on the shuttle or part of the TBM or habitat. Where the facility comprises height adjustment capability within the undercarriage of the shuttle frame, it maintains the alignment of the shuttle within the tolerances set by the manufacturer of the shuttle throughout the time the shuttle is docked.

> Note: Alignment facility can include a docking frame and guide rails on the TBMs on to which the shuttle can be driven (see TBM specification and EN 16191) or by providing height adjustment capability within the undercarriage of the shuttle frame.

Wheel gauge

6. Unless otherwise agreed with the *Project Manager*, the wheel gauge for rail mounting is 900mm.

Protective frame

7. The shuttle is fitted within a protective frame to minimise the risk of impact damage and facilitate lifting. The protective frame may incorporate wheels to facilitate its movement and handling. The corners of the frame are formed from castings to ISO 1161:2016 (see link in Annex A). The frame is fabricated in accordance with ISO 10885:2018 (see link in Annex A) or stronger. There is a protective non-flammable weather protection cover over the top of the frame.

Prevention of unintended movement

8. Where the shuttle frame is wheeled, there are means for preventing unintended movement of the shuttle frame.

Lifting points

9. The protective frame of the shuttle is fitted with lifting points. The load of the shuttle in service to be taken by the lifting points includes the weight of the shuttle, a full crew of occupants, the protective frame and all essential equipment mounted within the frame as required by the Scope. This in-service load is clearly marked on the lifting frame. A factor of safety of 10 is applied to the maximum in-service load when designing lifting points. The protective frame and its lifting points are designed for lifting persons and are thoroughly examined before initial use.

Tie down points

10. Tie down points are provided to secure the shuttle and frame on any transport vehicle or platform used.

    Note: Twist lock devices compatible with the ISO 1161:2016 corner castings of the frame may be used for tie down.

Supply lock

11. There is a supply lock on the main compartment. It is at least 250 mm dia. x 350 mm long and is sufficiently large to allow the passage of chemical containers for any CO/CO_2/VOC scrubbers installed in the shuttle. The outer door of the supply lock if opening outwards is fitted with an interlock to prevent its opening when the lock is pressurised. There is a pressure gauge and a bleed valve fitted to the outside of the supply lock.

Observation windows

12. There are two observation windows at least 100 mm in diameter for each compartment of the shuttle and one observation window in each interconnecting or end door. Observation windows meets the requirements of BS EN 12110:2014 in respect of materials used.

Spare penetrators

13. There are two spare penetrations of 40 mm minimum diameter in each compartment which until used are sealed with a blind flange or threaded plug or cap.

Chamber coatings

14. The interior of the shuttle is coated with a flame-retardant epoxy paint which is low in VOCs.

Thermal insulation

15. Any thermal insulation covering the shuttle is non-flammable.

Shuttle atmosphere control

16. There is a temperature and humidity control system on the shuttle capable of maintaining a temperature in the shuttle of between 20 ^{0}C and 35 ^{0}C with an accuracy of +/- 2 ^{0}C whilst in transit. The humidity of the shuttle atmosphere is controlled between 40% and 60%. The ambient temperature and humidity for the location of intended use is agreed between *Contractor* and contract medical adviser taking account of the preferences of those in it.

Control panels

17. Because of space constraints it can be impossible to fit a single control panel as for a personnel lock. Consequently, the shuttle is fitted with one or more control panels from which the operator can control the operation of the shuttle. The number of control panels are minimised. Panels and all the instrumentation on them are contained within the envelope of the protective frame. The control panel design specifically takes ergonomics into account to allow the operator of the shuttle to operate it in the best conditions (see EN 894 series in 4 parts 2008). The layout of the panel allows the operator to operate control equipment whilst simultaneously observing the relevant instrumentation.

18. A control panel is marked so that the function and switching direction of control equipment can be clearly recognised. The control panel has a schematic identifying the layout and function of the controls and instrumentation.

19. Each panel is illuminated with a nominal intensity of at least 200 lux at the panel surface.

Control functions and information

20. It is possible to exercise the following control functions and observe the following control information from the shuttle control panels

    a. the pressure and the composition (O_2 and He as % by volume) in each inlet supply line,

    b. valves to control the flow downstream of the panel in each supply line to each compartment,

    c. valves to control the de-pressurisation of each compartment,

    d. the pressure and composition (O_2 as % by volume and partial pressure, He as % by volume) downstream of the panel in each supply line to each compartment of the shuttle,

    e. high and low oxygen level alarms for each supply line with the capability to adjust alarm points at the panel,

    f. mirror scale gauges to indicate the pressure in each compartment and for the main compartment of the shuttle there is also a mirror scale gauge with a maximum full-scale deflection of 2 bar,

       Note: digital gauges of equivalent capability may be used

    g. the O2 and He concentrations (O2 as % by volume and partial pressure, He as % by volume) in each compartment,

    h. the CO and CO2 concentrations (as partial pressure) in each compartment,

    i. the temperature and humidity in each compartment,

    j. controls for the environmental control system for the shuttle,

    k. time both as real time and elapsed time with a display in hours, minutes and seconds, battery backup or clockwork,

    l. voice communications with each compartment with helium speech unscrambler capability,

    m. data recording device capable of recording the pressure and composition of compartment atmosphere including humidity, along with supply to each umbilical at 20 second intervals and

    n. valves and analysers may be physically located at the control panel or operated remotely from the control panel.

Power during TUP operations

21. Power is supplied to the shuttle during transfer between the habitat and the personnel lock on the TBMs. The same emergency power requirements as for personnel locks apply to shuttles.

External services connection panel

22. There is a panel at which the external services to the shuttle can be connected. The panel and connectors are located within the protective frame and are readily accessible. Connectors are self-sealing or fitted with caps to prevent the ingress of dirt when not in use. The connectors used, differ in diameter and type, to minimise the risk of cross connection. Each connector is clearly labelled with its function on the panel.

23. As a minimum there are connections for main and standby compressed air, main and standby mixed gas, oxygen for decompression, water (flow and return) for the climate control unit, power and standby power and communications.

On-board gas storage

24. As a minimum there are fastenings for three 50 litres x 200 bar gas storage cylinders within the protective frame. There are connections to the control panel for each cylinder. There is a pressure reducer on each connection adjacent to the connection point reducing supply pressure to less than 40 bar.

Personnel restraint

25. Seat belts for use during lifting and travel are provided on each seat in the shuttle.

Testing

26. A shuttle undergoes and passes the following tests before being put into service

    a. the shuttle as a pressure vessel is tested in accordance with EN 13445,

    b. the shuttle is functionally tested by the manufacturer prior to acceptance by the *Contractor* using maximum flow rates and at a pressure agreed with *Contractor* and *Project Manager* and

    c. the *Project Manager* is notified of the tests in advance and be entitled to attend.

All test and calibration certificates for instrumentation are recorded in the PPCIM system.

Appendix D - Competent persons for compressed air work

1. It is essential for the undertaking of work in compressed air that there are sufficient competent persons in safety critical roles for the work to be done safely. These roles, the duties falling to those undertaking the roles along with the competences required of those who fill them are set out in The Guide and Report 10.

2. For low and intermediate pressure work, the *Contractor* ensures the roles and positions identified in The Guide are filled by appropriately competent persons. These are the person in charge, hyperbaric supervisor, hyperbaric plant supervisor, lock attendant and compressor attendant/underground plant attendant. For intermediate pressure work the medical lock attendant and medical lock tender can also be required. The *Contractor* ensures that those persons are instructed and supervised appropriately in the duties required of them.

3. The *Contractor* provides training for all persons exposed to compressed air in accordance with the requirements of Regulation 15 of the WCA Regs.

4. For non-saturation exposures in high pressure work, the personnel and roles are similar to those for intermediate pressure work. In addition, the *Contractor* ensures that all personnel are competent in the use of mixed gas breathing mixtures and that sufficient additional personnel are provided to manage the procurement, storage and provision of mixed gas breathing mixtures in accordance with the *Contractor's* gas management plan.

5. For saturation exposures, additional personnel are required, and the *Contractor's* organisational management plan reflects this. The *Contractor* takes into account the guidance in clause 4.7 of Report 10. The proposed organisational structure, with justification of any deviations from the structure outlined in Report 10, are submitted to the *Project Manager* for acceptance in accordance with the Acceptance Procedure. The competence requirements of clause 4.7 of Report 10 are met or exceeded.

6. Those undertaking saturation exposures have had previous experience of saturation work either in tunnelling or diving and hold the qualifications set out in clause 4.7.9. The *Contractor* is entitled to present evidence to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, of competence and aptitude for saturation work in respect of personnel not meeting the requirements of clause 4.7 but deemed essential to the works. All those undertaking saturation exposures are appropriately instructed and supervised in the work to be undertaken and of the risks and mitigation measures involved.

S2700 *Client's* work specifications and drawings

S2705 *Client's* work specification

Preamble to the Specification

S2705.1 The specification for the works are the Specification for Highway Works (SHW), Volume 1 of the Manual of Contract Documents for Highway Works (MCHW) (see link provided in Annex A), as modified and extended by the Scope (including the *Client* compiled/completed numbered appendices as listed in numbered appendix 0/3). Together, these documents form the **"Specification"**.

S2705.2 Reference to the Client in the Specification for Highways Works is taken to mean the *Client*, the *Project Manager* or the *Supervisor* as the context requires.

S2705.3 The *Client* compiled/completed numbered appendices are as listed in numbered appendix 0/3.

S2705.4 The relevant publication date of each page of the SHW is given in the Schedule of Pages and Relevant Publication Dates (as defined in table 0/1 of Volume 1 of MCHW). These relevant pages and publications are current as of the Reference Date with the exceptions identified within section S320.

S2705.5 Prior to commencement of the DCO Construction Phase, the *Contractor* will compile/complete the numbered appendices (denoted 'E/C' or 'C') as listed in numbered appendix 0/3. These numbered appendices are to be submitted in accordance with the Acceptance Procedure.

The *Contractor* will ensure that such compiled/completed numbered appendices comply with the requirements of the SHW and as updated in accordance with paragraph S2705.1.

The *Contractor* updates the numbered appendices when changes occur and resubmits to the *Project Manager* in accordance with the Acceptance Procedure.

The relevant construction activity is not commenced until the updated *Contractor's* numbered appendices are accepted by the *Project Manager* in accordance with the Acceptance Procedure.

S2705.6 Insofar as the Specification (as defined in paragraph S2705.1) may conflict or be inconsistent with any provision in the SHW, the Specification will always prevail. Where the *Contractor* identifies a requirement that is less onerous than the SHW, the *Contractor* will, at the earliest opportunity, notify the *Project Manager* for resolution.

S2705.7 For numbered appendices 0/1 and 0/2, where a clause in the Specification is altered any original table/figure referred to in the clause applies unless the table/figure is also altered. Where a table/figure is altered any reference in a clause to the original table/figure applies to the altered table/figure. The *Contractor* ensures that numbered appendices 0/1 and 0/2 are compiled, only to the extent strictly required to comply with the requirements of the Scope.

S2705.8 Where a clause in the Specification relates to work, goods or materials which are not required for the *works*, it will be deemed not to apply.

S2705.9 Any numbered appendix referred to in the Specification which is 'not used' (as specified in numbered appendix 0/3) will be deemed not to apply.

S2705.10 References to the Overseeing Organisation will be deemed to be references to the *Client* (via the *Project Manager*) and relevant Local Authorities (as the context requires) and accordingly the roles and functions of the Overseeing Organisation will be performed by the *Client* (via the *Project Manager*) and relevant Local Authorities (as the context requires).

S2705.11 The Specification is used in conjunction with the contract and the delegation of the roles and functions of the Overseeing Organisation as stated in paragraph S2705.10 above will be amended as follows

- if any agreement, consent or approval which is required to be obtained from the relevant Local Authority impacts on the health and safety of the general public, the environment or any property or equipment not owned or operated by the *Contractor* or the subcontractor, such agreement, consent, or approval will be also obtained from the Client (via the *Project Manager*).

S2705.12 Where a clause or sub-clause in the Specification is annotated by “05/01” or similar, this indicates the relevant publication date that alteration(s) to the clause or sub-clause were made. The first double digit refers to the month, and the second double digit refers to the year.

S2705.13 The following interpretations will be applied to words or terms used in documents referred to in this section S2705 (including the associated annexes and appendices)

- except where the context requires otherwise, **“Engineer”** will be deemed to be a reference to the **“*Contractor*”** where such an interpretation is necessary for the Contractor to fulfil its obligations in regard to the design,
- where a **“numbered appendix”** is referred to, it will mean a reference to a numbered appendix of this section S2705 listed in numbered appendix 0/3 and contained in Annex DD of the Scope,
- all references to the **“Site”** have the same meaning as within the Contract,
- references to **"clause"** or **"sub-clause"** are to a clause or sub-clause of the relevant part of the MCHW (unless the context requires otherwise), and
- except where the context requires otherwise, **"*Client*"**, **“*Project Manager*”** or **“*Supervisor*”** are deemed to be a reference to either the Overseeing Organisation, Employer or contracting authority when read in conjunction with the DMRB, MCHW and IAN.

S2710 Drawings

S2710.1 Drawings are listed in Annex A.

S2800 Designated funds

S2805 Designated funds - *Contractor's* proposals

S2805.1 The *Project Manager* may request the *Contractor* to submit a proposal for the development of an Innovation to deliver a 'Designated funds initiative' (see link in Annex A). The *Project Manager* provides to the *Contractor* a brief

- describing the Innovation and its linkage to the subject-matter of the contract,
- stating when the Innovation is to be deployed and, if appropriate, removed from the Working Areas and
- indicating the desired outcome and the outputs to be produced by the *Contractor*.

S2805.2 Before submitting the draft proposal and if requested by the *Project Manager*, the *Contractor* attends a meeting to discuss the developing proposal and potential products. The *Client's* approach to designated funding is detailed in the 'Designated funds initiative' (see link in Annex A).

S2805.3 The *Contractor* submits the proposal to the *Project Manager* within the *period for reply* of the *Project Manager's* instruction or such other period as the *Project Manager* agrees. The proposal includes any necessary changes to the Scope.

S2805.4 The *Project Manager* replies to the proposal within two weeks. If the *Project Manager* does not accept the *Contractor's* proposal, the *Project Manager* states the reasons. If required by the *Project Manager*, the *Contractor* submits a revised proposal taking account of the reasons to the *Project Manager* for acceptance within one week.

S2805.5 If the *Project Manager* accepts the proposal, the *Project Manager* instructs the development of the Innovation as a change to the Scope.

S2805.6 The *Contractor* identifies separately in each application for payment the part of the Price for Work Done to Date that is attributable to the development of each Innovation. The *Contractor* provides any associated payment details requested by the *Project Manager*.

S2900 Systems engineering approach and deliverables

S2900.1 The *Contractor* undertakes design, development, integration, testing and commissioning to satisfy the Scope requirements including the 'LTC Tunnel System requirements specification' provided in Annex A.

S2900.2 The *Contractor* undertakes a systems engineering approach in accordance with

- ISO/ IEC/ IEEE 15288:2015 - System life cycle processes,
- ISO/ IEC/ IEEE 15289:2019 Systems and software engineering - Content of life-cycle information items (documentation),
- ISO/IEC/IEEE 29148-2018 - Systems and software engineering - Life cycle processes - Requirements engineering and
- BS EN 61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems.

(see links provided in Annex A).

S2900.3 Within 20 weeks of the *starting date*, the *Contractor* submits to the *Project Manager* for acceptance the following plans in accordance with ISO/ IEC/ IEEE 15288:2015 and ISO/ IEC/ IEEE 15289:2019.

Table 30 - systems engineering management plans

Management plan deliverables	**Content**
'systems engineering management plan'	• describes system boundary and key interfaces, • describes how activities and design artefact deliverables, listed in Table 32 and Table 31 respectively, are co-ordinated and undertaken by the *Contractor*, • includes a description of the *Contractor's* systems engineering and design organisation as well as associated RACI with wider stakeholders, • captures the process for reviewing *Client* provision preliminary documents (Table 32) and how these are used in the development of the detailed design and o encompasses the requirements of design, validation and verification, test and commissioning and o explains the hierarchy of management plans and relationships between them • includes methodology for consulting with the *Client* and assuring the system against operational and maintenance needs, • captures when *Contractor* deliverables are to be updated as an input to system and project stage gates and • includes the additional standards that the *Contractor* uses in the design, construction and the operational and maintenance of the works.
'systems engineering	• describes how requirements listed in the 'LTC Tunnel System requirements specification' provided in Annex A and related

requirements management plan'	standards are satisfied and managed throughout the Project lifecycle using the tool described in paragraph S2904.4, • encompasses the *Contractor's* incorporation of test and commissioning related data listed in section S700.
'systems engineering configuration management plan'	• captures how the LTC Tunnel System design baselines are recorded and change managed, • lists key configuration items, • encompasses the LTC Tunnel System migration plan highlighting key configuration states and • includes proposals for functional and physical configuration audits.
'systems engineering interface management plan'	• lists and captures interface management activities for individual LTC Tunnel System interfaces, • encompasses system, operational and cross contract system interfaces, • includes all relevant interfaces and describes *Contractor* activities to develop interface control documents (ICDs), implement, test and commission system interfaces and • as a minimum, develops content in line with the *Client's* 'Interface Management Plan' see link in Annex A.
'systems engineering safety management plan'	• details the methodology to satisfy the Network Performance Criteria's safety objectives and develops a safety argument for the LTC Tunnel System, • includes a plan to undertake hazard identification activities, • details the methodology (in accordance with EN 61508) for safety integrity level (SIL) determination and achievement of the LTC Tunnel System and • encompasses a plan for designing human factors and ergonomics activities including road user behavioural modelling, operator human factors analysis and corresponding qualitative and quantitative assessments of road user, operators and maintenance staff risk levels.
'systems engineering security management plan'	• details the activities and the methodology for adhering to relevant physical and cybersecurity requirements in line with the following standards including o ISO/IEC 27001 Information security management, o IEC 62443 Cybersecurity, o 'BS EN ISO 19650-5:2020 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM)' - Information management using building information modelling Part 5: Security-minded approach to information management, o ENISA SO-08 Minimum Security Requirements for Digital Service Providers - Physical and environmental security,

	o ENISA SO-09 Minimum Security Requirements for Digital Service Providers - Security of supporting utilities and o the UK National Cyber Security Centre Cyber Assessment Framework (see links provided in Annex A), • includes an applicability assessment against the contents of the above standards and • includes a methodology to complete a security threat assessment and a plan to incorporate identified mitigations and safe guards into the LTC Tunnel System and associated operations.
'systems engineering reliability availability and maintainability (RAM) management plan'	• provides detailed analysis and assessment activities to be undertaken to satisfy RAM requirements for the LTC Tunnel System pertaining to reliability, availaibilty and maintainability.
'systems integration plan'	• details the system and subsystem integration activities, • details the integration activities for LTC Tunnel System interfaces identified within the 'interface management plan' and • as a minimum, develops content in accordance with the *Client's* 'Systems Integration Plan' see link in Annex A.

S2900.4 In all plans the *Contractor* includes a description of

- relevant internal and external stakeholders,
- roles and responsibilities to deliver planned activities,
- relevant stage gates and inputs into stage gates in line with the content in the *Client's* Systems Integration Plan (see link in Annex A),
- deliverables and agreed deliverable update cycles in line with design and project stage gates listed in Table 31 and Table 32 and
- required agreements and associated governance / review activities highlighting relevant stage gates with entry and exit criteria.

S2900.5 A reason for not accepting a report listed in Table 30 above is

- it does not comply with the Scope or
- it does not provide sufficient detail to enable the *Project Manager* to understand and ensure the LTC Tunnel System achieves the required outcomes including Availability, safety, operability and maintainability.

S2900.6 The *Contractor* undertakes all activities listed within the management plans in Table 30. Following submission of the plans and prior to acceptance the *Contractor* complies with the draft plans in Providing the Works.

System Design Artefacts

S2900.7 The *Contractor* submits to the *Project Manager* for acceptance a 'schedule of the deliverables' for system design artefacts as part of the tunnels technical submissions procedure as described in section S260. A reason for not accepting the schedule is

- it does not comply with the Scope,
- it does not align with the plans required by Table Table **30 - systems engineering management plans** or
- it does not comply with the Accepted Programme.

S2900.8 The *Contractor* submits the following 'system design artefacts deliverables' described in Table Table **31 - Systems Engineering Design Artefacts** and Table Table **32 - Activity and artefacts relationships** and in accordance with the accepted management plans listed in Table Table **30 - systems engineering management plans**.

Table 31 - Systems Engineering Design Artefacts

Systems Engineering Design Artefacts	**Requirements**
'system requirements specification'	The *Contractor* develops the system engineering design artefact and evidences compliance with • the requirements of the 'LTC Tunnel System requirements specification' provided in Annex A and • its identified lower level requirements needed to satisfy the LTC Tunnels System Requirements and overarching scope.
'system definition report'	The *Contractor* develops the system engineering design artefact and • provides a narrative to the logical and physical systems architecture, • describes the system boundary and associated target environment, • describes the system(s) under consideration for security analysis and • describes the structure hierarchy including individual sub-systems in detail.
'logical systems architecture'	The *Contractor* develops the system engineering design artefact and • provides evidence of logical representation of the LTC Tunnel System inclusive of relevant interfaces and external systems and • describes the portioning of the system(s) under consideration in security zones, the sub-systems within those zones and the conduits between security zones.
'physical systems architecture'	The *Contractor* develops the system engineering design artefact and provides evidence of physical representation of the LTC Tunnel System taking into account the Project's topography, Tunnel Service Building locations, the *Client's* regional operation centre (ROC) and constituent components (e.g servers and networking infrastructure).

'preliminary cyber security risk assessment'	The *Contractor* develops the system engineering design artefact and evidences alignment with the *Client's* Physical Security Execution Plan (see link in Annex A).
'safety cases, analysis and assessment reports'	The *Contractor* develops the system engineering design artefact and • provides evidence of quantative justification and evidence for the safe operation of the LTC Tunnel System and • evidences alignment with the 'tunnel operational risk assessment' (see link in Annex A) by o utilising the same format of key safety parameters in terms of probability, frequency, likelihood, severity and overarching user risk level and o including overarching user risk level and, where available, hazard and specific hazard parameters.
'failure modes, effects and criticality analysis' (FMECA)	The *Contractor* develops the system engineering design artefact and • identifies all safety instrumented function (SIF), corresponding hazards, hazard classifications including risk factor and • evidences alignment with the 'tunnel operational risk assessment' by o utilising the same format of key safety parameters in terms of probability, frequency, likelihood, severity and overarching user risk level and o including overarching user risk level and, where available, hazard and specific hazard parameters.
'SIL assessment and determination report'	The *Contractor* develops the system engineering design artefact and • identifies SIL and corresponding systems which require risk reduction, • proposes SIL levels, • justifies why SIL levels are appropriate and • evidences compliance with EN 61508 methods.
'security level assessment and determination report'	The *Contractor* develops the system engineering design artefact and, informed by the *Client's* Physical Security Execution Plan (see link in Annex A) • identifies security levels applicable to each foundational requirement, component or zone and • justifies why the chosen security levels are appropriate.
'human factors analysis and assessment report'	The *Contractor* develops the system engineering design artefact and • reviews the *Client's* 'tunnel operational control philosophy' and as a minimum uses the same operational scenarios (see link in Annex A) and identifies key human factors and ergonomics requirements, • includes results and conclusions from its road user behavioural modelling based upon incident scenarios listed in the 'tunnel operational control philosophy',

	• identifies human factors and ergonomic safe guards and mitigations in response to the above results/conclusions and corresponding safety analysis and • provides quantitative safety justification as to why said safe guards and mitigations reduced user risk level to as low as reasonably practicable (ALARP) levels.
'design verification report'	The *Contractor* develops the system engineering design artefact and captures a matrix evidencing verification and validation purposes between the 'LTC Tunnel System requirements specification' and corresponding entries in design documentation, construction plans and test evidence.
'interface control documents'	The *Contractor* develops the system engineering design artefact and covers the definition of LTC Tunnel System interfaces (internal and external), detailing cross interface messaging, discipline integration and corresponding system functionality.

S2900.9 A reason for not accepting a material listed in Table 31 above is

- it does not comply with the Scope or
- it does not provide sufficient detail to enable the *Project Manager* to understand and ensure the LTC Tunnel System achieves the required outcomes including Availability, safety, operability and maintainability.

S2901 Core Activities and Artefacts

S2901.1 The *Client* provisioned preliminary documents (listed in Table 32) are based upon model and object-based systems engineering methods to define the system and its constituent boundaries to apportion requirements. This ensures consistency in system structures, functions and terms when undertaking operational analysis and assessment as well as Reliability, Availability, Maintainability and Safety activities. The *Contractor* undertakes a model and object-based systems engineering approach.

S2901.2 The *Contractor* is responsible for reviewing the preliminary documents, highlighting any preferred changes and developing the associated *Contractor* deliverables in respect to the LTC Tunnel System design. The *Contractor* submits the deliverables outlined in Table 32**Table 32 - Activity and artefacts relationships** to the Project Manager for acceptance.

Table 32 - Activity and artefacts relationships

Topic Area	***Client* provisioned preliminary documents**	**Associated *Contractor's* deliverable**	***Contractor's* responsibilities**
Operations and maintenance analysis	'operational control philosophy' (Tunnel) provided in Annex A	'operational control philosophy'	To review the *Client's* operational control philosophy and use as a minimum the operational scenarios and identified use case actors. To develop the deliverable in consultation with the *Client*, emergency

			services and other relevant stakeholders. To support development and validation of operational and maintenance procedures.
Logical system architecture and physical system architecture	'logical systems architecture' (Figure 7)	'system definition report' 'logical systems architecture' 'physical systems architecture'	To define and capture the logical and physical boundaries of the LTC Tunnel System and its constituent elements and interfaces. To undertake interface management and safety and RAM apportionment.
minimum operating requirements	'tunnel functional minimum operating requirements' provided in Annex A	'tunnel minimum operating requirements'	Define systems maintaining safe operation of the tunnels and approaches. To include the minimum combinations of conditions, availability of systems and procedures for the safe operation of the tunnels and approaches including cyber security consideration based on the assigned security level for the affected functions. To include actions to be undertaken in the event of one or more failures of a system including when a closure, suspension or restriction is required.
Discipline detailed design	Mechanical and Electrical Design and Execution Requirements	'ITS design report'	To undertake detailed design and satisfy 'LTC Tunnel System requirements specification' provided in Annex A.

	'intelligent transport system (ITS) design report'	'M&E detailed design report' and as built design[5]	
Requirements derivation and apportionment	'LTC Tunnel System requirements specification'	'systems requirement specification'	To create links between the requirements hierarchy (as described in paragraph S2903.1) to maintain traceability, verification and validation of the LTC Tunnel System.
Safety analysis and assessment	'tunnel SIL assessment report' provided in Annex A	'safety cases and analysis and assessment reports' 'SIL assessment and determination report'	To achieve and document the achievement of the management of hazardous events and achievement of so far as is reasonably practicable (SFRAP).
Security analysis and assessment	N/A	updated 'security level assessment and determination report'	To review and update the 'security level assessment and determination report' to reflect the developed state of the design.
RAM analysis and assessment	'RAM assessment' provided in Annex A	'RAM analysis and assessment report'	To achieve and document the achievement of Availability target and corresponding requirements captured within the 'LTC Tunnel System requirements specification' (HE540039-CJV-STP-GEN-REQ-TUN-00001) and additional RAM requirements.
Critical asset analysis and assessment	N/A.	'critical asset assessment report'	To analyse all assets within the operational LTC Tunnel System to identify any non critical assets.

[5] Details of ITS and M&E specific design deliverables to be submitted by the *Contractor* to the *Project Manager* for acceptance are provided in Tunnel System Requirements Specification (HE540039-CJV-STP-GEN-REQ-TUN-00001) in Annex A alongside a summary of all tunnel system related deliverables.

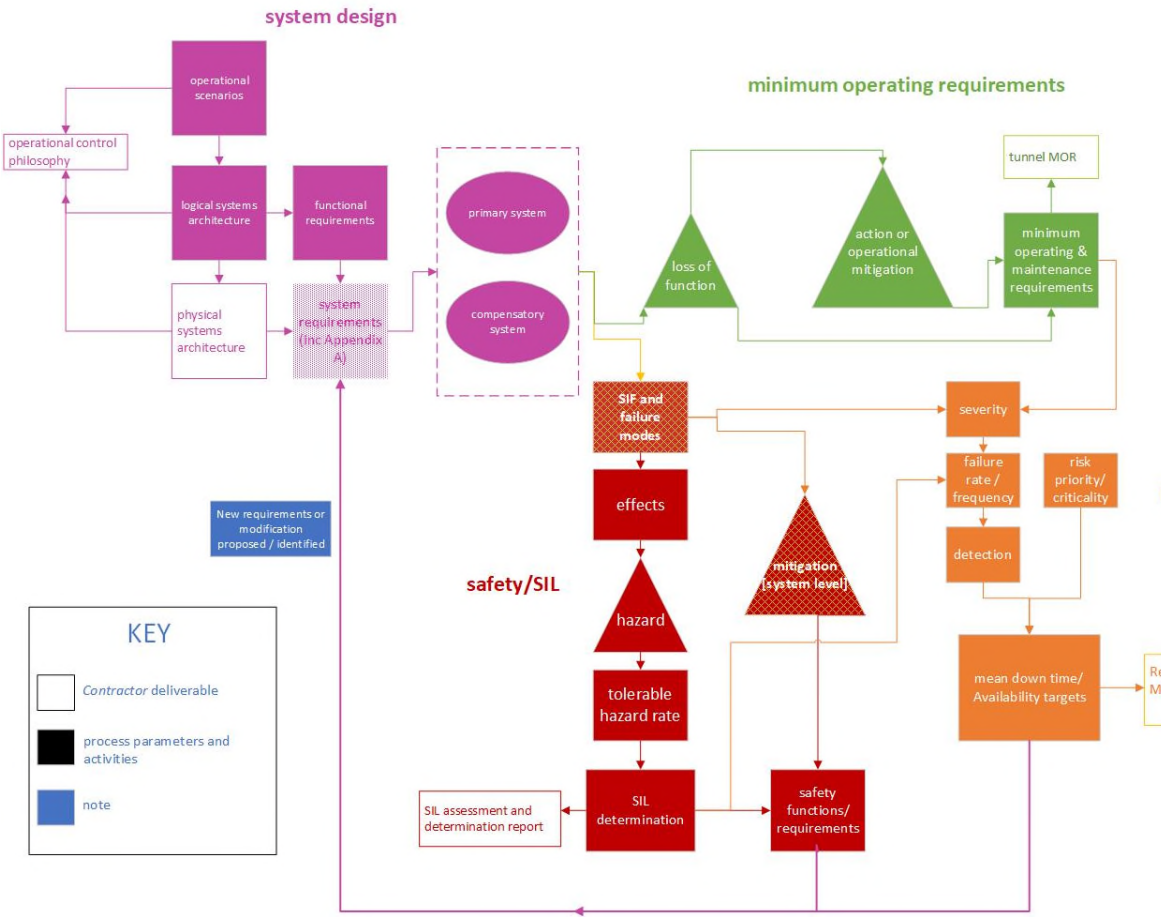
			To justify identified non critical assets.
Obsolescence validation	Section S370 whole life cost model	'obsolescence report'	To evidence availability and duration of • manufacturers support (including spares availability) and • Intellectual property rights (IPR) holders support for Software including maintenance, fault/Defect/ obsolescence resolution and development inline with the corresponding asset design life.

S2901.3 Figure 6 provides an illustrative overview of how the above activities and artefacts fit together, culminating in a system requirements specification for the LTC Tunnel System and its constituent elements.

S2901.4 The *Contractor* maintains Figure 6 depicted interrelationship between the

- 'operational control philosophy',
- 'minimum operation requirements',
- 'SIL assessment' and
- 'RAM assessment'.

Figure 6 - Interrelationship between Operations, RAM and Safety deliverables



Operations and Maintenance

S2901.5 While developing the LTC Tunnel System design and 'operational control philosophy', the *Contractor* plans for operations and maintenance activities, with specific focus on incident scenarios and sequence diagrams. These scenarios outline the stakeholder actions, constraints and system responses needed to safely manage incidents (including cyber incidents) during the operational phase.

S2901.6 To assess these scenarios and any newly generated scenarios, the *Contractor* attends workshops organised by the *Project Manager*. The workshop attendees include

- the *Client's* safety engineering & standards group,
- *Client*,
- Information Technology Directorate,
- chief information security officer's (CISO) team,
- emergency services,
- Local Authority representatives and
- tunnel design *Client* representatives.

Reliability, Availability and Maintainability (RAM)

S2901.7 The *Contractor* delivers the works satisfying (as a minimum) and evidencing against the following availability requirements

Table 33 - Availability targets

Lower Thames Crossing - Main Crossing (tunnel and approaches)	**Peak Period**		**Off Peak Period**	
Unplanned unavailability (Tunnel Structure/Civils) (annual mins per lane km) **MOR state 1-**	0 mins	**0.00%**	360 mins	**0.21%**
Unplanned unavailability (tunnel systems MOR) (annual mins per lane km) **-MOR state 1-**	160 mins	**0.05%**	80 mins	**0.05%**
Unplanned unavailability (tunnel systems critical) (annual mins per lane km) **-MOR state 2-**	0 mins	**0.00%**	720 mins	**0.41%**
Unplanned unavailability (tunnel systems optimal) (annual mins per lane km) **-MOR state 3-**	0 mins	**0.00%**	1800 mins	**1.03%**
Planned unavailability (annual mins per lane km) **-MOR state 4-**	0 mins	**0.00%**	3920 mins	**2.24%**
% Un-Available (Unplanned + Planned)	0.05%		3.93%	
Total % Available (Unplanned + Planned)	**99.95%**		**96.07%**	

The MOR states are defined as follows

Table 34 - MOR states

MOR State	Meaning
Maintenance Failure **MOR state 4** **(Mitigation available)**	An asset or system has developed a Defect or. Other assets or systems and enhanced procedures can be used as mitigation. Any mitigation measures are immediately implemented and constantly monitored. **Defect and fault rectification takes place at the next planned maintenance.**
Sub-optimal **MOR state 3** **(Mitigation available)**	A critical asset or system has developed a Defect or fault. Other assets or systems and enhanced procedures can be used as mitigation. Any mitigation measures are immediately implemented and constantly monitored. **Defect and fault rectification takes place at the earliest off-peak opportunity within 7 days.**
Critical failure **MOR state 2** **(Mitigation may be available)**	One or more critical assets or systems have developed major Defects or faults. The Defects or faults, under certain conditions, could represent a major hazard to road users, operational or maintenance staff or *Client's* reputational or charging revenue risk, as indicated in the accepted *Contractor's* MOR. Mitigation measures may be available, usually depending on external factors. If mitigation measures are **NOT** available, the affected lane(s) / tunnel(s) are immediately **CLOSED (CAT 1)** if they create a major hazard to road users, operational or maintenance staff, as indicated in the accepted *Contractor's* MOR. If mitigation measures are available, these are immediately implemented and constantly monitored. **Defect and fault rectification takes place at the earliest off-peak opportunity (e.g. next evening).**
Below MOR	One or more critical assets or systems have developed major Defects or faults that means it is/they are not operating as intended. The faults represent an immediate hazard to road users, operational or maintenance staff which cannot be mitigated (ALARP principles) by either asset, system or accepted operational measures applied to the LTC Tunnel System.

MOR state 1 **(No mitigation available)**	**The affected lane(s) / tunnel(s) are immediately CLOSED.** **Defect and fault rectification takes place immediately.**

S2901.8 The *Contractor* undertakes reliability, Availability and maintainability (RAM) analysis and assessment for the LTC Tunnel System focusing on minimising lane unavailability caused by unplanned and planned maintenance activities to achieve the Availability target listed in Table Table **33 - Availability targets** and corresponding requirements captured within 'LTC Tunnel System requirements specification' (provided in Annex A). A preliminary 'RAM assessment' has been produced for information (provided in Annex A).

S2901.9 The *Contractor* evidences how the LTC Tunnel System meets the Availability target and corresponding requirements captured within the 'LTC Tunnel System requirements specification' including the use of RAM analysis and assessment.

Safety Integrity Level

S2901.10 The *Contractor* generates an overarching safety case for the LTC Tunnel System's achievement of the Network Performance Criteria safety objective of 26% reduction in killed or seriously injured inclusive of mitigation measures and supported SIL determination and certification evidence for the *Project Manager's* acceptance. A preliminary 'SIL assessment report' has been produced.

S2901.11 In accordance with BS EN 61508 Functional Safety, the 'SIL assessment', undertaken by the *Contractor*, the *Contractor's* 'SIL assessment' determines and apportions risk reduction factors to safety-critical LTC Tunnel Systems. The *Contractor* includes LTC Tunnel System constituent (including multiple constituents) whose failures indirectly lead to adverse safety risks within the Contractor's 'SIL assessment'.

Minimum operating requirements (MOR)

S2901.12 The *Contractor* develops and updates a 'tunnel MOR' set and submits to the Project Manager for acceptance. A preliminary 'functional MOR' has been produced (HE540039-CJV-STU-GEN-REP-OPS-00001) (see link in Annex A) which includes a MOR table with safety score values relating to the tunnel preliminary design.

S2901.13 The *Contractor* defines and captures the threshold for initiating a full tunnel, a bore or one or more lane closures within the MOR. This threshold is based on the *Contractor's* LTC Tunnel System design as well as operational considerations identified through the RAM analysis.

S2901.14 The *Contractor* identifies within the 'tunnel MOR' corresponding mitigations and MOR state (as identified above in Table 34) associated with each respective failure condition in line.

S2901.15 The *Contractor* identifies and develops the 'tunnel MOR' to determine the criticality of each LTC Tunnel System constituent in different combinations and scenarios to identify the safety scoring. The 'tunnel MOR' identifies mitigation measures required in response to incident scenarios and system degraded operations. The 'tunnel MOR', system unavailability and failure rates complies with the Availability targets and safety targets listed within the Scope. The *Contractor* captures proposed mitigation measures against degraded Critical Asset or system states in the 'tunnel MOR' for acceptance by the *Project Manager*.

S2901.16 The *Contractor* applies resultant findings and design requirements, from the analysis and assessments obligations within section S2900, to the LTC Tunnel System design and demonstrates compliance with the LTC system requirements captured in 'LTC Tunnel System requirements specification' (provided in Annex A).

S2901.17 The *Contractor* consults with the operational stakeholders on the proposed ‘tunnel MOR’ and documents their comments. The *Contractor* addresses the comments.

S2901.18 The *Contractor* submits the ‘tunnel MOR’ as part of MOR submission to the *Project Manager* for acceptance. A reason for not accepting the ‘tunnel MOR’ is that

- it does not address the operational stakeholders comments,
- it does not demonstrate the Availability targets and safety targets are achieved,
- it does not provide sufficient detail to enable the *Project Manager* to understand how the Availability target and safety targets are achieved or
- it does not demonstrate there is no adverse impact upon
    - whole life costs or
    - future operational maintenance costs.

Critical assets

S2901.19 The *Contractor* submits a ‘non critical asset assessment’ to the *Project Manager* for acceptance within 12 weeks of the *starting date*. The *Contractor* uses the critical assets listed in the 'LTC Tunnel System requirements specification' (provided in Annex A) as a baseline to develop the *Contractor’s* ‘non critical asset assessment’ and tunnel MOR’.

S2901.20 The *Contractor* validates and provides justification for identified non critical assets/systems and any additions or deviations from the provided baseline using a FMECA/preliminary quantative safety justification within the *Contractor’s* ‘non critical asset assessment’.

A reason for not accepting the non critical asset assessment is that it does not provide sufficient detail to enable the *Project Manager* to understand how the assessment reached the conclusion that an asset is a non Critical Asset.

S2902 Systems Architecture

S2902.1 Figure 7 identifies the key boundaries and interfaces identified as part of the LTC Tunnel System. The *Contractor* develops a 'systems engineering interface management plan' as described in Table 30 and captures the requirements of section S2902 and additional interface requirements with Others described within sections S926 and S300.

S2902.2 System interface requirements are captured in the 'LTC Tunnel System requirements specification' (provided in Annex A).

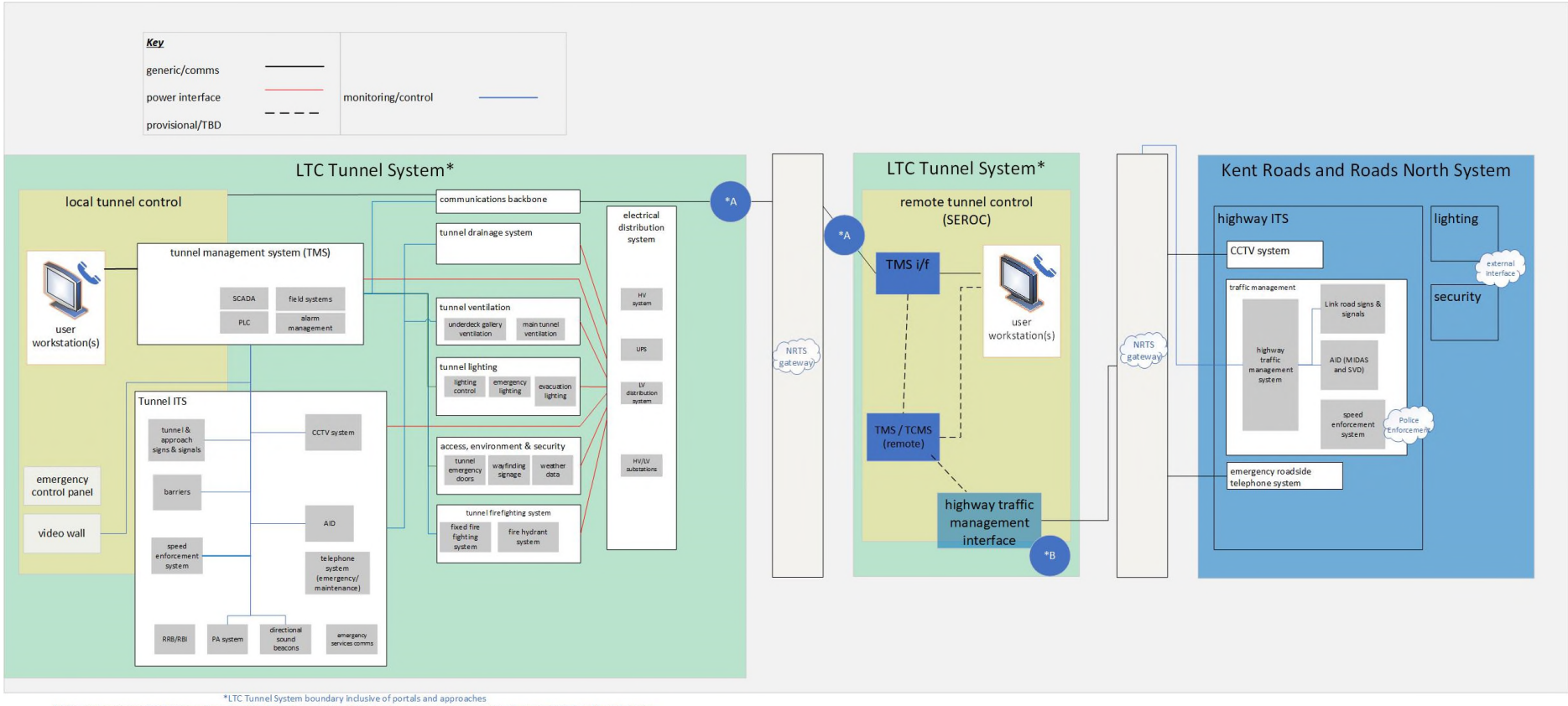


Figure 7 - The Tunnel Logical Architecture graphical model (security zones and conduits omitted for clarity)

Functional Summary

S2902.3 The *Contractor* ensures the LTC Tunnel Systems provide the capabilities of remote (primary) management from the Client's south east regional operations centre (SEROC) as well as local (secondary) management from the tunnel service buildings.

S2902.4 As part of the LTC Tunnel Systems, the 'tunnel management system' (TMS) represents the primary control and monitoring capability for the majority of the constituent systems within the tunnels. To enable flexibility and futureproofing, the *Contractor* provides the TMS to include both traditional traffic management capability as well as the 'plant monitoring & control functionality' (as per the definitions for PM&CS in 'CD 352 - Design of road tunnels - DMRB', see link provided in Annex A).

S2902.4A The Parties agree that software which is supplied electronically by the *Contractor* as part of the TMS and not on any tangible medium constitutes a sale of goods.

Tunnel Systems Interface with Others

S2902.5 Where the LTC Tunnel System interfaces with Others, the *Contractor* is responsible and accountable for interface control, integration management, ensuring application of the defined controls for the interface or zone and resultant implementation.

S2902.6 As specified in the 'Interface Matrix' provided in Annex A, the *Contractor* ensures the LTC Tunnel System interfaces to systems delivered by all Main Works Contractors, *Client* system providers and Others including the following

- interface between tunnel and highway control regions enabling traffic management as well as wider monitoring via closed circuit television (CCTV) feeds beyond the Site,
- communications interface between SEROC and locally housed equipment within the tunnels - telecommunications infrastructure provided by other LTC Contractors with demarcation points to be identified and agreed between the *Contractor* and the other LTC Contractors. See also section S300,
- telephone system interface to public domain,
- Road User Charging interfaces to external systems,
- enforcement systems interface to police services via SEROC,
- water supply to and waste water out of the tunnels and TSB,
- power interface - power supplies to the North Portal and South Portal, providing a connection point for the tunnel electrical distribution systems,
- 'tunnel management system' interface to tools for the Technology Operations Capability and Common Highways Agency Rijkswaterstaat Model (CHARM) to support strategic traffic management and
- the *Contractor* makes provisions within 'tunnel management system' design for a prospective interface with any future *Client* developed tunnel control systems to support operational migration to any replacement *Client* system.

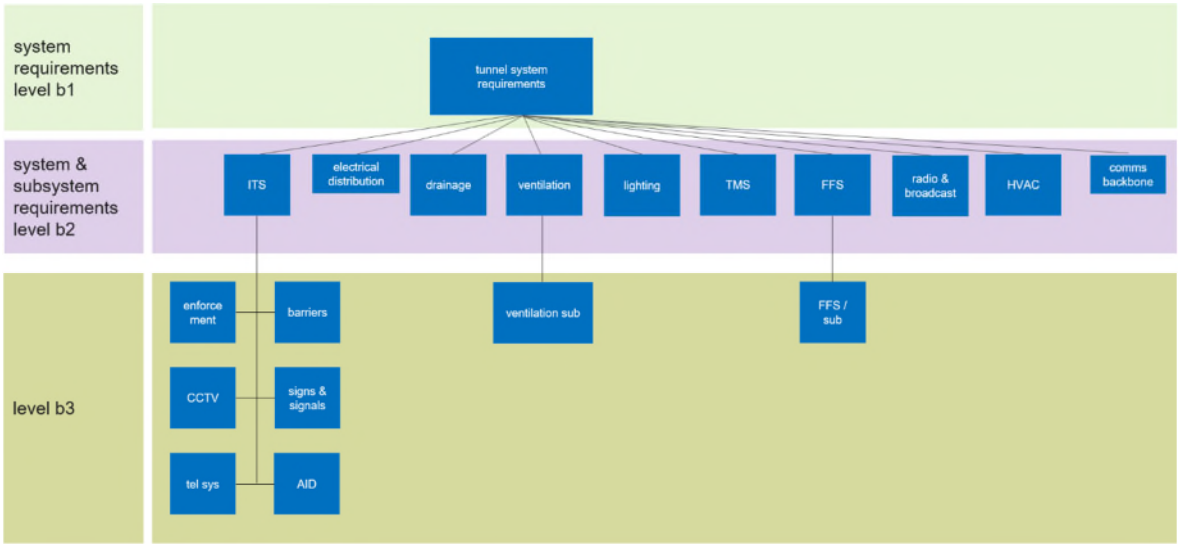
S2903 Systems Engineering Requirements Overview

Hierarchy

S2903.1 The *Client* has established a requirements hierarchy which is structured to correspond with the overarching logical systems architecture with each key system or logical "box" having its own

corresponding requirements module. This ensures consistency in system structures, functions and terms when apportioning requirements.

Figure 8 - Overview of the requirements hierarchy and its level of apportionment



S2903.2 The requirements hierarchy uses traceability satisfy or satisfied links enabling requirements to be broken down to constituent elements for further analysis ultimately supporting system verification and validation against the project requirements.

S2903.3 The *Contractor* maintains and updates the requirements hierarchy and associated traceability links. The *Contractor* submits any proposed changes to the LTC Tunnels System Requiremnets for acceptance to the *Project Manager*.

A reason for not accepting the requirements hierarchy and associated traceability links is that

- it does not maintain full traceability across levels of the hierarchy or
- system requirements are not fully satisfied by lower level requirements in the hierarchy.

S2904 Process Requirements

Process Requirements

S2904.1 The *Contractor* undertakes monthly technical consultation and review meetings with the *Project Manager* regarding the following areas

- the processes undertaken and captured in management plans by the *Contractor*,
- design deliverables content reviews,
- impact assessment for changes affecting LTC Tunnel System safety, Availability, the MOR, cyber security and operations and maintenance procedures and
- forward plan for assurance meetings and to agree deliverables required for the following groups
    - o Project Tunnel Assurance Group,
    - o Safety Control Review Group and

- tunnel design and safety consultation group.

S2904.2 The *Contractor* attends and submits the agreed deliverables to the following assurance groups for review

- Project Tunnel Assurance Group each month,
- Safety Control Review Group each month and
- tunnel design and safety consultation group each quarter.

Resource

S2904.3 The *Contractor's* organisation includes the following roles in Table 6 from the *starting date*.

Table 35 - systems engineering roles and responsibilities

systems engineering manager	Co-ordination of systems engineering activities and key design reviews • responsible for developing, managing and co-ordinating a systems engineering programme of works, and the suitably competent team needed to deliver the works, • integrating systems engineering activities with defined Project Control Framework stages and • management of key systems interfaces (including operations, and maintenance, across boundaries of the site elements encompassing software, electrical and mechanical interfaces).
systems engineering requirements manager	Management of the requirements hierarchy and providing input into key design reviews as follows • responsible for co-ordinative development of the tunnel system requirements hierarchy, • developing requirements management plan, processes and obtaining agreement from relevant stakeholders within the Client's organisation, • obtaining Client acceptance of requirements content and • monitoring compliance and evidence against requirements.

Systems Engineering Requirements Management

S2904.4 The *Client* uses the requirements repository product: DOORS NG. The *Contractor* uses DOORS NG. The *Contractor* uses this agreed tool as a requirements repository product to undertake the following activities in accordance with ISO/IEC/IEEE 29148-2018 International Standard - Systems and Software Engineering - Life Cycle Processes - Requirements Engineering (see link provided in Annex A)

- further develop and maintain the LTC Tunnel System requirements repository,
- manage, monitor and report progressive compliance against the requirements and design validation and

- capture corresponding verification and validation evidence against the Scope noting process requirements stated in section S700.

S2904.5 The *Contractor* complies with the following requirement attributes that determine how a particular requirement is managed, implemented or satisfied in accordance with Table 36 below.

Table 36 - requirements management guidance

Attribute	Description
ID	DOORS NG internal identifier
name	general reference number
primary text / content	main requirement text
rationale	justification for requirement
artefact type	e.g project requirement, system requirement or operational requirement
source	for information. The document or activity the requirement was captured or derived from
source section	for information. Second reference for the source e.g. section 3, paragraph 2
classification	whether a requirement is specific to a design solution or applicable in all cases

S2904.6 Requirements classified as

- “Mandatory” are applicable in all cases and provided within the works,
- “Application Specific” requirements are those only applicable if a certain design solution or configuration is adopted as described in the LTC Tunnel System Requirements and
- “Alternate compliance accepted” allow for alternate solutions to be proposed by the Contractor. An alternate proposed solution is submitted to the *Project Manager* for acceptance.

A reason for not accepting an alternate proposed solution is that it does not comply with the LTC Tunnel System Requirements.

S2904.7 The *Contractor* undertakes all system design reviews. This measures maturity of the system as well as identifying and ultimately resolving gaps and prospective changes to the requirements repository at all hierarchical levels. The *Contractor* submits any changes to mandatory requirements as described in the LTC Tunnels System Requirements to the *Project Manager* for acceptance. A reason for not accepting a change to a mandatory requirement is that it does not comply or meet the LTC Tunnel System Requirements.

S2904.8 The *Contractor* undertakes regular system verification and validation, maintaining traceability and evidence capture within DOORS NG. This includes lower level and third-party compliance evidence against the requirements.

S2904.9 The *Contractor* demonstrates compliance with 'LTC Tunnel System requirements specification' through evidence capture and submits it to the *Project Manager* for acceptance.

A reason for not accepting the compliance evidence capture is that it does not demonstrate compliance with the 'tunnels system requirements'.

S3000 Optimised *Contractor* Involvement

S3005 Optimised *Contractor* Involvement (OCI)

S3005.1 The Optimised *Contractor* Involvement (OCI) process is described within this section of the Scope.

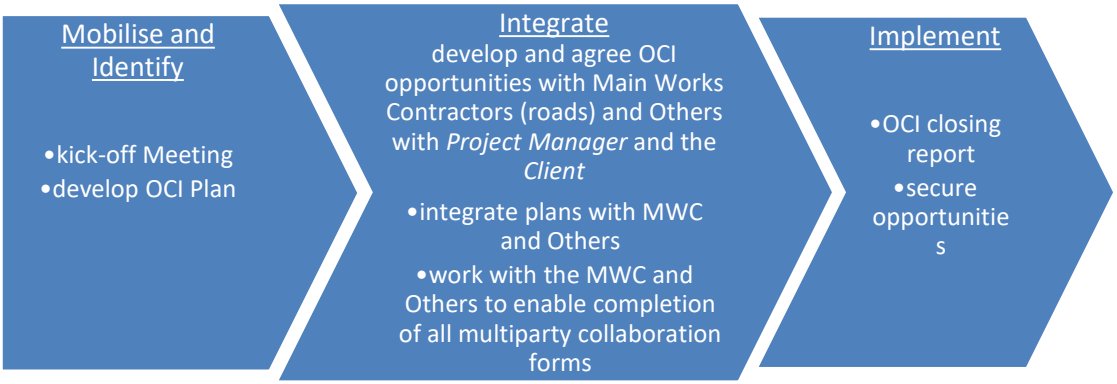
S3005.2 The OCI process commences at the *starting date* for the *Contractor* and *Project Manager* to identify efficiencies and innovation into the design, construction and operation of the *works* and for the Project through the identification and development of opportunities and the optimising of potential benefits arising from multi-party collaboration.

S3005.3 The outcome of a successful OCI period is the *Project Manager* has improved certainty that

- the *works* will be completed by the relevant Completion Dates and
- the *Project Manager's* forecast final Price for Work Done to Date is equal or less than the Target Budget.

The process is summarised in Figure 9.

Figure 9 - Summary of the OCI Process



S3010 OCI requirements and timescales

S3010.1 Not used.

S3010.1A The *Contractor* manages the OCI phase and proposes areas for optimisation, including

- design co-ordination between Main Works Contractors as set out in section S300,
- development of the contract interfaces as described in the 'Interface Matrix' referred to in section S900 and provided in Annex A, including design, construction, operation and land use plans with other Main Works Contractors and Others,
- buildability considerations, including temporary works,
- co-ordination of traffic management with other Main Works Contractors and Others to mitigate risk of disruption to the public,
- working with other Main Works Contractors to develop a process for determining whether harmonisation opportunities for Plant and Materials exist to maximise procurement opportunities for the Project,

- consistent use of information modelling,
- develop opportunities for programme optimisation of its own activities and the activities of other Main Works Contractors and Others,
- work with other Main Works Contractors and Others to develop the stakeholder co-ordination process including the approach to Consents,
- review of the Development Consent Order (DCO) to assess if the land required by the Contractor to Provide the Works can be reduced and
- working with other Main Works Contractors to input the *Contractor's* requirements into the Multiparty Collaboration Forms that are referenced in Appendix 1 to this section S3000.

S3010.2 The *Contractor* arranges an OCI kick-off meeting within one week of the starting date, with the *Client's* Project representatives and *Project Manager* (and its team) during which

- introductions are made of the main OCI contributors from the *Client*, *Contractor* and *Project Manager*,
- expectations and values and visions are shared,
- the OCI manager provides a presentation covering
    - OCI objectives and outcomes,
    - outline OCI programme,
    - which functional teams would need to be involved to explore fully the opportunities, whether this is from the *Client*, *Project Manager* or other Main Works Contractors or Others and
    - the approach to achieving the Promoter's objectives and Key Performance Indicators stated within secondary option clause X12 and
- future meetings and meeting dates are agreed. The *Client's* expectation is that, as a minimum, for the first three months such meetings are held bi-weekly and then held monthly.

The *Contractor's* OCI manager shall have previous experience of managing OCI or early contractor involvement phases on a major infrastructure programme and be able to coordinate various functional leads to help ensure timely submission of OCI deliverables. The *Contractor's* OCI manager shall have strong collaboration and communication skills and the ability to negotiate and seek agreement with a wide range of stakeholders.

S3010.2A The OCI deliverables excludes

- *the mobilisation activity schedule week 128 and week 131 and the mobilisation activity schedule week 132 and week 135 and*
- *the design deliverable schedule week 49 and week 52 and the design deliverable schedule week 144 and 148*.

S3010.3 Within two weeks of the OCI kick-off meeting the *Contractor* submits an 'OCI plan' to the Project Manager for acceptance in accordance with the Acceptance Procedure, confirming principal activities, proposals for areas that are the subject of optimisation and the following

- OCI team organisation chart with supporting narrative detailing the roles and responsibilities of each member of staff within the OCI team and identifying full-time roles and those which are part-time,
- how each *key person* interacts with the OCI team,
- how the *Contactor's* OCI team integrates with the *Client* (and its Project representatives), the *Project Manager* (and its team), the *Supervisor* (and its team), with other Main Works Contractors and Others,

- how any optimisation proposals are assessed for risks and how such risks are mitigated and
- the tools, templates and procedures to help ensure a successful OCI implementation, including a robust cost-benefit analysis process relating to opportunity proposals.

S3010.4 The *Contractor* works with the *Project Manager* and other Main Works Contractors to develop a detailed OCI programme abstracted from the Accepted Programme to support the other Main Works Contractors, the *Promoter's objectives* and Key Performance Indicators (KPIs) stated within secondary option clause X12 multiparty collaboration provisions as set out in the Contract Data.

S3010.5 The *Contractor* holds monthly workshops with the *Project Manager*, other Main Works Contractors and Others as required to discuss its OCI proposals and matters arising in relation to achieving the *Promoter's objectives*.

Procurement

S3010.6 The *Client* requires an aligned delivery team to deliver the Project. Such alignment is not limited to the *Client* and the *Contractor* but spans across the entire supply chain, especially with regards to Key Subcontractors. Early involvement and integration of Key Subcontractors into the delivery team is seen as essential in helping to achieve full value from the procurement process especially during the OCI period and enabling early familiarisation with the Project and its environmental and local community requirements. The *Contractor* uses its procurement and subcontracting plan to develop its proposals for Key Subcontractors, where practical to do so, within the OCI period. Subcontracts with Key Subcontractors are likely to include

- design,
- earthworks or ground improvements,
- Tunnel Boring Machine and associated Equipment,
- pre-casting or modularisation and
- mechanical, electrical, instrumentation, control and automation works.

S3010.7 The *Contractor* attends monthly meetings to explore synergies with the other Main Works Contractors, the *Project Manager* and the *Client* (as applicable) such as bulk buying and harmonising of assets including the category management requirements of section S285. Throughout the *works*, the *Contractor* collaborates and co-operates with the Main Works Contractors and Others, when utilising the *Client's* Category Purchase Agreements particularly in identifying a plan and producing a programme that includes for the required timescales associated with the *Client's* Category Supplier's procurement processes.

Programme Optimisation

S3010.8 The *Contractor's* OCI team conducts a programme review of the early critical path activities that it deems are capable of being optimised or commenced earlier than planned and which might present time risk mitigation opportunities with a focus on

- securing Accepted Programmes that reflect such opportunities,
- identifying third-party stakeholders and any related critical dependencies, this might include landowners, Statutory Undertakers and the like,
- assess the opportunity for commencing activities earlier than planned, particularly any critical early activities that form part of the works,
- Consents and discharging of the same and

- alignment of the design with the other Main Works Contractors and Others including reference to Key Dates and asset harmonisation and design at interfaces prior to the commencement of the relevant Construction Activity.

OCI deliverable requirements

S3010.9 The *Contractor* ensures that all OCI deliverables are appropriately co-ordinated and developed with the other LTC Contractors in accordance with section S1900.

S3010.10 To receive the Cross Contract Integration Milestone payment the *Contractor* ensures that

- all OCI deliverables that (including where re-submitted) require Multiparty Collaboration Forms within the timescales identified within this section S3000 and section S318 have been
    - updated to align with other OCI deliverables, where misalignment has been identified prior to the Cross Contract Integration Milestone and
    - accepted by the *Project Manager* and

  where an OCI deliverable requires a Multiparty Collaboration Form which has been previously accepted by the *Project Manager* but is no longer
    - current,
    - aligned or
    - compliant

  with other OCI deliverables that have been updated to comply with
    - the requirement of Others, including the DCO as granted
    - coordination with other Main Works Contractors,
    - Road Safety Audit requirements,
    - Departure,
    - Safety Control Review Group (SCRG) or
    - Approval in Principle (AIP)

the *Contractor* updates the OCI deliverable and re-submits to the *Project Manager* for acceptance in accordance with the Acceptance Procedure. The requirement for the *Contractor* to carry out such updates is not restricted to and survives the Mobilisation Phase.

Development Consent Order (DCO) Compliance

S3010.11 The *Contractor* reviews and assesses the impact of the DCO as granted and incorporates any amendments necessary to ensure the OCI deliverables are compliant with the same.

S3010.12 The *Project Manager* notifies the *Contractor* of the release of the OCI DCO and the DCO and provides access to the relevant information on the Project CDE when such information becomes available.

S3010.13 References to DCO in the Scope are interpreted as the Tender DCO until the *Contractor* is notified of the OCI DCO, then references to DCO in the Scope are interpreted as the OCI DCO until the *Contractor* is notified of the DCO made by the Secretary of State, then references to DCO in the Scope are interpreted as the DCO.

Stakeholder Engagement During the Mobilisation Phase

S3010.14 The *Contractor* complies with the requirements of section S929.

S3010.15 The *Contractor* is only permitted (with the exception of where consultation is required to develop the Mobilisation Phase liaison procedure) to engage with relevant Others in accordance with the agreed Mobilisation Phase liaison procedure.

S3010.16 Where formal endorsement of Consent documentation by relevant Others is required with a Consent granting body, the *Contractor* only commences formal consultation following the completion of the Judicial Review period post DCO.

S3010.17 The *Contractor* consults with relevant Others and complies with their requirements regarding engagement and includes these requirements within the Mobilisation Phase liaison procedure.

S3010.18 The *Contractor* identifies the relevant Others that require engagement during the Mobilisation Phase and ensures that that these are included within the Mobilisation Phase liaison procedure.

S3010.19 The *Contractor* prepares a 'Mobilisation Phase liaison procedure', that includes

- a list of relevant Others,
- details of the *Contractor's* process for engagement with relevant Others and compliance with the requirements of such relevant Others pre DCO and associated Judicial Review period,
- details of the relevant topics that require engagement,
- proposed timeframes for engagement,
- details of the Liaison Officer,
- a liaison procedure organisation chart that clearly identifies who will lead on such engagement,
- a procedure for ensuring coordination and agreement with other Main Works Contractors of the approach to engagement with relevant Others,
- a process for ensuring copies of all engagement records are uploaded onto the Project's Common Data Environment in accordance with sections S929 and S1900 and
- a process of *Project Manager* notification prior to engagement with Others for agreement by the *Project Manager*.

S3010.20 The *Contractor* complies with the Mobilisation Phase liaison procedure that has been agreed by the *Project Manager*.

S3010.21 Until the Mobilisation Phase liaison procedure is agreed by the *Project Manager*, the *Contractor*

- does not engage with the relevant Others prior to DCO and completion of the associated Judicial Review period,
- ensures that the associated OCI deliverable is compliant with the relevant published guidance and best industry standards and
- In these instances, the relevant consulting aspects of the OCI deliverable are deemed complete or complete in part until DCO.

OCI closing report

S3010.22 The *Contractor* submits an OCI closing report to the *Project Manager* for acceptance in accordance with the Acceptance Procedure two weeks before the end of the OCI period. The OCI closing report sets out and accurately records all suggested amendments to the Scope and Accepted Programme which may require the *Project Manager's* instruction.

S3010.23 The OCI closing report includes

- all implemented amendments to the Scope resulting from OCI and the effect on the programme,
- all additional suggested amendments to the Scope and the forecast effect on the programme,
- all additional aspects resulting from OCI and the forecast effect on the programme,
- a copy of the completed OCI opportunities register,
- any associated OCI opportunity proposal or change forms and registers submitted to and accepted by the *Project Manager*,
- the latest version of the OCI programme,
- OCI principal activities explored but not pursued together with an explanation of why,
- updated forecast of the total Defined Cost for the whole of the *works* and lump sum prices for the Mobilisation Phase and *sections 3* and *4*,
- updated procurement and subcontracting plan,
- copies of all signed Multiparty Collaboration Forms with other Main Works Contractors' signature and
- detailed reasons in the event a Multiparty Collaboration Form has not been signed by the *Contractor*.
- confirmation of which OCI deliverables will require further amendment to ensure compliance with the DCO as granted

The *Project Manager's* acceptance of the OCI closing report represents completion of the Cross Contract Integration Milestone.

S3000 Appendix 1 – OCI deliverables

The following activities may be described in both the Scope for this contract as well as the scope for the Kent Roads Contract and the Roads North of the Thames Contract.

The *Contractor* works with the Main Works Contractors (roads) to enable the successful completion of the Multiparty Collaboration Forms.

The *Contractor* provides all relevant information and liaises with each Main Works Contractor until such time that each Multiparty Collaboration Form has been developed so that they can be jointly signed by the other Main Works Contractors and the *Contractor* and accepted by the *Project Manager*.

Where a listed item does not refer to a Multiparty Collaboration Form the *Contractor* is to produce the required deliverable as part of the Mobilisation Phase works and submit the same directly to the *Project Manager* for acceptance in accordance with the Acceptance Procedure.

This S3000 Appendix 1 is based on the PCF requirements set out in S255 and the latest PCF Forward Plan which is included as an annex to section S255.

Following grant of the Development Consent Order, the *Contractor* updates the OCI deliverables in Appendix 1b to obtain any Consents required from the Secretary of State or any Local Authority.

Appendix 1a - Schedule of OCI Commercial Deliverables

***Contractor's* OCI Commercial Deliverables**						
Section 1 – General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Project Management Plan	A-1-01	Project Execution Plan	The *Contractor* prepares a project execution plan in accordance with section S825 with a completed Multiparty Collaboration Form in accordance with section S318.	MS Word	Within four weeks	Yes
Project Management Plan	A-1-02	Information Security Management Plan	The *Contractor* prepares an information security management plan in accordance with section S228.	MS Word	Within eight weeks	No
Equality Impact Assessment (EqIA) Screening, Analysis and Monitoring	A-1-03	Inclusion Action Plan (IAP)	The *Contractor* prepares an Inclusion Action Plan and quarterly progress report in accordance with section S253.	MS Word	Within 30 weeks and within two weeks of each quarter thereafter	No
Project Management Plan	A-1-04	Employment and skills plan (ESP)	The *Contractor* prepares an employment and skills plan in accordance with section S253.	MS Word	Within 20 weeks	No

***Contractor's* OCI Commercial Deliverables**						
Section 1 – General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Project Management Plan	A-1-05	Quality plan	The *Contractor* prepares a quality plan in accordance with section S600 with a completed Multiparty Collaboration Form in accordance with section S318.	MS Word	in accordance with the *conditions of contract*	Yes
Project Management Plan	A-1-06	Integrated Project Controls Plan (IPCP)	The *Contractor* prepares an IPCP in accordance with section S825 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within four weeks	Yes
Pre-Construction Design	A-1-07A	Availability report	The *Contractor* prepares an Availability report to demonstrate that its OCI deliverables comply with the Availability requirements contained in section S105 with a completed Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 44 weeks	Yes
Pre-Construction Design	A-1-07B	Availability report	The *Contractor* prepares an Availability report to demonstrate that its OCI deliverables comply with the Availability requirements contained in section S105 along with a completed Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 130 weeks	No

***Contractor's* OCI Commercial Deliverables**						
Section 1 – General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Centralised procurement of Roadside Infrastructure	A-1-08	Information for the Centralised procurement of Roadside Infrastructure	The *Contractor* contributes information required by the *Project Manager* for the Centralised procurement of Roadside Infrastructure in accordance with section S255.	As required by the "Project Control Framework Handbook" (see link provided in Annex A).	Within 120 weeks	No
Project Management Plan	A-1-09	Information for the Project Management Plan	The *Contractor* contributes information required by the *Project Manager* for the *Client's* Project Management Plan in accordance with section S255. The *Contractor* is deemed to have satisfied this requirement during the OCI stage by providing • A-1-01 (Project Execution Plan), • A-1-02 (Information Security Management plan), • A-1-04 (Employment and Skills Plan (ESP)),	MS Word	Within 120 weeks	No

***Contractor's* OCI Commercial Deliverables**						
Section 1 – General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
			• A-1-05 (quality plan), • A-1-06 (Integrated Project Controls Plan (IPCP)) and • A-4-02 (Procurement and subcontracting plan).			
PCF product reference is the same as the Deliverable title.	A-1-10	Lessons Learnt Log	The *Contractor* prepares the Lessons Learnt Log in accordance with section S255 The *Contractor* coordinates with other Main Works Contractors and updates the Lessons Learnt Log and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 120 weeks	No
PCF product reference is the same as the Deliverable title.	A-1-11	Equality Impact Assessment (EqIA) Screening, Analysis and Monitoring	The *Contractor* prepares the Equality Impact Assessment (EqIA) Screening, Analysis and Monitoring in accordance with section S255.	MS Word	Within 120 weeks	No
Change Request Form	A-1-12	Information for the Change Request Form	The *Contractor* contributes information required by the *Project Manager* for the	MS Excel	Within 120 weeks	No

***Contractor's* OCI Commercial Deliverables**						
Section 1 – General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
			Change Request Form in accordance with section S255.			
DCO Application - Development Consent Order & Explanatory Memorandum	A-1-13	Information for the DCO Application - Development Consent Order & Explanatory Memorandum	The *Contractor* contributes information required by the *Project Manager* for the DCO Application - Development Consent Order & Explanatory Memorandum in accordance with section S255.	As required by the Project Control Framework Handbook.	Within 120 weeks	No
PCF product reference is the same as the Stage One Deliverable title.	A-1-13A	Land – Gaining access for Surveys	The *Contractor* prepares a Land – Gaining access for surveys deliverable in accordance with sections S255 and S298. The *Contractor* provides sufficient information for the *Client* (via the *Project Manager*) to provide access to land for surveys during the first 12 months after the *access date*.	As required by the Project Control Framework Handbook.	Within 120 weeks	No
Post Decision Activities - Section 134 Compulsory Acquisition Notices & Document	A-1-14	Information for the Post Decision Activities - Section 134 Compulsory Acquisition Notices & Document	The *Contractor* contributes to the Post Decision Activities - Section 134 Compulsory Acquisition Notices & Document Certification / Deposit Processes deliverable in accordance with section S255.	As required by the Project Control Framework Handbook.	Within 120 weeks	No

***Contractor's* OCI Commercial Deliverables**						
Section 1 – General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Certification / Deposit Processes		Certification / Deposit Processes				
PCF product reference is the same as the Deliverable title.	A-1-15	Exercise of Compulsory Acquisition Powers (outsourced) Checklist	The *Contractor* prepares the Exercise of Compulsory Acquisition Powers (outsourced) Checklist deliverable in accordance with section S255.	As required by the Project Control Framework Handbook.	Within 120 weeks	No
n/a	A-1-16	OCI Workshops	The *Contractor* prepares and undertakes workshops during the Mobilisation Phase in accordance with section S3010.	As required in accordance with section S3010.	As required in accordance with section S3010.	No
n/a	A-1-17	Mobilisation Phase Liaison Procedure	The *Contractor* provides a Mobilisation Phase liaison procedure in accordance with section S3010.	MS Word	Within 20 weeks	No
Project Management Plan	A-1-18	Behaviour maturity plan (BMP)	The *Contractor* prepares a BMP in accordance with section S3100.	MS Word	Within 30 weeks	No
Project Management Plan	A-1-19	Leadership plan	The *Contractor* prepares a leadership plan in accordance with section S3100.	MS Word	Within 30 weeks	No

***Contractor's* OCI Commercial Deliverables**						
Section 1 – General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Project Management Plan	A-1-20	Reporting the progress towards achieving the leadership embedment tests	The *Contractor* prepares a report that reports the progress towards achieving leadership plan requirements in accordance with section S3100.	MS Word	Monthly	No
End of Stage Report	A-1-21	Information for the End of Stage Report	The *Contractor* contributes information required by the *Project Manager* for the End of Stage Report in accordance with section S255.	As required by the "Project Control Framework Handbook" (see link provided in Annex A).	Within 120 weeks	No
Project Management Plan and Employment & Skills Plan	A-1-22	Proposals to update the People Proposition	The *Contractor* provides proposals to update the People Proposition in accordance with section S253.	MS Word	Within 30 weeks	No
Project Management Plan and Employment & Skills Plan	A-1-23	Proposals to achieve accredited National Skills Academy for Construction	The *Contractor* submits proposals to achieve accredited National Skills Academy for Construction (NSAfC)	MS Word	Within 10 weeks	No

***Contractor's* OCI Commercial Deliverables**						
Section 1 – General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
		(NSAfC) project status	project status in accordance with section S253.			
Not used	A-1-24	Not used	Not used	Not used	Not used	Not used
Strategy for Exercising Compulsory Acquisition Powers	A-1-25	Tracker for land access requests with an associated access plan	The *Contractor* submits a tracker for land access requests with an associated access plan(s) in accordance with section S298.	As required in accordance with S298	Within 120 weeks	No
Supplier Quality Plan	A-1-26	Certification plan	The *Contractor* submits a certification plan in accordance with section S605.	MS Word	Within 10 weeks	No
N/A	A-1-28	Scores recorded by the *Contractor* against each collaborative performance framework (CPF) indicator	The *Contractor* submits scores recorded by the *Contractor* against each CPF indicator in accordance with section S670.	As required in accordance with section S670.	In accordance with section S670	No
Not used	A-1-29	Not used	Not used	Not used	Not used	Not used

***Contractor's* OCI Commercial Deliverables**						
Section 1 – General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
N/A	A-1-30	Roadside technology procurement strategy	The *Contractor* submits a roadside technology procurement strategy in accordance with section S285.	MS Word	Within 130 weeks.	No
N/A	A-1-31	Certification for management system.	Where a body accredited by United Kingdom Accreditation Service (UKAS) (or another equivalent European Accreditation body full member agreed by the *Project Manager*) certifies a management system, the *Contractor* obtains certification from the relevant body in accordance with section S605.	As required in accordance with S605.	Within 52 weeks.	No
Regular Reporting	A-1-32	Performance indicators (PIs)	The *Contractor* measures and reports on the PI's contained within the balanced scorecard in accordance with section S670.	As required in accordance with S670.	At each assessment date.	No
N/A	A-1-33	Cost time phased profile	The *Contractor* provides a cost time phased profile in accordance with section S815.	As required in accordance with S815	Quarterly	No

***Contractor's* OCI Commercial Deliverables**						
Section 1 – General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Regular Reporting	A-1-34	Variance report	The *Contractor* provides a variance report in accordance with section S815.	MS Word	Monthly	No
N/A	A-1-35	16 weeks lookahead cash flow	With each payment application submitted to the *Project Manager,* the *Contractor* includes a 16 weeks lookahead cash flow forecast in accordance with section S815.	As required in accordance with S815	With each payment application	No
N/A	A-1-36	Quarterly cashflow forecast	The *Contractor* provides a quarterly cashflow forecast in accordance with section S815.	As required in accordance with S815	Quarterly	No
N/A	A-1-37	Reports on the in-month and cumulative in-quarter variance of the latest submitted quarterly cash flow forecast	The *Contractor* provides reports on the in-month and cumulative in-quarter variance of the latest submitted quarterly cash flow forecast in accordance with section S815.	MS Word	Monthly	No
N/A	A-1-38	Performance review meetings	The *Contractor* attends performance review meetings in accordance with section S815.	N/A	Quarterly	No

***Contractor's* OCI Commercial Deliverables**						
Section 1 – General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Regular Reporting	A-1-39	Period end report	The *Contractor* provides a period end report regarding risk in accordance with section S815.	MS Word	Monthly	No
Regular Reporting	A-1-40	Management accounts and reports	The *Contractor* provides management accounts and reports for the documents and records detailed in paragraph S830.2	As required in accordance with S830	Quarterly	No
N/A	A-1-41	Operating Model Handbook	The *Contractor* provides proposals to update the Operating Model Handbook in accordance with section S253.	MS Word	Within 30 weeks.	No

OCI Commercial Deliverables						
Section 2 – Financial and Commercial Risk Management						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from starting date) for submission of OCI deliverable**	**Required for CCIM**
Project Schedule	A-2-01	Activity Schedules	The *Contractor* further develops the Mobilisation Phase Activity Schedule and the Construction Phase Activity Schedule (submitted at Tender) and ensures both contain the same level of detail and are consistent with the illustrative information provided in Volume 4 and contain sufficient level of detail to ensure future compliance with section S831 and are amended if in accordance Clause Z117 any Construction Phase activities are instructed to be carried out during the Mobilisation Phase.	MS Excel	Ongoing.	No
Project Schedule	A-2-02	Quantitative schedule risk analysis (QSRA) and quantitative cost risk analysis (QCRA) Report	The *Contractor* prepares a quantitative schedule risk analysis (QSRA) and quantitative cost risk analysis (QCRA) report in accordance with section S816.	MS Excel	Within 30 weeks for Project Manager acceptance in accordance with the Acceptance Procedure and quarterly thereafter	No
Final Estimate	A-2-03	Whole Life Cost Model	The *Contractor* prepares an updated Whole Life Cost Model in accordance with section S370.	MS Word and MS Excel	As required in accordance with section S370.	No

OCI Commercial Deliverables						
Section 2 – Financial and Commercial Risk Management						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from starting date) for submission of OCI deliverable**	**Required for CCIM**
PCF product reference is the same as the Deliverable title.	A-2-05	Risk Management Plan (including risk management process)	The *Contractor* prepares the Risk Management Plan in accordance with section S255 and S816. The *Contractor* coordinates with other Main Works Contractors and updates the Risk Management Plan and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 30 weeks	Yes
PCF product reference is the same as the Deliverable title.	A-2-06	Risk Register	The *Contractor* prepares the Risk Register in accordance with section S255 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 44 weeks	Yes
PCF product reference is the same as the Deliverable title.	A-2-07	Value Management Delivery Plan	The *Contractor* prepares the Value Management Delivery Plan in accordance with section S255 and section S600. The *Contractor* coordinates with other Main Works Contractors and updates the Value Management Delivery Plan and provides a Multiparty Collaboration in accordance with section S318.	MS Word	Within 120 weeks	No

OCI Commercial Deliverables						
Section 2 – Financial and Commercial Risk Management						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from starting date) for submission of OCI deliverable**	**Required for CCIM**
PCF product reference is the same as the Deliverable title.	A-2-08	Efficiency Register	The *Contractor* prepares the Efficiency Register in accordance with section S255 and section S600.	As required by the "Project Control Framework Handbook" (see link provided in Annex A).	Within 120 weeks	No
PCF product reference is the same as the Deliverable title.	A-2-09	Value Management Workshop Report	The *Contractor* prepares the Value Management Workshop Report in accordance with section S255 and section S600.	MS Word	Within 120 weeks	No
Benefits Realisation and Evaluation Plan	A-2-10	Information for the Benefits Realisation and Evaluation Plan	The *Contractor* contributes information required by the Project Manager for the Benefits Realisation Evaluation Plan in accordance with section S255.	As required by the Project Control Framework Handbook.	Within 30 weeks	No
Value Management Delivery Plan	A-2-11	Continuous improvement plan	The *Contractor* submits a continuous improvement plan in accordance with S670.	MS Word	Within 120 weeks	No
Not used	A-2-12	Not used	Not used	Not used	Not used	Not used

OCI Commercial Deliverables						
Section 2 – Financial and Commercial Risk Management						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from starting date) for submission of OCI deliverable**	**Required for CCIM**
N/A	A-2-13	Detailed estimates for the works and services to be undertaken by third parties	The *Contractor* submits detailed estimates for the works and services to be undertaken by third parties in accordance with section S928.	MS Excel	Monthly	No

OCI Commercial Deliverables						
Section 3 – Programme						
PCF Product Reference	*mobilisation activity schedule* reference	Deliverable	Description/Requirement	Format	Required time scale (from *starting date*) for submission of OCI deliverable	Required for CCIM
Project Schedule	A-3-01A	Programme	The *Contractor* prepares the Programme in accordance with section S500 with the exception of the cost loading aspects.	Primavera file P6	In accordance with the *conditions of contract*, commencing from the *starting date* up to and including month 4.	No

OCI Commercial Deliverables						
Section 3 – Programme						
PCF Product Reference	*mobilisation activity schedule* reference	Deliverable	Description/Requirement	Format	Required time scale (from *starting date*) for submission of OCI deliverable	Required for CCIM
Project Schedule	A-3-01B	Programme	The *Contractor* prepares the Programme in accordance with section S500.	Primavera file P6	In accordance with the *conditions of contract*, commencing and including month 5 after the *starting date.*	No
Project Schedule	A-3-02	Programme Narrative	The *Contractor* prepares a programme narrative describing the approach to construction strategy, programme logic, critical path and key programme features such as constraints and calendars.	MS Word	Submitted alongside the Programme	No
Project Schedule	A-3-03	Interface Programme (all interfaces with other Main Works Contractors)	The *Contractor* prepares an interface programme extracted from the Programme in accordance with section S500. The *Contractor* coordinates with other MWC and updates the Interface Programme and provides a Multiparty Collaboration Form in accordance with section S318	Primavera file P6	In accordance with the *conditions of contract*, commencing and including month 4 after the *starting date*.	Yes
Project Schedule	A-3-04	Information for the Project Schedule	The *Contractor* contributes to the Project Schedule in accordance with section S255.	Primavera file P6	Within 120 weeks	No

OCI Commercial Deliverables						
Section 3 – Programme						
PCF Product Reference	*mobilisation activity schedule* reference	Deliverable	Description/Requirement	Format	Required time scale (from *starting date*) for submission of OCI deliverable	Required for CCIM
			The *Contractor* is deemed to have satisfied this requirement during the Mobilisation Phase by completing • A-2-01 (Activity Schedule), • A-2-02 (quantitative schedule risk analysis (QSRA) and quantitative cost risk analysis (QCRA) Report), • A-3-01 (Programme), • A-3-02 (Programme Narrative), • A-3-03 (Interface Programme (all interfaces with other Main Works Contractors)) and • A-4-01 (Supply Chain Support Programme (SCSP).			
Non-PCF Product Regular Reporting	A-3-05	Monthly progress report	The *Contractor* prepares monthly progress reports in accordance with section S850.	MS Word	Monthly	No

OCI Commercial Deliverables						
Section 3 – Programme						
PCF Product Reference	*mobilisation activity schedule* reference	Deliverable	Description/Requirement	Format	Required time scale (from *starting date*) for submission of OCI deliverable	Required for CCIM
Stage Management Report	A-3-06	Information for the Stage Management Report	The *Contractor* contributes information required by the *Project Manager* for the Stage Management Report in accordance with section S255.	As required by the "Project Control Framework Handbook" (see link provided in Annex A).	Within 120 weeks	No
N/A	A-3-07	Weekly work plans	The *Contractor* prepares weekly work plans in accordance with section S505.	As required in accordance with section S505.	In accordance with section S505	No
Project Schedule	A-3-08	Schedule of work activities	The *Contractor* prepares a monthly schedule of work activities in accordance with section S1100.	MS Word	Monthly	No

OCI Commercial Deliverables						
Section 4 – Supply Chain						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable in accordance with this Scope section S3000**	**Required for CCIM**
Project Schedule	A-4-01	Supply Chain Support Programme (SCSP)	The *Contractor* prepares a supply chain support programme in accordance with section S254.	Primavera file P6	Within 30 weeks	No
Project Management Plan	A-4-02	Procurement and subcontracting plan	The *Contractor* prepares a procurement and subcontracting plan in accordance with section S1205.	MS Word	Within eight weeks	No
Not used	A-4-03	Not used	Not used	Not used	Not used	Not used
Project Management Plan	A-4-04	Procurement schedule	The *Contractor* prepares a procurement schedule in accordance with section S1205.	As required in accordance with section S1205	Within 12 weeks and monthly thereafter	No
N/A	A-4-05	Project Bank Account (PBA) Tracker, a detailed PBA	The *Contractor* provides a PBA Tracker, a detailed PBA statement and payment runs in accordance with section S2610.	As required in accordance with section S2610	Monthly	No

OCI Commercial Deliverables						
Section 4 – Supply Chain						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable in accordance with this Scope section S3000**	**Required for CCIM**
		statement and payment runs				
N/A	A-4-06	Reporting for Small and Medium Enterprises	The *Contractor* reports to the *Client* on each Small and Medium Enterprise (SME) employed on the contract in accordance with section S855.	As required in accordance with section S855.	Quarterly	No
N/A	A-4-07	Proposals for reporting subcontract tenders and tenderers	The *Contractor* makes proposals for reporting subcontract tenders and tenderers in accordance with section S1215.	MS Word	Within six weeks.	No
N/A	A-4-08	Collaborative Procurement Hub (CPH) meeting	The *Contractor* participates in CPH meetings in accordance with section S1240.	As required in accordance with section S1240	Within six weeks and monthly thereafter.	No

OCI Commercial Deliverables						
Section 4 – Supply Chain						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable in accordance with this Scope section S3000**	**Required for CCIM**
Regular Reporting	A-4-09	Progress report against the SCSP	The *Contractor* submits a progress report against the SCSP in accordance with section S254.	MS Word	Within two weeks of the end of each quarter commencing from the second quarter after the *starting date*	No

Appendix 1b - Schedule of OCI Technical (Design) Deliverables

The OCI deliverables include the following:

OCI - Technical (Design) Deliverables						
Section 1 - General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
N/A	B-1-01	Multiparty Collaboration Form	The *Contractor* prepares all relevant Multiparty Collaboration Forms in accordance with the requirements contained in section S318.	MS Word	Provided alongside OCI deliverables that require a Multiparty Collaboration Form	Yes
Implementation Report for New Standards	B-1-02	Quarterly report identifying new or updated design standards	The *Contractor* prepares quarterly reports in accordance with section S320	MS Word	As stated in section S320.	No
PCF product reference is the same as the Deliverable title	B-1-03	Implementation Report for New Standards	The *Contractor* prepares the Implementation Report for New Standards in accordance with section S255.	MS Word	As requested by the *Project Manager*	No
Not used	B-1-04	Not used	Not used	Not used	Not used	Not used

OCI - Technical (Design) Deliverables						
Section 1 - General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
			Not used		Not used	
Project Management Plan	B-1-05	Web-based portal	The *Contractor* prepares a proposal for a web-based portal in accordance with section S1900 with a completed Multiparty Collaboration Form in accordance with section S318.	The *Contractor* agrees the format of the web-based portal with the *Project Manager*.	Within 130 weeks	No
Not used	B-1-06	Not used	Not used	Not used	Not used	Not used
PCF product reference is the same as the Deliverable title.	B-1-07	Handover Schedule	The *Contractor* prepares the Handover Schedule in accordance with section S255.	MS Excel	Within 120 weeks	No
PCF product reference is the same as the Deliverable title.	B-1-08	Plan for Monitoring Operations and Monitoring Output	The *Contractor* prepares the Plan for Monitoring Operations and Monitoring Output in accordance with section S255. The *Contractor* coordinates with other Main Works Contractors and updates the Plan for Monitoring Operations and	MS Word	Within 120 weeks	No

OCI - Technical (Design) Deliverables						
Section 1 - General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
			Monitoring Output and provides a Multiparty Collaboration Form in accordance with section S318.			
N/A	B-1-09	'System Integration Plan'	The *Contractor* prepares the 'Systems Integration Plan' in accordance with section S2900. The *Contractor* coordinates with other Main Works Contractors and updates the Systems Integration Plan and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 20 weeks	Yes
PCF product reference is the same as the Deliverable title.	B-1-10	Test and Inspection Strategy	The *Contractor* prepares the Test and Inspection Strategy in accordance with section S700 and provides a Multiparty Collaboration Form in accordance with section S318. The *Contractor* coordinates and updates such Test and Inspection Strategy as the works progress.	MS Word	Within 120 weeks and on an ongoing basis	No
Not used	B-1-11	Not used	Not used	Not used	Not used	Not used
PCF product reference is the same as	B-1-12	Tunnel Design Verification and Validation Report	The *Contractor* prepares the Tunnel Design Verification and Validation Report	MS Word and MS Excel	Within 120 weeks	No

OCI - Technical (Design) Deliverables						
Section 1 - General						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
the OCI deliverable title			in accordance with the Project Control Framework.			
Project Management Plan	B-1-14	Information execution plan (IEP) and a business information execution plan (B-IEP)	The *Contractor* prepares an IEP and a B-IEP in accordance with section S1910.	MS Word	Within 12 weeks	No
Project Management Plan	B-1-15	Plan and programme to retain material	The *Contractor* prepares plan and programme to retain material in accordance with section S2210.	MS Word	Within 30 weeks	No
Design Management Plan	B–1-18	Design management plan	The *Contractor* prepares the design management plan in accordance with section S305.	MS Word	Within 10 weeks	No
N/A	B-1-19	Information management group workshops	The *Contractor* coordinates with the other MWC to ensure information management group workshops are held in accordance with section S1900.	As required in accordance with section S1900	Quarterly	No

Section 2 - Roads						
PCF Product Reference	**Reference / *mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Pre-construction Design	B-2-01	Alignment model	The *Contractor* prepares a coordinated mainline alignment model for the full length of the Project that complies with the requirements of section S1900 and provides a Multiparty Collaboration Form in accordance with section S318.	Both .IFC and native in accordance with section S1900	Within 24 weeks	Yes
Pre-construction Design	B-2-02	Alignment model	The *Contractor* continues to develop and coordinate the alignment model and provides a Multiparty Collaboration Form in accordance with section S318.	Both .IFC and native in accordance with section S1900	Within 130 weeks	No
Pre-construction Design	B-2-03	Co-ordinated Drainage Design Report	The *Contractor* prepares a Co-ordinated Drainage Design Report in accordance with section S322 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 30 weeks	Yes
Pre-construction Design	B-2-04	Co-ordinated Earthworks Strategy	The *Contractor* prepares a Co-ordinated Earthworks Strategy in accordance with section S323 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 30 weeks	Yes
PCF product reference is the same as the OCI deliverable title.	B-2-05	Draft Ground Investigation Report	The *Contractor* prepares a draft Ground Investigation Report in accordance with section S323.	MS Word	Within 120 weeks	No

Section 2 - Roads						
PCF Product Reference	**Reference / *mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
PCF product reference is the same as the OCI deliverable title.	B-2-06	Geotechnical Design Report	The *Contractor* prepares a Geotechnical Design Report in accordance with section S323.	MS Word	Within 120 weeks	No
Risk Register	B-2-07	Geotechnical Risk Register	The *Contractor* prepares a Geotechnical Risk Register consistent with the illustrative Geotechnical Risk Register provided in Annex A, in accordance with DMRB standard CD 622 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 30 weeks	Yes
Pre-construction Design	B-2-08	Pavement design report	The *Contractor* prepares a pavement design report in accordance with section S324 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 40 weeks	Yes
Pre-construction Design	B-2-09	Schedule of pavement proposals	The *Contractor* prepares a schedule of pavement proposals for all Project Roads.	MS Word	Within 60 weeks	No
Pre-construction Design	B-2-10	Schedule of pavement proposals	The *Contractor* continues to develop the schedule of pavement proposals in preparation for the submission of final OCI deliverables.	MS Word	Within 130 weeks	No

Section 2 - Roads						
PCF Product Reference	**Reference / *mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Pre-construction Design	B-2-11	Lighting strategy report	The *Contractor* prepares a lighting strategy report in accordance with section S325 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 120 weeks	No
Departures from Standards Checklist	B-2-12	Schedule of Proposed Departures	The *Contractor* prepares a completed Schedule of Proposed Departures using the template in Appendix 2 (OCI Technical Templates") with a Multiparty Collaboration Form in accordance with section S318. Where the *Contractor* proposes to review, agree and adopt Departures previously endorsed by the Safety, Engineering and Standards (SES) group these are to be included within Appendix 2.	MS Word	Within 12 weeks	Yes
Pre-construction Design	B-2-13	Geometrical Departures	For all Departures that have been identified as either changed or are in addition to those illustrative Departures (Letter of no objection or approved by the SES) provided in Annex A. The *Contractor* submits geometrical Departures in accordance with section S316.	MS Word	Within 120 weeks	No
PCF product reference is the same as the	B-2-14	Departures from Standard Checklist	The *Contractor* prepares a Departures from Standard Checklist in accordance with section S255.	MS Excel	Within 60 weeks	No

Section 2 - Roads						
PCF Product Reference	**Reference / *mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
OCI deliverable title.						
Road Safety Audit	B-2-15A	Co-ordinated Road Safety Audit strategy report	The *Contractor* prepares a co-ordinated RSA strategy report, that includes a plan that • details the appropriate method of communication between the RSA Team, the design organisation, and the *Contractor* (as described in DMRB standard GG 119), • details how the *Contractor* ensures a consistent approach to the format, content and level of detail contained in the RSA Brief, • details the extent of the design works covered in the RSA Brief during the OCI period and • provides a Multiparty Collaboration Form in accordance with section S318 and submits the strategy for agreement to the *Project Manager*.	MS Word	Within 44 weeks	Yes

Section 2 - Roads						
PCF Product Reference	**Reference / *mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Road Safety Audit	B-2-15B	Road Safety Audit brief	The *Contractor* coordinates with the other Main Works Contractors and prepares a Road Safety Audit brief for the design, carried out by the *Contractor* during the OCI period and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 70 weeks	No
Road Safety Audit	B-2-15C	Road Safety Audit response report	Following the receipt of the RSA by the RSA audit team, the *Contractor* prepares an RSA response report (as defined in DMRB GG 119) and attends any necessary SCRG meetings and seeks *Client* endorsement and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 100 weeks	No
Pre-construction Design	B-2-16	Agreed interface co-ordinates	The *Contractor* provides the agreed interface coordinates in accordance with section S320, accompanied by a Multiparty Collaboration Form in accordance with section S318.	MS Excel	Within 24 weeks	Yes

OCI Technical (Design) Deliverables						
Section 3 - ITS						
PCF Product Reference	**Reference / *mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Pre-construction Design	B-3-01	Basis of the ITS Design Report	The *Contractor* prepares a basis of the ITS Design Report in accordance with section S2901 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 130 weeks	No
PCF product reference is the same as the OCI deliverable title.	B-3-02	Technology and Systems Commissioning Plan	The *Contractor* prepares a Technology and Systems Commissioning Plan in accordance with section S715. The *Contractor* coordinates with the other Main Works Contractors and updates the Technology and Systems Commissioning Plan and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 120 weeks	No
PCF product reference is the same as the OCI deliverable title.	B-3-03	Telecommunications Requirements	The *Contractor* prepares a Telecommunications Requirements in accordance with section S255. The *Contractor* coordinates with the other Main Works Contractors and updates the Telecommunications Requirements and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 120 weeks	No

OCI Technical (Design) Deliverables						
Section 3 - ITS						
PCF Product Reference	**Reference / *mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
PCF product reference is the same as the OCI deliverable title.	B-3-04	Regional Operations Centre (ROC) Technology and Capacity Implications Report	The *Contractor* prepares a Regional Operations Centre (ROC) Technology and Capacity Implications Report in accordance with section S255. The *Contractor* coordinates with the other Main Works Contractors and updates the Regional Operations Centre (ROC) Technology and Capacity Implications Report and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 120 weeks	No
PCF product reference is the same as the OCI deliverable title.	B-3-05	Site Data Change Request	The *Contractor* prepares the initial Site Data Change Request in accordance with section S255.	MS Word	Within 120 weeks	No
PCF product reference is the same as the OCI	B-3-06	Code of Connection	The *Contractor* prepares the initial Code of Connection in accordance with section S255.	MS Word	Within 120 weeks	No

OCI Technical (Design) Deliverables						
Section 3 - ITS						
PCF Product Reference	**Reference / *mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
deliverable title.						
PCF product reference is the same as the OCI deliverable title.	B-3-07	Application for Roadside Electricity Connection (Exit Points)	The *Contractor* prepares the initial Application for Roadside Electricity Connection (Exit Points) in accordance with section S255.	MS Word	Within 120 weeks	No
PCF product reference is the same as the OCI deliverable title.	B-3-08	Permit to Connect	The *Contractor* prepares the initial Permit to Connect deliverable in accordance with section S255.	MS Word	Within 120 weeks	No

OCI Technical Design) Deliverables						
Section 4 - Structures						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
Pre-construction Design	B-4-01	Schedule of Structures Options Reports	The *Contractor* prepares a completed schedule of the *Contractor's* proposed changes or additions to the illustrative Structures Options Reports (preferred option) using the template given in Appendix 2 (OCI Technical Templates"). Where Structures Options Reports have been included within Appendix 2 the *Contractor* confirms that they have reviewed, agreed and adopted such Structures Options Reports.	MS Word	Within 30 weeks	No
Pre-construction Design	B-4-02	Structures Options Reports	For all Structures that have been identified as either changed or are in addition to those illustrative Structures Options Report (preferred option) listed in the Schedule of Structures Options Reports. The *Contractor* submits Structure Options Reports in accordance with DMRB standard CG 300 (Technical approval of highway structures) and ensures it contains the same level of detail and is consistent with the illustrative Structure Options Reports, provided on the *starting date*.	MS Word	Within 120 weeks	No

OCI Technical Design) Deliverables						
Section 4 - Structures						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
			Within these Structure Option Reports, the *Contractor* includes the preferred option from the illustrative Structures Option Reports. In the event that the *Contractor* proposes to alter the span or structural form from to those illustrative Structures Options Report (preferred option), the *Contractor* consults with the *Project Manager* and the TAA (via the *Project Manager*) and complies with the *Project Manager's* and the TAA's requirements in respect of the appropriateness of the alternative proposal and other parameters for such alternative arrangement.			
PCF product reference is the same as the OCI deliverable title.	B-4-03	Structures Options Report Checklist	The *Contractor* prepares the Structures Options Report Checklist in accordance with section S255.	MS Excel	Within 80 weeks	No
Pre-construction Design	B-4-04	Structures Key Location Plans	The *Contractor* prepares general arrangements plans at a scale of not less than 1:2500 showing the location of all Structures for the extent of the Site.	Adobe PDF	Within 120 weeks	No

OCI Technical Design) Deliverables						
Section 4 - Structures						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
Approvals in Principle Checklist	B-4-05	Schedule of Adopted Form 001 (Approvals in Principle)	The *Contractor* prepares a completed schedule of the adopted Form 001 (Approvals in Principle) that have been previously reviewed by the relevant Railway Authorities via a document review notice (DRN) using the template given in Appendix 2 (OCI Technical Templates). Where Form 001 have been included within Appendix 2 the *Contractor* confirms that they have reviewed, agreed and adopted such Form 001.	MS Word	Within 30 weeks	No
Approvals in Principle Checklist	B-4-06	Schedule of Adopted Approvals in Principle	The *Contractor* prepares a completed schedule of the adopted Approvals in Principle that have previously been accepted by the TAA using the template given in Appendix 2 (OCI Technical Templates). Where the Approvals in Principle have been included within Appendix 2 the *Contractor* confirms that they have reviewed, agreed and adopted such Approvals in Principle.	MS Word	Within 80 weeks	No

OCI Technical Design) Deliverables						
Section 4 - Structures						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
PCF product reference is the same as the OCI deliverable title.	B-4-07	Approvals in Principle Checklist	The *Contractor* prepares the Approvals in Principle Checklist in accordance with section S255.	MS Word	Within 80 weeks	No
PCF product reference is the same as the OCI deliverable title.	B-4-08	Design and Check Certificates Checklist	The *Contractor* prepares the Design and Check Certificates Checklist in accordance with section S255.	MS Word	Within 120 weeks	No
Pre-Construction Design	B-4-09	Early Structures Notification Form	Where appropriate, the *Contractor* prepares an Early Structures Notification Form, in accordance with section S255.	MS Word	Within 60 weeks	No
Pre-Construction Design	B-4-10	Evidence of *Contractor*'s responsible engineer (CRE) and *Contractor's* engineering manager	In accordance with Network Rail's requirements.	As agreed with Network Rail.	Within 10 weeks	No

OCI Technical Design) Deliverables						
Section 4 - Structures						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
		(CEM) in accordance with Network Rail				

OCI Technical (Design) Deliverables						
Section 5 Environment, Landscape, Architecture and Archaeology						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
Environmental Management Plans	B-5-01A	Draft second iteration of EMP (EMP2)	The *Contractor* prepares a draft EMP2 in accordance with section S207, Requirement 4 of Schedule 2 of the DCO and section S255 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 44 weeks	Yes
	B-5-01B	Draft second iteration of EMP (EMP2)	The *Contractor* updates the draft EMP2 in accordance with section S207, Requirement 4 of Schedule 2 of the DCO and section S255 with a completed Multiparty Collaboration Form in accordance with section S318.		Within 130 weeks	No
Environmental Management Plans	B-5-02A	Landscape and Ecology Management Plan	The *Contractor* prepares a Landscape and Ecology Management Plan that is to be developed from the Outline Landscape and Ecology Management Plan (provided in Annex A) in compliance with Requirement 5(2) of Schedule 2 of the DCO with a completed Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 44 weeks	Yes
	B-5-02B	Landscape and Ecology	The *Contractor* coordinates with the other Main Works Contractors and updates the Landscape and Ecology Management Plan with a		Within 130 weeks	No

OCI Technical (Design) Deliverables						
Section 5 Environment, Landscape, Architecture and Archaeology						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
		Management Plan	completed Multiparty Collaboration Form in accordance with section S318.			
Pre-construction Design	B-5-03	Co-ordinated Architecture and Landscape Design Report'	The *Contractor* prepares a Co-ordinated Architecture and Landscape Design Report in accordance with section S328 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 30 weeks	Yes
Environmental Management Plans	B-5-04	Environmental management system (EMS)	The *Contractor* prepares an EMS in accordance with section S207 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 44 weeks	Yes
Environmental Management Plans	B-5-05	Biodiversity Improvement Plan	The *Contractor* prepares a Biodiversity Improvement Plan in accordance with section S207 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 40 weeks	Yes
Environmental Management Plans	B-5-06	Carbon and energy management plan	The *Contractor* prepares a carbon and energy management plan in accordance with section S209 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 44 weeks	Yes

OCI Technical (Design) Deliverables						
Section 5 Environment, Landscape, Architecture and Archaeology						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
Not used	B-5-07	Not used	Not used	Not used	Not used	Not used
N/A	B-5-08	Evidence of the archaeological suppliers appointment[6]	The *Contractor* appoints archaeological suppliers from the *Client*'s Archaeological Framework in compliance with the terms of the framework contract to undertake archaeological works.	MS Word	Within four weeks of the suppliers appointment	No
N/A	B-5-09A	Detailed Written Scheme of Investigation	The *Contractor* ensures that the archaeological supplier prepares a detailed written scheme of investigation detailing areas of archaeological interest and reflecting the relevant mitigation measures set out in the archaeological mitigation strategy and outline written scheme of investigation provided in the DCO and in accordance with section S207. The *Contractor* incorporates any additional supporting information from the separately let ground investigation works, provided by the *Project Manager*.	Adobe PDF	Within 44 weeks	No

[6] **Note to *Contractor*:** In the event that the archaeological supplier under the *Client*'s Archaeological Framework is unable to meet the requirements of the Scope, the *Contractor* presents a business case for an equivalent archaeological supplier for agreement with the *Project Manager*.

OCI Technical (Design) Deliverables						
Section 5 Environment, Landscape, Architecture and Archaeology						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
	B-5-09B	Detailed written scheme of investigation	The *Contractor* ensures that the archaeological supplier updates the detailed written scheme of investigation in accordance with section S207. The *Contractor* incorporates any additional supporting information from the separately let ground investigation works, provided by the *Project Manager*.		Within 130 weeks	No
Environmental Management Plans	B-5-10A	Draft protected species licences	The *Contractor* prepares draft protected species licences in accordance with UK Government guidelines.	MS Word	Within 44 weeks	No
	B-5-10B	Draft protected species licences	The *Contractor* coordinates with the other Main Works Contractors and updates the Draft Protected Species Licences and provides a Multiparty Collaboration Form in accordance with section S318.		Within 130 weeks	No
Regular Reporting	B-5-11	Monthly environmental report	The *Contractor* provides monthly environmental report in accordance with section S207, as part of the A-3-05 (monthly progress report).	MS Word	Monthly	No

OCI Technical (Design) Deliverables						
Section 5 Environment, Landscape, Architecture and Archaeology						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
Project Management Plan	B-5-12	A plan to reach net zero position	The *Contractor* submits a plan to reach net zero position in accordance with section S209.	MS Word	Within five weeks	No
Not used	B-5-13	Not used	Not used	Not used	Not used	Not used
Pre-Construction Design	B-5-14	Evidence of LA114 compliance	The *Contractor* submits evidence of LA114 compliance in accordance with section S209.	PDF Format	Submitted alongside the *Contractor* 's design releases in accordance with the *Contractor's* submission schedule.	No
Regular Reporting	B-5-15	Carbon report	The *Contractor* submits the carbon report in accordance with section S209.	MS Word	Within 12 weeks and quarterly thereafter	No

OCI Technical (Design) Deliverables						
Section 5 Environment, Landscape, Architecture and Archaeology						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
Environmental Management Plans	B-5-16	Biodiversity management plan for each Compound	The *Contractor* submits a biodiversity management plan for each Compound in accordance with section S209.	MS Word	Within 130 weeks	No
N/A	B-5-21	Carbon reduction workshops	The *Contractor* coordinates with the other MWC to ensure monthly carbon reduction workshops are held in accordance with section S209.	N/A	Monthly	No

OCI Technical (Design) Deliverables						
Section 6 – Statutory Undertakers Works						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable**	**Required for CCIM**
PCF product reference is the same as the OCI deliverable title.	B-6-01	Statutory Undertakers Diversions	The *Contractor* reviews and oversees and co-ordinates the Statutory Undertakers Diversions in accordance with section S106.	Adobe PDF	Within 120 weeks	No
Statutory Undertakers Diversions	B-6-02	Utility works strategy	The *Contractor* prepares a utility works plan in accordance with numbered appendix 1/16 and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 30 weeks	Yes
Statutory Undertakers Diversions	B-6-03	Draft Utility works schedule	The *Contractor* prepares a utility works schedule in accordance with numbered appendix 1/16 and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 100 weeks	No
Statutory Undertakers Diversions	B-6-04	Schedule of the *Contractor's* proposed changes or additions to the illustrative Statutory Undertakers' Works	The *Contractor* prepares a completed schedule of the *Contractor's* proposed changes or additions to the illustrative Statutory Undertakers Works using the template given in Appendix 2 (OCI Technical Templates). The *Contractor* is to reference numbered appendix 1/16. Where Statutory Undertakers' diversions have been included within Appendix 2 the	MS Word	Within 30 weeks	No

			Contractor confirms that they have reviewed, agreed and adopted such Statutory Undertakers' diversions.			
Not used	B-6-05A	Not used	Not used	Not used	Not used	Not used
Not used	B-6-05B	Not used	Not used	Not used	Not used	Not used
Not used	B-6-05A	Not used	Not used	Not used	Not used	Not used
Not used	B-6-05B	Not used	Not used	Not used	Not used	Not used
Not used	B-6-06	Not used	Not used	Not used	Not used	Not used

Appendix 1c - Schedule of OCI Technical (Construction) Deliverables

The OCI deliverables include the following:

OCI Technical (Construction) Deliverables						
Section 1 Health, Safety, Security and Wellbeing						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Safety File	C-1-01	Health, safety and wellbeing (HSW) management system	The *Contractor* prepares a HSW management system in accordance with section S1100.	Adobe PDF	Within three weeks	No
F10 Notification of Construction Project HSE – Update	C-1-02	Information for the F10 Notification of Construction Project HSE – Update	The *Contractor* prepares the supporting information required by the *Project Manager* for the F10 Notification of Construction Project HSE – Update.	MS Word	Within 12 weeks	No
PCF product reference is the same as the OCI deliverable title.	C-1-03	Health & Safety File	The *Contractor* prepares a Health & Safety File in accordance with section S1106, agrees the format and template with the *Client* (via the *Project*	MS Word	Within 44 weeks	Yes

OCI Technical (Construction) Deliverables						
Section 1 Health, Safety, Security and Wellbeing						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
			Manager) during the OCI stage and complies with section S255 with a completed Multiparty Collaboration Form in accordance with section S318.			
PCF product reference is the same as the OCI deliverable title.	C-1-04	Scheme Asbestos Management Plan	The *Contractor* prepares the Scheme Asbestos Management Plan in accordance with section S255.	MS Word	Within 60 weeks	No
Safety File	C-1-05	Pre-construction information	The *Contractor* reviews and assesses the adequacy of the Pre-Construction Information in accordance with section S1106.	MS Word	Within 12 weeks	No
Construction Phase Plan	C-1-06	CDM Co-ordination Plan	The *Contractor* prepares a CDM Co-ordination Plan in accordance with section	MS Word	Within 12 weeks	Yes

OCI Technical (Construction) Deliverables						
Section 1 Health, Safety, Security and Wellbeing						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
			S1106 with a Multiparty Collaboration Form in accordance with section S318.			
Construction Phase Plan	C-1-07	Security management plan	The *Contractor* prepares a security management plan in accordance with section S215 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 100 weeks	No
Construction Phase Plan	C-1-08	Incident management plan	The *Contractor* prepares an incident management plan in accordance with section S1102.	MS Word	Within four weeks	No
Not used	C-1-09	Not used	Not used	Not used	Not used	Not used
Construction Phase Plan	C-1-10	Behavioural Based Safety (BBS) improvement modules	The *Contractor* prepares a programme of both initial and refresher Behavioural Based Safety (BBS)	MS Word	Within 60 weeks	No

OCI Technical (Construction) Deliverables						
Section 1 Health, Safety, Security and Wellbeing						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
			improvement modules in accordance with section S1101.			
Construction Phase Plan	C-1-11	Occupational health, and wellbeing (OHW) plan	The *Contractor* prepares an OHW plan in accordance with section S1104.	MS Word	Within four weeks	No
Construction Phase Plan	C-1-12	Drug and alcohol procedure	The *Contractor* prepares a drug and alcohol procedure in accordance with section S1103.	MS Word	Within eight weeks	No
Construction Phase Plan	C-1-13	All processes relating to fatal and construction risk management	The *Contractor* prepares all processes relating to fatal and construction risk management in accordance with section S1103	MS Word	Within 120 weeks	No
Safety Plan	C-1-14	Safety control review group (SCRG) meetings	The Contractor complies with the requirements of section S850.	As required by section S850	In accordance	No

OCI Technical (Construction) Deliverables						
Section 1 Health, Safety, Security and Wellbeing						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
					with section S850	
Safety Plan and Combined Safety and Hazard Log Report (also known as the Safety Report)	C-1-15	Safety risk assessment	The *Contractor* prepares a safety risk assessment in accordance with section S1102 with a Multiparty Collaboration Form in accordance with section S318.	MS Excel	Submitted alongside the *Contractor* 's design releases in accordance with the Contractor's submission schedule.	No
Construction Phase Plan	C-1-16	Details of its Protective Measures (security)	The *Contractor* submits details of its Protective Measures in accordance with section S227.	MS Word	Within 40 weeks	No
Project Management Plan	C-1-17	StART development plan	The *Contractor* submits a StART development plan in accordance with section S296.	MS Word	Within 30 weeks	No

OCI Technical (Construction) Deliverables						
Section 1 Health, Safety, Security and Wellbeing						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
N/A	C-1-18	Health, safety and wellbeing (HSW) meetings	The *Contractor* attends and produces a summary of the meeting and submits any improvement actions in accordance with section S670.	MS Word	Monthly and quarterly	No
Safety Plan and Combined Safety and Hazard Log Report (also known as the Safety Report)	C-1-19	All proposed activity type categories A, B or C (as determined in accordance with GG 104)	The *Contractor* submits all proposed activity type categories A, B or C (as determined in accordance with GG 104) in accordance with section S1102.	MS Excel	In accordance with section S1102.	No
Regular Reporting	C-1-20	Construction Design Management (CDM) Metrics report	The *Contractor* submits a CDM Metrics report in accordance with section S1102.	MS Word	Quarterly	No
N/A	C-1-21	*Client's* Supply Chain Maturity Matrix (SCMM)	The *Contractor* completes the *Client's* SCMM in	MS Word	Quarterly	No

OCI Technical (Construction) Deliverables						
Section 1 Health, Safety, Security and Wellbeing						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
			accordance with section S1102.			
N/A	C-1-22	Proposal to establish and implement a dedicated onsite training area to develop technical and personal skills	The *Contractor* submits its proposal to establish and implement a dedicated onsite training area to develop technical and personal skills in accordance with section S1103.	MS Word	Within 130 weeks	No
Construction Phase Plan	C-1-23	Fatigue risk management plan	The *Contractor* develops and implements a fatigue risk management plan in accordance with section S1103.	MS Word	Within 20 weeks	No
N/A	C-1-24	Occupational Health and Wellbeing (OHW) Maturity Matrix	The *Contractor* completes Occupational Health and Wellbeing (OHW) Maturity Matrix in accordance with section S1104	MS Word	Quarterly	No

OCI Technical (Construction) Deliverables						
Section 1 Health, Safety, Security and Wellbeing						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Health & Safety File	C-1-26	Process for reviewing, updating and maintaining the health safety file (HSF)	The *Contractor* submits a process for reviewing, updating and maintaining the HSF in accordance with section S1106.	MS Word	Within 44 weeks	No
N/A	C-1-27	Compliance with the Modern Slavery Act 2015	The *Contractor* prepares and delivers an annual: slavery and human trafficking report, transparency statement and a risk register with mitigating actions in accordance with section S229.	MS Word	Annually (no later than 1st August each year)	No
N/A	C-1-28	Health, safety and wellbeing (HSW) surveys	The *Contractor* undertakes HSW surveys of Staff, the *Client*, *Project Manager* (and its team) and *Supervisor* (and its	As required in accordance with	Quarterly	No

OCI Technical (Construction) Deliverables						
Section 1 Health, Safety, Security and Wellbeing						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
			team) on experiences of behaviour, culture, and wellbeing (including stress levels), in accordance with sections S253 and S1101.	section S1101		
N/A	C-1-29	Supervisors' health, safety and wellbeing (HSW) module	The *Contractor* develops a separate supervisors' HSW module that includes a specific assessment of candidate aptitude, awareness, attitude, communication and interpersonal skills in accordance with section S1101.	As required in accordance with section S1101.	Within 130 weeks.	No
N/A	C-1-30	Plan for implementing a Just and Fair Culture process	If the *Contractor* does not operate a Just and Fair Culture, the *Contractor* submits a plan for implementing a Just and Fair Culture process in	MS Word	Within 10 weeks.	No

OCI Technical (Construction) Deliverables						
Section 1 Health, Safety, Security and Wellbeing						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
			accordance with section S1101.			
Construction Phase Plan Safety risk assessments	C-1-31	Health, safety and wellbeing (HSW) implementation plan	The *Contractor* submits a HSW implementation plan in accordance with section S1102.	MS Word	Within 10 weeks	No
N/A	C1-32	Driving for work policy	The *Contractor* develops and implements a driving for work policy in accordance with section S1101.	MS Word	Within 30 weeks	No

OCI Technical (Construction) Deliverables						
Section 2 - Construction						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
PCF product reference is the same as the OCI deliverable title.	C-2-01A	Construction Phase Plan	The *Contractor* prepares a Construction Phase Plan in accordance with Section 1106 and includes individual plans to a scale of not less than 1:12500 showing the extent and stages of the Construction Phase for the Project and in accordance with section S255 with a completed Multiparty Collaboration Form in accordance with section S318.	Adobe PDF	Within 44 weeks	Yes
	C-2-01B	Construction Phase Plan	The *Contractor* updates the Construction Phase Plan in accordance with section S1100 and includes individual plans to a scale of not less than 1:12500 showing the extent and stages of the Construction Phase for the Project and in accordance with section S255 with a completed Multiparty Collaboration Form in accordance with section S318.		Within 120 weeks	No

OCI Technical (Construction) Deliverables						
Section 2 - Construction						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
PCF product reference is the same as the OCI deliverable title.	C-2-02A	Traffic Management Plan	The *Contractor* prepares a draft Traffic Management Plan (including required lane closures and diversions) and in accordance with section S240 and numbered appendix 1/17 and section S255 with a completed Multiparty Collaboration Form in accordance with section S318 .	MS Word	Within 44 weeks	Yes
	C-2-02B	Traffic Management Plan	The *Contractor* updates the draft Traffic Management Plan (including required lane closures and diversions) in accordance with section S240, numbered appendix 1/17 and section S255 with a Multiparty Collaboration Form in accordance with section S318.		Within 130 weeks	No
PCF product reference is the same as the	C-2-03A	Logistics Strategy	The *Contractor* prepares the Logistics Strategy deliverable in accordance with section S255 and section S299 with a completed	MS Word	Within 44 weeks	Yes

OCI Technical (Construction) Deliverables						
Section 2 - Construction						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
OCI deliverable title.			Multiparty Collaboration Form in accordance with section S318.			
	C-2-03B	Logistics Strategy	The *Contractor* updates the Logistics Strategy deliverable in accordance with section S255 with a Multiparty Collaboration Form in accordance with section S318.		Within 120 weeks	No
Logistics Strategy	C-2-04	Construction logistics plan (CLP)	The *Contractor* prepares a CLP in accordance with section S299 with a completed Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 130 weeks	No
Construction Phase Plan	C-2-05	*Contractor's* Delivery Management System (DMS)	The *Contractor* prepares a *Contractor's* DMS in accordance with section S299.	MS Word	Within 130 weeks	No
Environmental Management Plans	C-2-06	Mass haul diagram	The *Contractor* prepares a mass haul diagram in accordance with section S299 and provides a Multiparty Collaboration Form in accordance with section S318.	Adobe PDF	Within 100 weeks	No

OCI Technical (Construction) Deliverables						
Section 2 - Construction						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Construction Phase Plan	C-2-07	Office Buildings layout plans	The *Contractor* prepares Office Building layout plans in accordance with numbered appendix 1/1.	Adobe PDF	Within 130 weeks	No
Traffic Management Plan	C-2-08	Construction Travel Plan	The *Contractor* prepares a draft construction travel plan in accordance with section S240 with a completed Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 44 weeks	Yes
Construction Phase Plan	C-2-09	Draft site-specific travel plans	The *Contractor* prepares a draft site-specific travel plan in accordance with section S299.	PDF Format	Within 44 weeks	No
Construction Phase Plan	C-2-10	Draft site-specific travel plans	The *Contractor* updates the draft site-specific travel plan in accordance with section S299.	PDF Format	Within 130 weeks	No
Not used	C-2-11	Not used	Not used	Not used	Not used	Not used
Construction Phase Plan	C-2-12	Project office and welfare facilities plan	The *Contractor* submits a project office and welfare facilities plan in accordance with section S299.	Adobe PDF	Within 130 weeks	No

OCI Technical (Construction) Deliverables						
Section 2 - Construction						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
N/A	C-2-13	Review of the interface matrix	The *Contractor* reviews the interfaces detailed within the 'interface matrix' in accordance with section S926.	MS Word	Within 15 weeks	No
Construction Phase Plan	C-2-14	Design proposals for welfare and office provisions together with setup standards for each Compound and Worksite	The *Contractor* submits its design proposals for welfare and office provisions together with setup standards for each Compound and Worksite in accordance with section S1100.	Adobe PDF	Within 130 weeks	No

OCI Technical (Construction) Deliverables						
Section 3 – Operation and Maintenance						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Certificate of Compliance with the Operations Technical Leadership Group	C-3-01	Certificate of Compliance with the operations technical leadership group	The *Contractor* facilitates and obtains the Certificate of Compliance with the operations technical leadership group, in accordance with section S329.	As required by the "Project Control Framework Handbook" (see link provided in Annex A).	Within 120 weeks	No
Certificate of Compliance with the Operations Technical Leadership Group	C-3-02	Draft operations technical leadership group (Ops TLG) paper	The *Contractor* prepares a draft operations Ops TLG paper, in accordance with section S329 accompanied by the Multiparty Collaboration Form (where appropriate) in accordance with section S318.	MS Word	Within 44 weeks	Yes
Certificate of Compliance with the Operations Technical	C-3-03	Operations technical leadership group (OpsTLG) paper	The *Contractor* updates the draft operations Ops TLG paper in accordance with section S329 accompanied by the Multiparty Collaboration Form (where appropriate) in accordance with section S318.	MS Word	Within 120 weeks	No

OCI Technical (Construction) Deliverables						
Section 3 – Operation and Maintenance						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Leadership Group						
PCF product reference is the same as the Stage One Deliverable title	C-3-04	Safety Plan	The *Contractor* prepares the Safety Plan, in accordance with the safety objectives defined in section S105 and in accordance with section S255.	As required by the Project Control Framework Handbook.	Within 120 weeks	No
PCF product reference is the same as the Stage One Deliverable title.	C-3-05	Combined Safety and Hazard Log Report (also known as the Safety Report)	The *Contractor* prepares Combined Safety and Hazard Log Report (also known as the Safety Report) in accordance with sections S105 and S255 and provides a Multiparty Collaboration Form in accordance with section S318..	MS Word	Within 120 weeks	No
PCF product reference is the same as the Stage One	C-3-06	Combined Operations	The *Contractor* prepares the Combined Operations in accordance with section S255.	MS Word	Within 120 weeks	No

OCI Technical (Construction) Deliverables						
Section 3 – Operation and Maintenance						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Deliverable title						
Maintenance and Repair Statement	C-3-07	Information for the Maintenance and Repair Statement	The *Contractor* contributes to the Maintenance and Repair Statement in accordance with section S255. The *Contractor* is deemed to have satisfied this requirement during the Mobilisation Phase by completing C-3-11 (Asset Management Forward Plan) and A-1-07A and A-1-07B (Availability report) and providing a maintenance and repair statement in accordance with DMRB standard GD 304 ("Designing health and safety into maintenance") (see link provided in Annex A)	MS Word	Within 120 weeks	No
PCF product reference is the same as the OCI deliverable title.	C-3-08	Detailed Local Operating Agreement (DLOA)	The *Contractor* prepares the Detailed Local Operating Agreement (DLOA) in accordance with sections S240 and S255 and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 120 weeks	No
Detailed Local	C-3-09	Local operating agreement (LOA)	The *Contractor* prepares the local operating agreement (LOA) in accordance with section S240.	MS Word	Within 130 weeks	No

OCI Technical (Construction) Deliverables						
Section 3 – Operation and Maintenance						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Operating Agreement						
Network Performance Criteria and Charging	C-3-10	Information for the Network Performance Criteria and Charging	The *Contractor* prepares the supporting information required by the *Project Manager* for the Network Performance Criteria and Charging. The *Contractor* is deemed to have satisfied this requirement during the Mobilisation Phase by completing A-1-07A and A1-07B (Availability Report) and C-1-14 (Safety Plan).	MS Word	Within 120 weeks	No
Maintenance and Repair Strategy Statement	C-3-11	Asset Management Forward Plan	The *Contractor* prepares an Asset Management Forward Plan in accordance with section S370.	MS Word	Within 60 weeks	No
Combined Operations	C-3-12	Operation and Maintenance Training Plan	The *Contractor* prepares a draft Operation and Maintenance Training Plan that is to include details on the method of providing the required training to the Operations Directorate.	MS Word	Within 130 weeks	No

OCI Technical (Construction) Deliverables						
Section 3 – Operation and Maintenance						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
N/A	C-3-13	Presentation of the operational and maintenance solution to the operations technical leadership group (Ops TLG)	The *Contractor* presents the operational and maintenance solution to the Ops TLG in accordance with section S329.	As required in accordance with section S329	Within 120 weeks	No
Certificate of Compliance with the Operations Technical Leadership Group	C-3-14	Response paper to all operations technical leadership group (Ops TLG) recommendations	The *Contractor* prepares a response paper to all Ops TLG recommendations in accordance with section S329.	As required in accordance with section S329	In accordance with section S329.	No
N/A	C-3-15	Co-ordinates operational workshops	The *Contractor* undertakes co-ordinates operational workshops in accordance with section S329.	N/A	In accordance with section S329.	No

OCI Technical (Construction) Deliverables						
Section 3 – Operation and Maintenance						
PCF Product Reference	***mobilisation activity schedule* reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
N/A	C-3-16	Long-term support and maintenance plan for the security equipment	The *Contractor* submits a long-term maintenance plan for the security equipment in accordance with section S220.	MS Word	Within 130 weeks	No

OCI Technical (Construction) Deliverables						
Section 4 – Stakeholder Management						
PCF Product Reference	**Reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable in accordance with this Scope section S3000**	**Required for CCIM**
Not used	C-4-01	Not used	Not used	Not used	Not used	Not used
Not used	C-4-02	Not used	Not used	Not used	Not used	Not used
Communications Planning for Major Projects	C-4-03	Stakeholder engagement plan	The *Contractor* prepares a stakeholder engagement plan in accordance with section S252.	MS Word	Within 40 weeks	No
Communications Planning for Major Projects	C-4-04	Complaints procedure	The *Contractor* develops and implements a complaints procedure in accordance with section S865.	MS Word	Within 40 weeks	No
N/A	C-4-05	Detailed programme of engagement	The *Contractor* submits a detailed programme of engagement setting out how bespoke Customer groups are engaged whilst Providing the Works in accordance with section S865.	MS Word	Within 100 weeks	No

OCI Technical (Construction) Deliverables						
Section 5 – Legacy and Benefits (People Strategy)						
PCF Product Reference	**Reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable in accordance with this Scope section S3000**	**Required for CCIM**
Communications Planning for Major Projects	C-5-01	Community relations plan	The *Contractor* prepares a community relations plan in accordance with section S252 and provides a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 44 weeks	Yes
Benefits Realisation and Evaluation Plan	C-5-02	Customer plan	The *Contractor* prepares a customer plan in accordance with section S251.	MS Word	Within 40 weeks	No
Communications Planning for Major Projects	C-5-03	Information for the Communication Planning for Major Projects	The *Contractor* prepares the supporting information required by the *Project Manager* for the Communication Planning for Major Projects. The *Contractor* is deemed to have satisfied this requirement during the OCI period by completing • C-4-03 (Stakeholder engagement plan), • C-4-04 (Complaints procedure) and	As required by the "Project Control Framework Handbook" (see link provided in Annex A).	Within 120 weeks	No

OCI Technical (Construction) Deliverables						
Section 5 – Legacy and Benefits (People Strategy)						
PCF Product Reference	**Reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable in accordance with this Scope section S3000**	**Required for CCIM**
			• C-5-01 (Community relations plan).			
Notification of Development	C-5-04	Information for the Notification of Development	The *Contractor* contributes to the Notification of Development in accordance with section S255. The *Contractor* coordinates with the other Main Works Contractors and updates the Notification of Development and provides a Multiparty Collaboration Form in accordance with section S318.	Adobe PDF	Within 120 weeks	No
N/A	C-5-05	Archaeology community engagement plan	The *Contractor* prepares an archaeological community engagement plan in accordance with section S254.	MS Word	Within 60 weeks	No

OCI Technical (Construction) Deliverables						
Section 5 – Legacy and Benefits (People Strategy)						
PCF Product Reference	**Reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable in accordance with this Scope section S3000**	**Required for CCIM**
Benefits Realisation and Evaluation Plan	C-5-06	Method of measurement of social value outcomes	The *Contractor* prepares a method of measurement of social value outcomes in accordance with section S105.	MS Word	Within 60 weeks	No
Not used	C-5-07	Not used	Not used	Not used	Not used	Not used
Regular Reporting	C-5-08	Three-month monitoring report	The *Contractor* provides a three-month monitoring report in accordance with section S253.	MS Word	In accordance with section S253	No
Project Management Plan	C-5-09	Onboarding process	The *Contractor* provides proposals for its onboarding process in accordance with section S253.	MS Word	Within four weeks	No

OCI Technical (Construction) Deliverables						
Section 5 – Legacy and Benefits (People Strategy)						
PCF Product Reference	**Reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable in accordance with this Scope section S3000**	**Required for CCIM**
Project Management Plan	C-5-10	Induction programme	The *Contractor* submits its proposals for its 'induction programme' in accordance with section S253.	MS Word	Within four weeks	No
Project Management Plan	C-5-11	People engagement plan	The *Contractor* submits a people engagement plan that demonstrates how the relevant aspects of the People Proposition will be implemented in accordance with section S253.	MS Word	Within 30 weeks	No
Project Management Plan	C-5-12	Proposals for ongoing training and education programme	The *Contractor* submits its proposals for an ongoing training and education programme in accordance with section S253.	MS Word	Within 30 weeks.	No

OCI Technical (Construction) Deliverables						
Section 5 – Legacy and Benefits (People Strategy)						
PCF Product Reference	**Reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable in accordance with this Scope section S3000**	**Required for CCIM**
Project Management Plan	C-5-13	Plan to outline how it aligns with the guiding principles of the *Client's* People Strategy	The *Contractor* submits a plan to outline how it aligns with the guiding principles of the *Client's* People Strategy in accordance with section S253.	MS Word	Within 60-weeks.	No
Project Management Plan	C-5-14	Employee relations strategy	The *Contractor* submits an employee relations strategy in accordance with section S253.	MS Word	Within 60 weeks	No
N/A	C-5-15	List of knowledge management case studies	The *Contractor* provides a list of knowledge management case studies in accordance with section S253.	As required in accordance with section S253.	Quarterly commencing at month three after the *starting date.*	No

OCI Technical (Construction) Deliverables						
Section 5 – Legacy and Benefits (People Strategy)						
PCF Product Reference	**Reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable in accordance with this Scope section S3000**	**Required for CCIM**
Regular Reporting	C-5-16	Progress report against the Inclusion Action Plan (IAP)	The *Contractor* prepares a progress report against the IAP in accordance with section S253.	MS Word	Quarterly commencing in the second quarter from the *starting date*	No
Equality Impact Assessment (EqIA) Screening, Analysis and Monitoring	C-5-17	Equality, diversity and inclusion (EDI) training plan	The *Contractor* submits an EDI training plan in accordance with section S253.	MS Word	Within 30 weeks	No
N/A	C-5-18	Volunteering activities	The *Contractor* proposes volunteering activities in accordance with section S254.	MS Word	Within 100 weeks	No

OCI Technical (Construction) Deliverables						
Section 5 – Legacy and Benefits (People Strategy)						
PCF Product Reference	**Reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of a OCI deliverable in accordance with this Scope section S3000**	**Required for CCIM**
Regular Reporting	C-5-19	Volunteering report	The *Contractor* prepares a volunteering report in accordance with section S254	MS Word	At the end of each quarter.	No
N/A	C-5-20	Electronic human resources (HR) data system(s)	The *Contractor* provides a fully functional electronic human resources (HR) data system(s) in accordance with section S805.	As required in accordance with section S805	Within 32 weeks	No

Appendix 1d - Schedule of OCI DCO Compliance Deliverables

The OCI deliverables include the following:

OCI DCO Compliance Deliverables						
Section 1 – General						
PCF Product Reference	**Reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
PCF product reference is the same as the Deliverable title.	D-1-01	Information for the DCO – Managing Change	The *Contractor* contributes to the DCO - Managing Change in accordance with section S255. The *Contractor* coordinates with the other Main Works Contractors and updates the DCO – Managing Change and provides a Multiparty Collaboration Form in accordance with section S318.	As required by the "Project Control Framework Handbook" (see link provided in Annex A).	Within 120 weeks	No
PCF product reference is the same as the Deliverable title.	D-1-02	Evaluation of Change Register	The *Contractor* prepares a draft Evaluation of Change Register in accordance with section S255, capturing proposed changes to the design and construction methods and an assessment of materially new or materially different for the Environmental Statement and material/non-material for the DCO. The *Contractor* coordinates with the other Main Works Contractors and updates the Evaluation of Change Register and provides a	MS Excel	Within 120 weeks	No

OCI DCO Compliance Deliverables						
Section 1 – General						
PCF Product Reference	**Reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
			Multiparty Collaboration Form in accordance with section S318.			
Post Decision Activities Section 134 Compulsory Acquisition Notices & Document Certification Deposit Processes	D-1-03	Consents Management Plan	The *Contractor* prepares a Consents Management Plan prepared in accordance with section S929 with a Multiparty Collaboration Form in accordance with section S318.	MS Word	Within 30 weeks	Yes
DCO Application – Development Consent Order & Explanatory Memorandum	D-1-04	Consents Register	Consents Register prepared in accordance with section S929.	MS Excel	Within 30 weeks	No
N/A	D-1-05	OCI closing report	The *Contractor* prepares the OCI closing report and submits for Project Manager acceptance in accordance with the Acceptance Procedure.	MS Word	Within 130 weeks	No

OCI DCO Compliance Deliverables						
Section 1 – General						
PCF Product Reference	**Reference**	**Deliverable**	**Description/Requirement**	**Format**	**Required time scale (from *starting date*) for submission of OCI deliverable**	**Required for CCIM**
Pre-Construction Design	D-1-06	Design compliance report	The *Contractor* prepares a design compliance report in accordance with section S328.	MS Word	Within 130 weeks	No
Post Decision Activities Section 134 Compulsory Acquisition Notices & Document Certification Deposit Processes	D-1-07	Consents Strategy	The *Contractor* prepares a consents strategy in accordance with section S299.	MS Word	Within 24 weeks	No

Appendix 2 OCI Technical Templates

OCI Schedule of the *Contractor's* proposed changes or additions to the illustrative Statutory Undertakers' Works

Schedule of the *Contractor's* proposed changes or additions to the illustrative Statutory Undertakers' Works						
Reference	**Chainage**	**Location**	**Apparatus**	***Contractor* to indicate type of change (Changed/Additional/Removed):**	**Reasons for change**	**Benefits and disbenefits**

OCI Schedule of Proposed Departures

Schedule of Proposed Departures									
Contractor's **Reference**	***Client's*** **illustrative Departure Reference**	**Letter of No Objection Design Reference**	**DMRB Standard**	**Departures to be incorporated (tick as appropriate)**				**Departure Type**	**Comments/ Description**
				without amendment	**with amendment**	**not incorporated**	**additional**		

OCI Schedule of Structures Options Reports

Schedule of Structures Options Reports							
Contractor's Reference	**Structures Options Report Reference**	**Structure Name**	**Preferred option to be incorporated (tick as appropriate)**				**Comments/Description**
			without amendment	**with amendment**	**not incorporated**	**additional**	

OCI Schedule of Adopted Form 001 (Approvals in Principle)

Schedule of Adopted Form 001 (Approvals in Principle)			
***Contractor's* Reference**	**Previously Accepted (with amendments) Document Number Reference from the relevant document review notice (DRN)**	**Form 001 (Approval in Principle) adopted (Y/N)**	**Comments/ Description**

S3100 Behaviour and Principles

S3105 Improving behaviours, improving performance programme

S3105.1 The *Client* has identified 6 key areas to drive integrated working that aligned with the improving behaviours, improving performance programme

- decision making,

  "We share information, openly and willingly, involve the right people in decisions, and take decisions in an effective, timely manner"

- accountability,

  "We ensure commitments are clearly agreed and kept, and people hold themselves and others to account"

- constructive challenge,

  "We are open to challenge and different ideas and speak our own minds even in difficult situations"

- communication and engagement,

  "We communicate with each other in the best possible way to ensure understanding and engender commitment to deliver on our purpose"

- trust and respect and

  "We recognise and encourage the contribution of others. We act with integrity in everything we do. We say what we do and we do what we say".

- improvement and innovation

  "We challenge the status quo to find better ways of working and create an environment which allows this to happen without fear of failure".

S3105.2 The *Contractor* provides a behaviour maturity plan (BMP) within 30 weeks of the *starting date* for acceptance by the *Project Manager*.

The BMP provides details on how the *Contractor* identifies and embeds positive behaviours across the Project including

- the *Contractor's* approach to align itself with the 6 key areas stated in paragraph S296.1,
- the *Contractor's* tools and techniques that are used to identify, encourage and embed appropriate behaviours including
  - behaviour assessments,
  - personal profiling and
  - incorporation of behaviours into onboarding processes,
- an outline plan of activities undertaken during the Stage One to
  - embed the behaviours in advance of notice to proceed and
  - demonstrate continuity of behaviours from the Stage One into the Stage Two and
  - an outline plan of activities proposed during the first six months of the Stage Two.

S3105.3 The *Contractor* submits the BMP for acceptance of the *Project Manager*. A reason for not accepting the plan is that it does not provide details on all the approaches, tools and techniques to be implemented by the *Contractor*.

S3105.4 Once the BMP is accepted by the *Project Manager,* the *Contractor*

- complies with the BMP and
- keeps the BMP under review to ensure it is effective.

S3105.5 As a minimum, on each anniversary of the *starting date*, the *Contractor* reviews and updates the BMP. The C*ontractor* submits the updated BMP within three weeks of the relevant anniversary of the *starting date* to the *Project Manager* for acceptance.

S3110 Organisational Maturity

S3110.1 The *Contractor* ensures that its *leadership team* and wider project team's Staff demonstrate the following capabilities

- leadership maturity,
- collaborative behaviours,
- improving data sharing and management and
- supply chain engagement

to contribute to successful delivery of the *works*.

S3110.2 The areas of this Scope relevant to organisational maturity are

- considerate constructors as detailed in section S250,
- strategic alignment as detailed in section S296,
- continual improvement as detailed in section S671,
- training and competence of *Contractor's* Staff as detailed in section S680,
- subcontracting as detailed in section S1200,
- leadership development as detailed in section S3115,
- behavioural attributes as detailed in section S295,
- people strategy as detailed in section S253,
- collaborative procurement as detailed in section S1240 and
- project execution as detailed in section S825.

S3115 Leadership

S3115.1 The *Contractor* provides a 'leadership plan' within 30 weeks of the *starting date* for acceptance by the *Project Manager*.

The leadership plan provides

- detail on how the leadership team (including the Design Consultant' leadership and leadership team) influences design, behaviours of Staff and drive delivery operations of the works including
    - how the *Contractor* and the Design Consultants work seamlessly and with equality in Providing the Works,

- the approaches and processes that show how the *Contractor's* and Design Consultant' leaders develop and retain a successful project team, including
  - recruitment and on-boarding,
  - individual and team development and retention and
  - succession planning
- CVs for the leadership team,
- an explanation of how the leadership plan
  - is influenced by the StART development plan (paragraph S296.4),
  - influences and supports
    - delivery of the inclusion action plan (paragraph S253.2),
    - continual improvement including lean,
    - the internal communications process and
- influences the employment and skills plan (paragraph S253.10) and

- the leadership embedment tests to be used at notice to proceed to demonstrate
  - its leadership team and its Design Consultant are embedded into an integrated structure with the *Client*, *Project Manager*, *Supervisor* and Support Team and
  - its processes and procedures for Providing the Works are developed and integrated with *Client's* own processes and procedures.

S3115.2 The *Contractor* submits the leadership plan for acceptance of the *Project Manager*. A reason for not accepting the plan is

- it does not provide details on how the *Contractor's* leadership team influences and drives operation of the *works*,
- it does not provide sufficient detail of how the *Contractor* and the Design Consultants work seamlessly and with equality in Providing the Works,
- it does not provide sufficient details to enable the *Project Manager* to understand the leadership embedment tests to be used at notice to proceed or
- it does not provide sufficient details to enable the *Project Manager* to understand how the leadership embedment tests to be used at notice to proceed demonstrate the leadership team is embedded into an integrated structure with the *Client*, *Project Mana*ger, *Supervisor* and Support Team.

S3115.3 Once the leadership plan is accepted by the *Project Manager,* the *Contractor*

- complies with the leadership plan and
- keeps the leadership plan under review to ensure it is effective.

S3115.4 As a minimum, on each anniversary of the *starting date*, the *Contractor* reviews and updates the leadership plan. The C*ontractor* submits the updated leadership plan within three weeks of the relevant anniversary of the *starting date* to the *Project Manager* for acceptance.

S3115.5 During Stage One, the *Contractor* submits a report to the *Project Manager* on a monthly basis that details the progress towards achieving the leadership embedment tests to be used at notice to proceed as detailed in the leadership plan.

S3120 *Contractor's* and Design Consultants' Obligations

S3120.1 In Providing the Works, the *Contractor* agrees to, and its Design Consultants agree to

- make decisions unanimously and in the best interests of the Project and the *works* and
- have regard to the interests of each other when making any decision or exercising any discretion under the contract or the subcontract.

Contractor's and Design Consultants' Commitments

S3120.2 In Providing the Works, the *Contractor* commits to, and its Design Consultants commits to

- collective responsibility for the preparation and implementation of the design,
- establishing an integrated collaborative team environment to encourage open, honest and efficient sharing of information,
- a no fault and no dispute culture to avoid referral to adjudication and tribunals,
- encouraging innovation and innovative thinking to achieve optimal outcomes,
- creating positive peer relationships in an environment of mutual support, appreciation and encouragement and
- equitably sharing the benefits of the rewards and the burdens of the risks that are encountered in Providing the Works.

Contractor's and Design Consultants' Good Faith

S3120.3 In honouring their commitments and in Providing the Works the *Contractor* commits to, and its Design Consultants commit to

- do everything properly and reasonably within their control necessary to enable each other to perform their obligations under the contract,
- do all things necessary to enable each of us to enjoy the benefits and share the risks under the contract,
- act in a manner which does not impede or restrict performance and
- act in good faith, which means
    - acting fairly and reasonably,
    - act in a spirit of mutual trust and cooperation,
    - honesty in performing the work and services under the contract and
    - doing all things expected to give effect to the spirit and intent of behaviours, maturity, collaboration, leadership and integrated team working of the Project.

S3200 The Mobilisation Phase (Clause Z117)

S3205 Mobilisation Phase

S3205.1 The Mobilisation Phase includes

- the OCI deliverables,
- *the mobilisation activity schedule week 128 and 131* works in week 128 up to and including week 131,
- *the mobilisation activity schedule week 132 and 135* works in week 132 up to and including week 135,
- *the design deliverable schedule week 49 and 52* works in week 49 up to and including week 52 and
- *the design deliverable schedule week 134 and 135* works in week 134 up to and including week 135 and
- the other activities required by the Scope to be undertaken from the *starting date* and prior to any notice to proceed to the Construction Phase.

S3205.2 After the final OCI deliverables submission up to and including week 48, the *Contractor* commences and completes the activities in

- *the mobilisation activity schedule week 128 and 131* works in week 128 up to and including week 131,
- *the mobilisation activity schedule week 132 and 135* works in week 132 up to and including week 135,
- *the design deliverable schedule week 49 and 52* works in week 49 up to and including week 52 and
- *the design deliverable schedule week 134 and 135* works in week 134 up to and including week 135.

S3206 Construction Phase

S3206.1 Construction Phase includes the activities required by the Scope to be undertaken after to any notice to proceed to the Construction Phase and are not activities in the Mobilisation Phase.

S3300 Pre-Main Works Commencement

S3305 Pre-DCO Mobilisation Phase Works

S3305.1 The *Project Manager* may issue a Pre-DCO Mobilisation Phase Works Instruction detailing

- the works and services to be undertaken by the *Contractor*,
- the land to be entered to perform such relevant works and services,
- Pre DCO Access Date,
- Pre DCO Works Completion Date and
- Pre DCO Completion Date.

The *Project Manager* consults the *Contractor* on any draft Pre-DCO Mobilisation Phase Works Instruction prior to its issue.

S3305.2 The *Contractor* does not commence the Pre-DCO Mobilisation Phase Works detailed on a Pre-DCO Mobilisation Phase Works Instruction until the *Project Manager* has issued the related notice to proceed to Pre-DCO Mobilisation Phase.

S3305.3 The *Contractor* does not enter such land until the Pre DCO Access Date.

S3305.4 The *Contractor* does not enter such land after the Pre DCO Works Completion Date.

S3305.5 The *Contractor* completes the Pre-DCO Mobilisation Phase Works on or before the Pre DCO Completion Date.

S3305.6 The *Project Manager* may amend

- the works and services to be undertaken by the *Contractor* in Pre-DCO Mobilisation Phase Works Instruction,
- the Pre DCO Access Date,
- Pre DCO Works Completion Date and
- the Pre DCO Completion Date.

The *Project Manager* consults the *Contractor* on the implications for such changes prior to making them.

S3310 Pre-DCO Mobilisation Phase Works Insurances

S3310.1 Prior to the *Project Manager* issuing a notice to proceed to the Pre-DCO Mobilisation Phase Works, the *Project Manager* confirms which, if any additional *Contractor* provided insurances are to be provided and where necessary amends the Scope Annex J.

S3315 Preliminary works

S3315.1 The *Project Manager* may issue a Preliminary Works Instruction detailing

- the works and services to be undertaken by the *Contractor*,
- the land to be entered to perform such relevant works and services,
- Preliminary Works Access Date,
- Preliminary Works' Works Completion Date and
- Preliminary Works Completion Date.

The *Project Manager* consults the *Contractor* on any draft Preliminary Works Instruction prior to its issue.

S3315.2 The *Contractor* does not commence the relevant Preliminary Works' Works until the *Project Manager* has issued the related Preliminary Works Instruction.

S3315.3 The *Contractor* does not enter such land until the Preliminary Works Access Date.

S3315.4 The *Contractor* does not enter such land after the Preliminary Works' Works Completion Date.

S3315.5 The *Contractor* completes Preliminary Works' Works on or before the Preliminary Works Completion Date.

S3315.6 The *Project Manager* may amend

- the works and services to be undertaken by the *Contractor* in the Preliminary Works Instruction,

- the Preliminary Works Access Date,
- Preliminary Works' Works Completion Date and
- the Preliminary Works Date.

The *Project Manager* consults the *Contractor* on the implications for such changes prior to making them.

S3320 Preliminary works insurance

S3320.1 Prior to the *Project Manager* issuing a Preliminary Works Instruction, the *Project Manager* confirms which, if any additional *Contractor* provided insurances are to be provided and where necessary amends the Scope Annex J.

Contents

Annex A: Hyperlinks to and locations of referenced documents

The location of documents (including hyperlinks) referenced in the Scope are contained in the Annex A register (HE540039-LTC-GEN-GEN-REG-COM-00003 P13) located in the Contract Documents Register for Tunnels and Approaches (HE540039-LTC-COM-GEN-REG-COM-00017).

Annex BA: Form of Parent Company Guarantee (Tunnels and Approaches)

DATED **202**

(1) NATIONAL HIGHWAYS LIMITED

as Client

(2) [NAME OF GUARANTOR]

as Guarantor

PARENT COMPANY GUARANTEE

relating to a contract for the provision
of construction works at Lower Thames Crossing
Tunnels and Approaches

DATED

PARTIES:

(1) **NATIONAL HIGHWAYS LIMITED** (company no 09346363) whose registered office is at Bridge House, 1 Walnut Tree Close, Guildford, Surrey GU1 4LZ (the "**Client**")

(2) [●](company no [●]) whose registered office is at [●] (the "**Guarantor**")

BACKGROUND:

(A) By the Contract, the Client has employed the Contractor to carry out construction works at Lower Thames Crossing Tunnels and Approaches as more particularly described in the Contract.

(B) The Guarantor is the [ultimate][7] parent company of the Contractor[8].

(C) The Guarantor has agreed to guarantee the due performance by the Contractor of his obligations under the Contract in the manner set out in this deed.

OPERATIVE PROVISIONS:

1. DEFINITIONS AND INTERPRETATION

1.1. Unless the contrary intention appears, the following definitions apply:

"**Contract**" means the contract dated [●] between the Client (1) and the Contractor (2) for the carrying out of construction works at Lower Thames Crossing Tunnels and Approaches.

"**Contractor**" means [●] (company no [●]) whose registered office is at [●].

"**Insolvency Event**" means the Contractor being unable to pay its debts (as defined by Sections 123(1) and 268(1) of the Insolvency Act 1986) or any corporate action, legal proceedings or other procedure or step is taken in relation to:

a) suspension of payments, a moratorium of any indebtedness, winding-up, dissolution, administration or reorganisation (by way of voluntary arrangement, scheme of arrangement or otherwise) of the Contractor other than a solvent liquidation or reorganisation of the Contractor;
b) a composition, assignment or arrangement with any creditor of the Contractor;
c) the appointment of a liquidator, receiver, administrator, administrative receiver, compulsory manager or other similar officer in respect of the Contractor or any of its assets; or
d) enforcement of any security over any assets of the Contractor,

or any analogous procedure or step is taken in any jurisdiction.

1.2. The clause headings in this deed are for the convenience of the parties only and do not affect its interpretation.

[7] Note to Procurement Officer: delete if not applicable.
[8] Note to Procurement Officer: where the guarantee is being provided by a Consortium Member rather than Contractor, the references to "Contractor" need to be replaced with "Consortium Member" where necessary throughout the guarantee.

1.3. Words importing the singular meaning include the plural meaning and vice versa.

1.4. Words denoting the masculine gender include the feminine and neuter genders and words denoting natural persons include corporations and firms and all such words shall be construed interchangeably.

1.5. References in this deed to a clause are to a clause of this deed.

1.6. References in this deed to any statute or statutory instrument include and refer to any statutory amendment or re-enactment for the time being in force.

2. GUARANTEE

2.1. In consideration of the Client agreeing to enter into the Contract with the Contractor, the Guarantor irrevocably and unconditionally guarantees and undertakes to the Client that:

a) the Contractor will perform and observe all his obligations under the Contract at the times and in the manner provided in the Contract; and
b) in the event of any breach of such obligations by the Contractor, the Guarantor shall procure that the Contractor makes good the breach or otherwise cause it to be made good and shall indemnify the Client against any loss, damage, demands, charges, payments, liability, proceedings, claims, costs and expenses suffered or incurred by the Client arising from or in connection with it.

2.2. The Guarantor shall also indemnify the Client against:

a) any costs, losses and expenses (including legal expenses) which may be suffered or incurred by the Client in seeking to enforce and enforcing (i) this Guarantee and/or (ii) any judgment or order obtained in respect of this Guarantee; and
b) any loss or liability suffered or incurred by the Client if any of the obligations of the Contractor under the Contract is or becomes illegal, invalid or unenforceable for whatsoever reason as if such obligations were not illegal, invalid or unenforceable provided that the Client shall not recover any more from the Guarantor under the indemnity in this sub-clause 2.2(b) than the Client would have been entitled to recover from the Contractor under the Contract had the relevant obligations not been illegal, invalid or unenforceable.

2.3. Any limitation [, right][9] or defence which would have been available to the Contractor in an action under the Contract shall likewise be available to the Guarantor in a corresponding action under this deed, provided that nothing in this clause shall:

a) prejudice or affect any liability of the Guarantor under clause 2.2; nor
b) allow the Guarantor to avoid liability if either of the events specified in clause 5 occurs.

[9] Note to Procurement Officer: delete if not applicable.

3. GUARANTOR'S LIABILITY

3.1. The obligations of the Guarantor under this deed are in addition to and independent of any other security which the Client may at any time hold in respect of the Contractor's obligations under the Contract and may be enforced against the Guarantor without first having recourse to any such security.

3.2. The obligations of the Guarantor under this deed are in addition to and not in substitution for any rights or remedies that the Client may have against the Contractor under the Contract or at law.

3.3. The liability of the Guarantor under this deed shall in no way be discharged, lessened or affected by:

a) an Insolvency Event;
b) any change in the constitution, status, function, control or ownership of the Contractor or any legal limitation, disability or incapacity relating to the Contractor or any other person;
c) the Contract or any of the provisions of the Contract being or becoming illegal, invalid, void, voidable or unenforceable;
d) any time given, waiver, forbearance, compromise or other indulgence shown by the Client to the Contractor;
e) the assertion or failure to assert or delay in asserting any rights or remedies of the Client or the pursuit of any right or remedy of the Client;
f) the giving by the Contractor of any security or the release, modification or exchange of any such security or the liability of any person; or
g) any other act, event, omission or circumstance which but for this provision might operate to discharge, lessen or otherwise affect the liability of the Guarantor,

in each case with or without notice to, or the consent of, the Guarantor and the Guarantor unconditionally and irrevocably waives any requirement for notice of, or consent to, such matters.

3.4. Any decision of an adjudicator, expert, arbitral tribunal or court in respect of or in connection with the Contract and any settlement or arrangement made between the Client and the Contractor shall be binding on the Guarantor.

4. VARIATIONS TO THE CONTRACT

4.1. The Guarantor authorises the Contractor and the Client to make any addition or variation to the Contract, the due and punctual performance of which shall likewise be guaranteed by the Guarantor in accordance with the terms of this deed. The liability of the Guarantor under this deed shall in no way be discharged or lessened by any such addition or variation.

5. LIQUIDATION / DETERMINATION

5.1. The Guarantor covenants with the Client that:

a) if a liquidator is appointed in respect of the Contractor and the liquidator disclaims the Contract; or
b) if the Contractor's employment under the Contract is determined for any reason,

the liability of the Guarantor under this deed shall remain in full force and effect.

6. WAIVER

6.1. The Guarantor waives any right to require the Client to pursue any remedy (whether under the Contract or otherwise) which it may have against the Contractor before proceeding against the Guarantor under this deed.

7. RIGHTS OF GUARANTOR AGAINST CONTRACTOR

7.1. The Guarantor shall not by any means or on any ground seek to recover from the Contractor (whether by instituting or threatening proceedings or by way of set-off or counterclaim or otherwise) or otherwise to prove in competition with the Client in respect of any payment made by the Guarantor under this deed nor be entitled in competition with the Client to claim or have the benefit of any security which the Client holds for any money or liability owed by the Contractor to the Client. If the Guarantor shall receive any monies from the Contractor in respect of any payment made by the Guarantor under this deed, the Guarantor shall hold such monies in trust for the Client for so long as the Guarantor remains liable or contingently liable under this deed.

8. CONTINUING GUARANTEE

8.1. The terms of this deed are a continuing guarantee and shall remain in full force and effect until each part of every obligation of the Contractor under the Contract has been performed and observed and until each and every liability of the Contractor under the Contract has been satisfied in full.

9. THIRD PARTY RIGHTS

9.1. Unless the right of enforcement is expressly granted, it is not intended that any third party should have the right to enforce any provision of this deed pursuant to the Contracts (Rights of Third Parties) Act 1999.

10. NOTICES

10.1. Any notice or other communication required under this deed shall be given in writing and is to be delivered personally (which includes delivery by courier) or sent by pre-paid recorded or special delivery post to the party concerned [for the attention of its directors][10] at its address set out in this deed or to such other addresses as may be notified by such party for the purposes of this clause.

10.2. Any notice given pursuant to this clause will be deemed to have been served as follows:

a) if delivered personally, at the time of delivery; and
b) if sent by recorded or special delivery post, 48 hours after being delivered into the custody of the postal authorities but excluding Saturdays, Sundays and public and bank holidays in England.

10.3. In proving service, it will be sufficient to prove that personal delivery was made or that the envelope containing the notice was properly addressed and delivered into

[10] Note to Procurement Officer: delete if not applicable.

the custody of the postal authorities as a pre-paid recorded or special delivery letter.

11. GOVERNING LAW

11.1. The application and interpretation of this deed shall in all respects be governed by English Law and any dispute or difference arising under it shall be subject to the exclusive jurisdiction of the courts of England and Wales save that any decision, judgment or award of such courts may be enforced in the courts of any jurisdiction.

This deed has been executed as a deed and delivered on the date stated at the beginning of this deed.

EXECUTION PAGE

Executed as a deed by)
[GUARANTOR] acting by:)

Director

Director/Company Secretary

OR

Executed as a deed by **[GUARANTOR]**)
acting by [name of director] in the)
presence of:)

Signature ---

Name (block capitals) ---

Director

Witness signature ---

Witness name (block capitals) ---

Witness address ---

Annex BB: Alternative form of Parent Company Guarantee (Tunnels and Approaches)

DATED **202**

(1) NATIONAL HIGHWAYS LIMITED

as Client

(2) [NAME OF GUARANTOR 1]

as Guarantor

(3) [NAME OF GUARANTOR 2]

as Guarantor

PARENT COMPANY GUARANTEE

relating to a contract for the provision

of construction works at Lower Thames Crossing

Tunnels and Approaches

DATED

PARTIES:

(1) **NATIONAL HIGHWAYS LIMITED** (company no 09346363) whose registered office is at Bridge House, 1 Walnut Tree Close, Guildford, Surrey GU1 4LZ (the "**Client**")

(2) **[Guarantor 1]** (company no [●]) whose registered office is at [●] ("**[●]**")

and

(3) **[Guarantor 2]** (company no [●]) whose registered office is at [●] ("**[●]**")

(parties 2 and 3 acting collectively as the "**Guarantor**").

BACKGROUND:

(A) By the Contract, the Client has employed the Contractor to carry out construction works at Lower Thames Crossing Tunnels and Approaches as more particularly described in the Contract.

(B) [Guarantor 1] is [insert description of the relationship to the Contractor] and [Guarantor 2] is [insert description of the relationship to the Contractor][11].

(C) The Guarantor has agreed to guarantee the due performance by the Contractor of his obligations under the Contract in the manner set out in this deed.

OPERATIVE PROVISIONS:

1. DEFINITIONS AND INTERPRETATION

1.1. Unless the contrary intention appears, the following definitions apply:

"**Contract**" means the contract dated [●] between the Client (1) and the Contractor (2) for the carrying out of construction works at Lower Thames Crossing Tunnels and Approaches.

"**Contractor**" means [●] (company no [●]) whose registered office is at [●].

"**Insolvency Event**" means the Contractor being unable to pay its debts (as defined by Sections 123(1) and 268(1) of the Insolvency Act 1986) or any corporate action, legal proceedings or other procedure or step is taken in relation to:

a) suspension of payments, a moratorium of any indebtedness, winding-up, dissolution, administration or reorganisation (by way of voluntary arrangement, scheme of arrangement or otherwise) of the Contractor other than a solvent liquidation or reorganisation of the Contractor;
b) a composition, assignment or arrangement with any creditor of the Contractor;
c) the appointment of a liquidator, receiver, administrator, administrative receiver, compulsory manager or other similar officer in respect of the Contractor or any of its assets; or
d) enforcement of any security over any assets of the Contractor,

[11] Note to Procurement Officer: Amend to reflect the nature of the relationship between the entities forming the Guarantor to the Contractor.

or any analogous procedure or step is taken in any jurisdiction.

1.2. The clause headings in this deed are for the convenience of the parties only and do not affect its interpretation.

1.3. Words importing the singular meaning include the plural meaning and vice versa.

1.4. Words denoting the masculine gender include the feminine and neuter genders and words denoting natural persons include corporations and firms and all such words shall be construed interchangeably.

1.5. References in this deed to a clause are to a clause of this deed.

1.6. References in this deed to any statute or statutory instrument include and refer to any statutory amendment or re-enactment for the time being in force.

2. GUARANTEE

2.1. In consideration of the Client agreeing to enter into the Contract with the Contractor, the Guarantor irrevocably and unconditionally guarantees and undertakes to the Client that:

a) the Contractor will perform and observe all his obligations under the Contract at the times and in the manner provided in the Contract; and
b) in the event of any breach of such obligations by the Contractor, the Guarantor shall procure that the Contractor makes good the breach or otherwise cause it to be made good and shall indemnify the Client against any loss, damage, demands, charges, payments, liability, proceedings, claims, costs and expenses suffered or incurred by the Client arising from or in connection with it.

2.2. The Guarantor shall also indemnify the Client against:

a) any costs, losses and expenses (including legal expenses) which may be suffered or incurred by the Client in seeking to enforce and enforcing (i) this Guarantee and/or (ii) any judgment or order obtained in respect of this Guarantee; and
b) any loss or liability suffered or incurred by the Client if any of the obligations of the Contractor under the Contract is or becomes illegal, invalid or unenforceable for whatsoever reason as if such obligations were not illegal, invalid or unenforceable provided that the Client shall not recover any more from the Guarantor under the indemnity in this sub-clause 2.2(b) than the Client would have been entitled to recover from the Contractor under the Contract had the relevant obligations not been illegal, invalid or unenforceable.

2.3. Any limitation, right or defence which would have been available to the Contractor in an action under the Contract shall likewise be available to the Guarantor in a corresponding action under this deed, provided that nothing in this clause shall:

a) prejudice or affect any liability of the Guarantor under clause 2.2; nor
b) allow the Guarantor to avoid liability if either of the events specified in clause 5 occurs.

3. GUARANTOR'S LIABILITY

3.1. The obligations of the Guarantor under this deed are in addition to and independent of any other security which the Client may at any time hold in respect of the Contractor's obligations under the Contract and may be enforced against the Guarantor without first having recourse to any such security.

3.2. The obligations of the Guarantor under this deed are in addition to and not in substitution for any rights or remedies that the Client may have against the Contractor under the Contract or at law.

3.3. The liability of the Guarantor under this deed shall in no way be discharged, lessened or affected by:

a) an Insolvency Event;
b) any change in the constitution, status, function, control or ownership of the Contractor or any legal limitation, disability or incapacity relating to the Contractor or any other person;
c) the Contract or any of the provisions of the Contract being or becoming illegal, invalid, void, voidable or unenforceable;
d) any time given, waiver, forbearance, compromise or other indulgence shown by the Client to the Contractor;
e) the assertion or failure to assert or delay in asserting any rights or remedies of the Client or the pursuit of any right or remedy of the Client;
f) the giving by the Contractor of any security or the release, modification or exchange of any such security or the liability of any person; or
g) any other act, event, omission or circumstance which but for this provision might operate to discharge, lessen or otherwise affect the liability of the Guarantor,

in each case with or without notice to, or the consent of, the Guarantor and the Guarantor unconditionally and irrevocably waives any requirement for notice of, or consent to, such matters.

3.4. Any decision of an adjudicator, expert, arbitral tribunal or court in respect of or in connection with the Contract and any settlement or arrangement made between the Client and the Contractor shall be binding on the Guarantor.

4. VARIATIONS TO THE CONTRACT

4.1. The Guarantor authorises the Contractor and the Client to make any addition or variation to the Contract, the due and punctual performance of which shall likewise be guaranteed by the Guarantor in accordance with the terms of this deed. The liability of the Guarantor under this deed shall in no way be discharged or lessened by any such addition or variation.

5. LIQUIDATION / DETERMINATION

5.1. The Guarantor covenants with the Client that:

a) if a liquidator is appointed in respect of the Contractor and the liquidator disclaims the Contract; or
b) if the Contractor's employment under the Contract is determined for any reason,

the liability of the Guarantor under this deed shall remain in full force and effect.

6. WAIVER

6.1. The Guarantor waives any right to require the Client to pursue any remedy (whether under the Contract or otherwise) which it may have against the Contractor before proceeding against the Guarantor under this deed.

7. RIGHTS OF GUARANTOR AGAINST CONTRACTOR

7.1. The Guarantor shall not by any means or on any ground seek to recover from the Contractor (whether by instituting or threatening proceedings or by way of set-off or counterclaim or otherwise) or otherwise to prove in competition with the Client in respect of any payment made by the Guarantor under this deed nor be entitled in competition with the Client to claim or have the benefit of any security which the Client holds for any money or liability owed by the Contractor to the Client. If the Guarantor shall receive any monies from the Contractor in respect of any payment made by the Guarantor under this deed, the Guarantor shall hold such monies in trust for the Client for so long as the Guarantor remains liable or contingently liable under this deed.

8. CONTINUING GUARANTEE

8.1. The terms of this deed are a continuing guarantee and shall remain in full force and effect until each part of every obligation of the Contractor under the Contract has been performed and observed and until each and every liability of the Contractor under the Contract has been satisfied in full.

9. THIRD PARTY RIGHTS

9.1. Unless the right of enforcement is expressly granted, it is not intended that any third party should have the right to enforce any provision of this deed pursuant to the Contracts (Rights of Third Parties) Act 1999.

10. NOTICES

10.1. Any notice or other communication required under this deed shall be given in writing and is to be delivered personally (which includes delivery by courier) or sent by pre-paid recorded or special delivery post to the party concerned at its address set out in this deed or to such other addresses as may be notified by such party for the purposes of this clause.

10.2. Any notice given pursuant to this clause will be deemed to have been served as follows:

a) if delivered personally, at the time of delivery; and
b) if sent by recorded or special delivery post, 48 hours after being delivered into the custody of the postal authorities but excluding Saturdays, Sundays and public and bank holidays in England.

10.3. In proving service, it will be sufficient to prove that personal delivery was made or that the envelope containing the notice was properly addressed and delivered into the custody of the postal authorities as a pre-paid recorded or special delivery letter.

11. GOVERNING LAW

11.1. The application and interpretation of this deed shall in all respects be governed by English Law and any dispute or difference arising under it shall be subject to the exclusive jurisdiction of the courts of England and Wales save that any decision, judgment or award of such courts may be enforced in the courts of any jurisdiction.

12. JOINT AND SEVERAL LIABILITY

12.1. [Guarantor 1] and [Guarantor 2] shall be jointly and severally liable for the Guarantor's obligations under this deed.

12.2. The Client may take action against, or release or compromise the liability of, [Guarantor 1] or [Guarantor 2], without affecting the liability of the other.

This deed has been executed as a deed and delivered on the date stated at the beginning of this deed.

EXECUTION PAGE

Executed as a deed by **[Guarantor 1]** acting by:	))	..... Director
		..... Director/Secretary

Executed as a deed by **[Guarantor 2]**)
acting by:)

.....
Director

.....
Director/Secretary

Annex C: Client's personnel security procedures

Not used.

Annex D: Certificates

Lower Thames Crossing

General Certificate

Name of Project: Lower Thames Crossing[1]

Name of Submission:

Submission Reference:

1. We certify that the Submission and that the works submitted is in accordance with the Scope.

2. The Submission consists of the following documents:
   [List all relevant Key Data][2]

3. The associated supporting information relating to the Submission are listed below:
   [Include list of
   (i) agreement by the appropriate stakeholder including Third-Parties[3],
   (ii) all certification required by section S311 (Certification Procedure) of the Scope [3],

   and provide links to where this information is contained in the Common Data Environment.][2]

Signed: ……

Contractor

Name: ……

Title: ……..

Date: ……..

This Certificate is

i. returned marked "not accepted" [4]
ii. returned marked “accepted with comments” [4]
iii. returned marked "accepted" [4]

Comments [if applicable][4]: ……

Signed: ……

Project Manager

Name: ……

Date: ……

Notes (to be deleted from completed certificate)

1. If the completed certificate consists of more than one page, each page is to be identifiable by the name of the Project and by the name of the Submission.

2. Remove or replace text within square brackets.

3. Where not applicable to the Submission, delete as appropriate.

4. *Project Manager* to delete as appropriate.

Lower Thames Crossing

Design Certificate

Name of Project: Lower Thames Crossing[1]

Name of Submission:

Submission Reference:

1. We certify that we have used reasonable professional skill and care in preparing the Design Data and that the works submitted is in accordance with the Scope.

2. The Submission consists of the following documents:
[List all relevant Key Data][2]

3. The associated licenses, certificates, consents or otherwise relating to the Submission are listed below:
[Include list of
   (i) agreement by the appropriate authority in accordance with section S316 (Departures and Approval in Principal requirements) of the Scope[3],
   (ii) agreement by the appropriate stakeholder including Third-Parties[3],
   (iii) all certification required by section S311 (Certification Procedure) of the Scope[3],
   (iv) any license or consents or otherwise relating to the Submission [3]
   and provide links to where this information is contained in the Common Data Environment.][2]

Signed: ……

Designer

Name: ……

Title: ……..

Date: ……..

Signed: ……

Contractor

Name: ……

Title: ……..

Date: ……..

This Certificate is

i. returned marked "not accepted" [4]
ii. returned marked “accepted with comments” [4]
iii. returned marked "accepted" [4]

Comments [if applicable][4]: ……

Signed: ……

Project Manager

Name: ……

Date: ……

Notes (to be deleted from completed certificate)

1. If the completed certificate consists of more than one page, each page is to be identifiable by the name of the Project and by the name of the Submission.

2. Remove or replace text within square brackets.

3. Where not applicable to the Submission, delete as appropriate.

4. *Project Manager* to delete as appropriate.

Lower Thames Crossing

Archaeology Certificate

Name of Project: Lower Thames Crossing[1]

Name of Submission:

Submission Reference:

1. We certify that we have used reasonable professional skill and care in producing and reviewing (as appropriate) the Submission and confirm

a. the archaeology aspects of the Submission complies with the Scope,
b. [there is low risk of archaeological significance in the area impacted upon by the Submission and][2] **OR**
c. [where there are risks of archaeological significance in the area impacted upon by the Submission, these risks have been suitably identified and mitigated against.][2]

Signed: ……

Archaeologist

Name: ……

Title: ……..

Date: ……..

Signed: ……

Contractor

Name: ……

Title: ……..

Date: ……..

Notes (to be deleted from completed certificate)

1. If the completed certificate consists of more than one page, each page is to be identifiable by the name of the Project and by the name of the Submission.

2. Delete as appropriate.

Lower Thames Crossing

Landscape and Architectural Certificate

Name of Project: Lower Thames Crossing

Name of Submission:

Technical Reference:

1. We as Landscape Architect and/or Architect[1], certify that we have used reasonable professional skill and care in producing and reviewing (as appropriate) the Submission and confirm[2]

    a. the landscape architectural aspects of the Submission complies with the Scope

2. We as Landscape Architect and/or Architect[1], certify that we have used reasonable professional skill and care in producing and reviewing (as appropriate) the Submission and confirm[2]

    a. the architectural aspects of the Submission comply with the Scope.

3. As *Contractor* we certify and confirm the provenance/origin of the United Kingdom native plant stock incorporated into the *works* are in accordance with the requirements of section S3281.

Signed: ……

Landscape Architect and/or Architect[1]

Name(s): ……..

Title(s): ……..

Date: ……..

Signed: ……

Contractor

Name: ……

Title: ……..

Date: ……..

Notes (to be deleted from completed certificate)

1. Delete as appropriate.

2. Delete where design aspect is not included within the Submission.

Lower Thames Crossing

Ecology Certificate

Name of Project: Lower Thames Crossing

Name of Submission:

Submission Reference:

1. We as Ecologist, certify that we have used reasonable professional skill and care in producing and reviewing (as appropriate) the Submission and confirm

    a. the ecology aspects of the Submission complies with the Scope and
    b. ecological risks have been suitably identified and mitigated against.

Signed: ……

Ecologist

Name: ……

Title: ……..

Date: ……..

Signed: ……

Contractor

Name: ……

Title: ……..

Date: ……..

Lower Thames Crossing

Multiparty Collaboration Certificate

Name of Project: Lower Thames Crossing

Name of Submission:

Submission Reference:

1. We certify that in producing and reviewing (as appropriate) the Submission we have collaborated with the relevant Main Works Contractors

    a. and have agreed the relevant interface(s) contained within the completed Multiparty Collaboration Form(s) or completed Interface Control Document(s) [*List relevant title(s) and interface reference number(s) of the associated Multiparty Collaboration Forms(s) or Interface Control Document(s)*][1] and

    b. in accordance with the contract.

Signed: ……

Contractor

Name: ……

Title: ……..

Date: ……..

Notes (to be deleted from completed certificate)

1. Remove and replace text within square brackets.

Lower Thames Crossing

Enforcement Systems Certificate

Name of Project: Lower Thames Crossing[1]

Enforcement System:

Enforcement System Reference Number:

Certificate Ref. No. [ ]

Enforcement Systems Acceptance Certificate(s)

1. We certify that the enforcement system [description of relevant area by reference to an appropriate drawing] has been constructed, installed, tested and commissioned in compliance with the Scope.

SCHEDULE:

The system installed includes [include here any relevant supporting information relating to the installation of the enforcement system]

- a description of the works,
- a list of documents,
- evidential trails,
- Home Office Type Approval (HOTA),
- observations by the *Supervisor* and
- relevant certificates].

Signed: ……..

Designer (Principal)

Name: ……..

Title: ……..

Date: ……..

Signed: ……..

Contractor (Principal)

Name: ……..

Date: ……..

The *Client's* enforcement specialist comments are

[insert comments]

Signed: ……

Client's enforcement specialist

Name: ……

Date: ……

This certificate is:

i. returned marked "accepted"*
ii. returned marked "not accepted" as follows:*

* delete as appropriate

Signed: ……

Project Manager

Name: ……

Date: ……

Note to compiler (to be deleted from completed certificate):

(i) If the completed certificate consists of more than one page, each page is identifiable by the name of the Project and by the name of the item it describes and the date of preparation.

Lower Thames Crossing

Construction Certificate

Name of Project: Lower Thames Crossing[1]

Construction Activity:

Construction Activity Reference Number:

1. We certify that the construction activity has been constructed in accordance with

   a. the following Submission(s)
   [List all relevant Submission(s)][2]

   b. the Scope and

   c. the execution of the works has been accurately translated into the Project Information Model.

2. [Where applicable, the *Supervisor* has witnessed the completion of the construction activity on [add date(s)]][2,3]

3. Where applicable, the following DMRB certificates have been completed
   [List all applicable DMRB certificates (including completed construction compliance certificates)][2]

Signed: ……

Contractor

Name: ……

Title: ……..

Date: ……..

We certify that the *works* have been constructed in accordance with the relevant Submissions(s) and the Scope.

Signed: ……

Designer

Name: ……

Title: ……..

Date: ……..

This Certificate is

i. returned marked "not accepted" [4]
ii. returned marked "accepted" [4]

Comments [if applicable][4]: ……

Signed: ……

Project Manager

Name: ……

Date: ……

Notes (to be deleted from completed certificate)

1. If the completed certificate consists of more than one page, each page is to be identifiable by the name of the Project and by the name of the construction activity.
2. Remove or replace text within square brackets.
3. Where not applicable to the Submission, delete as appropriate.
4. *Project Manager* to delete as appropriate.

Lower Thames Crossing

Sectional Construction Certificate

Name of Project: Lower Thames Crossing[1]

Section name:

Section Reference Number:

1. We certify that the [add name of *section*][2] has been constructed in accordance with the Scope.

Signed: ……

Contractor

Name: ……

Title: ……..

Date: ……..

2. We certify that in examining the [add name of *section*][2] on [add date(s)][2] and confirm the [add name of *section*][2] has been constructed in accordance with the relevant Submissions(s) and the Scope.

Signed: ……

Designer

Name: ……

Title: ……..

Date: ……..

This Certificate is

i. returned marked "not accepted" [3]
ii. returned marked "accepted" [3]

Comments [if applicable][3]: ……

Signed: ……

Project Manager

Name: ……

Date: ……

Notes (to be deleted from completed certificate)

1. If the completed certificate consists of more than one page, each page is to be identifiable by the name of the Project and by the name of the relevant *section*.

2. Remove or replace text within square brackets.

3. *Project Manager* to delete as appropriate.

Lower Thames Crossing

Takeover Certificate

Name of Project: Lower Thames Crossing[1]

Name of *section* or part of the *works*:

Section Reference Number:

1. We certify that

   a. the [add name of *section*][2] has been Completed in compliance with the Scope.

   b. a final joint inspection has been carried out on [add date][2] and

   c. we have corrected notified Defects which would have prevented the *Client* and relevant Local Authorities from using the part of the *works* and Others from doing their work.

Signed: ……

Contractor

Name: ……

Title: ……..

Date: ……..

This Certificate is

i. returned marked "not accepted" [3]
ii. returned marked "takeover has been accepted" [3]

Comments [if applicable][3]: ……

Signed: ……

Project Manager

Name: ……

Date: ……

Notes (to be deleted from completed certificate)

1. If the completed certificate consists of more than one page, each page is to be identifiable by the name of the Project and by the name of the relevant *section*.

2. Remove or replace text within square brackets.

3. *Project Manager* to delete as appropriate.

Multiparty Collaboration Form template

Document Control

[Blue text provides instructions, the *Contractor* removes prior to Submission].

[Main Works Contractor to complete tables below]

Revision history [Each Main Works Contractor to include author and their organisation for the respective interface]

Interface Reference Number	

Document status	Version	Date	Description	Author (1)	Author (2)	Author (3) (where applicable)

Authorisation sheet [Authorised signatories from each Main Works Contractor to complete]

Name	Position	Organisation	Signed

Individuals to Contact [Contact details to be provided for each Main Works Contractor involved]

Key Personnel	Title	Organisation	Email	Phone Number

[Add title of Interface]

[The Multiparty Collaboration Form is to be used by *Contractor*(s) to undertake the coordination and communication duties between Main Works Contractors at all interfaces.]

[The Multiparty Collaboration Form is to be read in conjunction with the requirements contained in section S318 (“Design co-ordination”) of the Scope.]

[All relevant Main Works Contractors sign an individual Multiparty Collaboration Certificate using the template contained in Annex A of section S311 (“Certification Procedure”) of the Scope, to indicate they have complied with the agreements contained within the Multiparty Collaboration Form.]

[The *Contractor(s)* determine the number of interfaces to be included within each Multiparty Collaboration Form.]

Interface Details

[*Contractor(s)* to complete *Table 1 (Interface details)* below.]

Interface details	
Interface Reference Number	[Insert Interface Reference Number]
Interface Title	[Insert Interface Title]
Location	[Insert/describe the location of the interface] [Drawings are to be included in the appendices to this Multiparty Collaboration Form]
Summary	
[A brief description of the interface(s) that are covered by the Multiparty Collaboration Form]	

Table 37: - Interface details

Interface Activity (non-technical) [Delete as appropriate]

[The *Contractor*(s) ensures the items listed below are considered (where applicable):

- general considerations
    - alignment of processes or procedures,
    - DCO constraints and other key constraints,
    - *third party agreements*,
    - capital and whole life costs,
    - sustainability and
    - health safety and wellbeing
- training requirements,
- agreed time periods for the management and execution of the respective interface.
- the *Contractor(s)* key delivery dates to achieve their Accepted Programme,
- method of information sharing between *Contractor(s)* and
- method of co-ordinating]

[Any documents used will be referenced within the appendices of this Multiparty Collaboration Form and made available in the Common Data Environment.]

[The *Contractor(s)* are to summarise the information above into *Table 2 (Summary of Interface Activities)*.]

Interface Design Activities (Technical) [Delete as appropriate]

[The *Contractor*(s) ensures the items listed below are considered (where applicable)

- design consideration
    - consistency of the use of relevant standards and specifications,
    - road safety audits,
    - DCO constraints and other key constraints,
    - *third party agreements*,
    - Statutory Undertakers,
    - capital and whole life costs,
    - sustainability,
    - instrumentation and monitoring,
    - temporary works (including buildability and sequencing),
    - health safety and wellbeing and
    - operation and maintenance
- training requirements,
- agreed time periods for the management and execution of the respective interface,
- the *Contractor(s)* key delivery dates to achieve their Accepted Programme,
- method of information sharing between *Contractor(s)* (including information models) and
- method of co-ordinating drawings(s)].

[Any documents used will be referenced within the appendices of this Multiparty Collaboration Form and made available in the Common Data Environment.]

[The *Contractor(s)* are to summarise the information above into *Table 2 (Summary of Interface Design Activities)*.]

Interface Risk Register

[All Main Works Contractors update their risk registers to identify all interface risks and include such risks within the Multiparty Collaboration Form.]

[The Main Works Contractors arrange and undertake the meetings they deem necessary with the other Main Works Contractors to adequately capture all risks.]

[The Main Works Contractors complete and amend *Table 3 (Interface Risk Register)* in compliance with the *Client*'s Xactium system.]

Activity reference number	***Activity description***	***Activity type (including aesthetics, functionality, maintainability, operability and procedural)***	***Activity start date***	***Activity end date***	***Contractor's input***	***Agreed solution* and date of agreement**	***Documents referenced***	***Notes***
		[The *Contractor* is to include each activity type that applies to the interface]						

Table 38: Summary of Interface Activities

Risk ID	Cause	Interface Risk Description	Discipline	Likelihood	Severity	Risk	Mitigation Measures	Likelihood	Severity	Risk	Responsible Organisation

Table 39: Interface Risk Register

Appendix. Additional Information

Annex E: Continual improvement

Not used.

Annex F: Deed of Novation (Old Client to New Client for the Contractor)

DATED **202**

(1) NATIONAL HIGHWAYS LIMITED
as Old Client

(2) [*NAME OF NEW CLIENT*]
as New Client

(3) [*NAME OF CONTRACTOR*]
as Contractor

DEED OF NOVATION

relating to a [●] contract for the construction of the Lower Thames Crossing

Tunnels and Approaches

THIS DEED is made on day of 202

PARTIES:

(1) **NATIONAL HIGHWAYS LIMITED** (company no 09346363) whose registered office is at Bridge House, 1 Walnut Tree Close, Guildford, Surrey GU1 4LZ (the "**Old Client**")

(2) [insert details of replacement authority] (the "**New Client**")

(3) [●] (company no [●]) whose registered office is at [●] (the "**Contractor**")

BACKGROUND:

(A) By the Contract, the Old Client has employed the Contractor to provide the Works.

(B) The Old Client has agreed (with the consent of the Contractor) to transfer all its rights and obligations under the Contract to the New Client and the Contractor has agreed to accept the liability of the New Client in place of the liability of the Old Client under the Contract upon and subject to the terms of this deed, which is supplemental to the Contract.

1. DEFINITIONS AND INTERPRETATION

1.1. Unless the contrary intention appears, the following definitions apply:

"**Contract**" means the contract dated [●] between the Client (1) and the Contractor (2) (including any further agreement varying or supplementing the Contract) under which the Contractor has agreed to provide the Works.

"**Works**" means the Works to be provided by the Contractor pursuant to the Contract.

1.2. The clause and paragraph headings in this deed are for ease of reference only and are not to be taken into account in the construction or interpretation of any provision to which they refer.

1.3. Words in this deed denoting the singular include the plural meaning and vice versa.

1.4. References in this deed to any statutes or statutory instruments include any statute or statutory instrument amending, consolidating or replacing them respectively from time to time in force, and references to a statute include statutory instruments and regulations made pursuant to it.

1.5. Words in this deed importing one gender include both other genders and may be used interchangeably, and words denoting natural persons, where the context allows, include corporations and vice versa.

2. NOVATION

2.1. The Old Client and the Contractor release and discharge each other from the further performance of their respective obligations under the Contract and the Contractor acknowledges and accepts the liability of the New Client in place of the liability of the Old Client under the Contract.

2.2. The Contractor undertakes to be bound to the New Client by the terms of the Contract in every way as if the New Client was and always had been a party to the Contract in place of the Old Client.

2.3. The Contractor acknowledges and warrants to the New Client that it has duly observed and performed and will continue duly to observe and perform all its obligations under the Contract.

3. NEW CLIENT'S UNDERTAKING

3.1. Subject to Clause 4.1 below, the New Client undertakes to be bound to the Contractor by the terms of the Contract and to perform the obligations on the part of the Client under the Contract in every way as if the New Client was and always had been a party to the Contract in place of the Old Client.

4. PAYMENT OF SUMS DUE

4.1. The Contractor and the Old Client agree that the total amount to be paid by the Old Client to the Contractor for the Works provided under the Contract prior to the date of this deed is £[●]. The Contractor acknowledges that the Old Client has paid the sum of £[●] prior to the date of this deed. The balance of £[●] shall be invoiced by the Contractor to the Old Client and paid by the Old Client in accordance with the Contract.

4.2. The Contractor and the New Client agree that the New Client shall be solely responsible (to the exclusion of the Old Client) for payment of all sums due to the Contractor under the Contract for any Works provided after the date of this deed.

4.3. [Where, under Clause 2.2 above or under any other contract between the New Client and the Contractor, any sum of money is recoverable from or payable by the Contractor to the New Client, such sum may be deducted from or reduced by the amount of any sum then due or which may at any time become due from the New Client to the Contractor under Clause 4.2 above or under any other contract with any Department or Office of Her Majesty's Government.][12]

5. NOTICES

5.1. Any notice or other communication required under this deed shall be given in writing and is to be delivered personally (which includes delivery by courier) or sent by pre-paid recorded or special delivery post to the party concerned at its address set out in this deed or to such other addresses as may be notified by such party for the purposes of this clause.

5.2. Any notice given pursuant to this clause will be deemed to have been served as follows:

a) if delivered personally, at the time of delivery; and
b) if sent by recorded or special delivery post, 48 hours after being delivered into the custody of the postal authorities but excluding Saturdays, Sundays and public and bank holidays in England and Wales.

5.3. In proving service, it will be sufficient to prove that personal delivery was made or that the envelope containing the notice was properly addressed and delivered into

[12] Include only if the New Client is a Department or Office of Her Majesty's Government.

the custody of the postal authorities as a pre-paid recorded or special delivery letter.

6. GOVERNING LAW AND DISPUTES

6.1. This deed and any non-contractual obligations arising out of or in connection with it shall be governed by English Law.

6.2. The parties agree that the courts of England and Wales shall have exclusive jurisdiction to determine any dispute arising out of or in connection with this deed, including (without limitation) in relation to any non-contractual obligations. The parties irrevocably submit to the jurisdiction of those courts.

This Deed has been executed as a deed and delivered on the date stated at the beginning of this Deed.

[Executed as a deed by **NATIONAL HIGHWAYS LIMITED** by affixing his common seal in the presence of:)
)

Authorised Signatory

Authorised Signatory]

[Executed as a deed by **[NEW CLIENT]** acting by:)
)

Authorised Signatory

Authorised Signatory

[Executed as a deed by **[CONTRACTOR]** acting by:)
)

Director

Director/Secretary]

Annex G: Inclusion Action Plan

Additional Guidance

This guidance has been prepared to assist the *Client* and its supply chain (at any stage of remoteness from the *Client*) as users of the Inclusion Action Plan (IAP).

The guidance explains the wider context of the IAP and its use, including further information from the *Client's* subject matter expert.

Contents

Measure Overview

Introduction

The *Client* is determined, for business, legal and ethical reasons, to increase its equality, diversity and inclusion (EDI) provisions in all areas of its business. See "National Highways' Public Sector Equality Duty" (see link in **Annex 02**) which sets out its objectives for achieving this.

Intended Outcomes

The intent of this measure is to improve equality, inclusion and diversity, leading to better experiences for the workforce and delivery of a better-quality service to the *Client's* diverse customers and communities.

This will enable the *Client* and its supply chain to identify and deliver opportunities to make a difference in the three priority performance areas to

- create an inclusive working culture, practices and environment that enable everyone to perform to their full potential,
- consider and meet the diverse needs of customers and neighbouring communities at all stages of the framework/ scheme and
- develop wider supply chain capability around EDI.

Methodology

The *Contractor* gathers intelligence and evidence to identify opportunities

i) to create an inclusive working culture and develop a diverse workforce,
ii) to deliver a more socially sensitive and responsive strategic road network and be a better neighbour to communities impacted by the contract, in particular those who are vulnerable because of a protected characteristic and
iii) on how EDI is governed including the supply chain that demonstrates how progress is being measured and monitored.

This intelligence and evidence should be used to identify the current position in the IAP.

Examples of good and robust evidence and actions are given within the "Potential sources of evidence and activity" pages overleaf.

Within 3 months from the commencement of the contract or acceptance on to the framework, the *Contractor*

- gathers baseline intelligence,
- analyses this intelligence to identify actions and
- develops an evidence based IAP.

Potential sources of evidence and activity

CPF score	CPF score guidance	Working culture	Customer and community	Governance
6	An intelligence based IAP is in place which is being fully implemented and up to date.	Evidence of • monitoring use of/ outcomes in relation to Human Resources (HR) policies and procedures e.g. bullying/ harassment, grievance etc., • reasonable adjustments, • wellbeing initiatives, • use of Performance Development Plans (PDP)/ appraisals, • EDI training for all Staff, • active promotion of flexible/ agile working, • Staff networks, • range of accessible learning in place, • talent management/ developing Staff e.g. mentoring and coaching schemes and the impact of these, • support for those on career breaks and returners and • annual workforce and Staff engagement data analysis	Evidence of • disaggregation of data against protected characteristics/ affected groups. Actions identified to address negative impacts as found in the Equality Impact Assessment (EQIA) and the Equality, Diversity and Inclusion Tool (EDIT) (where applicable) or other such suitable method of measurement and monitoring, • use of diverse and accessible communication channels and monitoring the satisfaction and effectiveness of these, • use of diverse and accessible engagement	Evidence of • leadership and governance meetings where EDI is discussed, • public commitment to and leadership accountability for EDI, • EDI strategy with actions and outcomes, • reporting structure, • EDI Key Performance Indicators (KPIs) and monitoring of progress. • procurement processes include EDI, • *Contractor* meetings where EDI is discussed, • EDI development initiatives for supply chain and how they are supporting the

		and review with actions taken and outcomes arising out of these.	activities and monitoring the satisfaction and effectiveness of these, • face to face liaison with voluntary sector and minority groups, • Staff training on understanding diverse needs and • feedback to consultees.	*Client* in meeting its EDI objectives.
8	There is evidence that ongoing actions arising from the IAP are driving change and making a difference.	Evidence of • employment policies have EDI woven through them, • engagement survey findings are broken down into the protected characteristics and actions arise out of results, • Staff networks are empowered and driving change, • measurement of the effectiveness of EDI training, • monitoring of flexible/ part time working, • analysis of exit data and actions in place to address issues,	Evidence of • use of other data e.g. public health, trip attractors and labour market to inform actions, • the involvement of diverse groups, • monitoring the satisfaction with and effectiveness of communication channels, • evidence of shared learning, • cycle of direct and regular contact with diverse groups and review of the effectiveness/	Evidence of • collaboration across the supply chain in delivering EDI objectives and actions, • outcomes achieved, • benchmarking EDI activity against comparable organisations where progress is measured, • monitoring across the supply chain, • EDI KPIs for the supply chain where it uses its own data to drive improvements for change in their businesses and

		• examples of collaboration and sharing of good practice, • monitoring of training for effectiveness, • robust analysis in relation to things such as pay and grading, promotions, learning and development and exit data including breaking data down against the protected characteristics and • uses data to drive strategy and actions taken to address any issues.	satisfaction of these activities, • learning shared across peers and down the supply chain and • legacy arrangements.	• rewards for difference made.
10	There is evidence of actions driving change and making a quantifiable difference and that this good practice is being shared across the business and down the supply chain	Evidence of • employment policies have EDI woven through them, • engagement survey findings are broken down into the protected characteristics and actions arise out of results, • Staff networks are empowered and driving change, • measurement of the effectiveness of EDI training,	Evidence of • use of other data e.g. public health, trip attractors and labour market to inform actions, • the involvement of diverse groups, • monitoring the satisfaction with and effectiveness of communication channels, • shared learning,	Evidence of • collaboration across the supply chain in delivering EDI objectives and actions, • outcomes achieved, • benchmarking EDI activity against comparable organisations where progress is measured, • monitoring across the supply chain, • EDI KPIs for the supply chain where it

	(where applicable)	• monitoring of flexible/ part time working, • analysis of exit data and actions in place to address issues, • examples of collaboration and sharing of good practice, • monitoring of training for effectiveness, • robust analysis in relation to things such as pay and grading, promotions, learning and development and exit data including breaking data down against the protected characteristics and • uses data to drive strategy and actions taken to address any issues.	• cycle of direct and regular contact with diverse groups and review of the effectiveness/ satisfaction of these activities, • learning shared across peers and down the supply chain and • legacy arrangements.	uses its own data to drive improvements for change in their businesses and • rewards for difference made.

Inclusion Action Plan

Scope and Methodology

Throughout the life of the contract an evidence-based IAP is developed.

This will include steps and actions to

- create a working environment that enables Staff to perform to their full potential,
- retain a greater diversity of talent in the sector,
- deliver a more socially sensitive strategic road network that is a better neighbour to diverse groups and neighbouring communities impacted by the contract. Paying attention to those who have protected characteristics as outlined in the Equality Act 2010 and
- monitoring and measurement of the difference made including clear governance and accountability for the *Contractor's* own company and its supply chain.

The IAP must be in place within the first 3 months of the contract.

The IAP relates specifically to the contract and is based on intelligence gathered.

The template IAP is provided below.

The total IAP length should not exceed 20 pages.

The IAP actions

- have clear ownership at the appropriate level,
- are monitored regularly and
- further actions are taken to ensure progress and to evolve the plan in light of new intelligence/ evidence gathered.

The IAP needs to include

- the objectives – what the *Contractor* wants to achieve,
- current position - where the *Contractor* is at the start of the contract,
- action/ task to meet requirements – what the *Contractor* is going to do to meet its objectives,
- time frames – when the *Contractor* takes the action specified above
- update - to include details of activity during the quarter or details of review where there are no specific defined outputs with ongoing actions during the reporting period.

The impact of the actions is reviewed and good practice that is making a difference is shared widely by the *Contractor*.

Inclusion Action Plan Template

INCLUSION ACTION PLAN				**Reporting Period:**			
Name of Contract:		**Start Date:**		**Finish Date:**		**Contract Manager:**	
INTELLIGENCE							
Objective 1: To create an inclusive working culture, practices and environment that enable Staff to perform to their full potential **Objective 2: Consider and value the diverse needs of customers and neighbouring communities at all stages of the contract/ framework** **Objective 3: Governance and capability – including how the *Contractor* develops wider supply chain capability around EDI**							
Data							
Analysis							
Priorities for Action							

Part One – Working culture - outline the steps the *Contractor* takes to create a working environment and culture that enables Staff to perform					
Objective	**Current position**	**Action/ Task to meet requirements**	**Action due date**	**Person responsible**	**Update**
		1.			
Part two – Customers/ community – outline the steps the *Contractor* takes to genuinely consider the differing needs of customers and neighbouring communities when making decisions throughout the life of the contract					
Objective	**Current position**	**Action/ Task to meet requirements**	**Action due date**	**Person responsible**	**Update**
		1.			
Part three - Governance and accountability – describe how the *Contractor* holds itself and its supply chain to account in delivering and monitoring the difference made in relation to the above					
Objective	**Current position**	**Action/ Task to meet requirements**	**Action due date**	**Person responsible**	**Update**
		1.			

Inclusion Action Plan Scores

Metric	Scoring Guidance	Additional information	Score
Demonstrate an effective Inclusion Action Plan (IAP) is in place and is continually evolving to meet the requirements of the public sector equality duty and support the *Client* in embedding EDI in all areas of its business.	No intelligence gathered and no intelligence based IAP in place.	No evidence or IAP provided.	0
	Intelligence has not been gathered to identify opportunities but actions and IAP are in place to address the gathering of data and intelligence.	IAP being prepared with date of implementation provided.	2
	IAP in place but only being partially implemented.	Intelligence has not been used to identify opportunities, but actions and IAP are in place to address this. Actions are outstanding beyond their target date; no evidence of review or limited actions being carried out.	4
	Intelligence is gathered and analysed to identify opportunities and an intelligence based IAP is in place which is being fully implemented and up to date.	IAP is linked to priorities for action and being fully implemented. There is demonstrable activity that shows progress against expected timescales.	6
	An intelligence based IAP is in place and being fully implemented and evidence provided show the difference being made.	IAP and evidence provided are moderated by the *Client's* metric assessor to confirm it meets the scoring guidance.	8
	Robust intelligence based IAP is in place and being fully implemented and can show the quantifiable difference actions have made. Evidence that good practice is being shared.	Evidence produced shows the quantifiable difference in one of the 3 priority areas has led to legacy or the development of a case study and/ or good practice being shared widely with peers and down the supply chain. IAP and evidence provided are moderated by the *Client's* metric assessor to confirm it meets the scoring guidance.	10

Annex H: Procurement through Category Purchase Agreements (excluding technology Category Suppliers)

Not used.

Annex I: Procurement through Category Purchase Agreements – Technology Category Suppliers

Not used.

Annex J: Insurances required to be procured and maintained by the relevant LTC Contractor (and not forming part of the LTC OCIP)

Insurance Table

1.1 Without prejudice to its obligation to indemnify or otherwise be liable to the *Client* under the contract, the *Contractor*, from the *starting date* takes out and maintains or procures the taking out and maintenance in full force and effect insurance in accordance with the requirements specified in the Insurance Table in this Annex J and any other insurances as may be required by law (together the "Required Insurances"). The *Contractor* ensures that the Required Insurances are effective in each case not later than the date on which the relevant risk commences.

1.2 The *Contractor* ensures the Required Insurances referred to in paragraph 1.1 of this annex are taken out and maintained with insurers who (in the opinion of the *Client)* are of good financial standing, sound security, appropriately regulated and of good repute in the United Kingdom insurance market.

1.3 The *Contractor* does not (and the *Contractor* procures that none of its subcontractors (at any stage of remoteness from the *Client*) do not) take any action, or permit anything to occur in relation to it, which would entitle any insurer to refuse to pay any claim under any insurance policy in which that party is an insured, a co-insured or additional insured person.

1.4 The *Contractor*

- without limiting any specific requirements in the contract, takes or procures the taking of all reasonable risk management and risk control measures in relation to the contract as it would be reasonable to expect of a contractor, acting in accordance with industry best practice, including to the investigation and reporting of relevant claims to insurers,
- discharges all its obligations under the Insurance Act 2015 when placing, renewing, amending or maintaining any insurances required by the contract including complying with the duty of fair presentation to insurers and taking the actions needed to protect the *Client's* separate interests and
- uses all reasonable endeavours to procure that all insurance brokers through whom any Required Insurances to be effected by the *Contractor* are effected or maintained maintain intact their files (including all documents disclosed and correspondence in connection with the placement of those Required Insurances and the payment of premiums and claims under such Required Insurances) until the date specified in the Insurance Table for each relevant class of insurance.

1.5 The *Contractor* provides, on request to the *Project Manager*

- evidence of the Required Insurances, in a form satisfactory to the *Client*; and
- evidence, in a form satisfactory to the *Client,* that the premiums payable under the Required Insurances have been paid and that the insurances

are in full force and effect and meet the insurance requirements of the *Contractor* in respect thereof.

Neither inspection, nor receipt of such evidence, constitutes acceptance by the *Client* of the terms thereof, nor be a waiver of the *Contractor's* liability under the contract.

1.6 The *Contractor*

- where the insurers purport to cancel, suspend or terminate the Required Insurances, procures that the insurers, as soon as is practicable, notify the *Contractor* in the event of any such proposed suspension, cancellation or termination and
- where it receives such notification from insurers in relation to this paragraph 1.6 promptly notifies the *Project Manager* of receipt of such proposed suspension, cancellation or termination.

1.7 The *Contractor* promptly notifies to insurers any matter arising from or in relation to the contract from which it may be entitled to claim under any of the Required Insurances.

1.8 Except where the *Client* is the claimant party and without limiting the other provisions of the paragraph, the *Contractor* notifies the *Client* immediately, (such notification to be accompanied by reasonable particulars of the incident or circumstances giving rise to such claim).

- of any incident or circumstances which may give rise to any claim amounting to or in excess of £50,000.00 in connection with the contract under any of the Required Insurances and
- if the incident or circumstances may give rise to any claim in connection with the contract, which may be in excess of the limits of the Required Insurances.

1.9 If the *Contractor* is in breach of paragraph 1.1 of this annex the *Client* may pay (at its option) any premiums, insurance premium tax and insurance broker costs required to keep such insurance in force or itself procure such insurance, and in either case, recover such amounts from the *Contractor* on demand, together with all expenses incurred in procuring such insurance.

1.10 Where any policy requires the payment of a premium, insurance premium tax or other related insurance cost, the *Contractor* is liable for such premium, insurance premium tax or other related cost.

1.11 The *Contractor*

- where any insurance is subject to an excess or deductible below which the indemnity from the insurers is excluded, is liable for such excess or deductible and
- is not entitled to recover from the *Client* any sum paid by way of excess or deductible under the insurances whether under the terms of the contract or otherwise.

1.12 Insurance Table (Required Insurances)

PART A: Insurances required to be procured and maintained by the *Contractor* (and not forming part of the insurances provided by the *Client* as set out in Contract Data)

1. Professional indemnity insurance

1.1. Insured

Contractor

1.2. Interest

To indemnify the Insured (as set out in Part A paragraph 1.1 of this Insurance Table) for all sums which the Insured (as set out in Part A paragraph 1.1 of this Insurance Table) shall become legally liable to pay (including claimant's costs and expenses) as a result of any claim or claims first made against the Insured (as set out in Part A paragraph 1.1 of this Insurance Table) during the Period of insurance (as set out in Part A paragraph 1.6 of this Insurance Table) by reason of any act, error or omission arising from or in connection with professional services relevant to the contract.

1.3. Limit of indemnity (required level)

Not less than £25,000,000.00 in respect of any one claim and in the aggregate per annum and £5,000,000.00 in respect of any one claim and in the aggregate per annum in respect of asbestos (to the extent insured by the relevant policy).

1.4. Maximum deductible threshold

Not to exceed [£to be confirmed by the Parties][13] each and every claim.

1.5. Territorial limits

United Kingdom.

1.6. Period of insurance

From the *starting date* for the duration of the contract renewable on an annual basis unless agreed otherwise by the Parties and a period of twelve (12) years following the expiry or termination of the contract whichever occurs earlier.

1.7. Cover features and extensions

- legal liability assumed under contract, duty of care agreements and collateral warranties and
- retroactive cover from the *starting date* or retroactive date no later than the *starting date* in respect of any policy provided on a claims made form of policy wording.

1.8. Principal exclusions

- war and related perils,
- nuclear/radioactive risks,
- insolvency of the Insured (as set out in Part A paragraph 1.1 of this Insurance Table),
- bodily injury, sickness, disease or death sustained by any employee of the Insured (as set out in Part A paragraph 1.1 of this Insurance Table) arising out of the course of their employment and
- communicable disease.

[13] Maximum deductible thresholds will need to be proposed as part of the pre tender process.

2. Policies to be taken out as required by United Kingdom law.

Parties to the contract are required to meet their statutory insurance obligations in full. Insurances required to comply with all statutory requirements including to employers' liability insurance and motor third party liability insurance.

The limit of indemnity for the employers' liability insurance not to be less than £10,000,000.00 any one occurrence, the number of occurrences being unlimited during any annual period of insurance or such greater amount as is required by the applicable law for the duration of the contract or such greater period as is required by law.

The limit of indemnity for the motor third party liability insurance not to be less than unlimited each and every occurrence, the number of occurrences being unlimited in any annual policy period for third party death / bodily injury, and £10,000,000.00 for third party property damage each and every occurrence the number of occurrences being unlimited in any annual policy period, or such greater amount as is required by the applicable law for the duration of the contract or such greater period as is required by law.

The statutory insurances to contain an indemnity to principals clause in respect of claims made against the *Client* arising out of the performance of the *Contractor* of his duties under the contract.

The insurance will be maintained from the *starting date* throughout the period of the contract.

3. *Contractor*'s plant and equipment insurance

3.1. Insured

Contractor

3.2. Insured property

Plant, tools, and equipment, excluding Tunnel Boring Machines on the contract site, belonging to or the responsibility of *Contractor* or subcontractors (at any stage of remoteness from the *Client*) used or for use in connection with *works* associated with the contract.

3.3. Basis of cover

"All Risks" of physical loss, destruction or damage to the Insured property (as specified in Part A paragraph 3.2 of this Insurance Table) during the Period of insurance (as specified in Part A paragraph 3.6 of this Insurance Table) from any cause whatsoever, including whilst in transit (other than by sea or air) or in storage, unless otherwise excluded.

3.4. Sum insured (required level)

At all times an amount not less than the full reinstatement or replacement value of the Insured property (as specified in Part A paragraph 3.2 of this Insurance Table).

3.5. Territorial limits

United Kingdom including offsite storage and during inland transit.

3.6. Period of insurance

From the commencement of the relevant *works* until Completion of the relevant *works* and thereafter in respect of defects liability until the later of the *defects date* or the correction of notified Defects.

3.7. Principal exclusions

- war and related perils,
- nuclear/radioactive risks,
- pressure waves caused by aircraft and other aerial devices travelling at sonic or supersonic speeds,
- wear, tear and gradual deterioration,
- consequential financial losses,
- communicable disease,
- cyber and
- the territories of Belarus, Russia and Ukraine.

4. Third party liability insurance

4.1. Insured

Contractor

4.2. Interest

To indemnify the Insured (as set out in Part A paragraph 4.1 of this Insurance Table) in respect of all sums which the Insured (as set out in Part A paragraph 4.1 of this Insurance Table) shall become legally liable to pay as damages, including claimant's costs and expenses, in respect of accidental

- death or bodily injury to or sickness, illness or disease contracted by any person,
- personal injury,
- obstruction and interference and
- loss of or damage to physical property

happening during the Period of insurance (as set out in Part A paragraph 4.6 of this Insurance Table) and arising out of or in connection with the contract.

4.3. Limit of indemnity

Not less than £2,000,000.00 in respect of any one occurrence, the number of occurrences being unlimited in any annual policy period, but £2,000,000.00 in the aggregate per annum in respect of liability arising from pollution and contamination caused by a sudden, unintended and unexpected occurrence.

4.4. Maximum deductible threshold

Not to exceed [£to be confirmed by the Parties]

4.5. Territorial limits

United Kingdom.

4.6. Period of insurance

From the *starting* date until the later of first *access date* or when access is taken.

4.7. Cover features and extensions

Indemnity to principals clause under which the *Client* is indemnified in respect of claims made against the *Client* in respect of

- death or bodily injury to or sickness, illness or disease contracted by any person,
- personal injury,
- obstruction and interference and
- loss of or damage to physical property

arising out of or in connection with the contract and for which the *Contractor* is legally liable.

4.8. Principal exclusions

- war and related perils,
- nuclear and radioactive risks,
- liability for death, illness, disease or bodily injury sustained by employees of the Insured (as set out in Part A paragraph 4.1 of this Insurance Table) arising out of the course of their employment,
- liability arising out of the use of mechanically propelled vehicles whilst required to be compulsorily insured by applicable law in respect of such vehicles,
- liability in respect of predetermined penalties or liquidated damages imposed under any contract entered into by the Insured (as set out in Part A paragraph 4.1 of this Insurance Table),
- liability arising out of technical or professional advice other than in respect of death or bodily injury to persons or damage to third party property,
- liability arising from the ownership, possession or use of any aircraft or marine vessel,
- liability arising from seepage and pollution unless caused by a sudden, unintended and unexpected occurrence,
- liability arising from toxic mould,
- liability arising from asbestos,
- liability arising from cyber and data risks and
- liability arising from communicable disease.

5. Third party public liability insurance

5.1. Insured

Contractor

5.2. Interest

To indemnify the Insured (as set out in Part A paragraph 5.1 of this Insurance Table) in respect of all sums which the Insured (as set out in Part A paragraph 5.1 of this Insurance Table) shall become legally liable to pay as damages, including claimant's costs and expenses, in respect of accidental

- death or bodily injury to or sickness, illness or disease contracted by any person,
- personal injury,
- obstruction and interference and
- loss of or damage to physical property

happening during the Period of insurance (as set out in Part A paragraph 5.6 of this Insurance Table) and arising out of or in connection with the contract.

5.3. Limit of indemnity

Not less than £10,000,000.00 in respect of any one occurrence, the number of occurrences being unlimited in any annual policy period, but £10,000,000.00 in the aggregate per annum in respect of liability arising from pollution and contamination caused by a sudden, unintended and unexpected occurrence.

5.4. Maximum deductible threshold

Not to exceed [£to be confirmed by the Parties]

5.5. Territorial limits

United Kingdom.

5.6. Period of insurance

From the commencement of landscaping aftercare until completion of landscaping aftercare

5.7. Cover features and extensions

Indemnity to principals clause under which the *Client* is indemnified in respect of claims made against the *Client* in respect of

- death or bodily injury to or sickness, illness or disease contracted by any person,
- personal injury,
- obstruction and interference and
- loss of or damage to physical property

arising out of or in connection with the contract and for which the *Contractor* is legally liable.

5.8. Principal exclusions

- war and related perils,
- nuclear and radioactive risks,
- liability for death, illness, disease or bodily injury sustained by employees of the insured (as set out in Part A paragraph 5.1 of this Insurance Table) arising out of the course of their employment,
- liability arising out of the use of mechanically propelled vehicles whilst required to be compulsorily insured by applicable law in respect of such vehicles,
- liability in respect of predetermined penalties or liquidated damages imposed under any contract entered into by the insured (as set out in Part A paragraph 5.1 of the Insurance Table),
- liability arising out of technical or professional advice other than in respect of death or bodily injury to persons or damage to third party property,
- liability arising from the ownership, possession or use of any aircraft or marine vessel,
- liability arising from seepage and pollution unless caused by a sudden, unintended and unexpected occurrence,
- liability arising from toxic mould,
- liability arising from asbestos,
- liability arising from cyber and data risks and
- liability arising from communicable disease.

6. Third party public liability insurance

6.1. Insured

Contractor

6.2. Interest

To indemnify the Insured (as set out in Part A paragraph 6.1 of this Insurance Table) in respect of all sums which the Insured (as set out in Part A paragraph 6.1 of this Insurance Table) shall become legally liable to pay as damages, including claimant's costs and expenses, in respect of accidental

- death or bodily injury to or sickness, illness or disease contracted by any person,
- personal injury,
- obstruction and interference and
- loss of or damage to physical property

happening during the Period of insurance (as set out in Part A paragraph 6.6 of this Insurance Table) and arising out of or in connection with the contract.

6.3. Limit of indemnity

Not less than £20,000,000.00 in respect of any one occurrence, the number of occurrences being unlimited in any annual policy period, but £20,000,000.00 in the aggregate per annum in respect of liability arising from pollution and contamination caused by a sudden, unintended and unexpected.

6.4. Maximum deductible threshold

Not to exceed [£to be confirmed by the Parties]

6.5. Territorial limits

United Kingdom

6.6. Period of insurance

From the commencement of *section 2* to Completion of *section 3*.

6.7. Cover features and extensions

Indemnity to principals clause under which the *Client* is indemnified in respect of claims made against the *Client* in respect of

- death or bodily injury to or sickness, illness or disease contracted by any person,
- personal injury,
- obstruction and interference and
- loss of or damage to physical property

arising out of or in connection with the contract and for which the *Contractor* is legally liable.

6.8. Principal exclusions

- war and related perils,
- nuclear and radioactive risks,
- liability for death, illness, disease or bodily injury sustained by employees of the Insured (as set out in Part A paragraph 6.1 of this Insurance Table) arising out of the course of their employment,
- liability arising out of the use of mechanically propelled vehicles whilst required to be compulsorily insured by applicable law in respect of such vehicles,
- liability in respect of predetermined penalties or liquidated damages imposed under any contract entered into by the Insured (as set out in Part A paragraph 6.1 of this Insurance Table),
- liability arising out of technical or professional advice other than in respect of death or bodily injury to persons or damage to third party property,
- liability arising from the ownership, possession or use of any aircraft or marine vessel,
- liability arising from seepage and pollution unless caused by a sudden, unintended and unexpected occurrence,
- liability arising from toxic mould,
- liability arising from asbestos,
- liability arising from cyber and data risks and
- liability arising from communicable disease.

PART B: Insurances required to be procured and maintained by the *Contractor* (and not forming part of the insurances provided by the *Client* as set out in Contract Data)

1. Marine cargo insurance

1.1. Insureds

1. *Contractor*
2. *Client*

as appropriate, each for their respective rights and interests in the contract.

1.2. Insured property

All property and interest of every description for all transits by sea or air of all goods intended for the *works* where such items are carried for the account and interest of the Insured (as set out in Part B paragraph 1.1 of this Insurance Table) from risk attachment at factory premises or elsewhere to site and including off site storage.

1.3. Coverage

"All Risks" of physical loss or damage to the Insured property (as specified in Part B paragraph 1.2 of this Insurance Table) unless otherwise excluded.

1.4. Basis of valuation (required level)

Not less than the full replacement value plus 10% for anyone sending/any one voyage plus provision to include other cover features and extensions (as specified in Part B paragraph 1.8 below of this Insurance Table) as appropriate.

1.5. Maximum deductible threshold

Not to exceed [£To be determined between the Parties][14] each and every loss.

1.6. Territorial limits

Worldwide.

1.7. Period of insurance

On an 'Open' cover basis, from the commencement of the relevant transits until the delivery to the site plus any deferred unpacking period.

1.8. Cover features and extensions

- terrorism,
- Institute Cargo Clauses (A),
- Institute War Clauses (Cargo) including terrorism,
- Institute Strikes Clauses (Cargo) and
- overland transit to the extent it is not covered under any construction “all risks” insurance policy provided by the *Client* as set out in the Contract Data.

1.9. Principal exclusions

- as per Institute Cargo Clauses (A),
- ordinary leakage ordinary loss in weight or volume or ordinary wear and tear of the subject matter insured,
- inherent vice or nature of the subject matter insured,
- insolvency or financial default of the owners managers charterer's or operators of the vessel or aircraft, unless not material to the claim,
- un-seaworthiness of the vessel or craft, etc. but only where the Insured (as set out in Part B paragraph 1.2 of this Insurance Table) is aware of the un-seaworthiness,
- insufficiency or unsuitability of packing,
- delay,
- vessel not ISM Code certified/SOLAS Convention,
- war risks on land and radioactive contamination,
- sanctions clause,
- transits from / within Belarus, Russia and Ukraine,
- cyber,
- communicable disease,
- rust, oxidation and discoloration on unpacked or unprotected property (including or steelwork) and
- electrical, electronic, mechanical derangement unless caused by an insured peril.

2. Marine liability insurance

2.1. Insureds

1. *Contractor*
2. *Client*

as appropriate, each for their respective rights and interests in the contract.

2.2. Interest

[14] Maximum deductible thresholds to be proposed by the Participants.

To indemnify the Insureds (as set out in Part B paragraph 2.1 of this Insurance Table) in respect of all sums that the Insureds (as set out in Part B paragraph 2.1 of this Insurance Table) may become legally liable to pay (including claimants' costs and expenses) as damages in respect of accidental: death or bodily injury, illness or disease contracted by any person and or loss of or damage to property, happening during the Period of Insurance (in Part B paragraph 2.6 of this Insurance Table) and arising out of or in connection with the marine and waterborne activity associate with the works and the contract and not more specifically insured.

2.3. Limit of indemnity (required level)

Not less than [£ To be determined between the Parties][15] in respect of any one occurrence and in the aggregate during the Period of insurance (in Part B paragraph 2.6 of this Insurance Table).

2.4. Maximum deductible threshold

Not to exceed [£ To be determined between the Parties] each and every loss.

2.5. Territorial limits

As determined by the requirements of the contract

2.6. Period of insurance

From the commencement of the relevant works until Completion of the relevant works and thereafter in respect of defects liability until the later of the defects date or the date of correction of notified Defects.

2.7. Cover features and extensions

Legal costs in addition to the limit of indemnity.

2.8. Principal exclusions

- war and related perils,
- nuclear and/or radioactive risks,
- liability for death, illness, disease or bodily injury sustained by employees of the Insureds (as set out in Part B paragraph 2.1 of this Insurance Table) arising out of the course of their employment,
- liability arising out of the use of mechanically propelled vehicles whilst required to be compulsorily insured by legislation in respect of such vehicles.
- liability in respect of predetermined penalties or liquidated damages imposed under any contract entered into by the insured,
- events more properly covered under a professional indemnity policy,
- liability arising from the ownership, possession or use of any aircraft or marine vessel.
- liability arising from pollution and contamination unless caused by a sudden, unintended, unexpected and accidental occurrence,
- cyber liability exclusion and
- asbestos or toxins.

3. Protection and indemnity insurance

[15] Marine third party liability limit of indemnity will be determined between the Parties once the insurable risk profile and exposure of any marine / waterborne activity is known.

3.1.	Insureds [£ To be determined between the Parties dependant on vessel ownership, usage and method of engagement in main works][16]
3.2.	Interest To indemnify the Insureds (as set out in Part B paragraph 3.1 of this Insurance Table) for all sums that the Insured may become legally liable to pay (including claimants' costs and expenses) arising from owning or operating vessels and/or craft in respect of: death or bodily injury to, or sickness, or illness of disease contracted by any person; loss of or damage to property; removal of wreck; pollution, happening during Period of insurance (as set out in Part B paragraph 3.6 below) and arising out of or in connection with the works associated with the contract and not more specifically insured.
3.3.	Limit of indemnity (required level) Not less than as required by national and international regulations, convention or directive and for all other vessels a limit commensurate with marine insurance market practice for the type and size of vessel in question.
3.4.	Maximum deductible threshold Not to exceed [£ To be determined between the Parties] each and every loss.
3.5.	Territorial limits As determined by the requirements of the contract.
3.6.	Period of insurance From the commencement of the relevant works until Completion of the relevant works and thereafter in respect of defects liability until the Defects Certificate or termination certificate is issued.
3.7.	Cover features and extensions • liabilities under contracts and indemnities, • liabilities to persons being carried on board insured vessels, • specialist operations and • collision liabilities.
3.8.	Principal exclusions • war and related perils, • nuclear/radioactive risks, • liability for death, illness, disease or bodily injury sustained by employees of the Insureds (as set out in Part B paragraph 3.1 of this Insurance Table) arising out of the course of their employment, • liability arising out of the use of mechanically propelled vehicles whilst required to be compulsorily insured by legislation in respect of such vehicles, • sanctions clause and • transits from / within Belarus, Russia and Ukraine.

[16] Insured parties will depend upon use of vessels in connection with the works and who will be liable for the operation and navigation of any relevant vessels. Insured parties will also be determined by how the vessels are contracted by the relevant parties.

Annex K: Key Persons Schedule

Not used.

Annex L: Data Processing

1. Data Protection (Schedule A)

1.1 Processing, Personal Data and Data Subjects

This schedule is completed by the *Client,* who may take account of the view of the *Contractor,* however the final decision as to the content of this schedule is the *Client's* and at its absolute discretion.

1. The contact details of the *Client's* Data Protection Officer are Graham Woodhouse (dataprotectionadvice@highwaysengland.co.uk).

2. The contact details of the *Contractor's* Data Protection Officer or nominated lead are as per Contract Data part 2.

3. The *Contractor* complies with any further instructions issued by the *Client* with respect to the processing of Data.

Any such further instructions are to be incorporated into this table.

Description	Details
Identity of the *Client* and *Contractor*	The Parties acknowledge that for the purposes of the Data Protection Legislation, the *Client* is the Data Controller and the *Contractor* is the Processor in accordance with paragraph S227.9 of the Scope.
Subject matter of the processing	The processing is needed in order to ensure that the Processor can Provide the Works.
Duration of the processing	From the *starting date* to Completion of the whole of the *works.*
Nature and purposes of the processing	The nature of the processing includes collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction of data (whether or not by automated means). The purpose of the processing includes • recruitment assessment, • employment processing, • ID verification, • ability assessment, • training records, • engagement recording, • communication purposes, • health and safety,

	• physical security, • cyber security and • Disclosure Requests.
Type of Personal Data	The type of Personal Data includes • name, • home address, • date of birth, • gender, • national insurance number, • telephone number, • email address, • images, • audio and video recording, • education and qualifications, • work experience, • emergency contact details, • employment history with the organisation, • employment terms and conditions (eg pay, hours of work, holidays, benefits, absence), • incidents and traffic accidents, • occupational health and medical records, • personal protective equipment records, • training and development records and • disciplinary action.
	The type of special category data within Personal Data includes • race and ethnicity and • biometric data.
Categories of Data Subject	The categories of Data Subject include • Staff (including volunteers, agents and temporary workers), • subcontractors (at any stage of remoteness from the *Client*), • suppliers, • *Client,* • Stakeholders, • customers,

	• Landowners, • members of the local community, • site visitors and • users of the Project or *Client's* digital communications.
Plan for return and destruction of the data once the processing is complete UNLESS requirement under union or member state law to preserve that type of data	Data shall be retained until Completion of the whole of the *works* or earlier to be in accordance with paragraph S220.11 and destroyed in a secure manner.

Annex M: Conflict of Interest Information form

Lower Thames Crossing

Conflicts of Interest Declaration Form

Introduction

This form is for Highways England to ascertain whether your employment (or engagement) with the Lower Thames Crossing Project (LTC Project) gives or may give rise to an actual, potential, or perceived conflict of interest. Highways England recognises that it is not always possible to avoid a conflict of interest and a conflict of interest is not necessarily unethical or wrong, but it must be declared so that it can be managed appropriately.

Highways England considers that a conflict of interest occurs when your professional or personal interests or loyalties to a person or organisation affect, may affect or appear to affect the impartiality, judgement or effectiveness expected from you in your role working for Highways England and/or the LTC Project.

An interest is something that Highways England considers influences or may influence or bias a person or an organisation's professional judgement and/or objectivity, and/or affords an unfair advantage. The interest could be direct or indirect.

Conflicts of interest are explained further in the LTC Conflict of Interest Compliance and Implementation Guide. Please read this Guide carefully. It may be periodically updated and/or amended and it is your responsibility to review it on a regular basis.

Please complete this form by ticking the applicable boxes and providing the details required.

The form will take approximately 5 – 15 minutes to complete depending on your answers. To complete this form it would be helpful to have details on companies owned (including registered company number(s) and information on directorships / shares or securities owned) to hand.

You will be asked from time to time to reconfirm that the information you have given is still accurate and to update the form as appropriate.

Where your circumstances change, it is your responsibility to notify the Procurement Team by emailing LTCProcurement@highwaysengland.co.uk.

Your Details

Your Name:

Email address:

Line Manager:

Workstream:

Please enter a brief description

Question 1

Do you or will you have any continuing employment, remunerated trade, hold any professional and/or public office, consultancy and/or any other role or interest whatsoever, which you believe will or could conceivably cause a situation where there is an actual, potential or perceived conflict of interest?

Yes ☐

No ☐

If yes, please provide further details below

Question 2

Could there be an actual, potential or perceived conflict of interest in respect of your involvement with Highways England and/or the LTC Project as a result of your relationship with anyone with whom you are connected?

A connected person may be any person (including family members or other persons) to whom you have loyalties or connections or persons with whom you otherwise have a personal or professional relationship.

Yes ☐

No ☐

If yes, please provide further details below

Question 3

Do you hold, or any parties or persons connected to you, hold (or have held in the past 3 years) any directorships of companies, either public and/or private which could result in an actual, potential or perceived conflict of interest?

Yes ☐

No ☐

If yes, please provide further details below

Question 4

Do you, or any parties or persons connected to you, have any memberships of (or other connections to) any organisations which receive or might receive payments (including but not limited to grants, loans or contractual payments) from, carry out activities on behalf of, or have any other dealings with Highways England and/ or the LTC Project?

Yes ☐

No ☐

If yes, please provide further details below

Question 5

Do you, or any parties or persons connected to you, hold any offices in voluntary, professional and/or similar bodies or memberships of clubs and associations whose activities could relate to or in any way impact on (or be perceived to impact on) Highways England and/or the LTC Project?

Yes ☐

No ☐

If yes, please provide further details below

Question 6

Do you, or any parties or persons connected to you, own an interest or shares or securities in any companies or organisations, which are or could potentially be involved in the supply of goods, works or services to Highways England and/or the LTC Project, or otherwise have other business dealings with Highways England and/or the LTC Project?

Yes ☐

No ☐

If yes, please provide further details below

Question 7

Do you, or any parties or persons connected to you, own any land or property which might benefit from or have a connection with Highways England and/or the LTC Project?

Yes ☐

No ☐

If yes, please provide further details below

Question 8

Do you, or any parties or persons connected with you, have any other actual, perceived or potential conflict of interest? For example, are there any other interests that a member of the public, knowing the facts, might reasonably think are significant and relevant to your role on the LTC project or your continuing engagement with Highways England?

Yes ☐

No ☐

If yes, please provide further details below

I confirm that the information given in this form is true, complete and accurate.

Project Representative's Signature:

INSERT NAME HERE

Date:

INSERT DATE HERE

By submitting this form, you declare that to the best of your knowledge and belief (having taken all reasonable care to ensure that such is the case) the answers to all of the above questions are true and not misleading.

Annex N: Quality Table

Failure	Quality Management Points	Period of effect
Failure to appoint a *Quality Manager* Failure to appoint adequate resource to deliver the roles and responsibilities as identified in the Quality Plan Failure to appoint a *Quality Manager* within a month, or within a period agreed between the *Project Manager* and *Contractor*, of the role becoming vacant and appoint an Interim Quality Manager until the *Quality Manager* is appointed	25	Until audit confirms that failure corrected
Failure to have an accepted Quality Plan in place and operating	25	Until audit confirms that Quality Plan is complete and operating
A Quality Plan does not comply with the requirements of the contract as agreed with the *Project Manager*	10 per failure	Until audit confirms that Quality Plan complies
Failure to identify a Non-Conformity and raise a Non-Conformity report as defined in the *Contractor's* Quality Plan	5 per Non-Conformity	Until audit confirms that a process to identify a Non-Conformity and to raise a Non-Conformity report is operating and effective
Failure to raise a corrective action report or to correct a Non-Conformity in the time and manner set out in the corrective action report as defined in the *Contractor's* Quality Plan *(see note 1 below)*	10 per failure	Until failure corrected or until the *Project Manager* confirms by audit that a process to address the failure is operating and effective
Failure to correct Quality Plan in the time and manner set out in a corrective action report *(see note 1 below)*	10 per failure	Until failure corrected or until the *Project Manager* confirms by audit that a process to address the failure is operating and effective

Failure	Quality Management Points	Period of effect
Failure to implement • recommendations, • corrective actions to address Non-Conformities or • Opportunities for Improvement in an audit report *(see note 1 below) (see note 1 below)*	5 per recommendation, Non-Conformity or Opportunity for Improvement	Until audit confirms that • recommendation, • corrective actions to address Non-Conformities or • Opportunities for Improvement are implemented
Failure to carry out internal audit as per accepted Schedule of Planned Audits and without prior agreement and approval from the *Project Manager*	15 per audit	Until audit carried out as per revised schedule and agreed with the *Project Manager*
Carrying out work without release of hold point as defined in the *Contractor's* Quality Plan or Inspection and Test Plan	10 per item	Until audit confirms that a process to manage hold points is operating and effective
Failure to make records available for inspection by the *Client*	10 per failure	Until the records are made available and a process is operating and effective that makes records available to the *Client*
Failure to allow access for *Client* audits	10 per failure	Until access is allowed and a process is operating and effective that allows access for *Client* audit
Failure to have a complete Supply Chain Maturity Matrix (SCMM) Action Plan in place and operating as required by the contract	25 per failure	Until audit confirms that SCMM Action Plan complete and operating
Failure to update SCMM Action Plan as required	10 per failure	Until audit confirms that SCMM Action Plan updated

Failure	Quality Management Points	Period of effect
Failure to take an action detailed in the SCMM Action Plan *(see note 1 below)*	10 per failure	Until failure corrected or until the *Project Manager* confirms by audit that a process to address the failure is operating and effective
Failure by *Contractor* to accrue Quality Management Points that should have been accrued	The number of Points that should have been accrued	The period applicable to the failure that should have accrued Points or until the *Project Manager* confirms by audit that a process to address the failure is operating and effective
	plus, an additional number of Points equivalent to the Points that should have been accrued	Six months from the date when the additional Points were accrued or until the *Project Manager* confirms by audit that a process to address the failure is operating and effective

Note 1: For these failures additional Points are accrued at each audit until an audit confirms that rectification/correction/implementation/action has taken place.

Annex O: Multi Party Collaboration / Partnering Information

Not used.

Annex P: Additional Definitions Used in the Scope

Not used.

Annex QA: Form of Novation (Old Contractor to New Contractor/Client for a subcontractor)

DATED **202**

(1) **[*NAME OF OLD CONTRACTOR*]**
as Old Contractor

(2) **[*NAME OF NEW CONTRACTOR/CLIENT*]**
as New Contractor/
Client

(3) **[*NAME OF SUB CONTRACTOR*]**
as Subcontractor

DEED OF NOVATION

relating to a [●] contract for the construction of

Lower Thames Crossing

Tunnels and Approaches

THIS DEED is made on day of 202

PARTIES:

(1) [●] (company no [●]) whose registered office is at [●] (the "**Subcontractor**")

(2) [●] (company no [●]) whose registered office is at [●] (the "**Old Contractor**")

(3) [●] (company no [●]) whose registered office is at [●] (the "**New Contractor/Client**")

BACKGROUND:

(A) By the Contract, the Old Contractor has employed the Subcontractor to provide the Works.

(B) The Subcontractor has agreed (with the consent of the Old Contractor) to transfer all its rights and obligations under the Subcontract to the [New Contractor/Client] and the Subcontractor has agreed to accept the liability of the [New Contractor/Client] in place of the liability of the Old Contractor under the Subcontract upon and subject to the terms of this deed, which is supplemental to the Subcontract.

1. Definitions and interpretation

1.1. Unless the contrary intention appears, the following definitions apply:

"**Subcontract**" means the subcontract dated [DATE] between the Old Contractor (2) and the Subcontractor (1) (including any further agreement varying or supplementing the Subcontract) under which the Subcontractor has agreed to provide the Works.

"**Works**" means the works to be provided by the Subcontractor pursuant to the Subcontract.

1.2. The clause and paragraph headings in this deed are for ease of reference only and are not to be taken into account in the construction or interpretation of any provision to which they refer.

1.3. Words in this deed denoting the singular include the plural meaning and vice versa.

1.4. References in this deed to any statutes or statutory instruments include any statute or statutory instrument amending, consolidating or replacing them respectively from time to time in force, and references to a statute include statutory instruments and regulations made pursuant to it.

1.5. Words in this deed importing one gender include both other genders and may be used interchangeably, and words denoting natural persons, where the context allows, include corporations and vice versa.

2. Novation

2.1. The Old Contractor and the Subcontractor release and discharge each other from the further performance of their respective obligations under the Subcontract and the Subcontractor acknowledges and accepts the liability of the [New Contractor/Client] in place of the liability of the Old Contractor under the Subcontract.

2.2. The [New Contractor/Client] undertakes to be bound to the Subcontractor by the terms of the Subcontract in every way as if the [New Contractor/Client] was and always had been a party to the Subcontract in place of the Old Contractor.

2.3. The Subcontractor acknowledges and warrants to the [New Contractor/Client] that it has duly observed and performed and will continue duly to observe and perform all its obligations under the Subcontract.

3. [New CONTRACTOR/CLIENT]'S undertaking

3.1. Subject to Clause 4.1 below, the [New Contractor/Client] undertakes to be bound to the Subcontractor by the terms of the Subcontract and to perform the obligations on the part of the "Contractor" under the Subcontract in every way as if the [New Contractor/Client] was and always had been a party to the Subcontract in place of the Old Contractor.

4. Payment of sums due

4.1. The Subcontractor and the Old Contractor agree that the total amount to be paid by the Old Contractor to the Subcontractor for the Works provided under the Subcontract prior to the date of this deed is £[●]. The Subcontractor acknowledges that the Old Contractor has paid the sum of £[●] prior to the date of this deed. The balance of £[●] shall be invoiced by the Subcontractor to the Old Contractor and paid by the Old Contractor in accordance with the Subcontract.

4.2. The [New Contractor/Client] acknowledges that any payment made by the Old Contractor to the Subcontractor in respect of the Works (whether before or after the date of this deed) shall be treated as having been made to the Subcontractor and that the Old Contractor's payment obligation under the Contract shall to that extent be treated as discharged.

5. Notices

5.1. Any notice or other communication required under this deed shall be given in writing and is to be delivered personally (which includes delivery by courier) or sent by pre-paid recorded or special delivery post to the party concerned at its address set out in this deed or to such other addresses as may be notified by such party for the purposes of this clause.

5.2. Any notice given pursuant to this clause will be deemed to have been served as follows:

a) if delivered personally, at the time of delivery; and

b) if sent by recorded or special delivery post, 48 hours after being delivered into the custody of the postal authorities but excluding Saturdays, Sundays and public and bank holidays in England and Wales.

5.3. In proving service, it will be sufficient to prove that personal delivery was made or that the envelope containing the notice was properly addressed and delivered into the custody of the postal authorities as a pre-paid recorded or special delivery letter.

6. Governing law and disputes

6.1. This deed and any non-contractual obligations arising out of or in connection with it shall be governed by English Law.

6.2. The parties agree that the courts of England and Wales shall have exclusive jurisdiction to determine any dispute arising out of or in connection with this deed, including (without limitation) in relation to any non-contractual obligations. The parties irrevocably submit to the jurisdiction of those courts.

This Deed has been executed as a deed and delivered on the date stated at the beginning of this Deed.

EXECUTION PAGE

Executed as a deed by **[OLD CONTRACTOR]** acting by:)
)

Director

Director/Secretary

[Executed as a deed by **[NEW CONTRACTOR]** acting by:)
)

Director

Director/Secretary]

[Executed as a deed by **NATIONAL HIGHWAYS LIMITED** by affixing his common seal in the presence of:)
)

Authorised Signatory

Authorised Signatory]

Executed as a deed by **[SUBCONTRACTOR**] acting by:)
)

Director

Director/Secretary

Annex QB: Form of Novation (Old Contractor to new Contractor)

DATED **20**

(1) **NATIONAL HIGHWAYS LIMITED**
as Client

(2) **[*NAME OF NEW CONTRACTOR*]**
as New Contractor

(3) **[*NAME OF OLD CONTRACTOR*]**
as Old Contractor

DEED OF NOVATION

relating to a [●] contract for the construction of

Lower Thames Crossing

Tunnels and Approaches

THIS DEED is made on day of 202

PARTIES:

(1) **NATIONAL HIGHWAYS LIMITED** (company no 09346363) whose registered office is at Bridge House, 1 Walnut Tree Close, Guildford, Surrey GU1 4LZ (the "**Client**")

(2) [●] (company no [●]) whose registered office is at [●] (the "**Old Contractor**")

(3) [●] (company no [●]) whose registered office is at [●] (the "**New Contractor**")

BACKGROUND:

(A) By the Contract, the Client has employed the Old Contractor to provide the Works.

(B) The Old Contractor has agreed (with the consent of the Client) to transfer all its rights and obligations under the Contract to the New Contractor and the Client has agreed to accept the liability of the New Contractor in place of the liability of the Old Contractor under the Contract upon and subject to the terms of this deed, which is supplemental to the Contract.

1. Definitions and interpretation

1.1. Unless the contrary intention appears, the following definitions apply:

"**Contract**" means the contract dated [DATE] between the Client (1) and the Old Contractor (2) (including any further agreement varying or supplementing the Contract) under which the Old Contractor has agreed to provide the Works.

"**Works**" means the Works to be provided by the Old Contractor pursuant to the Contract.

1.2. The clause and paragraph headings in this deed are for ease of reference only and are not to be taken into account in the construction or interpretation of any provision to which they refer.

1.3. Words in this deed denoting the singular include the plural meaning and vice versa.

1.4. References in this deed to any statutes or statutory instruments include any statute or statutory instrument amending, consolidating or replacing them respectively from time to time in force, and references to a statute include statutory instruments and regulations made pursuant to it.

1.5. Words in this deed importing one gender include both other genders and may be used interchangeably, and words denoting natural persons, where the context allows, include corporations and vice versa.

2. Novation

2.1. The Old Contractor and the Client release and discharge each other from the further performance of their respective obligations under the Contract and the Client acknowledges and accepts the liability of the New Contractor in place of the liability of the Old Contractor under the Contract.

2.2. The New Contractor undertakes to be bound to the Client by the terms of the Contract in every way as if the New Contractor was and always had been a party to the Contract in place of the Old Contractor.

2.3. The Client acknowledges and warrants to the New Contractor that it has duly observed and performed and will continue duly to observe and perform all its obligations under the Contract.

3. New Contractor's undertaking

3.1. Subject to Clause 4.1 below, the New Contractor undertakes to be bound to the Client by the terms of the Contract and to perform the obligations on the part of the Contractor under the Contract in every way as if the New Contractor was and always had been a party to the Contract in place of the Old Contractor.

4. Payment of sums due

4.1. The Client and the Old Contractor agree that the total amount to be paid by the Client to the Old Contractor for the Works provided under the Contract prior to the date of this deed is £[●]. The Old Contractor acknowledges that the Client has paid the sum of £[●] prior to the date of this deed. The balance of £[●] shall be invoiced by the Old Contractor to the Client and paid by the Client in accordance with the Contract.

4.2. The New Contractor acknowledges that any payment made by the Client to the Old Contractor in respect of the Works (whether before or after the date of this deed) shall be treated as having been made to the New Contractor and that the Client's payment obligation under the Contract shall to that extent be treated as discharged.

5. Notices

5.1. Any notice or other communication required under this deed shall be given in writing and is to be delivered personally (which includes delivery by courier) or sent by pre-paid recorded or special delivery post to the party concerned at its address set out in this deed or to such other addresses as may be notified by such party for the purposes of this clause.

5.2. Any notice given pursuant to this clause will be deemed to have been served as follows:

a) if delivered personally, at the time of delivery; and

b) if sent by recorded or special delivery post, 48 hours after being delivered into the custody of the postal authorities but excluding Saturdays, Sundays and public and bank holidays in England and Wales.

5.3. In proving service, it will be sufficient to prove that personal delivery was made or that the envelope containing the notice was properly addressed and delivered into the custody of the postal authorities as a pre-paid recorded or special delivery letter.

6. Governing law and disputes

6.1. This deed and any non-contractual obligations arising out of or in connection with it shall be governed by English Law.

6.2. The parties agree that the courts of England and Wales shall have exclusive jurisdiction to determine any dispute arising out of or in connection with this deed,

including (without limitation) in relation to any non-contractual obligations. The parties irrevocably submit to the jurisdiction of those courts.

This Deed has been executed as a deed and delivered on the date stated at the beginning of this Deed.

EXECUTION PAGE

[Executed as a deed by **NATIONAL HIGHWAYS LIMITED** by affixing his common seal in the presence of:)
)

Authorised Signatory

Authorised Signatory]

Executed as a deed by **[NEW CONTACTOR]** acting by:)
)

Director

Director/Secretary

Executed as a deed by **[OLD CONTACTOR]** acting by:)
)

Director

Director/Secretary

Annex R: Advertising Subcontracts in accordance with the Public Contracts Regulations 2015

Not used.

Annex S: Retention Bond

Not used.

Annex T: Performance Bond

DATED 202

(1) NATIONAL HIGHWAYS LIMITED

- and -

(2) [BOND ISSUER]

ON DEMAND

relating to the construction of

[Lower Thames Crossing]

THIS BOND is made on day of 202

BETWEEN

(1) **NATIONAL HIGHWAYS LIMITED** (company no. 09346363) whose registered office is at Bridge House, 1 Walnut Tree Close, Guildford, Surrey GU1 4LZ (the "**Client**"); and

(2) **[BOND ISSUER]** [(Company no. […….])] whose registered office is at […..](the "**Bond Issuer**").

RECITALS

(A) By a contract dated [ ] ("**the Contract**") the Client engaged [ ] ("**the Contractor**") to [design and] carry out certain works, all in accordance with the Contract.

(B) Under clause X13 of the Contract, this Bond is to be procured by the Contractor in favour of the Client.

(C) A reference to a "Section" in this Bond is to a *section* as defined in the Contract. A reference to "PRAMS " in this Bond is to S2900 of the Scope.

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. The Bond Issuer hereby irrevocably and unconditionally undertakes to pay to the Client, as primary obligor, and waiving all rights of objection and defence and without reference to the Client, any sum or sums not exceeding in total the amount of £20,000,000 (*twenty million pounds sterling*) (the "**Maximum Amount**") upon receipt by the Bond Issuer of the Client's written demand.

2. Any demand by the Client shall be in writing addressed to the office of the Bond Issuer at [ ] [ref:] and shall state the amount of the payment which is to be made to the Client by the Bond Issuer and give details of an account in the UK to which funds must be sent.

3. All payments shall be made by the Bond Issuer in full, free of any present or future taxes, levies, duties, charges, fees or withholdings and without any deduction, restriction, conditions, withholding, set-off or counterclaim whatsoever.

4. Any demand made hereunder must be made on a day in which banks are generally open for business in London (a "**Business Day**") and a demand after 2 p.m. on a Business Day shall be treated as received by the Bond Issuer on the next Business Day.

5. Payment shall be made by the Bond Issuer to the Client without:

    a) the Bond Issuer being obliged or entitled to make any enquiry of the Client or the Contractor;
    b) the need for the Client to take any action against, or obtain the consent of, the Contractor;
    c) any proof or conditions (other than those specified herein),

    and notwithstanding:

    a) any dispute between the Client and the Contractor;

b) any objection of the Contractor or any other person; or
c) any liability (actual or contingent) which the Client and the Contractor may owe to one another.

6. If Completion of Section 3 is certified forty-eight weeks or less after the Completion of Section 2, other than in accordance with Z129.3, the Maximum Amount is reduced on the date of Completion of Section 3 to £10,000,000 (ten million pounds sterling) except in respect of any written demand(s) for payment complying with all the requirements hereof received by the Bond Issuer on or before the date of such reduction.

7. On the date of the Defects Certificate issued in relation to the whole of the works (other than Section 4 and assets specified under PRAMS), the Maximum Amount is reduced to £5,000,000 (five million pounds sterling) except in respect of any written demand(s) for payment complying with all the requirements hereof received by the Bond Issuer on or before the date of such reduction.

8. The Bond Issuer's liability under this Bond shall automatically expire on the earlier of (i) the date of the Defects Certificate issued in relation to the whole of the works (as defined in the Contract) and (ii) the date on which the Maximum Amount is reduced to nil (the "**Expiry Date**"), except in respect of any written demand(s) for payment complying with all the requirements hereof received by the Bond Issuer on or before the Expiry Date. After the Expiry Date, no further demands can be made under this Bond.

9. The Bond Issuer's liability under this Bond shall not be discharged, released, reduced or otherwise affected in any way by:

a) anything that the Client or the Contractor may do or omit or neglect to do in connection with the Contract which but for this provision may operate to exonerate or discharge the Bond Issuer or otherwise reduce or extinguish its liability under this Bond, or any time or waiver granted to or composition or arrangement with the Contractor,
b) the taking, variation, compromise, concession, renewal or release of, or refusal or neglect to take, effect or enforce any rights or remedies against the Contractor,
c) the insolvency, dissolution, liquidation, amalgamation, reconstruction or reorganisation of the Contractor,
d) any amendment, novation, extension, restatement, waiver or supplement to the Contract or any other document or security (however fundamental and whether or not more onerous);
e) any instruction change or variation made pursuant to the Contract or any document supplemental thereto;
f) any legal limitation or incapacity relating to the Contractor;
g) any invalidity of

(i) obligations of the Contractor under the Contract,

(ii) any security held by the Contractor or

(iii) any other person in connection with the Contract or

h) any dispute between the Client and the Contractor under or in relation to the Contract

10. Any notice or demand to be given under this Bond shall be in writing and shall be deemed to be given properly if it is delivered by hand, or sent by special delivery post or recorded delivery to the address of the relevant party set out above, or, in the case of a demand under clause 2, the address set out in that clause (or such other address as that party may have nominated for service). If the notice is sent by special delivery post or recorded delivery, it shall be deemed to be received two working days after the day it was posted. If the notice is delivered by hand, it shall be deemed to be received on the day it is delivered.

a) The Bond Issuer shall not assign, transfer or charge the benefit of the Bond or any part of it or any benefit or interest under it without the prior agreement of the Client.

b) The benefit of this Bond may be assigned by the Client without the consent of the Bond Issuer and/or Contractor to

(i) a replacement organisation established by the Secretary of State for Transport to take over the Client's functions or part of it,

(ii) a Department or Office of Her Majesty's Government or

(iii) Thurrock Borough Council, Essex County Council or Kent County Council.

c) If requested by the Client, the Bond Issuer shall promptly execute a novation agreement in such form as the Client may reasonably require, transferring the benefit of this Bond to

(i) a replacement organisation established to take over the Client's functions or part of it,

(ii) another public body exercising similar functions,

(iii) a Department or Office of Her Majesty's Government or

(iv) a local authority.

11. This Bond and any dispute or difference arising in connection with it is governed by, and construed in accordance with, the laws of England and shall be subject to the exclusive jurisdiction of the English courts to which the parties irrevocably submit.

12. Notwithstanding any other provisions of this Bond nothing in this Bond confers or purports to confer any right to enforce any of its terms on any party who is not a party to it where that right would not exist but for the Contracts (Rights of Third Parties) Act 1999.

IN WITNESS whereof the parties hereto have executed this Bond as a Deed on the date first before written.

EXECUTION PAGE

EXECUTED as a **DEED** by [NAME OF ATTORNEY] as attorney for [BOND ISSUER] under a power of attorney dated [DATE]

in the presence of a witness:

..... (*Signature)*

as attorney for [Bond Issuer]

Witness signature:

Name of witness:

Address of witness:

Occupation of witness:

[*National Highways execution block*]

Annex UA: Contractor Collateral Warranty to Others

DATED **202**

(1) **[NATIONAL HIGHWAYS LIMITED]**

- and -

(2) **[*NAME OF CONTRACTOR*]**

- and -

(2) **[*NAME OF BENEFICIARY*]**

CONTRACTOR DEED OF COLLATERAL WARRANTY TO OTHERS

relating to the construction of
Lower Thames Crossing
Tunnels and Approaches

THIS DEED is made on day of 202

BETWEEN:

(1) **"CLIENT"** means **National Highways Limited** (company number 09346363) whose registered office is at Bridge House, 1 Walnut Tree Close, Guildford, Surrey GU1 4LZ ("**Client**");

(2) **[*NAME OF CONTRACTOR*]** (company number) whose registered office is at (**"Contractor"**); and

(3) **[*NAME OF BENEFICIARY*]** (company number) whose registered office is at (**"Beneficiary"**) which term includes its legal successors and permitted assignees.

BACKGROUND:

(A) The Client intends to procure the Project.

(B) By the Contract, the Contractor has agreed with the Client to carry out and complete the Works upon the terms and conditions of the Contract.

(C) The Beneficiary has an interest in part of the Project.

(D) It is a term of the Contract, or has otherwise been agreed, that the Contractor enters into this deed of collateral warranty with the Beneficiary in relation to the Works.

IT IS AGREED:

By this deed and in consideration of the sum of £1 paid by the Beneficiary (receipt of which the Contractor hereby acknowledges), the Contractor agrees to enter into the obligations set out in this deed.

1. DEFINITIONS AND INTERPRETATION

1.1. In this deed the following words and expressions shall have the following meanings, unless the context requires otherwise:

"Contract" means the contract dated [DATE] made between the Client and the Contractor;

"Contractor's [Design] Documents" means the drawings, details and specifications of materials, goods and workmanship and other related documents prepared by or for the Contractor in relation to [the design of] the Works;

"Completion" means the date of completion of the whole of the Works pursuant to the Contract;

"Contractor Background IPR" has the meaning given in the Contract;

"Project" means [INSERT]; and

"Works" means the works and services to be undertaken by the Contractor under the Contract.

1.2. unless the context requires otherwise:

1.2.1 reference to any gender includes all genders, reference to the singular includes the plural (and vice versa) and reference to persons includes bodies corporate, unincorporated associations and partnerships (whether or not any of them have a separate legal personality);

1.2.2 reference to a recital or clause is a reference to a recital to or clause of this deed;

1.2.3 reference to any legislative provision will be deemed to include any subsequent re-enactment or amending provision;

1.2.4 the list of contents and clause headings are included for convenience only and do not affect its interpretation;

1.2.5 where a party comprises two or more persons:

1.2.5.1 any obligations on the part of that party contained or implied in this deed are deemed to be joint and several obligations on the part of those persons; and

1.2.5.2 references to that party include references to each and any of those persons; and

1.2.6 periods of time will be calculated in accordance with section 116 of the Housing Grants, Construction and Regeneration Act 1996.

2. STANDARD OF CARE

2.1. The Contractor warrants and undertakes to the Beneficiary that:

2.1.1 it has carried out and shall carry out its duties and obligations under the Contract subject to and in accordance with the terms of the Contract; and

2.1.2 in addition to and without derogation from clause 2.1.1:

2.1.2.1 it has carried out and shall continue to carry out and complete the Works in a good and workmanlike manner;

2.1.2.2 the Works [will on Completion comply]/[on Completion complied][17] in all respects with the requirements of the Contract.

3. NO INSTRUCTIONS TO CONTRACTOR BY BENEFICIARY

3.1. The Beneficiary may not give instructions to the Contractor under this agreement.

4. NOT USED

5. COPYRIGHT LICENCE

5.1. In addition to the intellectual property rights granted by the Contractor to the Client under the Contract, the Contractor shall grant (or shall procure the grant) to the Beneficiary an irrevocable, royalty-free, non-exclusive licence to copy and to use the Contractor Background IPR used in the Contractor's Design Documents and to

[17] Delete as applicable if the deed is entered in to prior to or post completion of the Works.

reproduce the [designs and] content of them for any purpose connected to the Works.

5.2. The licence referred to in clause 5.1 carries the right to grant sub-licences on the same terms and shall be freely transferable to third parties without the Contractor's consent and shall continue notwithstanding the determination (for any reason) of the Contractor's employment under the Contract.

5.3. The Contractor shall not be liable or responsible for any use of the Contractor's Design Documents for any purpose other than that for which the same was originally prepared and provided by the Contractor.

5.4. The Contractor waives or shall procure the waiver of any moral or authorship rights which he might otherwise possess under the Copyright, Designs and Patents Act 1988 in respect of the Contractor's Design Documents.

5.5. Insofar as ownership of any copyright in any Contractor's Design Documents is vested in any person other than the Contractor, the Contractor shall procure for the Beneficiary the benefit of a licence (on the same terms as clause 5.1) for the same purposes.

5.6. The Contractor shall indemnify the Beneficiary against any liability which the Beneficiary may incur by reason of the Contractor infringing or being held to have infringed any copyright.

5.7. The Contractor shall provide to the Beneficiary a copy of any of the Contractor's Design Documents as soon as reasonably practicable after receipt by the Contractor of a written request from the Beneficiary to do so. The Beneficiary agrees to pay the reasonable copying charges of the Contractor for provision of the same to the Beneficiary.

5.8. [The Client shall grant to the Beneficiary an irrevocable, royalty-free, non-exclusive licence to copy and to use the relevant intellectual property rights and to reproduce the [designs and] content of them for any purpose connected to the Works where such relevant intellectual property rights are:

5.8.1 assigned to the Client under the Contract; and

5.8.2 used in the Contractor's Design Documents.]

6. PROFESSIONAL INDEMNITY INSURANCE

6.1. The Contractor warrants that:

6.1.1 it has maintained and shall maintain, during the carrying out of the Works and for a period until twelve (12) years from Completion of the Works (notwithstanding earlier termination, expiry or suspension of the Contractor's employment under the Contract), the professional indemnity insurance required by the Contract with reputable insurers with a place of business in the United Kingdom for an amount not less than twenty five million pounds (£25,000,000), any one claim and in the annual aggregate, in respect of any incurred legal liability on the part of the Contractor in the performance of its design obligations under the Contract; and

6.1.2 cover under the professional indemnity insurance is extended to include the Contractor's liabilities under this deed.

6.2. As and when required by the Beneficiary, the Contractor shall produce for inspection documentary evidence that such insurance is being properly maintained.

6.3. If the Contractor is unable to obtain professional indemnity insurance, it shall promptly notify the Beneficiary.

7. ASSIGNMENT

7.1. The Beneficiary may at any time assign the benefit of this deed and/or any rights arising under it by way of absolute legal assignment to any person without the consent of the Contractor being required. Any assignment by the Beneficiary by way of security to any funder providing finance towards the Works and/or in relation to the Project (including the re-assignment of any rights on redemption) will not count as an assignment pursuant to this clause.

7.2. The Contractor undertakes to the Beneficiary not to contend in any proceedings under this deed that any person to whom the Beneficiary assigns or has assigned its rights under this deed in accordance with the provisions of this clause is to be precluded from recovering any loss resulting from any breach of this deed (whenever happening) by reason that such person is an assignee and not the original promisee under this deed or by reason of such person not being the Beneficiary and/or the loss suffered being different or greater to any loss that may have been suffered by the Beneficiary.

8. LIABILITY OF THE CONTRACTOR

8.1. Unless the contrary is stated, no provision of this deed is intended to exclude any obligation or liability which would otherwise be implied whether by statute, the law of contract, tort, equity or otherwise.

8.2. The responsibility of the Contractor under this deed is not to be reduced or in any way released or limited by any enquiry or inspection by or on behalf of any person notwithstanding that such enquiry or inspection may give rise to a claim by the Beneficiary against a third party.

8.3. The rights and benefits conferred upon the Beneficiary by this deed are in addition to any other rights and remedies that the Beneficiary may have against the Contractor including (without prejudice to the generality of the foregoing) any remedies in negligence.

8.4. Any limitation or defence which would have been available to the Contractor in an action under the Contract shall likewise be available to the Contractor in a corresponding action under this deed provided always that the Contractor shall not be entitled to raise any defence made on the basis that any loss incurred by the Beneficiary is not a loss to the Client nor shall it be entitled to raise a defence to a claim under this deed any contributory negligence defence, counterclaim or set-off that it may have against the Client under the Contract.

9. LIMITATION

9.1. The Beneficiary shall be entitled to commence legal proceedings against the Contractor at any time up to the expiry of 12 years from Completion of the Works.

For the avoidance of doubt, the parties agree that any provision of the Limitation Act 1980 to the contrary shall not apply to this deed.

10. NOTICES

10.1. Any notice required to be given under this deed shall be given in writing and is to be delivered personally (which includes delivery by courier) or sent by pre-paid recorded or special delivery post to the party concerned at its address set out in this deed or to such other addresses as may be notified by such party for the purposes of this clause.

10.2. Any notice given pursuant to this clause will be deemed to have been served as follows:

10.2.1 if delivered personally, at the time of delivery; and

10.2.2 if sent by recorded or special delivery post, 48 hours after being delivered into the custody of the postal authorities but excluding Saturdays, Sundays and public and bank holidays in England and Wales.

10.3. In proving service, it will be sufficient to prove that personal delivery was made or that the envelope containing the notice was properly addressed and delivered into the custody of the postal authorities as a pre-paid recorded or special delivery letter.

11. RIGHTS OF THIRD PARTIES

11.1. A person who is not a party to this deed shall have no right under the Contracts (Rights of Third Parties) Act 1999 to enforce any term of this deed. This clause does not affect any right or remedy of any person which exists or is available otherwise than pursuant to that Act.

12. JURISDICTION AND LAW

12.1. This deed is governed by and is to be construed according to English Law and the English Courts shall have jurisdiction in relation to all matters arising under it.

DELIVERED as a deed on the date of this document.

EXECUTION PAGE

Executed as a deed by **NATIONAL HIGHWAYS LIMITED** by affixing his common seal in the presence of:)
)

Authorised Signatory

Authorised Signatory

Executed as a deed by **[*NAME OF CONTRACTOR*]** by a director in the presence of a witness:)
)
)

Signature ---

Name (block capitals) ---

Director

Witness signature ---

Witness name (block capitals) ---

Witness address ---

Executed as a deed by)
[*NAME OF BENEFICIARY*])
by a [director] [member] in the presence of)
a witness:

Signature ----------

Name (block capitals) ----------

Director

Witness signature ----------

Witness name (block capitals) ----------

Witness address ----------

Annex UB: Contractor Collateral Warranty to Temporary Accommodation Third Party

DATED **202**

(1) **[NAME OF CLIENT]**

- and -

(2) **[NAME OF CONTRACTOR]**

- and -

(2) **[NAME OF BENEFICIARY]**

CONTRACTOR DEED OF COLLATERAL WARRANTY TO TEMPORARY ACCOMMODATION THIRD PARTY

relating to the construction of

Lower Thames Crossing

Tunnels and Approaches

THIS DEED is made on day of 202

BETWEEN:

(1) **"CLIENT"** means **National Highways Limited** (company number 09346363) whose registered office is at Bridge House, 1 Walnut Tree Close, Guildford, Surrey GU1 4LZ ("**Client**");

(2) **[*NAME OF CONTRACTOR*]** (company number) whose registered office is at (**"Contractor"**); and

(3) **[*NAME OF BENEFICIARY*]** (company number) whose registered office is at (**"Beneficiary"**) which term includes its legal successors and permitted assignees.

BACKGROUND:

(A) The Client intends to procure the Project.

(B) By the Contract, the Contractor has agreed with the Client to carry out and complete the Works upon the terms and conditions of the Contract.

(C) The Beneficiary has an interest in part of the Project.

(D) It is a term of the Contract, or has otherwise been agreed, that the Contractor enters into this deed of collateral warranty with the Beneficiary in relation to the relevant elements of the Works instructed under clause Z136 of the Contract for the benefit of the Beneficiary.

IT IS AGREED:

The Contractor agrees to enter into the obligations set out in this deed.

1. DEFINITIONS AND INTERPRETATION

1.1. In this deed the following words and expressions shall have the following meanings, unless the context requires otherwise:

"Contract" means the contract dated [date] made between the Client and the Contractor;

"Contractor's [Design] Documents" means the drawings, details and specifications of materials, goods and workmanship and other related documents prepared by or for the Contractor in relation to [the design of] the relevant elements of the Works instructed under clause Z136 of the Contract for the benefit of the Beneficiary;

"Completion" means the date of completion of the whole of the Works pursuant to the Contract;

"Contractor Background IPR" has the meaning given in the Contract;

"Project" means [INSERT]; and

"Works" means the works and services to be undertaken by the Contractor under the Contract.

1.2. unless the context requires otherwise:

1.2.1 reference to any gender includes all genders, reference to the singular includes the plural (and vice versa) and reference to persons includes bodies corporate, unincorporated associations and partnerships (whether or not any of them have a separate legal personality);

1.2.2 reference to a recital or clause is a reference to a recital to or clause of this deed;

1.2.3 reference to any legislative provision will be deemed to include any subsequent re-enactment or amending provision;

1.2.4 the list of contents and clause headings are included for convenience only and do not affect its interpretation;

1.2.5 where a party comprises two or more persons:

1.2.5.1 any obligations on the part of that party contained or implied in this deed are deemed to be joint and several obligations on the part of those persons; and

1.2.5.2 references to that party include references to each and any of those persons; and

1.2.6 periods of time will be calculated in accordance with section 116 of the Housing Grants, Construction and Regeneration Act 1996.

2. STANDARD OF CARE

2.1. The Contractor warrants and undertakes to the Beneficiary that:

2.1.1 it has carried out and shall carry out its duties and obligations under the Contract subject to and in accordance with the terms of the Contract; and

2.1.2 in addition to and without derogation from clause 2.1.1:

2.1.2.1 it has carried out and shall continue to carry out and complete the relevant elements of the Works instructed under clause Z136 of the Contract for the benefit of the Beneficiary in a good and workmanlike manner;

2.1.2.2 the relevant elements of the Works instructed under clause Z136 of the Contract for the benefit of the Beneficiary [will on Completion comply]/[on Completion complied][18] in all respects with the requirements of the Contract.

3. NO INSTRUCTIONS TO CONTRACTOR BY BENEFICIARY

3.1. The Beneficiary may not give instructions to the Contractor under this deed.

[18] Delete as applicable if the deed is entered in to prior to or post completion of the Works.

4. NOT USED

5. COPYRIGHT LICENCE

5.1. In addition to the intellectual property rights granted by the Contractor to the Client under the Contract, the Contractor shall grant (or shall procure the grant) to the Beneficiary an irrevocable, royalty-free, non-exclusive licence to copy and to use the Contractor Background IPR used in the Contractor's Design Documents and to reproduce the [designs and] content of them for any purpose connected to the relevant elements of the Works instructed under clause Z136 of the Contract for the benefit of the Beneficiary.

5.2. The licence referred to in clause 5.1 carries the right to grant sub-licences on the same terms and shall be freely transferable to third parties without the Contractor's consent and shall continue notwithstanding the determination (for any reason) of the Contractor's employment under the Contract.

5.3. The Contractor shall not be liable or responsible for any use of the Contractor's Design Documents for any purpose other than that for which the same was originally prepared and provided by the Contractor.

5.4. The Contractor waives or shall procure the waiver of any moral or authorship rights which he might otherwise possess under the Copyright, Designs and Patents Act 1988 in respect of the Contractor's Design Documents.

5.5. Insofar as ownership of any copyright in any Contractor's Design Documents is vested in any person other than the Contractor, the Contractor shall procure for the Beneficiary the benefit of a licence (on the same terms as clause 5.1) for the same purposes.

5.6. The Contractor shall indemnify the Beneficiary against any liability which the Beneficiary may incur by reason of the Contractor infringing or being held to have infringed any copyright.

5.7. The Contractor shall provide to the Beneficiary a copy of any of the Contractor's Design Documents as soon as reasonably practicable after receipt by the Contractor of a written request from the Beneficiary to do so. The Beneficiary agrees to pay the reasonable copying charges of the Contractor for provision of the same to the Beneficiary.

5.8. [The Client shall grant to the Beneficiary an irrevocable, royalty-free, non-exclusive licence to copy and to use the relevant intellectual property rights and to reproduce the [designs and] content of them for any purpose connected to the relevant elements of the Works instructed under clause Z136 of the Contract for the benefit of the Beneficiary where such relevant intellectual property rights are:

5.8.1 assigned to the Client under the Contract; and

5.8.2 used in the Contractor's Design Documents.]

6. PROFESSIONAL INDEMNITY INSURANCE

6.1. The Contractor warrants that:

6.1.1 it has maintained and shall maintain, during the carrying out of the Works and for a period until twelve (12) years from Completion of the relevant elements of the Works instructed under clause Z136 of the Contract for the benefit of the Beneficiary (notwithstanding earlier termination, expiry or suspension of the Contractor's employment under the Contract), the professional indemnity insurance required by the Contract with reputable insurers with a place of business in the United Kingdom for an amount not less than one million pounds (£1,000,000.00), any one claim and in the annual aggregate, in respect of any incurred legal liability on the part of the Contractor in the performance of its design obligations under the Contract; and

6.1.2 cover under the professional indemnity insurance is extended to include the Contractor's liabilities under this deed.

6.2. As and when required by the Beneficiary, the Contractor shall produce for inspection documentary evidence that such insurance is being properly maintained.

6.3. If the Contractor is unable to obtain professional indemnity insurance, it shall promptly notify the Beneficiary.

7. ASSIGNMENT

7.1. The Beneficiary may, with the consent of the Contractor (such consent not being unreasonably withheld), at any time assign the benefit of this deed and/or any rights arising under it by way of absolute legal assignment to any person, provided that no more than two such assignments shall be permitted.

7.2. The Contractor undertakes to the Beneficiary not to contend in any proceedings under this deed that any person to whom the Beneficiary assigns or has assigned its rights under this deed in accordance with the provisions of this clause is to be precluded from recovering any loss resulting from any breach of this deed (whenever happening) by reason that such person is an assignee and not the original promisee under this deed or by reason of such person not being the Beneficiary and/or the loss suffered being different or greater to any loss that may have been suffered by the Beneficiary.

8. LIABILITY OF THE CONTRACTOR

8.1. Unless the contrary is stated, no provision of this deed is intended to exclude any obligation or liability which would otherwise be implied whether by statute, the law of contract, tort, equity or otherwise. The Contractor’s liability to the Beneficiary for matters arising under this deed is limited to the lessor of one million pounds or three times the value of the works and services instructed under clause Z136 of the Contract for the benefit of the Beneficiary.

8.2. The responsibility of the Contractor under this deed is not to be reduced or in any way released or limited by any enquiry or inspection by or on behalf of any person notwithstanding that such enquiry or inspection may give rise to a claim by the Beneficiary against a third party.

8.3. The rights and benefits conferred upon the Beneficiary by this deed are in addition to any other rights and remedies that the Beneficiary may have against the Contractor including (without prejudice to the generality of the foregoing) any remedies in negligence.

8.4. Any limitation or defence which would have been available to the Contractor in an action under the Contract shall likewise be available to the Contractor in a corresponding action under this deed provided always that the Contractor shall not be entitled to raise any defence made on the basis that any loss incurred by the Beneficiary is not a loss to the Client nor shall it be entitled to raise a defence to a claim under this deed any contributory negligence defence, counterclaim or set-off that it may have against the Client under the Contract.

9. LIABILITY OF THE CLIENT

9.1. Unless the contrary is stated, the Client's liability to the Beneficiary for matters arising under this deed is limited to one pound (£1.00).

10. LIMITATION

10.1. The Beneficiary shall be entitled to commence legal proceedings against the Contractor at any time up to the expiry of twelve (12) years from Completion of the relevant elements of the Works instructed under clause Z136 of the Contract for the benefit of the Beneficiary. For the avoidance of doubt, the parties agree that any provision of the Limitation Act 1980 to the contrary shall not apply to this deed.

10.2. The Beneficiary shall be entitled to commence legal proceedings against the Client at any time up to the expiry of six (6) years from Completion of the relevant elements of the Works instructed under clause Z136 of the Contract for the benefit of the Beneficiary. For the avoidance of doubt, the parties agree that any provision of the Limitation Act 1980 to the contrary shall not apply to this deed.

11. NOTICES

11.1. Any notice required to be given under this deed shall be given in writing and is to be delivered personally (which includes delivery by courier) or sent by pre-paid recorded or special delivery post to the party concerned at its address set out in this deed or to such other addresses as may be notified by such party for the purposes of this clause.

11.2. Any notice given pursuant to this clause will be deemed to have been served as follows:

11.2.1 if delivered personally, at the time of delivery; and

11.2.2 if sent by recorded or special delivery post, 48 hours after being delivered into the custody of the postal authorities but excluding Saturdays, Sundays and public and bank holidays in England and Wales.

11.3. In proving service, it will be sufficient to prove that personal delivery was made or that the envelope containing the notice was properly addressed and delivered into the custody of the postal authorities as a pre-paid recorded or special delivery letter.

12. RIGHTS OF THIRD PARTIES

12.1. A person who is not a party to this deed shall have no right under the Contracts (Rights of Third Parties) Act 1999 to enforce any term of this deed. This clause does not affect any right or remedy of any person which exists or is available otherwise than pursuant to that Act.

13. JURISDICTION AND LAW

13.1. This deed is governed by and is to be construed according to English Law and the English Courts shall have jurisdiction in relation to all matters arising under it.

Delivered as a deed on the date of this document.

EXECUTION PAGE

Executed as a deed by **NATIONAL HIGHWAYS LIMITED** by affixing his common seal in the presence of:)
)

Authorised Signatory

Authorised Signatory

Executed as a deed by **[*NAME OF CONTRACTOR*]** by a director in the presence of a witness:)
)
)

Signature ---

Name (block capitals) ---

Director

Witness signature ---

Witness name (block capitals) ---

Witness address ---

Executed as a deed by)
[*NAME OF BENEFICIARY*])
by a [director] [member] in the presence of)
a witness:

Signature ----------

Name (block capitals) ----------

Director

Witness signature ----------

Witness name (block capitals) ----------

Witness address ----------

Annex UC: Design Consultant Collateral Warranty

DATED 202

(1) **[NAME OF DESIGN CONSULTANT]**

- and -

(2) **[NATIONAL HIGHWAYS LIMITED]**

- and -

(3) **[NAME OF CONTRACTOR]**

DESIGN CONSULTANT DEED OF COLLATERAL WARRANTY

relating to [□]

THIS DEED is made on day of 202

BETWEEN:

(1) **[*NAME OF DESIGN CONSULTANT*]** (company number) whose registered office is at (**"Design Consultant"**); and

(2) National Highways Limited (company number 09346363) whose registered office is at Company Secretary, Bridge House, 1 Walnut Tree Close, Guildford, Surrey, GU1 4LZ("Beneficiary") which term includes its legal successors and permitted assignees.

(3) **[*NAME OF CONTRACTOR*]** (company number) whose registered office is at (**"Contractor"**)

BACKGROUND:

A The Beneficiary intends to procure the Project.

B By the Construction Contract, the Contractor has agreed with the Beneficiary to carry out and complete the Works upon the terms and conditions of the Construction Contract.

C By the Contract, the Design Consultant has agreed with the Contractor to carry out and complete the Services upon the terms and conditions of the Contract.

D It is a term of the Contract, or has otherwise been agreed, that the Design Consultant enters into this deed with the Beneficiary in relation to the Services.

IT IS AGREED:

The Design Consultant agrees to enter into the obligations set out in this deed.

1. DEFINITIONS AND INTERPRETATION

1.1. In this deed the following words and expressions shall have the following meanings, unless the context requires otherwise:

"Contract" means the contract dated [ ] made between the Contractor and the Design Consultant;

"Construction Contract" means the contract dated [ ] made between the Beneficiary and the Contractor for the Works";

"Construction Products Regulations" the Construction Products Regulations 2013 (SI 2013/1387), the Construction Products Regulation (305/2011/EU), the Construction Products Regulations 1991 (SI 1991/1620) and the Construction Products Directive (89/109/EC);

"Design Consultant's Design Documents" means the drawings, details and specifications of materials, goods and workmanship and other related documents prepared by or for the Design Consultant in relation to the Services and the design of the Works;

"Group Company" means in relation to a company, that company, any subsidiary or holding company of that company;

"Completion" means the date of completion of the whole of the Works as certified pursuant to the Construction Contract;

"Prohibited Materials" means any products, substances or materials (or any combination of them) which at the time of use:

(a) are identified as potentially hazardous in the BPF/BCO report Good Practice in the Selection of Construction Materials (current edition), other than in accordance with the recommendations as to good practice contained in section 2 of that report; and/or

(b) any other product, substance or material which does not comply with:

(i) which does not comply with relevant British Standard specifications (or their European Union equivalents), codes of practice or good building/construction practice; or

(ii) which are otherwise generally known to the building/construction industry to be deleterious to:

(A) health, safety and wellbeing;

(B) the performance or durability of buildings, civil engineering works, or structures; or

(C) damaging to the environment

in the particular circumstances in which they are specified to be used or are used;

(c) any product supplied or placed on the market in breach of the Construction Products Regulations;

"Project" means [□];

"Project Manager" is as stated in the Construction Contract;

"Services" means the services to be performed by the Design Consultant under the Contract**;** and

"Works" means the works and services to be undertaken by the Contractor under the Construction Contract.

1.2. unless the context requires otherwise:

1.2.1 reference to any gender includes all genders, reference to the singular includes the plural (and vice versa) and reference to persons includes bodies corporate, unincorporated associations and partnerships (whether or not any of them have a separate legal personality);

1.2.2 reference to a recital or clause is a reference to a recital to or clause of this deed;

1.2.3 reference to any legislative provision will be deemed to include any subsequent re-enactment or amending provision;

1.3. the list of contents and clause headings are included for convenience only and do not affect its interpretation;

1.4. where a party comprises two or more persons:

1.4.1 any obligations on the part of that party contained or implied in this deed are deemed to be joint and several obligations on the part of those persons; and

1.4.2 references to that party include references to each and any of those persons; and

1.5. periods of time will be calculated in accordance with section 116 of the Housing Grants, Construction and Regeneration Act 1996.

2. STANDARD OF CARE

2.1. The Design Consultant warrants and undertakes to the Beneficiary that:

2.1.1 it has carried out and shall carry out its duties and obligations under the Contract subject to and in accordance with the terms of the Contract; and

2.1.2 in addition to and without derogation from clause 2.1:

2.1.2.1 it has carried out and shall continue to carry out and complete the Services in a good and workmanlike manner; and

2.1.2.2 the Services will on Completion comply in all respects with the requirements of the Contract.

3. MATERIALS

3.1. The Design Consultant further warrants to the Beneficiary that no Prohibited Materials have been or shall be used or specified for use in the construction of any part of the Works.

4. COPYRIGHT LICENCE

4.1. The Design Consultant shall indemnify the Beneficiary against any liability which the Beneficiary may incur by reason of the Design Consultant infringing or being held to have infringed any copyright or other intellectual property in connection with the Contractor's Design Documents.

4.2. The Design Consultant shall provide to the Beneficiary a copy of any of the Design Consultant's Design Documents as soon as reasonably practicable after receipt by the Design Consultant of a written request from the Beneficiary to do so. The Beneficiary agrees to pay the reasonable copying charges of the Design Consultant for provision of the same to the Beneficiary.

5. PROFESSIONAL INDEMNITY INSURANCE

5.1. The Design Consultant warrants that:

5.1.1 it has maintained and shall maintain, during the carrying out of the Works and for a period until twelve (12) years from Completion of the Works (notwithstanding earlier termination, expiry or suspension of the Design Consultant's employment under the Contract), professional indemnity

insurance with insurers who are of good financial standing, sound security, appropriately regulated and of good repute in the United Kingdom insurance market for an amount not less than £25,000,000.00 in respect of any one claim and in the aggregate per annum and £5,000,000.00 in respect of any one claim and in the aggregate per annum in respect of asbestos (to the extent insured by the relevant policy)., in respect of any negligence on the part of the Design Consultant in the performance of its design obligations under the Contract; and

5.1.2 cover under the professional indemnity insurance is extended to include the Design Consultant's liabilities under this deed.

5.2. As and when required by the Beneficiary, the Design Consultant shall produce for inspection documentary evidence that such insurance is being properly maintained.

5.3. If the Design Consultant is unable to obtain professional indemnity insurance, or if its insurance policy becomes void or unenforceable, it shall promptly notify the Beneficiary.

6. ASSIGNMENT

6.1. The Beneficiary may at any time assign the benefit of this deed and/or any rights arising under it by way of absolute legal assignment to any person.

6.2. The Design Consultant undertakes to the Beneficiary not to contend in any proceedings under this deed that any person to whom the Beneficiary assigns or has assigned its rights under this deed in accordance with the provisions of this clause is to be precluded from recovering any loss resulting from any breach of this deed (whenever happening) by reason that such person is an assignee and not the original promisee under this deed or by reason of such person not being the Beneficiary and/or the loss suffered being different or greater to any loss that may have been suffered by the Beneficiary.

7. LIABILITY OF THE DESIGN CONSULTANT

7.1. Unless the contrary is stated, no provision of this deed is intended to exclude any obligation or liability which would otherwise be implied whether by statute, the law of contract, tort, equity or otherwise.

7.2. The responsibility of the Design Consultant under this deed is not to be reduced or in any way released or limited by any enquiry or inspection by or on behalf of any person notwithstanding that such enquiry or inspection may give rise to a claim by the Beneficiary against a third party.

7.3. The rights and benefits conferred upon the Beneficiary by this deed are in addition to any other rights and remedies that the Beneficiary may have against the Design Consultant including (without prejudice to the generality of the foregoing) any remedies in negligence.

7.4. Subject to clause 7.6, any limitation or defence which would have been available to the Design Consultant in an action under the Contract shall likewise be available to the Design Consultant in a corresponding action under this deed provided always that the Design Consultant shall not be entitled to raise any defence made on the basis that any loss incurred by the Beneficiary is not a loss to the Contractor nor

shall it be entitled to raise a defence to a claim under this deed any contributory negligence defence, counterclaim or set-off that it may have against the Contractor under the Contract.

7.5. The Contractor and Design Consultant agree that no changes to the proposed form of the Contract shall be made following its acceptance by the Project Manager pursuant to Clause 26 of the Construction Contract without the written approval of the Beneficiary.

7.6. The provisions of clause 7.4 shall not apply to any changes made to the Contract in breach of clause 7.5.

8. LIMITATION

8.1. The Beneficiary shall be entitled to commence legal proceedings against the Design Consultant at any time up to the expiry of 12 years from Completion of the Works. For the avoidance of doubt, the parties agree that any provision of the Limitation Act 1980 to the contrary shall not apply to this deed.

9. NOTICES

9.1. Any notice required to be given under this deed is to be delivered personally (which includes delivery by courier) or sent by pre-paid recorded or special delivery post to the party concerned at its address set out in this deed or to such other addresses as may be notified by such party for the purposes of this clause.

9.2. Any notice given pursuant to this clause will be deemed to have been served as follows:

9.2.1 if delivered personally, at the time of delivery; and

9.2.2 if sent by recorded or special delivery post, 48 hours after being delivered into the custody of the postal authorities but excluding Saturdays, Sundays and public and bank holidays in England and Wales.

9.3. In proving service, it will be sufficient to prove that personal delivery was made or that the envelope containing the notice was properly addressed and delivered into the custody of the postal authorities as a pre-paid recorded or special delivery letter.

10. RIGHTS OF THIRD PARTIES

10.1. A person who is not a party to this deed shall have no right under the Contracts (Rights of Third Parties) Act 1999 to enforce any term of this deed. This clause does not affect any right or remedy of any person which exists or is available otherwise than pursuant to that Act.

11. JURISDICTION AND LAW

11.1. This deed is governed by and is to be construed according to English Law and the English Courts shall have jurisdiction in relation to all matters arising under it.

DELIVERED as a deed on the date of this document.

EXECUTION PAGE

Executed as a deed by)
[*NAME OF DESIGN CONSULTANT*])
by a director in the presence of a witness:)

Signature ----------

Name (block capitals) ----------

Director

Witness signature ----------

Witness name (block capitals) ----------

Witness address ----------

Executed as a deed by)
)
[***NAME OF BENEFICIARY***])
)

by a [director] [member] in the presence of a witness:

Signature .....

Name (block capitals) .....

Director

Witness signature .....

Witness name (block capitals) .....

Witness address .....

.....

.....

Executed as a deed by)
)
[**NAME OF CONTRACTOR]**)
)

by a [director] [member] in the presence of a witness:

Signature .....

Name (block capitals) .....

Director

Witness signature .....

Witness name (block capitals) .....

Witness address .....

.....

.....

Executed as a deed by)
)
[***NAME OF BENEFICIARY***])
)

by a [director] [member] in the presence of a witness:

Signature .....

Name (block capitals) .....

Director

Witness signature .....

Witness name (block capitals) .....

Witness address .....

.....

.....

Annex UD: Supplier collateral warranty

DATED 202

(1) [NAME OF SUPPLIER]

- and -

(2) [NATIONAL HIGHWAYS LIMITED]

SUPPLIER DEED OF COLLATERAL WARRANTY

relating to [□]

THIS DEED is made on day of 202

BETWEEN:

(1) **[*NAME OF SUPPLIER*]** (company number) whose registered office is at (**"Supplier"**); and

(2) National Highways Limited (company number 09346363) whose registered office is at Company Secretary, Bridge House, 1 Walnut Tree Close, Guildford, Surrey, GU1 4LZ("Beneficiary") which term includes its legal successors and permitted assignees.

BACKGROUND:

A The Beneficiary intends to procure the Project.

B By the Construction Contract, the Contractor has agreed with the Beneficiary to carry out and complete the Works upon the terms and conditions of the Construction Contract.

C By the Contract, the Supplier has agreed with the Contractor to carry out and complete the Services upon the terms and conditions of the Contract.

D It is a term of the Contract, or has otherwise been agreed, that the Supplier enters into this deed with the Beneficiary in relation to the Services.

IT IS AGREED:

The Supplier agrees to enter into the obligations set out in this deed.

1. DEFINITIONS AND INTERPRETATION

1.1. In this deed the following words and expressions shall have the following meanings, unless the context requires otherwise:

"Contract" means the contract dated [ ] made between the Contractor and the Supplier;

"Construction Contract" means the contract dated [ ] made between the Beneficiary and the Contractor for the Works";

"Construction Products Regulations" the Construction Products Regulations 2013 (SI 2013/1387), the Construction Products Regulation (305/2011/EU), the Construction Products Regulations 1991 (SI 1991/1620) and the Construction Products Directive (89/109/EC);

"Contractor" means [ ];

"Supplier's Design Documents" means the drawings, details and specifications of materials, goods and workmanship and other related documents prepared by or for the Supplier in relation to the Services and the design of the Works;

"Group Company" means in relation to a company, that company, any subsidiary or holding company of that company;

"Completion" means the date of completion of the whole of the Works as certified pursuant to the Construction Contract;

"Prohibited Materials" means any products, substances or materials (or any combination of them) which at the time of use:

(a) are identified as potentially hazardous in the BPF/BCO report Good Practice in the Selection of Construction Materials (current edition), other than in accordance with the recommendations as to good practice contained in section 2 of that report; and/or

(b) any other product, substance or material which does not comply with:

(i) which does not comply with relevant British Standard specifications (or their European Union equivalents), codes of practice or good building/construction practice; or

(ii) which are otherwise generally known to the building/construction industry to be deleterious to:

(A) health, safety and wellbeing;

(B) the performance or durability of buildings, civil engineering works, or structures; or

(C) damaging to the environment

in the particular circumstances in which they are specified to be used or are used;

(c) any product supplied or placed on the market in breach of the Construction Products Regulations;

"Project" means [□];

"Services" means the services to be performed by the Supplier under the Contract**;** and

"Works" means the works and services to be undertaken by the Contractor under the Construction Contract.

1.2. unless the context requires otherwise:

1.2.1 reference to any gender includes all genders, reference to the singular includes the plural (and vice versa) and reference to persons includes bodies corporate, unincorporated associations and partnerships (whether or not any of them have a separate legal personality);

1.2.2 reference to a recital or clause is a reference to a recital to or clause of this deed;

1.2.3 reference to any legislative provision will be deemed to include any subsequent re-enactment or amending provision;

1.3. the list of contents and clause headings are included for convenience only and do not affect its interpretation;

1.4. where a party comprises two or more persons:

1.4.1 any obligations on the part of that party contained or implied in this deed are deemed to be joint and several obligations on the part of those persons; and

1.4.2 references to that party include references to each and any of those persons; and

1.5. periods of time will be calculated in accordance with section 116 of the Housing Grants, Construction and Regeneration Act 1996.

2. STANDARD OF CARE

2.1. The Supplier warrants and undertakes to the Beneficiary that:

2.1.1 it has carried out and shall carry out its duties and obligations under the Contract subject to and in accordance with the terms of the Contract; and

2.1.2 in addition to and without derogation from clause 2.1:

2.1.2.1 it has carried out and shall continue to carry out and complete the Services in a good and workmanlike manner; and

2.1.2.2 the Services will on Completion comply in all respects with the requirements of the Contract.

3. MATERIALS

3.1. The Supplier further warrants to the Beneficiary that no Prohibited Materials have been or shall be used or specified for use in the construction of any part of the Works.

4. COPYRIGHT LICENCE

4.1. The Supplier shall indemnify the Beneficiary against any liability which the Beneficiary may incur by reason of the Supplier infringing or being held to have infringed any copyright or other intellectual property in connection with the Supplier's Design Documents.

4.2. The Supplier shall provide to the Beneficiary a copy of any of the Supplier's Design Documents as soon as reasonably practicable after receipt by the Supplier of a written request from the Beneficiary to do so. The Beneficiary agrees to pay the reasonable copying charges of the Supplier for provision of the same to the Beneficiary.

5. NOT USED

6. ASSIGNMENT

6.1. The Beneficiary may at any time assign the benefit of this deed and/or any rights arising under it by way of absolute legal assignment to any person.

6.2. The Supplier undertakes to the Beneficiary not to contend in any proceedings under this deed that any person to whom the Beneficiary assigns or has assigned its rights under this deed in accordance with the provisions of this clause is to be precluded from recovering any loss resulting from any breach of this deed

(whenever happening) by reason that such person is an assignee and not the original promisee under this deed or by reason of such person not being the Beneficiary and/or the loss suffered being different or greater to any loss that may have been suffered by the Beneficiary.

7. LIABILITY OF THE SUPPLIER

7.1. Unless the contrary is stated, no provision of this deed is intended to exclude any obligation or liability which would otherwise be implied whether by statute, the law of contract, tort, equity or otherwise.

7.2. The responsibility of the Supplier under this deed is not to be reduced or in any way released or limited by any enquiry or inspection by or on behalf of any person notwithstanding that such enquiry or inspection may give rise to a claim by the Beneficiary against a third party.

7.3. The rights and benefits conferred upon the Beneficiary by this deed are in addition to any other rights and remedies that the Beneficiary may have against the Supplier including (without prejudice to the generality of the foregoing) any remedies in negligence.

8. LIMITATION

8.1. The Beneficiary shall be entitled to commence legal proceedings against the Supplier at any time up to the expiry of 6 years from Completion of the Works. For the avoidance of doubt, the parties agree that any provision of the Limitation Act 1980 to the contrary shall not apply to this deed.

9. NOTICES

9.1. Any notice required to be given under this deed is to be delivered personally (which includes delivery by courier) or sent by pre-paid recorded or special delivery post to the party concerned at its address set out in this deed or to such other addresses as may be notified by such party for the purposes of this clause.

9.2. Any notice given pursuant to this clause will be deemed to have been served as follows:

9.2.1 if delivered personally, at the time of delivery; and

9.2.2 if sent by recorded or special delivery post, 48 hours after being delivered into the custody of the postal authorities but excluding Saturdays, Sundays and public and bank holidays in England and Wales.

9.3. In proving service, it will be sufficient to prove that personal delivery was made or that the envelope containing the notice was properly addressed and delivered into the custody of the postal authorities as a pre-paid recorded or special delivery letter.

10. RIGHTS OF THIRD PARTIES

10.1. A person who is not a party to this deed shall have no right under the Contracts (Rights of Third Parties) Act 1999 to enforce any term of this deed. This clause does not affect any right or remedy of any person which exists or is available otherwise than pursuant to that Act.

11. JURISDICTION AND LAW

11.1. This deed is governed by and is to be construed according to English Law and the English Courts shall have jurisdiction in relation to all matters arising under it.

DELIVERED as a deed on the date of this document.

EXECUTION PAGE

Executed as a deed by)
)
[***NAME OF SUPPLIER***])

by a director in the presence of a witness:

Signature .....

Name (block capitals) .....

Director

Witness signature .....

Witness name (block capitals) .....

Witness address .....

.....

.....

Executed as a deed by)
[*NAME OF BENEFICIARY*])
by a [director] [member] in the presence of)
a witness:

Signature ----------

Name (block capitals) ----------

Director

Witness signature ----------

Witness name (block capitals) ----------

Witness address ----------

Annex V: Advanced Payment Bond

DATED **202**

(1) [NAME OF CONTRACTOR]
as Contractor

(2) [NAME OF SURETY]
as Surety

(3) NATIONAL HIGHWAYS LIMITED
as Client

ADVANCE PAYMENT BOND

relating to a contract for the provision
of construction works at Lower Thames Crossing
Tunnels and Approaches

THIS ADVANCE PAYMENT BOND is made as a deed between the following parties whose names and registered office addresses are set out in the Schedule to this Bond (the "**Schedule**"):

(1) The "**Contractor**" as principal;

(2) The "**Surety**" as surety; and

(3) The "**Client**".

BACKGROUND:

(A) By a contract (the "**Contract**") entered into between the Client and the Contractor, particulars of which are set out in the Schedule, the Contractor has agreed with the Client to carry out certain construction works (the "**Works**") upon and subject to the terms of the Contract.

(B) The Client has agreed to make an advance payment (the "**Advance Payment**") to the Contractor in accordance with [clause Z120 (Payment Bond) / Z131 (Payments for Plant and Materials outside of the Working Areas)][19] of the Contract provided the Contractor has taken out this Bond in favour of the Client.

OPERATIVE PROVISIONS:

1. The Surety is unconditionally and irrevocably bound to the Client in the maximum aggregate sum of £[●] (the "Maximum Aggregate Sum") until the Works have reached the stage referred to in clause 7 below.

2. The Surety shall (waiving all rights of objection and defence, except in the case of fraud) immediately on receipt of a first demand, served from time to time by the Client, which complies with the requirements of Clause 3, pay to the Client the amount demanded up to the Maximum Aggregate Sum.

3. Any demand by the Client under Clause 2 shall:

    a) be in writing addressed to the Surety at its office as referred to in this Bond; and
    b) state the amount demanded [(which shall not exceed the amount of the payments made by the Client to the Contractor for Plant and Materials outside of the Working Areas (both as defined in the Contract) that has not been incorporated into the Works)][20].

    Such demand as above shall, for the purposes of this Bond but not further or otherwise, be conclusive evidence (and admissible as such) that the amount demanded is properly due and payable to the Client.

4. Notwithstanding Clause 1, the Maximum Aggregate Sum shall not apply so as to limit the amount payable by the Surety in relation to any rights or remedies which the Client may have arising from a breach of the terms of this Bond.

5. Any amount payable to the Client under this Bond shall be paid in full and free of any present or future taxes, levies, duties, charges, fees or withholdings of whatsoever nature and without any deduction, restriction, condition, withholding,

[19] Delete as applicable.
[20] Delete if bond not issued in accordance with clause Z131.

set-off or counterclaim. If and to the extent that the Surety is compelled by law to make any deduction or withholding, the Surety will gross up such payment so that the net sum received by the Client will be equal to the full amount which the Client would have received had no such deduction or withholding been made.

6. The benefit of this Bond may be assigned by the Client to any person to whom it assigns the benefit of the Contract, subject to notice in writing of such assignment being given to the Surety.

7. [This Bond shall remain in full force and effect until [section 1] (as defined in the Contract) of the Works has reached Completion (as defined in the Contract) under the terms of the Contract, at which time this Bond will terminate and become of no further effect.][21]

8. [This Bond shall remain in full force and effect until the later of;

- the time when all the Plant and Materials outside of the Working Area (both as defined in the Contract) (which the Client has made payment for) have been incorporated into the Works or
- [section 1[22]] [section 2] (as defined in the Contract) of the Works has reached Completion (as defined in the Contract) under the terms of the Contract

at which time this Bond will terminate and become of no further effect.][23]

9. This Bond shall be governed by and construed in accordance with the laws of England and any dispute or difference arising under it shall be subject to the exclusive jurisdiction of the courts of England and Wales save that any decision, judgment or award of such courts may be enforced in the courts of any jurisdiction.

10. Unless the right of enforcement is expressly granted, it is not intended that any third party should have the right to enforce any term of this Bond pursuant to the Contracts (Rights of Third Parties) Act 1999.

11. Any notice or other communication required under this Bond shall be given in writing addressed to:

- [Address of the Surety in England and Wales]
- For the Attention of [insert details]

or such other address in England and Wales as the Surety has from time to time notified to the Client in writing in accordance with the terms of this Bond as being an address for the receipt of such demands or notices.

Any notice or demand served on the Surety under this Bond shall be deemed to have been served:

- if delivered to or left at (but not in either case by post) the Surety's address as referred to in this clause above, at the time of delivery; or

[21] For use with clause Z120.
[22] Delete as appropriate, section 1 for use in Tunnels and Approaches and Roads North of the Thames and section 2 for use in Kent Roads.
[23] For use with clause Z131.

- if posted, at 10.00 a.m. on the second working day after it was put into the post.

In proving service of a notice or demand on the Surety it shall be sufficient to prove that delivery was made, or that the envelope containing the notice or demand was properly addressed and posted as a prepaid first class recorded delivery letter.

This Bond has been executed as a deed and delivered on the date stated at the beginning of this Bond.

Schedule

The Contractor:	[●] whose registered office address is at [●].
The Surety:	[●] whose registered office address is at [●].
The Client:	**NATIONAL HIGHWAYS LIMITED** (company no 09346363) whose registered office is at Bridge House, 1 Walnut Tree Close, Guildford, Surrey GU1 4LZ.
The Contract:	A contract dated [●] made between the Client and the Contractor in the form of the NEC4 Engineering and Construction Contract (June 2017 edition incorporating amendments January 2019 and October 2020) for the carrying out of construction works at [●].

EXECUTION PAGE

Executed as a deed by **[SURETY]** acting by:)
)

.....
Director

.....
Director/Company Secretary

OR

Executed as a deed by [**SURETY**] acting by [name of director] in the presence of:)
)
) Signature .....

Name (block capitals) .....

Director

Witness signature .....

Witness name (block capitals) .....

Witness address .....

.....

Annex W: Project Risk Register

Not used.

Annex X: Form of Performance Security

To: ……

(“The Client”)

THIS GUARANTEE is made on [.....……....]

Guarantee Nº.:

We have been informed that our client [corporate name and registered details of Contractor] (the “Contractor”) has entered into a contract with you dated [ ], (the “Contract”), for the execution of [scope of work of Contract], as further described in the Contract.

Furthermore, we understand that, the Contract contains an obligation on the part of the Contractor to provide a Guarantee in the amount of [10% of the total of the Prices (as defined in the Contract)].

As guarantor, we [insert name and address of the bank] (the “Bank”) hereby unconditionally and irrevocably undertake, without any right of setoff or counterclaim and notwithstanding any objection which may be made by the Contractor, on one or more occasions, to immediately pay to you as you may direct, such an amount not exceeding in total (when aggregated with any such amount(s) previously so paid) “amount in numbers”] [insert “amount in words”], upon receipt by us of your written notice stating that in your sole and absolute judgement, the Contractor is in breach of its obligation(s) under the Contract, without you needing to prove or to show grounds for your demand or the sum specified therein.

Such written notice of the Client shall be conclusively binding on us for all purposes under this Performance Security.

Any demand for payment hereunder may be made in total or in part, without invalidating the guarantee to any sum not called. This guarantee shall expire, no earlier than twelve (12) years after Completion of the whole of the *works* (as defined in the Contract), and any demand for payment under it must be received by us at this office on or before that date.

Any and all demands under this guarantee must either be in writing addressed to the Bank’s office …….. or by way of authenticated swift via the Client’s bankers and reaching the Bank on or before the Expiry Date

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 revision, ICC Publication No.758.

Signature(s)

Signed and sealed this day of ,[Insert date 202[ ]]

Annex Y: Software Confidentiality Agreement

Not used.

Annex Z: Pensions

1. In this Annex the following definitions apply

   - Contractor's Alternative Pension Plan is the pension scheme established or nominated by the *Contractor* which satisfies the conditions set out in paragraph 2.

2. The *Contractor* offers its employees who are assigned to provision of the *works* or a relevant part of the *works* membership of the Contractor's Alternative Pension Plan in respect of employment up to the Transfer Date.

3. Unless the prior consent of the *Project Manager* is given, the Contractor's Alternative Pension Plan is

   - a registered pension scheme for the purposes of the Finance Act 2004 and
   - a scheme which, as a minimum, fulfils the *Contractor's* benefit obligations under TUPE, the Transfer of Employment (Pension Protection) Regulations 2005 and sections 257 and 258 of the Pensions Act 2004.

4. Unless the prior consent of the *Project Manager* is given, the *Contractor* ensures that any subcontractor (at any stage of remoteness from the *Client*) and any such subcontractor's pension plan in respect of its employees who are assigned to provision of the *works* or a relevant part of the *works* complies with the requirements of this Annex, including paragraphs 2 and 5.

5. The *Contractor* ensures that

   - its obligations in respect of Exit Transferring Employees who are members of the Contractor's Alternative Pension Plan and
   - any subcontractor's (at any stage of remoteness from the *Client*) obligations in respect of Exit Transferring Employees who are members of any such subcontractor's pension plan

   are discharged prior to the Transfer Date.

Annex AA: Third Party Agreements list[24]

Annex AA Third Party Agreements List

Table 1: Agreements obtained by the *Client* - Agreements Placed

Stakeholder Name	Name of Agreement	Kent Roads	Roads North	Tunnels
High Speed 1	Site Investigation License agreement (Pre-enabling and Ground Investigation)	Kent Roads		
Network Rail Anglia	Basic Asset Protection Agreement 1 (Upfront Formalities and Surveys)		RN	Tunnels
Network Rail Anglia	Basic Asset Protection Agreement 2 (Installation of Monitoring Equipment)		RN	Tunnels
Network Rail Southern	Basic Asset Protection Agreement 1 (Ground Investigation)			Tunnels
Network Rail Southern	Basic Asset Protection Agreement 2 (Monitoring Assessment & Monitoring Target Installation)			Tunnels
Network Rail Southern	**Basic Services Agreement**			Tunnels
National Grid - Gas	Preliminary Works Agreement DDSA (PWA5)	Kent Roads		Tunnels
National Grid - Gas	Preliminary Works Agreement DDSA (PWA7)	Kent Roads		Tunnels
Cadent Gas Limited	Design Services Agreement (Non-Contestable)		RN	
Cadent Gas Limited	Contestable Detailed Design (Capita Property and Infrastructure Ltd)		RN	
National Grid – Electric Transmission Plc	Services Agreement (Provision of Consultancy Services)	Kent Roads	RN	
National Grid Electric Transmission Plc	Detailed Design Services Agreement (Non-Contestable)	Kent Roads	RN	
Southern Water	Detailed Design Services Agreement	Kent Roads		
Southern Gas Network Plc	Feasibility Service Agreement	Kent Roads		

[24] Note to tenderers: Copies of relevant agreements will be disclosed at a later date.

Stakeholder Name	Name of Agreement	Kent Roads	Roads North	Tunnels
Southern Gas Network Plc	SGN Detailed Design Services Agreement	Kent Roads		
UK Power Networks (Operations) Limited	Detailed Design Services Agreement (Non-Contestable)	Kent Roads	RN	Tunnels
Instalcom/ CenturyLink	Detailed Design Services (Non-Contestable)		RN	
Instalcom/ CenturyLink	Detailed Design Services (Contestable Works)		RN	
Instalcom/ GTT	Detailed Design Services (Non-Contestable)		RN	
Instalcom/ GTT	Detailed Design Services (Contestable Works)		RN	
BT Openreach	North and South Non-Contestable /Contestable Detailed Design	Kent Roads	RN	Tunnels
Port of Tilbury	Duct Enabling Works (Written Instruction)			Tunnels

Note: The following SU's Design Agreements have been placed under NRSWA and are C3 /C4

JSM/Zayo

Vodafone

Virgin Media

Verizon

Thames Water

Essex Suffolk Water incl Compound Connections Agreement CA5 to CA16 Design

On Tower UK Limited/Cellnex (Arqiva)

Anglian Water

Note: Assumption: City of London Corporation: HE will acquire the redundant high pressure gas pipeline through compulsory acquisition as result of the DCO being granted. This will enable the extinguishment of any rights from which the City of London currently benefit, LTC to cap the pipeline at the site boundaries negating the need for any diversion.

Table 2: Agreements the *Client* may obtain - Agreements required which are under negotiation and being progressed

Stakeholder	Agreement Name/ Type	Kent Roads	RN	Tunnels
Havering	Protective Provisions (Drainage Authority)		RN	
Essex	Protective Provisions (Drainage Authority)		RN	
Kent	Protective Provisions (Drainage Authority)	Kent Roads		
Thurrock	Protective Provisions (Drainage Authority)			Tunnels
North Kent Marshes	Protective Provisions (Drainage Authority)	Kent Roads		
Forestry Commission	Forestry Commission	Kent Roads		
Environment Agency	Environment Agency - Protective Provisions			Tunnels
Port of London Authority	Property Agreement			Tunnels
Port of London Authority	Protective Provisions			Tunnels
Essex Wildlife Trust	Mitigation Site Management (mink control on third party owned land)		RN	Tunnels
Essex Wildlife Trust	Land Agreements (Install and Maintain barn owl boxes on EWT land)		RN	Tunnels
Kent County Council	S253 Agreement for enhancement works in Shorne Woods Country Park	Kent Roads		Tunnels
Southern Water	Compound Connections Agreement CA2 Design	Kent Roads		
Southern Water	Compound Connections Agreement CA3 Design			Tunnels
Southern Water	Side Agreement	Kent Roads		Tunnels
Southern Water	Protective Provisions	Kent Roads		Tunnels
Southern Water	Diversion/Construction Works Agreement	Kent Roads		Tunnels
Essex & Suffolk Water	Side Agreement		RN	Tunnels
Essex & Suffolk Water	Protective Provisions		RN	Tunnels
Essex & Suffolk Water	Diversion/Construction Works Agreement		RN	Tunnels
Essex & Suffolk Water	Gun Hill and Linford TBM Water Supply - Design		RN	Tunnels
Anglian Water	Side Agreement		RN	Tunnels
Anglian Water	Protective Provisions		RN	Tunnels
Anglian Water	Diversion/Construction Works Agreement		RN	Tunnels

Stakeholder	Agreement Name/ Type	Kent Roads	RN	Tunnels
Thames Water	Side Agreement		RN	
Thames Water	Protective Provisions		RN	
Cadent Gas	Diversionary Works Agreement (Incl Purchase /Storage of Long Lead Materials)		RN	
Cadent Gas	Protective Provisions		RN	
Cadent Gas	Side Agreement		RN	
SGN	Diversionary Works Agreement	Kent Roads		
SGN	Protective Provisions	Kent Roads		
SGN	Side Agreement	Kent Roads		
UKPN	Side Agreement	Kent Roads	RN	Tunnels
UKPN	Diversionary Works Agreement	Kent Roads	RN	Tunnels
UKPN	Protective Provisions	Kent Roads	RN	Tunnels
Thurrock Power Limited	Protective Provisions		RN	Tunnels
Thurrock Power Limited	Interface Agreement		RN	Tunnels
Nat Grid Elec	Side Agreement	Kent Roads	RN	Tunnels
Nat Grid Elec	Diversion / Construction Agreement	Kent Roads	RN	Tunnels
Nat Grid Elec	Protective Provisions	Kent Roads	RN	Tunnels
Nat Grid Gas	Side Agreement	Kent Roads		Tunnels
Nat Grid Gas	Purchase + Storage of Long Lead Materials Agreement	Kent Roads		Tunnels
Nat Grid Gas	Diversion / Construction Works Agreement	Kent Roads		Tunnels
Nat Grid Gas	Protective Provisions	Kent Roads		Tunnels
Verizon	Diversion/Construction Works Agreement		RN	
Verizon	Protective Provisions		RN	
Airwave	Protective Provisions		RN	
Lumen (Century Link)	Side Agreement		RN	
Lumen (Century Link)	Protective Provisions		RN	
Lumen (Century Link)	Diversion / Construction Works Agreement		RN	
GTT	Protective Provisions		RN	
GTT	Diversion / Construction Works Agreement		RN	

Stakeholder	Agreement Name/ Type	Kent Roads	RN	Tunnels
BT Openreach	Diversion / Construction Works Agreement	Kent Roads	RN	Tunnels
BT Openreach	Protective Provisions	Kent Roads	RN	Tunnels
On Tower UK Ltd/Cellnex	Protective Provisions	Kent Roads	RN	
Virgin Media	Protective Provisions		RN	Tunnels
Virgin Media	Diversion / Construction Works Agreement		RN	Tunnels
Vodafone	Protective Provisions	Kent Roads	RN	Tunnels
Vodafone	Diversion / Construction Works Agreement	Kent Roads	RN	Tunnels
JSM/Zayo	Protective Provisions		RN	
JSM/Zayo	Diversion / Construction Works Agreement		RN	
Network Rail Infrastructure Ltd	Framework Agreement		RN	Tunnels
Network Rail Infrastructure Ltd	Protective Provisions		RN	Tunnels
Network Rail Southern	Basic Asset Protection Agreement – 3			Tunnels
High Speed 1 Ltd	Framework Agreement	Kent Roads		
High Speed 1 Ltd	Protective Provisions	Kent Roads		
PoT	Ducts Deed of Grant			Tunnels
PoT	Deed of Grant (Use of Access Road)			Tunnels
PoT	Protective Provisions			Tunnels
IVL	Early PFA Extraction (Site clean-up)			Tunnels

Table 3: Agreements the *Client* may obtain - Agreements which may be required but which are not yet under negotiation

Stakeholder	Agreement Name/ Type	Kent Roads	RN	Tunnels
Kent Down AONB Unit	Compensatory Enhancements in the AONB	Kent Roads		
Essex & Suffolk Water	Gun Hill and Linford TBM Water Supply – Construct (Incl Soil Mixing)		RN	Tunnels
Essex & Suffolk Water	Long Lead Materials		RN	Tunnels
Thames Water	Diversion/Construction Works Agreement		RN	
SGN	Purchase + Storage of Long Lead Materials Agreement	Kent Roads		
Airwave	Diversion/Construction Works Agreement		RN	
On Tower UK Ltd/Cellnex	Diversion / Construction Works Agreement	Kent Roads	RN	
Network Rail Anglia	Tilbury Viaduct – AiP Form 1 & Form A (OLE Modification)		RN	
Network Rail Anglia	Tilbury Viaduct – Bridge Protection Agreement		RN	
Network Rail Anglia	Tilbury Viaduct - Asset Protection Agreement – Oversail		RN	
Network Rail Anglia	Tilbury Viaduct Clearances (renewal c.Apr 2025)		RN	
Network Rail Anglia	Ockenden NMU – AiP* Form 1		RN	
Network Rail Anglia	Ockenden NMU Bridge Protection Agreement – Oversail		RN	
Network Rail Anglia	Ockenden NMU Clearances (renewal c.Apr 25)		RN	
Network Rail Anglia	Franks Farm Widening – AIP* Form 1		RN	
Network Rail Anglia	Franks Farm Widening – Asset Protection Agreement for Oversail and Pier Extension		RN	
Network Rail Anglia	Franks Farm Widening – Clearances (renewal c.Apr 25)		RN	
Network Rail Anglia	Franks Farm Widening – Bridge Protection Agreement for Pier Extension and Oversail (*pending land acquisition)		RN	
Network Rail Anglia	Shoeburyness Collector Road Oversail AIP* Form 1		RN	
Network Rail Anglia	Shoeburyness Collector Road Oversail and Pier Extension – Asset Protection Agreement		RN	

Stakeholder	Agreement Name/ Type	Kent Roads	RN	Tunnels
Network Rail Anglia	Shoeburyness Collector Road Oversail and Pier Extension – Bridge Protection Agreement		RN	
Network Rail Anglia	Shoeburyness Collector Road Oversail and Pier Extension – Clearances (renewal c.Apr 25)		RN	
Network Rail Anglia	Shoeburyness Collector Road Oversail and Pier Extension – Easement(s)		RN	
Network Rail Anglia	AiP* for Basic Asset Protection Agreements: Utilities Tilbury NGET o/h realignment Tilbury UKPN o/h replaced with UTX (under track crossing) Tilbury Essex & Suffolk Water UTX 700m West of Tilbury Viaduct for supply to TBM slurry machine Tilbury Essex & Suffolk Water (Linford Borehole) UTX East of Tilbury Viaduct for new supply to TBM slurry machine Ockendon UKPN o/h replaced with UTX Ockendon Essex and Suffolk Water UTX for diverted HP main Tilbury Loop Southern Boundary		RN	
Network Rail Southern	Gravesend Tunnel – Basic Asset Protection Agreement for Culvert			Tunnels
Network Rail Southern	Gravesend Tunnel – Asset Protection Agreement for Tunnel/North Kent Railway/Grout Tunnel			Tunnels
Network Rail Southern	Gravesend Tunnel – Clearances			Tunnels
Network Rail Southern	Network Rail Approval in Principle (*AiP) processes for Anglian Water Sewer Rising Main 300m south west of Station Road level crossing		RN	Tunnels
Network Rail Southern	*AiP for Essex & Suffolk Water Contestable UTX for Gun Hill water supply pipeline		RN	Tunnels
Network Rail Southern	*AiP for Essex & Suffolk Water Contestable U UTX for Linford water supply pipeline			Tunnels

Stakeholder	Agreement Name/ Type	Kent Roads	RN	Tunnels
Network Rail Anglia	*AiP for UKPN for Installation of power ducts and cables parallel to Tilbury Loop southern boundary		RN	Tunnels
Network Rail Southern	*AiP Great TBM Tunnel Crossings x 2 – NB + SB tunnels –North Kent Railway			Tunnels
Network Rail Southern	*AiP for impacts of RAMSAR Drive Shaft & 5m Tunnel			Tunnels
High Speed 1 Ltd	Asset Protection Agreement – Retaining Wall Construction including Piling	Kent Roads		
High Speed 1 Ltd	*NEW* Asset Protection Agreement – Drainage (04-135)	Kent Roads		
High Speed 1 Ltd	Network Rail high Speed LTD AiP** (**process on behalf of HS1 Ltd) for utilities works and possessions on/around HS1 operational land: UKPN – 11Kv Cable Diversion, HS1 Substation – AiP process started (Form 1) Telecomms (BT Openreach)	Kent Roads		
Southern Water	Compound Connections Agreement for CA2 Construct	Kent Roads		
Southern Water	Compound Connections Agreement for CA3 Construct			Tunnels
Southern Water	Diversion/Construction Works Agreement	Kent Roads		Tunnels
Southern Water	Asset Protection Agreement	Kent Roads		Tunnels
Essex & Suffolk Water	Adoption Of Contestable Diversion Works		RN	Tunnels
Essex & Suffolk Water	Asset Protection Agreement		RN	Tunnels
UKPN	Asset Protection Agreement	Kent Roads	RN	Tunnels
UKPN	Diversionary Works Agreement	Kent Roads	RN	Tunnels
Network Rail Anglia	Tilbury Viaduct Easement(s)		RN	
Network Rail Anglia	Ockenden NMU Easement(s)		RN	
Network Rail Anglia	Franks Farm Widening – Easements		RN	
Network Rail Anglia	Shoeburyness Collector Road Oversail and Pier Extension – Clearances (renewal c.Apr 25)		RN	
Network Rail Southern	Gravesend Tunnel – Easements			Tunnels

Table A – Non-Utility Agreements obtained by the *Client*

Stakeholder Name	Name of Agreement	Area
Network Rail Anglia	Basic Asset Protection Agreement 1 (Upfront Formalities and Surveys)	Tunnels
Network Rail Anglia	Basic Asset Protection Agreement 2 (Installation of Monitoring Equipment)	Tunnels
Network Rail Southern	Basic Asset Protection Agreement 1 (Ground Investigation)	Tunnels
Network Rail Southern	Basic Asset Protection Agreement 2 (Monitoring Assessment & Monitoring Target Installation)	Tunnels
Network Rail Southern	Basic Services Agreement	Tunnels
Port of Tilbury	Duct Enabling Works (Written Instruction)	Tunnels

Table B – Non-Utility Agreements the *Client* may obtain

Stakeholder	Agreement Name/Type	Area
Thurrock	Protective Provisions (Drainage Authority)	Tunnels
Environment Agency	Environment Agency – Protective Provisions	Tunnels
Port of London Authority	Property Agreement	Tunnels
Port of London Authority	Protective Provisions	Tunnels
Essex Wildlife Trust	Mitigation Site Management (mink control on third party owned land)	Tunnels
Essex Wildlife Trust	Land Agreements (Install and Maintain barn owl boxes on EWR land)	Tunnels
Kent County Council	S253 Agreement for enhancement works in Shorne Woods Country Park	Tunnels
Network Rail Infrastructure Ltd	Framework Agreement	Tunnels
Network Rail Infrastructure Ltd	Protective Provisions	Tunnels
Network Rail Southern	Basic Asset Protection Agreements - 3	Tunnels
PoT	Ducts Deed of Grant	Tunnels
PoT	Deed of Grant (Use of Access Road)	Tunnels
PoT	Protective Provisions	Tunnels
IVL	Early PFA Extraction (Site clean-up)	Tunnels

Annex CC: Equipment transfer of title and waiver

TRANSFER OF TITLE AND WAIVER

relating to the transfer of Equipment in connection with the construction of Lower Thames Crossing

This **Transfer of Title and Waiver** ("**Waiver**") is entered into between:

1) [25]	(the "**Recipient**");

and

2) [26]	(the "**Contractor**").

1. TRANSFER OF TITLE

1.1. In consideration of the Recipient entering into the waiver in paragraph 2 below, the Contractor transfers all rights, title and interest in the equipment listed in Schedule 1 (the "Equipment") to the Recipient. Title in the Equipment shall pass following delivery and unloading at the location stated in Schedule 1. The risk of damage to, or loss of, the Equipment shall pass to the Recipient once the Equipment has been delivered and unloaded at the location identified in Schedule 1 and any necessary installation works have been completed by the Contractor. All costs of delivery, unloading, and any necessary installation works and of any damage caused to the Equipment or any other property during such installation works are to be borne by the Contractor.

1.2. The Recipient accepts the Equipment "as seen". The Contractor makes no representations and gives no warranties as to the quality, condition, state or description of the Equipment, or its fitness or suitability for any purpose. All implied statutory or common law terms, conditions and warranties as to the Equipment are excluded to the fullest extent permitted by law.

2. WAIVER

2.1. With effect from the date of this Waiver, to the fullest extent permitted by law, the Recipient waives, releases and forever discharges, all and any actions, claims, rights, demands, set-offs or any remedies of any kind whatsoever, whether in the jurisdiction of England and Wales or any other, whether or not presently known to the parties or to the law, and whether in law or equity, that it has or may have against the Contractor and/or National Highways (as defined below) in connection with the Equipment, and agrees that save as stated in clause 1.1 neither the Contractor nor National Highways shall have any liability to the Recipient in respect of the Equipment.

2.2. [The Recipient will indemnify the Contractor and National Highways against all liabilities, costs, expenses, damages and losses (including but not limited to any direct, indirect or consequential losses) suffered or incurred by the Contractor or National Highways arising out of or in connection with the Equipment].

[25] Insert name of recipient organisation.
[26] Insert name of contractor.

3. NATIONAL HIGHWAYS

3.1. Pursuant to the Contracts (Rights of Third Parties) Act 1999, National Highways Limited (company no. 09346363) whose registered office is at Bridge House, 1 Walnut Tree Close, Guildford, Surrey GU1 4LZ ("**National Highways**") shall have the right to rely upon and enforce paragraph 2 of this Transfer of Title and Waiver.

Signed for and on behalf of the Recipient:

Signed .....

Authorised Signatory[27]

Date .....

[27] Ensure that this is a person with authority to sign contracts on behalf of the Recipient, e.g. a statutory director or member or equivalent.

SCHEDULE 1

EQUIPMENT
The following Equipment is transferred to the Recipient in accordance with this Transfer of Title and Waiver:[28]
Delivery location:[29]

[28] Within this Schedule, insert a full detailed description of what Equipment is being transferred to the Recipient. The description should be as specific as possible and include, for example, the type of accommodation, the original location of it, and the amount of rooms or units etc. For the repurposed timber, this description should include, for example, the type of timber and its reference number (if applicable).

[29] Insert location to which Contractor shall deliver Equipment.

Annex DD: Specification numbered appendices

numbered appendix 0/3: List of numbered appendices referred to in the Specification

A 0/3.1 List of numbered appendices

A 0/3.1.1 The *Contractor* ensures that the numbered appendices are completed by the *Contractor* as appropriate for the detailed design stage, prior to commencement of construction of the appropriate element. The numbered appendices shall be submitted in accordance with the Acceptance Procedure comprised of the numbered appendices identified in list A.

A 0/3.1.2 List A is a complete list of the numbered appendices, with those not adopted marked "Not Used".

A 0/3.1.3 The responsibility for compiling/completing the numbered appendices is indicated by the following symbols

1 E: the *Client* compiles,

2 E/C: the *Client* partially compiles and the *Contractor* shall complete and return to the *Client* and

3 C: the *Contractor* shall compile, complete and return to the *Client.*

A 0/3.1.4 The *Contractor* shall compile or complete the numbered appendices in accordance with the Notes for Guidance of the Specification for Highway Works (Volume 2 of the MCHW) and provide as a minimum the information described in the sample numbered appendices.

A 0/3.1.5 List B is not used.

A 0/3.1.6 List A:

Compiled/ Completed by	Appendix Number	Title
Introduction		
C	0/1	Contract specific additional, substitute and cancelled clauses, tables and figures included in the contract
C	0/2	Contract specific minor alterations to existing clauses, tables and figures included in the contract
E	0/3	List of numbered appendices referred to in the Specification
Not Used	0/4	List of drawings included in the contract
Not Used	0/5	Special national alterations of the overseeing organisations of Scotland/ Wales/ Northern Ireland
Preliminaries		
E	1/1	Temporary accommodation and Equipment for the Overseeing Organisation
E	1/2	Vehicles for the Overseeing Organisation
C	1/3	Radio Communication System for the Overseeing Organisation

Compiled/ Completed by	Appendix Number	Title
C	1/4	Working and fabrication drawings
C	1/5	Testing to be carried out by the *Contractor*
C	1/6	Supply and delivery of samples to the Overseeing Organisation
C	1/7	Site extent and limitations on use
C	1/8	Operatives for the Overseeing Organisation
C	1/9	Control of noise and vibration
C	1/10	Permanent works to be designed by the *Contractor*
C	1/11	Temporary works design
C	1/12	Setting out and existing ground levels
C	1/13	Programme of works
Not Used	1/14	Payment applications
E/C	1/15	Accommodation works
E/C	1/16	Privately and publicly owned services and supplies
E/C	1/17	Traffic safety and management
C	1/18	Temporary highways for traffic
C	1/19	Routeing of vehicles
C	1/20	Recovery vehicles and operation for breakdowns
C	1/21	Information boards
E	1/22	Progress photographs
C	1/23	Risks to health and safety
C	1/24	Quality management system
C	1/25	Temporary closed circuit television (CCTV) system for the monitoring of traffic
C	1/27	Temporary automatic speed camera system for the enforcement of mandatory speed limits at road works (TASCAR)
Site Clearance		
C	2/1	List of buildings, etc. to be demolished or partially demolished
C	2/2	Filling of trenches and pipes
C	2/3	Retention of material arising from Site clearance
Not Used	2/4	Explosives and blasting
C	2/5	Hazardous materials
Fencing		
C	3/1	Fencing, gates and stiles

Compiled/ Completed by	Appendix Number	Title
Road Restraint Systems (Vehicle and Pedestrian)		
C	4/1	Road restraint systems (vehicle and pedestrian)
C	4/2	Information required to demonstrate compliance of road restraint systems to BS EN 1317-1, BS EN 1317-2, BS EN 1317-3 and DD ENV 1317-4: 2002
Drainage and Service Ducts		
C	5/1	Drainage requirements
C	5/2	Service duct requirements
C	5/3	Surface water channels and drainage channel blocks
C	5/4	Fin Drains and narrow filter drains
C	5/5	Combined drainage and kerb systems
C	5/6	Linear drainage channel systems
C	5/7	Thermoplastics structural wall pipes and fittings
C	5/8	Maintenance plans for soakaways
Earthworks		
C	6/1	Requirements for acceptability and testing etc. of earthworks materials
C	6/2	Requirements for dealing with class U1B and class U2 unacceptable material
C	6/3	Requirements for excavation, deposition, compaction (other than dynamic compaction)
C	6/4	Requirements for class 3 material
C	6/5	Geotextiles used to separate earthworks materials
C	6/6	Fill to structures and fill above structural foundations
C	6/7	Sub-formation and capping and preparation and surface treatment of formation
C	6/8	Topsoiling
C	6/9	Earthworks environmental bunds, landscape areas, strengthened embankments
C	6/10	Ground anchorages, crib walling and gabions
C	6/11	Swallow holes and other naturally occurring cavities and disused mine workings
C	6/12	Instrumentation and monitoring
C	6/13	Ground improvement
C	6/14	Limiting values for pollution of controlled waters
C	6/15	Limiting values for harm to human health and the environment

Compiled/ Completed by	Appendix Number	Title
Road Pavements – General		
C	7/1	Permitted pavement options
C	7/2	Excavation, trimming and reinstatement of existing surfaces
C	7/3	Surface dressing – Performance specification
C	7/4	Bond coats, tack coats and other bituminous sprays
C	7/5	In situ recycling - the remix and repave processes
C	7/6	Breaking up or perforation of existing pavement
C	7/7	Slurry surfacing incorporating microsurfacing
Not Used	7/8	Not Used
C	7/9	Cold-milling (planing) of bituminous bound flexible pavement
Not Used	7/10	Not Used
C	7/11	Overband and inlaid crack sealing systems
C	7/12	Arrester beds
C	7/13	Saw-cut and seal bituminous overlays on existing jointed concrete pavements
C	7/14	Preparation of jointed concrete pavements prior to overlaying and saw-cut and seal of the bituminous overlay
C	7/15	Saw-cut, crack and seat existing jointed reinforced concrete pavements
C	7/16	Cracking and sealing of existing jointed unreinforced concrete pavements and CBM bases
C	7/17	Cracking plant and equipment progress record
C	7/18	Site specific details and requirements for cold recycled bitumen bound material
C	7/19	Site specific details and requirements for recycled cement bound material
Not Used	7/20	Not Used
C	7/21	Surface dressing – recipe specification
C	7/22	Repairs to potholes
Road pavements – concrete and cement bound materials		
Not Used	10/1	Plant and equipment for the construction of exposed aggregate concrete surface
Kerbs, footways and paved areas		
C	11/1	Kerbs, footways and paved areas
C	11/2	Access steps
Traffic signs		
C	12/1	Traffic signs: general

Compiled/ Completed by	Appendix Number	Title
C	12/2	Traffic signs: marker posts
C	12/3	Traffic signs: road markings and studs
C	12/4	Traffic signs: cones, cylinders, FTDs and other traffic delineators
C	12/5	Traffic signs: traffic signals
C	12/6	Traffic signs: special sign requirements on gantries
Road lighting columns and brackets, CCTV masts and cantilever masts		
C	13/1	Information to be provided when specifying lighting columns and brackets
C	13/2	(Specification for highways works) typical lighting column and bracket data sheets 1 and 2
C	13/3	Instructions for completion of column and bracket data sheets
C	13/4	Information to be provided when specifying CCTV masts
C	13/5	(Specification for highway works) typical CCTV mast data sheet
C	13/6	Instructions for completion of CCTV mast sheets
C	13/7	Information to be Provided When Specifying cantilever masts
C	13/8	(Specification for highway works) typical cantilever masts data sheets 1 and 2
C	13/9	Instructions for completion of cantilever masts data sheets
Electrical Work for Road Lighting and Traffic Signs		
C	14/1	Site records
C	14/2	Location of lighting units and feeder pillars
C	14/3	Temporary lighting
C	14/4	Electrical equipment for road lighting
C	14/5	Electrical equipment for traffic signs
Motorway Communications		
C	15/1	Motorway communications
C	15/2	Cable duct requirements
E	15/3	Requirements of the telecommunications services provider
Piling and Embedded Retaining Walls		
C	16/1	General |requirements for piling and embedded retaining walls
C	16/2	Precast reinforced and prestressed concrete piles and precast reinforced concrete segmental piles
C	16/3	Bored cast-in place piles
C	16/4	Bored piles constructed using continuous flight augers and concrete or grout injection through hollow auger stems
C	16/5	Driven cast-in-place piles

Compiled/ Completed by	Appendix Number	Title
C	16/6	Steel bearing piles
C	16/7	Reduction of friction on piles
C	16/8	Non-destructive methods for testing piles
C	16/9	Static load testing of piles
C	16/10	Diaphragm walls
C	16/11	Hard/hard secant pile walls
C	16/12	Hard/soft secant pile walls
C	16/13	Contiguous bored pile walls
C	16/14	King post walls
C	16/15	Steel sheet piles
C	16/16	Integrity testing of wall elements
C	16/17	Instrumentation for piles and embedded walls
C	16/18	Support fluid
Structural concrete		
C	17/1	Schedule for the specification of designed concrete
C	17/2	Concrete - impregnation schedule
C	17/3	Concrete - surface finishes
C	17/4	Concrete - general
C	17/5	Buried concrete
C	17/6	Grouting and duct systems for post-tensioned tendons
C	17/7	Precast concrete products
Structural steelwork		
C	18/1	Requirements for structural steelwork
Protection of steelwork against corrosion		
C	19/1	(Specification for highway works) Form HA/P1 (New Works) Paint System Sheet
C	19/2	Requirements for other work
C	19/3	(Specification for highway works) Form HA/P2 Paint Data Sheet
C	19/4	(Specification for Highway Works) Form HA/P3 Paint Sample Despatch List
C	19/5	General requirements
Waterproofing for concrete structures		
C	20/1	Waterproofing for concrete structures
Bridge bearings		
C	21/1	Bridge bearing schedule

Compiled/ Completed by	Appendix Number	Title
Not Used	22/1	Not Used
Bridge expansion joints and sealing of gaps		
C	23/1	Bridge deck expansion joints schedule
C	23/2	Sealing of gaps schedule (other than in bridge deck expansion joints)
Brickwork, blockwork and stonework		
C	24/1	Brickwork, blockwork and stonework
Special structures		
C	25/1	Requirements for corrugated steel buried structures
C	25/2	Requirements for reinforced soil and anchored earth structures
C	25/3	Requirements for pocket-type and grouted-cavity reinforced brickwork retaining wall structures
C	25/4	Environmental barriers
C	25/5	Requirements for buried rigid pipes for drainage structures
Miscellaneous		
C	26/1	Ancillary concrete
C	26/2	Bedding mortar
C	26/3	Cored thermoplastic node markers
Landscape and ecology		
C	30/1	General
C	30/2	Weed control
C	30/3	Control of rabbits and deer
C	30/4	Ground preparation
C	30/5	Grass seeding, wildflower seeding and turfing
C	30/6	Planting
C	30/7	Grass, bulbs and wildflower maintenance
C	30/8	Watering
C	30/9	Establishment maintenance for planting
C	30/10	Maintenance of established trees and shrubs
C	30/11	Management of waterbodies
C	30/12	Special ecological measures
Maintenance painting of steelwork		
C	50/1	(Specification for Highway Works) Form HA/P1 (Maintenance) Paint System Sheet
C	50/2	Requirements for other work

Compiled/ Completed by	Appendix Number	Title
C	50/3	(Specification for Highway Works) Form HA/P2 Paint Data Sheet
C	50/4	(Specification for Highways Works) Form HA/P3 Paint Sample Despatch List
C	50/5	General requirements
Concrete Repairs		
C	57/1	Repair product – requirements
C	57/2	Requirements for reinforcement
C	57/3	Execution of concrete repairs
C	57/4	Sprayed concrete
C	57/5	Concrete injection
C	57/6	Contractor investigation of concrete condition
C	57/7	Requirements for galvanic anodes

numbered appendix 1/1: Temporary accommodation and equipment for the Overseeing Organisation

A 1/1.1 Required Time Duration for Providing and Maintaining Accommodation and Equipment

A 1/1.1.1 The *Contractor* shall provide, maintain, service and remove all accommodation including contents, access roads and hardstanding, as described in this numbered appendix 1/1 ("**Temporary Accommodation and Equipment for the Overseeing Organisation**") for the use of the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) for the duration of the Accommodation Period. The Accommodation Period is defined as the dates below (unless otherwise agreed with the *Client* (via the *Project Manager*)

a. Accommodation Period commences within six weeks of the first *access date*

b. Accommodation Period ends three months after Completion of *section 1*

Where the *Contractor* proposes to downsize the Temporary Accommodation and equipment following Completion of *section* 1, the *Contractor* shall agree such proposals with the *Client* (via the *Project Manager*).

A 1/1.2 Accommodation Required

A 1/1.2.1 The *Contractor* and the *Client* (via the *Project Manager*) agree on the condition and suitability of any accommodation, equipment, furnishing, fittings and supplies that are provided by the *Contractor* as listed in this numbered appendix 1/1, prior to procurement of such items.

A 1/1.2.2 The *Contractor* provides an integrated office building facility with a single joint entrance and reception area, not exceeding 2 storeys, to accommodate the *Client* (and its team), the *Supervisor* (and its team), the *Project Manager* (and its team) and the *Contractor* and is defined as the "**Main Compound**".

A 1/1.2.3 The Main Compound shall be located in close proximity to the Site and shall comply with the DCO.

A 1/1.2.4 The Main Compound accommodates up to 60 personnel (including 10 personnel for the hot desk area) from the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team). The minimum requirements for the Main Compound are detailed in Table 1/1A ("Minimum Main Compound requirements for the *Client"*), unless otherwise agreed with the *Client* (via the *Project Manager*).

A 1/1.2.5 Should the *Contractor* elect to utilise any satellite compound(s) remote from the Main Compound, then accommodation and equipment is provided within each satellite compound for up to 12 personnel including 2 personnel for the hot desk area)of the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) (each referred to as a "Satellite Compound").

A 1/1.2.6 Each Satellite Compound is placed at strategic locations, where site activities

require ongoing monitoring, so as to prevent excessive travel between the strategic location on Site and the Main Compound. The minimum requirements for each Satellite Compound are detailed in Table 1/1B ("Minimum Satellite Compound requirements for the *Client*"), unless otherwise agreed with the *Client* (via the *Project Manager*).

A 1/1.2.7 "**Office Buildings**" means reference to both the Main Compound and Satellite Compounds.

A 1/1.2.8 The *Contractor* ensures that as a minimum the Office Buildings

- comply with
  - the Local Authority Building Control (LABC) certification,
  - Building Act,
  - Equality Act,
  - Health and Safety at Work Act etc.,
  - CDM Regulations,
  - the Electricity at Work Regulations,
  - the relevant recommendations of HSE published guidance,
  - and are in accordance with the relevant building regulations and standards (including the Approved Documents)

    (see links in Annex A),
- are constructed of secure 'anti-vandal' steel shell office-accommodation units or any system deemed suitable for temporary accommodation of this nature, which has been agreed by the *Client* (via the *Project Manager*),
- has a certificate from the manufacturer (where propriety units are proposed by the *Contractor*), stating that the units have a minimum design life of 10 years,
- are appropriately certified by the relevant Local Authority and local fire authority as suitable for occupation and the intended use,
- are cleaned and maintained daily (excluding Sunday, bank holidays and public holidays) for the Accommodation Period,
- include furniture, fixtures and fittings equipment stores, protective clothing, surveying equipment, computers, computer peripherals software and all supplies for the use of the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team). These are provided by the *Contractor* as new, unless otherwise agreed with the *Project Manager*,
- include facilities that are connected to existing main water, AC electricity supply, telecommunication utilities and shall include provision for heating and lighting (unless otherwise agreed with the *Client* (via the *Project Manager*)).
- are maintained by the *Contractor* for the Accommodation Period (unless otherwise stated) and covered by a buildings maintenance contract with an appropriate response and repair time,

- are provided with boot scrapers and boot cleaning facilities at each access,
- are in accordance with Approved Document H “Drainage and waste disposal” (see link in Annex A),
- includes firefighting equipment as required,
- are set apart from the *Contractor’s* storage warehouse and site plant depot and routes used by construction traffic and
- are spaced sufficiently away from the construction works or insulated appropriately, such that the noise from the *works* does not impact the efficiency of work conducted.

A 1/1.2.9 The *Contractor* shall submit a set of drawings illustrating the exact location, the layout and dimensions of each Office Building to the *Client* (via the *Project Manager*) for agreement, within 40 weeks of the *starting date*.

A 1/1.3 Road and Car Parks

A 1/1.3.1 The *Contractor* ensures that the Office Buildings are accessible by an access road, terminating in a car park. Car park areas shall be secure and set apart from plant, machinery and construction vehicle storage/parking areas.

A 1/1.3.2 The access roads and car park areas are kept clean and clear of snow, ice, frost, mud and debris and are not used by construction plant.

A 1/1.3.3 Sufficient lighting is to be provided in car park areas and access roads, while complying with the DCO requirements.

A 1/1.3.4 The *Contractor* provides secure car parking space at the Main Compound for 50 vehicles for use by the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team). These car park spaces are adjacent to the office with a segregated walking route to the main entrance of the office.

A 1/1.3.5 The *Contractor* provides secure car parking space at the Satellite Compound for 10 vehicles for use by the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team).

A 1/1.3.6 Covered and secured cycle parking for 20 bicycles is provided close to the main entrance of the Main Compound.

A 1/1.3.7 In addition to the requirements set out in numbered appendix 1/2 ("**Vehicles for the Overseeing Organisation**"), the *Contractor* provides an additional 2 vehicle charging points.

A 1/1.4 Fittings and Furnishings of Accommodation and other Equipment Required

A 1/1.4.1 The *Contractor* provides the fittings and furnishings and other equipment specified in Table 1/1A ("**Minimum Main Compound requirements for the *Client***"), unless otherwise agreed with the *Client* (via the *Project Manager*).

The *Contractor* provides the fittings and furnishings and other equipment specified in Table 1/1B ("Minimum Satellite Compound requirements for the *Client*"), unless otherwise agreed with the *Client* (via the *Project Manager*).

A 1/1.4.2 The offices and hot desk areas are furnished with single 1400mm wide x 800mm deep desks with adjustable swivel chairs to suit the occupancy number stated in

- Table 1/1A (Minimum Main Compound requirements for the *Client*) and
- Table 1/1B (Minimum Satellite Compound requirements for the *Client*).

A 1/1.4.3 The Main Compound is furnished with the following additional furniture

- 50 personal lockers,
- 5 noticeboards,
- 5 whiteboards and
- 5 drawing hanging frames and hangers.

A 1/1.4.4 Floor coverings are suitable for heavy-duty use.

A 1/1.4.5 Access to all rooms is controlled by a lock and key or electronic access control, unless otherwise agreed with the *Client* (via the *Project Manager*).

A 1/1.4.6 All equipment provided by the *Contractor* is maintained by the *Contractor* for the Accommodation Period (unless otherwise stated). The equipment is provided as new, installed and commissioned by a reputable quality assured supplier in accordance with BS EN ISO 9001:2015 (Quality management systems requirements) (see link in Annex A). The equipment is covered by a hardware maintenance contract with an 8 hour maximum response time for repair and replacement.

A 1/1.5 Heating and Lighting

A 1/1.5.1 The *Contractor* ensures that every area within the Office Buildings has suitable and sufficient lighting in accordance with the good practices of 'Lighting at work' published by the HSE and the requirements set out in the Display Screen Equipment Regulations 1992 (as amended in 2002) and any associated Approved Code of Practice and/or appropriate guidance (see links in Annex A).

A 1/1.5.2 The *Contractor* provides a minimum window area of 20% in all rooms occupied by the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) (excluding toilets and corridors). Anti-vandal protected, pyro-shield windows with steel shutters or similar are used to provide sufficient natural ventilation within the Office Buildings.

A 1/1.5.3 The *Contractor* ensures that during working hours the temperature within Office Buildings takes into consideration the activities which take place within the Office Buildings, without the need for special clothing in accordance with the appropriate HSE Approved Code of Practice and guidance.

A 1/1.5.4 The *Contractor* provides an alternative power source with sufficient capacity (such as a standby generator), to operate all lighting, heating and electrical outputs within the Office Buildings, in the case of a power outage/failure.

A 1/1.6 Network

A 1/1.6.1 The *Contractor* provides the following at the Office Buildings

- minimum internet connectivity capacity of 1024k per user/device and a committed data rate (CDR) of 256k/user/device,
- data backup, security, free access to internet, virus and data protection (including any training as required),
- access to the network for the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) and
- secure Wi-Fi connectivity is provided for *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) including mobile connectivity.

A 1/1.7 IT hardware

A 1/1.7.1 The *Contractor* maintains and replaces computer equipment as necessary.

A 1/1.7.2 The *Contractor* provides IT support for all equipment and software until the end of the Accommodation Period.

A 1/1.7.3 The *Contractor* updates the operating systems and software to the most up to date versions 3 years after the commencement of the Accommodation Period and provides any further software which is required due to such existing software becoming not maintainable.

A 1/1.7.4 The *Contractor* provides 4 no. high performance desktops with the following minimum specification (or similar approved)

- Intel Core i9-10900X,
- Windows 10 Pro,
- 32GB 2X16GB DDR4 3600MHz,
- 1TB Solid State Drive,
- 3.5" 2TB 7200rpm SATA Hard Drive and
- NVIDIA Quadro P1000 4GB, 4mDP (5820T).[30]

A 1/1.7.5 The *Contractor* ensures that each utilised desk shall be provided with the following equipment

- a port replicator,
- keyboard and mouse,

[30] Note: Technology requirements may be updated to reflect current technology.[31] Note to tenderers: Technology requirements may be updated to reflect current technology.[32] Note to tenderers: Email address to be provided in final contract.

- a 24-inch monitor on an adjustable arm and
- desk mounted 13amp sockets (4 no.) and all associated cabling.

A 1/1.8 Ancillary Equipment

A 1/1.8.1 The *Contractor* ensures that the following software shall be installed on each computer

- full installation of Microsoft 365 and Microsoft Office Professional,
- Microsoft Project 2019 (or later),
- Primavera P6 Professional Project Management or equivalent
- PC Security packages (Antivirus, firewall, Anti-Spyware etc.) with daily updates or as updated by the vendor,
- Adobe Reader,
- Adobe Acrobat X Pro,
- AutoCAD 2020,
- CIVIL 3D 2020 and
- encryption software using an industry standard encryption tool.

The *Contractor* ensures that the software is updated for the duration of the Accommodation Period. Where the *Contractor* proposes alternative software, this shall be agreed with the *Client* (via the *Project Manager*).

A 1/1.9 Printers and Plotters

A 1/1.9.1 The *Contractor* provides

- 3 no. at the Main Compound and
- 1 no. at the Satellite Compound,

multi-function printer/scanner/copier device capable of printing A3 and A4 sheets (min 11ppm black & white, min 7.5ppm colour) for use by the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team). Not less than 1200dpi, USB (or parallel) interface and all necessary software and drivers.

A 1/1.9.2 The *Contractor* provides 1 no. colour plotter capable of printing A1 and A0 sheets (not less than 600dpi) for use by the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team).

A 1/1.9.3 All photocopiers, printers and plotters are connected to the network and have associated network software and cabling to allow use by the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team).

A 1/1.9.4 The *Contractor* provides all consumables for the printers and plotters including ink cartridges and paper.

A 1/1.10 Photographic and Video Equipment

A 1/1.10.1 The *Contractor* provides 8 digital cameras, also capable of recording video clips, and peripheral equipment including carry case (minimum specification as follows: sensor resolution of (20) megapixels, optical zoom of (20)x and (2) SD cards, each of size of 64 GB along with the associated software and cables for downloading pictures onto computers.[31]

A 1/1.10.2 All photographic and video equipment is available for use by the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) until the Completion of the whole of the *works*.

A 1/1.11 Minimum Kitchen Requirements

A 1/1.11.1 The *Contractor* provides all necessary kitchen storage, appliances and other ancillary items to ensure functionality for the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) including

- cupboards,
- worktops,
- mugs,
- plates and bowls,
- cutlery,
- all cleaning facilities and personal sanitising equipment,
- filtered drinking water including chilled and instant boiling water taps,
- fridges,
- dishwashers,
- microwaves,
- free issue tea, coffee, sugar, milk (and dairy-free alternative) and
- vending machines.

A 1/1.12 Consumables

A 1/1.12.1 The *Contractor* provides all consumables necessary for office functionality for the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) including

- office stationery supplies,
- kitchen supplies,
- site welfare supplies,

as necessary for the Accommodation Period.

A 1/1.12.2 The *Contractor* promptly replaces unsatisfactory, unserviceable or damaged items.

[31] Note to tenderers: Technology requirements may be updated to reflect current technology.[32] Note to tenderers: Email address to be provided in final contract.

A 1/1.13 Not used.

A 1/1.13.1 Not used.

A 1/1.14 Health and Safety

A 1/1.14.1 The *Contractor* provides the latest health and safety publications in accordance with the Health and Safety at Work Act etc. at the Office Buildings.

A 1/1.14.2 The *Contractor* provides first aid posters at each Office Building that identify the location of first aid facilities and the name and location of the trained first aiders and the appointed person, or first aider who deputises in their absence.

A 1/1.14.3 The *Contractor* arranges and supplies appropriate health and safety training for the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) regarding its safety procedures.

A 1/1.14.4 The *Contractor* provides adequate first aiders and fire wardens for the offices and provides training and equipment as necessary for the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) to be designated as first aiders or fire wardens (where appropriate).

A 1/1.14.5 The *Contractor* arranges for regular safety drills at the Office Buildings involving the emergency services, as necessary.

A 1/1.15 Occupational Health and Wellbeing Service

A 1/1.15.1 Refer to section S1100 for occupational health and wellbeing service requirements.

A 1/1.16 Personnel Protective Equipment (PPE)

A 1/1.16.1 The *Contractor* provides PPE in accordance with section S1100.

A 1/1.17 Landline Telecommunication and Radios

A 1/1.17.1 The *Contractor* provides a site office telephone system with private and exclusive lines and handsets for each workstation connected to a fixed (landline) telephone network solely for the use of the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team).

A 1/1.17.2 If the *Contractor* uses multi-channel radios for communication, the *Contractor* provides to the *Project Manager* (and its team) and the *Supervisor* (and its team) with their own set of 10 multi-channel radios for use at every Office Building with charging stations and with an option for their own frequency as well as a joint frequency with the *Contractor.*

A 1/1.18 Smart Mobile Telephones

A 1/1.18.1 The *Contractor* provides the communications equipment as new and shall maintain and replace such equipment as required for the Accommodation

Period. Smart mobile telephones are provided to the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team).

A 1/1.18.2 Each smart mobile telephone has a touch screen and ensure 100% network coverage, unless otherwise agreed with the *Client* (via the *Project Manager*).

A 1/1.18.3 The communications equipment provided by the *Contractor* comprises of

a. 50 smart mobile telephones for designated use by the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team), together with protective case and chargers for each telephone,

b. spare chargers for 5 of the smart mobile telephones,

c. 50 in-car chargers and

d. an additional 3 smart mobile telephones (together with protective cases and chargers for each phone) for use as 'pool phones'.

A 1/1.18.4 The *Contractor* bears all Project related costs associated with each smart mobile telephone that is supplied for use by the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team).

A 1/1.18.5 The *Contractor* replaces any smart mobile telephones that are lost, damaged or require replacement and arranges for the maintenance or repair of smart mobile telephones as required.

A 1/1.18.6 All smart mobile telephones provided (for users as directed by the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team)) permit international calls to be received and made from the UK and to have international roaming facilities allowing calls to be received and made overseas.

A 1/1.18.7 The *Contractor* permits the use of, and if required, provides an additional 5 smart mobile telephones for the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) involved in monitoring of any off-site *works*, such as casting and fabrication works.

Table 1/1A - Minimum Main Compound requirements for the *Client*

Description	Dimensions	Quantity	Additional Requirements
Open plan office	Minimum 2m x 1.5m per person for occupancy number of 50 personnel.	1 no.	The open plan office is equipped with • a projector and screen\surface suitable for projection, • Bluetooth speaker\microphone device, • Microsoft Surface Hub 2S unit – minimum screen size of 1.4m x 2.1m
Private offices	Minimum 4m x 3m	2 no.	-
Hot Desk Area	Minimum 2m x 1.5m per person for occupancy number of ten (10) personnel.	1 no.	-
Storage rooms	Minimum 4m x 3m	1 no.	-
Server room	Minimum 4m x 3m	1 no.	A minimum of 1 no. full height switching cabinet is required. The room should have dedicated power supplies, UPS systems and dedicated cooling, determined by the quantity and role of the cabinets installed. The room is positively pressurised to manage dust. Access to the room is by controlled electronic access control.
Breakout Areas	Minimum 4m x 3m	3 no.	Furnished with tables and chairs to suit the occupancy numbers.
Meeting rooms	To suit an occupancy number of 10 personnel.	2 no.	Furnished with tables and chairs to suit the occupancy numbers. The *Contractor* establishes a shared electronic meeting room booking system accessible to all. The conference and meeting rooms are equipped with • a projector and screen\surface suitable for projection, • Bluetooth speaker\microphone device and • Microsoft Surface Hub 2S unit – minimum screen size of 1.0m x 1.4m.

Description	Dimensions	Quantity	Additional Requirements
Conference room	To suit a minimum occupancy number of 20 personnel.	1 no.	Furnished with tables and chairs to suit the occupancy numbers. Shared with and managed by the *Contractor*. The *Contractor* establishes a shared electronic meeting room booking system accessible to all. The conference room is equipped with • a projector and screen\surface suitable for projection, • Bluetooth speaker\microphone device and • Microsoft Surface Hub 2S unit – minimum screen size of 1.4m x 2.1m
Reception area (with waiting area)	To suit a minimum of occupancy number of 10 personnel.	1 no.	The reception area is furnished with a 1800mm x 800mm reception desk fitted with a front privacy panel and countertop. 2 no. adjustable swivel chairs shall be provided. Seated waiting area with padded seating to suit occupancy numbers. Managed by the *Contractor*. The reception area and entrance shall be branded in accordance with “Highways England branding specifications – Guidance for contractors”.
First aid room, multi-faith prayer rooms, kitchen/utility room, shower rooms, changing rooms, drying room, laundry room, toilet facilities (included disabled toilets) and smoking / vaping areas.	Appropriate for the number of personnel expected to use the Main Compound.	Appropriate for the number of personnel expected to use the Main Compound.	

Table 1/1B - Minimum Satellite Compound requirements for the *Client*

Description	Dimensions	Quantity	Additional Requirements
Open plan office	Minimum 2m x 1.5m per person for occupancy number of 10 personnel.	1 no.	-
Hot Desk Area	Minimum 2m x 1.5m per person for occupancy number of 2 personnel.	1 no.	-
First aid room, multi-faith prayer rooms, kitchen/utility room, shower rooms, changing rooms, drying room, laundry room, toilet facilities (included disabled toilets) and smoking / vaping areas.	Appropriate for the number of personnel expected to use the Satellite Compound.	Appropriate for the number of personnel expected to use the Satellite Compound.	-

numbered appendix 1/2: Vehicles for the Overseeing Organisation

A 1/2.1 Vehicles for the Overseeing Organisation

A 1/2.1.1 The *Contractor* provides vehicles for the Project in accordance with the following specification.

A 1/2.1.2 The vehicles provided by the *Contractor* are new (unless otherwise agreed with the *Project Manager*) and are maintained (including MOT) by the *Contractor* throughout the required period as defined in paragraph A 1/2.1.17 below. The *Contractor* supplies all fuel (where applicable), charging requirements and other consumables throughout this required period. The vehicles are returned to the *Contractor* at the end of the period defined in paragraph A 1/2.1.17 below.

A 1/2.1.3 Vehicles are provided for the exclusive use of the *Client* (and its team), the *Supervisor* (and its team) and *Project Manager* (and its team).

A 1/2.1.4 The *Contractor* ensures that replacement vehicles are provided for those being maintained or serviced or which are otherwise unavailable.

A 1/2.1.5 Vehicles are cleaned inside and outside by the *Contractor* once per week or as otherwise requested by the *Client* and the *Client's* personnel.

A 1/2.1.6 Vehicles are checked by the *Contractor* on a daily basis for tyre wear, operation of brakes and lights.

A 1/2.1.7 The *Contractor* checks fluid levels (oil, water, hydraulic fluid etc) and top up as necessary.

A 1/2.1.8 The *Contractor* ensures it maintains the recommended service intervals of the vehicles as per the manufacture's recommendations.

A 1/2.1.9 The *Contractor* provides secure parking for the vehicles in accordance with numbered appendix 1/1 when the vehicles are not in use.

A 1/2.1.11 The *Contractor* permits all vehicles provided to the *Client* (and its team), the *Supervisor* (and its team) and *Project Manager* (and its team) to be used off the Site on regular journeys between the Site and other locations for purposes related to the Project.

A 1/2.1.12 The *Contractor* provides training for driving vehicles on the Site for the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team), as requested by the *Client* (via the *Project Manager*).

A 1/2.1.14 All vehicles provided bear the legend "Highway Maintenance" and retro-reflective red and fluorescent yellow chevron markings at the rear of the vehicle. All vehicles are free from markings identifying any company associated with the Project.

A 1/2.1.15 In selecting a vehicle type, the *Contractor* complies with the sustainability requirements specified in section S209.

A 1/2.1.16 The *Contractor* selects electric vehicle types, unless otherwise agreed with the *Client* (via the *Project Manager*). If vehicles require charging points, then one charging point per vehicle is provided as part of the parking requirements for the *Client* in accordance with numbered appendix 1/1.

A 1/2.1.17 The following vehicles types of EU manufacture shall be provided:

Type	Number Required	Period Required
A	5	*access date* until the date falling 3 months after Completion of the whole of the *works* provided that the requirement reduces to 30% of the stated number required following completion of *section 4* (unless otherwise agreed with the *Project Manager*).
B	2	*access date* until the date falling 3 months after Completion of the whole of the *works* provided that the requirement reduces to 30% of the stated number required following completion of *section 4* (unless otherwise agreed with the *Project Manager*).

A 1/2.1.18 The minimum requirements of the above vehicle types are defined in paragraph A 1/2.2 below.

A 1/2.1.19 Where the *Contractor* is required to provide equivalent vehicles to those defined in pararaph A 1/2.2 below, the specification of such equivalent vehicles includes all equipment and features provided as standard on the named example vehicles and those additional requirements specified for each in paragraph A 1/2.2.

A 1/2.1.20 The *Contractor* maintains a log for the vehicle which includes maintenance and service record, checks as detailed above and weekly mileage. The log is to be kept inside the vehicle to which it relates.

A 1/2.2 Vehicle Types

A 1/2.2.1 All vehicle types

- include sign boards reading “Highway Maintenance” in accordance with Diagram 7404 of Schedule 13, Part VI of the Traffic Sign Regulations and General Directions 2016 on the rear of the vehicles (the lettering is to be the largest x height that can be accommodated out of the following heights: 37.5, 50, 62.5, 75 millimetres),
- include retroreflective red and fluorescent yellow chevrons on the rear of the vehicle and a roof mounted amber flashing light bar comprising at least 2 light sources in accordance with section O5.3 of Chapter 8 of the Traffic Signs Manual and the Road Vehicle Lighting Regulations 1989 and
- be 0 g CO2 / km emissions vehicles.

A 1/2.2.3 Type A – 5 seat SUV/Off-road vehicle. This vehicle, in addition to paragraph A 1/2.2.1 is to

- be suitable for on and off-road use, have 4 wheel drive, power steering and be supplied in light colour,
- be provided with the following equipment: fire extinguisher, first aid kit, hazard flashing unit, full size spare wheel, fuel filler cap lock, bonnet lock and spare wheel lock, link mats for each row of seats, tow rope, towing hooks front and rear and
- contain 2 (minimum) rear seats.

A 1/2.2.4 Type B – 2 / 4 door electric vehicle. This vehicle, in addition to paragraph A 1/2.2.1 is to

- have a carrying capacity of at least 0.25 tonnes, a minimum clearance (unladen) of 150 millimetres and independent suspension,
- be of a light colour and
- be provided with the following equipment: full size spare wheel, fire extinguisher, first aid kit, tow rope, luggage straps suitable for carrying survey equipment.

numbered appendix 1/15: Accommodation Works

A 1/15.1 General

A 1/15.1.1 The *Contractor* complies with section S298 in relation to the Accommodation Works.

A 1/15.1.2 The *Contractor* obtains all permissions which are required to enable the Accommodation Works to proceed and shall consult and confirm with relevant landowners, tenants, occupiers and other authorised users in connection with the provision of Accommodation Works.

A 1/15.1.3 The designs prepared by the *Contractor* ensure that Accommodation Works are completed by the applicable dates specified in the Accepted Programme.

A 1/15.1.4 Prior to entering any areas of land, the *Contractor* complies with section S298. The *Contractor* keeps the landowner and the occupier fully informed of the progress for completing any Accommodation Works.

A 1/15.1.5 The *Contractor* ensures that the Accommodation Works as required by the DCO are included in the Accommodation Works table below (known as the "**Accommodation Works Table**") and the locations of the plots are shown on general arrangement plans with reference to the DCO Site Plans. Any further or additional Accommodation Works required as a result of the detailed design are agreed between the *Contractor* and the relevant landowner.

A 1/15.1.6 Where the *Contractor* severs an existing means of access to a landowner, the *Contractor* (as a minimum) provides a temporary alternative to the same standard as the existing.

A 1/15.1.7 As a minimum the *Contractor* ensures that any permanent or temporary means of access are designed in accordance with the relevant design standards.

A 1/15.1.10 Where fencing required for the Accommodation Works is indicated alongside the permanent highway boundary of the Site, the fence is

- set outside the permanent highway boundary and
- connected to adjacent existing fencing or permanent fencing to ensure continuity of the fence.

A 1/15.1.11 Where water supplies are provided as part of the Accommodation Works, the *Contractor* uses best industry practices to ensure that the installation prevents freezing of the water supply. Any insulation to pipe work is robust to prevent damage from livestock and otherwise.

A 1/15.1.12 Where watercourses are piped as part of the Accommodation Works, the *Contractor* carries out the design in accordance with the Scope.

A 1/15.1.13 All drains and field drains severed by the *works* are reconnected by the *Contractor* and a plan showing depths and sizes is submitted to the relevant landowner with a copy provided to the *Client* (via the *Project Manager*). All drainage and ditch systems are reinstated by the *Contractor* and properly tied into roadside drainage where appropriate.

A 1/15.1.14 Where existing water troughs are removed by the *works*, or fields are severed from their water supply, the *Contractor* ensures that a suitable temporary water supply and trough is provided to the satisfaction of the landowner and occupier pending permanent replacement of the water supply and trough.

A 1/15.1.15 The status identified by the *Contractor* within the Accommodation Works Table uses the following designations to determine the Accommodation Works status, unless otherwise agreed with the *Project Manager*

- Agreed: The Accommodation Works are agreed with the relevant landowner, who is consulted by the *Contractor* regarding design, construction and completion of the specified Accommodation Works as appropriate,
- Pending Agreement: The Accommodation Works are not yet agreed with the relevant landowner and the Contractor is responsible for agreeing such Accommodation Works with the relevant landowners and
- Instructed by *Client*: The Accommodation Works are instructed by the *Client*, who is consulted by the *Contractor* regarding design, construction, and completion of the specified Accommodation Works, where appropriate.

A 1/15.1.16 The specifications outlined in the Accommodation Works Table are to be provided by the *Contractor* in compliance with the DCO or other relevant Local Authority requirements.

Table: Accommodation Works

Accommodation Works Interest	Plot Number	Boundary Type	Boundary Description	Additional Boundary Requirements	Additional Accommodation Works Requirements	Status

numbered appendix 1/16: Privately and Publicly Owned Services and Supplies

A 1/16.1 General

A 1/16.1.1 The *Contractor* shall be responsible for

- DCO compliance,
- management,
- coordination (including coordination of the Utility Works with the permanent and temporary *works*),
- facilitation (including undertaking all enabling works as detailed in paragraph A 1/16.4.2, unless otherwise agreed with the *Project Manager*),
- cost forecasting,
- progress reporting,
- construction logistics,
- the set-up, Installation, maintenance, operation and removal of Utility Logistics Hubs,
- abandonment and removal and
- works associated (i.e. making good) with the hand back of land to the relevant landowner.

of both contestable and non-contestable utility works (the "**Utility Works**") and shall include details of these Utility Works within the 'utility works plan'.

A 1/16.1.2 The *Contractor* consults with

- all Statutory Undertakers,
- relevant Local Authorities or
- other private apparatus owners

known as the "**Apparatus Owners**" and complies with their requirements regarding

- any works to existing apparatus,
- the programme of the Utility Works,
- contact details for inclusion in table 1/16A,
- any periods of notice and
- interruptions to supplies

where such apparatus is affected by the *works*.

A 1/16.1.3 The *Contractor* is responsible for

- design,
- construction,
- disconnection,
- as-built information (including drawings) and
- facilitating any necessary works to achieve the adoption of completed Utility Works by the relevant Apparatus Owner

of contestable Utility Works and shall include these details within the Utility Works plan.

A 1/16.1.4 The *Contractor* acknowledges that apparatus may not have been correctly shown on the utility drawings provided in Annex A and the Common Data Environment or obtained by the *Contractor* from Others.

A 1/16.1.5 The *Contractor* identifies the exact location of all apparatus within the Working Areas, prior to commencement of the relevant enabling works on site.

A 1/16.1.6 The *Contractor* ensures that prior to the disconnection, abandonment, removal and reinstatement of apparatus the *Contractor* obtains the necessary agreement from the relevant Apparatus Owner. The *Contractor* ensures that the *Project Manager* is notified of such agreements and the agreement is provided on the Project Common Data Environment (CDE).

A 1/16.1.7 The *Contractor* agrees the Utility Works including the location of

- all Apparatus locations,
- service connections,
- access chambers or
- service routes

with the relevant Apparatus Owner and notifies the *Project Manager* of such agreements.

A 1/16.1.8 Wherever practical, with the exception of apparatus owned by the *Client* or relevant local authority, the *Contractor* ensures that no

- service connections,
- access chambers or
- longitudinal service routes

are situated within the highway boundary of either a trunk road or side road, unless otherwise agreed by the *Project Manager* or relevant local authority (as appropriate).

A 1/16.1.9 The *Contractor* ensures that access chambers (including covers) are not situated within the road pavement or laybys of any Project Road, unless otherwise agreed with the *Project Manager* or relevant Local Authority (as appropriate).

A 1/16.1.10 The *Contractor* ensures the protection of all assets owned by Apparatus Owners commencing from the *access date* to *section 1*.

A 1/16.1.11 The *Contractor* ensures that all Utility Works to Apparatus owned by other private apparatus owners is to the highest standard of

- the equivalent Statutory Undertaker requirements,
- the *Client's* requirements or
- the existing Apparatus.

A 1/16.1.12 The *Contractor* provides all traffic management, unless otherwise agreed with the Apparatus Owner and the *Project Manager*. The *Contractor* shall ensure the provision of traffic management in accordance with the requirements of section S240 and numbered appendix 1/17).

A 1/16.1.13 The *Contractor* provides the initial setting out (and maintenance) of the Utility Works, a minimum of six weeks or as otherwise agreed with the *Project Manager*, prior to the relevant Apparatus Owner's access date and collaboratively works with Others as necessary to avoid

- any delay with regard to the positioning of such apparatus and construction of the *works*,
- increases in the amount payable to the relevant Apparatus Owner and
- increases in the Defined Cost.

Where Utility Works are non-contestable the Statutory Undertaker determines the final setting out of the Utility Works on site.

A 1/16.1.14 The *Contractor* notifies the *Project Manager* of all meetings between the *Contractor* and any Apparatus Owner two weeks in advance to allow the *Client* (and its team), the *Supervisor* (and its team) and the *Project Manager* (and its team) the opportunity to attend the meeting.

A 1/16.1.15 The *Contractor* uploads copies of all correspondence between the *Contractor* and any Apparatus Owner onto the Project Common Data Environment (CDE), within 1 week of issue or receipt.

A 1/16.2 Utility Works Strategy

A 1/16.2.1 The *Contractor* prepares a 'utility works strategy' report, that includes

- the *Contractor's* overall approach to manage, coordinate and facilitate the Utility Works required to Provide the Works,
- details of the *Contractor's* process for quality management of the Utility Works in accordance with section S600,
- a Utility Works organisation chart that aligns with the organisation chart required in accordance with section S800,
- a procedure for ensuring the Utility Works requirements of Others and the works/services require or undertaken by the *Contractor* in accordance with this numbered appendix 1/16 is included in the 'utility works plan',
- a procedure for ensuring coordination and agreement with other Main Works Contractors for Utility Works required across interfaces,
- a process for ensuring copies of all Utility Works records are recorded or obtained from Others and uploaded onto the Project CDE,
- a process for notifying the *Supervisor* (and its team) for Utility Works during the construction phase,
- a process for the correction of Defects within Utility Works (including works by Others),
- a strategy for diversion readiness (including all enabling works),
- reference to the 'utility works schedule',
- reference to the 'utility work plans' and
- reference to this numbered appendix 1/16

and submits the 'utility works strategy' in accordance with the Acceptance Procedure and accompanied by the Multiparty Collaboration Certificate, for acceptance by the *Project Manager*, prior to commencement of the relevant construction activity.

A 1/16.2.2 The *Contractor* ensures that the 'utility works strategy' report complies with the requirements of

- the Development Consent Order (DCO),
- the Scope and
- relevant Others.

A 1/16.3 Utility Works Schedule

A 1/16.3.1 The *Contractor* prepares a 'utility works schedule', that includes

- a twelve month forecast of all 'utility work plans' that will be prepared for construction activities and
- timeframes for the preparation of 'utility work plans' and submission in accordance with the Acceptance Procedure

and submits the 'utility works schedule' in accordance with the Acceptance Procedure and accompanied by the Multiparty Collaboration Certificate, for acceptance by the *Project Manager* prior to commencement of the Construction Phase.

A 1/16.3.2 The *Contractor* updates and submits the 'utility works schedule' for acceptance by the *Project Manager* at the same time as it updates and submits each programme for acceptance by the *Project Manager* and submits the 'utility works schedule' in accordance with the Acceptance Procedure.

A 1/16.3.3 The *Contractor* ensures that the 'utility works schedule' complies with the requirements of

- the Development Consent Order (DCO),
- the Scope,
- relevant Others and
- the 'utility works strategy' report that has been accepted by the *Project Manager*.

A 1/16.4 Utility Work Plans

A 1/16.4.1 The *Contractor* prepares 'utility work plans', in accordance with the utility work schedule, that includes

- a summary of all Utility Works that are included within that plan,
- identifies who is responsible (division of responsibilities) for such Utility Works (on and off Site),
- includes details of all enabling works carried out by the Contractor to facilitate the Utility Works carried out by Others,
- includes details of the Utility Works carried out by the Contractor (including any hold points from Others),
- includes details of the Utility Works carried out by Others (including how the Utility Works that are carried out by Others are managed and identify and

include hold points) and the works/services required or undertaken by the *Contractor* in accordance with this numbered appendix 1/16,

- includes evidence of coordination and agreement with Others,
- includes coordination and agreement with Others for Utility Works required across interfaces and
- includes a detailed method of recording and obtaining records from Others.

and submits the 'utility work plan(s)' in accordance with the Acceptance Procedure accompanied by the Multiparty Collaboration Certificate for acceptance by the *Project Manager*, at least 16 weeks prior to commencement of the relevant Utility Works on site.

A 1/16.4.2 The *Contractor* ensures that details of the following enabling works for contestable and non-contestable (including actions by the *Contractor* and Statutory Undertakers, third parties or Others) are included in the utility works plans, including

- identifying and undertaking archaeology requirements and associated mitigation,
- identifying and undertaking ecological requirements and associated mitigation,
- identifying and undertaking environmental requirements and associated mitigation,
- identifying and undertaking the discharge of Consents,
- facilitating the acquisition of land and identifying the associated access dates to comply with the requirements of section S298,
- protection of assets (including Structures) impacted by the Utility Works,
- identifying and recording the exact location of Apparatus,
- site clearance,
- site security (including boundary treatment),
- traffic management,
- access road,
- accommodation works (as identified in numbered appendix 1/15),
- welfare facilities and
- site inductions.

A 1/16.4.2A The *Contractor* ensures that details of the following handover works for contestable and non-contestable (including actions by the *Contractor* and Statutory Undertakers, third parties or Others) are included in the 'utility works plan' including

- abandonment (including any remedial measures),
- removal,
- reinstatement,
- aftercare and
- as-built information (including drawings).

A 1/16.4.3 The *Contractor* ensures that the 'utility work plans' comply with the requirements of

- the Development Consent Order (DCO),
- the Scope,
- relevant Others and
- the accepted 'utility works strategy'.

A 1/16.5 Table 1/16A Requirements

A 1/16.5.1 The *Contractor* ensures that contact details of Apparatus Owners are provided in Table 1/16A. The *Contractor* updates Table 1/16A when changes occur and when it is no longer current and resubmits numbered appendix 1/16 to the *Project Manager* in accordance with the Acceptance Procedure.

A 1/16.6 Utility asset schedule requirements

A 1/16.6.1 The known Utility Works to existing apparatus owned by Apparatus Owners are included in 'Utility asset schedule' (link provided in Annex A) is provided for illustrative purposes only and is not intended to be an exhaustive list.

The *Contractor* reviews, agrees and adopts the 'utility asset schedule' and updates it when changes occur or when it is no longer current and provides access to this on the Project CDE.

A 1/16.6.2 The key utility apparatus is included in 'Key Statutory Undertakers Utility Works' (link provided in Annex A).

Table 1/16A - Known Apparatus Owners and Others affected

Statutory Undertaker	Apparatus	Lead Contact	Contact Details	Address

numbered appendix 1/17 Traffic Safety and Management

A 1/17.1 Traffic Safety and Management

A 1/17.1.1 Unless otherwise stated in this contract, the *Contractor*

- plans,
- designs,
- programmes,
- provides,
- implements,
- maintains and
- removes

all traffic safety and management measures necessary for Providing the Works.

The temporary traffic safety and management measures shall be in accordance with the requirements of section S240 and this numbered appendix 1/17.

A 1/17.1.2 The *Contractor* obtains comments from the Traffic Management Forum (TMF) in accordance with section S240, that its traffic management plan has been developed such that it includes all necessary measures in relation to the design, timing and co-ordination of the related temporary traffic safety and management measures to minimise delays, disruptions and diversions to traffic.

This shall include traffic modelling as appropriate using micro-simulation and other similar or relevant measures.

A 1/17.1.4 The traffic management plan shall include

- details of the temporary traffic safety and management measures associated with each construction operation,
- phasing of the traffic management (including the start date, end date and duration of each phase),
- details temporary traffic safety and management measures to accommodate the Statutory Undertakers in accordance with the relevant Construction Works Agreements for each Statutory Undertaker contained in numbered appendix 1/16,
- details of the proposed temporary speed limit (including the assessment temporary speed limits where required in accordance with section S240),
- drawings showing traffic management layouts including
    - temporary traffic management measures,
    - position of traffic signs, signals and cones,
    - width of lanes,
    - working areas,
    - safety zones,
    - details of temporary barriers for the protection of personnel,
    - entry and exit points for site traffic,
    - provisions for emergency vehicles,
    - provisions for vehicle recovery,
    - provisions for wide loads and

- crossovers,

- the name and contact details of the Incident Liaison Officer and the Traffic Safety and Control Officer,
- sufficient information to demonstrate compliance with the DCO,
- records of any consultation with Others and
- a plan for handling and escorting abnormal loads through the temporary traffic safety and management measures including where use of narrow lanes, in accordance with Chapter 8 ("**Traffic Signs Manual**"), (see link provided in Annex A) prevents one full-width running-lane being provided in each direction.

A 1/17.1.5 The *Contractor* ensures that its traffic management plan takes account of events and public holidays which are likely to affect traffic flows.

A 1/17.1.6 The *Contractor* submits details of any proposed changes to its traffic management plan to the *Client's* traffic manager (via the *Project Manager*) at least two weeks before any required TMF engagement (unless required to ensure road user safety during a construction activity).

A 1/17.1.7 The *Contractor* submits all agreed applications relating to Temporary Traffic Regulation Orders (TTRO) in accordance with the Acceptance Procedure, prior to commencement of the relevant traffic management activity.

A 1/17.1.8 The *Contractor* confirms periods for notice and procedures for TTROs including authorisations of signs and signals on Side Roads with the relevant Local Authority and comply with the relevant Local Authority's requirements.

A 1/17.1.9 The *Contractor* is responsible for the payment of all charges associated with the preparation and publication of all TTROs by third parties necessary for implementation of the temporary traffic management plan.

A 1/17.1.10 Where required by the relevant local police, the *Contractor* supplies, erects, maintains and removes upon Completion of the relevant *section*, speed detection cameras for use by the police as temporary traffic safety and management measures.

The *Contractor* consults with the police (as applicable) and complies with their requirements for the type, location and number of speed detection cameras required.

A 1/17.1.11 The *Contractor* ensures that while any temporary traffic safety and management measures are in force they are inspected and constantly monitored by the *Contractor*.

Any defects identified in the temporary traffic safety and management measures are rectified by the *Contractor* to the satisfaction of the *Client* (via the *Supervisor*) for trunk roads, the relevant Local Authority for Side Roads and the relevant local police (where applicable).

A 1/17.1.12 Frequency of inspections and maximum response times, to rectify defects, is as follows

Location	Trunk Roads		All other Roads	
	Minimum frequency of inspection per 24-hour period	Maximum Response Time	Minimum frequency of inspection per 24-hour period	Maximum Response Time
Advance Signing	4	60 minutes	2	60 minutes
Taper	12	15 minutes	6	15 minutes
Lane Closure	6	30 minutes	3	30 minutes
End Signing	4	60 minutes	2	60 minutes

A 1/17.1.13 The *Contractor* keeps a daily record of all defects in any temporary traffic safety and management measures, the times when they were identified or reported, the action taken to correct the defects, and the times they were successfully corrected.

A 1/17.1.14 A copy of this record is provided to the *Client* (via the *Project Manager)* by the *Contractor* on the following day, via a notification and upload onto the Project Common Data Environment (CDE) in accordance with section S1900.

A 1/17.1.15 The *Contractor* ensures that sufficient personnel and stock of spare signs and cones etc, are available at all times to rectify defects to any temporary traffic safety and management measures.

A 1/17.1.16 The *Contractor* ensures that all personnel involved in the installation, maintenance and removal of temporary traffic safety and management measures within the Working Areas hold the relevant National Highway Sector Scheme certification.

A 1/17.1.17 When a contraflow is in operation, the *Contractor* ensures that an emergency route is provided at all times for emergency vehicles.

The emergency lane is kept free of Plant and Materials and Equipment (including unaccompanied stationary vehicles) but it may be used for site access.

A 1/17.1.18 All temporary WCH route diversions has a hard surface and adequate drainage to prevent flooding or ponding.

Excessive long lengths of diversions shall be avoided to avoid WCHs taking shortcuts and diversions shall avoid crossing areas that are or will be regularly traversed by heavy plant.

A 1/17.1.19 All diversions of WCH routes which are normally lit shall be provided by the *Contractor* with a standard of lighting that is equal to the original route. The *Contractor* shall ensure temporary lighting shall not adversely impact adjacent land and property.

A 1/17.1.20 The *Contractor* assists the police in moving abnormal loads through the Working Areas including the movement and reinstatement of traffic safety and management measures.

A 1/17.2 Monitoring of Roadworks

A 1/17.2.1 Traffic queues are monitored at all times by the *Contractor* during periods when temporary traffic safety and management measures are in operation.

A 1/17.3 Traffic Safety and Control Officer

A 1/17.3.1 The *Contractor* appoints a senior member of its staff to act as Traffic Safety and Control Officer. This person shall be responsible for all traffic safety and control during the construction of the *works*.

The Traffic Safety and Control Officer shall co-ordinate with the Incident Liaison Officer during incidents and emergencies.

A 1/17.3.2 The responsibilities of the Traffic Safety and Control Officer include

a) all temporary traffic safety and management measures associated with the *works*,
b) ensuring that all equipment relevant for temporary traffic safety and management measures are in place and in full working order at all times,
c) enforcement of all relevant health and safety directives, relating to operations and live traffic,
d) enforcement of site access requirements,
e) liaison with the *Client* (via the *Project Manager*), relevant Local Authorities and continued monitoring of the temporary traffic safety and management measures adopted and
f) arranging for watchmen and other staff so that the Site and Working Areas are patrolled, inspected and defects in the traffic management identified and corrected.

A 1/17.3.3 The *Contractor* notifies the *Client* (via the *Project Manager*) and the relevant Local Authorities with the name and 24 hours telephone number of the Traffic Safety and Control Officer and the Incident Liaison Officer, within 40 weeks of the *starting date* and notifies of updates whenever a change occurs.

A 1/17.5 Lane Occupations

A 1/17.5.1 On Side Roads, lane closures shall be subject to the prior agreement of the

- relevant Local Authority,
- landowners or occupiers (as applicable).

The *Contractor* ensures that a temporary replacement route or a temporary diversion is provided in accordance with the above agreement.

A 1/17.6 Safety of Personnel

A 1/17.6.1 The *Contractor* establishes a safety zone adjacent to temporary traffic safety and management measures within the Site or Working Areas.

The *Contractor* undertakes a road restraint risk assessment in accordance with DMRB standard CD 377 (“Requirements for road restraint systems”), (see link provided in Annex A).

A 1/17.7 Requirements for vehicles used on the *works*

A 1/17.7.1 All vehicles used in the *works* shall be compliant with the requirements of Chapter 8.

A 1/17.8 Temporary Traffic Signs

A 1/17.8.1 All temporary Traffic Signs shall comply with series 1200 of the Specification for Highway Works, (see link provided in Annex A).

numbered appendix 1/22: Progress Photographs

A 1/22.1 Progress Photographs

A 1/22.1.1 The *Contractor* engages a photographer to take the progress photographs as required by, and in accordance with, the requirements of this numbered appendix 1/22 ("**Progress Photographs**").

A 1/22.1.2 All images/photographs required in accordance with this numbered appendix 1/22 ("Progress Photographs") are to be uploaded to the Project Common Data Environment (CDE).

A 1/22.1.3 The *Contractor* provides the photographs to the *Project Manager* within seven days of taking the photographs and any which are unacceptable are retaken without delay.

A 1/22.1.4 The *Contractor* supplies all photographs in JPEG and RAW standard formats (unless otherwise agreed with the *Project Manager*).

A 1/22.2 Specification

The *Contractor* complies with the following specification for the progress photographs in respect of the *works*.

A 1/22.2.1 Ground Progress Photographs

- A set of ground progress photographs are taken prior to commencement of the *works* and then at no longer than 1 month intervals or as directed by the *Project Manager or Supervisor* until completion of the *works* from the same location each time,
- a set of progress photographs are supplied on the Project CDE and
- a report is provided with each set of photographs detailing the date, location and direction of view for each photograph in the set.

A 1/22.2.2 Aerial Progress Photographs

- a set of aerial progress photographs are taken at the commencement of the *works* and further sets of aerial photographs are taken at quarterly intervals during the *works*. A final set of aerial progress photographs are taken immediately following the completion of the *works*,
- each set of aerial progress photographs comprise a minimum of 100 photographs, taken with a single lens reflex digital camera,
- a set of aerial progress photographs are also supplied in JPEG and RAW standard formats to the Project CDE,
- each set of aerial progress photographs are taken from the same height, direction and of the same viewpoint,
- viewpoints, heights and directions are determined and detailed on an ordnance survey map prior to photographs being taken,
- the choice of aircraft used for taking the shots is such that it maximises the accuracy of the photographs from the viewpoints and
- the *Contractor* is required to obtain all licences required to fly a drone within the *boundaries of the site*.

A 1/22.2.3 The photographer is accompanied for both ground and aerial progress photographs by a representative of the *Client* (and its team), *Supervisor* (and its team) and *Project Manager* (and its team), should they wish to attend.

A 1/22.3 Time-lapse Photography and Website Use

A 1/22.3.1 General

- The *Contractor* arranges to produce a high-quality visual record of the construction of the *works*,
- in addition to the progress photographs detailed above, the *Contractor* arranges for time-lapse photographs to be taken throughout the construction phase at a minimum of 16 locations. The *Contractor* proposes the precise locations and number of cameras to be used for the approval of the *Client* (via the *Project Manager*) one month prior to the commencement of the *works* and
- in order to obtain the best quality output, cameras are set to obtain an image every 10 minutes.

A 1/22.3.2 Quality

- The *Contractor* proposes an ultra high definition (UHD) camera for each location for the approval of the *Client* (via the *Project Manager*),
- cameras, lenses and sensors are of a professional grade and from a reputable supplier,
- the camera resolution is high enough to allow the final film to be rendered as 4K with a minimum resolution of 3840 x 2160 pixels,
- the optical parameters of the proposed system is capable of adjustment from a remote location,
- the image interval is capable of being adjusted remotely to obtain additional detail during specific activities,
- the cameras are mounted on a stable structure that prohibits movement of the camera as a result of external influences such as wind or vibration and
- cameras are capable of working at night without sufficient grain or noise (0.002lux).

A 1/22.3.3 Reliability

- each fixed camera location has a suitable power and telecoms supply and a backup system is available to ensure that there is no loss of data,
- at each fixed camera location, suitable security measures are taken to prevent theft of the equipment,
- each fixed camera is capable of being remotely monitored to ensure that it is working correctly or as a minimum it is physically checked daily,
- the system is set to automatically restart after a power failure to ensure there is minimal loss of data,
- all recorded images are backed up to a site remote from the camera. This is either automatic or undertaken on a daily basis to avoid loss of data and be stored on the Project CDE,
- each camera is at least IP65 weather protected in accordance with BS EN 60529+A2:2013 (“**Degrees of Protection provided by enclosures**”) (see link provided in Annex A),

- the controlling computer has storage facilities for the length of the *works* for time lapse shooting with offsite backup facilities of the original image without further compression or adjustment and
- all cameras, computer control systems and backup systems are regularly maintained throughout the *works*.

A 1/22.3.4 Post Production

- All images are catalogued and stored on a secure site with a suitable back up facility,
- all images are time-stamped and catalogued in a calendar format for retrieval by the *Client* (and its team), *Supervisor* (and its team) and *Project Manager* (and its team),
- images from the time-lapse cameras are available to be uploaded by the *Contractor,* to a project website where the general public can monitor the progress of the *works*. The web image is to be updated every 10 minutes. Any images on the public website allows zooming and panning around the still image without buffering and must comply with the provisions of the Data Protection Act 2018,
- the images obtained throughout the *works* are used to provide a record for the *works*,
- the *Contractor* supplies a story board style post production plan outlining how each final film will look for the approval of the *Client* (via the *Project Manager*) prior to work on the final film and
- due to the overall duration of the Project, the *Contractor* allows for the production of annual films of 20 minutes duration, providing a record of construction within the preceding 12 months.

A 1/22.4 Webcams

A 1/22.4.1 General

- The *Contractor* provides 20 high definition pan tilt and zoom webcams, which provides multidirectional footage of the *works* throughout the construction period,
- the exact location for each webcam is agreed by the *Client* (via the *Project Manager*) and the chosen locations reflect the *works* being undertaken during a particular time period in the construction process. The *Contractor* is responsible for the relocation of each webcam following such a request being made by the *Project Manager,*
- the webcams are active 24 hours per day, seven days per week and are linked through a secure telecommunication system to the Main Compound (as per numbered appendix 1/1 Temporary Accommodation and Equipment for the Overseeing Organisation). Only authorised representatives of the *Client* and *Contractor* are given the security rights to view and alter the orientation of the images being gathered,
- the webcams are not viewed by the general public via the world wide web, unless made available by the *Client* via the project website. Where a web-based system is proposed this is provided via a secure internet site. The use of such a facility is to be subject to the approval of the *Client* (via the *Project Manager*) and

- the *Contractor* is responsible for the maintenance and, where necessary, the replacement, of all webcam components. The *Contractor* is also responsible for the provision of all connections, including power, and the computer software required to operate the webcams from the main construction compound.

numbered appendix 15/3 Requirements of the Telecommunications Services Provider

A15/3.1 Introduction

A15/3.1.1 The requirements set out in this Numbered Appendix 15/3 are those required by the Telecommunications Services Provider (TSP).

A15/3.1.1 The *Contractor* shall consult with the TSP regarding any telecommunication services and shall comply with their requirements including

- any works to existing apparatus,
- the programme,
- design (including coordination),
- testing and commissioning,
- any periods of notice,
- supervision and
- interruptions to supplies

where such telecommunication services are affected by the *works*.

A15/3.2 Programme Interface and Liaison

A15/3.2.3 From the *starting date*, the *Contractor* shall engage regularly with the TSP via the contact provided in paragraph A15/3.2.5, to establish a programme of works and communications protocols.

The *Contractor* shall agree with TSP, the communication protocols to be followed by the TSP for *works*.

Communication protocols that are to be agreed include

- design coordination,
- induction requirements,
- testing,
- notification periods,
- supervision and
- any additional measures (such as those imposed by the *Contractor* on vehicular access).

These shall be agreed with the TSP and submitted to the *Project Manager* for acceptance, in accordance with the Acceptance Procedure, prior to commencement of the relevant activity.

Where proposed changes are made to the above protocols, the *Contractor* shall notify the TSP and agree such changes with the TSP, resubmit the protocol for acceptance by the *Project Manager*, prior to implementation.

The *Contractor* ensures that these protocols are aligned and included (by reference) within the Technology and Systems Commissioning Plan requirements in section S700.

A15/3.2.4 The *Contractor* shall provide to the TSP all relevant Data including

- Construction Phase Plan,
- Programme,
- Design Data (including drawings and specifications)
- Construction Logistics Plan and
- Health & Safety requirements

that may affect the TSP's work, six weeks prior to the TSP's relevant activity.

A15/3.2.5 The *Contractor* prepares a TSP interface agreement in accordance with the Specification for Highway Works (SHW), prior to commencement of the construction phase.

This shall include a memorandum of understanding (including the division of responsibility) between the *Contractor* and the TSP in accordance with clause 1502.2.

This interface agreement shall be reviewed by the *Contractor* and TSP every three months during the construction phase.

The TSP point of contact for this Project is the Regional Manager, [Provided by the *Project Manager* within two weeks of the *starting date*]_____ ,

Telephone _____,

email _____,

Address, telent, 9 Ridgeway, Quinton Business Park, Quinton, Birmingham, B32 1AF. For general telent enquiries, the Network Operations Centre can be contacted on 08456 032239 or servicedesk@nrtsco.com

Should an issue arise that requires escalation, the *Project Manager* shall be contacted.

Following TSP's endorsement of the interface agreement, this interface agreement is to be submitted to the *Project Manager* for acceptance in accordance with the Acceptance Procedure, accompanied by a Multiparty Collaboration Certificate, prior to the commencement of the construction phase.

Where any addendums to the interface agreement are agreed with the TSP during the three monthly reviews (identified above), these addendums are not to be implemented into the *works* until such addendums have been accepted by the *Project Manager*.

A15/3.2.6 A schedule of the TSP's standard activities with their normal durations as listed in clause 1502.3 and are described in table ANNEX B of TLT/RGD/TSP/0420 "Working with telent - A Design Guide", link provided in Annex A.

The *Contractor* shall prepare an TSP activity list including

- design periods,
- mobilisation periods,
- procurement,
- installation,
- commissioning and
- service activation

for telecommunication services and agree this with the TSP and submit the endorsed TSP activity list for acceptance by the *Project Manager*, in accordance with the

Acceptance Procedure, accompanied by a Multiparty Collaboration Certificate, prior to commencement of the relevant design or Construction Activity.

A15/3.2.7 The *Contractor* shall agree a programme with the TSP for the deactivation, re-siting and reactivation of telecommunication services and the removal of any existing services and associated equipment and infrastructure. This programme shall comply with the timescales agreed in accordance with paragraph A15/3.2.6.

A15/3.2.8 The agreed notification periods for the TSP to attend site and remove equipment that is no longer required or requires re-siting is to be included in the TSP activity list.

A15/3.2.9 The TSP shall agree with the *Contractor* a schedule of requirements in respect of performing disconnections and connections to telecommunications service as part of the programming of the TSP works. The *Contractor* shall confirm the programme and advise any changes to dates providing a minimum of one weeks' notice.

A15/3.2.10 The *Contractor* will allow for, organise and prepare minutes for, the meetings as agreed in the TSP interface agreement.

All minutes are prepared and distributed by the *Contractor* within three working days following the date of the meeting and provided on the Project's Common Data Environment (CDE).

Both the *Contractor* and TSP will use these meetings to confirm any changes to the agreed TSP interface agreement.

A15/3.2.11 The notice periods that the *Contractor* shall provide the TSP for inspection and test witnessing activities that the TSP is required to undertake, are described in "Working with telent – A Design Guide".

A15/3.2.12 The *Contractor* must allow access at all reasonable times to the TSP to enable maintenance works to be carried out. The *Contractor* shall prepare and agree the TSP's access protocols with the TSP prior to commencement of the relevant construction activity.

A15/3.2.13 The *Contractor* shall install, maintain and remove network bypass ducts. The *Contractor* shall also provide a safe means of access to and alongside the route of the network bypass and shall clear the route of vegetation and other obstructions including those in the vicinity of the network bypass start and finish points.

This status shall be maintained throughout the life of the network bypass. The *Contractor* shall be responsible for managing the network bypass route during its life, ensuring that it is not endangered by Others or is at risk through theft.

The *Contractor* shall notify the TSP immediately in the event of any threat or actual damage to the network bypass and provide whatever assistance is required by the TSP to repair or rectify such Defects.

A15/3.2.14 Temporary traffic management and roadspace bookings outside of the Site shall be the responsibility of the *Contractor*. The lead in period for roadspace bookings is dependent upon the Area Team requirements but is not less than 12 weeks.

A15/3.2.15 Where third party access to an existing transmission station or transmission cabinet has been identified and required in numbered appendix 15/1, any planned work within a transmission station or transmission cabinet, must be prearranged with the TSP through the permit to work procedure (also known as Highways England PEWS (Planned Engineering Work System)).

Email:[32]

[32] Note to tenderers: Email address to be provided in final contract.

Access may only be possible under the TSP supervision dependent upon the work involved and the risks associated with the work both physical and of service disruption. The *Contractor* shall provide the TSP a minimum of two weeks prior notification of the need to access a transmission station or transmission cabinet.

A15/3.3 Location and Protection of the Telecommunications Services Provider's Infrastructure

A15/3.3.1 All requests for location and marking out of the TSP's existing buried equipment must be made through the TSP's network operations centre (NOC).

As built drawings showing the TSP's assets at the *starting date* shall be provided in the Common Data Environment. If required, the *Contractor* can request physical on site location and marking out in accordance with the ES1 (as defined in the document referenced below) process. This is described in the TSP's Procedure "A guide to making NRTS request", which is available from the TSP.

Two weeks' notice must be provided to the TSP for these physical on site location and marking out to be undertaken.

A15/3.3.2 All works in the proximity of the TSP's buried equipment involving excavation by hand or by mechanical means, must be carried out using a "permit to dig / break ground" procedure as described in HS(G) 47 (Avoiding danger from underground services), link provided in Annex A.

Where there is any doubt over the location of buried services, the telent ES1 location procedure shall be followed.

Where a significant risk to services have been identified by either the *Contractor* or the TSP during the design, the *Contractor* shall ensure that the TSP's representative can attend Site to monitor the *Contractor*'s work.

In such circumstances, two weeks' notice is to be provided by the *Contractor* to the TSP. Prior to using directional drilling the *Contractor* ensures that buried services of all types (including ownership) are identified and protected.

A15/3.3.3 Temporary cables, including network bypasses, shall be installed in sacrificial ducting and routed to minimize disturbance, accidental damage or possible theft.

The *Contractor* shall ensure that the

- design,
- protection,
- programming of temporary cabling,
- connections required,
- lengths required and
- duration

are agreed with the TSP.

The use of existing ducted infrastructure for temporary cables (such as SPECS or power cables) shall not be permitted, unless otherwise agreed with the TSP.

A15/3.3.4 The *Contractor* shall be responsible for

- all setting out for the TSP's works and
- agreeing such setting out with the TSP.

The *Contractor* shall monitor, refresh or reinstate any setting out, without charge, where damaged or otherwise corrupted by the actions of others (excluding the TSP).

A15/3.4 Communications Services

A15/3.4.1 The processes for design of telecommunication services, including

- outline design,
- detailed design,
- design changes,
- Departures and
- any re-measured items (those with an extra-over rate)

are described in the TSP's procedure "Working with telent – A Design Guide".

ANNEX B of this design guide references all of the TSP's standard drawings.

A15/3.4.2 The requirements on the *Contractor* for the design, to allow for cables to be installed across gantries by the TSP, shall ensure that all cables can be installed entirely from the gantry bases in one continuous pull and that the TSP will not require access to any part of the gantry above a point 2.0m above ground level.

A15/3.4.3 The process to agree with the TSP for any changes to the telecommunications services that are required (i.e. changes to those accepted detailed in numbered appendix 15/1) shall be in the form of a written application for a change addressed to the TSP's regional manager.

All such design change requests shall be allocated a unique reference number and an initial response shall be provided by the TSP within seven working days of receipt.

A register of design changes shall be maintained by the TSP and the status discussed at the regular design co-ordination meetings in accordance with the TSP interface agreement.

A15/3.4.4 The *Contractor* shall liaise with the TSP to agree the allocation requirements within the *Client's* cabinets, including

- space,
- power supply load allocation,
- total power dissipation and
- power supply distribution arrangements.

A15/3.4.5 The *Contractor* shall liaise with the TSP to agree the requirements in respect of the provision and updating of service configuration information related to the Telecommunications Services, including

- geographic location,
- IP addresses,
- URL addresses or
- other electronic address information (as appropriate)

of the telecommunications service and the roadside technology.

A15/3.4.6 The *Contractor* shall ensure that they comply with the TSP's requirements for the construction of infrastructure including

- ducts,
- sub-ducts and
- cabinet bases

in accordance with "Working with telent - A Design Guide".

The *Contractor* shall ensure that

- all ducts are laid with granular bed and surround, unless specified as cast into concrete,
- sub-duct colours follow a consistent orientation / pattern,
- cabinet bases include a minimum of 2 x 100mm ducts or sub-ducts and
- multiple ducts are
    - clipped together and
    - have the required spacers and strapping

in accordance with the manufacturers requirements.

A15/3.4.7 Where the *Contractor* is storing and installing cables for eventual handover to the TSP, the *Contractor* shall ensure that

- stored cables are maintained, secured and kept free of defects,
- cables are inspected and tested for sheath damage prior to installation to confirm that they are free from defects,
- cables are only installed within the ambient temperature limit criteria specified by the manufacturer,
- cables are pulled through ducts and chambers in accordance with good industry practice,
    - with rollers used at change of direction and
    - bellmouths used at duct entry points to prevent any sheath damage,
- lubrication is only used where permitted by the cable manufacturer,
- cables are not pulled through ducts where either the existing or proposed capacity exceeds 60% by cross sectional area and
- power cables and communications cables are not provided in the same duct.

A15/3.4.8 The *Contractor* shall ensure that all ducts and sub ducts to cabinets and transmission stations are sealed at both ends from water, gas and vermin ingress.

The *Contractor* shall ensure that the method of sealing ducts is provided by of either

- mechanical duct plugs
- a proprietary silicon or
- resin based system designed for cable duct sealing.

The *Contractor* shall ensure that ducts across gantries and directionally drilled ducts are sealed.

The use of expanded foam is not permitted and sealing of longitudinal ducts is not required.

A15/3.4.9 Where ducted infrastructure cannot be installed to the minimum depth requirements in accordance with the DMRB standards and the TSP's design guides, the *Contractor* shall propose an alternative duct route to achieve the minimum depth or provide enhanced protection.

This proposal will be made to the NCAB group via the TSP for agreement and will be dealt with on a case by case basis. The *Contractor* shall allow five weeks for the NCAB process.

A15/3.4.10 The *Contractor* shall ensure that where existing ducts are interrupted or extended, the resulting interface must provide a smooth, step free joint between the two ducts that will allow the free movement of cables (including the pulling through of new cables).

The joint shall be resilient and pose no risk of coming apart to allow ingress of water, silt or roots.

A15/3.4.11 The *Contractor* shall ensure that a suitable number of intermediate cable pulling pits are provided along the sacrificial ducts. It is the responsibility of the *Contractor* to satisfy itself that a sufficient number of pits have been provided.

A15/3.4.12 The *Contractor* shall ensure that chambers are constructed in accordance with "Working with telent - A Design Guide".

The *Contractor* shall ensure that chambers

- are Type A and Type B,
- have a sump and have positive drainage,
- are founded on a ST4 concrete base and backfilled full height with 150mm of ST2 concrete, unless local geotechnical and wheel loading criteria can be demonstrated to negate this requirement,
- are sealed against water ingress along all edges and joints,
- cover grades are suitable for the worst case wheel loading determined through risk assessment and
- have a maximum depth of 2000mm measured from proposed ground level.

A15/3.4.13 The *Contractor* shall provide formal written confirmations (authorisations) to the TSP (including any agreed instruction or notices) via the Project's Common Data Environment.

This shall include

- confirmations to proceed,
- notice periods for installation of telecommunication services,
- activation of services and
- deactivation of services.

The notice periods are as described in "Working with telent - A Design Guide".

A15/3.4.14 The *Contractor* shall ensure that service delivery points (SDP) are labelled in accordance with the TSP's requirements and these requirements are included in numbered appendix 15/1.

The *Contractor* shall use the relevant SDP label references in all correspondence with the TSP.

The *Contractor* shall be responsible for provision and labelling, unless otherwise agreed with the TSP.

A15/3.4.15 The steps involved in the provision of new telecommunication services by the TSP and the removal of existing telecommunication services, including

- information on cable pulling,
- cable termination and
- equipment provision in accordance with "Working with telent - A Design Guide"

and will be provided by the TSP where requested by the *Contractor* in accordance with the agreed notification period.

A15/3.4.16 For network bypass cables, the design process and responsibilities of the TSP and *Contractor*, together with the process of cutting over, are described in "Working with telent - A Design Guide".

ANNEX B of this guide includes the notice periods that the *Contractor* is required to provide the TSP for installation and removal. The *Contractor* agrees these requirements with the TSP and includes them within the TSP interface agreement.

A15/3.4.18 Where the *Contractor* is required to terminate cables into cabinets containing operational circuitry, the *Contractor* notifies (within two weeks) and facilitates the attendance of the TSP to oversee all works within the cabinet.

On notification, the TSP will supply as built records for the cabinet and define the safe working protocols.

The *Contractor* shall comply with the TSP's

- safe working protocols,
- specifications and
- requirements to provide as built, record sheets and other records

within cabinets with operational circuitry.

A15/3.4.19 Where the TSP is undertaking work on operational circuitry, including connections and disconnections from the live communications network, the *Contractor* shall define and supply a safe operation protocols from which the TSP will prepare a specific method statement. The *Contractor* shall ensure that these protocols have a fail-safe system is in place to allow works to proceed with zero risk of electrical injury or equipment damage.

A15/3.5 Communications Infrastructure

A15/3.5.1 Where the risk assessment has highlighted a need for arson or malicious damage prevention, security devices should be fitted to chambers.

Fire prevention trays shall be

- compatible with the chamber manufacture
- installed beneath the frame and cover and
- fixed and sealed against the chamber walls to provide an airtight seal.

The type of lockable chamber covers shall be agreed with the TSP.

A15/3.5.2 Where requested by the TSP, the *Contractor* shall arrange for the TSP to witness the proving of ducts.

A15/3.5.3 Where the *Contractor* proposes to use existing ducts, the *Contractor* shall prove the viability of existing ducts and agree this with the TSP before committing to their use.

For empty ducts

- the default test required by the TSP is the pulling through of a mandrel. Where there is evidence that the duct contains silt or other debris, then cleaning, brushing and jetting may be needed to free up space.
- this cleaning operation shall be followed by the use of a mandrel.

Where the duct contains one or more cables

- the *Contractor* needs to demonstrate to the TSP that the duct has been adequately proved and has the capability of accepting the new cables.
- The successful use of brushing or jetting over the full length of the duct, (i.e. from one end to the other, not halfway from either end), will normally be acceptable evidence that the duct has been proved.

The requirements of the TSP in respect of proving newly installed ducts including mandrel and air testing in accordance with "Working with telent - A Design Guide".

The *Contractor* shall ensure that copies of all record sheets shall be submitted to the TSP within seven working days or as otherwise agreed with the TSP.

A15/3.5.4 The *Contractor* shall prepare an access for maintenance strategy for the TSP's agreement, prior to commencement of the relevant construction activity.

This shall contain details of

- proposed vehicle parking,
- walking distances,
- steps,
- ramps,
- working zones and
- any other specific restrictions (including for risk mitigation).

The *Contractor* shall ensure that all cabinet and chamber locations will have clear working zones surrounding them in accordance with Drawings TLT/RGD/MCX 0811 and TLT/RGD/MCX/0812.

A15/3.5.5 The *Contractor* shall comply with the specification and design details for the *Client's* cabinets (whether wholly or partly the maintenance responsibility of the TSP) in accordance with "Working with telent - A Design Guide".

A15/3.5.6 The electrical power requirements and heat output of telecommunications equipment used by TSP in accordance with "Working with telent - A Design Guide".

A15/3.5.7 The TSP may require the *Contractor* to install certain cables prior to the installation of their own cables. The *Contractor* shall agree this with the TSP and include such details in numbered appendices 15/1 and 15/2.

A15/3.5.8 The *Contractor* shall ensure that where 40 pair and optical fibre cables are to be installed in the same duct, the 40 pair cables are installed first.

A15/3.5.9 If the *Contractor* is installing cable joints (cable joint enclosure (CJE) or above ground joint (AGJ)) located within the same chamber or cabinet as TSP cable joints, then the accommodation requirements shall be in accordance with "Working with telent – A Design Guide".

A15/3.5.10 The *Contractor* shall provide cable management fixings as shown on drawing MCX 0815 of the MCHW in all Type A chambers where a joint is required or expected. The location of these chambers shall be described in numbered appendix 15/1.

A15/3.5.11 The *Contractor* shall provide suitable earthing points or other earthing arrangements to allow appropriate connection to the TSP's lightning protection components.

A15/3.5.13 The *Contractor* ensures that all chambers shall be provided with a technology performance management service (TPMS) label fixed securely by riveting to an alloy plate and screwed into the concrete surround adjacent to the chamber cover. No internal labelling of chamber and ducts is required.

A15/3.5.14 The *Contractor* shall identify the *Client's* cables by use of labels and identification system agreed in advance with the TSP. Including locations where the *Client's* cables are terminated into cabinets, or locations, that the TSP is solely responsible for maintaining.

A15/3.5.15 Where armoured cables cannot be installed at the minimum depth requirements specified in drawing MCX 0141 of the MCHW, the *Contractor* shall propose an alternative route to achieve the minimum depth or provide enhanced protection. This proposal will be made to the CCWG via the TSP for agreement on a case by case basis. The *Contractor* shall allow five weeks for the CCWG process.

A15/3.5.16 Where both the *Client's* cables and the TSP maintained cables are to be buried in the same trench (where not ducted), a minimum of 300mm separation clearance shall be applied in both the vertical and horizontal planes.

Where one or more cables are power cables, the separation distance may need to be greater and a proposal shall be submitted by the *Contractor* for the TSP's agreement. The TSP shall confirm that there will be no detrimental impact on the adjacent TSP cables.

A15/3.5.17 The *Contractor* shall ensure that non-armoured cables in ducts is used throughout, unless otherwise agreed with the TSP.

Where agreed otherwise by the TSP, the *Contractor* shall ensure that buried armoured cables

- are limited to those areas where a repair or an interim solution is required,
- shall be run between adjacent cabinets from a single drum as buried joints will not be permitted,
- have a sacrificial duct for the armoured cables installed by the TSP,
- for lengths exceeding 50m, buried loops of a minimum of 3m length shall be provided adjacent to each of the cabinets and
- have a maximum length of (when measured along actual length, not in straight line between points) is 1000m.

A15/3.5.18 Sheath repairs to armoured cables are not permitted, unless otherwise agreed by the TSP.

Where otherwise agreed with the TSP, all repairs undertaken by the *Contractor* (where the damage has been caused by the others with the exception of the TSP) to armoured cables shall be tested by the TSP to confirm that they have been carried out successfully.

Where a sheath repair undertaken by the *Contractor* is not acceptable to the TSP, then

- the TSP may replace the unacceptable sheath repair undertaken by the *Contractor* or
- if notified by the *Supervisor*, the *Contractor* shall replace the unacceptable sheath repair within two days and shall advise the TSP when the replacement sheath repair is completed to enable the TSP to undertake any further testing and inspection by the TSP.

A15/3.6 Inspection and Testing

A15/3.6.1 The *Contractor* shall ensure that the following activities are completed prior to the TSP undertaking inspection and testing

- sufficient notice is provided in accordance with "Working with telent - A Design Guide"),
- completion and evidence of any pre-inspection works such as electrical testing and quality assurance,
- the issue of "ready to inspect" certificates (provided by the TSP upon request by the *Contractor*) for the works being offered up for inspection,
- safe means of access to the inspection site,
- the site itself must be free from hazards, or where safety item is not complete (e.g. handrail) a temporary solution is in place,
- appropriate site induction and supervision (if required) shall be available,
- any instruction manual or as built drawings shall be provided to the TSP representative to allow them to undertake the inspection or test and
- any necessary test or safety equipment available for their use.

A15/3.6.3 The *Contractor* shall ensure that records are produced following the inspection of the relevant works and evidence of the TSP attendance and endorsement.

These records shall be signed by the *Contractor* and countersigned by the TSP representative.

All tests shall have signed inspection sheets. Copies of all record inspection sheets shall be submitted within seven working days, unless otherwise agreed with the TSP and provided on the Project's Common Data Environment.

A15/3.6.4 A register of identified Defects, snagging and remedial works shall be maintained by the *Contractor*.

Any Defects that require or would benefit from input from the TSP shall be raised between the *Contractor* and the TSP representative for agreement.

This register shall include a process to ensure timely rectification of Defects, snagging and remedial works.

The *Contractor* shall ensure that the Defects (including Defects that are rectified) shall be readily available for inspection by the TSP representative and discussed in the regular progress meetings with the TSP as agreed in the TSP interface agreement.

The rectification of Defects, shall be agreed between the *Contractor* and the TSP's representative prior to implementation.

A15/3.6.5 The *Contractor* shall ensure that the activities required by paragraph A15/3.5.17 are undertaken before the inspection and testing of the telecommunication cables installation by the TSP.

A15/3.6.6 The *Contractor* shall ensure that the requirements of the TSP in respect of electrical testing and certification are in accordance with "Working with telent - A Design Guide".

Copies of all record sheets shall be submitted within seven working days or as otherwise agreed with the TSP and provided on the Project's Common Data Environment.

A15/3.7 Acceptance and Handover

A15/3.7.1 The process for handling Defects and remedial works during the *Contractor*'s commissioning of the TSP's infrastructure assets shall be agreed with the TSP and included in the technology and systems commissioning plan prior to submission for acceptance by the *Project Manager*.

The *Contractor* ensures that the technology and systems commissioning plan includes

- that a Defect is logged with the TSP's representative and agreed with the TSP prior to the rectification of the Defect by the *Contractor*, together with the programme,
- that the resolution to Defects is forwarded for agreement by the TSP's regional manager prior to implementation (unless required for temporary emergency situations),
- a record of Defects shall also be maintained by the TSP,
- the process for the *Contractor's* handover of assets to the TSP and
- the process for recording as built or record information

for assets that are maintained by the TSP in the future.

A15/3.7.2 The *Contractor* shall ensure all as built information or other relevant record information is provided in accordance with

- section S400,
- section S700 and
- the requirements of clause 1504.1(l).

The record information shall be provided by the *Contractor* in accordance with the accepted Technology and Systems Commissioning Plan.

A15/3.7.3 The *Contractor* shall ensure that any information required by the TSP, additional to that required by MCH 1349, is provided within the as built record information.

The additional information that may be required, including

- references on infrastructure layout drawings for access provision to new or modified roadside infrastructure,
- chamber cover type used (for lifting key type),
- chamber references (TPMS),
- duct arrangement,
- any residual risks to inform the future maintainer or operator and
- records of redundant telecommunication services.