

2

Methodology and approach for developing the feasibility study



2.1 Methodology and approach for developing the feasibility study

To support TfL in delivering this time critical programme, we have teamed with supply chain partners FM Conway (FMC) and Henderson Thomas Associates (HTA). Together, we bring unparalleled knowledge of the Brent Cross structures and the London network through recent and ongoing commissions including the TfL Surface Transport Infrastructure Construction Framework (STIC) and the London Highways Alliance (LoHAC). We are fully familiar with TfL requirements and the constraints of working on these structures. This will enable us to hit the ground running and crucially de-risk the delivery programme.

Our wider team, delivering the array of deliverables that will inform the Options Assessment Report (OAR) have been selected for their knowledge and expertise within their respective subject matters. To ensure a Best Athlete approach, a project specific skills matrix was adopted to inform our team selection process. Refer Appendix A for an illustration of the teams depth of knowledge.

Supply Chain Management: *integrated working with our supply chain and management of H&S performance to drive continuous improvement*

Our Project Manager, [REDACTED] will work with our partners to ensure their role and influence on delivery is understood through our early team induction into the Contract Quality Plan and expectations for collaborative behaviours. He will ensure we all have a clear focus on the critical task delivery required to achieve the overall programme.

Arcadis utilise the Source Dogg procurement platform that streamlines onboarding and tendering processes. This clear and transparent platform allows us to effectively manage and monitor suppliers to ensure that commitments are achieved, and client requirements are supported. As well as being LRQA certified, Arcadis are Achilles UVDB certified and the onboarding process was developed in accordance with their criteria. This streamlines the entire process, avoiding programme delays in procurement, and ensures consistent high-quality monitoring of our partners, which de-risks the delivery. Both FMC and HTA are already onboarded and monitored which provides added value through risk reduction and time saved by not having to enter an unfamiliar process.

Our strategic procurement team develop and manage supplier processes and ensure that documentation such as our UK procurement policy and Supplier Code of Conduct are adhered to. The team are members of the Chartered Institute of Procurement and Supply (CIPS).

To maximise the benefits to TfL of co-creation and collaboration, we treat our supply chain as we would our own people. We share, and expect them to contribute to, continuous improvement and lessons learned and involve them in innovative solution development. Founded on this methodology, we have built a successful working relationship with both FMC and HTA over a number of years working collaboratively on numerous projects together.

Arcadis has a dedicated SHEQ group that focuses on continual review of H&S aspects and performance of our suppliers. To become an 'Approved' supplier Arcadis require copies of H&S documentation and certifications and we monitor and evaluate compliance. We ensure that both organisational capability and suitable individuals are evaluated for each project to deliver high quality services with exemplar H&S standards, including: reviewing the CVs and relevant certification for staff engaged on our projects; reviewing performance records from past projects and; interviewing for senior or leadership roles.

CONTINUOUS IMPROVEMENT: Our IOSH and NEBOSH accredited HSE Manager, [REDACTED] will schedule supplier performance reviews quarterly with 360 review and feedback sessions every 6 months in accordance with the requirements of our SHEQ standards (ISO's 9001, 14001, 45001). Arcadis use a bespoke SHEQ and Integrated Observation Reporting (IOR) tool to capture and store this data. The IOR allows findings to be reviewed and improvement actions to be implemented.

EVIDENCE: *Rochester Bridge Refurbishment, 2020*

Our SHEQ / CDM specialist undertook regular audits of the works by FMC to ensure compliance with the H&S plans and supported the on-site PM and Supervisor team. The progressive learning and actions taken ensured the 90,000+ man hour contract was completed without any lost time incidents.

Our understanding of the Scope requirements:
We have an in-depth understanding of the Brent Cross structures and a wealth of asset management experience

The Feasibility Study is to inform and provide TfL with data to allow decisions through the Pathway Stage 2 - Option Selection and to inform the business case submission for external funding for the succeeding Pathway Stages including construction. We have a detailed understanding of TfL's strategic priorities, challenges and Pathway processes, this enabled a detailed review of the scope requirements, ensuring we developed a delivery model and feasibility programme to meet TfL objectives which will deliver value add project outcomes that are achievable and realistic.

EVIDENCE: Rotherhithe-Canary Wharf footbridge feasibility and options study, 2018

This study was delivered by a fully integrated TfL, Arcadis and subconsultant team. We considered a range of constraints and options, with critical challenge workshops to deliver reports that informed TfL prior to selection of a preferred option for public consultations.

Drawing on our long history of working with TfL, FMC's eight years' experience of LoHAC delivering works in Brent Cross, and HTA's experience investigating the structures dating back to the 90s, we have reviewed the scope and existing data provided to understand the condition and constraints of the structures. This enabled us to devise an effective investigation and access plan that will capture all necessary data to inform assessment and options studies whilst minimising disruption to the network. Examples of our knowledge of the structures include;

- Partial PTSI only required for the A41 Brent Cross flyover to look at anchorages
- Full PTSI of the A5 fly under required
- Substandard parapets generally, particular concern on the A41 flyover, mid level structures and slips
- A41 Brent Cross flyover piers fail in collision loading and have inadequate protection
- General concrete deterioration, spalling and corrosion, particularly the A41 Flyover, mid levels, slips, Brent Cross footbridge and Brent Cross Bridge

We have reviewed the scope requirements for assessment and optioneering, taking lessons learnt and best practice from delivering similar feasibility studies including the M32 Eastville Viaduct. This has given us an in-depth understanding of the level of effort required to complete the study successfully. We also understand how to provide evidence that the options have been fully assessed giving sufficient information to enable a single preferred option selection decision to be made based on accurate and well-informed data. Our teams are experienced in value management processes, with added value support available from our Senior Technical Director, [REDACTED] who managed the VM processes for Highways England in delivering a £40-50M annual portfolio of bridge asset maintenance renewals and upgrades in the Midlands.

In relation to achieving a short programme, we have also identified opportunities to deliver assessments and option development in parallel using dedicated teams, with a focus on Work Packages 1 and 4 that are on the critical path.

The scope requires options for maintenance and repair to ensure an improved condition and residual life for the 30 structures. We understand that TfL require a residual life of around 20 years for the structures, therefore investigations and options will be focused on this parameter.

EVIDENCE: Assessments and Feasibility Studies

Recently, Arcadis have undertaken and managed the assessment of over 50 bridge structures Assessments and Feasibility Studies in the UK, many with similar arrangements to the Brent Cross Structures.

Our methodology and approach to delivering the feasibility study: streamlined processes with dedicated resources and teams to meet TfL's challenging programme

In developing this proposal, our team held collaborative workshops with FMC and HTA to develop a streamlined methodology, as illustrated in Figure 2.1.1. Using our combined capabilities and knowledge on Brent Cross, we identified key challenges, constraints and critical path activities, and developed our methodology to mitigate risk and maximise efficiency. We developed a realistic and achievable programme that is focussed on delivering TfL's business case for funding application at the optimum timescale. The programme has

been significantly developed to ensure minimal modifications will be required following contract award.

To drive programme efficiency and minimise disruption to the network, a significant focus for our teams is to limit the investigations to only those absolutely required. We have developed a programme of investigations resulting in **64% being done 'off network'** significantly reducing the local impact while de-risking and compressing the programme. We have also developed phased traffic management, aligned with the Work Packages 1-7. This allows us to make efficient use of network closures by undertaking investigation work on multiple structures simultaneously, as detailed in Appendix C.

To deliver assessments and develop options efficiently, we have allowed for overlapping tasks and allocated dedicated teams to work in parallel to minimise the timescale. To take advantage of a potential lull period whilst waiting for statutory approvals for road closures, we have assumed AIPs and assessments of structures can commence before the inspections have been completed. Inspection results can then be fed into the assessment process when available.

Figure 2.1.1 Streamlined Methodology

EVIDENCE: Dargan Bridge CAT III Check, 2020-21

We undertook the assessment check work on this multi-span post-tensioned rail viaduct before the PTSI results were available to ensure we met critical programme constraints. It was agreed with the client that the PTSI results would be fed into the assessment when they became available.

The structures have been split into Work Packages in line with those shown in Appendix A of the ITT and we have allocated **four dedicated teams to work in parallel** to maximise programme efficiency, share learning and drive continuous improvements.

Upon contract award, we will work closely with your Project Manager and Project Sponsor to validate our methodology and programme. We will engage with key stakeholders early, including TfL internal stakeholders, and refine our approach and delivery plan, ensuring we incorporate all local knowledge and minimise disruption to the network and stakeholders. Upfront work we have undertaken during the tender stage will allow us to hit the ground running from day one.

Stage 2 – Option Selection / Feasibility Design

Feedback / Lessons Learn / Continuous Improvement

Desk study and data review: in-depth understanding of the structures and BridgeStation to support data review, coupled with comprehensive Structure Review Plus process to identify opportunities to reduce investigation scope

During the initial desktop data review stage, our integrated team, who are fully conversant with BridgeStation, will undertake detailed reviews of existing asset data to complete a focussed gap analysis. We will benchmark our findings against the Pathway Stage 1 outputs using our knowledge of the Brent Cross structures and experience on similar investigation works. This will enable us to identify critical areas of focus rapidly.

EVIDENCE: M32 Eastville Viaduct Value Management, 2021

We undertook a desk study and data review for the 3.3km viaduct which included 15 separate structures. This was recorded in a bespoke tracker and output was captured in a comprehensive presentation, both of which were very well received by our client, Highways England. We will draw on this experience and look to further improve this process for the Brent Cross project.

Our Structures Engineering Lead, [REDACTED] (CV2) will be the controlling mind and responsible for overseeing progress, quality and consistency. [REDACTED] will create a tracker to monitor progress, comprising of the documents reviewed along with the key findings. This will be a live document accessible by the integrated team, including TfL, so that progress can be evaluated in real time. This will give TfL visibility, confidence and the opportunity for continuous feedback.

We will verify the extent of information available on BridgeStation combined with early site visits and off network visual inspections. We have records of the condition of the Brent Cross structures from works carried out over recent years, and historic knowledge dating back to the 90s. This will ensure we undertake a comprehensive desk study capturing all available data. It will help identify value management opportunities and streamline the scope of investigation without impacting outcomes.

Our four dedicated teams will undertake the gap analysis in parallel, reviewing the structures in line with Work Packages, and ensuring critical structures such as the post-tensioned Brent Cross Flyover and

A5 Flyunder are reviewed early to identify critical path activities. We will apply a risk-based approach to site investigations through our comprehensive **Structure Review Plus** process. Reserve Factors on key elements within each structure will be determined and referenced against current condition. This may give the opportunity to reduce investigations due to high reserve factors.

At this stage we would undertake a comprehensive point cloud survey and develop the CS451 Structural reviews and asbestos desk studies.

Stakeholder engagement will commence early and continue throughout the project. Our Stakeholder Lead, [REDACTED] will arrange initial introductory bilateral or shared meetings to set the context. To ensure we fully consider and minimise the impact of the works to improve social value of the scheme, [REDACTED] will agree a programme of regular engagement which will then be taken forward by the technical leads. Key stakeholders and their categorisations are shown in the Stakeholder Mapping in Appendix B. Engaging 'Delivery' stakeholders, such as local authorities, Highways England and TfL internal stakeholders is important to ensure understanding of their issues and to supplement the data being reviewed, focusing the investigations and informing options development. 'Impact' stakeholders will be engaged to inform them of the project, its significance and programme, and to understand and mitigate the impact (if any) upon their activities.

Identification of investigations required: prioritise investigation needs to minimise duplication and better programme

Our Structures and Highways Engineering Leads will work closely with our Investigation Lead to assess appropriate inspection and testing options and develop the Inspection and Test Plan (ITP) for each structure, containing a detailed investigation scope, for agreement with TfL. This will be focused to ensure that investigations add real value and avoid duplication of work. Environmental and ecology surveys (and other necessary surveys) will also be identified, discussed and agreed with TfL.

We will use previous principal inspections and materials reports to highlight the critical elements and derive where further investigations will be of benefit. We will work with TfL to agree categories of investigations, initially proposed under three priorities: High (essential), Medium (nice to have) and Low (non-

essential). Investigations in the High category will be included in the investigation scope, with those in the Medium category to be discussed collaboratively with TfL to agree our approach.

All recommendations will be subject to our mandatory Independent Technical Challenge review process, led by [REDACTED] to ensure our proposals meet the scope and represent best practice. [REDACTED] is also our Concrete Specialist who has over 30 years of experience in managing similar assets. Within the first four weeks a workshop will be held with TfL to present and agree the appropriate scope of further investigations.

EVIDENCE: Westway PTSI, 2021

FMC and HTA undertook the PTSI on Westway Flyover covering over 30 structures on the A40. The Pundit Live Array was used during the PTSI, which uses ultra-sonic wave technology to detect features (targets) embedded within concrete such as voids and material thickness. This technique provided greater accuracy in identifying the areas of greatest potential for defects, reducing the number of break outs required on the structure, minimising time on site and delivering programme efficiencies.

The stakeholder engagement process will continue throughout this stage. Regular engagement and communications will keep stakeholders informed of progress and reassured of minimal disruption. Our Public Liaison Officer will handle communications and engagement with the local community, businesses, places of worship etc. prior to and during the site investigations in accordance with TfL's requirements and approval. Should any stakeholder issues arise, [REDACTED] will manage any conflict resolution or objection management, working with TfL to ensure a mutually satisfactory resolution. The Stakeholder Engagement Tracker will be regularly updated to record all contacts made, issues, risks and actions arising. This will be made available to TfL.

How we will ensure a comprehensive assessment of the condition of the structures: innovative techniques to enable effective on-site communication and drive efficiency

Our Structures Engineering Lead, [REDACTED], has extensive experience in the planning and execution of investigation works and will work with our investigations lead [REDACTED] and the wider team to oversee the planning and execution of all

investigation works including PTSIs. We will deploy mandatory on-site quality checks to ensure all required information is collected, eliminating the risk of revisiting site unnecessarily.

Our qualified site engineers/inspectors will be empowered to manage any issues raised during investigations. To allow effective communication and swift decision-making, we will use the innovative Realwear HMT-1 headset to allow for remote hands-free collaboration. The headset can show real-time video of the site in Microsoft Teams, allowing our experts to 'virtually' visit site at anytime.

Innovative investigation techniques will also be adopted to minimise structural intrusion. Our inspection specialists, HTA are industry leaders in undertaking investigations including the use of the innovative Pundit Live Array for PTSI surveys. We will use the Pundit Live Array technique to reduce intrusive survey work required for PTSI's, resulting in significant cost and programme savings.

CONTINUOUS IMPROVEMENT: All deliverables must satisfy our Produce, Check, Review and Approve (PCRA) process. The PCRA process requires progressive technical challenge and review and ultimately approval by competent technical directors with demonstrable relevant experience. The final approval stage is only closed out when evidence-based checking of deliverables confirms these are not only technically compliant but fulfil objectives of the client's brief.

Options development and assessment process: close collaboration with TfL to develop and sift options, with Construction and Buildability Management inputs to ensure options selection considers all relevant life cycle aspects

To ensure we deliver assessments and options meeting TfL's needs and objectives, we will engage with your Project Sponsor and Project Manager to agree assumptions, requirements and fundamentals including:

- The validity of the existing data whether from BridgeStation historic records or new investigations.
- Performance criteria requirements including maintenance strategy.
- The basis for assessment and option ranking.
- Acceptable programme, cost and risk profiles.
- Key stakeholder constraints and issues.

Based on existing data, Pathway Stage 1 outputs, and investigation results, we will develop a matrix clearly indicating technical and structural issues for each structure and include site constraints and stakeholder concerns gathered. We will facilitate collaborative planning workshops involving TfL to agree assessment assumptions and requirements, setting the baseline for options development.

Our Project Manager, [REDACTED] will lead the inter-disciplinary coordination workshops, programmed to ensure constraints and dependencies are reviewed continuously. This will ensure that changes in project information and assumptions are properly captured and can be managed across the whole project team. The workshops will ensure effective communication of new information and enable dissemination of information on the development of technical requirements from discipline specialists.

We will apply a sift process with agreed criteria to inform technical and value management workshops with TfL to review and rank options. Option evaluation and the sifting process will be a collaborative effort and we will work with your Project Sponsor and internal teams to assess and rank options. The workshops will also involve our Construction and Buildability Management Lead, [REDACTED] who has extensive experience in managing and delivering structures schemes on Brent Cross and similar structures. He will provide expert advice, discounting 'non-starter' ideas early and ensuring all options are feasible for delivery. Where possible, key stakeholders will be either invited to the workshops or consulted to ensure their views are considered.

This process is designed to provide an evidence-based audit trail that narrates the history of the options development whilst also de-risking the programme. Criteria will be established in the integrated delivery team which will reflect the constraints, dependencies, risks and opportunities identified, the project objectives, and the stakeholder impacts and opportunities. Crucially, it is also a time-efficient process, that will enable delivery of the required programme.

Our PM will be supported by the technical leads, SHEQ/environmental and cost team leads to undertake the principal reviews for options development. He will lead the presentation of information to TfL at workshops.

This process will result in a feasibility and options report for each structure in line with TfL guidance SQA-2022. Upon TfL agreement of the reports a single summary

report will be prepared and issued.

We will also prepare an Options Assessment Report (OAR) in line with DfT requirements to support the business case for funding. Arcadis have significant experience in the preparation of these reports, recently preparing OARs for over 25 structures on the Lower Thames Crossing project.

All deliverables will be reviewed and challenged through our PCRA and ITC processes.

EVIDENCE: M32 Eastville Viaduct Value Management, 2021

We facilitated cross-discipline technical workshops with key stakeholders (including Highways England OD, SES and maintainers), to collectively agree options, reducing customer impact through repair phasing and whole-lifecycle implications.

Value engineering proposals (added value)

In our Tender stage risk and opportunities review, we identified the following areas where value engineering could give real benefits:

- We understand that TfL's strategic goal is to ensure longevity for only the next 20 years. There may be the opportunity to screen out some structures from further work or optioneering as they are deemed low risk or to have 20 years+ residual life. This will be achieved using our Structural Reviews Plus approach.
- Using our specialist cost and carbon consultant teams, we would use the Whole Life Cycle approach to identify opportunities for asset upgrades that provide cost and carbon efficient capital and maintenance value without significant capital investment such as lighting and Technology upgrades.
- We will explore the possibility of creating Smart Assets for the future management of the assets that will provide remote data and also reduce the traffic management that will be used on the structures to support inspections over the next 20 years, i.e. implementation of structural health monitoring.

We believe the team we can offer TfL for this opportunity has the correct mindset, in-depth experience and approach to ensure best value, on-time delivery, and deliverables that TfL can rely on - enabling the fixed programme for TfL's further funding submissions to be achieved.

A nighttime photograph of a construction site on a wet road. In the foreground, a large orange and white traffic cone stands on the right. The road is wet and reflects the lights. A line of traffic cones runs down the center of the road, leading towards a construction area. In the background, there are blurred light trails from moving vehicles, including a red car and a white truck. A modern building with large windows is visible on the right side of the road. The overall scene is illuminated by streetlights and the headlights of vehicles.

3

**Approach to providing
safe access, obtaining
permits and minimising
traffic management**

3.1 Planning, securing road space and access and obtaining stakeholder buy-in

Our solution builds on FM Conway’s eight years’ experience of devising access solutions and booking road space on the Transport for London Road Network (TLRN) in the North West through the London Highways Alliance (LoHAC). This provides us with a detailed understanding of local traffic conditions, network sensitivity, permitting procedures, and existing relationships with key stakeholders. Having worked extensively on the structures at Brent Cross, we have an unparalleled understanding of the site itself and will bring lessons learnt from working with TfL buses and the London Boroughs of Brent and Barnet to drive proactive engagement with key stakeholders, secure buy-in and expedite the approval of access arrangements and traffic management (TM).

Planning access and securing road space:

Robust process built on a detailed understanding of the network, procedures, and stakeholder relationships

At tender stage, our integrated team including Arcadis’ structural engineers, FM Conway’s specialist Structures and TM teams, and structural investigation specialists Henderson Thomas Associates (HTA), has held collaborative planning workshops to plan access using the following hierarchy:

- **Confirming the investigations** required to achieve the objectives of the feasibility study.
- **Carrying out investigations off-network** by optimising the location of intrusive sampling and using innovative access solutions.

- **Using existing closures** by reviewing TfL’s North maintenance provider Tarmac/Kier’s (TKJV) block closures to leverage existing planned road space.
- **Minimising the number of lane closures** by grouping investigations based on the section of network and optimising the length of lane closures, so that multiple inspections and multiple structures can be completed under each TM setup.
- **Reducing the overall programme duration** by balancing the number of inspections required to provide sufficient detail for the feasibility study with the potential impact on the network and key stakeholders.
- **Further minimising stakeholder impact and network disruption** by drawing upon existing knowledge of the network to position lane closures at locations that prevent or minimise diversions, including preventing impacts to the M1 which will eliminate Highways England approval risk.

Our approach to TM and access reflects our understanding of what arrangements (length of lane closure, works duration and timing) will likely be accepted by TfL’s Coordination and Permitting team (CaP) and diversion routes previously agreed with Brent and Barnet Councils. We have also used our experience of liaising with London Buses to incorporate an extended period within our programme for proactive engagement to ensure timely approvals. Upon contract award, we will build on our detailed tender stage proposals in collaboration with TfL and key stakeholders to secure road space following the process in Figure 3.1.1 for each group of inspections to ensure we minimise disruption.

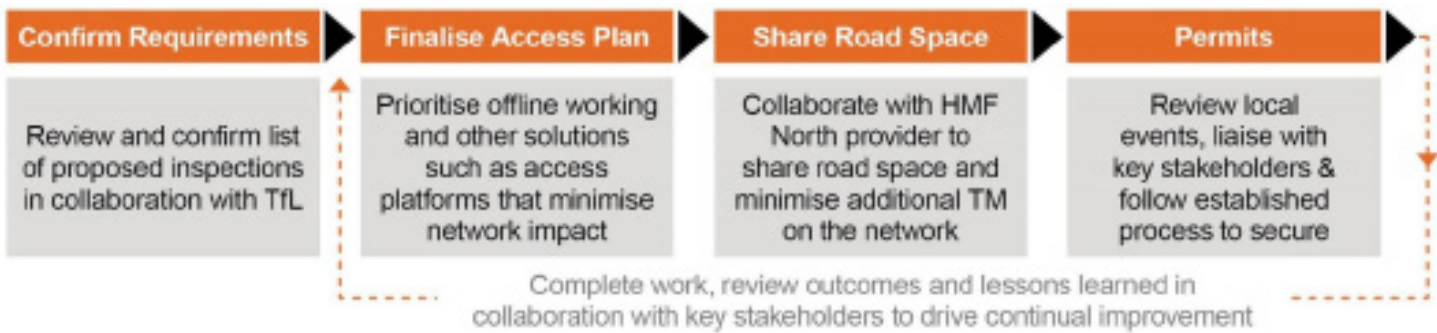


Figure 3.1.1 Collaborate with TfL and key stakeholders to plan and secure road space and access

Access proposals: Optimised TM phasing to minimise network disruption

We have reviewed the scope requirements during tender stage and developed our access proposals as detailed in **Appendix C**. To minimise disruption to the network and maximise programme efficiency, our approach uses off network access where possible to reduce lane closures and the requirement for booking road space. Our collaborative planning has enabled us to devise detailed access plans with **64% of our shifts to be completed off network** with no road space requirements, and no impact on traffic or local stakeholders. We anticipate only two temporary traffic regulation orders (TTROs) will be required - for the closure of the mid-levels north bridge and the mid-levels south bridge; these works will be completed in just two shifts.

The majority of underside investigations will be accessed using spider mobile elevated working platforms (MEWP) from verge areas. Having used these before on the Brent Cross structures, we know that they are particularly suitable as they can be tracked along footpaths to areas otherwise inaccessible by plant, and provide fast, safe and direct access to the underside of structures. Where underside lane closures are required, TM will be combined with other investigations on that stretch of the network. For example, we will implement a single lane closure extending from the Brent Cross mid-levels past Brent Cross Bridge which will allow us to complete the underside works on four structures within one TM setup.

For footbridge investigations, we will complete as much work from the topside as possible, using off-network spider MEWPs from verge areas for additional access. Due to the short duration of the remaining underside investigations, we will use van mounted MEWPs followed by impact protection vehicles to hold a single lane of traffic for a maximum of 15 minutes while samples are taken, at times of low traffic flow where possible. This approach will remove the requirement for any lane closures during footbridge investigations.

For the six structures crossing the River Brent, we will combine topside works that affect traffic with other investigations to minimise the number of lane

closures. For underside investigations, we will use our experience of accessing a structure on the A316 from the River Crane, and use floating scaffold pontoons in the River Brent (subject to liaison with the Environment Agency). This approach removes a minimum of 10-18 shifts of TM on the network, providing significant programme efficiencies and minimising disruption.

We are aware of TKJV's block closure programme in the North and will identify opportunities to share road space, limiting additional closure required for our works. We will maximise these opportunities by aligning the timing of our investigations and draw on our flexible and agile local resources including FM Conway's 100 strong TM workforce, the largest privately owned fleet of specialist vehicles and HTA's 44 strong workforce. This will minimise impact on the network, reduce programme and delivery risks, and ensure we meet TfL's milestone for funding application.

CONTINUOUS IMPROVEMENT:

Through our involvement in a multi-party planning forum with all providers on the Highway Maintenance and Projects Framework (HMF), we will continually liaise with TKJV and TfL's Network Management Team throughout our investigation programme. This will ensure we maintain visibility of any emergency closures for reactive works and identify opportunities to reduce the number of road space bookings required.

EVIDENCE:

Brent Cross Road Restraint System Installation, 2020

During installation of new road restraint systems on the mid-levels and slip roads, we collaborated with Thames Water to share road space during their emergency closures for repair work. This minimised network impact, reduced our programme by two weeks / 10 shifts of lane closures, and delivered a £20,000 traffic management saving for TfL.

Permits and Consents: Collaboration with TfL and adjacent highway authorities

Our dedicated Permit Coordinator, [REDACTED] will manage permits and consents for this project, providing a dedicated single point of contact for TfL and stakeholders. [REDACTED] will be supported by FM Conway's dedicated in-house permit team which manage 100,000 London Permitting Scheme (LoPS) permits each year. We will also take best practices from our collaboration with the Department for Transport in the development of Street Manager, a digital service for planning and managing road space / street works. This will ensure clear coordination and a right first-time approach to road space booking which will prevent delays to starting work on site.



Following initial stakeholder engagement, we will engage with TfL's Projects and Programmes Directorate and submit a traffic management application (TMAN) application via TfL's road space planning system, 'LondonWorks', including TM drawings, diversion routes, stakeholder commentary and programme of works using the Coordination & Permitting team's (CaP's) proforma. Upon approval of the TMAN, we will request road space via the pre-advanced authorisation (PAA) process three months in advance of the works. We will confirm applications for bus stop suspensions (liaising with London Buses at the earliest opportunity), parking suspensions and a TTRO for the mid-level closures required to facilitate inspections. A LoPS application will be raised via Street Manager at least 10 days

in advance of works commencing on site. We have an Application Programming Interface with Street Manager which integrates permits fully into our wider planning process, streamlines applications, provides visibility and removes duplication when applying for permits.

Proactive Stakeholder Engagement: Using existing relationships to obtain buy-in

Our access solutions have been designed to minimise disruption to the network, prioritising offline access and short duration TM which will limit the impact on stakeholders. Using knowledge and relationships developed through a number of schemes we have delivered at, or in close proximity to the Brent Cross Structures, we have incorporated stakeholder requirements within our approach. We will refine our tender stage proposals in collaboration with TfL's CaP and key stakeholders including London Buses, emergency services, Barnet and Brent Councils, Highways England, local businesses (Brent Cross Shopping Centre, Post Office, Ikea, and Tesco) and a range of road user groups including Logistics UK. We will also review our existing stakeholder logs to further expedite the planning process, provide accurate, timely, relevant and detailed information to all parties, and improve the quality of our engagement throughout our work.

EVIDENCE:

A406 Staples Corner Flyover joint replacement, 2017

We maintained regular dialogue with key stakeholders such as the two adjacent local authorities, Ikea, local business and bus operators, and liaised directly with Highways England and Connect Plus to agree diversion routes via the M25. During delivery, site updates were sent every four hours to our control room to update LSTCC, ensuring all interested parties were kept fully informed on progress. On both weekends the Flyover was opened ahead of the agreed 5am Monday deadline and all works were completed to TfL's quality standards and within budget.

"Works were planned with risk in mind and executed perfectly, which ensured the project was a success and completed to time, quality and cost." [REDACTED], TfL Structures

3.2 Provision of adequate measures to ensure safety and adequate traffic management on this commission

We will draw upon FM Conway's eight years' LoHAC experience acting as Principal Contractor and deliver complex traffic management to ensure we provide adequate measures to ensure safety. Having delivered investigations at the Brent Cross site specifically, and major structures schemes in the area, our knowledge of this section of the network is unrivalled. Our access approach, as detailed in **Appendix C**, has maximised off network access and limited additional traffic management required for our investigation works. We fully understand the key considerations when planning and implementing traffic management at Brent Cross which will ensure the safe planning, installation, monitoring and management of measures that will protect both our workforce and road users, while keeping network impact to an absolute minimum.

Pre-site arrangements: *Efficiently planning the construction phase*

Early Contractor Involvement: during investigation planning, our Principal Contractor will work closely with Arcadis, as Principal Designer and investigation specialist, HTA to confirm access requirements for all investigation works. We will refine our solution based on the access approach developed during tender stage, and identify safety measures for providing all access. Our Principal Contractor will participate in programme collaborative planning sessions and use knowledge of the site and local network to inform pre-construction planning, ensuring any site constraints and safety hazards are identified and mitigated, and all pre-construction information is seamlessly transferred and understood.

Provide adequate safe measures: Our access solution eliminates the risk of working adjacent to live traffic for 64% of our shifts through innovative off network access solutions. A majority of the off-network shifts will require working above water and/or working at height; we will implement our formal permit to work system for these activities to confirm the Principles of Prevention have been implemented.

When carrying out works from spider mobile elevated working platforms (MEWP) and scaffold towers above water, operatives will work within secure baskets wearing fall restrain lanyards, attached to their working platforms via a harness.

To control the risks associated with working in water and within confined spaces during culvert investigations, all personnel will be 'high-risk confined space' trained, water and air tests for toxicity will be completed prior to entry, site specific emergency rescue plans will be prepared and communicated to operatives during task briefings, and gas monitors will be worn by operatives to identify any emerging risks. Radio communications and updates at defined intervals will ensure safe systems of work are maintained at all times.

Traffic management design: Our approach to TM is designed to maximise capacity through the Brent Cross area during our works while protecting the safety of all road users and our workforce. We will implement a structured process informed by our existing local knowledge, all available traffic data, and engagement with key stakeholders, to develop traffic management proposals in accordance with TfL's Temporary Traffic Management Handbook, the Safety at Street Works and Roadworks Code of Practice and Chapter 8 of the Traffic Signs Manual.

This process will be led by FM Conway's in-house team of qualified TM designers, overseen by a Lantra-qualified Traffic Safety & Control Officer (TSCO) who has spent the past eight years managing complex traffic management on the TLRN and has specific knowledge of this location. The seamless integration of our specialist TM division within our delivery team will ensure TM designs fully consider the scope of our on-site activities to provide safe working room, while protecting road users.

We will carry out detailed site assessments to understand the local environment, confirm dimensions, identify emergency diversion routes, and prepare a preliminary site risk assessment. FM Conway's artificial intelligence cameras will capture traffic and pedestrian data from the site; this proprietary technology uses deep learning algorithms to accurately classify and count objects, including path analysis and speed of travel.

Our TSCO will draw upon existing relationships with all key stakeholders at this site including London Buses, Brent and Barnet Councils, TfL's maintenance provider in the North, Highways England, road user groups, the Met Police and other emergency services. This early engagement will capture all constraints, minimise the number of design iterations and build strong relationships ahead of the implementation phase. Our systematic approach to design, planning and communication will not only increase safety, it will also reduce the risk of programme delays from unexpected problems during implementation. The consultation process will also highlight third party activity in the area and identify the optimal timing of works with significant impact on traffic. Based on our experience of the area, we have developed a TM approach that will prevent impacts on local businesses (Brent Cross Shopping Centre, Post Office, Ikea, and Tesco). However, we will consult with them to provide advanced notification of our works and communicate our solution to minimise disruption. We will refine our tender stage traffic management proposals in collaboration with TfL's Coordination and Permitting team (CaP) prior to submitting initial road space applications.

Implementation, maintenance and ongoing monitoring: All traffic management will be implemented by FM Conway's NHSS 12A/B and D qualified operatives under the guidance of our TSCO who will be dedicated to the Brent Cross investigations, providing continuity of resources through each phase. As Principal Contractor, FM Conway's Supervisor will verify the competency of all operatives before attending site and will lead comprehensive site inductions prior to commencing work to communicate roles, health and safety arrangements and risk controls.

'Intellicone' sensor technology will detect any displacement or incursions and alert our TM Supervisor in real time. TM gangs will maintain a 24/7 presence on site, recording inspections every two hours. All TM switches and inspections will be recorded in BIM 360 using spatially referenced image capture software to provide a detailed audit trail. A combination of artificial intelligence cameras and mid-shift reviews will inform the dynamic assessment of TM measures by monitoring traffic, cyclist, and

pedestrian movements, highlighting unsafe road user behaviour and validating the effectiveness of TM arrangements. This dynamic approach will maximise safety and minimise disruption by ensuring any potential TM modifications are assessed and implemented without delay under the direction of our site based TSCO.

Fulfilling our role as Principal Contractor: *Efficiently planning, managing, monitoring and coordinating the construction phase*

We will implement a structured process to **plan, manage, monitor and coordinate** the Construction Phase, working in collaboration with TfL and Arcadis to apply the general **principles of prevention** and maintain exemplary health & safety standards on this project.

Our structured risk management process is embedded within their BSI accredited Integrated Management System (incorporating ISO 45001 and 39001) and recorded through formal Risk Assessments.

We have formed a fully integrated team during the tender period, and early engagement with the design team, multi-disciplinary construction personnel and our key supply chain partner for inspections, Henderson Thomas Associates, has provided a vital window of opportunity to eliminate health and safety risks and coordinate works effectively. We will build on this during mobilisation, establishing dedicated risk workshops structured around the nine principles of prevention to review outputs from our tender stage risk workshops, systematically address each identified risk and challenge ourselves to eliminate the potential for harm.

Decision logs will be maintained to demonstrate that the principles of prevention have been rigorously applied. FM Conway operates a formal 'Permit to Work' system for activities involving significant hazards, such as working at height, in excavations, and working within confined spaces, to ensure an approved safe system of work is in place. TM plans for all phases of work will be included within the Construction Phase Plan which will be used to communicate site arrangements to all personnel attending site.

Examples of similar work: *Directly comparable works on the TLRN in the North*

Westway Post Tensioned Special Inspection

(PTSI): FM Conway facilitated a comprehensive series of structural investigations at the Westway on behalf of TfL. These works, completed in April 2021, are directly comparable to the Brent Cross project and included more than 30 structures.

Our solutions to minimise disruption and obtain stakeholder buy-in included using existing 'block closures' to minimise discrete interventions, and taking advantage of low traffic volumes during COVID-19 lockdowns. We also used long lane closures, including from Marylebone Flyover to Wood Lane (3 miles), where we had up to ten teams on site carrying out multiple inspections. This solution reduced the overall programme duration by 30% and kept network disruption to a minimum.

- **Benefit to Brent Cross:** We will use the same team on this project to build on innovative access solutions and enhance collaborative planning.

LoHAC: As TfL's Principal Contractor, we maintained TfL's structures in the NW framework area. At Brent Cross, we recently installed new road restraint systems on the mid-levels and slip roads; we collaborated with Thames Water to carry out work within their emergency closures which reduced our programme by two weeks.

In addition to numerous inspections at Brent Cross itself, we have delivered major schemes on the A406 and A41, including Staples Flyover and the Neasden superscheme. Working in partnership with TfL and our supply chain to map all routine maintenance and scheme activity, we developed a series of 'block closures' designed to facilitate maintenance activity across multiple workstreams. In the first 12 months following implementation of 'block closures' the number of traffic management interventions reduced by 38%, and TM operative man hours on the network was reduced by 57%.

- **Benefit to Brent Cross:** We will bring this detailed network knowledge and principles of works coordination to minimise lane closures during our investigations.

Staples Flyover: We replaced two expansion joints over two weekends involving full closures of the A406 in both directions. We engaged with TfL's network management team, the Metropolitan Police and our key suppliers as part of our collaborative planning process to model a range of scenarios designed to complete the works safely while minimising disruption to this critical section of the Strategic Road Network. As a result of this evidence led planning process, TfL granted a departure from their standard practice and allocated a full closure of Staples Flyover for two consecutive weekends as opposed to 54 nights of closures. This reduced man hours on the network by 25%, and the increased productivity and reduced TM realised a total saving of £900k.

- **Benefit to Brent Cross:** We will build on this meticulous approach to planning and minimising time on the network to drive efficiency and minimise disruption.

Brent Cross Development: In recognition of our North West TLRN expertise, we were engaged by the Graham Hotchief joint venture to support a major infrastructure works package linked to the £1.4bn expansion of Brent Cross. Using our knowledge of the local network, key stakeholders and road space booking procedures, we provided a single source solution for all traffic management requirements including design, road permits, temporary traffic orders and liaison with multiple highway authorities.

- **Benefit to Brent Cross:** Reinforces our local knowledge and provides us with existing relationships and direct points of contact with key stakeholders in the area.