Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Examining Authority's Second Written Round of Questions and Requests for Information

Response from Thames Water

Design, Landscape and Visual Impact

Doc Ref: **APP51**

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

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Responses to second written questions
Q24 Design, Landscape and Visual Impact

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Abbreviations

BT	British Telecom
CSO	combined sewer overflow
DCO	development consent order
LGV	light goods vehicle
LLAU	limits of land to be acquired or used
PLA	Port of London Authority
TfL	Transport for London

1 Question: 24.1

Can the Applicant provide a table giving, for each site, the implications of the 10 yearly maintenance operation with regard to: access arrangements required and whether these are within the LLAU; what temporary plant and machinery and office/welfare facilities would be required; the likely maximum duration of the 10 yearly maintenance regime and expected activities.

1.1 Summary response

1.1.1 This response includes our responses to second written questions 24.2 and 33.5.

1.1.2 An explanation of the ten-yearly operational maintenance activities anticipated at the main tunnel and combined sewer overflow (CSO) drop shafts is contained below, together with a breakdown of the types of vehicle, plant and support equipment required.

1.1.3 A table identifying the implications of the ten-yearly operational maintenance activities at each main tunnel shaft and CSO drop shaft is listed below.

1.2 Detailed response

1.2.1 Access to the Thames Tideway Tunnel system would periodically be required for inspection and maintenance purposes, whereby access would typically be classified into the following primary activities:

a. Ten-yearly operational maintenance – this would facilitate the internal inspection of the deep-level main tunnel, connection tunnels, main tunnel shafts and CSO drop shafts.

b. Equipment inspection and maintenance – this would allow the inspection and maintenance of equipment located within the shallower chambers, such as penstocks, flap valves and ventilation equipment. It would be typically conducted at a frequency of approximately every three to six months.

c. Unplanned visits for maintenance or repairs – this would enable clearance of blockages and/or repairs of equipment failures.

1.2.2 Further details of the maintenance regime are contained within the *Engineering Design Statement* (Doc ref: 7.18, Section 3.6).

1.2.3 It is anticipated that the ten-yearly maintenance operation would be broadly conducted in the following sequence:

a. Attendance of personnel, plant and associated equipment for tunnel/ shaft cleaning and debris removal prior to inspection

b. Attendance of personnel, vehicles, plant and associated equipment for tunnel/shaft internal inspection

c. Attendance of personnel, plant and associated equipment for tunnel/ shaft remedial repairs as identified during the inspection phase.

1.2.4 The largest operational vehicles, plant, equipment and associated support requirements are anticipated to occur during the internal inspection of the tunnels and shafts. Consequently, the operational and maintenance area at each CSO drop shaft or main tunnel shaft location has been sized to reflect this.

Vehicles, plant and support equipment

1.2.5 A breakdown of the anticipated vehicles, plant and associated equipment is listed below:

a. Primary crane – this would be the main mobile crane for the lifting of personnel and equipment into and out of the shaft. The exact specification, size and space allocation would be dependent upon shaft depth, weight of equipment to be lifted and proximity between set-down area, crane and shaft. Suitable space would be allowed to facilitate the full extension of crane outriggers and bearing pads.

b. Secondary crane – this would be the back-up crane for the lifting of personnel and equipment into and out of the shaft. The exact specification, size and space allocation would be dependent upon shaft depth, weight of equipment to be lifted and proximity between set-down area, crane and shaft. Space allowed should facilitate the full extension of crane outriggers and bearing pads.

c. Flushing welfare vehicle – this would be a mobile welfare vehicle for Thames Water operational personnel and would not need to be located directly adjacent to shaft, ie, it could be located within an adjacent parking bay or equivalent. Typically, this vehicle would be approximately 7.5m long, 2.45m wide and 3m in height.

d. Flushing vehicle equipment trailer – this trailer would not need to be located directly adjacent to shaft, ie, it could be located within an adjacent parking bay or equivalent. The trailer would be approximately 4m long and 2.5m wide.

e. Materials vehicle 1 – this would be a rigid heavy goods vehicle (HGV) with flat bed and ‘Hiab’ lifting arm, or similar. This vehicle would be approximately 7.5m long and 2.5m wide.

f. Materials vehicle 2 – this would be a light goods vehicle (LGV), long-wheel base van with cab and flat bed, approximately 6m long and 2.5m wide.

g. Materials vehicle 3 – this would be a LGV, short-wheel base van, approximately 5m long and 2.5m wide. This vehicle would not need to be located directly adjacent to a shaft, ie, it could be located within an adjacent parking bay or equivalent.

h. Equipment storage container – this would be a single storage container approximately 2.5m long and 2.5m wide for the safe storage of equipment and materials. This would not need to be located directly

adjacent to the shaft, ie, it could be located within an adjacent parking bay or equivalent.

i. Waste skip – set-down area of 20 cubic yards (9.2m^3). Typically, this would be a maxi skip, 3.7m long and 2m wide. Consideration has been given to allow for a standing area and an access route for the associated lorry to deliver or collect the waste skip.

j. Generator – this would be a containerised generator with acoustic protection, typically 3m in length and 2.5m wide, to provide power. This would not need to be located directly adjacent to shaft, ie, it could be located within an adjacent footway, parking bay, etc, but consideration has been given to avoid cable routes across public footpaths, roads and other public spaces where possible.

k. Set-down area 1 – this would be a set-down area for storage of the non-hinged removable access covers. Suitable space would be provided to avoid stacking of access covers.

l. Set-down area 2 – this would be a set-down area for primary and secondary man-rider cages to facilitate personnel access into and out of the shaft and tunnels.

m. Set-down area 3 – this would be a set-down area for miscellaneous equipment, eg, inspection equipment, vertical lifting skips, flap valve, penstock, etc. Space for the largest piece of equipment at site has been allowed for, such as flap valve or penstock, including frame.

n. For main tunnel shaft locations only – an additional set-down area for the bespoke tunnel inspection vehicle and rescue vehicle. This area could be incorporated into the same area as set-down area 3 listed above.

o. For main tunnel shaft locations only – an additional area for a bulk roll-on roll-off waste skip of between 20 cubic yards (15.3m^3) to 40 cubic yards (30.6m^3) capacity for the removal of grit and other debris from the tunnel. Suitable space would be allocated to provide an access route and standing area for the lorry to deliver or collect the waste skip.

Activities

1.2.6 Activities which would be common to all main tunnel shaft sites and CSO drop shaft sites are expected to include the following:

a. lifting manhole covers off the shaft and other chambers as required, and storage of them in a safe location adjacent to the shaft or chamber

b. personnel access to and from shafts using a crane and man-rider cage

c. raising and lowering equipment into the shaft using a crane

d. raising and lowering of skips to the bottom of the shaft and removal of debris that has accumulated in the shaft and tunnel

e. inspection and maintenance of mechanical and electrical equipment on the site

f. inspection and maintenance of permanent air management equipment on the site, including replacement of activated carbon filters

g. activities associated with the welfare of personnel involved in operation and maintenance of the site and tunnel system

h. installation, operation and removal of temporary air handling equipment to facilitate inspection of the shaft and tunnel.

1.2.7 Our response to first written question 5.5g (Doc ref: APP05, Section 5.8) describes some of the activities that are expected to be carried out at shafts during the ten-yearly operational maintenance.

1.2.8 Table 1.1 below sets out the implications of the ten-yearly operational maintenance activities for each site.

1.2.9 Question 24.2 asks us to provide a plan for each site showing the site layout for:

a. the plant and machinery and other facilities expected to be needed during maintenance

b. any areas that would need to be fenced off

c. access roads or paths that would need to be temporarily diverted and areas of oversailing for cranes.

d. The limits of land to be acquired or used (LLAU) should be shown on the plans.

1.2.10 Operational layout plans, illustrating the anticipated configuration of the plant and support equipment, crane oversailing, temporary fencing, access and temporary diversion of footpaths, and showing the LLAU for each main tunnel site and CSO site, are provided in the volume of Supporting Drawings (Doc ref: APP66).

1.2.11 The operational layout plans illustrate the anticipated configuration of vehicles, plant and support equipment for the deep level inspection of the main tunnel, connection tunnels, main tunnel shafts and CSO drop shafts. It should be noted that the layouts are illustrative and the configuration of vehicles, plant and support equipment may be modified from that illustrated depending upon the exact operation being undertaken. It should also be noted that the mobile crane manufacturer may also differ from that illustrated.

1.2.12 Maintenance and inspection of other equipment, such the mechanical and electrical assets (eg, flap valves and penstocks) would require similar vehicles, plant and support equipment, but would be arranged in an alternative configuration to that illustrated on the submitted operational layout plans.

1.2.13 The operational layout plans have been developed in discussion with Thames Water's Operational Maintenance Team and Thames Water's framework crane contractor, who currently provides lifting equipment for existing operational activities.

1.2.14 Each site would require the attendance of two mobile cranes. The primary crane would provide the main lifting requirements for each site and would facilitate the transfer of plant, equipment and personnel between surface level and shaft invert level. A secondary crane would generally provide a backup facility to remove inspection personnel in the event of a failure of the primary crane.

1.2.15 The size and type of each anticipated mobile crane requirement is dependent on a number of site-specific factors, including:

a. Proximity – The proximity of the crane to both the shaft openings and the appropriate set down areas influences the lifting capacity of the crane. Generally a crane of larger lifting capacity is required if the distance between the shaft openings and the set down areas is greater. Shafts which are elevated to the surrounding ground level, such as the CSO drop shaft at Earl Pumping Station, would require a greater mobile crane lifting capacity than at other sites, where the cover level of the shaft is equal to the surrounding ground level.

b. Equipment – The size of equipment to be lowered to the shaft invert influences the crane capacity required. For example, mobile cranes for the main tunnel sites and those on the Greenwich connection tunnel require greater capacity to lower and remove the tunnel inspection and rescue vehicles. Similarly, CSO drop shafts with larger hydraulic flows would have larger flap valves and penstocks and consequently would have greater lifting capacity requirements. It has been assumed that the mobile cranes associated with the deep level inspection of tunnels and shafts would also be used for the inspection and removal of other assets (flap valves, penstock etc).

c. Depth – The depth of the shaft influences the mobile crane capacity required. Generally cranes with a larger capacity have a greater length of lifting cable, so consequently the sites with deeper shafts, combined with those where the proximity of the crane location is not directly adjacent to the shaft, require a greater crane capacity.

d. Site constraints – The adjacent site constraints, such as adjacent buildings and developments, landscaping, access restrictions have also been considered in the development of the illustrative operational layout plans. Similarly, to endeavour to minimise permanent encroachment into the river, foreshore sites have been configured (where possible) to locate the mobile cranes directly adjacent to the CSO drop shafts. This reduces the required lifting capacity of the mobile crane and therefore minimises the permanent operational and maintenance area required.

1.2.16 The operational layout drawings illustrate the anticipated crane boom radius between the main tunnel shaft and CSO drop shaft access openings and the set down areas #1, #2 and #3. It is anticipated that changes to the elevation of the crane boom may be required during lifting operations to reflect site specific factors. Consequently, the anticipated crane boom illustrated on the operational layout drawing may take the form of an ‘arc’ rather than a more conventional ‘circular’ form.

Effect of closures of public spaces

1.2.17 Question 33.5 asks us to provide further information on the likely duration and frequency of closure of walkways and open space to the public at each relevant location, in the context of operation and maintenance of the permanent works.

1.2.18 Table 1.1 below sets out at which sites walkways and open space would be temporarily closed during the ten-yearly maintenance activities and the associated duration. The operational layout plans illustrate which areas we anticipate would be fenced off, and temporary diversion routes.

1.2.19 The most frequent operational activity is anticipated to be the equipment inspection and maintenance activity, as described in para. 1.2.1b above. It is anticipated that this would occur at a frequency of approximately every three to six months, and would take in the order of several hours to complete.

1.2.20 The vehicles, plant and support equipment required for the equipment inspection and maintenance activity is anticipated to be a couple of LGVs.

1.2.21 The extent of the physical impact upon adjacent walkways and open space of the three- to six-month operational activity is anticipated to be similar to that associated with the ten-yearly operational maintenance activity, but with a reduced significance because of the short duration and smaller scale of activity.

Table 1.1 Ten-yearly maintenance arrangements

Site	Access arrangements	Third-party access restrictions	Are access arrangements within the LLAU?	Assumed cranes required (or equivalent)	Assumed support vehicles, equipment and plant	Anticipated duration	Expected activities (see para. 1.2.6 for common activities)
Acton Storm Tanks	Directly off Canham Road onto the Thames Water site via the new access created by the project.	All works are within Thames Water operational site, accessed directly off public highway.	Yes	Primary crane – Demag City AC-50 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container, bulk roll-on/roll-off waste skip, tunnel inspection and rescue vehicle	Several weeks	Common activities plus lowering and removal of tunnel inspection vehicle.
Hammersmith Pumping Station	Access to CSO drop shaft on St George land via new vehicle crossover from Distillery Road built as part of the project. Access to interception chamber on existing Thames Water site using existing Thames Water access from Chancellor's Road.	1) CSO drop shaft access within public boulevard on St George development. Area to be fenced and made safe in accordance with legal agreement between Thames Water and St George. 2) Access to interception chamber and ventilation equipment.	Yes	Primary crane – Demag City AC-40 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities
Barn Elms	Access from Queen Elizabeth Walk onto new access road across Barn Elms playing fields built as part of the project	The access road and CSO drop shaft area are not fenced off within Barn Elms playing fields. Therefore adequate fencing and safe system of work to be employed to access the site and work safely around the CSO drop shaft and chambers.	Yes	Primary crane – Demag City AC-40 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities
Putney Embankment Foreshore	Site accessed directly of the Embankment via new vehicle crossover built as part of the project.	Maintenance vehicles will park on public highway. Restrictions to on-street parking, Thames Path and permissive public realm (foreshore structure) required and establishment of a safe working area.	Some maintenance vehicle parking outside LLAU on public highway.	Primary crane – Demag City AC-40 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities
Dormay Street	Access via Wandsworth depot directly from Dormay Street	All works will take place within Wandsworth depot. Relocation of depot vehicles required and establishment of a safe working area.	Yes	Primary crane – Demag City AC-25 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities

Site	Access arrangements	Third-party access restrictions	Are access arrangements within the LLAU?	Assumed cranes required (or equivalent)	Assumed support vehicles, equipment and plant	Anticipated duration	Expected activities (see para. 1.2.6 for common activities)
King George's Park	Access directly off Neville Gill Close via new vehicle crossover built as part of the project	Partial closure of open space. Maintenance vehicles will park on public highway. Restrictions to on-street parking. Pedestrian diversion and establishment of a safe working area required.	Yes	Primary crane – Demag City AC-25 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities
Carnwath Road Riverside	Access directly off Carnwath Road via new vehicle crossover built as part of the project.	No effect on public highway. Establishment of a safe working area required.	Yes	Primary crane – Demag City AC-40 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container, bulk roll-on roll-off waste skip.	Several weeks	Common activities plus lowering and removal of tunnel inspection vehicle.
Falconbrook Pumping Station	Existing access across York Gardens across Lavender Road	Partial closure of York Gardens and establishment of a safe working area and restrictions on vehicles accessing the Library and Community Centre.	Some maintenance vehicle parking outside LLAU	Primary crane – Demag City AC-40 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities
Cremorne Wharf Depot	Access directly from Lots Road	All works either on Thames Water owned Lots Road Pumping Station site, or on local authority depot. No effect on public highway.	Some maintenance vehicle parking outside LLAU requiring temporary suspension of parking.	Primary crane – Demag City AC-25 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities
Chelsea Embankment Foreshore	Access directly off Chelsea Embankment.	Pedestrian diversion, establishment of a safe working area, and partial closure of traffic lane required. Restrictions to permissive public realm (foreshore structure) required.	Yes	Primary crane – Demag City AC-25 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities
Kirtling Street	Existing accesses off Kirtling Street and Cringle Street	Restrictions to CEMEX operations while access taking place (covered by legal agreement between Thames Water and CEMEX).	Yes	Primary crane – Demag City AC-40 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container, bulk roll-on/roll-off waste skip.	Several weeks	Common activities plus lowering and removal of tunnel inspection vehicle.

Site	Access arrangements	Third-party access restrictions	Are access arrangements within the LLAU?	Assumed cranes required (or equivalent)	Assumed support vehicles, equipment and plant	Anticipated duration	Expected activities (see para. 1.2.6 for common activities)
Heathwall Pumping Station	Existing accesses off Nine Elms Lane	Pedestrian diversion of permissive section of Thames Path required. Restrictions to permissive public realm (foreshore structure) and establishment of a safe working area and activities on safeguarded wharf required.	Yes	Primary crane – Demag City AC-25 class Secondary crane – CX-8T Stairlifter	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities
Albert Embankment Foreshore	Access off Albert Embankment and via Lacks Dock access roadway.	Pedestrian diversion of Thames Path and establishment of a safe working area and restrictions to permissive public realm (foreshore structure) required.	Yes	Primary crane – Demag City AC-25 class Secondary crane – Demag City AC-25 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), Materials vehicle 3 (van). flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities
Victoria Embankment Foreshore	Access directly off Victoria Embankment	Pedestrian diversion of Thames Path and establishment of a safe working area and restrictions to permissive public realm (foreshore structure) required.	Yes	Primary crane – Demag City AC-25 class Secondary crane – CX-8T Stairlifter	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities
Blackfriars Bridge Foreshore	Access directly off Victoria Embankment	Pedestrian diversion of Thames Path and establishment of a safe working area and restrictions to permissive public realm (foreshore structure) required.	Yes	Primary crane – Tadano Faun ATF 30-2L Secondary crane – Tadano Faun ATF 30-2L	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container.	Several weeks	Common activities plus lowering and removal of tunnel inspection vehicle.
Chambers Wharf	Existing access off Bermondsey Wall East	No effect to public highway. Site is currently a vacant development site. (Shaft located near to river to minimise impact on future development)	Yes	Primary crane – Demag City AC-40 class Secondary crane – Demag City AC-40 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container, bulk roll-on/roll-off waste skip.	Several weeks	Common activities plus lowering and removal of tunnel inspection vehicle.
Earl Pumping Station	Existing accesses off Yeoman Street and Chilton Grove	No effect to public highway. All works are within Thames Water operational site, accessed directly off public highway.	Yes	Primary crane – LTM 1055 class Secondary crane – Demag City AC-40 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities plus in very rare events lowering and removal of tunnel inspection vehicle.
Deptford Church Street	New vehicle crossovers off Crossfield Street and onto Coffey Street built as part of the project	Partial closure of open space. Maintenance vehicles will park on public highway. Restrictions to on-street parking. Pedestrian diversion and establishment of a safe working area required.	Yes	Primary crane – Demag City AC-40 class Secondary crane – Demag City AC-40 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities plus in very rare events lowering and removal of tunnel inspection vehicle.

Site	Access arrangements	Third-party access restrictions	Are access arrangements within the LLAU?	Assumed cranes required (or equivalent)	Assumed support vehicles, equipment and plant	Anticipated duration	Expected activities (see para. 1.2.6 for common activities)
Greenwich Pumping Station	Existing access off Norman Road	No effect to public highway. All works are within Thames Water operational site, accessed directly off public highway.	Yes	Primary crane – LTM 1055 class Secondary crane – Demag City AC-40 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container	Several weeks	Common activities plus lowering and removal of tunnel inspection vehicle.
King Edward Memorial Park Foreshore	Access directly off Glamis Road via new vehicle crossover built as part of the project	Partial closure of open space. Pedestrian diversion and restrictions to permissive public realm (foreshore structure) and establishment of a safe working area required.	Yes	Primary crane – Demag City AC-40 class Secondary crane – Demag City AC-40 class	Materials vehicle 1 (rigid HGV), materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment, storage container	Several weeks	Common activities plus lowering and removal of tunnel inspection vehicle.
Abbey Mills Pumping Station	Existing access directly off Gay Road	No effect to public highway. All works are within Thames Water operational site.	Yes	Primary crane – Demag City AC-40 class Secondary crane – Demag City AC-40 class	Materials vehicle 1 (rigid HGV), Materials vehicle 2 (LGV), materials vehicle 3 (van), flushing welfare vehicle with trailer, generator, waste skip, equipment storage container, bulk roll-on/roll-off waste skip	Several weeks	Common activities plus lowering and removal of tunnel inspection vehicle.

2 Question: 24.2

Can the Applicant provide a plan for each site showing the site layout for: the plant and machinery and other facilities expected to be needed during maintenance; any areas that would need to be fenced off; access roads or paths that would need to be temporarily diverted and areas of oversailing for cranes. The LLAU should be shown on the plans.

2.1 Our response

2.1.1 The answer to this question is included in our response to question 24.1.

3 Question: 24.3

How long would the tunnel be out of service during the 10 yearly maintenance operation? Provide typical expectations for standard inspection and maintenance and a worst case scenario.

3.1 Our response

3.1.1 Inspection of the London Tideway Tunnels system is planned to take place at approximately ten-year intervals. However, depending on completion of the Thames Tideway Tunnel, the first inspection may occur in 2024 to 2026. The Lee Tunnel would have been in operation for approximately ten years and the Thames Tideway Tunnel for only a few years.

3.1.2 Inspection of the deep tunnels of the Milwaukee combined sewer deep tunnel system in 2002 covered 3km of tunnel per day. This is the minimum expected rate for the London Tideway Tunnels system due to the anticipated use of improved transport vehicles, laser scanning, remote sensors and visual inspection by qualified personnel. The typical time spent out of service for the main tunnel and long connection tunnels would therefore be between ten to 15 days.

3.1.3 The worst-case scenario would be if the inspection indicated imminent failure of the tunnel; in this case the out-of-service period would be significantly longer and could last a number of months while the situation is evaluated and rectified. This scenario is not expected to occur.

3.1.4 A less severe scenario would be the discovery of significant pockets of sediment that may require removal. The sediment deposits would need to be transported to a shaft, lifted to the surface and removed. We estimate that this could extend the out-of-service period by a further ten days (based on five significant areas of sedimentation and two days to effect the removal).

3.1.5 Section 7 of the London Tideway Tunnels Operating Techniques (see Appendix C of the *Statement of Common Ground* with the Environment Agency submitted on 4 November 2013, Doc ref: APP19.S1.19) sets out the contingencies currently identified that would allow the system to be taken out of service, including the 10-yearly inspections.

4 Question: 24.4

In relation to Blackfriars Bridge Foreshore Note 6 to drawing DCO-PP-17X-BLABF-190016 revision 1 indicates that the means of modifying the BT cooling water tunnel is to be confirmed. How is the cooling water tunnel proposed to be modified? Has the proposed modification been agreed by BT, Transport for London (TfL) and the Port of London Authority (PLA)?

4.1 Summary response

4.1.1 British Telecom (BT), Transport for London (TfL) and the Port of London Authority (PLA) have confirmed that two of the three mitigation options proposed are acceptable to them. We are now studying risks and scheduling issues for both options prior to choosing the final option to be implemented. A meeting to discuss the final option selected is planned with BT for February 2014 and further joint meetings will be held with BT, TfL and the PLA to finalise this agreement.

4.1.2 Schedule 1, Work No. 17b of the *Draft DCO* will be amended to include the agreed modification. We anticipate entering into an asset protection agreement with BT for the delivery of these works.

4.2 Detailed response

4.2.1 The BT cooling tunnel is the primary source of cooling water for the adjacent telephone exchange in Baynard House. This is a concrete tunnel containing pipework that circulates river water within the telephone exchange. The tunnel includes a water intake point at the end furthest into the river and a discharge point coinciding with approximately low tide level, hence the discharge point is always submerged.

4.2.2 The current elevation of the discharge point conflicts with the proposed dredged pocket of the relocated Blackfriars Millennium Pier and the dredging works will leave the discharge point elevated 2m above the new riverbed. This obstruction is unacceptable to all parties, due to risks to mariners and to the operation of the cooling tunnel. As a result, modifications are required to the discharge point and these are being discussed with BT, TfL and the PLA.

4.2.3 Following a feasibility study to identify suitable modifications, a joint meeting was held with BT, TfL and the PLA on 8 October 2013 to discuss the three identified options, referred to as A, B and C.

4.2.4 Option A involves maintaining the cooling tunnel in its current location and creating a new discharge point at a location further along the tunnel, **towards the river wall**. The existing discharge point would then be made redundant and capped off below the riverbed.

4.2.5 Option B involves maintaining the cooling tunnel in its current location and creating a new discharge point at a location further along the tunnel, **towards the river**. The existing discharge point would then be made redundant and capped off below the riverbed.

4.2.6 Option C also involves maintaining the cooling tunnel in its current location **and** also maintaining the discharge point in its current location, but lowering the elevation of the discharge point by approximately 2m so as to accommodate the proposed dredged pocket for the relocated Millennium Pier.

4.2.7 During the joint meeting on 8 October 2013, there was broad agreement that Option A was not a preferred solution due to the requirement for working close to the existing river wall, concerns about construction risk and the proximity of the foundation of the wall to the works. It was agreed that this option would not be considered any further.

4.2.8 At this meeting, it was also agreed that options B and C were feasible and acceptable to all parties, and that further, more detailed, fluvial studies should be carried out to investigate any effects on the performance of the cooling tunnel.

4.2.9 The detailed fluvial studies were carried out in November and December 2013, and the findings were discussed at a further joint meeting with BT, TfL and the PLA on 20 December 2013.

4.2.10 The results of the fluvial studies confirmed that both options B and C are feasible and that both options would have negligible effects on the operation of the cooling tunnel.

4.2.11 At the meeting on 20 December, BT, TfL and the PLA confirmed that both options are acceptable.

4.2.12 It was agreed that the Thames Tideway Tunnel project would now carry out a study to identify risks and scheduling implications associated with options B and C, such that a single option may be chosen by Thames Water.

4.2.13 This study is under way and the results will be discussed at future joint meetings with BT, TfL and the PLA to ensure that these parties agree with the chosen option.

4.2.14 Further meetings are planned with BT for February 2014 to discuss scheduling, procurement and consents durations, and further joint meetings with BT, TfL and the PLA will be planned as appropriate.

4.2.15 Both options B and C will require the installation of temporary cofferdams in the river within the limits of land to be acquired or used. The details of these works will be developed with BT once the chosen option is determined.

4.2.16 Schedule 1, Work No. 17b of the *Draft DCO* will be amended to include the agreed modification. We anticipate entering into an asset protection agreement with BT for the delivery of these works.

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