
# NORTHWICK PARK HOSPITAL

## Design, Supply, Delivery, Installation and Commissioning of Sub-Station 3 LV Reconfiguration Works

## Particular Specification

22/09/2022

# Northwick Park Hospital

## Sub-Station 3 LV Reconfiguration Works - Particular Specification

22/09/2022

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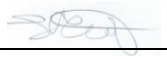
| Signature |  | | |
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| Project number | | | |
| File reference | | | |

PARTICULAR SPECIFICATION

**Project Name:**
**Design, Supply, Delivery, Installation and Commissioning of**

**Sub-Station 3 LV Reconfiguration Works**

at
Northwick Park Hospital

London

Northwick Park Hospital
Watford Road
Harrow
London
HA1 3UJ

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## 1 PRELIMINARIES

1.1 The Project Generally

This project is to supply, deliver, install and commission all Sub-Station 3 LV Reconfiguration Works to facilitate the installation of generator supplies the Existing Sub 3 LV switchgear.

1.2 Project Particulars

1.2.1 THE PROJECT:

Name: **Supply, Delivery, Installation and Commissioning of Sub-Station 3 LV Reconfiguration Works**

Location: Northwick Park Hospital,
Watford Road
Harrow
HA1 3UJ

1.2.2 EMPLOYER (CLIENT):

Northwick Park Hospital,
Watford Road
Harrow
HA1 3UJ

1.2.3 THE PRINCIPAL CONTRACTOR:

To be Confirmed

1.2.4 CONTRACT ADMINISTRATOR:

Muhammad Syed
Capital and Estates
Northwick Park Hospital,
Watford Road
Harrow
HA1 3UJ

1.2.5 PLANNING SUPERVISOR:

TBC

1.2.6 MECHANICAL / ELECTRICAL ENGINEER:

Larry Gough
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PE28 3DQ
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E-mail info@lakesjoingrandly.co.uk

1.3 Tender and Contract Documents

Performance Specification
Tender with associated drawings listed in 1.3.1.

1.3.1 THE TENDER DRAWINGS: ***Drawings to follow:***

| Drawing No. | Description | Scale |
|---|---|---|
| LJG_NPH_SUB3_001 | Site Location Plan | NTS |
| LJG_NPH_SUB3_002 | Existing Overview HV Schematic | NTS |
| LJG_NPH_SUB3_003 | Existing HV and LV Schematic | NTS |
| LJG_NPH_SUB3_004 | Existing LV Schematic | NTS |
| LJG_NPH_SUB3_005 | Existing Site Layout | NTS |
| LJG_NPH_SUB3_006 | Existing Sub 3 LV Switch Panel Arrangement | NTS |
| LJG_NPH_SUB3_007 | Existing Chapel Generator Building Coverage Plan | NTS |
| LJG_NPH_SUB3_008 | Proposed Ladder Racking Route | NTS |

1.3.2 MECHANICAL AND ELECTRICAL: GENERAL REQUIREMENTS

This is detailed in the scope of works

A working knowledge of the standards cited in this specification must be incorporated within the business proposals for all electrical and mechanical engineering services.

The performance requirements for the electrical and mechanical services for each element is scheduled in Section 6.

1.3.3 THE PRE-TENDER HEALTH AND SAFETY PLAN:

To be issued separately.

1.4 The Site / Existing Buildings

1.4.1 THE SITE:

The site boundaries for this Project are the workings areas as shown on the tender drawings. Site compound area to be agreed.

1.4.2 EXISTING BUILDING:

The buildings will be in use and the working areas will be occupied with existing switchgear and will remain so for the duration of the contract.

Fire escapes from the existing surrounding buildings will need to be maintained.

1.4.3 EXISTING SERVICES

Where applicable, existing services are indicated on the tender drawings.

1.4.4 SITE VISIT:

The contractor should visit the site when preparing the tender and must make due allowance for:

- Local conditions
- Extent of operations
- Supply of and conditions affecting labour
- Storage space for materials, including all additional handling, transporting and access arrangements due to site conditions
- Position of underground services and drains,
- The nature of the ground and the execution of the contract generally.

Site visits must be by appointment. Appointments to visit site should be made with Muhammad Syed who can be contacted on 07863 846253.

## 1.5 Description of the Work

### 1.5.1 BRIEF SCOPE OF WORK:

Now that the space previously occupied by the HV generator compound has been cleared to enable the land sale, Northwick Park Hospital, the trust now requires its standby generator support infrastructure ratifying, with sufficient system alterations and phasing to minimise risks to the Trust during the changeover works.

This contract is a full Turnkey package and requires the successful contractor to take on full Design and Build responsibility, including any necessary Civils works, all Mechanical and Electrical installation including full liaison with the generator specialist to arrange any isolations / disconnections / installations / commissioning on site as part of this work. It is assumed all tenderers will have the relevant insurances in place, including Professional Indemnity.

The existing LV systems on site will need to be inspected and maintained in full use throughout the works and until the new systems are installed and established on site as detailed in this document.

It is essential that the tendering Contractor visit site to carry out a full survey and familiarise themselves of the task in hand and of the existing building and surroundings. All necessary survey, detailed design and construction should be allowed for as it will be the Contractors responsibility for the design and build of these as part of this package and take in to account the access difficulties, risk of security, room floor levels and switching requirement due to the proximity of existing LV cabling, plant and operational departments directly above and adjacent to these works including a Critical Care Unit.

The contractor shall provide costs for all works complete with all necessary cabling modifications and any necessary switch panel modifications to suit the new arrangement.

Works on the LV generator cabling and switch panel modifications will be a single phased installation to ensure continuity of supply availability. To achieve this part of the works the Contractor will be responsible for all design, engineering, collection, delivery, offloading, handling, positioning and installation requirements of new equipment and materials as well as removal of redundant existing plant. Deliveries and movements will require close coordination between the Trust and the contractor as access is very restricted.

The works required will involve the systematic isolation of key sections of the LV systems in Sub-Station 3 to isolate sections of the existing sub 3 LV panel in turn and enable it to be modified and extended with the new switch sections currently sitting in position beside the existing arrangement as detailed within the documentation pack. Further detailed Scope Information is included in Section 6.

### 1.5.2 THE PLANS

Modifications can be made but proposals showing any variation to the methodology must be submitted at tender return.

### 1.5.3 PROGRAMME

A fully detailed program shall be presented with the tender that indicates the time from date of order to completion. A guidance programme of anticipated key deliverables and time frames has not been included within this specification.

A fully detailed program shall be presented with the tender that indicates the time from date of order to completion.

### 1.5.4 BUILDING REGULATIONS

Where necessary it is the contractor's responsibility to obtain current Building Regulation consent (all fees paid by main contractor).

Works must comply with the NHS Estates Health Technical Memorandums.

Health Technical Memorandum 06-01 - Electrical services supply and distribution
Health Technical Memorandum 06-02 - Electrical safety guidance for low voltage systems

The above recommendations are without prejudice to any requirements which may be required by the local building regulation authority or Local London Fire & Rescue Services.

Planning – The employer will be applying for Full Planning Approval if necessary, under 'Designated Powers'.

### 1.5.5 WORKING ARRANGEMENTS

The contractor will be entirely responsible for the accurate and efficient installation and performance of the works and such responsibility cannot be transferred in whole or in part to any other party.

The Contractor will be deemed to have examined the site of the work, Form of contract, Specification and General Conditions, with such schedules, drawings, plans and related documents as are annexed thereto or referred to therein.

If all information required cannot be obtained from this examination, application for information shall be made to the Contract Administrator prior to submission of the tender.

Claims made by the Contractor arising from any lack of knowledge in this respect will not be considered.

# THE CONTRACT Section 2.00

## 2 THE CONTRACT

2.1 DB 2016 Design and Build Contract (DB) 2016

The contractor's attention is drawn to JCT guidance issued in 2012 for implementation of DB 2016

The contractor's attention to the Public Contract Regulations 2015 is essential

2.2 SUB - CONTRACTS

Ensure that all sub-contractors, suppliers and others responsible to the Contractor or who may affect or be affected by the works are fully aware of the contract conditions and any amendments thereto.

2.3 DOMESTIC SUB-CONTRACTOR APPOINTMENTS

Domestic Sub-contractors will be subject to appointment in accordance with section 3 clause 3.3 of the Main Contract Conditions.

THE CONDITIONS:

**Section 1 Definitions and Interpretation**

1.1 **Definitions**

**Interpretation**

1.2 Reference to clauses
1.3 Agreement etc. to be read as a whole
1.4 Headings, references to persons, legislation etc.
1.5 Reckoning periods of days
1.6 Contracts (Rights of Third Parties) Act 1999
1.7 Notices and Other Communications
1.8 Effect of Final Statement
1.9 Effect of Payments other than payment of Final Statement
1.10 Consents and Approvals
1.11 Applicable Law

**Section 2 Carrying out the Works**

**Contractor's obligations**

2.1 General obligations
2.2 Materials, goods and workmanship

**Possession**

2.3 Date of Possession - Progress
2.4 Deferment of Possession
2.5 Early use by Employer
2.6 Work not forming part of the Contract

**Supply of Documents, Setting Out etc.**

2.7 Contract Documents
2.8 Construction information
2.9 Site Boundaries

**Discrepancies and Divergences**

2.10 Divergence in Employer's Requirements and definition of site boundary
2.11 Preparation of Employer's Requirements
2.12 Employer's Requirements – inadequacy
2.13 Notice of discrepancies etc
2.14 Discrepancies in documents
2.15 Divergences from Statutory Requirements
2.16 Emergency compliance with Statutory Requirements

2.17 **Design Work - liabilities and limitation**

**Fees, Royalties and Patent Rights**

2.18 Fees or charges legally demandable
2.19 Patent rights and royalties - Contractor's indemnity
2.20 Patent rights – Instructions

**Unfixed Materials and Goods - property, risk etc**

2.21 Materials and goods - on site
2.22 Materials and goods - off site

**Adjustment of Completion Date**

2.23 Related definitions and interpretation
2.24 Notice by Contractor of delay to progress
2.25 Fixing Completion Date
2.26 Relevant Events

**Practical Completion, Lateness and Liquidated Damages**

2.27 Practical completion
2.28 Non-Completion Notice
2.29 Payment or allowance of liquidated damages

**Partial Possession by Employer**

2.30 Contractor's consent
2.31 Practical completion date
2.32 Defects etc. - Relevant Part
2.33 Insurance - Relevant Part
2.34 Liquidated damages - Relevant Part

**Defects**

2.35 Schedules of defects and instructions
2.36 Notice of Completion of Making Good

**Contractor's Design Documents**

2.37 As-built Drawings
2.38 Copyright and use

**Section 3 Control of the Works**

**Access and Representatives**

3.1 Access for Employers Agent

3.2 Site Manager

**Sub-Contracting**

3.3 Consent to sub-contracting
3.4 Conditions of Sub-Contractors

**Employer's Instructions**

3.5 Compliance with instructions
3.6 Non-compliance with instructions
3.7 Instructions other than in writing
3.8 Provisions empowering instructions
3.9 Instructions requiring Changes
3.10 Postponement of work
3.11 Instructions on Provisional Sums
3.12 Inspection – tests
3.13 Work not in accordance with the Contract
3.14 Workmanship not in accordance with the Contract
3.15 Antiquities

3.16 **CDM Regulations**

**Section 4 Payment**

**Contract Sum and Adjustment**

4.1 Adjustment only under the Conditions
4.2 Items included in adjustments
4.3 Taking adjustments into account

**Taxes**

4.4 VAT
4.5 Construction Industry Scheme (CIS)

**Payments and Notices – general provisions**

4.6 Advance Payment
4.7 Interim payments – Contractor's Interim Payment Applications, due dates and Payment Notices
4.8 Relevant statement and Final Payment Notice
4.9 Interim and final payments - final date and amount
4.10 Pay Less Notices and other general provisions
4.11 Contractor's right of suspension

**Interim Payments - calculation of sums due**

4.12 Gross Valuation - Alternative A
4.13 Gross Valuation - Alternative B
4.14 Sums due as Interim Payments
4.15 Listed Items

**Retention**

4.16 Rules on treatment of Retention
4.17 Retention Bond
4.18 Retention - amounts and periods

**Loss and Expense**

4.19 Matters materially affecting regular progress
4.20 Notification and ascertainment
4.21 Relevant Matters
4.22 Amounts ascertained - addition to Contract Sum
4.23 Reservation of Contractor's rights and remedies

4.24 **Final Statement and Final Payment**

**Section 5 Changes**

5.1 Definition of Changes
5.2 Valuation of Changes and provisional sum work
5.3 Giving effect to Valuations, agreements etc

**The Valuation Rules**

5.4 Measurable Work
5.5 Day work
5.6 Change of conditions for other work
5.7 Additional provisions

**Section 6 Injury, Damage and Insurance**

**Personal Injury and Property Damage**

6.1 Contractor's Liability – personal injury or death
6.2 Contractor's Liability – loss, injury or damage to property
6.3 Loss or damage to Existing Structures or their contents

**Insurance against Personal Injury and Property Damage**

6.4 Contractor's insurance of his liability
6.5 Contractor's insurance of liability of Employer
6.6 Expected Risks

**Insurance of the Works and Existing Structures**

6.7 Insurance Options and Period
6.8 Related definitions
6.9 Sub-contractors – Specified Perils cover under Works Insurance Policies
6.10 Terrorism Cover – policy extensions and premiums
6.11 Terrorism Cover – non-availability – Employer's options
6.12 Evidence of insurance
6.13 Loss or damage - insurance claims and reinstatement
6.14 Loss or damage to Existing Structures - right of termination

**Professional Indemnity Insurance**

6.15 Obligation to insure

6.16 Increased cost and non-availability

**Joint Fire Code – Compliance**

6.17 Application of clauses
6.18 Compliance with Joint Fire Code
6.19 Breach of Joint Fire Code – Remedial Measures
6.20 Joint Fire Code – amendments/revisions

**Section 7 Assignment Performance Bonds and Guarantees, Third Party Rights and Collateral Warranties**

**Assignment**

7.1 General
7.2 Rights of enforcement

7.3 **Performance Bonds and Guarantees**

**Clauses 7 A to 7E - Preliminary**

7.4 Rights Particulars
7.5 Notices
7.6 Execution of Collateral Warranties

**Third Party Rights from Contractor**

7A Rights for Purchasers and Tenants
7B Rights for a Funder

**Collateral Warranties from Contractor**

7C Contractor's Warranties - Purchasers and Tenants
7D Contractor's Warranty - Funder

7E **Third Party Rights and Collateral Warranties from Sub-Contractors**

**Section 8 Termination**

8.1 Meaning of insolvency
8.2 Notices under Section 8
8.3 Other rights, reinstatement

**Termination by Employer**

8.4 Default by Contractor
8.5 Insolvency of Contractor
8.6 Corruption and regulation 73 (1)(b) of the PC Regulations
8.7 Consequences of termination under clauses 8.4 to 8.6
8.8 Employer's decision not to complete the works

**Termination by Contractor**

8.9 Default by Employer
8.10 Insolvency of Employer

8.11 **Termination by either Party and regulations 73 (1)(a) and 73 (1)(c) of the PC Regulations**

8.12 **Consequences of Termination under clauses 8.9 to 8.11 etc.**

**Section 9 Settlement of Disputes**

9.1 **Mediation**

9.2 **Adjudication**

**Arbitration**

9.3 Conduct of Arbitration
9.4 Notice of reference to arbitration
9.5 Powers of Arbitrator
9.6 Effect of award
9.7 Appeal – questions of law
9.8 Arbitration Act 1996

**Schedules**

**Schedule 1 Design Submission Procedure**

**Schedule 2 Supplemental Provisions**

**Schedule 3 Insurance Options**

Insurance Option A
(New Buildings – All Risks Insurance of the Works by the Contractor)
Insurance Option B
(New Buildings – All Risks Insurance of the Works by Employer)
Insurance Option C
(joint Names Insurance of the Employer of Existing Structures and Works in or Extensions to them)

**Schedule 4 Code of Practice**

**Schedule 5 Third Party Rights**

Part 1: Third Party Rights for Purchasers and Tenants
Part 2: Third Party Rights for a Funder

**Schedule 6 Forms of Bonds**

Part 1: Advance Payment Bond

Part 2: Bond in respect of payment for off-site materials and/or goods

Part 3: Retention Bond

**Schedule 7 JCT Fluctuations Option A**
(Contribution, levy and tax fluctuations)

# EMPLOYERS REQUIREMENTS Section 3.00

## 3 EMPLOYER'S REQUIREMENTS

(This section gives the Employer's requirements for all works carried out on the NPH site, therefore contractors should be mindful that there may be clauses below which are not applicable to the Job in hand, if in doubt concerns to be raise and brought to the attention of the NPH Project Manager).

3.1 Tendering / Subletting / Supply

MAIN CONTRACT TENDERING

3.1.1 SCOPE

These conditions are supplementary to those stated in the invitation to tender and the Form of Tender.

3.1.2 TENDERING PROCEDURE

Will be in accordance with the principles of the 'Code of Procedure for Single Tendering' 1996

3.1.3 ACCEPTANCE OF TENDER

The Employer and his representatives:

- Offer no guarantee that the lowest or any tender will be recommended for acceptance or accepted.
- Will not be responsible for any cost incurred in the preparation of any tender

3.1.4 PERIOD OF VALIDITY

Tenders must remain open for consideration (unless previously withdrawn) for not less than period of 3 calendar month/s from date fixed for the submission or lodgment of tenders.

PRICING /SUBMISSION OF DOCUMENTS

3.1.5 PRELIMINARIES IN THE SPECIFICATION

The Preliminaries /General Conditions sections (1.10-5.60 inclusive) must not be relied on as complying with SMM7.

3.1.6 SPECIFICATION WITHOUT QUANTITIES

Where and to the extent that quantities are not included in the specification, tenders must include for all work shown or described in the tender documents as a whole or clearly apparent as being necessary for the complete and proper execution of the works.

3.1.7 PRICING OF SPECIFICATION

Alterations and qualifications to the specification must not be made without consent of the CA. Tenders containing unauthorised alterations or qualifications may be rejected. Costs relating to items in the specification, which are not priced will be deemed to have been included elsewhere in the tender.

3.1.8 THE CONTRACT SUM ANALYSIS

Must be submitted with the tender.

3.1.9 ERRORS IN THE PRICED SPECIFICATION/CONTRACT SUM ANALYSIS

Will be dealt with in accordance with the Code of Procedure for single stage selective tendering 1996 alternative 1 (the word 'specification ' or the words 'contract sum analysis ' being substituted for 'bills of

quantities')

3.1.10 TENDER SUBMISSION

The tender submission shall comprise:

- **Form of Tender**
- **Tender Certificate**
- **Tender Summary**
- **Building Works Tender Summary**
- **Preliminaries and provisional sums**
- **Electrical Services Tender Summary**
- **Mechanical Services Tender Summary**
- **Detailed Construction Programme**

3.1.11 PROGRAMME

The contractors proposed programme as specified in section 1.53 showing the sequence and timing of the principal parts of the works, periods for (planning and design and itemising any work which is excluded must be submitted with the tender).

3.1.12 SUBLETTING

Without the written consent of the Contract Administrator, the Contractor shall not assign this contract.

3.1.13 TENDER AWARD PROCESS

As part of the tender award process, the Trust will shortlist several contractors and ask them to attend a tender interview. At said interview, a 1-hour time slot will be provided where the contractor will be expected to give a formal presentation on their company, its structure, support network and capabilities. The presentation should then extend to how they will undertake the works and assure the Trust of 'business as usual' at all times and adhere to the Trusts safe systems of work which will be enforced at all times.

The interview timeline will be:

| No | Item | Time Limit |
|---|---|---|
| 1 | Introductions & Client Overview | 5 mins |
| 2 | Contractor Presentation | 15 mins |
| 3 | Q&A Session | 30 mins |
| 4 | Client Summary & Close-out | 10 mins |

Following on from the contractor's presentation, the Trust interviewing panel will then pose a number of scripted but not pre-advised technical, practical or managerial type questions to the contractor and will score their responses accordingly.

The scoring matrix that will be used in this instance will be

| Score | Description |
|---|---|
| 0 | No confidence in supplier's ability to provide service |
| 1 | Lower confidence in supplier's ability to provide service |
| 2 | Confident that supplier will be able to provide service, but with some minor reservations. |
| 3 | Full confidence in supplier's ability to provide service – supplier knowledgeable and able to fully reply to questions. |
| 4 | Exceptional Response – Exceeds requirements, providing additional benefit/value/ experienced above that specified |

The scores from the tender interview will then be aggregated with the price and quality scores from the initial tender return and used as a mechanism to support any award decision the Trust decides to make.

3.2 Provision, Content and Use of Documents

DEFINITIONS AND INTERPRETATIONS

3.2.1

CA means the person nominated in the Contract as the Contract Administrator or his authorised representative.

3.2.2 IN WRITING

When required to advise, notify, inform, instruct, agree, confirm, obtain information, obtain acceptance or obtain instructions do so in writing.

3.2.3 ACCEPTANCE

(and words derived there from) means the acceptance in writing of the CA unless specified otherwise.

3.2.4 A PRODUCT

Means materials (including naturally occurring material and goods (including components, equipment and accessories) intended for permanent incorporation in the works.

3.2.5 EQUIVALENT PRODUCTS

Where the specification permits substitution of a product of different manufacture to that specified and such substitution is desired, before ordering the product notify the employer and when requested, submit for verification documentary evidence that the alternative product is equivalent in respect of material, safety, reliability, function, compatibility with adjacent construction, availability of compatibly accessories and, where relevant, appearance. Submit certified English translations of any foreign language documents.

Any proposal for use of an alternative product must also include proposals for substitution of compatible accessory products and variation of details as necessary, with evidence of equivalent durability, function and appearance of the construction as a while. If such substitution is sanctioned, and before ordering products, provide revised drawings, specification and manufacturer's guarantees as required by the CA.

3.2.6 EQUIVALENT PRODUCTS

Whenever products are specified by proprietary name and the phrase 'or equivalent 'is not included, it is deemed included.

3.2.7 BRITISH STANDARD PRODUCTS

Where any product is specified to comply with a British Standard for which there is no equivalent European Standard it may be substituted by a product complying with a grade or category within a national standard of another Member State of the European Community or an International standard recognised in the UK specifying equivalent requirements and assurances in respect of material, safety, reliability, functioning compatibility with adjacent construction, availability of accessories and where relevant, appearance. In advance of ordering notify the CA of all suck substitutions and, when requested, submit for verification documentary evidence confirming that the products comply with the specified requirements.

3.2.8 REFERENCES TO BSI DOCUMENTS

Are to the versions and amendments listed in the British Standards Catalogue and in subsequent issues of BSI Update - Standards up to and including that for one month before the date of the submission of tenders.

3.2.9 FIX ONLY

Means all labour in unloading, handling, storing and fixing in position, including use of all plant.

3.2.1 SUPPLY AND FIX

Unless stated otherwise all items given in the schedule of work and/or on the drawings are to be supplied and fixed complete.

DOCUMENTS PROVIDED ON BEHALF OF THE EMPLOYER

3.2.11 ADDITIONAL COPIES OF DRAWINGS

All information will be issued in electronic format (PDF). Contractors are to copy/print all information.

3.2.12 ADDITIONAL COPIES OF EMPLOYERS REQUIREMENTS

Not used.

3.2.13 TENDER DRAWINGS

Show schematic layout only, any significant variations to these drawings must be included in the tender return. It is the responsibility of the Contractor to complete the design, make due allowance for all materials necessary to complete the work and to achieve a full co-ordination of all services and equipment.

The Contractor will receive electronic copies of the drawings and specifications and shall ensure his site staff have two paper copies of all drawings and two copies of the specification and subsequent revision thereto. Additional electronic copies of the drawings and specification can be obtained as necessary.

The Drawings accompanying the documents show the general arrangement and extent of the Works but may not cover every detail and are generally diagrammatic in content.

Notwithstanding the provision of the drawings the Contractor shall be held responsible for the work embodied therein and shall take his own particulars and dimensions from site and provide at his own expense all necessary working drawings, copies of which shall be submitted to the Contract Administrator for comments before the work is executed.

3.2.14 DIMENSIONS

The accuracy of dimensions scaled from the drawings is not guaranteed. Obtain from the employer any dimensions required but not given in figures on the drawings nor calculable from figures on the drawings.

DOCUMENTS PROVIDED BY CONTRACTOR / SUB-CONTRACTORS

3.2.15 CONTRACTORS DESIGN: DESIGN AND PRODUCTION INFORMATION

When preparing the master programme make reasonable allowance for completing design / production information, including submission to the Planning Supervisor for comment, inspection by the CA, and

any subsequent amendment(s), resubmission(s) and re-inspection(s).

During the Contract submit to the employer the required number of copies of design / production information. The employer will note his comments on one copy, then return to the contractor.

Ensure that any necessary amendments are made with no delay. Unless and until the employer confirm that resubmission is not required submit copies of amended drawings etc. to employer, and ensure incorporation of necessary amendments all as before.

If submitted design / production information differs from the Employers Requirements, each such difference must be the subject of a request for substitution or Change, supported by all relevant information.

Should any amendment required by the Employer be considered to involve a Change which has not already been acknowledged as a Change by the Employer, notify the Employer without delay and in any case within 7 days, and do not proceed with ordering, fabrication, erection or installation until subsequently instructed. Claims for the extra cost of such work, if made after if has been carried out, may not be allowed.

Complete final version of all design / production information and submit to the Employer the number of copies required by him.

3.2.16 PRODUCTION INFORMATION for the Contractor's designed work must include:

The design / production information shall be submitted within 2 working weeks of the date of acceptance of the tender by, or on behalf of, the Employer.

Drawings shall be to scale 1:50 for departmental plans.

3.2.17 PRODUCTION DRAWINGS

Prepare production drawings of the Contractors proposal including Building work, Mechanical and Electrical services.

For services engineering information, submit two copies to the Employer and two further copies to the Mechanical and Electrical Engineer. Allow, from receipt from the Employer / Engineer, 5 working days for their inspection / comments of the first issue of each item of information and 5 working days for subsequent resubmissions.

For substructure information, submit two copies to the Employer and two further copies to the Structural Engineer. Allow, from receipt from the Employer / Engineer, 5 working days for their inspection / comments of the first issue of each item of information and 5 working days for subsequent resubmissions.

For superstructure information, submit two copies of such information to the Employer. Allow, from receipt by the Employer, 5 working days for his inspection / comments.

The employers agent inspection will not relieve the Contractor of his responsibility to check dimensions and quantities, nor, the Contractor's / Sub-Contractor's design responsibility where such design is specified in, or by performance requirements is derived from, this Specification.

Where plant and equipment is to be installed inside or close to existing buildings or structures, the Contractor shall take his own dimensions of the buildings or structures for the purpose of installing any plant and materials to be supplied and fixed under this Contract and shall be responsible for the accuracy of such dimensions.

In the preparation of installation / production drawings and in the erection of the Contract Works, the Contractor shall ensure that adequate provision is made for access to, operation and maintenance of the various valves, dampers, components, plant and equipment.

Provision shall be made so that apparatus that needs regular removal for maintenance may be removed with the minimum of disconnections and without interference to other adjacent installations.

In each case where the Contractor considers that available access may be inadequate, it shall be referred to the Contract Administrator.

Should any portion of the Works which reasonably and obviously would be inferred as necessary for complete, safe and satisfactory operation of the Works as a whole, be not specified or expressly described in the Specification and/or drawings the Contractor not withstanding such omission shall provide and execute such work as part of the contract and shall not be entitled to any extra payment on that account.

The Contractor shall prior to ordering submit to the Contract Administrator drawings showing the construction details and dimensions of all plant, equipment and machinery included in the Works.

The Contractor shall submit Drawings of control panels and specially prepared comprehensive wiring diagrams of all internal and external wiring required for permanent power and control circuits associated with the plant and equipment included in the Works. Manufacturers' standard leaflets applying to typical installation or to individual components will not be accepted as supplementary information.

3.2.18 AS BUILT DRAWINGS

Shall be maintained on site as a fully detailed record of all changes from the Production drawings. These shall be kept available at all times for inspection by the Employer.

3.2.19 AS BUILT DRAWINGS AND INFORMATION

Must be provided to the Employer not less than 2 weeks before the date for Completion as follows.

3.2.20 MAINTENANCE INSTRUCTIONS AND GUARANTEES

Retain copies delivered with components and equipment (failing which, obtain), register with manufacturer as necessary and hand over to Employer on or before Practical Completion. Notify Employer of telephone numbers for emergency services by Subcontractors after Practical Completion.

3.3 Management of the Works

GENERALLY

3.3.1 BUILDING REGULATIONS: Submit for and obtain Full Building Regulations approval.

3.3.2 SUPERVISION

Accept responsibility for co-ordination, supervision and administration of the Works, including all subcontracts. Arrange and monitor a programme with each subcontractor, supplier, local authority and statutory undertaker, and obtain and supply information as necessary for co-ordination of the work.

3.3.3 INSURANCES

Before starting work on site submit documentary evidence and/or policies and receipts for the insurances required by the Conditions of Contract.

3.3.4 CLIMATIC CONDITIONS

Keep an accurate record of:
- Daily maximum and minimum air temperatures.
- Delays due to adverse weather, including description of the weather, types(s) of work affected and number of hours lost.

3.3.5 OWNERSHIP

Materials arising from the alteration work are to become the property of the Contractor except where otherwise stated. Remove from site as work proceeds.

3.3.6 HARDCORE

Brick rubble or other hard materials arising from the work may not be reused as hardcore.

3.3.7 EMERGENCY CONTACTS

When required by the Employer provide him with details of two alternative emergency 'out of hours' telephone numbers for the Principal, Mechanical, Electrical contractors and such other contractors specified by the Employer.

3.3.8 PROGRAMME

As soon as possible and before starting work on site prepare in an approved format a master programme for the works, which must make allowance for all:

* Design and production information provided by the Contractor / Sub-Contractors / Suppliers, including inspection and checking.
* Planning and mobilisation by the Contractor
* Running in, adjustment, commissioning, testing and validation of all engineering services and installations.
* Work resulting from instructions issued in regard to the expenditure of provisional sums.
* Work by or on behalf of the employer

The nature of the scope of which, the relationship with preceding and following work and any relevant limitations are suitably defined in the contract documents.

Where and to the extent that the programme implications for work which is not so defined are impossible to assess the Contractor should exclude it from his programme and confirm this when submitting the programme.

* Submit 4 copies to Employer.

3.3.9 MONITORING

Record progress on a copy of the programme kept on site. If any circumstances arise which may affect the progress of the Works put forward proposals or take other action as appropriate to minimise any delay and to recover any lost time.

3.3.10 PROJECT MEETING

Prior to the commencement of the works the Employer will call a meeting to review the project. The Employer will chair, take and distribute minutes.

3.3.11 CONTRACTORS SITE MEETINGS

The contractor shall hold regular site meetings to review progress and other matters arising from the administration of the Contract. Meetings will be held at least bi monthly.

Invite Employer to each meeting.

The Trust will ensure the availability of accommodation at the time of such meetings.

Attend all meetings and inform subcontractors and suppliers when their presence is required.

The Contractor shall chair the meetings and take and distribute minutes.

3.3.12 NOTICE OF COMPLETION

3.3.13 EXTENSIONS OF TIME

When a notice of the cause of any delay or likely delay in the progress of the Works is given, written notice must also be given of all other causes which apply concurrently. The Contractor shall, as soon as possible, submit to the Employer:

Relevant particulars of the expected effects if appropriate related to the concurrent causes.

An estimate of the extent, if any, of the expected delay in the completion of the Works beyond the Date for Completion, and all other relevant information required by the Employer.

CONTROL OF COST

3.3.14 EXISTING WORK

The extent and location of renewal of existing work must be agreed, at least on a provisional basis, with the Employer before the work is started. Remove existing work in ways to reasonably minimise the amount of removal and renewal.

3.3.15 EMPLOYER INSTRUCTIONS

If requested by the Employer prepare costs of issued instructions within 10 days.

3.3.16 PROPOSED INSTRUCTIONS

If the Employer issues details of a proposed instruction with a request for an estimate of cost, submit such an estimate without delay and in any case within 7 days. The estimate must include:

A detailed breakdown of the cost including any allowance for direct loss and expense.
Details of any additional resources, which may be required.
Details of any adjustments, which may have to be made to the programme for the works.
Any other information as is reasonably necessary for the Employer to fully assess the implications of issuing such an instruction.

Inform the Employer immediately if it is not possible to comply with any of the above requirements.

3.3.17 BUILDERS WORK IN ASSOCIATION WITH ENGINEERING WORKS

The Contractor shall take full responsibility for all associated builders work for all trades. The Contractor shall be held responsible for the accuracy of all builder's work details.

All builders work in respect of the installation of engineering services will be carried out by the Contractor.

All bases, holes through structures, positions for brackets, chases etc., shall be detailed by the Contractor either on drawings, submitted in accordance with dates agreed with the Contractor, or by marking out on site in advance by the Contractor. Where the formation of holes, cutting away, etc., might adversely affect the building structure, drawings detailing those requirements shall be prepared by the Contractor and submitted to the Contract Administrator for Comment.

The Contractor shall plug all structures for his fittings and shall provide all necessary fixing devices.

The Contractor shall proceed in sufficient time to avoid delays to the Contract, provide sufficiently detailed drawings or templates for all items requiring foundation bolts or other fixtures and for all plant required to be built into or otherwise affecting the structure.

The Contractor shall ensure that foundation levels for plant, bedding and grouting of plant on foundations and bases, and grouting in of other fixings are adequately and properly performed.

The Contractor will excavate backfill and reinstate all trenches including the installation of service marker posts.

The Contractor will supply and lay any sand or other building materials necessary for initial coverage of buried services.

3.4 Quality Standards / Control

MATERIALS AND WORK GENERALLY

3.4.1 GOOD PRACTICE

Where and to the extent that materials, products and workmanship are not fully detailed or specified they are to be:

Of a standard appropriate to the Works and suitable for the functions stated in or reasonably to be inferred from the project documents, and

In accordance with good building and services installation practice.

3.4.2 GENERAL QUALITY OF PRODUCTS / MATERIALS

Products to be new unless otherwise specified.

For products specified to a British or European Standard obtain certificates of compliance from manufacturers when requested by Employer.

When a choice of manufacturer or source of supply is allowed for any particular product or material, the whole quantity required to complete the work must be of the same type, manufacture and/or source unless otherwise approved. Produce written evidence of sources of supply when requested by Employer.

Ensure that the whole quantity of each product and material required to complete the work be of consistent kind, sized, quality and overall appearance.

Where consistency of appearance is desirable ensure consistency of supply from the same source. Unless otherwise approved do not use different colour batches where they can be seen together.

If products are prone to deterioration or have a limited shelf life, order in suitable quantities to a programme and use in appropriate sequence.

3.4.3 PROPRIETARY PRODUCTS

Handle, store, prepare and use or fix each product in accordance with its manufacturers current printed or written recommendations/instructions. Inform Employer if these conflict with any other specified requirement. Submit copies to Employer when requested.

The tender will be deemed to be based on the products as specified and recommendations as described in the manufacturers' literature current at one month before tender return date.

Obtain confirmation from manufacturers that the products specified and recommendations on their use have not been changed since that time. Where such change has occurred inform Employer and do not place orders for or use the affected products without further instructions.
Where British Board of Agreement certified products are used, comply with the limitations, recommendations and requirements of the relevant valid certificates.

3.4.4 PROTECTION OF PRODUCTS

Prevent over-stressing, distortion and any other type of physical damage.
Keep clean and free from contamination, prevent staining, chipping, scratching or other disfigurement, particularly of products exposed to view I the finished work.
Keep dry and a suitably low humidity atmosphere to prevent premature setting, moisture movement and similar defects. Where appropriate store off the ground and allow free air movement around and between stored products.
Prevent excessively high or low temperatures and rapid changes of temperature of the products.
Protect adequately from rain, damp, frost, sun and other elements as appropriate. Ensure that products are at a suitable temperature and moisture content at time of use.
Ensure that sheds and covers are of ample size, in good weatherproof condition and well secured.
Keep different types and grades of products separately and adequately identified.
So far as possible keep products in their original wrappings, packing or containers, until immediately before they are used.
Wherever possible retain protective wrappings after fixing and until shortly before Practical Completion.
Ensure that protective measures are fully compatible with and not prejudicial to the products / materials.

3.4.5 SUITABILITY OF PREVIOUS WORK AND CONDITIONS

Before starting each new type or section of work, ensure that:

Previous, related work is appropriately complete, in accordance with the project documents, to a suitable standard and in suitable condition to receive the new work.

All necessary preparatory work has been carried out, including provision for services, damp proofing, priming and sealing.

The environmental conditions are suitable, particularly that the building is suitably weather-tight when internal components, services and finishes are installed.

3.4.6 GENERAL QUALITY OF WORKMANSHIP

Operatives to hold a construction skills certificate scheme (CSCS card)must be appropriately skilled and experienced for the type and quality of work.

Take all necessary precautions to prevent damage to the work from frost, rain and other hazards.

Inspect components/materials carefully before fixing or using and reject any, which are defective.

Fix or lay securely, accurately and in alignment.

Where not specified otherwise, select fixing and jointing methods and types, sizes and spacing of fastenings in compliance with section Z20, fastenings to comply with relevant British Standard.

Provide suitable, tight packing at screwed and bolted fixings to take up tolerances and prevent distortion. Do not over tighten fixings.

Adjust location and fixing of components so that joints, which are to be finished with mortar or sealant or otherwise left open to view are even and regular. Ensure that all moving parts operate properly and freely.

Do not cut, grind or plane pre-finished components to remedy binding or poor fit without approval.

3.4.7 BS 8000: BASIC WORKMANSHIP

Where compliance with BS 8000 is specified, this is only to the extent that the recommendations therein define the quality of the finished work.

Where BS 8000 gives recommendations on particular working methods or other matters which are properly within the province and responsibility of the Contractor, compliance therewith will be deemed to be a matter of general industry good practice and not a specific requirement of the Employer under the Contract.

If there is any conflict of discrepancy between the recommendations of BS 8000 on the one hand and the project documents on the other, the latter will prevail.

ACCURACY / SETTING OUT GENERALLY

3.4.8 SETTING OUT

Check levels and dimensions of the site against those shown on the drawings and record the results on a copy of the drawings. Notify the Employer in writing of any discrepancies and obtain instructions before proceeding.

3.4.9 APPEARANCE AND FIT

Arrange the setting out, erection, juxtaposition of components and applications of finishes (working within the practical limits of the design and the specification) to ensure that there is satisfactory fit at junctions, that there are no practically or visually unacceptable changes in plane, line or level and that the finished work has a true and regular appearance.

Wherever satisfactory accuracy, fit and/or appearance of the work are likely to be critical or difficult to achieve obtain approval of proposals or of the appearance of the relevant aspects of the partially finished work as early as possible.

Without prejudice to the above and unless specified otherwise, tolerances will (where applicable) be not greater than those given in BS5606, Tables 1 and 2.

SERVICES GENERALLY

3.4.10 SERVICE RUNS

Make adequate provision for services, including unobstructed routes and fixings. Wherever possible ducts chases and holes are to be formed during construction rather than cut.

3.4.11 MECHANICAL AND ELECTRICAL SERVICES

Must have final tests and commissioning carried out so that they are in full working order at practical completion.

3.4.12 TESTING GENERALLY

Testing is the process of inspection, which is necessary to determine whether plant, equipment and installations meet the specified requirements.

3.4.13 TESTING MATERIALS ETC

The contractor shall provide such labour, materials, stores, apparatus and instruments as may be required for the tests.

3.4.14 TEST RESULTS

On completion of the testing, one copy of the results shall be supplied to the Employer, duly signed on behalf of the contractor and authorised by the Employer or his site representative. It is the responsibility of the contractor to bring to the specific attention of the Employer any failure in his attempts to meet the test requirements.

Where failure is demonstrably due to a fault in the installation attributable to the contractor or his workmen the whole of the cost of the correction of such work including all water, fuel and electricity used shall be borne by the contractor

PRACTICAL COMPLETION

3.4.15 COMMISSIONING GENERALLY

Commissioning is the advancement of engineering plant, equipment and installations from the stage of static completion to full working order to specified requirements and includes the setting-to-work and performance testing of all plant, equipment and installations and the documentation of results.

Commissioning will include the energising of electrical installations, setting plant and equipment into motion, verifying the operation of controls, safety devises and alarms; the regulating of flow quantities and the setting of controls within limits specified in the specification.

3.4.16 COMMISSIONING MATERIALS

The contractor shall provide all labour, materials, instruments all other items necessary for commissioning.

The contractor shall provide evidence of the state of calibration of the instruments he proposes to use and when requested to do so, shall verify their accuracy to the satisfaction of the Employer.

The type of instruments used and their application shall also be subject to the Employer's approval.

3.4.17 VALIDATION

Once the testing and commissioning described above and in volumes 2 and 3 has been completed and agreed by the Employer/ Engineer, demonstrate compliance to the requirements to the Employer's validation officer.

SUPERVISION/INSPECTION/DEFECTIVE WORK

3.4.18 SUPERVISION

In addition to the constant management and supervision of the works provided by the Contractor's person in charge, all significant types of work must be under close control of competent trade supervisors to ensure maintenance of satisfactory quality and progress.

3.4.19 ACCESS FOR EMPLOYER

Provide at all reasonable times access to the Works and to other places of the contractor or Subcontractors where work is being prepared for the Contract.

3.4.20 DEFECTS IN EXISTING CONSTRUCTION

To be reported to Employer without delay. Obtain instructions before proceeding with work, which may:

Cover up or otherwise hinder access to the defective construction, or

Be rendered abortive by the carrying out of remedial work.

3.4.21 ACCESS FOR INSPECTION

Give Employer not less than 5 working days' notice before removing scaffolding or other facilities for access.

3.4.22 PROPOSAL FOR RECTIFICATION OF DEFECTIVE WORK/PRODUCTS

As soon as possible after any part(s) of the work or any products are known to be not in accordance with the Contract, or appear that they may not be in accordance, submit proposals to CA for opening up, inspection, testing, making good, adjustment of the Contract Sum, or removal and re-execution.

Such proposals may be unacceptable by the Employer, and may issue contrary instructions.

WORK AT OR AFTER COMPLETION

3.4.23 GENERALLY

Make good all damage consequent to the work.

Remove all temporary markings, coverings and protective wrapping unless otherwise instructed. Clean the works thoroughly inside and out including all accessible ducts and voids, remove all splashes, deposits, efflorescence, rubbish and surplus materials consequent upon the execution of the work.

Cleaning materials and methods to be as recommended by manufacturers of products being cleaned, and to be such that there is no damage or disfigurement to other materials or construction.

Obtain COSHH dated data sheets for all materials used for cleaning and ensure they are used only as recommended by their manufacturers.

Touch up minor faults in newly painted/repainted work, carefully matching colour, and brushing out edges. Repaint badly marked areas back to suitable breaks or junctions.

Adjust, ease and lubricate moving parts of new work as necessary to ensure easy and efficient operation including doors, windows, drawers, ironmongery, appliances, valves and controls.

3.4.24 INSPECTIONS

At an agreed date, and when the works are substantially complete, all services tested and commissioned, the works will be inspected by the Employer. Any outstanding work arising from this inspection shall be completed prior to the date agreed for Practical Completion.

3.4.25 CLEANING

In addition to the generality of clause 3.40.23, the building shall be cleaned to the standards required for operational use as a clinical ward.

3.4.26 SECURITY AT COMPLETION

Leave the works secure with all accesses locked. Account for and adequately label all keys and handover to Employer with itemised schedule, retaining duplicate schedule signed by Employer as receipt.

3.4.27 MAKING GOOD DEFECTS

Make arrangements with the Employer and give reasonable notice of the precise dates for access to various parts of the Works for purposes of making good defects. Inform Employer when remedial works to the various parts are completed.

3.5 Security / Safety / Protection

3.5.1 THE PRE-TENDER HEALTH AND SAFETY PLAN

To be prepared with assistance from the planning supervisor.

3.5.2 NOISE

Comply generally with the recommended BS 5228: Part 1, clause 9.3 for minimising noise levels during the excavation of the Works.

Fit all compressors, percussion tools and vehicles with effective silencers of a type recommended by manufacturers of the compressors, tools or vehicles.

Do not use pneumatic drills and other noisy appliances at any time without consent of the Employer.

Do not use or permit employees to use radios or other audio equipment in ways or at times, which may cause nuisance.

3.5.3 POLLUTION

Take all reasonable precautions to prevent pollution of the site, the Works and the general environment including streams and waterways. If pollution occurs, inform the appropriate Authorities and the Employer with no delay and provide them with relevant information.

3.5.4 NUISANCE

Take all necessary precautions to prevent nuisance from smoke, dust, rubbish, vermin and other causes.
Ensure all contractors personnel adhere to the Trust alcohol policy whilst working on site.

3.5.5 FIRE PREVENTION

Take all necessary precautions to prevent personal injury, death and damage to the Works or other property from fire. Comply with joint Code of Practice 'Fire Precaution on Construction Sites' published by the Building Employers Confederation and the Loss Prevention Council.

3.5.6 FIRE PRECAUTIONS

Allow for taking adequate precautions against fire and prior to work commencing obtain the approval of the CA to the precautions and the procedures to be adopted in the case of fire. Arrangements shall cover means of escape, provision of fire-fighting equipment, raising alarm, removal of accumulated rubbish, smoking restrictions, flammable materials and access through external working area of fire appliances.

3.5.7 FIRE POLICY

Smoking will not be permitted on the site.

3.5.8 BURNING ON SITE

Of materials arising from the work will not be permitted.

3.5.9 WATER

Prevent damage from storm and surface water. (Items for keeping the site and excavations free of water are given elsewhere).

3.5.10 MOISTURE

Prevent the work from becoming wet or damp where this may cause damage. Dry out the Works thoroughly.

Control the drying out and humidity of the Works and the application of heat to prevent:

Blistering and failure of adhesions, Damage due to trapped moisture, excessive movement.

3.5.11 WASTE

Remove rubbish, debris surplus material, spoil regularly, and keep the Site and Works clean and tidy.

Remove all rubbish, dirt and residue from voids and cavities in the construction before closing in.

Ensure that non-hazardous material is disposed of at a tip approved by a Waste Regulation Authority.

Remove all surplus hazardous material and their containers regularly for disposal off site in a safe and competent manner as approved by a Waste Regulation Authority and in accordance with the relevant regulations

Retain waste transfer documentation in site.

3.5.12 MILLENNIUM COMPLIANCE

Certify that equipment complies with PD 2000-1A: 'A definition of Year 2000 conformity requirements' published by BSI.

PROTECT THE FOLLOWING

3.5.13 WORK IN ALL SECTIONS

Adequately protect all types of work and all parts of the Works, including carried out by others, throughout the Contract. Whenever work is of an especially vulnerable nature or is exposed to abnormal risks, provide special protection to ensure that damage does not occur.

3.5.14 EXISTING SERVICES

Notify all service authorities and/or adjacent owners of proposed works not less than one week before commencing site operations.

**Notify the client FOUR-WEEKS before any proposed shutdowns or disruption to services. As there will be potential for shutdowns for this project over the contract period, all shutdowns will need to be mapped out and indicated on the main programme of works**

Before starting work, check positions of existing mains/services. Where positions are not shown on

drawings, obtain relevant details from service authorities or other owners.

Observe service authority's recommendations for work adjacent to existing services.

Adequately protect, and prevent damage to all services. Do not interfere with their operation consent of the service authorities or their owners.

If any damage to services results from the execution of the Works, notify Employer and appropriate service authority without delay. Make arrangements for the works to be made good with out delay to the satisfaction of the service authority or other owners as appropriate. Any measures taken by the Employer to deal with an emergency will not affect the extent of the contractor's liability.

Replace any marker tapes or protective covers disturbed during site operations to the service authority's recommendations.

3.5.15 ROADS AND FOOTPATHS

Adequately maintain roads and footpaths within and adjacent to the site and keep clear of mud and debris. Any damage to roads and footpaths caused by site traffic or otherwise consequent upon the Works must be made good to the satisfaction of the Local Authority or other owner. Bear any costs arising.

3.5.16 TREES/HEDGES/SHRUBS/GRASSED AREAS

Adequately protect and preserve, except those which are to be removed. Replace to approval or treat as instructed any species or areas damaged or removed without approval.

3.5.17 EXISTING FEATURES

Prevent damage to existing buildings, fences, gates, walls, roads, paved areas and other site features which are to remain in position during the execution of the Works.

3.5.18 EXISTING FITTINGS

Protect existing fittings and furniture in occupied buildings.

3.5.19 EXISTING WORK

Prevent damage to existing property undergoing alteration or extension and make good to match existing, any defects so caused. Remove existing work the minimum necessary and with care to reduce the amount of making good to a minimum.

3.5.20 BUILDING INTERIORS

Protect building interiors exposed to weather during the course of alteration work with temporary enclosures of sufficient size to permit execution of the work and which will remain weather tight even in severe weather.

3.5.21 EXISTING STRUCTURES

Provide and maintain during the execution of the Works all incidental shoring, strutting, needling and other supports as may be necessary to preserve the stability of existing structures on the site or adjoining, that may be endangered or affected by the Works.

Support existing structure as necessary during cutting of new openings or replacement of structural parts.

Do not remove supports until new work is strong enough to support the existing structure. Prevent over stressing of completed work when removing supports.

3.5.22 CRIMINAL RECORDS BUREAU CHECK (CRB)

It is a requirement of The London North West University Healthcare NHS Trust that all contractors and/or sub contractors who work on site in clinical areas or in the vicinity of vulnerable people must hold a CRB check and must not appear on the Vulnerable Adults List or Barred Children's list.

3.6 Specific Limitations on Methods / Sequence / Timing

3.6.1 SCOPE

The limitations described in this section are supplementary to limitations described or implicit in information given in other sections or on the drawing.

3.6.2 SCAFFOLDING

Ensure that standing scaffolding is erected early enough and/or dismantled late enough to suit the programmes of all subcontractors.

3.6.3 COMPLETION IN SECTIONS OR PARTS

Where the employer is to take possession of any Section or Part of the Works and such Section or Part will, after it's practical completion, depend for it's adequate functioning on work located elsewhere on the site, complete such other work in time to permit such possession to take place.

During execution of the remainder of the Works, ensure that completed sections or Parts of the Works have continuous and adequate provision of services, fire precautions, means of escape and safe access.

3.7 Facilities / Temporary Works / Services

3.7.1 LOCATIONS

Inform Employer of the intended siting of all spoil heaps, temporary works and services.

3.7.2 MAINTAIN

Alter adapt and move temporary works and services as necessary. Clear away when no longer required and make good.

3.7.3 LIGHTING AND POWER

The permanent electrical installation may be used by the contractor, but the Employer does not undertake that it will be available.

Electricity for the Works will be supplied free of cost to the Contractor.

3.7.4 WATER

For the works will be supplied free of cost to the Contractor.

3.7.5 MOBILE TELEPHONES

Are not permitted in the Client's premises.

3.7.6 TEMPERATURE AND HUMIDITY

The permanent heating installation may be used for drying out the Works and controlling temperature and humidity levels but: The employer does not undertake that it will be available.

The contractor must take responsibility for operation, maintenance and remedial work, and arrange supervision by and indemnification of the appropriate Subcontractors and pay costs arising.

3.8 Operations / Maintenance of the Finished Building

3.8.1 THE BUILDING MANUAL

The building manual (incorporating the Health and Safety File and subtitled accordingly) is to be a comprehensive information source and guide for the Employer and end users providing a complete understanding of the building and it's systems and enabling it to be operated and maintained efficiently and safely. The Planning Supervisor is required to obtain or prepare all the information to be included in the Manual, produce the required number of copies of the Manual and submit them to the Employer for checking by the Planning Supervisor and for delivery to the Employer.

The Manual is to consist of the following three parts sectioned as appropriate:

Part 1: GENERAL: content as clause 3.80.2, the information being provided to the Planning Supervisor by the employers agent.

Part 2: BUILDING FABRIC: Content as clause 3.80.3, plus certain as-built drawings and other information provided to the Contractor by the employers agent.

Part 3: BUILDING SERVICES: Content as clause 3.80.4

The presentation of this manual to be as clause 3.80.5

A complete draft of the manual must be submitted not less 2 weeks before the date of submissions of the final copies of the manual. Amend the draft manual in the light of any comments and resubmit to the employer. Do not proceed with production of the final copies of the maul until authorised to do so by the employer.

Final copies of the manual: provide the Employer with 3 copies at practical completion.

As built drawings: provide 3 copies on paper folded to A4, and on computer disk in AutoCAD 2010 (dwg format).

3.8.2 THE BUILDING MANUAL PART 1 GENERAL INFORMATION must include:

A description of the building.

Details of ownership and all consultants and designer.
Details of all authorities plus copies of all consents and approvals obtained.
Names, addresses, telephone and fax numbers of all contractors, subcontractors, suppliers and manufacturers. (Contractors to provide data).
Any operational requirements and constraints of a general nature which are not relevant to other parts of the building manual.
The fire safety strategy for the buildings (s) including drawings showing emergency escape routes, locations (this clause is given purely for the contractor’s information)

3.8.3 THE BUILDING MANUAL PART 2: BUILDING FABRIC INFORMATION:

Provide such information as is reasonably required by the planning supervisor including:

Details of construction methods and materials which may present significant residual hazards with respect to cleaning maintenance or demolition for all contractor designed work performance specified work.
As - built drawing recording details of construction for all contractor designed work and performance specified work.
Copies of manufacturers current literature for all products for which the particular proprietary brand has been chosen by the contractor, including COSHH dated data sheets and manufacturers recommendations for cleaning and maintenance.

Copies of all guarantees, warranties and maintenance agreements offered by sub contractors and manufacturers.

Copies of all test certificates and reports required in the specification.

To enable the Employer to prepare 'as built' drawings submit to him marked up print at least 2 weeks before Practical completion identifying amendments to issued main constructional including sub structure and drainage, drawings.

3.8.4 THE BUILDING MANUAL PART 3: BUILDING SERVICES information must include:

A full description of each of the systems installed including services capacity and restrictions.
Diagrammatic drawings of each system indicating principal items of plant, equipment valves, service runs etc.

Legend for all colour-coded services.
Electrical circuit references and distribution boards charts. (to be shown on as - built drawings)

Schedules (system by system) of plant, equipment, valves etc., stating their locations, duties and performance figures. Each item must have a unique number cross referenced to the record and diagrammatic drawings and schedule.

The name, address and telephone number of the manufacture of every item of plant and equipment together with catalogue list numbers.

Manufacturer' technical literature for all items of plant and equipment, assembled specifically for the project, excluding irrelevant matter and including drawings, electrical circuit details an operating and maintenance instructions.

A copy of all test certificates (including but not limited to electrical circuit tests, corrosion tests, type tests, works tests, start and commissioning tests) for installations and plant, equipment, valves etc. Used in the installations

A copy of all manufacturers' guarantees. Warranties and maintenance agreements offered by sub-contractors and manufacturers.

Starting up, operating and shutting down instructions for all equipment and systems installed. Schedules of all fixed and variable equipment settings established during commissioning.

Procedures for seasonal changeovers.

Recommendations as to the preventative maintenance frequency and procedures to be adopted to ensure the most efficient operation of the systems.

Lubrication schedules for all lubricated items.

A list of normal consumable items.

A list of recommended spares to be kept in stock by the Employer, being those items subject or wear or deterioration and which may involve the employer in extended deliveries when replacements are required at some future date.

Procedures for fault finding.

Emergency procedures, including telephone numbers for emergency services.

3.8.5 PRESENTATION OF BUILDING MANUAL:

The part of the Manual that is the Contractor's responsibility is to be contained in a series of A4, plastic covered, loose-leaf binders with hard covers, each indexed divided and appropriately cover titled. Selected drawings needed to illustrate or locate items mentioned in the Manual, where larger than A4, are to be folded and accommodated in the binders so that they may be unfolded without being detached from the rings. The main set(s) of as- built drawings may form an annex(s) to the manual. The Contractor must include electronic versions of this document in Word, Excel and Autocad 2010 format on CD's.

3.8.6 TRAINING OF EMPLOYER'S STAFF:

Before Practical Completions the contractor is to explain and demonstrate to the Employer's staff the purpose, functions and operation of the installations including all items and procedures listed in the Building Manual. Include for not less than 1.0 operating days for this purpose.

3.9 Contractors Health and Safety Requirements

The primary legal responsibility for the Health and Safety of their workforce and any people who may be affected by their work activities lies with the Contractor. However, without relieving the Contractor of any of his legal and contractual responsibilities this **Health and Safety Resume** has been produced to assist the Contractor in ensuring that safe working practises and measures are adopted whilst working at the Trust's sites.

The purpose of this document is to foster co-operation and form a partnership between the Trust and the Contractors to promote Health and Safety at Work. It is **not** the intention for it to be used as an excuse for **inactivity** by the Contractor but sets out both the Trust's general requirements when working on their plant and systems, and **some** detailed requirements to avoid danger from significant specific hazards.

The information given in this resume is **not** intended to be exhaustive, but to illustrate the **nature** of the Trust's operations by referring to any hazards that are frequently met and/or are common sources of accidents.

3.9.1 CONTRACTOR'S OVERVIEW

In addition to their statutory responsibilities Contractors, Sub-Contractors and their employees and agents **shall** abide by the Trust's operational/administrative rules and procedures, including those for:

- Fire
- Evacuation
- First Aid
- Reporting of Serious Accidents/Incidents
- Permit-to-Work Systems etc.
- Special procedures for working in infectious areas and with biologically contaminated equipment.

Any of which that are relevant to the safe and smooth enactment of the contract.

In pursuance of the above the Contractor shall:

a) Attend a Pre-Site Contract Meeting with a primary and functional aim of discussing the Health and Safety issues associated with the contract and agreeing a Health and Safety plan and implementation strategy.
b) Nominate a safety representative to be directly responsible for the management of the day-to-day safety requirements of the contract, and as such, shall be the point of contact for the Project Manager on any issues pertaining to Health and Safety.
c) Work within his company's general Health and Safety Policy requirements and the resultant Health and Safety management plan as agreed at the pre-site meeting.
d) Describe and explain what actions are to be taken to implement and effectively comply with the Plan's Health and Safety requirements.
e) Comply with all Orders, Regulations and By-Laws made by a competent authority that are applicable to the works, in such matters that may affect the Health and Safety of persons on or adjacent to the sites.

### 3.9.2 PROJECT ENGINEER LEAD MANAGER - CAPITAL AND ESTATES

The Project Lead shall nominate a **Project Manager**, whose responsibilities shall include liaising with the Contractor on Health and Safety aspects such that any operations by **any** party that affect any other with regards to Health and Safety can be made known and acted upon. **Such appointment will not relieve the Contractor from his own responsibilities for Health and Safety**. The Project Engineer shall be the Contractor's focal point for Health and Safety Issues. The Project Manager shall conduct a pre-site meeting to ensure that **before** the work is started the following significant Health and Safety issues shall be discussed and agreed:

- The Project manager shall make the Contractor aware of any potential hazards and their associated precautionary/control procedures established on site.
- The Contractor shall propose their Nominated Site Supervisor(s) and Competent Person(s). Before work is started they shall have undergone sufficient instruction and training to ensure that they are fully conversant with the Trust's Permitry Procedures and certified as such in accordance with the Trust's documentation procedures.
- Site Emergency Procedures, including Emergency Evacuation.
- The Contractor's nominated Safety Representatives.
- Waste disposal procedure/environmental legislation compliance.
- Hazardous Substance Control.
- Possible impact of the Contractor's work activities on other people's activities.
- An effective communication system.
- The Project Managers limits of power and authority - such that he can stop work if in his opinion people's Health and Safety is being significantly compromised. The Contractors right to refer the matter to the Estates Manager in exceptional circumstances where the problems cannot be resolved at the working level.
- The Contractor's obligation to provide the Project Manager with any appropriate approved certification of competence/testing etc. i.e. fork lift trucks, lifting tackle inspections, crane use, scaffold erectors etc.
- The Project Managers and the Contractor's safety representative shall agree any activities that are considered to be **outside** the existing control measures and the **Contractor** shall produce a written **Method Statement** of how the job is to be undertaken safely. The Project Manager shall, in due course, assess the Method Statements by whatever means he considers appropriate (specialist services etc.), and agree to their implementation **prior** to the contractor imposing them on the work.
- Minutes of the meeting shall be taken by the Project Manager and circulated to the Contractors (and any Sub-Contractors) to authorise them as a true record of the meeting.

### 3.9.3 THE CONTRACTOR

All the Contractor's employees, including Sub-Contractors, shall be given appropriate induction training **specific** to the location and nature of the work. Induction shall include:

- The general site safety requirements, including permit systems
- Site emergency procedures
- Potential hazards
- Hazard control measures
- Precautionary measures
- Infection control procedures

All contract staff must be under proper supervision at **all** times when on the Trust's sites. Where Contractors are to work unsupervised (i.e. lone working) the circumstances and method of work shall be agreed with the Project Manager.

The Contractors, having been shown safe access to and egress from the work place, shall use it!

The Contractors shall only use fit for purpose tools and equipment, which must be in good repair. ***Under no circumstances should tools and equipment, including keys, be loaned to contractors from the Capital and Estates Department unless supervised by Estates personnel***. Where necessary equipment shall be erected to the suppliers/ manufacturer's instructions.

Where Personal Protective Equipment is required for the work, it shall be provided by the Contractor. Failure by an employee to take proper care of the PPE or refusal to wear it shall normally result in dismissal from site following an initial verbal warning (confirmed in writing).

Whilst working the Contractors shall keep the work area as clean and tidy as practicable, and free from loose debris or any other obstructions. All floors and walkways must be kept clear of materials, tripping and slipping hazards (especially any wet work).

The Contractor shall exercise proper control over waste management and shall ensure that the water systems (including drains) are not polluted (i.e. water jetting, chemical cleaning etc.), and the air is not polluted (i.e. dust, combustion products etc).

The Contractor shall record attendance at site of all his employees, including Sub-Contractors, so that their numbers can be readily accounted for in times of Fire or other emergency.

3.9.4 THE TRUST'S SAFETY PROCEDURE

General Safety:

In addition to the need to apply formal **Permit-to-Work** Systems to secure the Health and Safety of persons at work or those affected by the work, there is also need to assure and maintain the **General Safety to** and **from** the place of work **and** at the **vicinity** of the place of work. Hence, before work is started, it is the personal responsibility of the Contractor's Supervisor to satisfy himself that appropriate Health and Safety precautions are taken to establish **General Safety** at and in the **vicinity** of the workplace, and that the access/egress route(s) shown to him by the Project Manager are used as instructed and kept safe.

Once the work has started the Contractor's Competent Person in charge of the work shall **continue** to maintain conditions which ensure **General Safety**. He shall also ensure that his work activities do not adversely affect other work areas.

The Safety Rules Procedures:

Whenever work on the Trust's contract is subject to the Trust's **Safety Rules** the Contractor **shall** comply with them.

The Contractor shall nominate Supervisor(s) and Tradesmen to undergo the appropriate induction training and assessment to enable them to be certified as Competent under the Trust's Safety Rules to receive and clearly specified safety documents.

The induction training shall comprise an awareness of the philosophy and basic principles behind the Safety Rules and detail the procedures associated with the issue, operation and clearance of specified Safety Documents. This shall include Permit Locks, Key Safes, **Danger** and **Caution Notices**, Safe Retention of the Safety Document etc. The Contractor's Competent Person(s) shall be assessed by an Authorised person for competency (within the context of the Safety Rules) and be certified in writing to that effect.

The Project Manager may, for whatever reason he considers appropriate, refuse to accept a person nominated by the Contractor. The Contractor shall have redress through the Authorised Person.

The Contractor shall be made fully aware of the requirement for a **controlled release** of plant/apparatus. Due to the possible operational implications, which at a hospital site may well be dire in terms of patient safety and well-being, arranging for system shut downs will need careful planning. As such these shall be given due consideration as part of the Permit System Process, including proper and timely notification for the requirement for a Safety Document, through the proper procedures and request pro-forma.

**As much notice as practicable of the requirement for equipment isolations and their attendant Safety Documents shall be given by the Contractor's Supervisor. Plant/apparatus shall be returned to the agreed programme, delays can be costly in more ways than simply money.**

3.10 Site Rules for Contractors

3.10.1 LOCATION OF SITE ACCESS AND EGRESS (INTERNAL)

Access routes within buildings on Trust Sites will be specified in the tender documentation as agreed at the preliminary site meeting with the Project Manager prior to commencing works. Trust staff, patients and visitors may also use these routes. It is the contractor's responsibility to ensure all access routes are kept clean and clear of debris at all times and checked regularly, i.e. at least once a day by a designated site operative.

3.10.2 LOCATION OF SITE ACCESS AND EGRESS (EXTERNAL)

Access routes into Trust sites will either be specified (with a site plan) in the Tender Documents or agreed at the preliminary site meeting with the Project Manager prior to works commencing. It is the contractor's responsibility to ensure that accumulations of mud and debris are cleared immediately they appear and that all access roads into site areas are maintained in a safe manner at all times for general site traffic.

3.10.3 LOCATION OF TEMPORARY SITE ACCOMMODATION

If sufficient reason exists, the Trust may agree to the siting of temporary accommodation for the contract period in a suitable location. This will either be specified in the tender documentation or agreed with the Project Manager at the preliminary site meeting. It will be the contractor's responsibility to install, maintain and remove on completion any temporary services to temporary accommodation. All with the agreement of the Project Manager.

3.10.4 SERVICES TO BE PROVIDED TO THE CONTRACTOR

Water and electricity will be provided from the nearest convenient take off point if agreed during the Tender stage or before work commences with the Project Manager. It will be the contractor's responsibility to install, maintain and remove on completion temporary supplies as necessary to enable the works and to reinstate services and finishes, all in accordance with legislation current at that time. Welfare facilities for the Contractor's site staff may be available on a project specific basis. When not available, the Contractor will provide these facilities on a basis agreed with the Project Manager.

3.10.5 LOCATION OF LOADING AND STORAGE AREAS

Unloading areas may be allocated at specific times in certain locations by agreement with the Project Manager. Storage areas will be allocated in a similar way to temporary accommodation. Special requests for short-term storage should be made to the Project Manager. Generally, no internal storage within existing buildings will be provided unless designated within tender documentation.

3.10.6 CONTRACTOR PARKING

Because of the lack of parking spaces available for contractors on the site, a limited number of designated spaces may be made available, with the agreement with the Project Manager. All other contractors parking will abide by the Trust's visitors parking permit scheme. The permit must be clearly displayed in the vehicle at all times. Failure to park in the designated parking area or failure to display a valid parking permit could lead to the Contractor being fined. The contractor will be held responsible for paying such fines for its vehicles.

3.10.7 DELIVERY OF MATERIALS

Unless otherwise stated in the contract documentation, delivery of materials to the contractor's site should normally occur between 6.00am and 8.30am, to minimise disruption to Trust staff and patients. Deliveries outside of these allocated times and at weekends may be agreed with the Project Manager. All deliveries likely to cause an obstruction must be discussed with the Project Manager, so that suitable traffic control arrangements may be agreed. Waiting areas for delivery vehicles etc will also have to be agreed with the Project Manager.

3.10.8 CONTRACTOR'S RESPONSIBILITY FOR TRAFFIC CONTROL

Contractors involved in works resulting in the restriction of access on Trust roads should provide traffic control equipment, they should also be aware that emergency vehicles will have priority over any traffic signals in use and are not to be obstructed at any time.

3.10.9 IDENTITY BADGES

All Contractors that move about within the NPH site will be issued with the Trust's 'Estates Contractor' identity badge, which is to be worn whenever on Trust premises. Individuals not wearing badges will be asked to leave site. Contractors working for the Tender company within the building site the Tender company must ensure that their staff and contractors have been DBS (Disclosure Burring Service) checked.

3.10.10 DISABLED ACCESS/EGRESS

Disabled access routes must not be obstructed under any circumstances unless they form part of the site area and alternative arrangements have been agreed.

3.10.11 PEDESTRIAN ROUTES

In addition to the movement of vehicles on site access roads, patients on trolleys and beds will also be moved through some of these areas. Contractors must ensure full access for trolleys, beds and equipment is maintained at all times.

3.10.12 THE 'PERMIT TO WORK' SYSTEM

Permits to work will be required from the Operational Estates manager, before starting any work regarding the following: -

- **Low Voltage Systems**
- **Sanction for Testing**

- **High Voltage Systems**
- Medical Gas Systems
- Theatre Clean/Vent Systems
- Magnetic Resonance Imaging Controlled Area
- Fume Cupboards
- Areas of Controlled Radioactivity. Radioactive Waste Drains
- Hot Works on Fire Risk Activities. Pressure Vessels
- Confined Spaces
- **Isolation of Electrical Systems**
- Isolation of Water Services
- Natural Gas Installations
- Excavation
- Drainage runs

**Once issued the conditions of the permit must be strictly adhered to at all times.**

3.10.13 FIRE AND FIRE RISK ACTIVITIES

All Contractors involved in fire risk activities should ensure that they take measures to minimise risk wherever possible by removing any combustible materials and providing adequate firefighting equipment. When undertaking any fire risk activity all such work should cease at least half an hour prior to the end of the working day. An employee must be designated to check the site prior to leaving.

Existing fire detectors sited within contractors working area shall be temporary isolated and protected with dust covers. This shall be in agreement with the Operational Estates Manager, and Project Manager. In the event of a fire break out, the procedure on the Northwick Park Site is described in section 3.10.14.

3.10.14 FIRE PROCEDURE: WITHIN HOSPITAL BUILDINGS

All contractors should make themselves aware of the local fire safety plan for the ward/department in which they are working so as to establish the predetermined location for assembly within the ward/department.

An intermittent sounding of the fire alarm sounders means there may be a fire in an adjacent ward/department.

A continuous sounding fire alarm is an instruction to evacuate the ward/department /building.

**On detecting a fire**
1. Remove persons from immediate danger.
2. Sound alarm by breaking glass of fire alarm call point.
3. Shut doors and windows adjacent to the fire.
4. Do not call switchboard.
5. Attack fire only if this can be done without jeopardising personal safety.

**On hearing an intermittent fire alarm**
6. Prepare for evacuation by clearing escape routes for patients and staff.
7. Go to ward/department predetermined location.
8. Await further instruction from Hospital staff

**On hearing a continuous fire alarm**
9. Prepare for evacuation by clearing escape routes for patients and staff.
10. Leave the ward/department/building by the nearest available exit. Close fire doors as you go.
11. **Do not use lifts**.
12. **Do not** re-enter the ward/department/building until instructed to do so by the Hospital Fire Response Team, or Fire Service.

**Should evacuation of an area be necessary, this will be co-ordinated at the scene of the fire by the Hospital Fire Response Team, or Fire Service.**

3.10.15. SPECIFIC SITE HAZARDS

The Trust will inform the Contractor of any known specific site hazards prior to commencement of work.

3.10.16 NOISE AND VIBRATION LEVELS

Contractors should ensure that noise and vibration levels created within their site are kept to a minimum at all times. Equipment that generates high levels of noise or excessive vibration should be substituted for less noisy or disruptive equipment where possible or adequately damped, silenced and soundproofed. Engine driven plant should only be operated during agreed hours or as specified within the project specify details of the tender documents.

Radios or other audio equipment are prohibited on all Trust premises (including contractor's designated site areas and compounds). These devices may cause considerable disturbance to patients and staff, disrupting clinical treatment and as a result must not be used.

3.10.17 CONTROL OF DUST, FUMES AND DEBRIS

All operations that produce dust (e.g. disc cutting, chasing, high-speed sawing etc) in excess of 10 milligrams of dust per cubic metre of air (10 mgjm3) averaged out over eight hours, or any respirable dust in excess of 5 mgjm3 averaged over eight hours is deemed to be a substantial concentration of dust and therefore within the definition of substance hazardous to health (COSHH).

Dust producing equipment is to be controlled at source with local exhaust ventilation or dust suppression tools to the satisfaction of the Project Manager. All work areas are to be suitably sealed against dust breakout to other areas, and where required to control dust breakout measures such as double doors or air locks are to be supplied.

All temporary screens to be constructed out of fire-retardant materials, of a suitable nature to fully contain any expected hazards. Approval of method statement to control dusts to be gained prior to starting work from the Project Manager.

Working areas to be cleaned as required by means that do not promote dust transfer. When requested by the Project Manager, air and environmental monitoring of the building works and adjacent areas will be required.

3.10.18 REGULATIONS AND CODES OF PRACTICE

a) Latest relevant BS Standards and Codes of Practice

b) Health and Safety at Work Act and Work Place Regulations current edition

c) Building Regulations current edition

d) Local Authority Regulations and Bye-Laws current edition

e) Local Authority Fire Officer

f) Electricity Supply Regulations current edition

g) CIBSE Code for Interior Lighting current edition

h) HVCA Ductwork Specification current edition

i) CIBSE Guides and Commissioning Codes current edition

j) BS 7671 Requirements for electrical installations. (IEE Regulations 17th Edition) including all amendments

k) Gas Regulations current edition

l) Local Water Authority Bye-Laws current edition

m) Environmental and Public Health Approval current edition

n) COSHH Regulations current edition

o) Clean Air Act current edition

p) The Electricity (Factories Act) Special Regulation current edition

q) Electricity at Work Regulations current edition

r) Any additional requirements covered in the drawings and contract documentation

s) CDM regulations

t) Insurance company inspection requirements

u) Loss Prevention Council (Formally FOC)

v) Electromagnetic Compatibility Regulations SI No 2172, 89/336/EEC current edition

w) Electrical Equipment (Safety) Regulations SI No. 3260, 73/23/EEC current edition

x) UK Construction Products Regulations SI No. 3051, 89/103/EEC current edition

y) Site Waste Management Plans Regulations current edition

z) The Control of Asbestos Regulations current edition

aa) Manual Handling Operation Regulations current edition

bb) The Regulatory Reform (Fire Safety) Order current edition

cc) The Working at Height Regulation current edition

dd) HSG (95) 10 Hospital Infection Control

ee) The Health and Safety at Work Act 1974

ff) The Control of Pollution Act 1974

gg) The Management of Health and Safety at Work Regulations 1999

hh) The Construction (Health, Safety and Welfare) Regulations 1996

ii) Debris should be disposed of in accordance with the Trust's Waste

jj) Disposal Policy.

3.10.18 CONTRACTORS WORKING HOURS

Normal working hours on Trust sites will be between 7.30am and 6pm Monday to Friday. Weekend and out of hours working will be agreed with the Project Manager.

3.10.19 ACCIDENTS/INCIDENTS

Any dangerous occurrences/incidents as defined in RIDDOR should be immediately reported to the HSE and the Project Manager. Accidents/incidents which fall outside the scope of the RIDDOR should be recorded in the normal way and copies of the reports handed to the Project Manager at the next scheduled Site Meeting or on the completion of works, whichever is sooner.

3.10.20 ELECTRICAL TOOLS

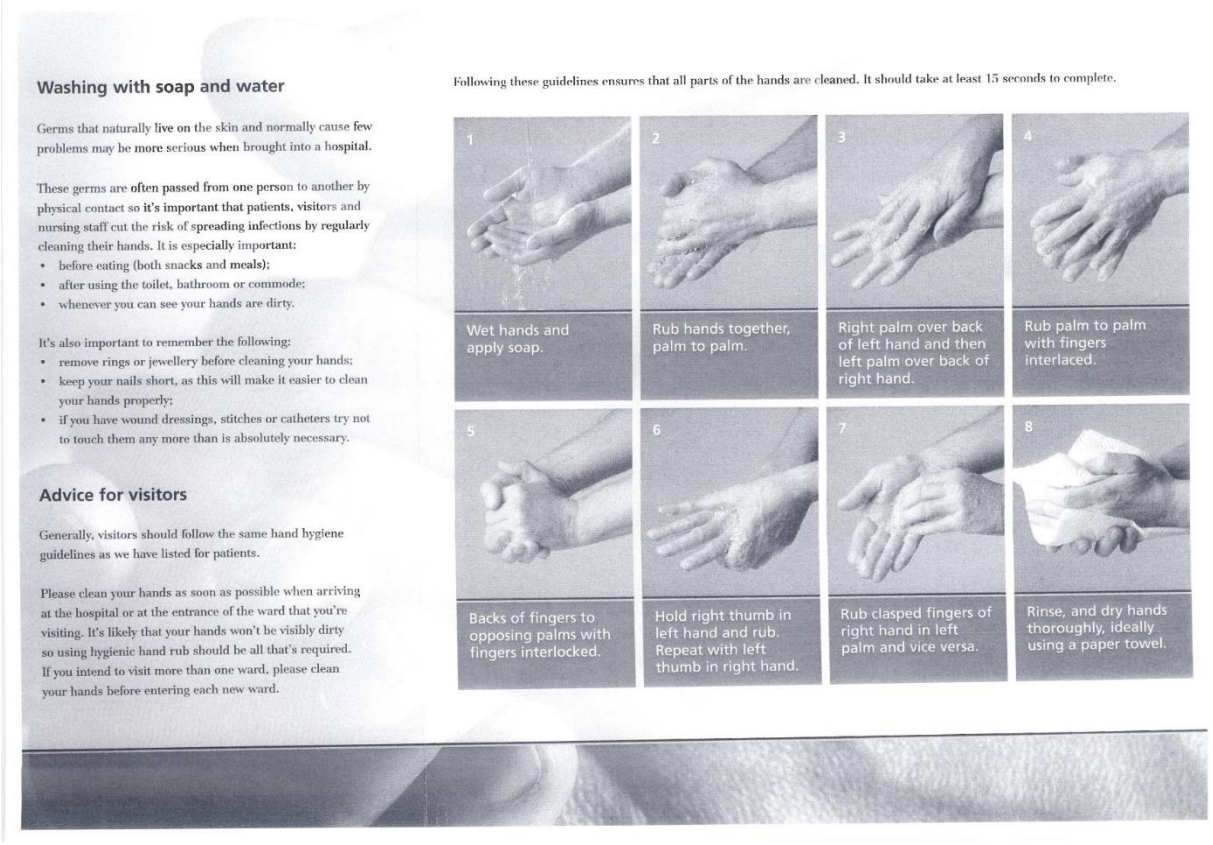
All electrical tools used by contractors must be either 110 vac or 240 vac and RCD protected and with an up-to-date test certificate available for inspection.

3.10.21 SMOKING

The Trust has a no smoking policy in all buildings including areas temporarily forming contractors working areas.

3.10.22 INFECTION CONTROL

The London North West University Healthcare NHS Trust requires that all contractors follow Trust guidance and infection control policy with regard to hand washing requirements for preventing spread of infection. Hand hygiene advice for patients and visitors is noted below:



**Washing with soap and water**

Germs that naturally live on the skin and normally cause few problems may be more serious when brought into a hospital.

These germs are often passed from one person to another by physical contact so it's important that patients, visitors and nursing staff cut the risk of spreading infections by regularly cleaning their hands. It is especially important:

- before eating (both snacks and meals);
- after using the toilet, bathroom or commode;
- whenever you can see your hands are dirty.

It's also important to remember the following:

- remove rings or jewellery before cleaning your hands;
- keep your nails short, as this will make it easier to clean your hands properly;
- if you have wound dressings, stitches or catheters try not to touch them any more than is absolutely necessary.

**Advice for visitors**

Generally, visitors should follow the same hand hygiene guidelines as we have listed for patients.

Please clean your hands as soon as possible when arriving at the hospital or at the entrance of the ward that you're visiting. It's likely that your hands won't be visibly dirty so using hygienic hand rub should be all that's required. If you intend to visit more than one ward, please clean your hands before entering each new ward.

Following these guidelines ensures that all parts of the hands are cleaned. It should take at least 15 seconds to complete.

3.10.23 FITNESS FOR WORK

The London North West University Healthcare NHS Trust requires that all contractors working on the Trust's site are, at all times, fit for work. The Trust retains the right to request that individuals leave the site if they are unfit for work for reasons of alcoholism, drug taking, injury, tiredness or any other reason that may affect the standard of workmanship or the health and safety of members of the public or hospital staff within the area.

3.10.24 STANDARDS OF DRESS

All contractors will report to work in suitable clean clothing. the following items of clothing are examples of unacceptable clothing, either on the grounds of health and safety or for the Trust's public image: Denim jeans or skirts, track suits, casual sports t-shirts, leisure shorts, combat trousers, sweat-shirts, baseball caps/hats, overly tight or revealing clothes, clothing bearing inappropriate slogans, the wearing of shorts is not acceptable, neither are bare chests. Dirty clothes or overalls will not be worn in public or patient areas. Clothing must be suitable for the task being carried out. Personal protective equipment will be worn wherever applicable. Footwear must be safe, sensible, in good order, smart and clean and have regard to Health and Safety considerations. Visible tattoos are to be discouraged and where present should not be offensive to others. Where they are deemed to be offensive they should be appropriately covered. Jewellery should be discreet and appropriate and not cause offence or be a health and safety hazard. Facial/body piercing are not permitted and must be removed before coming on site, piercings for religious or cultural reasons must be covered. Hair should be neat and tidy at all times. Headwear worn for religious purposes are permitted. All contractors must display a high standard of personal hygiene.

3.10.25 HOSPITAL EQUIPMENT

The use and borrowing of Hospital equipment or tools is not acceptable and contractors should ensure that they have sufficient equipment to carry out the work specified.

3.10.26 TWO-WAY RADIOS AND CELL PHONES

There is a risk to patients from radio frequency transmissions interfering with electro-medical equipment. As a result, the use **of two-way radios by contractors is prohibited but to facilitate the shutdown works, Trust owned radios will be issued to all operatives attending the works**.

There is a risk that when cell-phones are turned on they transmit signals back to their cell-net base regardless of whether they are monitoring, receiving or transmitting calls. Cell phones must be turned off to be safe. The risks will be controlled by a total ban on the use of cell-phones within all areas of the hospital and up to 10 metres from those buildings, this includes corridors and circulation areas. This means that cell phones may only be turned on outside, 10 metres away from any buildings.

3.10.27 ASBESTOS

The Trust maintains a register of all known locations of Asbestos existing on the Trusts premises. This register must be checked before any work starts on any construction site on any part of the Trust's site.

No work shall be carried out on any suspected asbestos bearing materials by any person who is not suitably trained. No testing or analysing shall be carried out by any person or laboratory that has not gained N.A.M.A.S. or similar accreditation. No work shall be carried out on any asbestos material without written instructions from the Trust's representative, this can be given in the form of a specification Site Instruction.

Any Contractor finding what he believes to be an Asbestos bearing material on any of the Trust's premises should stop work immediately and bring it to the attention of the Trust's Project Manager or representative who will, if deemed necessary, suspend all further work until the affected areas are made safe.

3.10.28 ASBESTOS LABELLING

The Trust has adopted the H.S.E. suggested working for the Asbestos warning labels.

3.10.29 THE MENTAL HEALTH ACT

Contractors need to be aware that certain works undertaken on the Trust's premises will bring contractors into contact with patients admitted under the Mental Health Act. These patients may be uninhibited or disruptive and contractors may need to put in place additional measures on site that would minimise the risk to this group of patients.

# CONTRACTORS GENERAL COST ITEMS Section 4.00

## 4 CONTRACTOR'S GENERAL COST ITEMS

| | | |
|---|---|---|
| **4.1** | **MANAGEMENT AND STAFF** | |
| **4.2** | **SITE ACCOMMODATION** | |
| **4.3** | **SERVICES AND FACILITIES** | |
| 4.3.1 | POWER | WILL BE SUPPLIED |
| 4.3.2 | LIGHTING | |
| 4.3.3 | FUELS (excluding fuels for testing and commissioning) | |
| 4.3.4 | WATER | WILL BE SUPPLIED |
| 4.3.5 | TELEPHONE AND ADMINISTRATION | |
| 4.3.6 | SAFETY, HEALTH AND WELFARE | |
| 4.3.7 | STORAGE OF MATERIALS | |
| 4.3.8 | RUBBISH DISPOSAL | |
| 4.3.9 | CLEANING | |
| 4.3.10 | DRYING OUT | |
| 4.3.11 | PROTECTION OF WORK IN ALL SECTIONS | |
| 4.3.12 | SECURITY | |
| 4.3.13 | MAINTAIN PUBLIC AND PRIVATE ROADS | |
| 4.3.14 | SMALL PLANT AND TOOLS | |
| 4.3.15 | GENERAL ATTENDANCE ON NAMED / NOMINATED SUBCONTRACTORS | |
| **4.4** | **MECHANICAL PLANT** | |
| 4.4.1 | CRANES | |
| 4.4.2 | HOISTS | |
| 4.4.4 | TRANSPORT | |
| 4.4.8 | PAVING AND SURFACING PLANT | |
| **4.5** | **TEMPORARY WORKS** | |
| 4.5.1 | TEMPORARY ROADS | n/a |
| 4.5.3 | ACCESS SCAFFOLDING | |
| 4.5.4 | SUPPORT SCAFFOLDING AND PROPPING | |
| 4.5.5 | HOARDINGS, FANS, FENCING ETC | |
| 4.5.6 | TEMPORARY SCREENS | |
| 4.5.7 | HARDSTANDING | |
| **4.6** | **WORK BY OTHERS** | |
| | | |
| **4.7** | **BY EMPLOYER** | |
| | | |
| **4.8** | **PROVISIONAL SUMS** | |
| | | |
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| | | |
| | | |
| | | |
| | **Additional Costs to be added to overall Tender Cost** | |

# FORM OF TENDER Section 5.00

## 5 FORM OF TENDER

5.1 Form of Tender

| | |
|---|---|
| TO: | **NORTHWICK PARK HOSPITAL NHS TRUST** |
| FOR: | **DESIGN, SUPPLY, DELIVERY, INSTALLATION AND COMMISSIONING OF SUB-STATION 3 LV RECONFIGURATION WORKS** |
| AT: | **NORTHWICK PARK HOSPITAL - LONDON** |
| JOB NO: | **……..** |
| TENDER NO: | |

I/We hereby undertake to enter into a contract to execute and complete the whole of the works described, implied or referred to in the documents inviting a tender.

for the sum of £……

(sum in words) .....

..... .....

Exclusive of Value Added Tax which will be added at the appropriate rate.

I/we agree that should obvious errors in pricing or errors in arithmetic be discovered before acceptance of this offer in the priced bill and Specifications submitted by me/us these errors will be dealt with in accordance with Alternative 1 contained in section 6 of the N.J.C.C. Code of Procedure for Single Stage Selective Tendering 1996.

We agree that this tender remains open for acceptance for a period of 4 months from the date of tender.

The submission of this tender is deemed to imply that the tender is bona fide (please sign separate form) and that I/we have not divulged the tender price and further that I/we have taken all necessary steps to ensure that it will not be divulged to any person or body before 28 days after the day that tenders are to be submitted to Northwick Park Hospital NHS Trust.

Signature: .....

Printed: .....

Status: .....

Name of Contractor: .....

Address: .....

.....

Date: .....

Signature of witness to Signatory: .....

5.2 Tender Certificate

| | |
|---|---|
| TO: | **NORTHWICK PARK HOSPITAL NHS TRUST** |
| TENDER FOR: | **DESIGN, SUPPLY, DELIVEY, INSTALLATION AND COMMISSIONING OF SUB-STATION 3 LV RECONFIGURATION WORKS** |
| AT: | **NORTHWICK PARK HOSPITAL - LONDON** |
| RETURNABLE BY: | **2022 @ 12:00 noon** |

The essence of selective tendering is that the client shall receive bona fide competitive tenders from all those tendering. In recognition of this principle, we certify that this is a bona fide tender, intended to be competitive, and that we have not fixed or adjusted the amount of the tender by or under or in accordance with any agreement or arrangement with any other person. We also certify that we have not done and we undertake that we will not do at any time up to 28 days after the date specified for the return of this tender any of the following acts:-

a) Communicating to a person other than the person calling for those tenders the amount or approximate amount of the proposed tender, except where the disclosure, in confidence, of the approximate amount of the tender was necessary to obtain insurance premium quotations required for the preparation of the tender;

b) Entering into any agreement or arrangement with any other person that he shall refrain from tendering or as to the amount of any tender to be submitted;

c) Offering or paying or giving or agreeing to pay or give any sum of money or valuable consideration directly or indirectly to any person for doing or having done or causing or having caused to be done in relation to any other tender or proposed tender for the said work any act or thing of the sort described above.

In this certificate, the word “person” included any persons, anybody or association, corporate or un-incorporate; and “any agreement or arrangement” includes any such transaction, formal or informal, and whether legally binding or not.

Signed .....

(To be signed by a Director, Company Secretary, Partner or Sole Principal)

Print Name .....

Position .....

On behalf of .....

Date .....

5.3 Tender Summary – Building Works

| Item Ref | Description | Price (£) |
|---|---|---|
| B1 | Design | £ |
| B2 | Builderswork | £ |
| B3 | Demolition | £ |
| B4 | Ceiling / Walls / Partitions Adaptations for Access | £ |
| B5 | Floor Adaptations for Access | £ |
| B6 | Fabric Penetration Making Good / Fire Stopping | £ |
| B7 | System Integrity Testing | £ |
| B8 | Scaffolding / Hoists | £ |
| B9 | Other items (please specify) | £ |
| B10 | Phasing Requirements Other items (please specify) | £ |
| B11 | Contingency | £ |
| Total Building Works Price | | £ |

5.4 Breakdown of Tender

This breakdown constitutes the Contract Sum Analysis. Please complete and return with your Tender.

| ITEM | DESCRIPTION | SUM |
|---|---|---|
| 1. | Preliminaries | £ |
| 2. | Specialist survey works by panel manufacturer | £ |
| 3. | LV Testing & Verification Works | £ |
| 4. | Safe System of Works Requirements | £ |
| 5. | Provision of AP Duties | £ |
| 6. | New Ladder Rack Containment | £ |
| 7. | New LV Generator Supply Cables | £ |
| 8. | Switch Panel Modifications | £ |
| 9. | Control System Modifications | £ |
| 10. | Making Good of Panel top Boxes | £ |
| 11. | Extra over for out of hours working | £ |
| 12. | Testing and Commissioning | £ |
| 13. | Grading Study | £ |
| 14. | O&M manuals | £ |
| 15. | Any other item not included above (give details) | £ |
| 16. | FIXED PRICE TENDER – TO FORM OF CONTRACT | £ |

(IN WORDS) .....

Signed.....

For and on behalf of.....

5.5 Alternative Equipment

List below those commodities which have been described as from a specified Manufacturers for which approval is sought to change from the specified Manufacturer. The Tender will be deemed always to include for commodities to be manufactured by the firm specified.

| **Commodity** | **Specified Manufacturer** | **Proposed Manufacturer** | **Tender Cost Return** |
|---|---|---|---|

Signed .....

For and on Behalf of .....

Date.....

5.6 Unspecified Manufacturers

List below those commodities for which a Manufacturer has not been specified in the Tender Documentation and state the Proposed Manufacturer. Failure to list all the proposed Manufacturers below will not prevent consideration by the Contract Administrator of proposals at any other time, but the Tender will be deemed always to include for commodities which comply with the Descriptions contained in the Tender Documentation and which are of manufacture which the Contract Administrator will approve.

| **Commodity** | **Name of Proposed Product** | **Name and Address of Proposed Manufacturer** |
|---|---|---|

Signed .....

For and on Behalf of .....

Date.....

5.7 Proposed Sub-Let Work

List below those parts of the works which will be sub-let and state the proposed firm. Failure to list all parts of the works to be sub-let will not prevent consideration by the Contract Administrator of proposals at any other time, but apart from the works listed below, the Tender will be deemed always to include for the work being undertaken by the Contractor.

| **Part of the Works** | **Name of the Proposed Firm** | **Address of the Proposed Firm** |
|---|---|---|

Signed .....

For and on Behalf of .....

Date.....

5.8 Form of Declaration

We declare that we are not parties to any scheme or arrangement under which

a) we communicate the amount of our Tender to any other person or body before the Contract is let

b) any other party for the works, which are the subject of our Tender, is reimbursed any part of his tender cost

c) our Tender prices are adjusted by reference directly or indirectly to the prices of any other Tenders for the works.

We also agree that:

No Tender shall be deemed to have been accepted by the Client unless such acceptance shall be notified to the Tenderer in writing under the hand of the Client. The invitation to submit a tender implies no obligation to accept the lowest, or any, tender and no responsibility for any expense or loss which may be incurred in the preparation thereof.

As witnessed by hand this.....day of.....

Signature.....

Contractor's Name in Full.....

Address.....

.....

# SCOPE OF WORKS Section 6.00

## 6 Scope of Works

Lakes Join Grandly Ltd were commissioned in September 2022 to undertake an assessment of LV essential electrical systems on site at Northwick Park Hospital, London in order to ensure there is suitable generator supported systems distributed across the site.

This part of the Specification relates to the works required to bring online existing 'new' but unused switch panel sections currently sat in LV Sub-Station 3 and comprising 4No LV switchboard's made up of 2 No Generator incomers and 2 No ACB's for future blocks the works will compromise all associated site electrical Infrastructure and essential upgrade / replacement works required on major LV installation at Northwick Park Hospital, London.

This part is to be read in conjunction with all other parts of the specification and where detailed requirements given in this part are at variance with the general requirements of this specification, the method described in this part shall apply, but the Contractor shall bring this to the attention of the Contract Administrator.

The drawings indicate diagrammatically the requirements of the installations so far as location of various plant and items of equipment are concerned.

The Contractor shall carry out the surveys including specialist surveys on all of all of the switchgear, procurement, programming, production of working drawings, supply, delivery to site, positioning, installation, fixing and making all connections to all materials necessary, protection, setting to work, cleaning and the testing and commissioning of the completed electrical installation and associated works for its satisfactory operation, all in accordance with the requirements of this Specification and the accompanying drawings.

All works shall be undertaken on essential electrical services under strict Permit to Work processes in accordance with the HTM Safe Systems of Work so must include all PPE and system protection necessary to complete the required system upgrades.

**System Overview**

A brief overview of the existing infrastructure is that there are 2 no REC incomers and 6 no Trust owned transformer sub stations fed from The Trust owned local 11kV network rings with designations Sub 1, 2, 3, 4, 5 & 6. Each transformer feeds separate LV intake panels at each of these locations as shown on the existing site schematic diagram.

The transformers individually supply their own LV intake panels but they cannot be coupled and operate in parallel. Outgoing from each section of the main LV intake panels are supplies feeding a number of individual LV switchboards within the hospital as well as other direct fed loads such as CT'S, MRI, Power Factor Correction etc.

The hospital site is currently supported by 4 no. standby generators rated at 2900kVA, 2900Kva, 1000kVA, 1000kVA & 675kVA to provide back-up 'essential' power to the various Sub-Station main LV switchboards to cover total site power failure from the DNO and local failure between the main HV intake and main LV switchboard.

As part of this scheme new generator cables will be installed from the chapel generator so that Sub-Station 3 can be linked to a standby generator as part of the infrastructure improvements.

The works being undertaken as part of this project involves the detailed and fully intrusive testing and evaluation of the existing 'new' switch panel sections which are currently sitting deenergised and unconnected in Sub-Station 3 and have been since they were delivered approximately five years ago. These panels have never been energised or correctly installed as part of a previous series of works.

The contractor will therefore be responsible for intrusively checking these existing units and ensuring they are safe and suitable for reuse on the LV system and then testing all systems associated with Sub-Station 3 all the way through the network including the full grading study to ensure that all Generator ACB's operate correctly and protect the system as intended and necessary to provide a safe and robust system.

Once the switch panel sections have been proven and assured, the works will then involve the connection of these cubicles into the existing panel through extension of the busbars and installation of new LV cable feeds from the existing chapel generator LV switch panel spare device to the new cubicles with a link between to provide full generator support to all sections of Sub-Station No3. This will be achieved by way of utilising existing 1500mm heavy duty ladder rack previously installed to the rear of Sub-Station 3 LV switch panel.

The new LV generator cables to be installed will be 3 No 185mm² 4-core XLPE/SWA/PVC cables routed 'above ground' on the new 1000mm heavy duty ladder rack installed from the chapel generator as part of the sequence of works. The existing cable systems will need to be inspected and maintained in full use and extreme care will be needed to protect these existing cables during the works as the new systems are installed and established on site and as detailed in this document.

It is essential that the tendering Contractor visit site to carry out a full survey and familiarise themselves of the task in hand and of the existing building and surroundings.

All necessary survey, detailed design and construction should be allowed for as it will be the Contractors responsibility for the design and build of these as part of this package and take in to account the risk of system continuity.

The switch panel installation arrangements and cable link between the chapel generator and Sub-Station 3 LV switch panel will be designed to provide full resilience and it is must be appreciated invasive modification to switchgear will be necessary to enable all works to be undertaken but this must be with full care and attention as this system provides supplies to approximately 50% of the site.

As part of the works, the contractor will employ a specialist panel manufacturer to coordinate the Intrusive testing of the panel, modification, busbar alterations, connection, testing and commissioning and will be required to work in close conjunction with the Trust APs to ensure all works are completed with no risk to the Trust's operation.

**Outline of Works Required**

The main supply and HV / LV distribution systems are to remain operational at all times during the works and this will require a multi-phase approach to the installation.

The outline of works required, subject to confirmation and acceptance by the successful contractor include four main elements which are:

1) Area preparation including site clearance
2) Testing verification and assurance of the existing unconnected switchgear components
3) Installation of LV generator supplies from chapel generator to new completed systems
4) Complete installation and modify switchgear and associated control systems

These works in a little bit more detail include

**a) Area preparation including site clearance**

i) Produce working drawings showing how the new LV containment cabling systems and panel modifications will be configured, safely installed and connected into the agreed LV switchgear configuration.
ii) Removal of surplus and unused materials in existing LV Sub-Station 3 switch room

iii) Removal of existing 'underground' cable trench covers necessary to facilitate free and easy access to all existing cables
iv) Erection of all necessary temporary safety barriers to protect personnel from any uncovered cable trenches
v) Clearance of redundant cables in and around the switch panel
vi) Programme in all the works necessary to achieve the system installation
vii) To enable the systems to be transferred over, the following installation is suggested but can be improved upon by the contractor in close consultation with Lakes Join Grandly Ltd engineers and the Trust

**b) Testing verification and assurance of the existing Switch Panel Cubicles**

i) Obtain a Permit to Work from the Trusts Authorised Person (AP) and strictly abide by the HTM Safe Systems of Work ensuring all staff have full PPE and provide the system protection necessary
ii) Confirm the panels being inspected are fully isolated from the LV network and under the control HTM permit to work process
iii) Removal of all access panels to facilitate inspection of all cable connections
iv) Removal of access covers to facilitate internal inspection to ensure no moisture ingress has occurred causing delamination or deterioration of internal copper work
v) The following information, not all of which may be required, is intended to describe the items which need to be tested to prepare switchgear for service. The contractors specialist panel manufacturer may add additional tests as they deem appropriate.

(1) Nameplate Data Confirmation
(2) Power Meggering
(3) Auxiliary Components and Wire Checks
(4) Hand Meggering
(5) Temperature Devices
(6) CT Tests
(7) Auxiliary Power
(8) Automatic Transfer Switch
(9) Polarity
(10) Cooling System (if installed)
(11) Auxiliary-Equipment Protection and Alarms
(12) Short-Circuit Impedance
(13) Overall Loading
(14) Trip Checks
(15) Busbar Resistance

**c) The following is an approximate sequence for switch panel testing, again all of which may not be required:**

(1) Inspect cubicles and parts for shipping damage and moisture.
(2) Check nameplate and prints for proper voltages and external phasing connection to the line or bus.
(3) Check and Megger all wiring point to point: ACB's, MCCB's, control wiring, Busbars and all other devices on the switch panel and interconnecting cables

**7. Commissioning process for LV switchgear**

These details are for guidance on the items that should be inspected, checked, and tested during the checking, installation and commissioning processes for the LV switchgear and associated circuit breakers in LV Sub-Station 3.

The commissioning process to be followed for the LV switchgear and circuit breakers involves detailed evaluations, verifications, and checks that determine whether the proper switchgear and circuit breaker specifications and installation requirements are met.

Tests must also be performed to determine whether the power distribution system will operate properly and safely after installation and completion.

When the LV switchgear and circuit breakers have been inspected and tested satisfactorily during the commissioning process, the system should operate in accordance with manufacturer's specifications for its maximum useful life with the understanding that the units to be installed are already circa 5 years old.

Due to the age of the equipment the detailed evaluation of switchgear detailed below must be followed.

### 7.1 Visual Inspection

As the LV switchgear and circuit breakers have already been received from the manufacturer, a visual inspection must be performed to verify that the switchgear and circuit breakers that were received from the manufacturer are in good physical condition and that all of the requested parts and accessories are present.

Whist only a cursory inspection is typically performed at the receiving point, the systems on site may have not been afforded these checks previously so must be fully inspected now.

During the inspection, the contractor must look for obvious equipment damage and determine whether all necessary support equipment (e.g., racking lever, and technical manuals) are present.

### 7.2 Verification Against Specifications

The design of the switch panels and new cubicles has already been completed as part of a previous stage by other parties so the type of LV switchgear and circuit breakers are assumed to have been selected for the specific power system on site but have not been shown in the drawings, prints, or specifications for the installation other than what we have been able to ascertain.

The purpose of verifying the LV switchgear and circuit breakers at this point is to ensure that the equipment that is being installed meets industry standards.

Generally, the verification by the specialist manufacturer will consist of a determination of whether the type and rating of the equipment that is to be installed matches the size and type of the equipment that is already installed and to be connected to. Any disparity must be escalated at the earliest opportunity.

The specialist manufacturer employed by the contractor will inspect the manufacturer's nameplate data on each switchgear compartment and circuit breaker, and compare them to the requirements on the electrical plan to determine whether the correct equipment is being used and if possible, provide data sheets for the equipment being used.

### 7.3 Low voltage Switchgear Nameplate

The LV switchgear should have nameplates that are clearly visible on the front of the switchgear and nameplate should contain manufacturer-type information that describes.

- Manufacturer's name
- The type designation
- The serial number.
- Rated frequency
- Rated maximum voltage
- Rated insulation level
- Rated continuous current

- Rated short-time current
- Rated short-circuit current

The rated insulation level of the LV switchgear at each maximum voltage rating will be equal to the low-frequency one-minute withstand voltage.

The LV switchgear should have been designed for this and should be marked with the continuous current that the switchgear is capable of carrying and the fault current values that the switchgear is capable of interrupting without damage to the switchgear.

Specific current ratings for low voltage switchgear should be as follows:

**Rated Continuous Current at 50 Hz**

The rated continuous current at 50 Hz will be the amount of current that can be continuously carried by the switchgear primary circuit components (e.g., buses, bus connections) without exceeding switchgear equipment allowable temperature rise.

Examples of switchgear equipment are primary or secondary circuit components, insulation, and switchgear structural components.

**The Rated Short-Time Current**

The rated short-time current is the designated limit of available current at which the switchgear must interrupt the current within the required time at the rated maximum voltage.

The required time is termed the “rated short-time duty” and corresponds to two periods of one-half second current flow that are separated by a 15-second interval of zero current.

**The Rated Short-Circuit Current**

The rated short circuit current of low voltage switchgear will be the designated limit of available current at the rated maximum voltage that the switchgear must be required to withstand for a period of no less than four cycles.

### 7.4 Circuit Breaker Nameplate

All circuit breakers must have a nameplate that is clearly visible on the front of the breaker and should contain circuit breaker manufacturer-type information that describes

- The manufacturer’s name
- The type of designation
- The serial number
- Rated frequency
- Rated maximum voltage
- Rated continuous current
- Rated short-circuit current at the rated maximum voltage
- Rated short-circuit current

All circuit breakers and electric power distribution systems must be designed to operate at a specific frequency of 50 Hz and should be marked with the continuous current that the breaker is capable of carrying and the short-circuit fault current values that the breaker is capable of interrupting without damage to the breaker.

Specific current ratings for LV circuit breakers are as follows:

**Rated Continuous Current at 50 Hz**

The rated continuous current at 50 Hz will be the amount of current that the low voltage circuit breaker can continuously carry without exceeding the allowable temperature rise.

**The Rated Short-Time Current**

The rated short circuit current will be the designed limit of available (prospective) rms current at which the circuit breaker will be required to perform its short-time duty cycle at the rated maximum voltage. The short-time duty cycle is defined as two periods of 1/2 second current flow, which is followed by a 15-second interval of zero current.

### 7.5 Evaluating LV switchgear and Circuit Breaker installation and testing

Installation inspections are to be performed to verify that proper switchgear and circuit breaker installation materials are used, that installation specifications and parameters are met, and that proper installation procedures are followed.

Installation tests should detect shipping or installation damage, gross manufacturing defects, or errors in workmanship or installation as the proper evaluation of inspection and testing data during the commissioning process can help maximize equipment operating time and feed into failure prediction which can drastically reduce equipment downtime. If a failure is predicted, operational changes can be made, maintenance can be performed, or equipment that is failing can be replaced in a controlled manner.

If a problem is corrected before it is installed and causes damage averted, operating costs will be lower because a malfunction can cause associated (or nearby) equipment damage and widespread disruption of service, or the problem can activate emergency if it cannot be repaired.

A failure in any one of the many inspections, checks, or tests that must be performed at this stage during the installation and testing evaluation will be sufficient to prevent the equipment from being commissioned and read it to be replaced.

### 7.6 Visual Inspection

Visual inspections will be used to assess the physical condition of switchgear and the associated circuit breakers. The visual inspection will be a pass fail verification about any aspect of the physical condition or the operation of equipment whilst the criteria to determine the acceptability of the visual inspections can be subjective, the visual inspections should be performed by an experienced and specialist manufacturer.

A failure of alignment, mechanism linkage, lubrication, or cleanliness inspection can usually be corrected through enhanced maintenance procedures. Any physical damage or suitability inspection failure will require the replacement of the damaged component.

All necessary technical data to evaluate the results of the visual inspection should be obtained from the switchgear and circuit breaker manufacturer.

The following visual inspections are used to assess the condition of low voltage switchgear and the associated circuit breakers:

7.6.1 Suitability
7.6.2 Physical Damage
7.6.3 Alignment
7.6.4 Cleanliness
7.6.5 Arc Chute Assembly
7.6.6 Contacts
7.6.7 Mechanism/Linkage
7.6.8 Lubrication

### 7.6.1 Suitability

The purpose of the visual inspection for suitability is to determine whether the switchgear and associated circuit breakers are appropriate for the application in which they are placed. Under normal circumstances, the suitability of the equipment should be determined before it is placed into the system but there is an expectation that this has already been undertaken on the switch panel cubicles positioned in Sub-Station 3 as part of the previous project process.

A visual inspection must however still be performed to ensure that changes that may have been made to the system have not exceeded the ratings of the switchgear or the associated circuit breakers.

To determine the suitability of switchgear and the associated circuit breakers, a visual inspection of the nameplate data should be performed and compared to the electrical system single line diagram in the switch room or any updates included in the tender pack.

If the nameplate information on a circuit breaker does not match the ratings of the electrical system, the circuit breaker should be replaced with a circuit breaker that is correctly rated.

### 7.6.2 Physical Damage

Physical damage to switchgear or to circuit breakers that are contained in switchgear, can lead to switchgear or circuit breaker failure during critical system operations and the levels of electric energy that passes through switchgear and the large forces that are required to open and close circuit breakers can propagate and amplify any minor installation damage.

Any damage to switchgear and circuit breakers can then lead to catastrophic equipment failure, fire, personal injury, or death so any physical damage to switchgear or circuit breakers that is noted requires the immediate replacement of the damaged component.

The most obvious and common forms of physical damage are cracks, dents, missing or broken pieces, bent doors, and burned out indicator lights. The purpose of the physical damage inspection is to identify whether corrective repairs or component replacement is necessary.

Switchgear and circuit breakers that show any form of physical damage, no matter how small, will be deemed to have failed the physical damage inspection and need full replacement.

### 7.6.3 Alignment

The purpose of the alignment inspection is to ensure that the switchgear and circuit breaker will properly pass current when they are connected to the rest of the electrical system. Proper alignment of a circuit breaker frame when it is installed in the switchgear will ensure that the line and load buses are properly connected to the circuit breaker when the circuit breaker is racked in.

Improper alignment can cause uneven circuit breaker engagement, over heating and wear. Due to the construction of circuit breaker frames, circuit breakers that are out of alignment are usually visually obvious.

When the circuit breaker is properly aligned, the sides of the circuit breaker will be parallel to the corresponding sides of the frame, and the proper clearance will be evident. Any misalignment must be corrected, or the frame and chassis replaced.

### 7.6.4 Cleanliness

The purpose of the cleanliness visual inspection is to ensure the proper operation of the switchgear and circuit breakers over the maximum operating life of the equipment. The accumulation of dirt over a period of time will impede the proper operation of the circuit breaker and will reduce the dielectric

strength of the switchgear and circuit breaker insulation. Dust and dirt can also reduce the speed and sensitivity of a circuit breaker under fault conditions.

As the switch panel cubicles have been sat in the room unused for several years, the accumulation of large amounts of dust and dirt should be cleaned away from the switchgear and associated circuit breakers during the pre-installation maintenance cycles.

### 7.6.5 Arc Chute Assembly

The arc chute assembly on a circuit breaker is responsible for the suppression of the arc that forms when the circuit breaker opens. The purpose of the visual inspection of the arc chute assembly is to ensure that the chutes can safely suppress the arc that forms when the circuit breaker opens under normal operation and fault conditions.

When a visual inspection of the arc chute assembly is performed, three conditions exist that will cause the assembly to fail inspection: burn marks, scale, and cracks.

Although unlikely, any burn marks present on any of the arc chutes, will require them to be replaced and similarly scale, which is the accumulation of foreign material in the chutes and that will impede the ability of the arc chutes to extinguish an arc. All chute assemblies must be assessed and any cracks present will result in the circuit breakers needing to be replaced in their entirety.

### 7.6.6 Contacts

The circuit breaker contacts provide a current path through the circuit breaker to interrupt the current during normal operating and fault conditions. Damage can occur at the breaker contacts as a result of the mechanical stress from breaker closing operations and the electrical arc that forms during breaker opening operations.

The purpose of the visual inspection of circuit breaker contacts is to ensure that the circuit breaker contacts provide a low resistance current path and that the circuit breaker contacts safely interrupt current during normal operating and fault conditions.

During the contact inspection, the primary bushings, porcelains, and finger clusters should be checked and whilst any small burns and pock marks will not interfere with the operation of the contacts, the contacts will need to be replaced when they erode over time to some wear point that is defined by the manufacturer.

### 7.6.7 Mechanism / Linkage

The mechanism linkage assembly of a circuit breaker performs the actual movement of the contacts when the breaker opens or closes. The purpose of the linkage inspection is to ensure that the mechanism linkage can move freely.

Free movement of the mechanism linkage will ensure that the circuit breaker can properly and rapidly operate the circuit breaker contacts.

The specialist panel manufacturer inspector should visually determine that no obstructions exist that will impede the movement of the mechanism linkage and that when the open close operation test is performed, no circuit breaker damage can occur.

### 7.6.8 Lubrication

The lubrication visual inspection should be performed in conjunction with the mechanism linkage visual inspection. The purpose of the lubrication inspection is to ensure that the circuit breaker mechanisms, the moving parts, the bearing points, and the sliding mechanics are properly lubricated and free of dirt, dust or rust.

## 8. Mechanical Inspection

A mechanical inspection will be used to assess the ability of switchgear and the enclosed circuit breakers to physically perform the mechanical movements that are necessary for proper operation. Tests will also be performed during the mechanical inspection to assess switchgear and circuit breaker safety functions.

A failure of mechanism operation can usually be corrected through maintenance procedures and issues such as a bolt torque test failure can be corrected through adjustment of the bolts with a torque wrench.

The general mechanical inspections and tests that are to be performed on the switchgear and circuit breakers are as follows:

8.1 Bolt Torque
8.2 Door Operation
8.3 Rack in – Rack Out
8.4 Open/close Operation

### 8.1 Bolt Torque

The purpose of the bolt torque inspection is to ensure that enough force is present to hold the buswork and circuit breaker frames in place during circuit breaker operations and fault conditions. To determine the amount of force that exists between a bolt and a circuit breaker, a torque wrench will be applied to the bolt in the direction that will tighten the bolt, and the amount of torque will be read and recorded.

The manufacturer of the circuit breaker will need to provide a list of acceptable torques in the form of a circuit breaker technical manual and be referred to for all torque checks.

### 8.2 Door Operation

Each switchgear circuit breaker compartment must be provided with a door (safety barrier) which should ideally contain an interlock that prevents the closure of the door unless the circuit breaker is racked in or completely removed.

During the mechanical inspection, each switchgear compartment door operating mechanism (e.g., handles and locking bars) should be mechanically operated and the door interlocks be tested with any failures fully corrected.

### 8.3 Rack In – Rack Out

When a breaker is racked into the switchgear, the line and load sides of the breaker contacts are connected to the electrical system sometimes with additional control power connections also made to enable the circuit breaker to be remotely controlled and automatically operated.

The purpose of a rack in – rack out inspection is to ensure that the circuit breaker moves in and out of the switchgear freely and that all connections and safety interlocks engage and function correctly.

Circuit breakers generally have a test position to allow the operation of the breaker when it is in the switchgear but not connected to the electrical system. The circuit breaker test position varies from manufacturer to manufacturer but generally, as a circuit breaker is pushed into its switchgear cell and the guides of the circuit breaker lock into place, the circuit breaker should be in the test position.

In the test position, the circuit breaker protrudes from the switchgear so that the breaker operation can be observed. In this position, the primary contacts of the circuit breaker are not connected to the system, but the control circuitry of the circuit breaker can be energized and the circuit breaker can be cycled without affecting the rest of the electrical distribution system. While the circuit breaker is in transit between the test and the fully inserted position, the breaker should not have control power, and it should not operate. This must be checked and verified as part of the test process.

Interlocks are likely to be provided in LV circuit breakers designed to prevent the unsafe operation of the circuit breaker such as to prevent racking in or racking out a closed breaker and rack-out interlock that trips a closed breaker when it is moved from the fully inserted or test positions.

If the breaker is closed, the busbar connections will complete the electric circuit as soon as the busbar connections come in contact with the switchgear busbars so when a breaker is racked into the switchgear in the closed position, dangerous arcing and uncontrolled equipment startups could occur.

Conversely, if a closed breaker that is in the fully inserted position is racked out, the current interruption would take place at the busbar connections instead of the breaker main contacts and because there is no arc-suppression mechanism at the busbar connectors, dangerous arcing could occur.

The rack-out interlock is designed to prevent dangerous arcing at the switchgear busbar connections and the mechanical inspections and tests that are to be performed on the circuit breaker must follow a logical progression with the breaker racked to the test position and the circuit breaker cycled and the operation observed.

The breaker will then be left in the closed position, and the breaker racked towards the fully inserted position. When the breaker leaves the test position, the breaker should trip. After the breaker trips from the rack-out interlock, the breaker is returned to the test position and cycled a final time.

During the racking operations, mechanical condition of all auxiliary devices, bumpers, position indicators, latching, tripping, and operating mechanisms must also be checked for proper operation.

**8.4 Open Close Operation**

The circuit breakers must always be in a condition to operate no matter how infrequently the circuit breaker has been used so an open close operation test is to be undertaken to ensure that the circuit breaker opens and closes properly.

To perform the open close operation test, the circuit breaker should be racked to the test position and the circuit breaker cycled, and the breaker operation observed. The breaker control power is to then be disconnected (or bypassed), and the breaker manually closed and tripped.

During the opening and closing operations, the mechanical condition of all auxiliary devices, bumpers, position indicators, latching, tripping, and operating mechanisms must be checked for proper operation with the moving contact travel for the circuit breaker is measured and recorded.

The manufacturer’s technical manual should contain information on the minimum moving contact travel distances and must be used for all test processes

**9. Electrical inspection**

During the commissioning process, electrical inspections and tests are to be performed to check the ability of the switchgear and circuit breakers to operate for a reasonable future period of time under a variety of operating conditions and loads.

Acceptance or installation tests will usually detect shipping or installation damage and gross defects or errors in workmanship in equipment construction. Once the installation and inspection data have been recorded and assembled, a methodical and consistent program of periodic data collection and evaluation should be established.

The full range of checks to be undertaken must include:

- Switch gear physical checks undertaken by the commissioning and maintenance teams.
- All out going cables tightness and torque mark checking.
- All breakers contact engagement checking.

- Outgoing cables shield wire to be confirmed for all feeders
- Circuit breaker front, back and side internal inspection, removal of material inspection tags if any in the cubicles
- Housekeeping of switch gear etc.
- Main cable tightness and torque marking checking
- Inspection of front and back door interlock with breaker service positions
- Busbar and Line connection checks
- Check for loose connections.
- Check all the breakers close open manually and electrically.
- Check the closed breaker spring discharges when removing and other physical alignment during rack in and rack out condition.
- Verification of equipment labeling.
- Inspect the excess gaps / cable gland holes on the panel which are to be plugged.
- Perform ductor test on all main bus joints
- Check the annunciation indications for alarms (transformers and relays) and remote indications
- Check target LED indication
- Partial differential function check
- Breaker lock out functional check at less than 80% bus voltage.
- Check the breaker open operation when main breaker closed manually and bus voltage is dead.
- Check the breaker tripping protection functions.
- Check ATS and sync operation
- Earth resistance check for main body.
- Meggering of bus bar.
- Breakers ATS and parallel operation checks.
- Verifying the Relay settings and breaker tripping relays
- Annunciation signals and alarms functions.
- Testing and functional checks of the incoming cables
- Cable phasing continuity
- Interlock checking (upstream to downstream)
- Functional checks
- ATS Automatic transfers witch and parallel operation of the bus.
- Lock out relay function check
- Phase sequence of bus A and bus B and noting of incoming voltages
- Interlock check between upstream to downstream breakers

9.1 Turn in revised prints and test reports, which should include the following:

- All test data
- Moisture data
- Problems encountered
- In-service data
- Time energized and release to operation
- Any unusual problem that information will aid in future equipment testing

10. Completion Elements

Once the switch panel cubicles have been fully inspected and assured the contractor will undertake the installation and full testing of the new LV generator cables linking the following elements

1. Chapel generator LV switch gear spare 1000 A ACB to Sub-Station 3 section 1 generator incomer.

2. Sub-Station 3 section 1 generator incomer ACB to Sub-Station 3 section 2 generator incomer ACB.

   Following the testing of all LV cables, the protection system associated with all six elements noted above will need to be checked and tested to ensure the system discriminates throughout the network.

   The contractor will need to undertake their own discrimination study and make any necessary adjustments on the system trip settings to ensure the Trusts wider network is fully protected at all times

11. **Installation of generator supplies from chapel switch panel to new systems**

    i. In order to undertake the installation of cables as planned the contractor will need to undertake some initial load monitoring of the LV switch panel sections in Sub-Station 3 to ascertain their peak and lowest load times and determine when it is most appropriate for the modifications to be undertaken so that just one supply bus is used and the coupler opened to isolate half the panel with other loads supported on generators

    ii. To achieve this element the contractor shall supply and install a fluke 435 power quality analyser for at least one week on each supply and then produce a short form report showing the overall loads

    iii. Following the load survey, the contractor shall Implement a full HTM 06-03 safe system of work in conjunction with the Trust AP's to ensure all system isolations are undertaken in a controlled manner

    iv. At an agreed time, having obtained full approval from all H and W/X Block department users and key stakeholders, including the Emergency Planning team, the systematic isolation of both panel sections and installation of both new LV generator feed cables shall commence as per the phasing methodology shown on the tender drawings

    v. The contractor must ensure that the LV switch panel in Sub-Station 3 always has at least one supply fully energised and operational with one section fully isolated by way of utilising the bus coupler to de-energise each section of the panel as necessary

Throughout the installation there is a significant risk to the Trust, so the contractor must ensure full LV supply coverage at all times with defined and agreed open points being introduced as necessary such that these will be able to provide power at their nominal rated capacity to maintain the Hospital power distribution systems, unless agreed otherwise.

**Installation and Phasing of the Works**

The Works shall be taking place within a CDM controlled environment and coordination between the Trust and the Contractor will be essential at all times. The installation shall comply with the current standards and regulations applicable.

All materials, equipment, work, facilities, and services necessary to undertake the Works shall be performed and supplied in accordance with the most recent legally required applicable standards, codes of practice, legislation, requirements of the relevant government, regulatory body at time of contract award.

The Contractor is responsible for identifying any conflicts found between the requirements of this Specification and any codes and standards used in the design. In the event of conflict in standards, the following hierarchy of standards shall apply in order of precedence, unless otherwise agreed:

- Statutory requirements

- Standards identified in the Specification
- European Standards (EN)
- British, National or International Standards (BS, ISO, DIN, ASME, ASTM etc.)
- Health Technical Memoranda

This document contains representative examples of the Standards and Codes of Practice only and should not to be considered as comprehensive. Additional Standards and Codes of Practice are identified throughout the Specification.

Throughout the installation there is a risk to the Trust with regards delivery access, so the contractor must ensure routes are clear at all times unless by prior arrangement. Out of hours working must be included within the tender sum for all deliveries, offloading, positioning and all electrical works, shutdowns etc to ensure no disruption to hospital delivery schedules.

We would suggest this is approximately 6-weeks' worth of work but some elements such as surveying the switchgear to be connected, capture of the systems to be transferred, Load Monitoring, preparing working drawings installation of generator cables and containment can all be done in advance. Arranging all of the paperwork and draughting permits can also be done in advance to reduce this time where possible. This shall then be followed by all necessary isolations and modifications, but the successful contractor must confirm full timescales at tender return.

The Contractor's programme for carrying out the above works shall be agreed with the Contract Administrator in liaison with the Client. The Contractor shall make allowance for working and co-ordination with other trades and working within an occupied building and live switch panels.

It should be noted that there will be a requirement to work out of hours mainly for all shutdowns of critical areas, although the main construction work will be permitted in hours. All works must be completed with minimal impact to the Trust so will require full liaison with the Trusts Emergency Planning Leads and could necessitate in the Sub-Station 3 switch panel modifications and migrations being done during operational hours when more clinical staff are available to support patient care in the event of an emergency arising

The specialist work elements to be undertaken by the contractor include, but may not be restricted to, the following:

1. Survey the site and the existing switch panels including the four new switch cubicles to understand the practicalities of achieving the task
2. Supply and deliver to site the systems and the necessary installation team. **NOTE** this must include the necessary Accompanying Safety Person as required under HTM 06-02 and 06-03
3. Once on site obtain all Permits to work from the Trusts Authorised Person (AP) LV strictly abide by the HTM Safe Systems of Work ensuring all staff have full PPE and provide the system protection necessary.

**Contractor Responsibilities**

1. The contractor will finalise all Contractor Design Portions which include but may not be limited to
    - i Specialist switchgear manufacturer involvement
    - ii Load Monitoring
    - iii Authorised Person (AP) LV
    - iv Finalisation of switching plans
    - v Cable route
    - vi Surveys (Internal to switchgear and external)
    - vii Final cable sizings
    - viii Finalisation of Containment systems

2. The contractor will allow for commissioning (Out of hours) the HV systems
3. The contractor will include to carry out full testing of the supplied equipment and working with the Trust and employment of the DNO engineers if necessary.
4. The contractor will provide all welfare facilities for their personnel working on site.
5. The Trust will provide 230vac supply for their 110vac portable tools.
6. The contractor will include to carry out full testing of the supplied equipment and working with the Trust and employment of the witnessing engineers.
7. The contractor will allow for all Civil works as necessary.
8. The contractor will allow for all deliveries, Cranes, Offloading, Mechanical and Electrical works and Installation of the new systems
9. The Contractor shall note the space and access limitations in the areas as they are very restrictive due to constant deliveries.

**Design Criteria**

**General**

The Contractor shall provide equipment and systems of proven technology that has operated commercially at other locations of a similar type, scale, nature and complexity. The Plant shall be designed to be safe, economic (in both capital cost and operating cost) and offer a high availability / reliability with low outage / downtime. The Plant shall require minimum operator intervention under normal operating conditions.

The equipment storage containers shall be capable of delivering the Trust requirements over the full range of anticipated ambient conditions as defined in the Specification. Adequate allowance shall also be included for normal variations in Plant operating conditions. All supporting systems shall be inspected and checked as having adequate margins of capacity to achieve this requirement.

**Design Life**

The “Design Life” is the period of time over which the systems required to continue to meet its expected performance with predictable operating and maintenance costs and without the necessity to rebuild major structural elements.

The equipment shall be designed for a life of at least 25 years and will be operated and maintained in accordance with the Contractor’s O&M manuals. Civil works shall generally be designed for a minimum working lifetime of not less than 25 years such that major structural repair shall not be required during this period.

The systems shall be designed for operation at its specified operating conditions.

The equipment shall be designed to facilitate safe inspection, cleaning, maintenance and repair. The design shall incorporate every reasonable precaution and provision for the safety of all persons concerned in the operation and maintenance of the Plant.

Wherever possible, the systems and components shall be designed for standardisation and interchangeability utilising equipment of reliable and proven performance from reputable manufacturers.

**Design Conformity**

All equipment supplied shall conform to the requirements of the Specification.

The equipment shall be capable of withstanding, without damage, undue heat, strain, vibration, noise, corrosion or other operating difficulties, all stresses which may be experienced during normal operation, cyclic load operation, sudden load swings and under all specified test conditions. No part of the

equipment shall suffer from accelerated ageing as a result of exposure to the specified ambient and operating conditions.

All materials, equipment and systems to be incorporated into the works shall be new and of a standard proven design.

All equipment and systems shall have sufficient margin to cater for equipment and system wear, tear and deterioration.

The equipment, such as the ISO container storage units shall be designed such that, in the event of a fault, it and its associated systems shall shutdown in a safe manner without damage to any equipment and an emergency alert sent to all applicable Trust parties. All equipment shall be designed to permit safe shutdown on loss of electrical power supply or on loss of control system.

**Design Standards & Codes of Practice**

The Contractor shall comply with all Laws and regulations of the United Kingdom. All systems and equipment supplied, all work carried out in fulfilment of the Contract shall conform in all respects to all the laws and regulations, by-laws and requirements of National / local or other authorities which are applicable to the Works.

The equipment shall comply with the current Occupational Health and Safety Regulations.

European Standards (EN) shall be used for the design, construction and testing of the Plant. Where EN standards are not available, the Contractor may request to use appropriate National or International Standards.

All materials, equipment, work, facilities, and services necessary to undertake the Works shall be performed and supplied in accordance with the most recent legally required applicable standards, codes of practice, legislation, requirements of the relevant government, regulatory body at time of contract award.

The Contractor is responsible for identifying any conflicts found between the requirements of this Specification and any codes and standards used in the design of the. In the event of conflict in standards, the following hierarchy of standards shall apply in order of precedence, unless otherwise agreed:

- Statutory requirements
- Standards identified in the Specification
- European Standards (EN)
- British, National or International Standards (BS, ISO, DIN, ASME, ASTM etc.)

The Contractor shall provide Electrical equipment that enables operation and maintenance to be performed in a safe and efficient manner in compliance with all Statutory regulations including and the most current standards and codes of practice at time of contract including but not limited to:

- Electricity at Work Regulations 1989
- Electricity Safety, Quality and Continuity Regulations
- Health and Safety at Work etc. Act 1974
- BS EN 50160 – Voltage Characteristics of Electricity Supplied by Public Distribution Systems
- BS 7671: Requirements for Electrical Installations 18th Edition
- BS EN 7430 – Code of Practice for Earthing
- Control of pollution (Oil Storage) (England) Regulations 2001
- HSG 176 - Storage of Flammable Liquids in Tanks 2015
- PPG2 Pollution Prevention Guidelines 2004
- The Building Regulations 2012 Approved Document J6.

- Recommendations for Fire Safety in the Storage of Highly Flammable and Flammable Liquids - Part 1 General Principles RC20 part 1. The Fire Protection Association.
- Risk Control - Storage and Use of Highly Flammable and Flammable Liquids in External Storage Tanks RC57. RISC Authority.
- GAPS Guidance 2.5.2 Table 3.
- Material Safety Data Sheet - Diesel Fuel Oil - Nationwide Fuels.
- Oil Fired Technical Association (OFTEC) guidance OFT 200.
- HSE website http://www.hse.gov.uk/fireandexplosion/petroleum-faqs.htm.
- BS EN 12285-2.
- Engineering Recommendation P25 – The Short-Circuit Characteristics of Electricity Boards Low Voltage Distribution Networks and the Co-ordination of Overcurrent Protective devices on 230V Single Phase Supplies up to 100A (1984)
- Engineering Recommendation P26 – The Estimation of the Maximum Prospective Short- Circuit Current for Three Phase 400V Supplies
- Engineering Recommendation P28 – Planning Limits for Voltage Fluctuations Caused by Industrial, Commercial and Domestic Equipment in the UK
- Engineering Recommendation G5/4 – Limits for Harmonics in the UK Electricity Supply
- Engineering Recommendation G74 – Procedure to Meet the Requirements of IEC 60909 for the Calculation of Short Circuit Currents in Three Phase AC Power Systems
- Engineering Technical Report 120 – Application Guide to Engineering Recommendation G74
- ATEX
- DSEAR

The following table contains representative examples of the Standards and Codes of Practice only and should not to be considered as comprehensive. Additional Standards and Codes of Practice are identified throughout the Specification.

| **Standard** | **General** |
|---|---|
| 97/23/EC | Pressure Equipment Directive |
| 93/68/EC | CE Marking |
| **Standard** | **Quality Assurance & Environmental** |
| ISO 9001 | Quality management systems. |
| ISO 14001 | Environmental management systems. |
| ISO 18001 | Occupational Health & Safety |
| **Standard** | **Mechanical & Pipework** |
| IEC 60331 | Tests for electric cables under fire conditions |

| Standard | Acoustic & Vibration |
|---|---|
| ISO 3747 & 9614 | Acoustics – Determination of sound power levels of noise sources |
| BS 4142 | Rating of industrial noise affecting mixed residential and industrial areas |
| ANSI/ASA S1.4 | American National Standard Specification for Sound Level Meters |
| **Standard** | **Electrical & Instrumentation** |
| IEEE 80 | IEEE Guide for Safety in AC Sub-Station Grounding |
| IEEE 1050 | Guide for instrumentation and control equipment grounding |
| IEC 60423 | Conduits for electrical purposes |
| IEC 60439 | Low voltage switchgear and control gear assemblies |
| IEC 60502 | Power cables with extruded insulation and their accessories |
| IEC 60269 | Low Voltage Fuses |
| IEC 60529 | Enclosure Degree of Protection (IP) |
| IEC 60614 | Conduits for electrical installations |
| EN 60751 | Industrial platinum resistance thermometer sensors |
| BS 6739 | Code of practice for instrumentation in process control systems |
| BS 7671 | Requirements for Electrical installations |
| BS EN 50288-1&7 | Cables used in analogue and digital communication and control. |
| BS EN 61131 | Programmable Controllers |
| BS EN 61508 | Functional safety of electrical/electronic/programmable electronic systems |
| BS 60204 | Safety of machinery — Electrical equipment of machines |
| BS EN 60794 | Optical fibre cables |

| | |
|---|---|
| BS EN 55014 | EMC Requirements |
| BS EN 61000 | Electromagnetic compatibility (EMC) |
| BS EN 62305 | Protection against lightning |
| BS IEC 60287 | Electric cables. Calculation of the current rating |
| BS IEC 60853 | Calculation of the cyclic and emergency current rating of cables |
| IEEE 80 | IEEE Guide for Safety in ac Sub-Station Grounding |
| IEEE 665 | IEEE Standard for Generating Station Grounding |
| IEEE 1050 | Guide for instrumentation and control equipment grounding |
| ISO 11064 | Ergonomic design of control centres |
| ISO 13407 | Human Centred Design Process for Interactive Systems |
| ISO 6385 | Ergonomic principles in the design of work systems |
| BS 7430 | Code of Practice for Earthing |

**Design Site Operating Conditions**

The HV systems are generally located inside, and ambient temperature and humidity values are typically those that are prevailing in Harrow.

Air quality is unchanged from local ambient air; no filtration is used or required.

The site is not considered to be subject to unusual levels of shock, vibration, chemical pollution or radiation but the contactor shall confirm this as part of their final design checks.

**Process Design Safety**

**Design Reviews**

The Contractor shall demonstrate that the design and layouts are in compliance with the Design Criteria of the Specification. The Contractor shall conduct constructability, operability and maintainability reviews of the proposed design at the appropriate stages and shall include the Trust in these reviews. These shall include the following:

- HAZOP with Trust, Contractor and Control Specialist
- Operability review
- Plant Noise Study
- Availability, Reliability and Maintainability (ARM) review

**Safe Design**

Safe Design is a process defined as the integration of hazard identification and risk assessment early in the design process to eliminate the risks of injury throughout the life of the project being designed. It encompasses all design aspects including hardware/software systems, equipment, products, tooling, materials, energy controls, layout and configuration.

The Contractor shall employ a Safe Design process and undertake the design in a manner that eliminates, or minimises as far as reasonably practicable, risks to health and safety throughout the life of the Plant being designed.

The Contractor's design process shall:

- Comply with all current legislative requirements
- Comply with the Specification Health, Safety and Environmental section
- Comply with BS ISO 31000 and BS EN 31010
- Prepare a Safe Design plan
- Engage with all stakeholders and include the Trust in the activities to identify, assess, and prioritise risks.

In addition, the Contractor shall undertake reviews including but not limited to:

- HAZOP studies, (including the Trust)
- Hazardous Area assessment and classification

The Contractor shall include and maintain in the Schedule all design related activities including but not limited to, milestones for:

- All Safe Design related activities
- All Safe Design deliverables

The Contractor shall prepare and maintain a Safe Design dossier, including but not limited to:

- The Safe Design Plan
- The Process Risk Register
- Records of the activities, actions and communication with stakeholders and measures implemented to eliminate, mitigate and control all identified risks.
- Deliverables from all risk related reviews and studies

**HAZOP Studies (BS IEC 61882)**

The Contractor shall conduct HAZOP studies once the preliminary designs, including Process Flow Diagrams (PFD's), Piping and Instrumentation Diagrams (P&ID's), and Single Line Diagram (SLD's), for all systems are complete.

Drawings and documents for HAZOP review shall be issued no later than 2 (two) weeks prior to the planned date of the HAZOP. These studies shall examine the design of the Works and determine whether the design during operation, including abnormal modes of Works operation, complies with this Specification in terms of hazards and operability. The scope of the studies shall also include but not be limited to:

- Integration with any existing utilities, services and processes
- The configuration of the Plant control system
- The provision of adequate safeguards to permit remote operation

The Trust shall participate in the HAZOP studies and the designs shall be modified at the Contractors cost to incorporate the recommendations of the studies. The Contractor shall track and report on progress associated with implementing actions raised during the studies and present the Trust with a complete dossier showing the original minutes and the corrective actions taken to resolve issues logged.

**Hazardous Area Assessment and Classification**

The Contractor shall carry out a comprehensive Plant-wide assessment of all areas which may be considered hazardous in accordance with current legislation and standards including BS EN 1127.

Any deviation from the requirements of the applicable legislation and Standards shall be accompanied by written proof of an equivalent or higher level of safety for the design. This proof shall be included in the Hazardous Area Dossier.

**Hazardous Area Dossier**

The Contractor shall prepare a Hazardous Area Dossier providing complete installation, operations and maintenance information for all equipment provided in hazardous areas and any systems designed to provide protection to that equipment.

The Dossier shall include details of certification for all equipment supplied.

The dossier shall incorporate a test and maintenance plan to ensure the integrity of the installed protective systems and demonstrate that they can be monitored, recorded and maintained over the life of the Works. The Dossier shall include but not be limited to:

- The classification of hazardous areas.
- Equipment group and temperature class.
- Installation instructions.
- Certification for electrical equipment, including items with special conditions (e.g.
- equipment with certificate numbers suffix ‘X’).
- Descriptions of intrinsically safe system/s.
- Documentation for the area/environment to which equipment will be exposed, (e.g. T rating, Ex rating, IP rating, corrosion resistance.
- Certification for rating of equipment (e.g. voltages/frequency) during normal operation.
- Manufacturer’s QA / QC documentation, (e.g. inspectors/inspection reports.
- Records for the maintenance of explosion-protected equipment in accordance with its type protection (e.g. list and location of equipment, spares, technical information).
- Records covering any maintenance, overhaul and repair of systems / equipment.
- Records of selection criteria for cable entry systems
- Drawings and schedules for circuit identification.

**Civil, Structural & Building Works**

Based on loading data to be ascertained and provided by the contractor if required as part of these works, the contractor will engage a specialist consultant to carry out an assessment of existing ground conditions and structures and advise on suitability or permanent strengthening required to and new construction of:

- Concrete platforms / bases / supports if required
- Access staircase

- Fencing adaptations

Any work required to these items must be carried out as part of this contract.

Any further civil, structural and building works required for the Plant shall be carried out by the Contractor and identified within their Tender price.

All works shall be designed in accordance with the appropriate British or European Standards and all relevant Building Regulations.

Method statements

The Contractor shall prepare method statements prior to all construction activities, including working methods, construction plant utilisation, temporary works, construction sequence, environmental considerations and safety management including allowance for all necessary cranage, plant manoeuvres and waste haulage required.

Site Survey, Enabling and Preparation works

The Contractor is to be responsible for the accurate setting out of the Works in accordance with the design drawings and shall have undertaken a detailed site survey as part of their tender submission. No variation will be accepted during the construction period for unknown ground condition elements.

Environmental considerations

The Contractor shall protect the existing plant, equipment and surrounding buildings from dust and damage resulting from the Works.

**Civil works**

The scope of the works shall include, but be not limited to:

- surface preparation of existing foundation bases including stripping back of any supplementary finishes and any redundant sole plates / fixings
- removal of existing redundant bases / foundations if considered necessary and if they cannot be reused for construction of new generator, AST or GRP enclosure bases
- construction of new containment foundations
- construction of new foundations piers
- supply and fixing of any necessary new sole plates or other holding down arrangements
- Modification of fencing and access gates around compactor locations to enable installation of relocated compactor and relocation of waste bins

**Steelwork**

General

Design of steel structures shall be in general accordance with BS EN 1993. The members of each individual structure shall be fabricated from steel of one grade and from the same manufacturer.

The Plant shall be designed and arranged in such a way that they can be easily erected and dismantled, without large scale dismantling of other parts of the Plant being necessary.

All plinths for auxiliaries (i.e. Motors, etc.) must be at least 200 mm high to ensure that adequate clearance is available for protection from surface water damage.

Interface with Existing Steelwork.

Where the Contractors design interfaces with existing facilities these shall comply with this specification.

Shop Drawings

The Contractor shall prepare fully detailed and coordinated fabrication / shop drawings with supporting calculations.

Protection to Steelwork

The preparation, protection and painting systems selected for ferrous surfaces shall provide a life to first maintenance of 25 years, excluding doors, windows, louvers etc. which shall be coated with protective systems providing a life to first maintenance of 15 years.

All corrosion protection coatings shall be applied in accordance with the manufacturer's written instructions. Where any protective coatings are damaged, all loose and damaged paint shall be removed down to the bare steel using a needle gun and/or rotary wire brush and adjacent sound paint which is to be over coated shall be thoroughly abraded to ensure adhesion of touch-up paint, all to the satisfaction of the Engineer.

Fire Protection to Steelwork

The successful contractor shall assess the finished installation and determine the need for fire protection. Where this is considered necessary, all fire protection proposals and applications shall be in accordance with UK building regulations and shall be to the satisfaction of the local Fire Officer. The coatings shall be applied by a specialist applicator strictly in accordance with the product manufacturer's recommendations.

Erection

Prior to the erection of permanent steelwork, the Contractor shall prepare a detailed method statement with all supporting drawings and calculations setting out the sequence for erection, lay down areas and details of craneage proposed.

The Contractor shall take care during erection to ensure that no damage occurs to the steel structure or other structures due to the use of transportation or lifting gear or in any other way.

Welding, torch-cutting and drilling work on the steel structure shall be avoided where possible and it shall be ensured that the integrity of the structures is intact. If mountings or suspensory attachments for erection purposes are attached to the steel structure, they shall be removed by the Contractor after work is completed and the steel structure restored to a proper condition by grinding away the welded seam surplus material and other deformities and painted/protected to the original condition.

Foundation Bolts

Boxing out for bolts shall not be permitted. Tolerance tubes shall be fitted to any necessary foundation bolts. The projection of threaded portions of bolts above the foundation level shall be adequate to properly secure the nuts.

Grout must be non-shrink type, pre-blended, packaged proprietary material, meeting the requirements of the latest edition of relevant codes and standards. Class "A" is to be used for general grouting below base plates of structural steelwork, and for Plant items that do not impose dynamic loadings upon the grout. Class "A" is not to be used where contact with prestressing cables is likely. Class "C" is to be used below all machinery and Plant where reciprocating or centrifugal loadings occur and structural steelwork columns directly supporting such dynamic loadings. The use of grouts containing iron filings is not acceptable.

**Site Requirements, Limitations and Restrictions**

**General Site Requirements**

Location and Laydown Areas

All Plant and equipment and laydown areas, both temporary and permanent, shall be located within the designated Site. The maintenance of the laydown and construction areas shall be the responsibility of the Contractor. It is envisaged that the laydown area will be constrained and limited to the area indicated only. This will need to be considered by the contractor and incorporated into their planning.

Site Access - Personnel

Personnel access to the ISO storage and HV generator areas are generally controlled via the on-site estates & facilities team. This arrangement will continue to be in place throughout the tender period until the contractor is formally appointed. Upon commencement of the construction works, the contractor shall be provided a key to storage and HV generator area but to maintain daily and out of hours emergency access to the operational compactor and storage units, the contractor will need to sign those keys in and out every day at the Estates office

Site Access – Plant, Equipment and Materials

In order to provide adequate health, safety and security control, the Contractor shall be responsible for managing the access to and egress from the Site for all deliveries by themselves or sub-contractors. The management and timing of deliveries and removals is of particular relevance due to the vehicular access to the site being limited to the route identified on the tender drawings.
The Trust must have access to the installation Site outside site working hours in times of emergency and the contractor shall ensure provisions are made to ensure it is safe to do so. 24-hour general site security facilities will be provided by the Trust.

Site Clearance, Establishment, and Waste Disposal

The Contractor shall take over the designated construction areas as found and shall allow for any site clearance, demolition, service diversions, or preparation that may be required for establishment of temporary and permanent Works.
The Contractor shall be responsible for transportation and disposal of all wastes, materials, objects and any other residual matter required to be removed from the Site arising from the Works.

**Site Facilities**

Signage

Size, type, location, wording etc. of all signs, boards and posters shall be agreed with the Trust prior to erection.

Contractor's Accommodation

If considered necessary the Contractor will provide site offices, mess room and small item storage facilities within the demise indicated on the tender drawings and provide safe pedestrian access from the site entry to the site facilities and the designated construction area paying full attention to Trust Portering / Cleaning Staff using this area regularly for refuse disposal and cleaning material/equipment collections.

The Contractor will also need to provide the necessary temporary site facilities for reception and storage, lay-down areas, assembly areas, workshops etc if they consider it necessary to undertake the works.

Within 4 weeks from the Commencement date the Contractor shall produce detailed drawings showing proposed locations of his and his subcontractors' establishment and central site office area together with any other temporary arrangements, drainage, surface preparation, parking, laydown and/or temporary storage areas etc.as appropriate given the provision of the facilities described in the previous paragraphs above. Such drawings shall be provided to the Trust for comment and approval.

Before the use of site accommodation commences, the Contractor shall notify the Trust of the full details of proposed personnel to be employed on Site and arrange for the required site inductions and passes to be completed and obtained.

The Contractor's accommodation shall be suitably identified with the Contractor's name and that of his site representative and kept well maintained by the Contractor. The Contractor's accommodation and surrounding areas shall be kept clean and tidy at all times and cleaned frequently.

The Contractor shall be responsible for the maintenance of the allocated areas and all other installed services. On completion of the Works the Contractor shall remove all temporary structures, equipment and other arrangements from the Site and reinstate all surfaces back to how they were at the commencement of the works.

Trusts Accommodation

No allowance for Trust's Accommodation is required.

Telecommunications

N/A.

Site Records

The Contractor shall maintain records of all relevant documentation and test certificates. The Contractor shall ensure that records are available to meet obligations to all statutory bodies and to any committees, working parties or teams that are established to meet the needs of the Contract. These records shall be maintained, retained and have an electronic backup until hand over of all Works. The records shall include but not be limited to: -

- Health & Safety Register including risk assessments and site procedures
- Site register for lifting appliances, cranes, slings, hooks, lifting beams and tackle supplied as part of the permanent works
- Scaffold register
- Plant commissioning documents for all aspects and parts of the Works
- Test certificates from tests on all equipment on Site
- Operation and Maintenance manuals
- Quality Assurance Plan
- Site register for all temporary and permanent portable electrically powered equipment and tools.
- Site register for members of staff including times in & out, trades and companies

First Aid

The Contractor shall provide construction site first aid cover on Site to provide first response.

Site Cleanliness and Waste Disposal

The Contractor shall prohibit the committing of nuisance by his employees and subcontractors within the Site or upon the Trust's or adjacent land. Any employee or subcontractor found violating this provision shall be immediately discharged and not be employed again on this Contract.

Sanitation and Drainage

No temporary toilets will be accommodated at the Site and the Trust will make existing toilet and ablution facilities available for the use of Contractor's/subcontractors personnel.

Use of Motor Vehicles and Parking

No allocated car parking facilities can be provided by the Trust for the Contractor's/sub- contractors or visitors vehicles regardless of prior permission or signing in each day at security. It is expected that all contractors seeking to park on site will pay and display in the same manner as the public

Site Restrictions

The Contractor, his employees and his sub-contractors shall not trespass beyond the limits of the Site and those areas of adjacent third-party sites agreed specifically with the Engineer.

Electricity

The Contractor shall be responsible for providing temporary electricity supplies to the Site, within the capacity of the existing infrastructure, throughout construction.

Potable Water

Not used.

Drainage/sewerage

Not used.

Receipt & Storage of Equipment and Materials at Site

All items, packing cases, containers and packages delivered to and received at Site shall be recorded against the contractors shipping schedules and immediately inspected for signs of damage. All signs of damage shall be investigated, and the extent and nature of the damage recorded. The contents of each packing case, container or package shall be checked against the contents list and any discrepancies noted. Each item shall be carefully unpacked and checked for mechanical damage and/or damage to environmental protection. All such damage shall be recorded.

All Plant and equipment to be stored out of doors shall be placed on timber or the equivalent so that it is not in contact with the ground and provided with adequate weather protection. The Trust may instruct the Contractor to carry out a repair or special cleaning process on any item on which the protection has been ineffective and/or which has been subjected to adverse storage conditions.

All items stored at Site shall be inspected on a regular basis and adequate records of inspection and environmental protection rectification carried out shall be kept.

On withdrawal from store, each item or component shall be prepared for erection by removal of temporary shipping and site storage protection. Inspection shall be carried out immediately prior to erection to ensure that all such protection has been properly and completely removed as necessary unless being used for additional protection during erection. All such protective measures shall be removed prior to testing the Plant.

The Contractor shall be held responsible for and making good of, all damage resulting from improper preparation of goods for shipment or storage.

**Health, Safety & Environmental**

**General**

All parties are to comply with Health and Safety and CDM legislation as applicable at the time of construction and as may be amended during the period of construction. The Contractor shall ensure that all design and works carried out are in compliance with all relevant UK and European Union Health and Safety legislation.

**CDM roles**

Under the project the successful contractor will act as Principle Contractor for the project. The roles of Principle Designer, Designer and Contractor will be taken by the Contractor and the attendant duties and responsibilities will be undertaken by them as the relevant party.

The duty of the Principal Contractor is to manage the project in accordance with the parameters set out in Regulations 8 and 12 to 15 of the Construction Design & Management Regulations 2015. The Principal Contractor's role in this project will include but not be limited to the following:

- To manage the Project with due regard to Health, Safety and the Environment to avoid any incidence or process occurring that is harmful to the wellbeing or health of personnel directly involved with the construction and operation of the proposed facility, visitors to the Site, the public, neighbouring sites and their occupants, the natural environment.
- To liaise with and assist the Principle Designer to produce the Project Health & Safety File, the pre-construction and construction phase plans, the design review and quality documents.

The Contractor will maintain an active method of recording and enforcing the following as a minimum requirement;

- Risk assessments
- Method statements
- Appointed persons register
- Accident/Incident records
- First aider certificates
- Firefighting equipment registers
- PAT testing
- Lifting equipment testing
- Plant vehicle inspection and maintenance
- Plant vehicle driving license register
- Electrical engineer certificates
- CSCS register
- Electrical isolation permits
- Mechanical work permits
- Confined space work permits
- Gas monitor test calibration certificates
- CDM regulations
- COSHH data sheets

The Contractor shall provide as a minimum the following Risk Assessments and Method Statements:

- Works to Electrical Systems
- General Access to undertake works
- Access to "LIVE" systems
- Isolation of services
- Monitoring.
- Testing and commissioning

The Contractor will be a Principle Designer and Designer as defined in the Regulations and as such is required to produce Designer's Risk Assessments**.**

**The Contractor shall ensure that at all times the Works, installation and method of working by him and his Subcontractor's comply with Site Rules. All permanent and temporary works shall comply with all applicable Laws and applicable codes of practice and guidance including (without limitation) the following:**

- Health and Safety at Work, etc. Act 1974.
- CDM Regulations 2015.
- Electricity Supply Regulations.
- Control of Major Accidents Regulations
- The Electricity Council National Codes of Practices.
- BS7671: 2008 Requirements for Electrical Installations, Eighteenth Edition, incorporating all amendments current at date of Tender issue.
- Supply of Machinery (Safety) Regulations 2008
- Construction Regulation Handbook – produced by the Royal Society for the Prevention of Accidents
- Temporary Works Code of Practice BS5975:2008

The Principal Contractor will formulate a Construction Phase Plan. The Contractor shall adhere to the requirements of this Plan at all items and shall be deemed to have included in his Contract Price to undertake all reasonable actions, liaison, meetings, and other communications as necessary to ensure the safe construction of the works.

The Contractor shall comply with the requirements of Schedules 4 & 5 contained within Appendix 3 a form these schedules will form part of the contract

Interface with Others

All Subcontractors appointed by the Contractor shall, at all times, be the responsibility of the Contractor and shall adhere to all procedures and requirements of the Contractor or the Trust stated in the Contract.

The Contractor shall:-

- Provide regular safety training for Contractor's staff.
- Participate in HAZOPs; lifting and access reviews; and Safety Integrity Review (SIL) meetings
- Attend and contribute as required in Trust Design and Safety Reviews

Asbestos

The presence of asbestos in the storage and HV generator areas is known and any known asbestos in the works area is identified within the Asbestos Register to which the Contractor should refer before commencing any works and take appropriate measures accordingly.

Prior to commencement of the works an R&D survey shall be arranged by the Trust to identify if there is any unknown asbestos

In the event that asbestos removal is required then the Trust will arrange the removal of asbestos containing materials through a licensed asbestos removal Contractor. In the event that asbestos containing materials are required to remain in place, the Contractor shall be responsible for ensuring that the Works are carried out safely and take into account the provisions of Control of Asbestos Regulations 2006. Any costs associated with this shall be borne by the Trust

Chemicals

A COSHH assessment will be required for all materials considered hazardous in normal or fault conditions and approved by the Trust prior to use. Materials shall be clearly and unambiguously indicated on the equipment, together with any special instructions. Hazardous shall be taken as meaning explosive, toxic, carcinogenic, mutagenic or biologically active in any way.

The Contractor shall detail and record the extent to which any hazardous materials are used in the Plant via the O&M manual. Instructions shall be given regarding the disposal of such materials or components containing or incorporating such materials.

Storage tanks for chemicals shall be fitted with bunds in compliance with Environment Agency general sector guidelines on IPPC and Above Ground Oil Storage Tanks PPG2. Bunds shall comply with the HSE guidelines on secondary containment. All storage and handling of chemicals shall comply with COSHH Regulations 2012.

**Quality Assurance**

The Contractor shall manage all activities in accordance with the requirements of British

Standard EN ISO 9001 2008. The Contractor and all subcontractors shall have Quality

Systems that meet the requirements of the BS EN ISO 9001 standard or equivalent. Quality Assurance will be carried out in accordance with the relevant sections of this Specification

The Contractor shall work to an approved Quality Assurance Management Plan, which shall reference all quality practices and policies to be applied to the project so as to comply with the intent of ISO 9001, including but not limited to:

- Responsibilities and authorities
- Document control
- Design verifications
- Subcontractor assessment and control
- Calibration requirements
- Traceability
- Non- conformance control
- Construction method statements
- Inspection and test plans
- Internal audits
- Records
- References to supporting project manuals (e.g. safety manual, start-up manual)
- Storage and maintenance of equipment The Quality Assurance Management Plan shall :-
- Demonstrate efficient production, handling and distribution of all documents, including the controlled withdrawal of documents that have been updated
- Ensure equipment items that have a high impact to the cost of the Works, or influence on the Programme or process functionality of the Plant are given appropriate priority through the design, procurement, installation and testing phases
- Define work processes and inspection plans to check and approve the quality and consistency of design, procurement, manufacture and testing of supplied equipment;
- Ensure that third party sub-contractors and suppliers adhere to equivalent standards of quality procedures and processes in supply of their Works
- Measures to be taken for storage and maintenance for the Works and Contractor's equipment prior to installation, as well as for the period between the completion of the installation and Take-Over.

The Quality Assurance Management Plan shall include an Inspection & Test Plan (ITP) to enable the Engineer Witness functional tests during both manufacture and installation at the site.

The ITP shall include specific criteria for acceptance or rejection, including criteria for any non-destructive testing inspections. The ITP shall as a minimum:

- Indicate each inspection and test point and its relative location in the production cycle including incoming, packing and site inspections.
- Indicate where subcontractors' services shall be employed - e.g. subcontractor non- destructive testing (NDT) or heat treatment
- Identify the characteristics to be inspected, examined, and tested at each point and specify procedures and acceptance criteria to be used, and the Standard from which these criteria have been quoted

The Contractor shall provide within the Quality Assurance Management Plan a Site Quality Control program including requirements for Site Quality Control surveillance.

The Quality Assurance Management Plan shall also refer to project specific procedures encompassing but not limited to:

- Compliance program for Applicable Permits and Applicable Laws
- Public relations program and procedures
- Emergency preparedness & contingency plans
- Environmental programs (e.g. waste containment)
- Hazardous material handling

**Reliability & Maintainability**

**Reliability**

The Plant shall be designed for high reliability of start-up and running at any time throughout the year and to operate reliably with no more than a single annual planned outage of individual generator sets one at a time for maintenance.

**Maintainability**

The Plant shall be designed and constructed to provide safe and efficient access to systems and equipment requiring regular maintenance and/or replacement during the Design Life to enable O&M staff to carry out their routine activities and withdraw/handle component items without the need to use additional temporary access equipment.

Facilities shall be included to enable mechanical, electrical and instrumentation equipment to be isolated and locked to allow safe access.

Permanently installed certified lifting and handling equipment, (or lifting beams as appropriate), shall be provided for all components weighing in excess of 25 kg that are dismantled and/or lifted during periods of maintenance. Lifting Beams are installed above each of the engine bays; the Contractor shall review the adequacy of these beams with respect to the maintenance requirements of the new engines. If the existing lifting beams are not adequate, an option price should be provided for their replacement.

A full and comprehensive set of O&M manuals shall be provided in accordance with the Documentation section of this Specification

**Contract Management, Programme & Progress Reporting**

**Contract Management**

The Contractor shall provide a project specific Project Execution Plan (PEP) outlining how it intends to execute this Project. The PEP shall explain how the major elements of the project including, project management and control, engineering design and technical coordination, procurement, manufacture, inspection, factory acceptance testing, construction, installation including pre-takeover testing, takeover testing and training are proposed to be undertaken to deliver the scope of the Works.

**Programme**

The Contractor shall supply a Level 2 critical path network programme for the Works, clearly identifying key interrelationships/dependencies and critical path/s.

All Programmes will be produced using Microsoft Project.

Within 4 weeks of contract award the Contractor shall provide the following additional level of programme information and detail to support the above milestone dates:

Detailed (Level 3) Programme with Associated Milestones

The programme shall show all design, engineering, procurement, mobilisation, construction and commissioning activities required for the orderly performance and completion of the work, for both Site and off-site activities. The programme shall show the inter-relationship of the availability of engineering drawings, equipment procurement and material delivery dates, award of sub- contracts, construction & commissioning activities etc.

Key milestones to include but not limited to the following:

- Commencement of design
- Completion of preliminary and detailed design
- Start on Site
- Factory Acceptance Tests (FATs)
- Dates of delivery of all items of major equipment
- Commencement and completion of construction and installation
- Commencement and completion of commissioning of all major plant items.
- Interfaces with Trust Existing Facilities
- Commencement of commissioning
- Take-Over and Acceptance tests
- Contract date for completion
- Times for Completion

Progress Reporting

The Contractor will be required to attend a fortnightly progress meeting with the Trust with every other meeting a formal monthly meeting.

In order to accommodate this requirement, the Contractor will be required to produce and submit for review and agreement an updated programme and monthly report five (5) Working Days prior to the monthly progress meeting.

The Contractor shall provide the following in support of the monthly progress report.

Progressed Programme and Supporting Information

The programme is to be progressed to the weekly progress meeting date with the following information shown against all activities:

- Actual / forecast start
- Actual / forecast finish
- Remaining duration
- Per cent complete
- Total float

The Critical-Path through the remainder of the Project shall be clearly shown. Updated / progressed Plant and Equipment / Materials Schedules shall be provided.

Written Weekly Progress Reports

Written reports shall be provided on a monthly basis recording the following pertinent information under the headings shown:

<u>General</u>

This section shall summarise the progress of the design, procurement, construction and commissioning. Attention shall be paid to highlight any critical activities, which may endanger the completion of the

Works or any sections by the due dates. Reasons for delay or potential delays shall be indicated together with recovery actions to be taken or planned.

This section shall also highlight all outstanding requests by the Contractor for drawings or other information required; identifying dates the information was first requested and the date the information or query is required to be provided with reference to the specific activity ID on the programme.

Safety

This section shall contain a summary of all activities / issues related to safety.

Quality Assurance

This section shall highlight important quality matters in general and the deviations from the Project Quality plan, inclusive of the status of non-compliances / corrective actions.

Design

This section shall describe the status of the design of those parts of the work for which the Contractor is responsible.

Procurement

This section shall describe the status of purchasing and delivery of all items, including equipment and bulk materials, and the placing of subcontracted work. The Contractor shall highlight items that require special attention, are affected by long delivery times and / or limited available float according to the programme.

Construction & Testing

This section shall describe in narrative format the construction, installation and testing performance. Deviations from plan shall be explained and corrective actions taken or proposed shall also be detailed.

Programme & Progress

This section shall contain an Overall Project Level 2 Programme rolled up from the Level 3 programme including but not limited to the key Project milestones. This programme shall show the logical sequence and relationships between the various Project phases. (I.e. design, procurement, construction, installation, commissioning & performance tests)

Variations

A listing of the events the Contractor considers will / may result in a Variation to the Contract Price and / or for Extension to any date or period specified in the Contract.

The report shall provide the following information:

- Number of Variations and initiator
- Short description of each Variation
- Estimated or agreed value or expense of each Variation
- Effect of Variation on the Approved Programme

Early Warning Issues

Details shall be highlighted of early warning of events that may affect project cost or progress identified by the Contractor.

**Security**

**Security During Construction**

A register shall be maintained to record the names of all personnel present on Site at all times. Each of the Contractors employees or subcontractor's working on/visiting the Site shall be identified as being employed by or responsible to the Contractor by displaying Site specific identification.

The Contractor, the Contractor's subcontractors and their employees shall comply with the requirements of the Trust as regards entry to and exit from the Site. No vehicles shall be allowed onto the Site except those carrying materials or equipment necessary for execution of the Works unless authorised by the Trust

**Pre-Commissioning & Commissioning**

**General**

The Contractor shall be responsible for performing all mechanical, electrical testing and process functional testing of the Plant to demonstrate compliance with the design basis prior to any commissioning or performance testing. These tests shall include but are not limited to; verification and checking of all protection settings and checking of all Plant safety related trip settings in readiness for commissioning.

Pre-Commissioning & Commissioning Quality Plan

The Contractor shall produce a Quality Plan to detail all pre-commissioning and commissioning test requirements of the Works. Fully detailed written commissioning procedures shall be produced for all pre and commissioning activities and tests procedures shall include, but not be limited to: marked-up P&IDs, wiring diagrams showing valve positions (open or closed), the planned sequence of operations with valve numbers and location of temporary strainers, fittings and pipe runs to safely enable commissioning to start.

The Contractor shall be responsible for carrying out all the commissioning work associated with bringing the Plant to a condition where it is ready to undergo performance testing.

Pressure Testing

All pressure related systems & equipment shall be installed in compliance with the Pressure Equipment Directive (PED). Where Plant components form part of a system, each item of equipment comprising that system shall be similarly inspected and tested prior to placing the system into live duty. Static tests to demonstrate interactive operation of components within the system shall also be completed prior to energizing any system for the first time.

Hydrostatic Testing

Test pressures shall be in accordance with the applicable BS, EN or ISO standard. If none are specified then the test pressure shall be 1.5 times the design pressure, but not less than 3.5barg.

Pneumatic Testing

The Contractor may propose pneumatic testing only in exceptional cases where hydraulic testing is impractical. Pneumatic or gas leak testing supplementary to hydrostatic testing shall be applied in appropriate cases where specified by the applicable BS, EN or ISO standard.

Alignment of Rotating Equipment

Alignment of coupled equipment (e.g. pumps and motors) shall be in accordance with the requirements of the equipment manufactures installation standards.

**Pre-Commissioning Tests**

Pre-commissioning test activities shall comply with the Pre-Commissioning Quality Plan, Procedures and Programme to include, but not be limited to:

Mechanical & Electrical Equipment

The following checks and test measurements shall be made prior to commissioning to demonstrate compliance with applicable BS, EN or ISO standards:

- Screwed connections for correct assembly
- Terminals and terminal connections for correct assembly

- Earthing connections for correct resistances
- Measurement of insulation values
- Marking, inscription, provision of designation nameplates/tags
- Rotating field measurement
- Voltage regulation and current checks
- Polarity check of DC voltages
- Phase rotational check of three phase AC voltages
- Voltage regulation at load centres and final consumer busbars
- Fuses, over-current trips, short circuit trips, time settings, relay settings;
- Safety signs and warning signs
- Setting indicators and feedback signals to the central control room etc.
- Wiring and cabling for conformity with as-design circuit drawings
- Functional tests of M & E equipment
- Tests of earthing, insulation and lightning protection systems
- Tests of lighting systems

ICA Equipment

During the erection and commissioning period all instrumentation, control and automation equipment shall be tested. Packaged Plant units which have been satisfactorily FAT tested may be exempt, subject to the Engineers written agreement. Tests shall include but not be limited to calibration, functional tests and on-line pre-commissioning: -

- Calibration tests of analogue measuring loops including all remote indications, recorders and the input signals used for closed loop control
- Testing of all binary transmitters by actuating the Plant-mounted transmitter. Those which cannot be actuated at the primary element shall be simulated as close as possible to their respective sensor
- Wiring test of all control cabling in the field, relay and control rooms
- Functional control testing of remote drives, circuit breakers, solenoid valves & actuators
- Testing of all interlocks to ensure safe operation
- Testing of the alarm annunciation and event recorder system in the field & control room
- Testing control of all closed loops
- Testing of insulation between cable screen and ground.

**Commissioning Tests**

Commissioning test activities shall comply with the Commissioning Quality Plan, Procedures and Programme.

Once any system or item of equipment is energized or otherwise made live, the Contractor shall conduct tests to demonstrate that the system and its constituent components function safely, collectively as designed, that individual components operate at varying loads under steady state conditions within their stated operating parameters, and that all related systems/component items respond correctly to transient conditions. Control systems and dynamic responses shall be optimised to anticipated load changes and transient conditions. The Contractor shall undertake adjustments necessary to achieve the optimal level of Plant reliability, capacity and performance. The final configuration of the instruments, control and monitoring systems is to be made available in both hardcopy and softcopy to the Engineer. All operational data including vibration, temperature, voltage, current, pressure etc. shall be recorded for all systems and equipment.

Commissioning shall include, but not be limited to: -

- Tests on individual items or sub-units for correct operation including setting of limits, operating points, sequence of operation etc.
- Tests and required adjustments on the units, auxiliaries and ancillary systems to verify correct functioning and performance

- Tests (and adjustments as required) to prove the correct functioning and operation of all fire and safety systems and respective controls
- Unit running tests to verify starting reliability and state of tune over the full range of loads
- The plant shall reach steady state condition at maximum output during testing

The Contractor shall provide all necessary equipment, (including labour, materials, stores, chemicals, instruments and any temporary equipment), as required to complete the tests.

If any portion of a Plant fails to pass its Commissioning Tests, the tests shall be repeated as necessary until the test is passed. If the deviation is not of material importance, then the commissioning may continue with the agreement of the Trust.

The Contractor shall prepare, maintain and update a list of all items which are incomplete or defective which require remedial action by the Contractor and four copies shall be submitted to the Engineer on a weekly basis. The nonconforming portion shall then be remedied and re-scheduled for testing at a later date with the agreement of the Trust.

General

The Contractor shall demonstrate the correct functioning of the Plant in accordance with the agreed Commissioning Procedures. On completion of each commissioning activity the commissioning schedule shall be signed and dated by the Contractor. The Trust shall counter-sign the commissioning schedule to confirm the witnessed tests.

**Performance Tests**

The Contractor shall demonstrate during the commissioning period in conjunction with The Trust operations that the Plant performs fully in accordance with the performance guarantees by using the installed instruments supplemented as necessary by test instrumentation. The pass / fail criteria for each discrete system shall be documented and agreed in advance of performance testing.

The contractor will provide 2 weeks' notice prior to any performance tests being undertaken

The Trust reserves the right to employ a third party to measure and assess the Plant performance.

Test Failure

In the event of the results not meeting the performance guarantee, the Contractor will be permitted to modify the Plant at his own expense and to repeat second test at a time to suit The Trust. If this second test is unsuccessful, the agreed payments may be withheld.

If the operation of the Plant is not as required, then the contractor is to make available all necessary skilled staff to resolve the issues to ensure the operation of the Trust is not compromised.

If after repeated attempts to rectify the plant, it still fails to meet the performance guarantee then The Trust shall at his discretion reject the Plant and seek damages.

**Training**

The Contractor shall train the Trusts Personnel in the operation and maintenance of all systems and equipment designed, procured and installed for the complete Plant. At the end of the training the operation and maintenance personnel shall be capable of: -

- safe and economic operation of the Plant and all auxiliary facilities
- undertaking all regular daily and weekly maintenance routines correctly
- perform all minor fault-finding activities correctly

The Contractor shall provide all operations and maintenance training necessary to instruct the Trusts O&M Contractor staff on the safe, reliable, and efficient operation of the Works.

Classroom training and on-site training will be required as part of the contract, to ensure operating and maintenance competence of relevant Trust staff.

The Contractor shall ensure that Plant operators receive sufficient familiarisation and training to ensure the correct operation of the plant; allowance for this training shall be identified within the tender and confirm training format and time requirements.

**Documentation**

**Extent of Documentation**

The Contractor shall be responsible for the preparation and issue of documentation including but not limited to:

- Design drawings and related specifications.
- Project procedures including co-ordinating procedure.
- Equipment lists
- Piping and valve standards and schedules
- Electrical and instrument schedules
- Electrical Installation Certificates as per BS7671 requirements.
- Detailed specifications for equipment and materials including equipment sizing
- Calculations and protection studies
- Sub-contract packages
- Certification of all pressure systems, cranes and lifting equipment, where applicable in accordance with specified standards and regulations
- Expediting and inspection reports.
- Material audits.
- Project photographs
- Quality assurance plans
- Procedures and audits
- Quality reports
- Progress reporting
- Operation and maintenance manuals
- As- built drawings
- Single line diagrams
- Commissioning procedures
- Acceptance test procedures
- Acceptance test records
- Equipment commissioning records
- Equipment system safety test results and records.
- Project dossier (lifetime records).
- Project close-out report.

Documentation for Information

The Contractor shall submit to the Trust within four (4) weeks of the Commencement Date a preliminary list of Documentation they intend to produce in executing the Works for the information, i.e. the list of “Documentation for Information”.

Final Documentation

The Contractor shall supply three hard copies of all Final Documentation and two electronic copies in a current Microsoft format on CD-ROM. The Contractor shall provide Final Documentation, which shall include but not be limited to the following:

Engineering Drawings

Complete as-built drawings for the Plant:

- fabrication drawings, material and welding specifications
- material schedules including all maintenance consumables
- general arrangement drawings
- civil and building drawings, including loadings

Drawings shall be scaled and provided on a standard paper size from A0 to A4. All project specific drawings produced by the Contractor shall have a standard drawing title block clearly indicating the revision. Drawings shall be numbered and carry KKS numbers or a system to cross-reference drawings to Plant tag numbers.

Diagrams, Lists and Charts

All diagrams, lists and charts shall have a standard drawing title block and shall not exceed A3 size; however the length may be extended according to actual requirements. A table of contents shall be provided to identify the revision status of the individual sheets, drawings and their distribution. All diagrams and lists shall be provided with cross references, including those from sub-contractors and be provided with complete cross references to their corresponding connected outputs/inputs found on another sheet (signal no. and sheet no.).

Control Valve Data Sheets

All control valves shall be provided with standard data sheets identifying type of valve; manufacturer; flow media; and valve characteristics.

Instrument List

The Instrument List shall contain all primary sensors, instruments and signal processing equipment in the Plant including, but not limited to: -

- local measurements
- remote measurements
- binary transmitters
- limit switches
- test measuring points

Each item in the Instrument List shall have a designation according to the KKS classification system, descriptive text and all necessary design data, measuring ranges, units, settings, displays, manufacturer, type etc. The design data entered in the list shall enable procurement of the sensors if necessary. The Instrument List shall also contain all limit switch and trip settings recorded from the testing and commissioning of the Works.

Logic Diagrams

Logic Diagrams shall contain a representation of remote and logic controls and interlocking circuits for BMS, ESD, drive control and for all logic controls of vendor package units. The representation shall allow a clear understanding of the logic for all personnel. For complex logic circuits a narrative description of the working principles shall also be included. The specified order of automatic operating and time intervals between successive operations shall be taken into account. Binary logic elements (shall be used for processing and combining binary signals. The symbols used shall be in accordance with IEC 60617. All symbols shall be clearly explained in the diagram and/or in an attached legend.

Single-Line Diagrams

Single-Line Diagrams shall be a simplified diagram of the essential electrical equipment and their connections. All circuits shall be represented by a single line only.

Single-line diagrams shall be drawn in a way which is easy to survey and shall contain as far as possible all technical information of the equipment represented.

Installation Diagrams

Installation Diagrams shall represent the routing of cables and the position of associated equipment according to their correct position in the building plan or arrangement drawing.

Terminal Connection Diagrams

Terminal connection diagrams shall represent terminal boxes, marshalling racks, switchboards, etc. and shall show the terminals and/or terminal strips properly numbered in relation to the incoming and outgoing power and control cables.

Wiring Diagrams

Wiring diagrams shall contain all connections within one apparatus (cubicle, etc.) including all terminal numbers to be connected, the wire code and size and the bundle code.

Cable Schedules

Cable schedules shall contain all required information for the design, erection and routing of all power, communication and control cables and bus ducts. HV and LV power cables shall be listed in a general schedule containing the following information:

- all types of cable used;
- cross-section of all cables and number of cores; and
- outer diameter of all cables

Diagrams shall be produced showing routing of cable racks and trays at different elevations, suitably sectionalised and numbered.

In addition, cable lists shall be provided for all power and control cables containing at least the following information:

- cable designation
- cable routing
- type of cable, cross section and number of cores cable length.

Electrical Consumer List

The electrical consumer list shall include but not be limited to:

- motors
- valve, actuators
- solenoid valves
- motorised set-point adjusters
- adjusting devices (gear units, rotor blades)
- circuit breakers in the electrical auxiliaries Plant
- heating elements including trace and frost protection heating
- lighting.

The list shall include a column indicating consumer status - normally operational (energised) or is standby (de-energised), the rated load and normal operating load at Design Thermal Input for each piece of equipment.

Terminal Diagrams

Terminal diagrams shall contain all connections for the terminal strips of each cubicle on both sides (incoming/outgoing) of the terminals, including the codes of wires and cables and their sizes.

Parts List and Spare Parts Manual

The parts list shall contain all equipment, material and accessories installed in the respective parts of the Plant and requiring maintenance. Spare part manuals provided shall contain information of part numbers and exploded diagrams necessary for understanding assembly/disassembly and ordering purposes.

Operating and Maintenance Manuals

Prior to Taking Over of the Plant, the Contractor will produce the draft operation & maintenance manuals. The manuals shall be in the form of a loose-leaf A4 folder and shall be bound in such a way that a whole drawing can be unfolded for viewing.

The Operating and Maintenance Manuals shall be written specifically for the Works. Operating instructions, fault and diagnostic guides, cleaning operations, lubrication and maintenance tasks shall all be purpose written. The Operation and Maintenance Manuals shall include the identification of specific process conditions and maintenance tasks that are critical to the achievement of the Design Life and the Availability criteria.

Three (3) sets of the final and approved edition of the manuals written in English shall be provided within 3 months of the successful Performance Test. The final Manuals shall have a clear indexing system and shall also be issued electronically on a CD-ROM in pdf format. The O&M Manuals shall include but not be limited to:

- Operations
- Brief general description of the Plant.
- Brief description of the use of the Plant including the operational and control philosophy for each section
- Definition of technical terms and abbreviations
- Specification of each item of equipment, accessories and components including a list stating; clearances, tolerances, materials, ratings, characteristic curves, etc.
- Description of the technical operating basis of the Plant and equipment items, including flow sheets, diagrams, circuit diagrams, piping diagrams, etc.
- Operating instructions containing the sequence of individual manipulations required for operation of each item of the Plant.
- Suitable for instructing new personnel in the operation of the Plant and its equipment.
- Testing and adjustment procedures for the Plant or equipment, to be undertaken after overhauls and during operation
- List of settings of controllers and interlocks of equipment
- Mechanical, Electrical and I&C Equipment
- Introduction
- Detailed description
- Detailed services and maintenance instructions
- Introduction on the philosophy of equipment design
- Preventive maintenance, to indicate the inspection required at regular intervals, the inspection procedures, the routine cleaning and lubricating procedures, the regular safety checks (all tolerances, shop data and alignment details shall be included).
- Tabulated faults diagnosis/symptoms and remedial actions to be taken
- Repair and adjustments: visual inspection, the test points measurements, fitting and dismantling process, calibration of parts and final re-commissioning procedures
- Spare and wear parts lists containing all necessary data for procuring spares, including title, spare/original part number, order number, material specification, and exploded view diagrams of the equipment and component parts.
- Cross reference list of approved manufacturers lubricants
- Material specification for packings, seals and gaskets
- List of special tools
- Testing and adjustment
- Drawings
- Sectional drawings
- Assembly drawings, including exploded views.

- As-built drawings.

Certificates and Documentation

The Contractor shall provide the following certification information:

- All certification required by Legislation including but not limited to fire certificates, Environmental Agency certification, etc.
- Service/utility connection approvals with respective providers including limits of use for water, telecoms, electricity, gas etc.
- Certification from the inspection and testing of all pressure vessels, ATEX compliant equipment, etc., to demonstrate compliance testing in accordance with Legislation.
- All documentation for compliance with COSHH requirements.