Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Transport Assessment

Doc Ref: **7.10**

APFP Regulations 2009: Regulation **5(2)(q)**

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Errata

Section	Paragraph No. / Reference	Page No.	Errata / Clarification
Section 4 Acton Storm Tanks	4.2.9	2	Text should read “To accommodate larger construction vehicle manoeuvres on the one-way route along Warple Way, Canham Road and Stanley Gardens, a number of on-street parking bays would need to be suspended. Five sections of parking have been identified where a total of 99m of parking would need to be suspended.”
Section 4 Acton Storm Tanks	4.2.10	3	Text should read “A 16m length of parking, or three spaces, would be suspended along the eastern side of Warple Way, just north of the junction with Canham Road. An additional 21m length of parking on the eastern side of Warple Way outside 27 to 35 and 37 to 41 Warple Way would be suspended. This was recommended for suspension by the LB of Ealing due to the width of the carriageway at this location on a curve in the road....."
Section 5 Hammersmith Pumping Station	5.5.50	49	Text should read “There would be the suspension of one parking bay during the construction period. The impact on parking would be negligible.”
Section 13 Chelsea Embankment Foreshore	Table 13.5.4	66	Phase: Construction. Issues: Narrowing the carriageway of Chelsea Embankment (A3212). Design measures text should read “...Temporary removal of white lining and provision of new white lining and road markings as appropriate (approximate length would be 200m)”.
Section 13 Chelsea Embankment	Drawing number: DCO-PP-12X-CHEEF-140030	N/A	Item of Work incorrectly refers to 8 vehicle bays. Text should read “Temporary suspension of parking

Section	Paragraph No. / Reference	Page No.	Errata / Clarification
Foreshore figures (Schedule of associated highway works)	Works reference: CHEEF_C07 Location: Chelsea Embankment (Bull Ring)		spaces (approximately 10 vehicle bays) and bus stop”.
Section 13 Chelsea Embankment Foreshore figures (Schedule of associated highway works)	Drawing number: DCO-PP-12X-CHEEF-140031 Works reference: CHEEF_P01 Location: Chelsea Embankment	N/A	Item of Work incorrectly refers to 8 vehicle bays. Text should read “Reinstatement of parking spaces (approximately 10 vehicle bays) and bus stop”.
Section 17 Victoria Embankment Foreshore	All	N/A	Text refers to the Victoria Embankment (A3211) as being eastbound/westbound. The Victoria Embankment is northbound / southbound. Any reference to the Victoria Embankment eastbound should be read as 'northbound'. Any references to the Victoria Embankment westbound should be read as 'southbound'.
Section 19 Shad Thames figures (Schedule of associated highway works)	Drawing Number: DCO-PP-18X-SHTPS-200022 Works Reference: SHTPS_C01 Location: Maguire Street	N/A	Item of Work should read “Suspension of parking bays (4 No.) and Car Club (1 No)”.
Section 19 Shad Thames figures (Schedule of associated highway works)	Drawing Number: DCO-PP-18X-SHTPS-200022 Works Reference: SHTPS_C03 Location: Maguire Street	N/A	Item of Work should read “Removal of bollards and four trees”.
Section 19 Shad Thames figures	Drawing Number: DCO-PP-18X-SHTPS-200022	N/A	Item of Work should read “Reinstatement of bollards and four trees. Removal of provision for vehicle

Section	Paragraph No. / Reference	Page No.	Errata / Clarification
(Schedule of associated highway works)	Works Reference: SHTPS_P04 Location: Maguire Street		turning head".
Section 20 Chambers Wharf figures (Schedule of associated highway works)	Drawing Number: DCO-PP-19X-CHAWF-210024 Works Reference: CHAWF_P02 Location: Bevington Street	N/A	Item of Work should read "Re-provision of resident parking bay (6 No.)".
Section 20 Chambers Wharf figures (Schedule of associated highway works)	Drawing Number: DCO-PP-19X-CHAWF-210024 Works Reference: CHAWF_P07 Location: Chambers Street	N/A	Item of Work should read "Re-provision of resident parking bay (2 No.)".
Section 21 King Edward Memorial Park Foreshore	21.2.13	3	Text should read "During construction 90% of the cofferdams fill (both import and export), 90% of the excavated material from the shaft and 90% of the excavated material for connection tunnels, interceptions and associated structures would be transported by barge and all other material by road."
Section 21 King Edward Memorial Park Foreshore	21.5.52	65	Text should read "During construction it is anticipated that 90% of cofferdam fill (import and export), 90% of shaft excavation material and 90% of connection tunnels, interceptions and associated structures excavated material would be transported by barge. The peak number of barge movements would occur in Site Year 3 of construction and would be an average of four barge movements a day."
Section 21 King Edward Memorial Park Foreshore	Drawing Number: DCO-PP-24X-KEMPF-250025. Works Reference: PTH1X_C01	N/A	Item of work should not make reference to the Trees for Cities depot. Text should read "Provision of gated construction site access at the location of an existing vehicle access. The

Section	Paragraph No. / Reference	Page No.	Errata / Clarification
figures (Schedule of associated highway works)	Location: Glamis Road - north of Shadwell Pier Head access.		existing access will be widened to accommodate HGVs and dropped kerbs and tactile paving will also be provided".
Section 23 Deptford Church Street	23.5.57	64	Text should read "The construction site would require the temporary restriction of four on-street parking bays along Coffey Street and the prohibition of uncontrolled parking along part of Crossfield Street during both phases of construction to enable lorries to access and leave the site..".
Section 23 Deptford Church Street	Table 23.7.1	106	Phase: Construction. Mode of Transport: Parking. Key Findings text should read "Four parking bays would be suspended along Coffey Street and some informal parking would be prohibited along Crossfield Street....".
Section 23 Deptford Church Street figures (Schedule of associated highway works)	Drawing Number: DCO-PP-22X-DEPCS-230018 Works Reference: DEPCS_C06 Location: Deptford Church Street, northbound	N/A	Item of Work should read "Existing bus stop removed and reprovided to suit new altered road layout".
Section 23 Deptford Church Street figures (Schedule of associated highway works)	Drawing Number: DCO-PP-22X-DEPCS-230018 Works Reference: DEPCS_C07 Location: Deptford Church Street, southbound	N/A	Item of Work should read "Existing bus stop removed and reprovided to suit new altered road layout".
Section 23 Deptford Church Street figures (Schedule of associated highway works)	Drawing Number: DCO-PP-22X-DEPCS-230018 Works Reference: DEPCS_C08 Location: Deptford Church Street	n/a	Item of Work should read "Provision of new signal controlled pedestrian crossing. Includes dropped kerb, tactile paving, road markings and electrical/BT connections (existing crossing is removed, ref C10)".
Section 23	Drawing Number:	N/A	Item of Work should read "Removal of

Section	Paragraph No. / Reference	Page No.	Errata / Clarification
Deptford Church Street figures (Schedule of associated highway works)	DCO-PP-22X-DEPCS-230018 Works Reference: DEPCS_C10 Location: Deptford Church Street		existing signal controlled pedestrian crossing (new crossing provided, ref C08)".

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Transport Assessment

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Main Report

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Transport Assessment executive summary

EX 1 Introduction

EX 1.1 This *Transport Assessment (TA)* presents the findings of the assessment of transport issues associated with the Thames Tideway Tunnel project.

EX 1.2 The *TA* considers the construction and operation of the Thames Tideway Tunnel project and examines issues at a strategic level and at a local level in the vicinity of each of the project sites.

EX 1.3 The assessment examines the likely significant construction impacts of the project on transport at three levels:

a. a project-wide assessment which identifies the strategic impacts associated with activity at all project sites

b. an assessment of a sub-area of central London around the Victoria Embankment Foreshore and Blackfriars Bridge Foreshore sites to examine the impacts arising from concurrent construction activity at those sites

c. site-specific assessments which identify the impacts in the local area around each of the individual project sites

EX 2 Proposed development

EX 2.1 The proposed development comprises a new tunnel beneath the River Thames to capture discharges from 34 combined sewer overflows (CSOs) to reduce pollution of the River Thames.

EX 2.2 The main tunnel would be approximately 25km long and would run from Acton Storm Tanks in the west to Abbey Mills Pumping Station in the east. Two long connection tunnels would also be constructed to deliver flows into the main tunnel:

a. the 1.1km Frogmore connection tunnel in Wandsworth

b. the 4.6km Greenwich connection tunnel passing through Greenwich, Lewisham and Southwark.

EX 2.3 At Abbey Mills Pumping Station the Thames Tideway Tunnel project would connect to the Lee Tunnel, which is currently under construction between Abbey Mills Pumping Station and Beckton Sewage Treatment Works.

EX 2.4 The project would require construction works at a total of 24 sites, comprising 23 sites along the length of the main and connection tunnels and a further site at Beckton Sewage Treatment Works.

EX 2.5 Some 16 of the 24 construction sites would be located adjacent to, or very near, the River Thames. At 11 of these sites, it is proposed that a proportion of construction materials would be transported by river. Road transport would be required for all or some construction materials at all sites.

Construction

EX 2.6 'CSO' sites would be used for works to intercept and control existing CSOs, typically including the construction of shafts and underground works to intercept CSOs and construct connections to the main tunnel.

EX 2.7 'Main tunnel' sites would be used for the construction of the main tunnel. Works would include the construction of a shaft from which the tunnel boring machines would either be driven or received. Main tunnel sites would be located at Acton Storm Tanks, Carnwath Road Riverside, Kirtling Street, Chambers Wharf, Abbey Mills Pumping Station and Greenwich Pumping Station (for the Greenwich connection tunnel). Where necessary, CSO interception works would also take place at main tunnel sites.

EX 2.8 Construction at Beckton Sewage Treatment Works would be required to enable the existing Works to cater for the additional volume of combined sewage flows.

EX 2.9 For the purposes of the assessment the estimated start date for the overall construction programme is in early 2016 and construction would last for just under seven years, finishing towards the end of 2022. Construction programmes at individual sites would vary within this overall programme and therefore peak construction activity would not occur at the same time on all sites.

EX 2.10 The amount and type of construction material to be imported to and exported from each site would vary depending on the nature of the construction activity required in each location.

EX 2.11 A *Code of Construction Practice (CoCP)* has been developed which contains measures to reduce transport impacts. These include heavy goods vehicle (HGV) management and control measures, the management of road and river access to and from sites and the anticipated hours during which vehicle movements would take place.

EX 2.12 A *Project Framework Travel Plan* has been prepared which provides a framework for the development of site-specific *Travel Plans* by the appointed contractors and contains requirements and guidelines to assist contractors in doing so.

Transport Strategy

EX 2.13 It is estimated that the project would require or generate a total of 7.99 million tonnes of construction material. The greatest proportion of material generated would be excavated material, representing approximately 59% of the total tonnage.

EX 2.14 The proposed *Transport Strategy* has been developed by considering a range of issues relating to the potential for construction materials to be transported by road, river and rail.

EX 2.15 The *Transport Strategy* envisages certain construction materials being transported by river directly to and from 11 of the project sites. These materials include cofferdam fill, excavated material from shafts, the main tunnel and other works and sand and aggregates for secondary tunnel linings. Not all of these materials would be transported by river at all sites.

EX 2.16 Where certain materials are to be transported by river, the target proportion to be moved by river is 100%. However, to allow for periods when river transport may be unavailable or for materials which are unsuitable for river transport, such as excessively wet spoil or any contaminated materials, the assessment has been based on transporting 90% of these materials by river with the remaining 10% by road. This equates to approximately 53% of the total tonnage of construction materials being transported by river in total.

EX 2.17 In addition to the transport of materials directly to and from project sites, there would also be a significant opportunity to source materials from suppliers which receive their goods or raw materials by river or rail. It is estimated that this could equate to approximately 30% of the total materials tonnage required across the construction programme.

Operation

EX 2.18 During the operational phase the only activity expected to take place at the project sites would be that associated with periodic maintenance and inspection. Regular maintenance visits would occur every three to six months with more significant maintenance and inspection activity expected approximately once every ten years. These activities would be short-term and limited to the vicinity of each of the project sites.

EX 3 Engagement

EX 3.1 A range of consultation and engagement has been undertaken to inform the development of the transport-related aspects of the design of the project and the methodology for the *TA*.

EX 3.2 Transport for London (TfL) is the strategic transport authority for London. It has been consulted in relation to pedestrian and cycle routes and facilities, public transport services including those on the river and highway network and operation issues.

EX 3.3 Each of the London boroughs in whose areas project sites would be located has been consulted in its capacity as local highway authority (LHA) in relation to transport issues.

EX 3.4 The Greater London Authority (GLA) and Port of London Authority (PLA) have been consulted on project-wide issues, including the strategy for transporting construction materials.

EX 3.5 Engagement with stakeholders has included meetings with individual LHAs to discuss the proposals, the requirements for access to project sites and the proposed methodology for the *TA*. Technical meetings have been held with TfL to discuss the strategic and local highway modelling methodology, the scenarios to be tested and a number of the primary assumptions for the analysis.

EX 3.6 A number of workshops jointly attended by TfL and the LHAs have been held to provide briefings on the transport issues at each of the project sites and discuss proposals for each site in detail and potential refinements.

EX 3.7 Workshops have been held with TfL, the PLA, the GLA and the LHAs as part of the development of the *Transport Strategy*.

EX 3.8 Draft copies of the *TAs* for all of the project sites to were provided to TfL and the relevant LHAs for comment and further workshops have been held to discuss these comments in more detail.

EX 3.9 Where possible, comments received from these and other stakeholders throughout the engagement process have been taken into account in the *TA*.

EX 4 Methodology

Baseline conditions

EX 4.1 The *TA* identifies existing (baseline) conditions on the transport networks at both strategic level and in the vicinity of project sites.

EX 4.2 Relevant national, regional and local transport policy has been reviewed and considered as part of the assessment. A range of technical guidance has been identified and forms the basis for the assessment methodology and the design of the proposals.

EX 4.3 Baseline conditions have been identified using site visits, desk-based collation of available information from TfL and the LHAs and field survey data collection.

EX 4.4 Existing walking and cycling networks and facilities have been identified, including pedestrian crossings, cycle routes and cycle parking in the vicinity of each site. Pedestrian and cycle flows have been derived primarily from field survey sources.

EX 4.5 Existing public transport services operating in the area surrounding each site have been identified. These include bus, London Underground, London Overground, Docklands Light Railway (DLR) and river passenger services. The Public Transport Accessibility Level (PTAL) at each of the proposed sites has been determined using standard methodology specified by TfL. This provides a standardised measure of the overall availability of public transport in each location.

EX 4.6 The typical patterns of vessel movements on the River Thames have been identified based on published river passenger service timetables and discussions with vessel operators, including those operating freight traffic.

EX 4.7 Existing traffic conditions on the local highway network have been established from field surveys and from existing traffic models and traffic count information made available by TfL and the LHAs. This information has been supported with information from strategic highway network models provided by TfL and through the development of local junction capacity models to represent baseline conditions.

EX 4.8 On-street parking provision and availability has been determined from site visits and field surveys. Coach parking facilities and on-street loading bays have also been identified.

EX 4.9 Accident data for the most recent five year period available has been collated and analysed for the local roads in the vicinity of each of the sites.

EX 4.10 Field survey data collection has been undertaken to provide comprehensive information on traffic, pedestrian and cycle flows and parking usage in the vicinity of each of the sites. Fieldwork was primarily undertaken between May and July 2011, with further phases of work undertaken in August 2011 and May and June 2012.

Construction assessment

EX 4.11 The construction assessment compares a base case, which represents transport conditions in the assessment year without the project, with a development case, which represents conditions in that year with the project under construction.

Assessment years

EX 4.12 The duration and nature of construction activity would vary from site to site and not all sites would experience peak activity at the same time within the overall construction programme.

EX 4.13 The assessment years therefore differ for the project-wide and site-specific assessments and different sites may also have different assessment years.

EX 4.14 At the project-wide level, the highway network assessment has been undertaken for the year in which the total number of daily construction lorry movements to and from all sites would be greatest. At the site-specific level, the period in which the number of daily construction lorry movements at each site is expected to be greatest at each site has been used for the highway network assessment.

EX 4.15 Consideration has also been given to the impacts that might arise at other times, when the combined number of daily construction lorry movements for the western, central and eastern groups of sites would be greatest.

EX 4.16 The assessment year for the pedestrian, cycle and public transport networks at each site is the same as that for the highway network. This ensures that any impacts related to changes in highway network operation reflect the greatest number of construction lorry movements. As the number of construction personnel would remain relatively constant throughout the project these years are also appropriate in relation to the movements of construction workers.

EX 4.17 The assessment of impacts on river movements has been based on the month in which the number of barges required would be greatest in total for the project-wide assessment and greatest at each site for the site-specific assessments.

EX 4.18 A movement is defined as a journey made in one direction (ie from an origin to a destination) by a vehicle or barge. In the course of a visit to the site, a vehicle or barge makes two movements, one to and one from the site.

Assessment areas

EX 4.19 For the pedestrian and cycle network the assessment has considered the routes to, through and around each of the project sites.

EX 4.20 The assessment area for the public transport networks typically includes services within walking distances of 640m and 960m from the site for bus and rail/river services respectively, which are consistent with the thresholds used in the PTAL methodology.

EX 4.21 For the project-wide assessment of the highway network, strategic Highway Assignment Models (HAMs) provided by TfL have been used. There are five of these models, which together cover the whole of the Greater London area. Three of the models have been used in this assessment, for west, central and east London, which cover the full extent of the route of the Thames Tideway Tunnel.

EX 4.22 The extent of the local highway network assessment area for each site includes the site access locations, immediately adjacent junctions and, as a minimum, the construction vehicle route between the site access and the first junction on the Transport for London Road Network (TLRN) or the Strategic Road Network (SRN). Beyond this, the assessment area has been informed by considering the volume of construction traffic and the degree of impact that would be experienced at the nearest junction of the construction vehicle route with the TLRN or SRN.

Base case conditions

EX 4.23 Construction and operational base case conditions for pedestrians and cyclists take into account definitive proposals to change these networks where relevant including proposals for additional pedestrian and cycle routes.

EX 4.24 Planned commitments to public transport infrastructure or service improvements have been identified. These are generally intended to increase public transport capacity either to meet general growth in public transport demand (patronage) or to provide significant enhancement on particular routes.

EX 4.25 Future patronage changes on public transport services will be driven by a range of complex factors and there are inherent uncertainties in setting a patronage level for a future year. Therefore, in order to ensure that the busiest base case scenario has been used when assessing the impact of additional construction worker journeys by public transport, the capacity for bus, rail and river services in the construction base case has been assumed to remain the same as the capacity in the current baseline situation. This means that the assessment has taken no advantage of any additional capacity that might become available in future years.

EX 4.26 The underlying pattern of river use has not substantially changed in recent years, but the Mayor of London and TfL actively promote the use of the river for both passengers and freight. However, it is difficult to determine what the scale and nature of any change might be and therefore the construction base case for assessing the impacts on river movements has been assumed to be the same as the baseline situation.

EX 4.27 For the strategic highway network, the base case models have been taken as being the 2021 forecast year HAMS. These include a range of planned highway network changes up to that date. Local junction capacity models for the construction base case have been created by applying traffic growth factors derived from the HAMs for each local authority to the baseline models.

EX 4.28 Account has been taken of committed developments in the surrounding area which may be under construction or completed by the relevant assessment year.

Walking and cycling

EX 4.29 Physical changes to pedestrian and cycle routes arising from the proposals at each construction site have been identified. The implications of those changes have been examined in relation to pedestrian and cycle journey times, safety and levels of pedestrian and cycle demand.

EX 4.30 Consideration has also been given to any linkages to key pedestrian or cycle destinations that would be affected by the project, including for example, links to public transport stops and interchanges, other significant destinations and access to the Thames Path.

Public transport

EX 4.31 The anticipated number of public transport journeys by construction workers has been compared to the typical capacity of local public transport services. This enables the additional demand to be expressed as a proportion of total capacity and equated to an additional number of passengers per service.

EX 4.32 The assessment has also recognised that bus services may be affected by changes occurring on the highway network as a result of the construction of the project. Where relevant, the assessment has used the outcomes of the highway network assessment to indicate whether road-based public transport services would be likely to experience changes in journey time.

EX 4.33 The assessment has also considered the need for relocation or reprovision of set-down, pick-up or standing facilities for both taxis and coaches in the vicinity of construction sites.

River movements

EX 4.34 The implications of barge movements on the River Thames in the immediate area of each relevant project site have been examined by comparing the number of river movements generated by that site with the anticipated base case level of activity on the river at that location.

EX 4.35 Separate *Navigational Issues and Preliminary Risk Assessments* have been undertaken for each site at which river transport is proposed, in order to define the specific navigational issues that might arise as a consequence of barge movements, loading and unloading facilities and other changes associated with the project. These are reported separately from the *TA*, to accompany the application for development consent documentation.

Parking

EX 4.36 The assessment has examined whether the works at each project site would result in a temporary or permanent change to car parking provision. Where appropriate, it has identified whether and how alternative provision could be made to accommodate such displacement and the impact on parking provision and activity that would result.

EX 4.37 The project aims to minimise the number of car journeys made by workers to and from sites. The *Project Framework Travel Plan* and site-specific *Travel Plans* to be developed by site contractors would contain measures to achieve this aim.

EX 4.38 Parking for construction workers would not be provided at the project sites, except at Abbey Mills Pumping Station and Beckton Sewage Treatment Works. Furthermore, parking in surrounding streets is already controlled at many of the sites and this would discourage workers from travelling by car. However, it is recognised that at some sites parking in surrounding streets is not controlled and therefore the assessment for those sites takes account of a proportion of workers driving to and from the site. This does not detract from the measures proposed in the *Project Framework Travel Plan*.

Strategic highway network assessment

EX 4.39 The strategic highway network modelling has allowed changes to delay and journey time to be identified that might arise on the wider highway network as a consequence of additional traffic demand and/or the reassignment of traffic from busier to less busy routes to optimise network performance.

EX 4.40 The approach to modelling the highway network at a strategic level has been based on the use of existing TfL HAMs. These models are used by TfL to predict future highway network conditions and have been developed using GLA employment and population forecasts, which are based on the employment and housing projections set out in the London Plan.

EX 4.41 The HAMs have baseline years of 2008 / 2009 and a forecast year of 2021. In order to provide consistency between this assessment and the work already done by TfL, it has been agreed with TfL that the 2021 forecast year from the HAMs would be used to represent the construction base case for this assessment.

EX 4.42 The construction traffic related to project sites would comprise construction lorry movements and operational construction vehicles (for example small deliveries, contractors' supervision staff and maintenance vehicles). The potential for worker journeys to be made by car to certain sites has also been included.

EX 4.43 The aggregated average peak hour numbers of these movements for the assessment years have been added to the three TfL 2021 forecast year HAMs. This has produced a 'project-wide peak' scenario.

EX 4.44 The assessment has been based on 10% of the average daily number of lorry journeys occurring in the peak hours, which has been agreed with TfL as a reasonable approach.

EX 4.45 Highway network changes associated with the project have been incorporated into iterations of the strategic modelling to ensure that any wider implications have been identified and addressed in the overall assessment.

EX 4.46 Construction lorry routes have been discussed and refined with TfL and the LHAs. The routes have been identified using the following criteria:

a. using the quickest route from the site to the TLRN or SRN

b. keeping to the TLRN / SRN where possible and minimising use of lower class roads

c. avoiding routes with height / weight / width restrictions and banned turns

d. avoiding heavily congested routes where possible.

EX 4.47 Construction lorry trips have been assigned to the HAMs on this basis, together with other vehicle associated with construction and worker car trips where relevant.

EX 4.48 The overall statistics from the HAMs have been used to identify the degree of change to delay on the network in each of the three modelled areas. The model outputs have also been examined to identify locations where changes in journey times would be significant.

Local highway network assessment

EX 4.49 Local junction capacity models have been developed for relevant locations in the vicinity of each of the sites. These provide a platform from which local construction base case models have been developed.

EX 4.50 Baseline models have been developed using appropriate junction modelling software, including the PICADY, LinSig and TRANSYT software packages. TfL modelling guidelines have been used as the basis for preparing and checking models and their outputs.

EX 4.51 Models for the construction base case have been created by applying traffic growth factors derived from the TfL HAMs to the baseline models. This provides consistency with the strategic highway network modelling.

EX 4.52 As they have been derived from the HAMs, these growth factors include anticipated changes in traffic as a result of other development and infrastructure schemes. Where necessary, physical and traffic demand changes associated with other developments or infrastructure changes which are not adequately covered by the HAMs have been incorporated in the local construction base case models.

EX 4.53 The average peak hour construction vehicle numbers have been added to the local construction base case models to produce equivalent construction development case models. These include any construction traffic from other Thames Tideway Tunnel project sites that would pass through the junction being modelled.

Sub-area highway network assessment

EX 4.54 In addition to the project-wide and site-specific assessments, traffic modelling has been undertaken for a sub-area of the highway network in central London using a VISSIM traffic microsimulation model.

EX 4.55 This sub-area assessment considers the impacts that might arise on Victoria Embankment (A3211) between the Victoria Embankment Foreshore and Blackfriars Bridge Foreshore sites because of concurrent construction activity and associated highway network alterations at these two sites.

EX 4.56 The sub-area assessment covers Victoria Embankment (A3211) between Westminster Bridge (A302) and Blackfriars Bridge (A201) and includes the junctions at these bridges and the intermediate junctions along the route.

EX 4.57 A number of scenarios representing different points in the construction programme at the two sites have been considered.

EX 4.58 A baseline VISSIM model has been developed and validated against observed conditions. Construction base and development case models have been developed from this baseline model, using a similar method to that described for the local junction assessments.

Committed developments

EX 4.59 Other developments within 1km of each site which are likely to be under construction or complete by the assessment year have been identified. Where possible, information on the expected number of journeys generated by those developments and on any physical changes proposed to the highway network has been collated.

EX 4.60 As the HAMs used for the strategic highway network assessment already take account of forecast changes in employment and population, derived from the London Plan, this means that the strategic level assessment inherently takes into account future development across London. It also means that the growth factors used in the local highway network assessment, which have been derived from the HAMs, also take account of new development.

EX 4.61 However, for the assessment of the project sites at Kirtling Street, Heathwall Pumping Station and Albert Embankment, specific additional account has been taken of development proposals in the Nine Elms Opportunity Area and surroundings. This has been done to ensure that the modelling of the local highway network and demands around those sites is reasonably representative of future conditions.

Sensitivity testing

EX 4.62 The ‘core’ assessment presented in the *TA* has been based on the proposed *Transport Strategy*.

EX 4.63 Discussions have taken place with TfL on the need for sensitivity testing within the highway network assessment to address the possibility of

a. variation in construction vehicle numbers on a daily basis

b. increases in lorry movements as a result of temporary operational issues affecting the ability to move construction materials by river

c. changes in programme which might alter the times at which peak construction activity occurs or might increase the scale of the project-wide peak of activity.

EX 4.64 If construction vehicle numbers were to exceed the average daily figure for the peak months, this would be infrequent in the context of the overall construction programme bearing in mind that the assessment has been based on the peak month of construction activity at each site, rather than a lower 'typical' month.

EX 4.65 The use of river transport for certain construction materials forms part of the *Transport Strategy* and therefore it is not likely that all materials would be moved by road at all sites. If river transport were not available for operational reasons, this is likely to affect only particular sites or to occur for short periods of time. In practice the potential for peak construction activity at different sites to coincide would be limited because of the sequential nature of the construction activities required.

EX 4.66 Nevertheless a sensitivity test has been undertaken within the *TA* to identify the potential impacts of higher construction lorry numbers. The sensitivity test has been based on the number of construction lorry movements that would be related to moving all construction materials by road. This has been assumed to act as a proxy for events of this nature to give a reasonable sensitivity test and does not detract from the proposed *Transport Strategy*.

Operational assessment

EX 4.67 During operation of the Thames Tideway Tunnel project the only transport activities expected would relate to maintenance and inspection of equipment, shafts and tunnels. The transport demands created in the operational phase would therefore be limited to occasional maintenance visits to each site every three to six months, and the use of larger cranes and associated support vehicles required for access to the shafts and tunnel every ten years. It is anticipated that this would present no significant issues for the transport networks, as maintenance trips to the site would be infrequent and short-term.

EX 4.68 As a result, quantitative analysis has not been required to assess the operational phase and the assessment has been based on qualitative professional judgement.

EX 4.69 Operational assessments have been undertaken at a site-specific level only. As transport activity associated with this phase is expected to be very low, there is no requirement to address project-wide operational issues within the assessment.

EX 4.70 The operational assessment has been limited only to those transport networks and users that might be affected. Typically these are limited to the highway network and the issues associated with maintenance vehicles accessing sites. Where necessary, impacts on pedestrians, cyclists, public transport and parking have also been considered.

Assessment years

EX 4.71 The assessment year for the operational phase at all sites is Year 1 of operation by which time all construction work would be complete and any permanent structures and changes to transport routes and networks would be in place. As transport activity associated with the operational phase would be very low, there is no requirement to assess any other year.

Assessment areas

EX 4.72 The assessment areas for the operational assessment are the same as for the construction assessment, insofar as these areas are relevant to the operational phase.

EX 5 Project-wide assessment

EX 5.1 The project-wide assessment has considered the likely impacts that would arise at a strategic level on London's public transport, river and highway networks as a result of activity associated with all project sites. Impacts at the local level, including the consideration of impacts on pedestrians and cyclists, have been addressed in the site-specific assessments.

Baseline

EX 5.2 The majority of the sites have PTAL indices of 3 ('moderate') or more and eight of the sites have PTAL indices of 5 ('very good') or more. Only four sites are rated with less than 'moderate' public transport accessibility (Acton Storm Tanks, Barn Elms, Carnwath Road Riverside and Beckton Sewage Treatment Works).

EX 5.3 Bus services are available within 640m of all sites, which is the walking distance threshold specified in the PTAL methodology. 18 of the sites also have at least one form of rail service (London Underground, London Overground, DLR or National Rail) within the threshold of 960m walking distance and all but one have rail services within 1.6km or 20 minutes walk. Nine sites have river services available within 960m of the site. There are therefore good opportunities for construction workers to make use of public transport facilities to access project sites.

EX 5.4 The River Thames is used by freight operators, leisure users and marine emergency services. Leisure use tends to be greater in the upstream stretches of the river. Approximately 20 river movements a day pass the Putney Embankment Foreshore site and this increases to around 50 movements a day in the vicinity of Cremorne Wharf Depot. The busiest section of the river is that downstream of the Victoria Embankment Foreshore site, where up to 280 river movements a day can be experienced.

EX 5.5 All sites are served by road access and construction vehicle routes have been identified which use the TLRN and SRN as far as possible.

Construction vehicle and barge movements

EX 5.6 Construction of the project would last for approximately seven years. Certain construction materials would be transported by river at 11 of the 24 sites and the remaining materials, and all materials at other sites, would be transported by road.

EX 5.7 When the combined number of construction lorries is greatest across the project, in Project Year 4, a total of some 880 construction lorries per day would be required.

EX 5.8 The sites generating the greatest number of lorry movements in total over the whole construction period would be the main tunnel drive sites at Carnwath Road Riverside, Kirtling Street and Chambers Wharf and the connection tunnel site at Greenwich Pumping Station.

EX 5.9 A maximum of nine barges a day would be required across the project when barge activity is greatest overall, which would occur in Project Year 2. The sites generating the greatest number of barge movements in total over the whole construction period would be the main tunnel sites at Carnwath Road Riverside, Kirtling Street and Chambers Wharf.

EX 5.10 It is anticipated that the total number of construction workers working on sites at any one time would be approximately 2,300 workers.

EX 5.11 The *Project Framework Travel Plan* contains measures to discourage workers from travelling by car and these would be developed further in the site-specific *Travel Plans*. There would be no on-site parking for workers other than at the Abbey Mills Pumping Station and Beckton Sewage Treatment Works sites, which are within existing Thames Water facilities. For the purposes of the assessment, the strategic highway modelling allows for the possibility that workers might drive to these sites, and might drive to six other sites (Acton Storm Tanks, Carnwath Road Riverside, Dormay Street, Falconbrook Pumping Station, Earl Pumping Station and Deptford Church Street) and park in surrounding roads, although this does not detract from the aims of the *Project Framework Travel Plan*.

EX 5.12 The assessment has therefore been based on around 67% of construction worker journeys being made by public transport and a further 16% on foot or by cycle. The assessment assumes a maximum of approximately 13% to 14% of workers driving to sites across the project.

Construction assessment

Public transport

EX 5.13 During construction, the project-wide assessment shows that there would be no significant impact on public transport patronage as a result of the additional journeys to and from project sites by construction workers, as these would be spread across the bus, rail and river networks in London. The strategic and sub-area highway network modelling indicates that any changes to bus journey times would be very small and would not be significant.

River movements

EX 5.14 The project-wide issues associated with river transport relate to the number of additional barge movements that would be introduced to the River Thames. This would fluctuate during the project depending upon the phasing of the overall construction programme and the nature and volumes of materials being transported at any particular time.

EX 5.15 Separate *Navigational Issues and Preliminary Risk Assessments* have been undertaken at sites where it is proposed to use the river to transport construction materials. These examine whether any specific impacts on navigation or navigational risk would arise and are reported separately outside the *TA*.

EX 5.16 Barges would be hauled to and from project sites by tugs towing one or two barges at a time. The number of barges towed would depend on barge size, tidal and mooring conditions at each site. The maximum barge requirement across the project would be nine barge deliveries and collections per day, which equates to approximately eight river transit movements in each direction.

EX 5.17 The total number of project barge movements at a given point on the River Thames would be greater further downstream. The assessment concludes that there would be a negligible impact on river users upstream of Carnwath Road Riverside, a minor impact between Carnwath Road Riverside and Kirtling Street and a moderate impact downstream of Kirtling Street.

Strategic highway network

EX 5.18 The strategic highway network assessment takes account of the additional construction vehicle movements associated with the project and the changes that would be created to the highway network at Blackfriars Bridge Foreshore and Deptford Church Street, as agreed with TfL.

EX 5.19 The strategic modelling shows that the highest concentrations of construction lorry movements would occur on the A2 corridor comprising Shooters Hill Road, Rochester Way Relief Road and East Rochester Way (18 lorries per hour per direction), on Nine Elms Lane (A3205) (nine lorries per hour per direction), on Newham Way (A13) and the A12 between Blackwall and Bow (seven lorries per hour per direction) and on Camberwell New Road (A202) and the South Circular Road (A205) (up to five vehicles per hour per direction).

EX 5.20 These additional lorry movements would be very low compared to total flows on these parts of the road network. The routes identified already carry significant volumes of traffic and therefore the number of additional vehicles would be insignificant.

EX 5.21 Statistics from the strategic models show that overall increases in journey times would be very small (less than 1%) compared to those without the additional project traffic on the network. Changes in delay of more than one minute at particular locations in the model would be limited and would not be directly related to project construction traffic.

EX 5.22 It has been estimated that over the whole of the project programme the total distance travelled by project construction lorries would be in the order of 11.2 million km. Using network-wide accident rates for London this would potentially lead to an additional seven accidents over the duration of the project, or approximately one additional accident per year.

EX 5.23 The *CoCP* sets out the measures through which the objective of safeguarding road safety and minimising the risk of accidents would be pursued at both project-wide and site-specific levels. Statistics from TfL suggest that in 2011 there were over 24,400 road traffic collisions, leading to a total of 29,250 casualties. Against this background and bearing in mind the measures proposed to minimise the risk of accidents, the potential for one additional accident to occur per year as a result of the movement of construction vehicles is not statistically significant.

EX 5.24 In total there would be approximately 17 hazardous loads per week on average across the whole of the Thames Tideway Tunnel project. These include fuel deliveries. Hazardous load movements would be managed in accordance with relevant legislation and good practice.

EX 5.25 As these movements would be distributed across the highway network in London the impact of hazardous load movements is considered to be very low.

Sub-area highway network

EX 5.26 The sub-area VISSIM modelling provides an assessment of how the network on Victoria Embankment (A3211) would be affected by concurrent construction work at Victoria Embankment Foreshore and Blackfriars Bridge Foreshore.

EX 5.27 A number of scenarios have been tested to represent different combinations of construction activity and traffic management at these two sites during the construction period.

EX 5.28 The sub-area modelling shows that on Victoria Embankment (A3211), the greatest increases in journey time for any of the scenarios tested would be between 20 and 45 seconds in the westbound direction between Blackfriars Bridge (A201) and Westminster Bridge (A302). These changes arise from local reductions in lane width at the Victoria Embankment Foreshore site and on the westbound slip road at Blackfriars Bridge.

EX 5.29 In the eastbound direction between Westminster Bridge (A302) and Blackfriars Bridge (A201) the assessment shows that the greatest increase in journey time would be approximately 25 seconds in the eastbound direction over the length of the modelled network. This arises from the changes in operation of the Blackfriars Bridge junction as a result of the closure of the westbound slip road in the later phase of construction at the Blackfriars Bridge Foreshore site.

EX 5.30 The sub-area model does not cover the wider network and therefore journey times on diversion routes for periods when the westbound slip road at Blackfriars Bridge Foreshore would be closed are not recorded. However, the results of the strategic highway assessment using the HAMs show that there would be no changes to journey times of more than one minute on the wider network in this area.

EX 5.31 In the context of the overall operation of the network these changes are not considered to be significant and would be less than one additional minute in all cases over a route of approximately 2km.

Sensitivity testing

EX 5.32 Sensitivity testing on the operation of the strategic highway network, assuming a higher level of construction lorry movements and for the peak month of activity that this would produce, shows that the overall changes to journey times would not be significant using the sensitivity test assumptions. Changes to delay of more than one minute have been indicated in a very small number of locations under this scenario and inspection of the modelling indicates that these would not be directly related to project construction traffic.

Operation

EX 5.33 During the operational phase the only activity associated with the project would be that related to maintenance. This activity would be infrequent and the number of vehicle movements involved would be very low. Any short-term changes or impacts on transport networks would occur at a local level in the vicinity of project sites and a project-wide assessment of the operational phase has not been necessary.

EX 6 Acton Storm Tanks

EX 6.1 The site is located on land within the existing Thames Water pumping station and storm water tanks fronting Warple Way and Canham Road. It is bounded by Canham Road to the north, Warple Way to the east and southeast and an area of open land currently used for car parking to the west and southwest.

EX 6.2 A temporary construction access would be created off Canham Road, on the northern perimeter of the site with a left turn in and left turn out arrangement.

EX 6.3 To accommodate larger construction vehicle manoeuvres on the one-way route along Warple Way, Canham Road and Stanley Gardens, a total of 15 parking spaces would need to be restricted on these roads.

EX 6.4 Construction at the Acton Storm Tanks site is anticipated to last for approximately three years. All construction materials would be transported by road at this site.

EX 6.5 In the peak month of construction lorry movements, which would occur in Site Year 2, the site would generate an average of 23 lorries or 46 lorry movements per day. The site is expected to require a maximum workforce of 40 people on site at any one time.

EX 6.6 During construction pedestrians on Canham Road may experience minor changes to journey times as a result of the need to cross the site access point. Pedestrian movements on other routes would be unaffected. Cyclists in the area would experience no significant additional delay. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 6.7 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 6.8 The temporary restriction of 15 parking spaces in Warple Way, Canham Road and Stanley Gardens would not lead to any significant impacts on parking as spare capacity to accommodate displaced demand would exist in the area.

EX 6.9 The additional movements associated with construction traffic at this site would not have a significant impact on the operation of the nearby junctions on The Vale (A4020) at Warple Way and Stanley Gardens.

EX 6.10 During the operational phase there may be a need for temporary restriction of parking spaces on Warple Way, Canham Road and Stanley Gardens when large cranes require access to the site for major maintenance work, to allow these vehicles to manoeuvre safely. These occurrences would be infrequent and short term and would have no significant impact overall on parking and the operation of the highway network.

EX 7 Hammersmith Pumping Station

EX 7.1 The site is part of the cleared area known as Hammersmith Embankment / Fulham Reach which is located at the corner of Chancellor’s Road and Distillery Road. It is bounded by the Thames Water Hammersmith Pumping Station and a vacant former industrial site to the west, Chancellor’s Road to the north, Distillery Road to the east and Winslow Road to the south.

EX 7.2 Access to the site would be via the existing access from Distillery Road with a right turn in and left turn out only arrangement. Minor kerb works to modify the junction of Chancellor’s Road with Distillery Road would be required to ensure the safe movement of construction vehicles to and from the site.

EX 7.3 It would be necessary to extend the restricted hours applying to single yellow lines to 07:00 to 19:00 Monday to Saturday along Chancellor’s Road and Distillery Road. One parking space on the southern side of Chancellor’s Road east of the junction with Distillery Road would need to be restricted during construction to enable large construction vehicles to make the left-turn into Distillery Road. Construction vehicle movements would be managed along the rest of Chancellor’s Road so that larger vehicles would not be required to pass each other at sections where on-street parking is located.

EX 7.4 Construction at Hammersmith Pumping Station is anticipated to last for approximately 32 months. All construction materials would be transported by road at this site.

EX 7.5 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 21 lorries or 42 lorry movements per day. The site is expected to require a maximum workforce of 45 people on site at any one time.

EX 7.6 During construction pedestrians using Distillery Road may experience minor changes to journey times as a result of the need to cross the site access point. Pedestrian movements on other routes would be unaffected. Cyclists in the area would experience no significant additional delay. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 7.7 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 7.8 The temporary restriction of one parking bay on Chancellor's Road and extension of the restricted hours on single yellow lines on Chancellor's Road and Distillery Road would not have a significant impact on parking activity in the area.

EX 7.9 The operation of the highway network would not be affected by the additional construction vehicle movements associated with this site.

EX 7.10 During the operational phase there may be a need for temporary restriction of parking on Chancellor's Road and Distillery Road when large vehicles require access to the site for major maintenance work, to allow these vehicles to manoeuvre safely. These occurrences would be infrequent and short term and would have no significant impact overall on parking and the operation of the highway network.

EX 8 Barn Elms

EX 8.1 The site is located in the southern section of the Barn Elms Schools Sports Centre and associated playing fields.

EX 8.2 The site would be accessed from Rocks Lane (A306) via Queen Elizabeth Walk. A new access road would be constructed across the northern and eastern regions of the Barn Elms Sports Centre and playing fields to serve the construction site in the southern area. This access would be segregated from pedestrians, cyclists and other vehicles by fencing. It would be necessary to temporarily restrict approximately 30 parking spaces in the Sports Centre car park.

EX 8.3 Construction at the Barn Elms site is anticipated to last for approximately 26 months. All construction materials would be transported by road at this site.

EX 8.4 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 22 lorries or 44 lorry movements per day. The site is expected to require a maximum workforce of 40 people on site at any one time.

EX 8.5 During construction there would be no significant impact on pedestrians using the area. The construction vehicle route between Queen Elizabeth Walk and the site would be segregated using fencing. Construction activity would be minimised at times of heavier recreational use of the playing fields and construction vehicle movements would not take place on Saturday afternoons or on Sundays. Cyclists in the area would experience no significant additional delay. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 8.6 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 8.7 Although approximately 30 spaces would be restricted in the Sports Centre car park, it is anticipated that it would be possible to rearrange the existing parking layout to reprovide a proportion of the restricted spaces elsewhere within the car park. The impacts on parking have been assessed as not significant.

EX 8.8 There would also be no significant impact on the operation of the local highway network as a result of the additional construction vehicle movements.

EX 8.9 During the operational phase there may be a need for temporary traffic management to enable large cranes to access the site for major maintenance work. These occurrences would be infrequent and short term and would be appropriately managed. They would therefore have no significant impact overall on pedestrians, cyclists, parking or the operation of the highway network.

EX 9 Putney Embankment Foreshore

EX 9.1 The site is located in the southern foreshore of the River Thames, to the west of Putney Bridge. It is bounded to the south by Embankment and Lower Richmond Road (B306) and to the north by the River Thames. A public slipway is located within the site at the eastern end of Embankment.

EX 9.2 A further site area for construction of a temporary slipway is located adjacent to Embankment 300m to the west of Putney Bridge. Putney Pier lies to the west of the site.

EX 9.3 Access to the main site would be via a new access point close to the junction of Embankment and Lower Richmond Road (B306). Access to the temporary slipway site would be from Embankment via Glendarvon Road.

EX 9.4 Pedestrian route diversions would not be required past the main site. Ten cycle stands at the eastern end of Embankment would be relocated approximately 20m to the west.

EX 9.5 The existing slipway at this location would be closed during construction and a temporary slipway would be provided approximately 300m to the west on Embankment. This would be completed before the existing slipway is closed.

EX 9.6 To allow large vehicles to access the main site approximately five parking spaces on Embankment would be restricted. The pedestrian refuge at the Lower Richmond Road (B306)/ Embankment junction would need to be removed to allow the movement of larger construction vehicles. A short length of the Embankment between the new site access and Lower Richmond Road (B306) would be converted to two way operation during construction at the main site.

EX 9.7 During construction of the temporary slipway, pedestrians would be diverted from the northern footway of Embankment onto a protected diversion route within the carriageway past the temporary slipway site. Cyclists would be diverted from the off-road cycle lane on the northern side of Embankment onto the carriageway past the temporary slipway site.

EX 9.8 Construction vehicles would approach the temporary slipway site via Glendarvon Road and Embankment and return to Lower Richmond Road (B306) via Thames Place. Temporary traffic management would be required at the site access point. The vehicle lane width of Embankment would be reduced in order to provide a protected pedestrian route past the site.

EX 9.9 During construction of the temporary slipway it would be necessary to restrict approximately 34 parking spaces on Embankment and six parking spaces at the southern end of Glendarvon Street to allow for the movement of construction vehicles.

EX 9.10 Construction at the Putney Embankment Foreshore site is anticipated to last for three and a half years. The construction of the temporary slipway would be undertaken prior work on the main site and would last approximately three months.

EX 9.11 During construction, a proportion of construction materials would be transported by river and the remainder by road.

EX 9.12 In the peak month of construction lorry movements, which would occur in Site Year 2, the site would generate an average of 21 lorries or 42 lorry movements per day. The peak month of barge activity would occur in Site Year 3, when an average of two barges would be required per day. The site is expected to require a maximum workforce of 50 people on site at any one time.

EX 9.13 During construction there would be no significant change to pedestrian routes or journey times. Cycle journey times would not be affected; cyclists would be diverted onto the carriageway for a short distance on Embankment. The pedestrian and cycle diversions required would be short and measures would be taken to ensure that these routes are safe and adequately signed.

EX 9.14 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 9.15 The impact on river navigation and access issues would be very small due to the low number of barges required at this site. Public access to the river would be maintained through the provision of the temporary slipway.

EX 9.16 The car parking restricted during construction of the temporary slipway would not be reprovided as there would be insufficient space available to do so. There could be some shortfall in parking availability in the immediate area as a result.

EX 9.17 The five parking spaces to be restricted on Embankment during construction of the main site would not be re-provided elsewhere. However, at this time there would be available capacity elsewhere on Embankment as parking spaces would have been reinstated following completion of the temporary slipway.

EX 9.18 Minor changes to the junction of Embankment with Lower Richmond Road (B306) would be required during works at the main site. There would be no significant impact on the operation of the junction.

EX 9.19 During the operational phase there may be a need for temporary restriction of parking spaces on Embankment when large cranes require access to the site for major maintenance work, to allow these vehicles to manoeuvre safely. These occurrences would be infrequent and short-term and would have no significant impact overall on parking and the operation of the highway network.

EX 10 Carnwath Road Riverside

EX 10.1 The site is located adjacent to the north bank of the River Thames and west of Wandsworth Bridge. It currently comprises light industrial/ warehouse uses and brownfield open land sites along a section of river frontage, including Whiffin Wharf and Hurlingham Wharf. The site is bounded to the north by Carnwath Road.

EX 10.2 Access to and from the site would take place from Carnwath Road via Wandsworth Bridge Road (A217). During the earlier construction phases two site accesses would be in use on Carnwath Road; the western of the two would only be used as an entry for emergency access or specific deliveries. During later construction phases the western access would be closed.

EX 10.3 The Thames Path links Carnwath Road to the riverside path and runs through the site. The route would diverted during construction but the overall length of this section of the Thames Path would remain the same.

EX 10.4 The ‘hail and ride’ service on bus route 424 would be affected by construction as buses would be unable to stop in the vicinity of the site. This would prevent passengers boarding and alighting on this section of Carnwath Road.

EX 10.5 To accommodate the site access and larger vehicles travelling along Carnwath Road, it would be necessary to restrict approximately 12 parking spaces on Carnwath Road. It would also be necessary to extend the restricted hours for the single yellow line parking restrictions on Carnwath Road, between Wandsworth Bridge Road (A217) and the western site boundary, to 07:00 to 19:00, Monday to Saturday.

EX 10.6 Kerb realignment on the left turn from Wandsworth Bridge Road (A217) into Carnwath Road would be undertaken to avoid larger construction vehicles overrunning the footway.

EX 10.7 Construction at the Carnwath Road Riverside site is anticipated to take approximately six years. During construction, a proportion of construction materials would be transported by river and the remainder by road.

EX 10.8 In the peak month of construction lorry movements, which would occur in Site Year 2, the site would generate an average of 45 lorries or 90 lorry movements per day. The peak month of barge activity would occur in Site Year 2, when an average of two barges would be required per day. The site is expected to require a maximum workforce of 165 people on site at any one time.

EX 10.9 During construction pedestrians may experience some delay when crossing the site accesses on Carnwath Road; however, such delays are likely to be small. There would be no other changes to pedestrian journey times. Cyclists using the Thames Path would not be delayed; those travelling through the junction of Wandsworth Bridge Road (A217) with Carnwath Road and Townmead Road would experience minor but insignificant delays. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 10.10 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 10.11 Bus passengers would not be able to hail bus route 424 on Carnwath Road adjacent to the site. This would affect only a small number of passengers and the route itself would continue to operate. Some passengers might have to walk further to catch a bus but could hail the service at Peterborough Road 20m to the north or use the existing bus stop on Townmead Road 260m to the east. Bus journey times would not be significantly affected.

EX 10.12 The impact on river navigation and access issues would be very small due to the low number of barges required at this site.

EX 10.13 There would be sufficient parking capacity available to accommodate demand displaced by the restriction of twelve parking spaces on Carnwath Road, or a small number of workers driving to the site and parking in the surrounding area, should that arise.

EX 10.14 Modifications to kerb alignments would be made to accommodate the turning movements of large vehicles. Additional construction vehicles and changes to the junction of Wandsworth Bridge Road (A217) with Carnwath Road and Townmead Road would result in a minor increase in average delays at this junction but the change would not be significant.

EX 10.15 During the operational phase there may be a need for temporary restriction of parking spaces on Embankment when large vehicles require access to the site, to allow these vehicles to manoeuvre safely. These occurrences would be infrequent and short-term and would have no significant impact overall on parking and the operation of the highway network.

EX 11 Dormay Street

EX 11.1 The site is located at Dormay Street, north of Armoury Way (A217). It is bounded by railway lines and a vehicle storage area to the north, the Causeway to the east and a maintenance depot to the west. The construction site would be located in two areas, one either side of Bell Lane Creek. It is proposed that the northern and southern sections of the site would be linked by a temporary ‘Bailey’ type bridge.

EX 11.2 Access to the site would be via Dormay Street. Dormay Street is a two-way cul-de-sac that leads to a number of small industrial units and a council depot.

EX 11.3 In order to provide adequate carriageway width for construction vehicles a section of parking on The Causeway opposite the site access would need to be removed for the duration of the construction works.

EX 11.4 Construction at the Dormay Street site is anticipated to last for just over two years. All construction materials would be transported by road at this site.

EX 11.5 In the peak month of construction lorry movements, which would occur in Site Year 2, the site would generate an average of 25 lorries or 50 lorry movements per day. The site is expected to require a maximum workforce of 70 people on site at any one time.

EX 11.6 During construction pedestrian and cycle routes in the vicinity of the Dormay Street site would not be altered. Some construction vehicles would use The Causeway, which provides a link to the Thames Path, but the number of these vehicles would be small and the size of vehicles limited by an existing weight restriction. Measures to ensure the safety of pedestrians and cyclists would be taken during construction. There would therefore be no significant impact on pedestrians and cyclists.

EX 11.7 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 11.8 A section of on-street parking on The Causeway would need to be removed to facilitate construction vehicle movements. However as the use of these spaces is very low there would be spare capacity available in other spaces on The Causeway.

EX 11.9 The additional construction traffic would not affect the operation of the highway network.

EX 11.10 During the operational phase road users may experience infrequent, short-term and temporary delays when large vehicles require access to the site. However in the context of the overall operation of the highway network this would not be significant.

EX 12 King George's Park

EX 12.1 The site is located at the northern end of King George's Park, adjacent to the entrance from Buckhold Road (A218). The site is bounded to the northwest by Buckhold Road (A218), to the south by King George's Park and to the east by Neville Gill Close.

EX 12.2 Access to and from the site would be from Neville Gill Close and would operate with a right turn in and left turn out arrangement. Construction lorries would be managed such that lorries do not attempt to pass in Neville Gill Close. Other traffic would continue to operate two-way. The pedestrian refuge at the junction with Buckhold Road (A218) would be retained and reconfigured to allow for the turning movements of construction vehicles.

EX 12.3 Existing pedestrian accesses to King George's Park would be maintained. An existing pedestrian route within the park would require diversion around the western perimeter of the construction site.

EX 12.4 Construction at the King George's Park site is anticipated to last for approximately two and a half years. All construction materials would be transported by road at this site.

EX 12.5 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 8 lorries or 16 lorry movements per day. The site is expected to require a maximum workforce of 40 people on site at any one time.

EX 12.6 During construction the diversion of a pedestrian route within the park would add some 40m to the journey distance for those using this path. This would cause only a minor increase in journey times. Other pedestrians would not be affected. Cyclists using the cycle route on Neville Gill Close may experience a slight increase in accident risk as a result of the movement of construction vehicles; however measures would be taken to ensure the safety of pedestrians and cyclists during construction.

EX 12.7 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 12.8 There would be no changes to car parking during the construction period. The minor changes to the junction of Neville Gill Close and Buckhold Road (A218), and the additional construction vehicle movements, would have no significant impact on the operation of the highway network in the vicinity of the site.

EX 12.9 During the operational phase road users may experience infrequent, short-term and temporary delays when large vehicles require access to the site. Temporary parking restrictions, or permits to park on yellow lines, may be required on Neville Gill Close for maintenance support vehicles at these times. In the context of the overall operation of the highway network this would not be significant.

EX 13 Falconbrook Pumping Station

EX 13.1 The site is located on York Road (A3205) and comprises the existing Thames Water pumping station and a disused toilet block to the south west. It is bounded by York Gardens Adventure Playground to the north, York Gardens to the east, the York Gardens Library and Community Centre to the south and York Road (A3205) to the west.

EX 13.2 Vehicle access to and from the site would take place from the southbound carriageway of York Road (A3205). There would be one entry point and one exit point arranged on a left turn in, left turn out basis.

EX 13.3 An existing pedestrian and cycle access to York Gardens from York Road (A3205) would be relocated to the south and pedestrians would be diverted along the eastern boundary of the site before gaining access to the gardens.

EX 13.4 For a short period of the construction works, a 1m diameter pipe would be installed below the eastern footway, which would require the closure of the footway. During this time pedestrians would be diverted onto the western footway of York Road. Pedestrians would be directed to cross York Road (A3205) at Lombard Road to the north and Plough Road to the south.

EX 13.5 The southbound bus stop on York Road (A3205) to the south of the pumping station would be revised to accommodate the site exit. This would result in buses stopping 10m closer to the Plough Road junction.

EX 13.6 Fourteen parking spaces including one blue badge holder space would need to be removed from the area around the library and community centre and the adventure playground to accommodate the site exit. The blue badge holder space would be reprovided in the nearest available location and the other 13 spaces would not be reprovided.

EX 13.7 Once construction is complete, the site accesses on York Road (A3205) would be removed and access for maintenance in the operational phase would be from Lavender Road. The pedestrian and cycle access to York Gardens would be reinstated and widened.

EX 13.8 Construction at the Falconbrook Pumping Station site is anticipated to last for approximately three years. All construction materials would be transported by road at this site.

EX 13.9 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 18 lorries or 36 lorry movements per day. The site is expected to require a maximum workforce of 40 people on site at any one time.

EX 13.10 During construction pedestrians using the eastern footway of York Road (A3205) would have to cross the two site access points, which could lead to occasional delays. For a short period, the eastern footway would be closed and pedestrians would have to cross to the western footway, though journey times would increase by less than one minute. Pedestrians walking to and from York Gardens would follow a diverted route but the change in journey times would be very small. Overall the impacts on pedestrian journey times would not be significant.

EX 13.11 Cyclists using York Road (A3205) and other routes in the surrounding area would not experience any significant change to journey times. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 13.12 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 13.13 The temporary removal of parking spaces adjacent to the library and community centre and the playground would not significantly affect parking activity in the local area, as there would be spare capacity elsewhere in surrounding streets to accommodate displaced demand.

EX 13.14 The change to journey times on this part of the highway network would be negligible and therefore there would be no significant impact on road users.

EX 13.15 During the operational phase, maintenance vehicles would access the site from Lavender Road. This may require measures to be taken to ensure the safety of pedestrians and cyclists in this area when large vehicles are manoeuvring. Additionally it would be necessary to restrict a maximum of 23 parking spaces in Winstanley Road, Newcomen Road, Darien Road and Ingrave Street to allow such vehicles to manoeuvre safely. This would have a limited and short-term impact on parking activity in the area.

EX 13.16 When large vehicles are required to visit the site, there may also be some minor delays to road users, although as these would be infrequent and short term there would be no overall impact on highway network operation.

EX 14 Cremorne Wharf Depot

EX 14.1 The site is located to the southeast of Lots Road and comprises a council depot, Cremorne Wharf and the Thames Water Lots Road pumping station. It is bounded to the northeast by the Chelsea Wharf development, to the east by the River Thames, to the southwest by the Lots Road Power Station site, and to the northwest by Lots Road.

EX 14.2 Access to the site would be from Lots Road. Construction vehicles would approach and leave the site via the junction of Lots Road / Cremorne Road/Cheyne Walk (A3220). During construction a one way system in and out of the site would be operated using the existing access points, which would be modified to accommodate large construction vehicles. Construction traffic would turn left into and right out of the site from Lots Road.

EX 14.3 The Thames Path runs along the southern footway of Lots Road. This footway would be closed for a short period to construct the crossovers for access to the site; at other times it would remain open and unobstructed.

EX 14.4 During construction four parking bays on Lots Road would be restricted and one blue badge holder bay relocated in order to enable two lorries to pass each other.

EX 14.5 Construction at the Cremorne Wharf Depot site is anticipated to last for three years. During construction, a proportion of construction materials would be transported by river and the remainder by road.

EX 14.6 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 12 lorries or 24 lorry movements per day. The peak month of barge activity would also occur in Site Year 1, when an average of one barge would be required per day. The site is expected to require a maximum workforce of 65 people on site at any one time.

EX 14.7 During construction pedestrians using Lots Road and the Thames Path may experience occasional delay at the site access points because of construction vehicle movements. However, as the anticipated number of construction vehicles is low, this would be an infrequent occurrence. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 14.8 Cyclists using Lots Road may experience some additional delay when travelling through the junction with Cremorne Road and Cheyne Walk (A3220) as a result of additional construction traffic demand at that junction. This would not be a significant change in the context of overall cycle journey times.

EX 14.9 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 14.10 The impact on river navigation and access issues would be very small due to the low number of barges required at this site.

EX 14.11 Although four parking spaces would be restricted on Lots Road, there would be spare capacity in the surrounding area to accommodate displaced demand. There would be no loss of parking for blue badge holders although one space would be relocated.

EX 14.12 Some minor physical changes would be needed to the site accesses. The additional construction vehicle movements would result in small increases in average delay at the junction of Lots Road with Cremorne Road and Cheyne Walk (A3220) although these increases would not be significant in the context of wider network operation.

EX 14.13 If the Lots Road / Cremorne Road / Cheyne Walk (A3220) junction were to be signalised as part of the Lots Road Power Station development, prior to or during construction works at Cremorne Wharf Depot, the assessment findings would remain similar and there would be no significant change to the operation of the highway network compared to the construction base case.

EX 14.14 During the operational phase the modified site access arrangements would be retained to allow for the movement of larger vehicles during more substantive maintenance activities. Road users may experience infrequent, short-term and temporary delays when large vehicles require access to the site. However in the context of the overall operation of the highway network this would not be significant.

EX 15 Chelsea Embankment Foreshore

EX 15.1 The site is located on the north foreshore of the River Thames. It comprises part of the foreshore and sections of the carriageway and footways of Chelsea Embankment (A3212), and a small section of Ranelagh Gardens.

EX 15.2 Construction at this site would take place in two locations, one on the foreshore of the River Thames and one in the eastbound carriageway of Chelsea Embankment (A3212).

EX 15.3 The site on the foreshore would be active throughout the construction period. The southern footway of Chelsea Embankment (A3212) would generally be closed, but would be reopened to the public during weekends (except during weekend working). Part of the westbound lane of Chelsea Embankment (A3212) would be closed when required to accommodate construction vehicles. One lane in each direction would be maintained at all times on Chelsea Embankment (A3212).

EX 15.4 The site in the eastbound carriageway would be required for construction of an overflow weir chamber. This would be built in the later phases of construction activity and would require closure of part of the eastbound carriageway and northern footway. One lane in each direction would be maintained at all times on Chelsea Embankment (A3212).

EX 15.5 Vehicle access to and from the main site would take place from the westbound carriageway of Chelsea Embankment (A3212) using a left-turn in / left-turn out arrangement. Vehicle access to the worksite in the eastbound carriageway of Chelsea Embankment (A3212) would take place from that carriageway on a left-turn in / left-turn out basis.

EX 15.6 The Thames Path runs along the southern footway of Chelsea Embankment (A3212). When this footway is closed, pedestrians would be diverted to the northern footway, using existing pedestrian crossings west of the Bull Ring gate and at the junction of Chelsea Embankment (A3212) with Chelsea Bridge Road (A3216). When part of the northern footway is also closed, a temporary signalised pedestrian crossing would be provided on Chelsea Embankment (A3212) between the two worksites.

EX 15.7 During final landscaping works it would be necessary to restrict ten parking spaces in the Bull Ring for a short period. No other parking restrictions would be required. Bus route 360 would not be able to turn at this location during this period.

EX 15.8 On completion of the works the highway layout would be reinstated to the baseline condition. The existing traffic island located to the east of the Bull Ring would be relocated slightly to the east of its existing location. A new structure on the foreshore would form part of the public realm.

EX 15.9 Construction at the Chelsea Embankment Foreshore site is anticipated to last for three and a half years. During construction, a proportion of construction materials would be transported by river and the remainder by road.

EX 15.10 In the peak month of construction lorry movements, which would occur in Site Year 3, the site would generate an average of 42 lorries or 84 lorry movements per day. The peak month of barge activity would occur in Site Year 1, when an average of three barges would be required per day. The site is expected to require a maximum workforce of 65 people on site at any one time.

EX 15.11 During construction, pedestrians would experience increases to journey times as a result of the diversions from the southern and northern footways of Chelsea Embankment (A3212) and the need to cross the road twice. The increase could be between two and three minutes. Cyclists travelling on the roads in the area may also experience small increases in journey time as a result of the additional construction traffic on this part of the highway network. There would be a slight increase in the risk of accidents for pedestrians and cyclists as a consequence of the diversion routes and additional construction lorries. Measures would be taken to ensure that temporary arrangements are designed to ensure the safety of pedestrians and cyclists.

EX 15.12 Additional worker journeys could be accommodated on base case public transport services in the surrounding area. Bus route 360 would not be able to serve the Bull Ring during the period when final landscaping works are being undertaken in the Bull Ring. However as this part of the route is a spur from the existing route on Grosvenor Road (A3212) and Chelsea

Bridge Road (A3216), the overall impact on this route would be small and the remainder of the route would not be affected.

EX 15.13 The impact on river navigation and access issues would be very small due to the low number of barges required at this site.

EX 15.14 The restriction of ten parking spaces in the Bull Ring would not have a significant impact on parking in the area as this would be for a short period.

EX 15.15 One lane in each direction would be maintained on Chelsea Embankment (A3212) at all times during construction. There would be small increases in average delays to vehicles on the highway network in the vicinity of the site as a result of the additional construction traffic and temporary highway layout changes but these would not be significant.

EX 15.16 During the operational phase road users may experience small additional delays when large vehicles require access to the site for maintenance purposes. Access to the foreshore structure for the public would also be temporarily restricted. These changes would be infrequent and short-term and therefore would not be significant.

EX 16 Kirtling Street

EX 16.1 The site is located south of the River Thames and west of the Thames Water Heathwall pumping station.

EX 16.2 The site comprises two areas to the north and south of Cringle Street. The northern area is bounded to the north by the River Thames, to the east by the Riverlight development and Kirtling Street, to the south by Cringle Street and to the west by the Cemex concrete batching plant. The southern area is bounded to the southeast by Nine Elms Lane (A3205), to the north by Cringle Street and to the west by Kirtling Street.

EX 16.3 Vehicle access to and from the site would be via Cringle Street and Kirtling Street from Nine Elms Lane (A3205) or Battersea Park Road. The northern and northwestern sections of Kirtling Street (approximately 130m in total) would be closed to general traffic, except vehicles accessing the Cemex plant, throughout the construction period. Any other traffic requiring access to this area would be diverted via Cringle Street and Nine Elms Lane (A3205).

EX 16.4 A temporary jetty would be provided to transfer excavated material via conveyors from the site to barges.

EX 16.5 The closure of part of Kirtling Street would require a diversion for pedestrians using the Thames Path. The route would be diverted southbound along the eastern part of Kirtling Street to Cringle Street.

EX 16.6 Construction at the Kirtling Street site is anticipated to last for six years. During construction, a proportion of construction materials would be transported by river and the remainder by road.

EX 16.7 In the peak month of construction lorry movements, which would occur in Site Year 3, the site would generate an average of 96 lorries or 192 lorry movements per day. The peak month of barge activity would also occur in

Site Year 3, when an average of four barges would be required per day. The site is expected to require a maximum workforce of 235 people on site at any one time.

EX 16.8 During construction, the diversion of the Thames Path and presence of site access points could increase pedestrian journey times by approximately one minute. This would not be a significant change and would only affect pedestrians using the Thames Path. Cyclists in the area may also experience some increases in journey times as a result of these diversions and the additional construction traffic on the highway network. However those increases would also be less than one minute and therefore would not be significant.

EX 16.9 There would be a slight increase in the risk of accidents for pedestrians and cyclists as a consequence of the diversion routes and additional construction lorry movements. Measures would be taken to ensure that temporary arrangements are designed to ensure the safety of pedestrians and cyclists.

EX 16.10 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 16.11 The impact on river navigation and access issues would be low. The presence of the temporary jetty and the additional barge movements required could cause minor delays to river traffic associated with the waste transfer station at Cringle Dock and the Cemex concrete plant.

EX 16.12 Parking on Kirtling Street and Cringle Street is expected to be removed as part of the Battersea Power Station development and therefore no parking restrictions in these streets would be required for the Thames Tideway Tunnel construction works.

EX 16.13 The closure of the northern and northwestern section of Kirtling Street to public traffic would affect a small number of users and diversion routes would be provided. Access to the Cemex plant would be maintained. Additional construction traffic movements would have a negligible impact on highway network operation.

EX 16.14 If the Battersea Power Station development and associated transport network improvement were to be delayed, the diversion of the Thames Path would use the eastern part of Kirtling Street, Cringle Street and Nine Elms Lane (A3205) to the south of the site. Some additional highway layout changes would be required at the junction of Kirtling Street with Nine Elms Lane (A3205) and Battersea Park Road (A3205). A bus stand in Cringle Street would need to be relocated in this scenario and existing parking on Kirtling Street and Cringle Street would require restriction to allow larger construction vehicles to manoeuvre. However, the overall impacts on the transport networks would remain as described above.

EX 16.15 During the operational phase road users may experience small additional delays when large vehicles require access to the site for maintenance purposes. Parking on Kirtling Street and Cringle Street is expected to be removed by the Battersea Power Station development and therefore there would be no impact on parking during this phase. These changes would be infrequent and short-term and therefore would not be significant.

EX 17 Heathwall Pumping Station

EX 17.1 The site comprises land within the existing Thames Water pumping station, the adjacent Middle Wharf and an area of the foreshore of the River Thames. The site is bounded to the north by the River Thames, to the south by Nine Elms Lane (A3205), to the west by the Riverlight development and to the east by open space beyond which is Elm Quay (a residential building).

EX 17.2 Vehicle accesses to and from the site would be located on Nine Elms Lane (A3205). The site would have two accesses which would be created by making minor modifications to existing access points. Both accesses would operate on a 'left-turn in, left-turn out' only basis.

EX 17.3 The Thames Path currently follows a route on the riverside to the east and west of the site but there is no route across the river frontage of the pumping station. The route skirts the eastern, southern and western sides of the site via Nine Elms Lane (A3205). No diversion of this route would be required.

EX 17.4 Construction at the Heathwall Pumping Station site is anticipated to last for approximately three years. During construction, a proportion of construction materials would be transported by river and the remainder by road.

EX 17.5 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 18 lorries or 36 lorry movements per day. The peak month of barge activity would also occur in Site Year 1, when an average of two barges would be required per day. The site is expected to require a maximum workforce of 40 people on site at any one time.

EX 17.6 During construction there would be no changes to pedestrian routes in the area, including that of the Thames Path. Pedestrians may experience occasional delays in crossing the site access points although the number of construction vehicle movements would be low and therefore these delays would be infrequent. There would therefore be no significant impacts on pedestrian movements.

EX 17.7 Cyclists using the Thames Path and those using the highway network in the area would experience negligible changes in journey time as a result of construction works at this site. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 17.8 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 17.9 The impact on river navigation and access issues would be very small due to the low number of barges required at this site.

EX 17.10 There would be no changes to parking in the surrounding area during construction. Work at this site would not result in any significant change to journey times on the highway network. The operation of the nearby signal junction of Nine Elms Lane (A3205) with Kirtling Street is addressed within

Section 14 of the *TA*, for the Kirtling Street site, and shows a similar conclusion.

EX 17.11 During the operational phase road users may experience small additional delays when large vehicles require access to the site for maintenance purposes. These changes would be infrequent and short-term and therefore would not be significant.

EX 18 Albert Embankment Foreshore

EX 18.1 The site is located on the foreshore of the River Thames to the north of Vauxhall Bridge. In order to provide access and working areas the site would also occupy part of the riverside footway.

EX 18.2 The River Thames lies to the north of the site. Immediately to the east are Camelford House and Vauxhall Cross (the SIS building), beyond which lies Albert Embankment (A3036).

EX 18.3 Two construction access options are being considered for this site. In access option A all vehicle access to and from the site would take place from the northbound carriageway of Albert Embankment (A3036) via a new access road adjacent to the existing Lacks Dock slipway. In access option B construction vehicle access to and from the site would take place from the northbound carriageway of Albert Embankment (A3036) via a new access road between Camelford House and Tintagel House. In this option a newly constructed access road adjacent to the existing Lacks Dock slipway would still be necessary to provide occasional access to the foreshore site.

EX 18.4 The Thames Path runs along the footway between the river and Camelford House and would require closure and diversion during the construction works. Pedestrians would be diverted along the western footway of Albert Embankment (A3036) between Albert Embankment Gardens and the Vauxhall Bridge (A202) / Wandsworth Road (A3036) junction. Pedestrians would cross at the signalised crossing on Vauxhall Bridge Road (A202) to connect with the existing Thames Path on the western side of Wandsworth Road (A3036).

EX 18.5 Emergency exit routes from Camelford House and Peninsula Heights that currently use the Thames Path would be maintained and diverted through safe paths across the site.

EX 18.6 Two parking spaces within Camelford House would be removed during construction if access option A were used. If access option B were used, six parking bays at Tintagel House would need to be removed and amendments made to the access to the Tintagel House underground car park. Tintagel House is currently unoccupied.

EX 18.7 If access option A were adopted an additional security check would be required for construction vehicles. This would occur at a remote vehicle holding area within ten minutes drive of the site and is expected to be within the Nine Elms area.

EX 18.8 Once construction is complete, new public realm areas would be available in the foreshore to the west of Camelford House and also to the west of Vauxhall Cross, effectively widening the Thames Path at this location.

EX 18.9 Construction at the Albert Embankment Foreshore site is anticipated to last for three and a half years. During construction, a proportion of construction materials would be transported by river and the remainder by road.

EX 18.10 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 23 lorries or 46 lorry movements per day. The peak month of barge activity would also occur in Site Year 1, when an average of four barges would be required per day. The site is expected to require a maximum workforce of 65 people on site at any one time.

EX 18.11 During construction, pedestrians using the Thames Path would experience small changes to journey times as a result of the diversion of the route during construction and these would not be significant. Cyclists are not permitted to use the Thames Path at this location. Cyclists on the highway network would not experience any change to journey times. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 18.12 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 18.13 The impact on river navigation and access issues would be very small due to the low number of barges required at this site.

EX 18.14 The loss of two parking spaces at Camelford House for access option A would not be significant. For access option B, the loss of parking at Tintagel House is unlikely to be significant and access to the underground car park would need to be managed by traffic signals to allow alternate one way operation.

EX 18.15 The new construction access at Lacks Dock in access option A would be shared with Duck Tours vehicles and management measures would be put in place to avoid conflicts. This would also apply to access option B, although the number of construction vehicles using the Lacks Dock access would be very small in that scenario.

EX 18.16 Road users would experience only minor changes to average delays as a result of additional construction vehicle movements to and from this site, whichever access option is selected.

EX 18.17 During the operational phase, access to the foreshore seating areas would need to be restricted to allow vehicles to access operational structures. This would have a short term impact on Thames Path users but would be infrequent. Closures may be limited to one day for regular maintenance, and to periods of up to two weeks when major maintenance works are undertaken every ten years. Road users may also experience some minor additional delay as a result of the movement of larger maintenance vehicles. However overall this would not present a significant impact on Thames Path users or the operation of the highway network.

EX 19 Victoria Embankment Foreshore

EX 19.1 The site is located in the foreshore of the River Thames and would also occupy a section of the existing riverside footway of Victoria Embankment (A3211). The site is bounded to the north, east and south by the River Thames and to the west by Victoria Embankment (A3211). A permanently moored vessel, the Tattershall Castle, and two moorings are located within the site area. To the north is the restaurant vessel Hispaniola. A further mooring is located to the south of the site.

EX 19.2 Vehicle access to and from the site would take place from the nearside lane of the southbound carriageway of Victoria Embankment (A3211) using a left-turn in, left-turn out arrangement. This lane would need to be closed for periods of time during the works to accommodate construction vehicles.

EX 19.3 The Thames Path runs along the riverside footway of Victoria Embankment (A3211) part of which would be closed throughout construction. Pedestrians using this route would be diverted to the western footway of Victoria Embankment (A3211) and would use the existing signalised crossings at the junctions with Horse Guards Avenue and at Northumberland Avenue (A400) to cross Victoria Embankment (A3211).

EX 19.4 The Tattershall Castle would be relocated upstream to the south of the site during construction.

EX 19.5 Construction would be undertaken in several phases. During utility diversion works it would be necessary to reduce the carriageway width on Victoria Embankment (A3211). At this time a total of nine coach parking spaces on Victoria Embankment (A3211) between Northumberland Avenue (A400) and Horse Guards Avenue would be restricted. A loading bay in the southbound carriageway and 30 motorcycle spaces in the northbound carriageway would also need to be restricted. In order to maintain two lanes of traffic in each direction on Victoria Embankment (A3211) in this phase of construction the central reservation would be removed and lane widths would be reduced to 3m on the offside and 3.25m on the nearside lane in each direction. For short periods it may be necessary to reduce the southbound carriageway of Victoria Embankment (A3211) to a single lane and this would take place outside of peak hours or overnight to minimise disruption.

EX 19.6 Following utility diversion works, the coach parking and motorcycle spaces in the northbound carriageway, and the central reservation, would be reinstated. The coach parking spaces and the loading bay in the southbound carriageway would continue to be temporarily restricted.

EX 19.7 During the following phases, space would be required from time to time on the nearside of the southbound carriageway of Victoria Embankment (A3211) to accommodate construction vehicles or other construction activity. Two lanes of traffic would be maintained in each direction on Victoria Embankment (A3211) at all times.

EX 19.8 On completion of construction the highway layout would be returned to the baseline condition including the reinstatement of the Thames Path. A new structure on the foreshore would form part of the public realm.

EX 19.9 Construction at the Victoria Embankment Foreshore site is anticipated to last for four and a half years. During construction, a proportion of construction materials would be transported by river and the remainder by road.

EX 19.10 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 14 lorries or 28 lorry movements per day. The peak month of barge activity would occur in Site Year 1, when an average of two barges would be required per day. The site is expected to require a maximum workforce of 65 people on site at any one time.

EX 19.11 During construction, pedestrians using the riverside footway on Victoria Embankment (A3211) would be diverted to the western footway. This would require pedestrians to cross Victoria Embankment (A3211) twice, although the overall length of the diversion route would be similar to the existing route. The need to make these road crossings could lead to journey time increases of approximately two minutes. Other pedestrian movements in the area would not be affected.

EX 19.12 Cyclists using Victoria Embankment (A3211) would experience negligible changes to journey times. The traffic management works required and the additional construction vehicles may lead to a slightly increased risk of accidents to cyclists. However, measures would be taken to ensure that temporary arrangements are designed to ensure the safety of pedestrians and cyclists.

EX 19.13 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 19.14 The impact on river navigation and access issues would be very small due to the low number of barges required at this site. The Tattershall Castle would be relocated to the south during construction and could continue in operation.

EX 19.15 When coach parking spaces on Victoria Embankment (A3211) are restricted, alternative provision for coach layover would be made on Albert Embankment (A3036), Millbank (A3212) or Lambeth Palace Road (A3036). Existing coach spaces elsewhere on Victoria Embankment (A3211) north and south of the site would be used for passenger boarding and alighting. This would result in slight increases to the distances walked by passengers, although this would depend on the destinations being visited by coach users.

EX 19.16 When the loading bay in the southbound carriageway of Victoria Embankment (A3211) is restricted, an existing bay to the north of Northumberland Avenue (A400) could be used as an alternative, or other loading bays nearby. This would not create any significant impact on loading activity in the area.

EX 19.17 The restricted motorcycle spaces on Victoria Embankment (A3211) would not be reprovided as there would be spare capacity in the surrounding area and the restrictions on these bays would be in place for a short time in the overall construction period.

EX 19.18 Any additional delays to traffic at adjacent junctions as a result of the highway layout changes and additional construction vehicle movements would be small and not significant.

EX 19.19 During the operational phase it would be necessary to temporarily restrict public access to the foreshore structure. Four coach parking spaces on Victoria Embankment (A3211) to accommodate the movements of large vehicles accessing the site for maintenance purposes. Road users may also experience some minor additional delay as a result of the movement of these vehicles. These occurrences would be infrequent and short term and would have no significant impact on pedestrian movement, parking and the operation of the highway network.

EX 20 Blackfriars Bridge Foreshore

EX 20.1 The site is situated on the foreshore of the River Thames adjacent to the westbound slip road from Blackfriars Bridge (A201) to Victoria Embankment (A3211) and close to the Blackfriars Underpass (A3211). The site would also occupy part of the riverside footway, from Paul's Walk adjacent to Blackfriars Bridge to Victoria Embankment (A3211), opposite Temple Avenue.

EX 20.2 The site area includes Blackfriars Millennium Pier and the President, a moored vessel. Prior to main construction works, Blackfriars Millennium Pier would be moved downstream to a location east of Blackfriars railway bridge, opposite Puddle Dock. The President would be moved upstream and re-moored approximately 140m to the west at Chrysanthemum Pier.

EX 20.3 Two different arrangements for vehicle access would be used at this site. During the early phases of construction, all construction vehicles would approach the site from the Blackfriars Bridge junction using the westbound slip road. Construction vehicles would leave the site westbound on Victoria Embankment (A3211). There would be no construction vehicle access directly from Victoria Embankment (A3211) via Upper Thames Street (A3211) during these phases.

EX 20.4 During these early phases the width of the westbound slip road would be reduced during periods of greater construction activity to accommodate construction vehicles arriving at and departing from the site. Two coach parking bays and one loading bay on the slip road would be restricted. Access for through traffic would be maintained.

EX 20.5 In the later phases of construction the westbound slip road would be closed to all vehicles to allow works to take place. Construction vehicles would therefore approach the site on Upper Thames Street (A3211) through the Blackfriars Underpass (A3211) and depart on Victoria Embankment (A3211) towards Westminster Bridge (A302). Traffic management would be provided on Upper Thames Street (A3211) to facilitate the safe entry and exit of construction vehicles at the site.

Appropriate diversion routes would be signed for traffic unable to use the westbound slip road.

EX 20.6 The Thames Path runs along Paul's Walk and the southern footway of Victoria Embankment (A3211). It would be closed and pedestrians diverted during construction works. The diversion route would be from Paul's Walk up to Blackfriars Bridge using the existing staircase on the eastern side of the bridge. A lift would be provided so that mobility-impaired pedestrians could follow the same route.

EX 20.7 Pedestrians would use existing crossing points at the Blackfriars Bridge junction to cross to the Victoria Embankment (A3211) eastbound slip road, on the north side of Victoria Embankment (A3211). The route would follow the northern footway of Victoria Embankment (A3211) and pedestrians would cross back to the southern footway at the junctions with Temple Avenue or Temple Place.

EX 20.8 On completion of construction the highway layout would be returned to the baseline condition including the reinstatement of the Thames Path. A new structure on the foreshore would form part of the public realm. Blackfriars Millennium Pier would remain in its relocated position to the east of Blackfriars railway bridge. A step-free access route between Paul's Walk and Blackfriars Bridge would be maintained through the retention of the lift adjacent to the eastern staircase.

EX 20.9 Construction at the Blackfriars Bridge Foreshore site is anticipated to last for five years. During construction, a proportion of construction materials would be transported by river and the remainder by road.

EX 20.10 In the peak month of construction lorry movements, which would occur in Site Year 2, the site would generate an average of 46 lorries or 92 lorry movements per day. The peak month of barge activity would occur in Site Year 4, when an average of three barges would be required per day. The site is expected to require a maximum workforce of 70 people on site at any one time.

EX 20.11 During construction the closure of Paul's Walk and this part of the Thames Path would result in pedestrian journey times increasing by approximately three minutes, given the diversion route across the Blackfriars Bridge junction and via the northern footway of Victoria Embankment (A3211). The assessment indicates that the diversion route, and the section of Paul's Walk adjacent to the relocated pier, would operate satisfactorily with the altered pedestrian movements that would be experienced and the relocated access to the pier.

EX 20.12 Cyclists using the Blackfriars Bridge junction and surrounding highway network may experience minor increases in journey times as a result of the additional construction traffic in the area and changes to junction operation created by the closure of the westbound slip road later in the construction period. Cyclists using the westbound slip road itself would need to find alternative routes for their journey when the slip road is closed. If routes further to the north or on the south side of the river were to be used, this could add approximately six minutes to the journey.

Measures would be taken to ensure that temporary arrangements are designed to ensure the safety of pedestrians and cyclists.

EX 20.13 Additional worker journeys could be accommodated on base case public transport services in the surrounding area. Buses would not experience significant changes to journey times as a result of the changes to the highway layout during construction.

EX 20.14 The impact on river navigation and access issues would be very small due to the low number of barges required at this site. The President would be relocated upstream to Chrysanthemum Pier during construction and could continue in operation. Blackfriars Millennium Pier would be relocated to the east, with revised access arrangements via Paul's Walk. Whilst this would change arrangements for vessels calling at the pier, it is not anticipated that this would create significant adverse impacts on vessel operators.

EX 20.15 Alternative provision would be made for the two coach parking bays that would be restricted. A temporary loading bay would be located on White Lion Hill, 300m to the east of the site, to replace the loading bay on the westbound slip road for the duration of the construction period.

EX 20.16 Drivers travelling through the junctions in the vicinity of the site would experience some additional delays during construction as a consequence of the changes to the highway network and additional construction traffic. These could be up to one minute depending on the route taken through this part of the network.

EX 20.17 During the operational phase, there may be a need to restrict access to the foreshore structure during maintenance activities. Pedestrians accessing the relocated Millennium Pier would have adequate routes to do so and step-free access between Blackfriars Bridge and Paul's Walk would be provided through the retention of the new lift at the eastern staircase.

EX 20.18 Road users may experience some minor delays when larger vehicles are required to access the site for maintenance. However these would be infrequent and short-term and would not represent a significant impact on highway network operation.

EX 21 Shad Thames Pumping Station

EX 21.1 The site is located within the existing Thames Water pumping station. It is bounded to the north by Wheat Wharf apartments, to the east by the Clove Building which includes the Design Museum, to the south by Tamarind Court and to the west by a private car park serving Vanilla and Sesame Court.

EX 21.2 The main worksite would be within the existing pumping station. Vehicle access to and from the site would take place from the existing access point on Maguire Street. Works to manholes and underground chambers would also be required in Maguire Street and Gainsford Street for short periods.

EX 21.3 During works at this site approximately 50m of the western footway of Maguire Street would be closed. Pedestrians would be required to cross onto the eastern footway of Maguire Street. To facilitate construction vehicle movements seven parking bays and one car club parking bay at the northern end of Maguire Street would be temporarily restricted.

EX 21.4 Works in Maguire Street would require a temporary closure of the road. During this period two-way operation would be implemented on the northern part of Shad Thames with associated traffic management to maintain access to properties. Car parking in this part of Maguire Street would be restricted for the duration of these works and a further three spaces would be restricted at the southern end of Maguire Street. Pedestrian access would remain available through Maguire Street.

EX 21.5 Works in Gainsford Street would require closure of approximately 20m of Gainsford Street southeast of the junction with Maguire Street. This would include the northern footway of Gainsford Street, with pedestrians being diverted to the southern footway. The ten parking bays and one car club bay along Maguire Street would remain temporarily restricted.

EX 21.6 Works would be programmed so that the closure of Maguire Street and Gainsford Street would not coincide.

EX 21.7 Construction at the Shad Thames Pumping Station site is anticipated to last for one and a half years. All construction materials would be transported by road at this site.

EX 21.8 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of seven lorries or 14 lorry movements per day. The site is expected to require a maximum workforce of 24 people on site at any one time.

EX 21.9 During construction pedestrians may experience very small increases to journey times as a result of the closure of footways in Maguire Street and Gainsford Street, but pedestrian routes through these streets would remain available. Cyclists would be diverted when these streets are closed and alternative routes exist nearby via Shad Thames and Curlew Street. However, the impact on cycle journey times is not expected to be significant. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 21.10 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 21.11 Parking spaces restricted during construction would not be reprovided. Spare capacity would be available in surrounding streets to accommodate displaced demand.

EX 21.12 Some changes to the highway layout would be required to accommodate two way operation in Shad Thames when Maguire Street is closed. Access to properties would be maintained although may require drivers to use alternative routes in some cases. Overall there would be no significant impact on highway network operation.

EX 21.13 During the operational phase it may be necessary to temporarily restrict one parking space on Maguire Street to accommodate the movements of large vehicles accessing the site for maintenance purposes. Road users may also experience some minor additional delay as a result of the movement of these vehicles. These occurrences would be infrequent and short term and would have no significant impact overall on parking and the operation of the highway network.

EX 22 Chambers Wharf

EX 22.1 The site is located on land at Chambers Wharf, to the north of Chambers Street and south of the River Thames. In order to provide working areas, the site would also occupy a section of the foreshore.

EX 22.2 The western edge of the site is formed by the rear of Luna House and Axis Court. The eastern edge of the site is bounded by Loftie Street and the southern edge by Chambers Street. Riverside Primary School is located on Bevington Street to the southeast of the site. St. Michael's Roman Catholic College and St Joseph's RC Primary School are located to the southwest of the site.

EX 22.3 Vehicle access to and from the site would take place from Chambers Street via Bevington Street and Jamaica Road (A200).

EX 22.4 Footways in Bevington Street would not be diverted but a new pedestrian refuge would be provided on Bevington Street to the south of the junction with Chambers Street.

EX 22.5 An alternative signed route would be provided for cyclists currently using Chambers Street in order to reduce conflicts with construction traffic. The diversion route would run between Bermondsey Wall West and Bermondsey Wall East via George Row, John Felton Road, East Lane, Scott Lidgett Crescent, Janeway Street and Farncombe Street.

EX 22.6 Fifteen parking spaces on Bevington Street close to the junction with Chambers Street would be restricted during construction to create space to allow construction lorries to pass each other in Bevington Street. Nine on-street parking spaces would also be restricted at the eastern end of Chambers Street. Parking would not be reprovided during the periods when the restriction is in place.

EX 22.7 Construction at the Chambers Wharf site is anticipated to last for six years. During construction, a proportion of construction materials would be transported by river and the remainder by road.

EX 22.8 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 55 lorries or 110 lorry movements per day. The peak month of barge activity would occur in Site Year 6, when an average of three barges would be required per day. The site is expected to require a maximum workforce of 165 people on site at any one time.

EX 22.9 During construction pedestrians would not experience any noticeable change in journey times in the area around the site. An additional pedestrian refuge would be provided in Bevington Street to assist pedestrians crossing this road, which would be used by construction vehicles. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 22.10 Cyclists would be diverted from Chambers Street to an alternative route to reduce conflicts with construction traffic. This would increase journey times by around two minutes for cyclists using the Thames Path. There are proposals by TfL to introduce a new Cycle Superhighway on Jamaica Road (A200) by 2015 and this would provide a further alternative to the Thames Path route.

EX 22.11 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 22.12 The impact on river navigation and access issues would be very small due to the low number of barges required at this site.

EX 22.13 Parking bays that would be restricted during construction would not be reprovided and there would be sufficient capacity in existing parking facilities on surrounding streets to accommodate displaced parking demand.

EX 22.14 The operation of the highway network in the vicinity of the site and at the junction of Bevington Street with Jamaica Road (A200) would not be significantly affected and any increases to average delays would be very small.

EX 22.15 During the operational phase access to the site would be from an access on Loftie Street. A maximum of five parking spaces may require restriction when large vehicles are required to access the site for maintenance work and there may be some minor additional delays to road users. However as these occurrences would be infrequent and short-term, they would not have a significant impact on parking or the operation of the highway network in the area.

EX 23 King Edward Memorial Park Foreshore

EX 23.1 The site is located within the foreshore of the River Thames adjacent to King Edward Memorial Park, which is bounded by The Highway (A1203) to the north and Glamis Road to the west.

EX 23.2 Vehicle access to and from the site would take place from Glamis Road to the west of the park, which would be arranged on a left turn in, right turn out basis. Construction vehicles would use a vehicle route between Glamis Road and the working area through the southern end of the playing field, tennis court and open area within the park. This route would be retained after construction to provide access for maintenance vehicles.

EX 23.3 The Thames Path uses the riverside footway within the park, part of which would be occupied by the construction site and access road during construction and would therefore require diversion. During the day a controlled crossing point would be located on the construction access route within the park to allow Thames Path users to continue to walk through the park. At other times, Thames Path users would be diverted to Glamis Road at the north-western corner of the park and south along Glamis Road to rejoin the Thames Path route.

EX 23.4 Changes would be required to the junction of The Highway (A1203) with Glamis Road, by relocating the signal stopline on Glamis Road further south to enable large vehicles to turn left into Glamis Road. It would also be necessary to restrict approximately three car parking spaces on Glamis Road during the construction period.

EX 23.5 Construction at the King Edward Memorial Park Foreshore site is anticipated to last for three and a half years. During construction, a proportion of construction materials would be transported by river and the remainder by road.

EX 23.6 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 41 lorries or 82 lorry movements per day. The peak month of barge activity would occur in Site Year 3, when an average of two barges would be required per day. The site is expected to require a maximum workforce of 40 people on site at any one time.

EX 23.7 During construction the diversion of pedestrian routes and the need to cross the site access on Glamis Road would introduce slightly longer journey times for pedestrians on these routes, but would not represent a significant change. Cyclists using the Thames Path would be similarly affected. Cyclists using the highway network may experience small increases in average delay as a consequence of the additional construction vehicle movements but this would also not be significant overall. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 23.8 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 23.9 The impact on river navigation and access issues would be very small due to the low number of barges required at this site.

EX 23.10 Parking spaces restricted during construction would not be reprovided. Spare capacity would be available in surrounding streets to accommodate displaced demand.

EX 23.11 The operation of the highway network would not be significantly affected by the additional construction vehicle movements or the highway layout changes that are proposed.

EX 23.12 During the operational phase it may be necessary to temporarily restrict parking spaces on Glamis Road to accommodate the movements of large vehicles accessing the site for maintenance purposes. Road users may also experience some minor additional delay as a result of the movement of these vehicles. These occurrences would be infrequent and short term and would have no significant impact overall on parking and the operation of the highway network.

EX 24 Earl Pumping Station

EX 24.1 The site is located within the existing Thames Water pumping station and adjacent industrial land. It is bounded to the north by Chilton Grove, to the east by Yeoman Street and to the west by Croft Street.

EX 24.2 Access to the site would be from Yeoman Street and egress would be onto Croft Street, with vehicles travelling via Chilton Grove and Yeoman Street to Plough Way (B206).

EX 24.3 The working area would also occupy the western footway of Yeoman Street, and parts of the eastern footway of Croft Street. Part of the southern footway of Chilton Grove would also be closed for a shorter period of time. Pedestrians would be diverted to the footways on the other side of these streets. A short closure of Chilton Grove would be required and temporary traffic management would be provided during this period.

EX 24.4 Kerbside parking along Yeoman Street to the south of the junction with Chilton Grove and along the southern section of Chilton Grove between the junctions with Yeoman Street and Croft Street would be restricted during construction. One parking space on Croft Street and seven spaces on Chilton Grove would also be restricted for part of the construction period.

EX 24.5 Construction at the Earl Pumping Station site is anticipated to last for four years. All construction materials would be transported by road at this site.

EX 24.6 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 34 lorries or 68 lorry movements per day. The site is expected to require a maximum workforce of 40 people on site at any one time.

EX 24.7 During construction pedestrians may experience minor increases in journey time as a result of the closure of parts of footways and the need to cross Yeoman Street, Croft Street and Chilton Grove. There would be no other pedestrian diversions and these delays would not be significant. Cyclists may experience very small changes to journey times as a result of additional construction vehicle movements in the area. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 24.8 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 24.9 There would be sufficient spare capacity in parking spaces in the surrounding area to accommodate any demand displaced as a result of the restriction of parking on parts of Yeoman Street, Croft Street and Chilton Grove.

EX 24.10 There would be no significant additional delay to road users as a result of the additional construction traffic movements in the area during construction.

EX 24.11 During the operational phase road users may experience some minor additional delay as a result of the movement of larger vehicles required for maintenance work. These occurrences would be infrequent and short term and would have no significant impact on the operation of the highway network.

EX 25 Deptford Church Street

EX 25.1 The site is located on an area of open land used as an amenity area, between Cross field Street and Coffey Street to the west of Deptford Church Street (A2209). Works would also be required in the northbound carriageway and part of the western footway of Deptford Church Street (A2209) for part of the construction period.

EX 25.2 During construction, Crossfield Street and Coffey Street would operate in a one-way direction with traffic entering via Crossfield Street and exiting via Coffey Street. A temporary link between Coffey Street and Crossfield Street to the northwest of the site would be provided, to allow through traffic access. A temporary fire refuge point for St. Joseph's RC Primary School would be created in an enclosed area outside the school on Crossfield Street.

EX 25.3 Eight parking spaces on Coffey Street and kerbside parking on part of Crossfield Street would be restricted during construction to enable lorries to access and leave the site. Parking on Crossfield Street between the site entrance and the junction of Crossfield and Coffey Street would be maintained.

EX 25.4 For part of the construction period the northbound carriageway of Deptford Church Street (A2209) and a section of the western footway would be closed. Traffic would be diverted to the southbound carriageway which would operate as a two-way carriageway with one lane in each direction using appropriate traffic management measures. During this period the northbound and southbound bus lanes would be removed and the pedestrian crossing at the junction of Coffey Street and Deptford Church Street (A2209) would be relocated approximately 100m to the north. Four bus stops would also be relocated. The bus stops on Deptford Church Street (A2209) north of the junction with Coffey Street would be moved to the north of the junction with Bronze Street and those south of the junction with Crossfield Street would be relocated approximately 30m further to the south.

EX 25.5 Construction at the Deptford Church Street site is anticipated to last for three and a half years. All construction materials would be transported by road at this site.

EX 25.6 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of 32 lorries or 64 lorry movements per day. The site is expected to require a maximum workforce of 40 people on site at any one time.

EX 25.7 During construction and when the western footway of Deptford Church Street (A2209) is closed, pedestrians would either be diverted to the eastern footway, or would have to travel via Crossfield Street and Coffey Street. This would lead to an additional journey time of two to three minutes as a result of the additional distance involved and the need to cross Deptford Church Street (A2209) twice if using the eastern footway. Pedestrians using the relocated crossing of Deptford Church Street

(A2209) to the north of Coffey Street to make east-west journeys would experience additional journey times of up to two minutes.

EX 25.8 Cyclists would experience a small increase in journey time if using Deptford Church Street (A2209) during the period when the northbound carriageway is closed. Some additional delays would also be experienced elsewhere on the network as a result of construction vehicle movements, although these would be less than one additional minute and are therefore not significant. Measures would be taken to ensure that temporary arrangements are designed to ensure the safety of pedestrians and cyclists.

EX 25.9 Additional worker journeys could be accommodated on base case public transport services in the surrounding area. Buses would experience a minor increase in delays at adjacent junctions as a result of additional construction vehicle movements, although these would not be significant overall. There would be no significant change to bus journey times during the period when the northbound carriageway of Deptford Church Street (A2209) is closed.

EX 25.10 The parking spaces restricted on Crossfield Street and Coffey Street would not be reprovided as there would be sufficient capacity in the surrounding area to accommodate displaced demand.

EX 25.11 Road users would experience some additional delays on the road network surrounding Deptford Church Street (A2209) as a result of the additional construction vehicle movements in the area. However, these delays would not be significant in the context of the overall operation of the highway network. The temporary closure of the northbound carriageway of Deptford Church Street (A2209) and associated traffic management works would not introduce any substantial additional delays for traffic in the area.

EX 25.12 During the operational phase it may be necessary to temporarily restrict up to 14 parking spaces on Coffey Street and some of the kerbside parking on Crossfield Street in order to accommodate the movements of large vehicles accessing the site for maintenance purposes. This would be for a short period and capacity would exist in parking spaces elsewhere to accommodate any short-term displacement of demand. Road users may also experience some minor additional delay as a result of the movement of these vehicles. These occurrences would be infrequent and short term and would have no significant impact overall on parking and the operation of the highway network.

EX 26 Greenwich Pumping Station

EX 26.1 The site is located within the existing Thames Water pumping station together with the areas known as Phoenix Wharf and Harts Wharf, to the north of the DLR viaduct. It includes an area under the existing Network Rail viaduct. The site is bounded to the east by Norman Road (B208), south by Greenwich High Road (A206) and west by Deptford Creek.

EX 26.2 Vehicle access to the site would be via a left in arrangement from the northbound carriageway of Norman Road (B208). Construction vehicles would turn right onto the southbound carriageway of Norman Road (B208) to leave the site. The existing access to the pumping station from Greenwich High Road (A206) would be used by light vehicles only. One new gated access would be created and four existing accesses would be modified to accommodate construction vehicle movements to and from the site.

EX 26.3 A shared pedestrian and cycle footpath links Norman Road (B208) to Creekside alongside the National Rail viaduct and crosses Deptford Creek on Ha'penny Hatch Bridge. The eastern section of the footpath between Norman Road (B208) and the bridge would require a minor diversion as a result of the construction works at the site.

EX 26.4 Construction at the Greenwich Pumping Station site is anticipated to last for approximately five and a half years. All construction materials would be transported by road at this site.

EX 26.5 In the peak month of construction lorry movements, which would occur in Site Year 3, the site would generate an average of 77 lorries or 154 lorry movements per day. The site is expected to require a maximum workforce of 165 people on site at any one time.

EX 26.6 During construction pedestrians may experience occasional delays when crossing site access points, although these delays would be small. The diversion of the footpath between Norman Road (B208) and Creekside would not alter journey times for pedestrians or cyclists. Cyclists may also experience minor additional delays on the road network around the site as a result of additional construction vehicle movements, but this would not be significant. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 26.7 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 26.8 Parking in the area would not be affected by construction at this site. Road users may experience minor additional delays as a result of additional construction traffic movements but these would not significantly affect the operation of the highway network.

EX 26.9 During the operational phase road users may experience some minor additional delay as a result of the movement of larger vehicles required for maintenance work. These occurrences would be infrequent and short term and would have no significant impact on the operation of the highway network.

EX 27 Abbey Mills Pumping Station

EX 27.1 The site is located within existing Thames Water pumping station. It is bounded by Thames Water operational infrastructure to the north, the Prescott Channel and allotments to the west and the Channelsea River and Abbey Creek to the southeast.

EX 27.2 Vehicle access to the site would be from the existing pumping station access on Gay Road. Construction vehicles would travel via Gay Road, Abbey Lane and High Street (A118)

EX 27.3 A total of 17 parking spaces would be restricted on Abbey Lane together with the extension of single yellow line restrictions and introduction of additional waiting restrictions, to aid the movement of larger construction vehicles.

EX 27.4 Construction at the Abbey Mills Pumping Station site is anticipated to last for approximately four years. All construction materials would be transported by road at this site.

EX 27.5 In the peak month of construction lorry movements, which would occur in Site Year 2, the site would generate an average of 70 lorries or 140 lorry movements per day. The site is expected to require a maximum workforce of 45 people on site at any one time.

EX 27.6 During construction no changes to the pedestrian network would be necessary. Pedestrians may experience occasional additional delay crossing the site access on Gay Road, although this is an existing access and the change would not be significant. Cyclists would not be significantly affected. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 27.7 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 27.8 Parking spaces requiring restriction during construction would not be reprovided. These restrictions and the additional waiting restrictions proposed would not have any significant impact on parking as there would be spare capacity in the surrounding area to accommodate displaced demand. The proposals are similar to those adopted for the construction of the Lee Tunnel which is taking place at this site.

EX 27.9 There would be no significant impact on the operation of the highway network and the level of construction vehicle activity expected is similar to that associated with the current Lee Tunnel works at this site.

EX 27.10 During the operational phase road users may experience some minor additional delay as a result of the movement of larger vehicles required for maintenance work. These occurrences would be infrequent and short term and would have no significant impact on the operation of the highway network.

EX 28 Beckton Sewage Treatment Works

EX 28.1 The site comprises an area within the existing Thames Water sewage treatment works. The sewage treatment works is bounded by Alfred’s Way (A13) to the north, Barking Creek to the east and the River Thames to the south.

EX 28.2 Access to the site would be from Jenkins Lane which connects to Alfred’s Way (A13) close to its junction with Royal Docks Road (A1020) and the North Circular Road (A406). Construction vehicles would use the existing access to the sewage treatment works making a left turn in and right turn out. Parking for workers would be available within the site.

EX 28.3 A Green Chain route, which is a designated public right of way and recreational footpath, is located along the river to the east of the site. Pedestrian diversions would not be necessary during construction.

EX 28.4 Construction at the Beckton Sewage Treatment Works site is anticipated to last for approximately four and a half years. All construction materials would be transported by road at this site.

EX 28.5 In the peak month of construction lorry movements, which would occur in Site Year 2, the site would generate an average of 25 lorries or 50 lorry movements per day. The site is expected to require a maximum workforce of 65 people on site at any one time.

EX 28.6 During construction there would be no diversion of pedestrian routes. Pedestrians using Jenkins Lane may experience occasional delays at the site access as a result of construction vehicle movements; however as this is an existing access this would not represent a significant change. Cyclists using Jenkins Lane may experience occasional additional delays as a result of construction vehicles using this route but overall this would be a negligible change. Measures to ensure the safety of pedestrians and cyclists would be taken during construction.

EX 28.7 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 28.8 There would be no changes to parking on Jenkins Lane or in other locations. The operation of the highway network would not be significantly by the additional construction vehicle movements to and from this site.

EX 28.9 During the operational phase road users may experience some minor additional delay as a result of the movement of larger vehicles required for maintenance work. These occurrences would be infrequent and short term and would have no significant impact on the operation of the highway network.

EX 29 Bekesbourne Street

EX 29.1 The site is located on part of Bekesbourne Street, south of Ratcliffe Lane, and on part of Ratcliffe Lane. It is bordered by John Scurr House to the east and residential properties to the west. A private road forms the site boundary to the south, and the junction of Bekesbourne Street and Ratcliffe Lane forms the boundary to the north.

EX 29.2 Vehicle access would be from Ratcliffe Lane and Bekesbourne Street. Larger vehicles would reverse into the site under supervision and leave in forward gear. Vehicles would approach the site on Ratcliffe Lane from the east and depart westward towards Butcher Row (A126).

EX 29.3 Fifteen parking spaces would be temporarily restricted in the southern section of Bekesbourne Street adjacent to John Scurr House.

EX 29.4 Construction at this site would involve three phases. Traffic management arrangements would alter between phases in order to maintain access for existing users as far as possible.

EX 29.5 During the three phases, work would be undertaken in Bekesbourne Street requiring the available width of this street to be reduced to a single lane. This single lane would be controlled either by temporary traffic lights or by traffic marshals. Pedestrian access would remain available along the eastern footway adjacent to John Scurr House throughout these phases.

EX 29.6 A further four short sub-phases of work would be required in Ratcliffe Lane to install a ventilation duct within phase 2. The worksite area in Bekesbourne Street would remain in place during these phases and a second smaller site compound would be erected on the footway and part of the carriageway of Ratcliffe Lane. Temporary traffic management and changes to highway layout would be required to manage pedestrians and traffic around the Ratcliffe Lane worksite. The left and right turns from Ratcliffe Lane into Bekesbourne Street would be prohibited on separate occasions for short periods of time to allow for works in the Ratcliffe Lane carriageway. At times, a total of five parking bays on Ratcliffe Lane would need to be restricted.

EX 29.7 On completion of construction the parking and highway layout would be reinstated to base case conditions, with the exception of two parking spaces in Bekesbourne Street which would be permanently removed to accommodate an electrical and control kiosk.

EX 29.8 Construction at the Bekesbourne Street site is anticipated to last for approximately eight months. All construction materials would be transported by road at this site.

EX 29.9 In the peak month of construction lorry movements, which would occur in Site Year 1, the site would generate an average of five lorries or ten lorry movements per day. The site is expected to require a maximum workforce of 65 people on site at any one time.

EX 29.10 During construction, a pedestrian route would be maintained in Bekesbourne Street alongside John Scurr House at all times. Temporary and short-term diversions would be required for pedestrians in Ratcliffe Lane using either barriered areas in the carriageway or by diverting pedestrians to the southern footway. Overall the impact on pedestrian journey times would be very small and would not be significant.

EX 29.11 Cyclists using Ratcliffe Lane would only experience minor changes to journey times. Cyclists using the southern section of Bekesbourne Street may be affected by temporary alternate one-way working in this street, although would be able to dismount and walk past the site if necessary. Overall the impact on cyclists would not be significant. Temporary arrangements for pedestrians and cyclists would be designed to ensure their safety during construction.

EX 29.12 Additional worker journeys could be accommodated on base case public transport services in the surrounding area.

EX 29.13 It would not be possible to reprovide the spaces that would need to be temporarily restricted in Bekesbourne Street and Ratcliffe Lane during construction and therefore there may be moderate impacts on parking availability in the area during the eight month construction period.

EX 29.14 Access to local residential properties and community facilities would be maintained throughout the construction works. Road journey times would not be significantly affected by the temporary highway layout changes, as traffic flows in the area and the number of construction vehicles required at this site would be low.

EX 29.15 During the operational phase, the carriageway width in Bekesbourne Street may be reduced and pedestrians temporarily diverted in order to allow maintenance work to be undertaken. However, the impact on pedestrians would be limited and alternative routes would be provided when maintenance is being carried out. Road users may experience minor infrequent and short-term delays when larger vehicles are manoeuvring around the site during major maintenance works, which are likely to occur approximately every ten years. The permanent loss of two parking spaces in Bekesbourne Street would not have a significant impact on parking availability in the area. Overall, the impacts on transport at this site during the operational phase would not be significant.

Glossary

Term	Description
aggregated flows	The sum of traffic flows from different sources or locations (for example, the sum of construction lorry flows generated at a number of Thames Tideway Tunnel project sites).
Assessment area	The area around the proposed development within which transport impacts have been considered.
Assessment year	A year for which conditions on the transport networks, with or without the project, have been assessed.
Base case	A future case, without the project, in a particular assessment year
baseline	The existing conditions on the transport networks relevant to the assessment.
Base year	The year in the Highway Assignment Models which represents the base against which changes in traffic conditions over time are assessed (typically the years 2008 or 2009 for the TfL Highway Assignment Models).
Code of construction practice	A document that sets out control measures to be adopted during the construction period.
Cofferdam	A watertight structure, usually of sheet piling, that encloses an area under water and is pumped dry to enable construction to be carried out. The inside of a cofferdam can be filled to create a safe working area.
Combined sewer overflow (CSO)	A structure, or series of structure, designed to allow spillage of excess wastewater from a combined sewer under high rainfall conditions. Flows may discharge by gravity or by pumping.
Connection tunnel	See ‘interception chamber’
construction lorry	A heavy goods vehicle transporting construction material to or from a Thames Tideway Tunnel project site.
Construction site	The area of a site used during the construction phase.
Consultation	Consultation relates to the public consultation process.
CSO site	A site that contains the CSO interception chambers, connection culverts and the drop shaft from which the connection tunnel is built. Each site needs to be able to provide enough space for all construction-related activities, which would vary depending on the diameter of the shaft and method of tunnel construction.
Cycle Hire	The scheme operated by Transport for London providing cycles for hire from a large number of locations across

Term	Description
	central London.
Cycle Superhighway (CS)	A strategic route for cyclists through London, denoted by specific signage, road marking and surface colouring.
Degree of saturation (DoS)	A measure of the operation of an approach to a traffic signal junction, expressing the amount of traffic flow passing through the traffic signal stopline as a percentage of the available capacity on that approach.
Development case	A future case, with the project, in a particular assessment year.
Development Consent Order (DCO)	An order under the Planning Act 2008 approving a development that is or forms part of a Nationally Significant Infrastructure Project. The order can grant planning permission and compulsory purchase powers. The order is granted by the Government ministers.
Drive site	A main tunnel site that contains the shaft from which the tunnel boring machine is ‘driven’ forward, ie, starts from. Excavated material is removed from and segments are fed into the tunnel via the shaft at the drive site.
Drive shaft / launch shaft	The main shaft from which a tunnel boring machine is ‘launched’ or ‘driven’. Excavated material is removed from and segments are fed into the tunnel at the drive / launch shafts.
Drive / shaft site	Main tunnel drive shaft sites lie at the start of tunnel drives and accommodate the majority of tunneling activities. At these sites, a shaft would be constructed and the tunnel boring machine would be built at the bottom. The machine would then be used to construct the tunnel by excavating the ground and lining the tunnel with precast concrete segments. Modern tunnel boring machines would be used to build the main tunnel from west London to Abbey Mills Pumping Station and many of the smaller connection tunnels to the CSOs to be intercepted.
Drop shaft	See ‘interception chamber’.
Embedded	Mitigation that is an integral part of the project.
Engagement	Engagement relates to discussions and consultations with statutory organizations and other technical stakeholders. It includes interim engagement activities.
Environmental impact assessment (EIA)	An assessment of the likely significant effects that a proposed project may have on the environment that considers natural, social and economic aspects, which is prepared in accordance with the Infrastructure Planning EIA Regulations 2009.
EIA Scenario	The core assessment presented in the *TA* is based on the

Term	Description
	Transport Strategy. It examines the month(s) in which construction vehicle activity at this site would be greatest and uses the average daily number of construction lorry movements that would occur in that month.
Environmental Statement	A document to be prepared following an EIA that provides a systematic and objective account of the EIA's findings, prepared in accordance with the Infrastructure Planning EIA Regulations 2009.
excavated material	The earth / soil / ground material removed when shafts, tunnels and other structure are excavated. Excavated material can be either topsoil, subsoil or other material such as rock.
fill	Material required to raise existing ground levels. This may comprise 'cut' material generated within a site, or imported material.
forecast year	A year in the Highway Assignment Models which represents a future year for which the models have been tested to assess changes in traffic conditions over time (typically 2021 for the TfL Highway Assignment Models).
foreshore	Ground uncovered by a river when the tide is low.
GEH statistic	A statistic representing the 'goodness of fit' between the predictions of a VISSIM model of an existing highway network and the actual observed conditions. The GEH statistic is used to validate VISSIM models against observed conditions.
growth factor	A factor representing the degree to which the distance travelled by traffic on a particular part of the highway network is expected to change between two different points in time.
grout	A material that is commonly injected in a fluid state to improve the engineering properties of poor ground conditions, fill voids (eg, between a structural tunnel lining and cut ground), or as a material for repairing damaged segments.
haul roads	Temporary roads provided within a contractor's site area to allow the transportation of material around the site.
HGV	Heavy Goods Vehicle greater than 7.5 tonnes.
Highway Assignment Model (HAM)	A strategic highway model developed by Transport for London to assist in examining future changes to traffic conditions at a strategic level as a result of infrastructure or development changes over time.
hoardings	Closed panel fencing used to enclose construction sites.

Term	Description
impact	A physical or measurable change to the environment that is attributable to the Thames Tideway Tunnel project.
illustrative plans	These plans illustrate one way in which the development, or an element of it, may be laid out, but is not a commitment.
indicative plans	These plans indicate and provide a commitment to how the development would be laid out within the approved parameters and design principles.
interception chamber	A structure constructed around an existing combined sewer that diverts stormwater from the sewer into a new system of structures to transfer stormwater flow to a sewage treatment works. Transferring the flow from the existing sewer to the sewage treatment works requires a series of other structures including: • connection culvert: a covered channel structure to connect the interception chamber to the drop shaft • drop shaft: a vertical circular structure used to drop the flow down to the main tunnel level and connect the connection culvert to the connection tunnel • connection tunnel: a tunnel that connects the drop shaft to the main tunnel • main tunnel: the tunnel that transfers the flows from the connection tunnels to Abbey Mills Pumping Station, where they are transferred to Beckton Sewage Treatment Works via the Lee Tunnel • pumping station: a vertical circular structure with pumps at the bottom is used to lift stormwater flows up to the sewage treatment works.
Lee Tunnel	The Lee Tunnel comprises a storage and transfer tunnel from Abbey Mills Pumping Station to Beckton Sewage Treatment Works and the interception of the Abbey Mills CSO
LGV	Light Goods Vehicle less than 3.5 tonnes
licence	Formal permit that allows the holder to engage in an activity, subject to conditions specified in the licence itself and the legislation under which it was issued.
limits of deviation (LODs)	Land boundary limits within which permanent structures must remain.
limits of land to be acquired or used (LLAU)	Land outside the limits of deviation that is available for construction but not to accommodate permanent structures.
LinSig	A computer software package used to model the operation of traffic signal junctions.

Term	Description
local highway authority	A London borough in its role of being responsible for the operation of the highway and transport network within its authority area.
local highway modelling	Computer-based analysis of the operation of individual or groups of junctions on the highway network.
magnitude	Size or scale of an impact or effect.
main tunnel	The tunnel that would run from Acton Storm Tanks in the west to Abbey Mills Pumping Station in the east.
main tunnel reception site	A site used to remove the tunnel boring machine from the main tunnel at the end of the drive.
main tunnel site	A site from which the main tunnel would be built. Each site needs to provide enough space for all construction-related activities, which would vary depending on the type of tunnel boring machine use and whether the site is a drive site, double drive site or reception site.
MGV	Medium Goods Vehicle between 3.5 and 7.5 tonnes.
mitigation measures	Proposed actions to prevent or reduce adverse effects arising from the whole or specific elements of a development.
mode split / modal split	A term used to describe the proportions of a total number of journeys which are made by different modes of transport, eg, walking, cycling, public transport, car.
movement	A journey made in one direction (ie from an origin to a destination) by a vehicle or barge
OmniTrans	A computer software package used for multi-modal transport network modelling and for assigning traffic to routes within those networks.
other construction vehicles	Vehicles travelling to and from construction sites as part of the operation of a site, eg, supervisors travelling between sites, maintenance workers, minibus transport for workers and deliveries of office materials.
passenger car units (pcu)	A unit used in traffic models to represent different vehicle types in terms of the equivalent number of cars that they represent. This takes account of the amount of road space occupied and performance of different vehicles. The pcu factor for a car is one; vans and three-axle vehicles represent 1.5 pcu, vehicles with four or more axles 2.3 pcu, buses and coaches two pcu; motorcycles 0.4 pcu and pedal cycles 0.2 pcu.
patronage	The number of passengers using a particular public transport service.
pcu-hours (pcu-hrs) /	The total time spent by all traffic (pcu or vehicles) within a

Term	Description
vehicle hours (veh-hrs)	specified area of a highway network, derived from the sum of the time spent by each pcu within the network. Vehicle-hours represent the equivalent figure based on the number of vehicles rather than the number of pcu.
Pcu-kilometres (pcu-km) / vehicle-kilometres (veh-km)	The total distance travelled by all traffic (pcu or vehicles) within a specified area of a highway network, derived from the sum of the distance travelled by each pcu within the network. Vehicle-km represent the equivalent figure based on the number of vehicles rather than the number of pcu.
peak hour(s)	The hour(s) in a day in which traffic or passenger flows are highest.
phase one consultation / phase two consultation	Phase one and two consultation have been undertaken in accordance with Section 42 of the Planning Act 2008, involving consultation with stakeholders in the Greater London area. Phase one of public consultation for the project ran from 10 September 2010 to 14 January 2011. Phase two of consultation ran from 4 November 2011 to 10 February 2012.
PICADY	A computer software package used to model the operation of junctions on the highway network which are not controlled by traffic signals, ie, T junctions and crossroads.
planning policy guidance / statements	Planning policy guidance notes and planning policy statements, which have replaced the former, are prepared by the Government following public consultation to explain statutory provision and provide guidance on planning policy and the operation of the planning system. They also explain the relationship between planning policies and other policies that have an important bearing on issues of development and land use.
project year	A year within the programme of construction for the project as a whole, measured in 12 month periods from the start of construction of the project.
public right of way	Route to which the public has right of access.
public transport accessibility level (PTAL)	A method of measuring how accessible a location is to rail, underground, bus and river passenger services.
pumping station	See ‘interception chamber’
ready-mix concrete	Ready-mix concrete is concrete that is manufactured in a factory or batching plant, according to a set recipe, and then delivered to a work site
reception site	A main tunnel site that would contain the shaft from which a tunnel boring machine would be ‘received’ ie, ends up. The tunnel boring machine would be removed from the

Term	Description
	tunnel via the shaft at the reception site.
red route	Red routes form a network of roads designated by Transport for London to carry heavy volumes of traffic. They comprise major routes into and around London and are also known as the Transport for London Road Network (TLRN). Transport for London is responsible for managing these routes and enforcing regulations on them.
Road Safety Audit	A structured procedure for auditing proposed changes to the highway network in order to consider whether proposed designs have considered the safety of all road users, identify any issues which may be unsafe and to recommend design changes to resolve those issues.
safeguarded wharf	A wharf that is protected by the Mayor of London and the Port of London Authority, to ensure that it is retained as a working wharf and protected from redevelopment into other uses.
SATURN	A computer software package used for modelling the operation of large highway networks, based on the identification of trip demands and using dynamic analysis to determine routes taken by different trips through the network, based on considerations of journey time, distance and speed parameters.
shaft	Duct, pipe or vertical tunnel.
site	The area of proposed development.
site year	A year within the programme of construction for a particular Thames Tideway Tunnel project site, measured in 12 month periods from the start of construction at that site.
slipway	A sloping surface leading down to a body of water from which boats may be launched.
statutory	Required, permitted or enacted by statute.
strategic highway modelling	Computer-based analysis of the operation of large highway networks at a strategic level, eg, for regional areas of Greater London.
strategic road network (SRN)	A network of some 500km of roads considered to be important strategic routes within the capital. The relevant London boroughs are the local highway authorities for these roads but TfL has a strategic responsibility to coordinate works and ensure the free flow of traffic on these routes. The strategic road network is separate from but complementary to the Transport for London Road Network.
temporary works	Works required to facilitate construction, including any works left in place after completion.

Term	Description
Thames Path	The designated footpath that follows the route of the River Thames.
transport assessment	The formal assessment of traffic and transportation issues relating to a proposed development. The findings are usually presented in a report that accompanies the application for development consent.
Transport for London	The strategic transport authority for London.
Transport for London Road Network (TLRN)	The 580km network of major roads administered by Transport for London, also known as 'red routes'.
Transport Strategy	A document which sets out the proposals for transporting construction materials by road or river.
TRANSYT	A computer software package used to model the operation of adjacent and linked traffic signal junctions.
Travel Plan	A document which sets out a structure for managing the travel patterns of employees and visitors, usually with the aim of reducing the proportion of travel by private car and increasing the use of walking, cycling and public transport. A Travel Plan contains objectives, a series of measures and initiatives that may be employed to achieve these objectives, and arrangements for monitoring progress against the objectives and targets of the Travel Plan.
utilities	Assets belonging to utility companies, including Thames Water, that range from aged, rigid cast-iron pipework to flexible cables and ductwork.
VISSIM	A computer software package used to simulate the operation of parts of a highway network, usually at a local level and including traffic signal junctions, in greater detail using a range of output statistics and animated representations of the highway network to aid understanding
works	All construction work associated with the construction of the Thames Tideway Tunnel.
worksite	Site on which construction works are carried out.

Abbreviations

Abbreviation	**Term**
AM	morning
arr	arrive
ATC	automatic traffic counter
ATTrBuTE	Assessment Tool for Travel plan Building, Testing and Evaluation
BODS	Bus Origin Destination Survey
CIHT	Chartered Institution of Highways and Transportation
CLoHAM	Central London Highway Assignment Model
CLP	Construction Logistics Plan
CoCP	Code of Construction Practice
CPZ	controlled parking zone
CS	cycle superhighway
CSO	combined sewer overflow
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
Defra	Department for the Environment, Food and Rural Affairs
dep	depart
DfT	Department for Transport
DLR	Docklands Light Railway
DMRB	Design Manual for Roads and Bridges
DoS / DOS	degree of saturation
EIA	environmental impact assessment
ELHAM	East London Highway Assignment Model
ES	Environmental Statement
FORS	Freight Operator Recognition Scheme
GLA	Greater London Authority
HA	Highways Agency
HAM	Highway Assignment Model
HGV	heavy goods vehicle
km	kilometres
km/h	kilometres per hour
LA	local authority

Abbreviation	Term
LB	London borough
LCN	London Cycle Network
LGV	light goods vehicle
LHA	local highway authority
LLAU	limit of land to be acquired or used
LoD	limit of deviation
LPA	local planning authority
LTS	London Travel Survey
LU	London Underground
m	metres
m^2	square metres
MAP	Model Auditing Process
MCA	Maritime and Coastguard Agency
min:sec / mm:ss	minutes and seconds
mm	millimetres
MTS	Mayor’s Transport Strategy
n/a	not applicable
NCN	National Cycle Network
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NR	Network Rail
NSIP	nationally significant infrastructure project
op veh	construction operation vehicles
PCU	passenger car unit
pcu-hrs	passenger car unit hours
PLA	Port of London Authority
PLoS / LoS	pedestrian level of service
PM	afternoon
PPG	Planning Policy Guidance
PPS	Planning Policy Statement
PRoW	public rights of way
PS	pumping station
PTAL	public transport accessibility level
RB	Royal Borough

Abbreviation	Term
RBKC	Royal Borough of Kensington and Chelsea
RNLI	Royal National Lifeboat Institution
RPG	Regional Planning Guidance
RTMP	river transport management plan
SPD	supplementary planning document
SPG	supplementary planning guidance
SRN	strategic road network
t / T	tonne(s)
TA	Transport Assessment
TfL	Transport for London
TLRN	Transport for London Road Network
TM	traffic management
TMP	traffic management plan
UK	United Kingdom
veh	vehicles
WeLHAM	West London Highway Assignment Model

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Thames Tideway Tunnel

Transport Assessment

Sections 1 to 3: Introduction, stakeholder engagement and project-wide transport assessment

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1 Introduction

1.1 Introduction

1.1.1 This *Transport Assessment (TA)* has been prepared by Thames Water Utilities Limited[i] (Thames Water) to accompany the application for development consent ('the application') for the Thames Tideway Tunnel project ('the project'). The *TA* presents the findings of the assessment of transport issues associated with the project.

1.1.2 The *TA* has considered the project-wide transport issues that would arise at a strategic level and might affect transport networks across London during construction and operation of the Thames Tideway Tunnel. It has also considered the transport issues that would arise in the vicinity of each of the Thames Tideway Tunnel project sites as a result of construction and operational activity in each of those locations.

1.1.3 The project-wide assessment is described in Section 3 of this *TA*. It sets the strategic transport context and examines the extent to which the project when considered as a whole would affect the operation of London's transport networks.

1.1.4 The project-wide assessment also sets the background for each of the site-specific assessments. These are reported in Sections 4 to 27 of this *TA*.

1.1.5 Each of Sections 3 to 27 of the *TA* provide the following information:

a. a description of the proposed development, relevant to the particular section of the *TA*, which provides key project information which has been used to inform the assessment

b. the methodology used for the assessment. Section 3 of the *TA* provides an overview of both the strategic and local assessment methodologies and any site-specific variations are described in the relevant Sections of the *TA*

c. a description of the baseline conditions on the transport networks relevant to the particular section of the *TA*

d. the anticipated numbers of construction barges, lorries and other vehicles relevant to the particular section of the *TA*, together with the anticipated number of construction worker journeys

e. the assessment for the construction phase and where appropriate the operational phase of the project in the particular location being considered

[i] The *Draft Development Consent Order (DCO)* contains an ability for Thames Water to transfer powers to an Infrastructure Provider (as defined in article 2(1) of the DCO) and/or, with the consent of the Secretary of State, another body

f. a summary of the findings of the assessment for the particular section of the *TA*.

1.2 Proposed development

1.2.1 The project comprises a wastewater storage[ii] and transfer tunnel between Thames Water's operational sites at Acton Storm Tanks and Abbey Mills Pumping Station. The tunnel would intercept identified combined sewer overflows (CSOs) that frequently discharge into the tidal reaches of the River Thames. The flows of combined sewage (raw sewage mixed with rainwater) discharged from those CSOs would be captured, stored and pumped out for treatment at Beckon Sewage Treatment Works. Detailed descriptions of the project that has been assessed are provided in Section 3 of the *Environmental Statement* Volume 3 (Project-wide effects assessment) and the site assessment volumes (Volume 4 to 27).

1.2.2 The main tunnel would be approximately 25km long and would run from Acton Storm Tanks in the west to Abbey Mills Pumping Station in the east.

1.2.3 Two long connection tunnels would also be constructed to deliver flows into the main tunnel:

a. the 1.1km Frogmore connection tunnel in Wandsworth

b. the 4.6km Greenwich connection tunnel passing through Greenwich, Lewisham and Southwark.

1.2.4 At Abbey Mills Pumping Station the Thames Tideway Tunnel would connect to the Lee Tunnel, which is currently under construction between Abbey Mills Pumping Station and Beckton Sewage Treatment Works.

1.2.5 The project would require construction works at a total of 24 sites, comprising 23 sites along the length of the main and connection tunnels and a further site at Beckton Sewage Treatment Works.

1.2.6 The sites would be located across a total of 13 London local authorities comprising:

a. the London Borough (LB) of Ealing

b. the LB of Hammersmith and Fulham

c. the LB of Richmond-upon-Thames

d. the LB of Wandsworth

e. the Royal Borough (RB) of Kensington and Chelsea

f. the LB of Lambeth

g. the City of Westminster

h. the City of London

[ii] It should be noted that wastewater would only be stored in the tunnel for a temporary period until it can be pumped out at Beckton Sewage Treatment Works

i. the LB of Southwark

j. the LB of Tower Hamlets

k. the LB of Lewisham

l. the RB of Greenwich

m. the LB of Newham.

1.2.7 Some 16 of the 24 construction sites would be located adjacent to, or very near, the River Thames. At 11 of these sites, it is proposed that a proportion of construction materials would be transported by river.

1.2.8 Road transport would be required for all or some construction materials at all sites. The assessment identifies a network of routes that would be used by construction vehicles travelling to and from Thames Tideway Tunnel project sites. These have been based on the aim of using the strategic route network for as much of the journey as possible and using local roads only where necessary to access a site from the strategic network.

1.3 Assessment methodology

1.3.1 The methodology for the assessment is described in Section 3 of the *TA* and where necessary, variations to that methodology are described in the relevant site-specific Sections of the *TA*.

1.3.2 A range of engagement activities have been undertaken with technical and statutory stakeholders during the preparation of the TA and ES. These stakeholders include Transport for London (TfL), the Greater London Authority (GLA), the Port of London Authority (PLA) and each of the London boroughs within which Thames Tideway Tunnel project sites would be located.

1.3.3 Section 2 of the *TA* provides a more detailed description of key elements of the engagement process. Each of Sections 3 to 27 of the *TA* summarises the key issues that have been raised that are relevant to the particular Section of the *TA*. Full tables of comments raised, and responses to them, are provided within Volumes 2 to 27 of the *Environmental Statement*.

1.4 Reference documents

1.4.1 The *TA* draws on a range of legislation, policy and guidance documents and the relevant documents are identified and referenced in Sections 3 to 27 of the *TA*.

1.4.2 In addition, the *TA* draws on a number of other documents which form part of the application for development consent. These include:

a. the *Transport Strategy*, which sets out the proposed strategy for the transportation of construction materials to and from Thames Tideway Tunnel project sites

b. the *Code of Construction Practice (CoCP) Part A*, which includes a range of measures that would be implemented project-wide to reduce transport impacts

c. the *CoCP Part B's* for each of the Thames Tideway Tunnel project sites, which include site-specific measures that would be used to reduce transport impacts in conjunction with the project-wide measures set out in the *CoCP Part A*

d. the *Project Framework Travel Plan*, which addresses project-wide travel planning measures that would be used to manage and monitor the travel patterns of workers to and from each of the Thames Tideway Tunnel project sites and which also contains requirements and guidelines for the development of site-specific *Travel Plans* by the appointed contractors.

2 Stakeholder engagement

2.1 Approach

2.1.1 A range of consultation and engagement has been undertaken to inform the development of the transport-related aspects of the design of the project and the methodology for the *TA*.

2.1.2 This has enabled constraints and opportunities affecting each of the sites to be identified and understood; the scope of the assessment to be discussed; the technical and analytical methods available for the assessment to be reviewed; and the draft findings of the assessment to be discussed with stakeholders.

2.1.3 Where possible and appropriate, the views of stakeholders have been taken into account in the design and the assessment.

2.2 Stakeholders

2.2.1 On transport aspects, a number of key technical and statutory stakeholders have been consulted.

2.2.2 Transport for London (TfL) is the strategic transport authority for London and has a wide responsibility for the pedestrian, cycle, public transport and highway networks. It has been consulted in relation to:

a. pedestrian and cycle routes and facilities

b. London bus services, which are planned, tendered and managed by TfL

c. London Underground, London Overground and Docklands Light Railway (DLR) services which are managed by TfL and relevant operating companies

d. river passenger services which are planned, tendered and managed by TfL

e. highway network and operation issues, particularly in relation to the Transport for London Road Network (TLRN) and Strategic Road Network (SRN) and on all traffic signal junctions that might be affected, as TfL has responsibilities for each of these elements of the network

2.2.3 Each of the London boroughs in whose area Thames Tideway Tunnel project sites would be located has been consulted in its capacity as local highway authority (LHA) in relation to transport issues. Discussions with the LHAs have covered pedestrian, cycle and highway networks for which each LHA is responsible, together with public transport and river issues where appropriate.

2.2.4 The Greater London Authority (GLA) and Port of London Authority (PLA) have been consulted on project-wide issues, including the strategy for transporting construction materials.

2.3 Forms of engagement

2.3.1 Engagement with the stakeholders listed in Section 2.2 has taken a number of different forms, which are described below.

2.3.2 Meetings have been held with individual LHAs to discuss the construction proposals and the associated requirements for access to Thames Tideway Tunnel project sites. These meetings have informed the development of the design of the project, including the locations of site access points and any traffic management or other physical changes required to facilitate the safe movement of traffic.

2.3.3 These individual meetings have also provided the opportunity to seek the views of the LHAs on the proposed approach to and methodology for the *TA*.

2.3.4 Regular bi-monthly meetings have been held with TfL to provide a progress report and discuss specific issues arising from the technical liaison meetings (which are described below).

2.3.5 Technical meetings have been held with TfL to discuss the strategic and local highway modelling methodology. This has allowed agreement to be reached on the most appropriate modelling tools for the assessment, the scenarios to be tested and a number of the primary assumptions for the analysis.

2.3.6 Joint meetings have also been held with TfL and the relevant LHAs to discuss the potential effects on coach parking provision along Victoria Embankment (A3212), the need for temporary relocation of coach parking bays and suitable locations for the alternative provision during Thames Tideway Tunnel construction.

2.3.7 A number of workshops have been held in the period between Spring 2011 and Winter 2012 which have been jointly attended by TfL and the LHAs. These workshops have included:

a. briefings on the likely transport issues at each of the Thames Tideway Tunnel project sites and on the proposed methodology and approach to the *TA*

b. a series of ‘design’ workshops in Summer 2011 to consider proposals for each site in detail and obtain the views of the LHAs and TfL so that these could be taken into account in the development of the proposals in each location

c. a further series of ‘design’ workshops in Autumn / Winter 2011 to follow up on the issues raised in the Summer 2011 workshops and present refinements to the proposals

d. a number of workshops with TfL, PLA, GLA and the LHAs as part of the development of the *Transport Strategy*.

2.3.8 Draft copies of the *TA* for two example sites were provided to TfL in Summer 2012 for initial review and comment. Comments received have been taken into account in developing the assessment further.

2.3.9 Draft copies of the *TAs* for all of the Thames Tideway Tunnel project sites were provided in Autumn 2012 to TfL and the relevant LHAs. Further workshops were held, attended by TfL and all the LHAs, to discuss these comments in more detail and where possible, comments have been taken into account in this *TA*.

2.3.10 Comments on transport issues have also been received from stakeholders as part of the Phase 1, Phase 2 and Section 48 consultations on the project proposals.

2.3.11 Each of Sections 3 to 27 of the *TA* summarises the key issues that have been raised from all of the forms of engagement that are described in the preceding paragraphs.

2.3.12 Common responses that are relevant to all or the majority of Thames Tideway Tunnel project sites, or to the *TA* methodology, are discussed in Section 3 of the *TA*. Responses which are relevant to individual sites are covered in Sections 4 to 27 of the *TA*. Volumes 2 to 27 of the *Environmental Statement* provide full details of issues raised and responses to them.

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3 Project-wide transport assessment

3.1 Introduction

3.1.1 This Project-wide *Transport Assessment* (*TA*) presents the findings of the assessment of the strategic transport issues associated with the Thames Tideway Tunnel project.

3.1.2 The complete *TA* has considered project-wide transport issues, which are reported in this section of the *TA*, and transport issues which are specific to each of the 24 Thames Tideway Tunnel project sites, which are reported in the site-specific *TAs* (Sections 4 to 27).

3.1.3 The purpose of this Project-wide *TA* is to set out the strategic transport context for the project, the development proposals and any strategic transport implications arising from these proposals to ensure that appropriate mitigation measures are identified, where necessary.

3.1.4 The Project-wide *TA* therefore examines the combined activity at all Thames Tideway Tunnel project sites, in the context of the anticipated project programme, to identify the implications for the strategic transport networks in London. It also considers a sub-area of central London in more detail, where concurrent construction work on adjacent project sites may produce particular effects within that sub-area.

3.1.5 The *TA* draws on a number of project-wide common documents which include the *Transport Strategy* and the *Code of Construction Practice (CoCP)*. Further detail on these documents which form the background to the *TA* can be found in Section 1 of the *TA*.

3.1.6 The *TA* structure is as follows:

a. Section 3.2 includes a description of the proposed development. This details key project information relevant to the transport assessment including the proposed *Transport Strategy* and *CoCP*

b. Section 3.3 outlines in detail the assessment methodology used for the Project-wide *TA*

c. Section 3.4 details the baseline conditions on the strategic transport networks surrounding the Thames Tideway Tunnel project

d. Section 3.5 sets out the anticipated numbers of barge, lorry, other vehicle and construction worker movements for the selected assessment scenarios

e. Section 3.6 provides the assessment of the construction phase of the project. This Section also outlines the sub-area assessment and the outcomes of sensitivity testing for the highway network

f. Section 3.7 summarises the Project-wide*TA* findings.

3.2 Proposed development

3.2.1 The proposed development is described in detail in Volume 1 of the *Environmental Statement* and is summarised in Section 1 of the *TA*. It comprises a new tunnel beneath the River Thames to capture discharges from 34 combined sewer overflows (CSOs) to reduce pollution of the River Thames.

3.2.2 The project would require construction works at a total of 24 worksites, comprising 23 sites along the length of the main and connection tunnels and a further site at Beckton Sewage Treatment Works.

3.2.3 Some 16 of the 24 construction sites would be located adjacent to, or very near, the River Thames. At 11 of these sites, it is proposed that a proportion of construction materials would be transported by river.

3.2.4 Road transport would be required for all or some construction materials at all sites. The assessment identifies a network of routes that would be used by construction vehicles travelling to and from Thames Tideway Tunnel project sites. These have been based on the aim of using the strategic route network for as much of the journey as possible and using local roads only where necessary to access a site from the strategic network.

Construction

3.2.5 Construction activities would vary depending on the works required in each individual site location. In broad terms sites have been considered as either ‘CSO’ sites or ‘main tunnel’ sites and the characteristics of each are described below.

3.2.6 CSO sites would be used for works to intercept and control existing CSOs. Works would typically include the construction of shafts and underground works to intercept CSOs and construct connections to the main tunnel.

3.2.7 Main tunnel sites would be used for the construction of the main tunnel. These sites would be either the start (‘drive’) or end (‘reception’) points for tunnel boring machines. Key works would involve the construction of a shaft from which the tunnel boring machines would either be driven or received. These sites would comprise Acton Storm Tanks, Carnwath Road Riverside, Kirtling Street, Chambers Wharf, Abbey Mills Pumping Station and Greenwich Pumping Station (for the Greenwich connection tunnel). Where necessary, CSO interception works would also take place at main tunnel sites.

3.2.8 Construction at Beckton Sewage Treatment Works would be required to enable the existing Works to cater for the additional volume of combined sewage flows. This would include construction of two shafts and tunnels together with additional pipelines, tunnels and pumps.

3.2.9 The details of the construction works required at each site are set out in the relevant Volumes of the *Environmental Statement* and Sections 4 to 27 of the *TA*.

Construction programme

3.2.10 For the purposes of the assessment the estimated start date for the overall construction programme is in early 2016 and construction would last for just under seven years, finishing towards the end of 2022. This includes any associated development works that would be required before construction work commences at the individual sites.

3.2.11 Construction programmes at individual sites would vary within this overall programme and therefore peak construction activity would not occur at the same time on all sites. The estimated programme for each site is set out in the relevant site-specific *TA* sections and *Environmental Statement* volumes.

3.2.12 Within this Project-wide *TA*, assessment years have been referred to as 'Project Years' which are measured in 12 month periods from the beginning of construction work on the project as a whole. In the site-specific *TAs*, assessment years have been referred to as 'Site Years' which are measured in 12 month periods from the beginning of construction work at the particular site being considered.

Material quantities

3.2.13 The amount of construction material to be imported to and exported from each site would vary depending on the nature of the construction activity to be undertaken in each location.

3.2.14 Figure 3.2.1 (see Project-wide *Transport Assessment* Figures) summarises the total volumes of material to be transported at each site across the construction programme. It shows that the sites generating the highest tonnages would be Carnwath Road Riverside, Kirtling Street, and Chambers Wharf, which would be the three main tunnel drive sites.

3.2.15 Construction of the project would require the following types of material:

a. exported site excavated material from the tunnels, shafts and other works

b. imported and exported cofferdam fill material

c. exported demolition material

d. imported concrete (either ready mixed prior to arrival at the site or prepared on site at a batching plant, through the delivery of aggregates, sand and cement)

e. imported grout

f. imported steel reinforcement

g. imported shaft and tunnel segments (pre-cast)

h. imported tunnel supplies and consumables (formwork/pipe/track/oils)

i. imported and exported construction plant and equipment

j. imported site office consumables.

3.2.16 The overall tonnage of each of the above material types is summarised in Table 3.2.1. This shows that the greatest proportion of material generated by the project would be excavated material, with 4.7 million tonnes generated over the course of the project across all sites. This equates to approximately 59% of the total tonnage.

3.2.17 The other main material types required for the project would be concrete (ready-mix or raw materials for on-site batching, 13.7% of total tonnage), imported fill (8.2%) and tunnel segments (7.7%).

Table 3.2.1 Estimated materials tonnages by type

Material type	Approximate tonnage	Percentage of total
Excavation - main and long connection tunnels	3,235,000	40.5%
Excavation - main and CSO shafts *	825,000	10.3%
Excavation - cofferdam fill	450,000	5.6%
Excavation – other **	210,000	2.6%
Imported fill – including cofferdam	655,000	8.2%
Precast tunnel / shaft linings	615,000	7.7%
Concrete – ready-mix	670,000	8.4%
Concrete on site batched – cement, sand and aggregates	420,000	5.3%
Temporary construction materials including formwork/ pipe/ track/ oils	320,000	4.0%
Demolition material	140,000	1.8%
Grout – cement, PFA/cement replacement, sand, bentonite	145,000	1.8%
Steel reinforcement bars	100,000	1.3%
Plant deliveries and removals	170,000	2.1%
Office and general site deliveries	45,000	0.6%
Total	7,990,000	100.0%

** Includes connection tunnels*

*** e.g. from interception chamber and connection culvert*

Transport Strategy

3.2.18 The proposed *Transport Strategy* has been developed by considering a range of issues relating to the potential for construction materials to be transported by road, river and rail.

3.2.19 Since the phase two consultation in November 2011, further development of the proposed strategy for transporting construction material has been undertaken and a revised version of the *Transport Strategy* was included as part of the 'Section 48' publicity exercise undertaken between July and October 2012. For details of this exercise, see the *Consultation Report* which accompanies the application.

3.2.20 The work undertaken in developing the *Transport Strategy* has resulted in an increase in the targeted proportion of construction materials to be transported directly to and from construction sites by river. The resultant change in estimated construction lorry numbers are described in Table 3.2.2.

Table 3.2.2 Development of *Transport Strategy* since phase two consultation

Sites with river access	Performance of proposed strategy compared with strategy presented at phase two consultation
Putney Embankment Foreshore	Improved: 500 fewer lorries (1,000 fewer lorry movements)
Carnwath Road Riverside	Improved: 3,100 fewer lorries (6,200 fewer lorry movements)
Cremorne Wharf Depot	Improved: 1,200 fewer lorries (2,400 fewer lorry movements)
Chelsea Embankment Foreshore	Improved: 2,200 fewer lorries (4,400 fewer lorry movements)
Kirtling Street	Improved: 3,500 fewer lorries (7,000 fewer lorry movements)
Heathwall Pumping Station	Improved: 1,700 fewer lorries (3,400 fewer lorry movements)
Albert Embankment Foreshore	Improved: 2,700 fewer lorries (5,400 fewer lorry movements)
Victoria Embankment Foreshore	Improved: 1,600 fewer lorries (3,200 fewer lorry movements)
Blackfriars Bridge Foreshore	Improved: 5,800 fewer lorries (11,600 fewer lorry movements)
Chambers Wharf	Improved: 9,600 fewer lorries (19,200 fewer lorry movements)

King Edward Memorial Park Foreshore	Improved: 600 fewer lorries (1,200 fewer lorry movements)

3.2.21 During the development of the *Transport Strategy*, key stakeholders including Transport for London (TfL), the Greater London Authority (GLA), the Port of London Authority (PLA) and the relevant London boroughs were consulted.

3.2.22 A wide range of criteria have been examined in evaluating the potential opportunities, risks and implications of different transport options. These criteria include:

a. policy and policy drivers

b. economic, environmental and social impacts of each transport option

c. practicality and risk in the context of the Thames Tideway Tunnel project

d. safety

e. cost.

3.2.23 The *Transport Strategy* is based on consideration of the opportunities to:

a. reduce the need to transport materials and waste to and from project sites

b. increase the use of river and rail modes where these have been judged to provide the best environmental outcomes balanced against the need to be practicable and cost effective

c. adopt best practice within the planning of the project to reduce the number of vehicle trips, such as considering the use of local sources for materials and disposal

d. adopt best practice techniques to reduce fuel consumption and emissions and to reduce the risk of accidents, including participation in relevant London schemes such as the TfL Freight Operator Recognition Scheme (FORS).

3.2.24 Detailed consideration has been given to the issues associated with moving each type of construction material by different modes, the operational constraints at each site and the characteristics of the relevant supply chains. The *Transport Strategy* for the use of river transport is summarised in Table 3.2.3 and is based on the following materials being transported by river:

a. import and export of cofferdam fill material at Putney Embankment Foreshore, Chelsea Embankment Foreshore, Heathwall Pumping Station, Albert Embankment Foreshore, Victoria Embankment Foreshore, Blackfriars Bridge Foreshore, Chambers Wharf and King Edward Memorial Park Foreshore

b. shaft excavated material from Putney Embankment Foreshore, Carnwath Road Riverside, Cremorne Wharf Depot, Chelsea Embankment Foreshore, Heathwall Pumping Station, Albert

Embankment Foreshore, Victoria Embankment Foreshore, Blackfriars Bridge Foreshore, Chambers Wharf and King Edward Memorial Park

c. main tunnel excavated material from the main tunnel drive sites at Carnwath Road Riverside, Kirtling Street and Chambers Wharf

d. excavated material from connection tunnels, interception and associated structures at Putney Embankment Foreshore, Cremorne Wharf Depot, Chelsea Embankment Foreshore, Albert Embankment Foreshore, Victoria Embankment Foreshore, Blackfriars Bridge Foreshore, Chambers Wharf and King Edward Memorial Park

e. import of sand and aggregates for main tunnel secondary lining for the main tunnel drive sites at Carnwath Road Riverside, Kirtling Street and Chambers Wharf.

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Table 3.2.3 Proposed transport of materials by river

Construction site	Cofferdam fill (import / export)	Excavated material (export)			Main tunnel secondary lining aggregates (import)
		Shaft	Main tunnel	Other	
Putney Embankment Foreshore	Y	Y	N/a	Y	N/a
Carnwath Road Riverside	N/a	Y	Y	N/a	Y
Cremorne Wharf Depot	N/a	Y	N/a	Y	N/a
Chelsea Embankment Foreshore	Y	Y	N/a	Y	N/a
Kirtling Street	N/a	N/a	Y	n/a	Y
Heathwall Pumping Station	Y	Y	N/a	n/a	N/a
Albert Embankment Foreshore	Y	Y	N/a	Y	N/a
Victoria Embankment Foreshore	Y	Y	N/a	Y	N/a
Blackfriars Bridge Foreshore	Y	Y	N/a	Y	N/a
Chambers Wharf	Y	Y	Y	Y	Y
King Edward Memorial Park Foreshore	Y	Y	N/a	Y	N/a

The Transport Strategy envisages that 90% of the materials indicated above would be transported by river from the sites indicated.
** Programme constraints preclude the transport of main shaft excavation materials being proposed by river at Kirtling Street*

3.2.25 The target proportion for the above materials to be moved by river directly to and from each site is 100%. However, to allow for periods when river transport may be unavailable or materials which are unsuitable for river transport, such as excessively wet spoil or any contaminated materials, the assessment has been based on transporting 90% of these materials by river with the remaining 10% by road.

3.2.26 Based on 90% of the materials listed in para. 3.2.24 being transported by barge directly to and from sites, this equates to approximately 53% of the total tonnage of construction materials across the construction period. If this amount could be increased to 100% of the materials listed it would equate to approximately 59% of the total tonnage of construction materials.

3.2.27 The *Transport Strategy* does not preclude any appointed contractors from increasing the use of river transport if it is practicable and economic to do so. Thames Water would engage with contractors to identify opportunities or appropriate incentives to encourage greater use of the river.

3.2.28 In addition to the transport of materials directly to and from Thames Tideway Tunnel project sites, there is also a significant opportunity to source materials from suppliers which receive their goods or raw materials by river or rail. It is estimated that this could equate to approximately 30% of the total materials tonnage required across the construction programme.

3.2.29 A proportion of this 30% is ready-mix concrete, which represents 9% of the total construction material tonnage across the project. This would be transported direct to sites by road, but it is proposed to source ready-mix concrete from suppliers which receive the raw materials by rail or river.

3.2.30 Based on the commitments to using river transport directly to and from project sites (see para. 3.2.25), the potential for additional materials to be transported directly to sites (see para. 3.2.27) and the potential to source materials from suppliers whose own raw materials are received by river or rail (see para. 3.2.28), there could be a total of 97% of all construction materials being transported by river or rail for at least some part of the journey between raw supply or disposal locations and the project sites. Plate 3.2.1 illustrates this breakdown in broad terms. Plate 3.2.2 summarises the proposed *Transport Strategy*.

Plate 3.2.1 Transport of construction materials

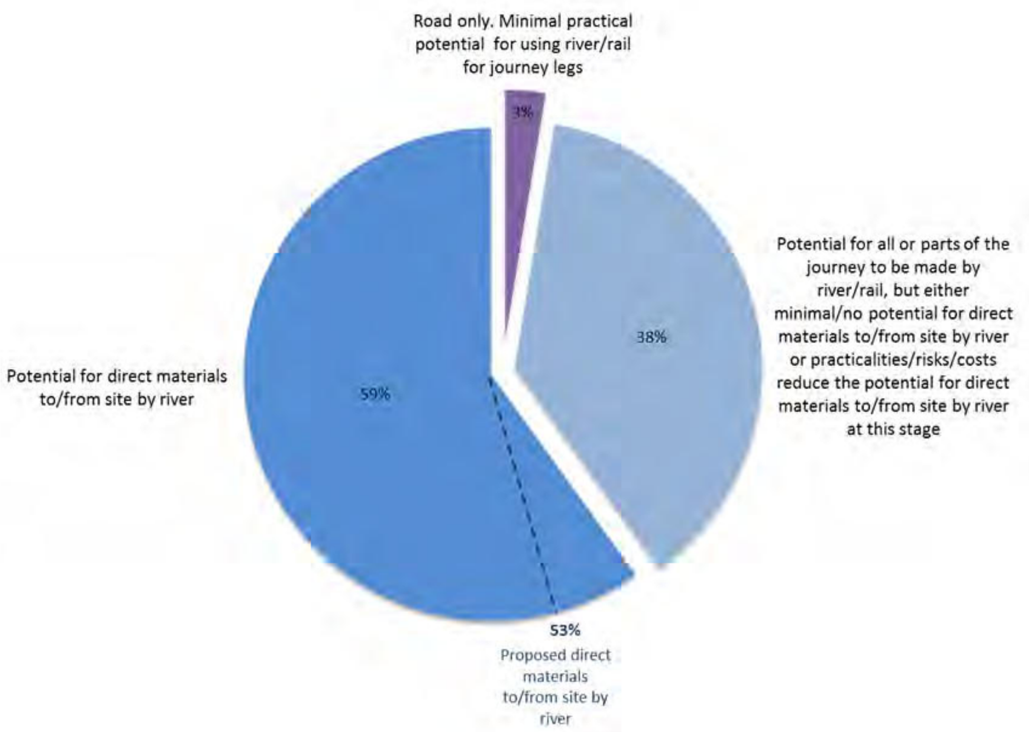
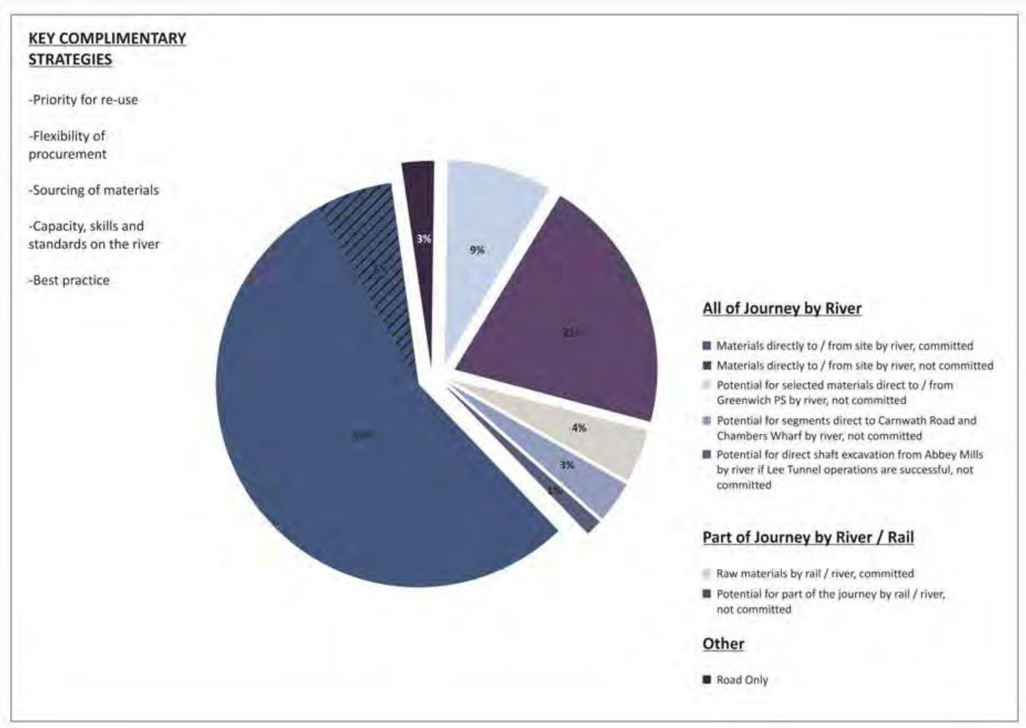


Plate 3.2.2 Summary of proposed *Transport Strategy*



Barge sizes

3.2.31 Table 3.2.4 shows the typical barge sizes required at each construction site where materials would be transported by river.

Table 3.2.4 Typical Barge sizes

Site name	Excavated material	Imported cofferdam fill	Bulk aggregates
Putney Embankment Foreshore	350T	350T	n/a
Carnwath Road Riverside	800T	n/a	350T
Cremorne Wharf Depot	350T	n/a	n/a
Chelsea Embankment	800T	800T	n/a
Kirtling Street	1000T	n/a	350T
Heathwall Pumping Station	350T	350T	n/a
Albert Embankment	350T	350T	n/a
Victoria Embankment	800T	800T	n/a
Blackfriars Bridge	800T	800T	n/a
Chambers Wharf	1500T	1000T	350T
King Edward Memorial Park Foreshore	1000T	1000T	n/a

Construction vehicles

3.2.32 All other materials would be transported by road. A range of construction lorry types would be required for the various types of material that would be transported by road. Table 3.2.5 summarises the typical road vehicle types associated with each material.

Table 3.2.5 Construction lorry types

Vehicle type	Material
Rigid-bodied tipper	Excavation, fill (in and out), sand and aggregates for concrete, demolition material

Vehicle type	Material
Rigid-bodied mixer	Ready-mix concrete
Rigid-bodied vehicle	Rebar, office supplies
Articulated vehicle	Tunnel linings, cement for concrete, grout supplies (bentonite, fly ash, cement), rebar, structural steel, office supplies, TBM supplies, plant and equipment

Construction routes

3.2.33 The routes that would be used by construction traffic serving the Thames Tideway Tunnel project sites have been determined from consideration of potential supply and disposal locations and the nature of the highway network on routes between the sites and those locations.

3.2.34 In addition, discussions have been held with TfL and the Local Highway Authorities (LHAs) in order to identify the principles of the construction vehicle routes and to seek to avoid parts of the network that are considered by the authorities to be particularly sensitive.

3.2.35 Figure 3.2.2 (see Project-wide *Transport Assessment* figures) shows the range of locations of potential supplier sites within London and the surrounding area. At this stage in the project, no firm decisions have been made about which of these sites would be used but Figure 3.2.2 (see Project-wide *Transport Assessment* Figures) provides a representative sample of the locations that might be used to support the assignment of construction traffic to the transport networks.

3.2.36 The assignment of project construction traffic to the highway network is described in paras. 3.3.68 to 3.3.73. The key corridors within the highway network for project construction vehicles would be:

a. the A4/M4 corridor to the west

b. the South Circular Road (A205) corridor through south London

c. routes in the Nine Elms and Vauxhall area

d. the Lower Road / Evelyn Street (A200) and Deptford Church Street (A2209) corridor through inner southeast London

e. the A2 and A20 corridors to the east

f. the A13 corridor to the east.

Code of Construction Practice

3.2.37 Measures incorporated into the *Code of Construction Practice* (CoCP) *Part A* and *Part B* to reduce transport impacts include HGV management and control measures such as designated vehicle routes to sites for construction vehicles and the anticipated hours during which vehicle movements would take place, as outlined in paras. 3.5.1 to 3.5.5 below. The implementation of these measures has been assumed for the assessment of construction effects.

3.2.38 Key transport-related measures incorporated within the *CoCP Part A* include:

a. contractors would ensure that works are undertaken in such a way as to maintain existing public access routes and rights of way, as far as is reasonably practicable

b. where required alternative or diverted routes would be adequately signed

c. the transportation of materials, including hazardous materials, would consider the risk of pollution incidents and include mitigation measures to reduce the likelihood and impact of any incident

d. a site-specific *Traffic Management Plan* would be prepared for each site in consultation with the highway authorities and the emergency services and agreed with those organisations. This would include arrangements for site access and egress, temporary and permanent changes to highways, the strategy for traffic management and parking management and agreement on the local routes to be used by construction lorries. A *Construction and Logistics Plan* would also be prepared detailing the management of movements to and from the site

e. provision to maintain access for deliveries to neighbouring properties and to inform occupiers of proposed closures and diversions in advance

f. lorry management measures including approved routes for lorries, arrangements to ensure that lorries do not arrive before standard working hours or park or wait in non-agreed areas and a system of pre-notification of vehicle arrivals to prevent queuing outside sites

g. a requirement for contractors to minimise the need for and duration of diversions to pedestrian, cycle and vehicle routes, to provide clear signage of diversions, ensure they are suitable for mobility-impaired users where practicable and provide controls at site accesses to ensure the safety of pedestrians and cyclists

h. the adoption of best practice measures for construction road transport, such as the use of vehicles compliant with EURO 5 emission standards, vehicles to be fitted with 'active' cycle safety measures and membership of the TfL Freight Operator Recognition Scheme (FORS).

3.2.39 Where river transport would to be used for construction materials, the *CoCP Part A* includes provisions for the following:

a. contractors would be required to maintain existing navigational channels and undertake works so as to limit undue inconvenience to the public and river users as far as is reasonably practicable

b. a site-specific *River Transport Management Plan* would be produced for each relevant construction site, in consultation with the Port of London Authority (PLA), Maritime and Coastguard Agency (MCA) and the emergency services, together with other river users and operators. These Plans would include defined roles and responsibilities for activities associated with river transportation, dredging arrangements, an agreed standard operating methodology and emergency arrangements and contingency plans.

3.2.40 Based on current travel planning guidance including TfL's 'Travel planning for new development in London'[1], this development falls within the threshold for producing a Strategic Framework Travel Plan. A draft *Project Framework Travel Plan* has been prepared based on the TfL ATTrBuTE guidance[2]. The *Project Framework Travel Plan*, which accompanies the application, addresses project-wide travel planning measures, including the need for a project-wide Travel Plan Manager, initial travel surveys during construction and a monitoring framework. It also provides a framework for the development of site-specific *Travel Plans* by the appointed contractors and contains requirements and guidelines to assist contractors in doing so.

3.2.41 The *Project Framework Travel Plan* sets out:

a. the overarching objectives for travel planning set by the project

b. generalised project-wide targets in the context of which site-specific targets would be developed

c. an outline of the type of indicators that may be used to monitor *Travel Plan* progress, which would be developed further as necessary during the life of the *Travel Plan*

d. the proposed management structure for the *Project Framework Travel Plan* and site-specific *Travel Plans* and the relationships between them, including arrangements for a Travel Plan Liaison Group

e. the responsibilities of the client, contractor, subcontractors and workers in relation to the *Travel Plans*

f. discussion of the types of travel planning measures that may be appropriate for this project

g. requirements for ongoing monitoring and review of the *Travel Plans* on a regular basis, through employee travel surveys and engagement with the Travel Plan Liaison Group.

Other measures during construction

3.2.42 At some sites, measures have been incorporated within the design of the project which are not listed in the *CoCP*. Typically these would be physical changes proposed to the highway or other networks that would form part of the arrangements to ensure the safe movement of pedestrians, cyclists and vehicles. At the project-wide level, there are no specific measures that are relevant to the assessment and are not already identified in the *CoCP*.

Operation

3.2.43 During the operational phase the only activity expected to take place at Thames Tideway Tunnel project sites would be that associated with periodic maintenance and inspection. This activity would be infrequent. Regular maintenance visits would occur every three to six months. More significant maintenance and inspection activity including the need to locate cranes and associated support vehicles on site for access to the shaft and tunnel would take place approximately once every ten years.

3.2.44 These activities would be short-term and any changes required to the transport networks on a temporary basis would be limited to the vicinity of each of the project sites. The site-specific sections of the *TA* consider the issues associated with access for cranes and other maintenance vehicles, including any changes that might be required to the highway, walking, cycling and parking facilities as necessary in each location.

3.3 Assessment methodology

3.3.1 Whilst the effects associated with transport for the operational phase have been scoped out of the *Environmental Statement*, the site-specific *TAs* examine the operational phase at each site in order to satisfy the relevant stakeholders that technical issues have been addressed (for example, those associated with access for maintenance activities). However, as paras. 3.2.43 to 3.2.44 explain, there is no need for the Project-wide *TA* to address the operational phase as any operational issues are only likely to occur at the local level.

Stakeholder engagement

3.3.2 In order to inform the methodology for the *Transport Assessment* and assist in the refinement of the design and assessments, a range of transport technical and statutory stakeholders have been consulted.

3.3.3 TfL has been engaged in its role as strategic transport authority for London. Discussions have been held in relation to highway layout and operation, pedestrian and cycle networks, London Underground, London Overground and DLR services, London bus services and passenger services on the River Thames.

3.3.4 Engagement has also taken place with each of the London local planning and highway authorities along the route of the Thames Tideway Tunnel project.

3.3.5 The GLA and PLA have been consulted in relation to project-wide issues, including the use of the river for construction materials transport. River service operators have been consulted at sites where their operations could be directly affected.

3.3.6 Comments received from all these and other relevant stakeholders have been taken into account in preparing the *TA*.

3.3.7 Engagement has taken place in several forms which broadly comprise:

a. discussions on the scope of the *Transport Assessment* and the methodology to be used

b. a series of technical discussions with TfL on the approach to strategic and local highway network modelling for the assessment

c. workshops with TfL and LHAs to discuss proposals at each of the project sites in order to identify key issues relating to access, movement, safety and construction vehicle routing and enable the design to respond to those

d. discussions with individual LHAs to ensure that local issues associated with the project sites have been identified and where possible addressed in the design and assessment process

e. workshops with TfL and the LHAs to discuss the draft assessments at each site

f. a number of meetings and workshops with TfL, PLA, GLA and LHAs as part of the development of the *Transport Strategy*.

3.3.8 Site-specific issues arising from the engagement with transport stakeholders are addressed in Volumes 4 to 27 of the *Environmental Statement* and are also summarised in the site-specific *TAs*.

3.3.9 Common issues emerging from the engagement process, which are relevant to project-wide considerations in the *TA*, include those set out in Table 3.3.1.

Table 3.3.1 Common consultation responses

Comment	Response
The use of the river to transport construction materials should be	Detailed studies have been undertaken to examine the

Comment	Response
maximised to reduce impacts on the local and wider environments.	potential of the river for transporting construction materials and develop the *Transport Strategy* which forms the basis for the *Transport Assessment* and is discussed in paras. 3.2.18 to 3.2.31.
The assessment should be based on a clearly defined construction and logistics strategy.	The assessment has been based on the *Transport Strategy* and programme described in paras. 3.2.10 to 3.2.11 and paras. 3.2.18 to 3.2.31.
A comprehensive and consistent methodology should be established for modelling traffic impacts on the highway network arising from the project.	A modelling methodology has been developed in discussion with TfL to ensure a consistent approach to highway network modelling at both strategic and local levels. The methodology is described in paras. 3.3.47 to 3.3.56.
Operational phase transport impacts should be addressed in the *Transport Assessment*.	Operational phase impacts have been addressed in the site-specific *TAs* where operational activity might affect the operation of transport networks. There are no issues which are expected to arise in the operational phase at the project-wide level, as maintenance activity would be infrequent and temporary and would involve a very small number of vehicles.
The *Code of Construction Practice (CoCP)* should reflect both generic (project-wide) issues and specific issues relevant to individual sites.	The *CoCP Part A* addresses generic issues relevant to the project as a whole, including those relating to transport and access. The *CoCP Part B* for each construction site addresses site-specific issues. A *Project Framework Travel Plan* has also been prepared which includes project-wide objectives, principles and governance arrangements together with requirements and guidance for developing site-

Comment	Response
	specific *Travel Plans*. This approach is described in paras. 3.2.37 to 3.2.42.
The study areas for each site should be justified.	The extent of the study areas has been informed by the nature of the road network, the number of construction vehicles expected and the anticipated degree of impacts. This approach is described in para. 3.3.76.
The peak hours used in the assessment should be justified.	The assessment has adopted network-wide peak hours of 08:00 to 09:00 and 17:00 to 18:00 as these are the hours represented in the TfL Highway Assignment Models which have been used for the strategic highway network assessment and to inform local junction capacity modelling, as described in para. 3.3.62. The site-specific *TAs* contain further discussion on local peak hours.
Modal splits for work travel should be derived from surveys of comparable construction sites rather than the 2001 Census.	2001 Census information has been used as this provides a consistent data set for the assessment. Where appropriate adjustments have been made to reflect site-specific measures to minimise the number of workers travelling by car, as described in paras. 3.5.20 to 3.5.29. Relevant information from the 2011 Census was not available at the time of publishing this document
The impact of proposed diversions to the Thames Path and other pedestrian routes should be assessed.	The site-specific *TAs* address the impacts associated with pedestrian diversions, where necessary.
The impact on river services and coach parking should be considered within the	The site-specific *TAs* have considered effects on river services and coach parking where

Comment	Response
assessment of transport effects.	these are relevant to a particular site. The Project-wide *TA* discusses impacts on river services and movement in paras.3.6.64 to 3.6.80.
The heavy goods vehicle (HGV) figures should be HGV movements rather than the number of HGVs.	Figures for the traffic generated by the Thames Tideway Tunnel project are generally presented in the assessment as movements. Where necessary and for clarity the number of vehicles, or movements by direction, is also reported.
There is a concern that use of daily average HGV flows at each site will under-represent both the local and strategic impacts of the scheme, hence the forecast vehicle demand flows to be used in any traffic modelling and *Transport Assessment* must be discussed and agreed with TfL.	Discussions have been held with TfL on the methodology for strategic and local modelling and the scenarios to be tested. The assessment has been based on daily average HGV movements for the peak months of construction vehicle and barge activity. The modelling scenarios have been agreed including sensitivity tests to examine the implications for the highway network if higher numbers of construction vehicles were to be generated for particular reasons or at certain times. These sensitivity tests are set out in the relevant site-specific *TAs* and in the Project-wide *TA* the outcomes of these tests are dealt with in paras. 3.6.145 to 3.6.202.
It will be important to ensure that highway operating capacity and journey time reliability for road users can be maintained	The site-specific and Project-wide *TA*s examine the operation of the highway network with and without the Thames Tideway Tunnel project to identify the potential changes in capacity and journey time. Where possible, measures to address any adverse changes have either been incorporated into the design of the project or have been identified separately.

Comment	Response
Thames Water should co-operate with the London boroughs to minimise local disruption and to agree site access routes and establish a clear structure/mechanism for community feedback during construction periods to enable local issues to be discussed and resolved	The *CoCP* describes how London councils would be engaged to minimise construction effects. Additionally the *CoCP* sets out the community liaison and management measures which would be undertaken during the construction works. TfL and the LHAs have been consulted on the proposed access routes to/from each of the sites.

3.3.10 The key technical issues raised have been addressed as far as is practicable at this stage within the Project-wide *TA*, the site-specific *TAs* and the *Environmental Statement*, in consultation with TfL and the Local Highway Authorities.

Baseline data collection

3.3.11 Baseline conditions have been identified using site visits, desk-based collation of available information from TfL and the Local Highway Authorities and field survey data collection. The scope of data collection and the information obtained are outlined in each of the site-specific sections of the *TA*.

3.3.12 A brief overview of the nature of the data obtained is set out in the following paragraphs.

Pedestrian and cycle networks

3.3.13 Baseline data collection has identified existing walking and cycling networks and facilities, including pedestrian crossings, cycle routes and cycle parking in the vicinity of each site. Pedestrian and cycle flows have been derived primarily from field survey sources.

3.3.14 At sites with significant levels of pedestrian activity in the surrounding area, a pedestrian Level of Service (LoS) assessment has been undertaken, based on the criteria established by Fruin[3] for describing the operation of pedestrian footways under different levels of pedestrian demand.

Public transport networks

3.3.15 Existing bus, rail and river passenger transport services operating in the area surrounding each site have been identified. Details of any specific taxi infrastructure, such as rank locations, have been collated.

3.3.16 The Public Transport Accessibility Level (PTAL) at each of the proposed sites has been determined using the standard PTAL methodology described in the TfL Transport Assessment Best Practice Guidance[4] (TfL, 2010). Reference has also been made to the PTAL calculator within the TfL Planning Information Database online[5] .

Highway network and parking

3.3.17 Existing traffic conditions on the local highway network have been established from data collected from field surveys and from existing traffic models and traffic count information held by TfL and the LHAs.

3.3.18 Existing provision for private parking and servicing at properties adjacent to the construction sites has been identified from site visits to ensure that any impacts on access to these properties have been considered as part of the assessment.

3.3.19 On-street parking at or adjacent to the proposed sites has been identified from site visits. This includes provision for both permit and non-permit holders, the presence of Controlled Parking Zones (CPZs) and associated time restrictions, motorcycle parking and parking for blue badge holders. Where appropriate, existing coach parking facilities and on-street loading bay provision and controls have also been identified.

3.3.20 Accident data for the most recent five year period available has been collated for the local roads in the vicinity of each of the sites.

Desk based baseline data sources

3.3.21 Information has been obtained from available sources within TfL and the Local Highway Authorities, and other reliable published sources where appropriate. Table 3.3.2 details the information which has been collected and reviewed.

Table 3.3.2 Desk-based baseline data sources

Source	Data	Notes
TfL	Accident record data	Sourced via TfL from police database records.
TfL	Bus route and timetable information	Sourced from TfL website[6].
TfL	Bus timetable and patronage information	Sourced from TfL Bus Origin Destination Survey (BODS) database.
TfL	Rail timetable information	Sourced from TfL website.
TfL	River passenger service timetable and patronage information	Service information sourced from TfL website.

Source	Data	Notes
TfL and LHAs	Pedestrian and cycle flow information	Information from TfL count databases and other information relating to development in the vicinity of sites (eg, Transport Assessments supporting planning applications).
TfL, LHAs and other published sources	Pedestrian and cycle route networks	Information from TfL website and cycle guides, Sustrans website[7] and Walk London website[8].
TfL and LHAs	Parking controls	Location of CPZs and hours of operation based on information available from LHAs.
TfL and LHAs	Traffic flow data	Information from TfL count databases and other information relating to development in the vicinity of sites (eg, Transport Assessments supporting planning applications).
TfL	Strategic Highway Assignment Models (HAMs)	Use of TfL strategic models to support analysis underlying this assessment.
TfL	Local traffic models	Use of local junction models to provide additional information on traffic demand and junction operation to support analysis underlying this assessment.
TfL	Traffic signal data	Traffic signal layout and operational data to inform local junction modelling.

Field surveys

3.3.22 A programme of field survey data collection was undertaken to provide comprehensive information on traffic, pedestrian and cycle flows and parking usage in the vicinity of each of the sites.

3.3.23 Fieldwork was primarily undertaken between May and July 2011. School and public holiday periods were excluded from the data collection, with the exception of automatic traffic count data which were collected both during school term and school holiday periods to provide a comparison.

3.3.24 Further field survey work was undertaken in August 2011 at a number of locations to collect pedestrian flow data and provide information on pedestrian activity during the summer holiday period.

3.3.25 A third set of field data was gathered in May and June 2012 to provide additional traffic, pedestrian and river usage information, including coverage of locations where surveys had not been possible or appropriate in earlier tranches of survey work.

3.3.26 The scope of the field survey work was informed by the availability of data from the desk based sources described in Table 3.3.2 and discussions with TfL and the Local Highway Authorities

3.3.27 Field survey data collection covered the topics shown in Table 3.3.3. The scale of the data collection required varied from site to site and not all of the data sources illustrated in the table below were necessary in all locations. The field surveys undertaken in relation to each site are detailed in the site-specific *TAs* in Sections 4 to 27.

Table 3.3.3 Field survey baseline data sources

Source	Data	Notes
Commissioned field surveys	Manual classified vehicle turning counts at junctions	Undertaken either by video observation or manual data collection.
Commissioned field surveys	Automatic volumetric vehicle counts	Undertaken using the temporary installation of automatic traffic count (ATC) equipment.
Commissioned field surveys	Pedestrian and cycle flow surveys	Undertaken by video observation or manual data collection at junctions and on other key walking and cycling routes.
Commissioned field surveys	Queue length surveys	Undertaken by video observation or manual data collection at junctions.
Commissioned field surveys	Saturation flow measurements	Undertaken by manual data collection at traffic signal

Source	Data	Notes
		junctions.
Commissioned field surveys	Parking surveys	Undertaken by manual data collection.

3.3.28 Data collection covered the key peak and off-peak time periods that were considered likely to be required for the assessment as follows:

a. weekday morning peak period (AM peak)

b. weekday daytime off-peak period (inter peak)

c. weekday evening peak period (PM peak)

d. weekend peak period

e. weekday night time period.

3.3.29 The field survey information has been combined with information available from the desk based sources to produce a comprehensive baseline dataset for each construction site. A *Baseline Data Report* has been prepared which forms Appendix A of this Section of the *TA*.

Construction

3.3.30 The construction assessment compares a construction base case, which represents transport conditions in the assessment year without the Thames Tideway Tunnel project, with a construction development case, which represents conditions with the project under construction. The construction base case does not include any traffic or other activity related to the Thames Tideway Tunnel project.

3.3.31 The assessment examines the likely significant construction impacts of the project on transport at three levels:

a. a project-wide assessment which identifies the impacts associated with all Thames Tideway Tunnel project sites within the project, which is contained in this section of the *TA*

b. an assessment of a sub-area of central London around the Victoria Embankment Foreshore and Blackfriars Bridge Foreshore sites to examine the effects arising from concurrent construction activity at those sites. This sub-area assessment is also contained in this section of the *TA*

c. site-specific assessments which identify the impacts in the local area around each of the individual sites. These assessments are contained within the site-specific *TAs* in Sections 4 to 27.

Walking and cycling

3.3.32 Changes arising from construction workers travelling on foot or by cycle to and from sites would be most evident, and have the greatest effect, in the immediate surroundings of each site. The typical length of walking and cycling journeys means that these trips are likely to originate from areas within one to five kilometres of each site and therefore these journeys would not present any issues at the strategic level on the pedestrian and cycle networks.

Public transport

Assessment methodology

3.3.33 The changes arising from public transport journeys made by construction workers have been examined in relation to the capacity of public transport services at each site location.

3.3.34 The number of public transport journeys identified from the mode share assumptions at each site have been compared to the typical capacity of local bus, rail and river services. This enables the additional demand to be expressed as a proportion of total capacity and equated to an additional number of passengers per service.

3.3.35 The capacity of each form of public transport varies depending on the vehicle or train type used. For this assessment, typical average capacities per bus, train or boat have been defined which are:

a. bus: an assumed capacity of 50 passengers per bus (typical of a single-decker bus). Where double-decker buses are operated, impacts would in practice be lower than those established using this capacity figure

b. DLR: an assumed average capacity of 300 passengers per DLR train

c. National Rail / London Overground: an assumed capacity of 600 passengers per train. Train lengths vary on different services and capacities typically lie between 400 and 1,200 passengers per train. The figure of 600 passengers per train assumed for this assessment is considered appropriate given the range of services available and the likelihood that in peak hours, train lengths will tend to be longer than at off-peak times

d. London Underground: an assumed capacity of 1,000 passengers per train

e. river passenger services: an assumed capacity of 200 passengers per vessel.

3.3.36 For simplicity, and as construction worker numbers would be low at the majority of sites, the additional demand has been compared with the total capacity available taking into account public transport routes in all directions.

3.3.37 The assessment recognises that worker journeys may not be distributed evenly across all public transport services at a particular site. However, at this stage there is no firm information on where workers might be travelling from and to. Given the small numbers of workers involved at most sites, sensitivity testing on the distribution of public transport journeys is not considered necessary as the impact on patronage would be very small in any case.

3.3.38 The assessment also recognises that public transport services, particularly bus services, may also be affected by changes occurring on the highway network as a result of the construction of the Thames Tideway Tunnel project. Where relevant, the assessment uses the outcomes of the highway network assessment to indicate whether road-based public transport services would be likely to experience changes in journey time or routes.

3.3.39 The methodology described above has been applied at the site-specific level, as this is where the effects of additional patronage are most likely to be concentrated.

3.3.40 At the project-wide level, the changes to public transport services in terms of patronage have been considered in the context of the wider bus, rail and river networks to present a comparative view on how the project as a whole might affect these networks.

Assessment year for public transport networks

3.3.41 The assessment year for the public transport network in the construction phase is the project-wide peak year of activity (Project Year 4) used for the highway network assessment, which is discussed in paras. 3.3.58 to 3.3.60 and paras. 3.5.14 to 3.5.18.

River movements

Assessment methodology

3.3.42 The implications of barge movements on the River Thames in the immediate area of each relevant project site have been examined by comparing the number of movements generated by that site with the anticipated base case level of activity on the river at that location.

3.3.43 At the project-wide level, the assessment has aggregated the number of barge movements and considered the number of river transit movements required to move that number of construction barges. This takes account of the fact that barges would be hauled by tugs and that smaller barges may be capable of being hauled in pairs, subject to mooring and tidal conditions. The number of river transit movements required for construction barges has been compared with the typical pattern and number of river transit movements along the river in the base case.

3.3.44 The project-wide effects of additional barge movements on the River Thames have been assessed by comparison with the estimated number of transit movements occurring on the river in the construction base case.

3.3.45 Separate *Navigational Issues and Preliminary Risk Assessments* have been undertaken for each site at which river transport is proposed, in order to define the specific navigational issues that might arise as a consequence of barge movements, loading and unloading facilities and other changes associated with the project. These are reported separately from the *TA*, to accompany the application for development consent documentation.

Assessment year for river movements

3.3.46 The assessment of river movements has been based on the month in which the cumulative number of barge movements from all sites would be greatest. This would occur in Project Year 2 and is discussed in more detail in paras. 3.5.7 to 3.5.12.

Highway network

3.3.47 The way in which the Thames Tideway Tunnel project might affect the operation of the highway network has been assessed at both the project-wide and site-specific levels.

3.3.48 The project-wide assessment has used strategic highway network modelling to provide an overview of how the total number of construction vehicles associated with the project at any one time would change traffic conditions on the wider network.

3.3.49 The outcomes of the strategic highway network modelling have also been used to inform a series of local highway network models which have been created for each site-specific assessment. These local models have been used to examine the way in which key junctions close to project sites would operate with the additional construction traffic demand, or with physical changes to the highway layout that might be required during construction.

Approach to strategic modelling

3.3.50 Strategic highway network modelling has been undertaken using the TfL Highway Assignment Models (HAMs). These comprise five strategic models, using SATURN[iii] software. Three of the five TfL HAMs have been used in this assessment:

a. the West London Highway Assignment Model (WeLHAM)

b. the Central London Highway Assignment Model (CLoHAM)

c. the East London Highway Assignment Model (ELHAM).

3.3.51 Figures 3.3.1, 3.3.2 and 3.3.3 (see Project-wide *Transport Assessment* figures) show the coverage of these three models.

3.3.52 The strategic highway network modelling allows identification of the changes to delay and journey time that might arise on the wider

[iii] SATURN is a software package used for modelling the operation of large highway networks, based on the identification of trip demand matrices and using dynamic assignment algorithms to determine trip routes through the network based on journey time, distance and speed parameters.

highway network as a consequence of additional traffic demand and/or the reassignment of traffic from busier to less busy routes to optimise network performance.

3.3.53 Discussions have taken place with TfL on the scenarios to be tested at the strategic level. A summary of those discussions and the approaches agreed with TfL is given in the *Strategic Modelling Methodology Report*, which is contained in Appendix B of this section of the *TA* and the methodology is summarised in the following paragraphs.

3.3.54 The HAMs have been built by TfL with a 'base year' of 2008/2009. For this assessment, it has been agreed with TfL that the base year in the HAMs would be taken as being equivalent to baseline conditions for the purposes of this assessment.

3.3.55 The HAMs have a modelled 'forecast year' of 2021. Whilst this is generally later than the years in which peak construction activity is expected to occur at the project sites, it has been agreed with TfL that the 2021 forecast year in the HAMs can be treated as the construction base case for the purposes of the strategic modelling. This avoids the need to re-forecast and re-validate the strategic model, bearing in mind that the construction period for the Thames Tideway Tunnel is anticipated to run from around 2016 to 2022.

3.3.56 As the *Transport Assessment* is primarily concerned with comparing the construction development case with the construction base case, rather than with present-day baseline conditions, no further work has been done on the 2008/2009 modelled base year scenarios in the HAMs as this is not necessary.

Strategic modelling assessment area

3.3.57 The three HAMs used for the project-wide assessment cover the full extent of the route of the Thames Tideway Tunnel project. The model boundaries overlap and the 24 construction sites within the project have each been allocated into one of the three HAM areas, as listed in Table 3.3.4 and illustrated schematically on Figure 3.3.4 (see Project-wide *Transport Assessment* figures).

Table 3.3.4 Allocation of sites to HAM boundaries

WeLHAM	CLoHAM	ELHAM
Acton Storm Tanks	Falconbrook Pumping Station	Chambers Wharf
Hammersmith Pumping Station	Cremorne Wharf Depot	Shad Thames Pumping Station
Barn Elms	Chelsea Embankment Foreshore	King Edward Memorial Park Foreshore

WeLHAM	CLoHAM	ELHAM
Putney Embankment Foreshore	Kirtling Street	Bekesbourne Street
Carnwath Road Riverside	Heathwall Pumping Station	Earl Pumping Station
Dormay Street	Albert Embankment Foreshore	Deptford Church Street
King George's Park	Victoria Embankment Foreshore	Greenwich Pumping Station
	Blackfriars Bridge Foreshore	Abbey Mills Pumping Station
		Beckton Sewage Treatment Works

Strategic modelling assessment years

3.3.58 The construction development case modelling examines construction traffic demands for

a. the project-wide peak month of activity – the month in which the total number of construction lorries generated by the project would be greatest

b. the months in which aggregated activity at the western, central and eastern clusters of sites (as shown in Table 3.3.4) would be greatest.

3.3.59 The project-wide peak month of activity would occur in Project Year 4 and would also coincide with the month in which the total number of lorries generated by sites in the central and eastern clusters of sites would be greatest. The western cluster peak of activity would occur in Project Year 2.

3.3.60 The derivation of these assessment years and scenarios is explained in more detail in paras. 3.5.14 to 3.5.18.

Construction traffic demand

3.3.61 For each of the three HAMs, a construction development case has been created which adds the forecast vehicle movements associated with the project to the base case model flows (ie, the 2021 HAMs forecast year).

3.3.62 The HAMs represent peak hours of 08:00 to 09:00 and 17:00 to 18:00 and these have been taken as the network-wide peak hours in the project-wide and site-specific assessments. These peak hours are considered to be the most sensitive overall in relation to highway network operation because these are the periods when traffic flows on the network are greatest.

3.3.63 It is acknowledged that in practice the number of construction vehicle movements may not be constant across the working day. Conversely, contractors may seek to minimise the number of lorry movements necessary in the peak hours, in order to reduce the likelihood of disruption to schedules due to congestion or incident.

3.3.64 The assessment has been based on 10% of the daily number of lorry journeys occurring in the peak hours, which has been agreed with TfL as a reasonable approach.

3.3.65 The additional trips related to construction traffic from the project worksites comprise construction lorry movements and operational construction vehicles (for example small deliveries, contractors' supervision staff and maintenance vehicles). In addition, the potential for worker journeys to be made by car to certain sites has been included to provide a robust assessment (as explained in more detail in paras. 3.5.20 to 3.5.27) although, in practice, such trips would be actively discouraged through measures implemented in the *Project Framework Travel Plan* and site-specific *Travel Plans*.

Network changes due to construction

3.3.66 Initial tests were carried out using the HAMs to determine whether the physical changes to the highway network that would be required in certain locations during construction were capable of being modelled in the HAMs. This exercise confirmed that many of the minor changes likely to be required were either not significant enough to represent with any confidence at the strategic level, or that the changes would be associated with minor and uncontrolled junctions which are not represented in the HAMs.

3.3.67 Following this exercise it was agreed with TfL that only two changes associated with the construction phase were likely to have more than very local effects. These changes would be at the Blackfriars Bridge Foreshore and Deptford Church Street sites. They are described in more detail in para. 3.6.88 and have been included in the strategic model runs for the construction development case.

Assignment of construction traffic

3.3.68 Figure 3.2.2 (see Project-wide *Transport Assessment* figures) provides an indication of the supply and disposal locations that might be used during the project, as a basis for preparing the assignment of construction traffic to the transport networks.

3.3.69 For the highway network modelling construction lorry trips were allocated to fixed routes defined for each origin / destination pair. The proposed routes were discussed and refined with TfL and the

Local Highway Authorities. The routes were identified using the following criteria:

a. using the quickest route from the site to the TfL Road Network (TLRN) or the Strategic Road Network (SRN)

b. keeping to the TLRN / SRN where possible and minimising use of lower class roads

c. avoiding routes with height / weight / width restrictions and banned turns

d. avoiding heavily congested routes where possible.

3.3.70 Figure 3.3.5 (see Project-wide *Transport Assessment* figures) shows the proposed network of routes to be used by construction lorries.

3.3.71 The assignment of construction lorry trips to the network has been undertaken using OmniTrans[iv] assignment software. This has enabled a 'fixed' assignment to be generated for construction lorry movements to and from all Thames Tideway Tunnel project sites which ensured that these were limited to the routes proposed and that the HAMs did not dynamically reassign these journeys onto other routes.

3.3.72 The fixed routes were coded into SATURN as pre-loaded fixed flows, using a passenger car unit (pcu) factor of two for HGVs, which means that each additional construction vehicle movement contributes to delays to the equivalent of two additional car movements.

3.3.73 Private car journeys made by construction workers have been assigned directly to the SATURN matrices, as workers making these journeys would be free to choose the most appropriate routes to and from the site based on network conditions. Paras. 3.5.20 to 3.5.27 explain the assumptions made about worker car journeys for the purposes of the assessment and that this represents a robust analysis.

Approach to local highway modelling

3.3.74 The project-wide assessment does not require local highway modelling, which is relevant only to the site-specific assessments.

3.3.75 Local highway modelling has been undertaken in the majority of site-specific *TAs* in order to examine how local junctions would operate in the construction development case and compare this with the construction base case.

[iv] OmniTrans is a software package used for multi-modal transport network modelling and in this case has been used to produce assignments of construction traffic across the proposed network of routes to be used for the project.

3.3.76 The extent of the assessment area for the local highway network modelling has been informed by considering the volume of construction traffic at each site and the degree of impact that would be experienced at the nearest junction of the construction vehicle route with the TLRN or SRN. Where the assessment indicates that the forecast impacts at this junction would not be significant, junctions further afield on the strategic network have not been assessed. Where impacts have been forecast to be significant at the nearest TLRN or SRN junction, a wider area of the local network has been considered in the assessment.

3.3.77 Baseline junction capacity models have been built using a range of proprietary software as appropriate, which includes:

a. PICADY – a software tool for modelling the operation of priority (unsignalled) junctions

b. LinSig – a software tool for modelling the operation of individual, or closely-linked, traffic signal junctions

c. TRANSYT – a software tool for modelling the operation of networks of linked traffic signal junctions.

3.3.78 Where appropriate and possible, suitable existing models and signal timing information from TfL have been used. Where new models have been developed these have been based on observed data. Baseline traffic flows for these local junction models have been derived from baseline data obtained through field survey work or from other available sources.

3.3.79 TfL Modelling Guidelines (TfL, 2010)[9] and Model Audit Processes (TfL, 2011)[10] have been used as the basis for preparing and checking models and their outputs. Validation of the models has been based on observed data including signal timings, traffic volumes and queue lengths.

3.3.80 These models are considered suitable for this planning stage and are intended to demonstrate the nature of the impacts of the additional vehicles generated by the Thames Tideway Tunnel project. It is acknowledged that these models may require further refinement as the project design is finalised. However, as a period of time would elapse before construction commences, it would be necessary in any case to review and revalidate the models against traffic conditions at that time, as is normal practice.

3.3.81 Base case models have been developed from the baseline models by factoring baseline traffic flows to reflect traffic growth between the baseline and base case periods.

3.3.82 The growth factors used in this approach have been obtained from the HAMs by comparing the 2008/2009 modelled base year and 2021 modelled forecast year outputs for each local authority area as described in paras. 3.6.26 to 3.6.28.

3.3.83 The HAMs outputs for the construction development case scenarios have been used to identify the changes in turning movements associated with project construction traffic at each local junction being assessed. These changes have been extracted from the HAMs and added to the base case flows in each local model.

3.3.84 This is considered reasonable, as it is recognised that using the absolute traffic flows shown in the HAMs outputs can over- or underestimate actual conditions. Whilst the HAMs provide a useful comparative tool, at the local level it is normally accepted that taking the changes in turning flows and applying those to baseline data provides a more robust approach and one that is more readily capable of validation. In addition it ensures that the local models not only take account of Thames Tideway Tunnel project construction traffic from any of the project sites but also of any other traffic reassignment effects on the wider network that are produced by the HAMs.

Committed developments

3.3.85 The assessment has considered the changes that might occur as a result of committed developments in the areas surrounding each site. The developments considered are identified within the *Environmental Statement* and are noted in each of the site-specific *TAs*.

3.3.86 Of particular relevance to the transport assessment process are any significant physical highway changes proposed as part of other developments and any additional trips expected from those developments on the local highway networks.

3.3.87 At the project-wide level the assessment has used the HAMs developed by TfL. These are built up from the London Travel Survey (LTS) model, which is a strategic model representing travel patterns in London.

3.3.88 The LTS model contains over 1,000 zones and allows origin – destination matrices to be developed to represent future travel demand patterns, based on employment and population forecasts including those used by the GLA, which are in turn derived from those set out in the London Plan[11] (GLA, 2011).

3.3.89 This means that the strategic level assessment inherently takes into account future planned development across London.

3.3.90 It also means that the growth factors used in the local highway modelling take account of the effects of new development and thus carry these effects through to the local modelling for the construction base and development cases.

3.3.91 For the project sites at Kirtling Street, Heathwall Pumping Station and Albert Embankment, the local highway modelling for the construction base case has taken specific account of development proposals in the Nine Elms Opportunity Area and surroundings.

3.3.92 This has been done to ensure that the modelling of the local highway network and demands around those sites was reasonably representative of future conditions, as not all of the changes and development proposals appeared to be fully represented in the relevant HAM (CLoHAM).

Accidents and safety

3.3.93 During the development of the *Transport Strategy*, consideration was given to the potential for an increased incidence of accidents on the highway network across London as a result of construction lorry movements associated with project sites.

3.3.94 For the project-wide assessment, a broad estimate has been made of the number of additional accidents that might arise as a result of the total distance travelled by Thames Tideway Tunnel project construction lorries during the construction phase. This has been based on historical data on accident rates related to the distance travelled by HGVs on the road network.

Sub-area highway analysis

3.3.95 In addition to the strategic modelling work for the project-wide assessment and local highway modelling for site-specific assessments, traffic modelling has been undertaken for a sub-area of the highway network in central London.

3.3.96 This sub-area assessment responds to requests from stakeholders to consider the effects on the highway network connecting the Victoria Embankment Foreshore and Blackfriars Bridge Foreshore sites. These sites would both be on the Embankment on the north side of the River Thames and the assessment has been requested to examine whether that part of the network would be affected by concurrent activity at these two sites.

3.3.97 It has been agreed with TfL that the appropriate tool for this sub-area assessment is a VISSIM[v] traffic micro-simulation model. This permits analysis in more detail than the TfL HAMs, whilst also allowing a number of junctions within a network to be included within the same model.

VISSIM assessment area

3.3.98 The sites at Victoria Embankment Foreshore and Blackfriars Bridge Foreshore would be approximately 1.5km apart along Victoria Embankment (A3211). There is a possibility that concurrent works at both sites could affect conditions on that stretch of Victoria Embankment (A3211).

3.3.99 The Chelsea Bridge Foreshore site would also be on the Embankment route but would be 4.5km west of the Victoria Embankment Foreshore and over that distance it is considered

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[v] VISSIM is a traffic microsimulation software package widely used in the transport planning industry to model smaller areas of the highway network, including signal junctions, in greater detail using animated representations of the highway network operation to aid understanding of network operation together with the output of operational statistics.

unlikely that any interaction on traffic conditions would occur. The sub-area assessment does not incorporate the Chelsea Embankment Foreshore site for this reason.

3.3.100 The assessment area for the VISSIM model extends along Victoria Embankment (A3211) from Westminster Bridge (A302) in the west to Blackfriars Bridge (A201) in the east. It includes the junctions of:

a. Westminster Bridge (A302) / Bridge Street / Victoria Embankment (A3211)
b. Victoria Embankment (A3211) / Horse Guards Avenue
c. Victoria Embankment (A3211) / Northumberland Avenue
d. Victoria Embankment (A3211) / Savoy Place / Savoy Street
e. Victoria Embankment (A3211) / Temple Place (west)
f. Victoria Embankment (A3211) / Temple Place (east)
g. Victoria Embankment (A3211) / Temple Avenue
h. Victoria Embankment (A3211) eastbound slip road / New Bridge Street (A201) / Queen Victoria Street
i. Blackfriars Bridge (A201) / Victoria Embankment (A3211) westbound slip road
j. Queen Victoria Street / Puddle Dock
k. Upper Thames Street (A3211) / Puddle Dock.

VISSIM assessment time periods

3.3.101 The VISSIM model addresses the AM (07:00 to 10:00) and PM (16:00 to 19:00) peak periods and has been developed for the baseline, construction base and development cases.

3.3.102 To assist in understanding whether concurrent works at the Victoria Embankment Foreshore and Blackfriars Bridge Foreshore would create interacting effects on this part of the highway network, the VISSIM model has considered three scenarios for the development case. These are explained below.

3.3.103 Scenario 1 represents phase 1 of construction at Victoria Embankment Foreshore. This would take place in Project Year 1. In that phase Victoria Embankment (A3211) at that site would be narrowed to facilitate utility diversion works, although two lanes would be maintained in each direction. There would be no construction activity at Blackfriars Bridge Foreshore at this point in the programme.

3.3.104 Scenario 2 represents phases 1 and 2 of construction at Blackfriars Bridge Foreshore, during which the westbound slip road between Blackfriars Bridge (A201) and Victoria Embankment (A3211) would remain open but lane widths would be reduced. This would occur in Site Year 2 at Blackfriars Bridge Foreshore, which is Project Year 3, and is the time at which construction lorry flows from the Blackfriars Bridge Foreshore site would be greatest. There would be concurrent construction activity at Victoria Embankment Foreshore at this time which has also been taken into account in the VISSIM model.

3.3.105 Scenario 3 represents phase 3 of construction at Blackfriars Bridge Foreshore, during which the westbound slip road between Blackfriars Bridge (A201) and Victoria Embankment (A3211) would be closed. This would occur in Site Year 3 at Blackfriars Bridge Foreshore, which is Project Year 4. There would be concurrent construction activity at Victoria Embankment Foreshore at this time, which has also been taken into account in the VISSIM model.

VISSIM traffic flows

3.3.106 In order to ensure that the VISSIM assessment was reasonable, and to provide a consistent basis for comparison, the same traffic flows have been used in each of the three development case scenarios tested in the VISSIM model. The flows have been derived as follows:

a. base case traffic flows were produced by applying growth factors to the baseline traffic flows. The growth factors were those for the City of Westminster and City of London areas, taken from the HAMs, as described in para. 3.3.82 and paras. 3.6.26 to 3.6.28. For the VISSIM model, the highest of these two growth factors has been used. The base case flows therefore effectively represent growth to 2021.

b. construction traffic flows were added to the base case flows to form the development case scenarios. The construction traffic flows represent the greatest number of vehicles in total that would be generated by the Victoria Embankment Foreshore and Blackfriars Bridge Foreshore sites at any point in the programme, which would be in Project Year 3 associated with the peak of construction lorry activity at Blackfriars Bridge Foreshore.

VISSIM model development

3.3.107 Traffic information for the VISSIM model has been drawn from baseline traffic surveys and from TRANSYT models provided by TfL. Site layout drawings and signal timing information for the relevant junctions were obtained from TfL; signal timings were reviewed and re-calibrated against observed on-street timings.

3.3.108 The baseline VISSIM model was calibrated to reflect current conditions on the highway network, including a number of adjustments to model parameters in order to better represent the actual behaviour of vehicles at the junctions in the VISSIM network. These are described in more detail in paras. 3.4.107 to 3.4.108.

3.3.109 The baseline VISSIM model was also validated to ensure that it gave a reasonable representation of existing conditions. Validation was undertaken using observed traffic flows and journey times from the baseline surveys and guidance set out in the Design Manual for

Roads and Bridges (DMRB), Volume 12 Section 2 (DfT, 1996)[12] and is described in paras. 3.4.109 to 3.4.115.

3.3.110 The baseline VISSIM model was used to create equivalent models to represent the construction base case, by applying appropriate growth factors. A number of scenarios for the construction development case were also prepared, representing different stages in construction at Victoria Embankment Foreshore and Blackfriars Bridge Foreshore.

3.3.111 The assessment compares the VISSIM results for the construction development case scenarios with the construction base case in order to examine the likely effects of the construction development scenarios.

Sensitivity testing

3.3.112 The ‘core’ assessment presented in the *TA* has been based on the *Transport Strategy*. It examines the month(s) in which construction vehicle activity at this site would be greatest and uses the average daily number of construction lorry movements that would occur in that month. This is considered to be reasonable because it addresses:

a. the time at which construction vehicle movements would be greatest at each site and project-wide and there would be longer periods when the number of vehicle movements would be lower

b. although there may be occasions in the peak month(s) when the number of lorry movements in one day might exceed the average daily figure, these would be limited. The number of instances would be small in the context of the overall construction period and would be offset by other times when the number of construction vehicle movements would be lower than the average daily figure for the peak month

c. if lorry movements are required outside the typical hours of 08:00 to 18:00 on weekdays and 08:00 to 13:00 on Saturdays, this would be agreed in advance with TfL and the relevant LHA.

3.3.113 The need for sensitivity testing has been discussed with TfL. Such a test could be used to address:

a. variation in construction vehicle numbers around the average daily figure for the peak month

b. increases in lorry movements as a result of temporary operational issues affecting the ability to move construction materials by river

c. changes in programme which might lead to construction activity peaking at different times and/or a greater coincidence of peaks at adjacent sites which could lead to higher construction lorry flows on the surrounding highway network.

3.3.114 As para. 3.3.112 explains, if construction vehicle numbers were to exceed the average daily figure for the peak months, this would be an infrequent occurrence and should be seen in the context that the assessment has been based on the peak month of construction activity at each site, rather than a lower ‘typical’ month.

3.3.115 It is a commitment that river transport would be used for certain construction materials and this forms part of the *Transport Strategy*. It is therefore not likely that all materials would be moved by road at all sites. However, there is a possibility that river transport might not be available at a particular site or sites for short periods of time and this might be the result of temporary navigational constraints, local issues temporarily preventing access to the river, or wider issues restricting river movements to a number of sites (such as the closure of the Thames Barrier).

3.3.116 In practice the potential for increased coincidence of construction peaks between sites would be limited because of the sequential nature of the construction activities required. Whilst it is possible that individual worksite peaks might change slightly, it is very unlikely that all worksites would experience peak activity in the same period.

3.3.117 Although these events, if they were to arise, would be limited and short-term, it has been agreed with TfL that sensitivity testing would be undertaken within the *TA* to identify the potential impacts associated with such occurrences. It has also been agreed that for consistency, the test would be based on the number of construction lorry movements that would be related to moving all construction materials by road. This has been assumed to act as a proxy for events of this nature and represents an upper bound on the level of construction traffic that could be expected.

3.3.118 A summary of the review of potential sensitivity test scenarios is given in the *Strategic Modelling Methodology Report* contained in Appendix B of this Section of the *TA*.

Operation

3.3.119 As paras. 3.2.43 to 3.2.44 explain, during the operational phase maintenance activity would be occasional and temporary and any issues relating to the operation of the transport networks would occur at a local level in the vicinity of project sites.

3.3.120 At a project-wide level, there is therefore no need to assess the transport implications of the operational phase of the project.

3.4 Baseline

3.4.1 The following paragraphs sets out the policy background and baseline conditions for the strategic public transport and highway networks within the assessment area. It also describes general baseline conditions in relation to river movements.

Policy review

3.4.2 As part of the *Transport Assessment*, relevant policy has been reviewed at national, regional and local levels.

National policy

3.4.3 National policy promoted by the Government provides a framework within which regional and local policies are developed. Relevant national policy includes:

a. the National Planning Policy Framework (NPPF) (Department for Communities and Local Government, 2012)[13], issued in March 2012

b. the National Policy Statement (NPS) for Waste Water (Department for the Environment, Food and Rural Affairs, 2012)[14], issued in March 2012.

National Planning Policy Framework (NPPF)

3.4.4 The Department for Communities and Local Government published the NPPF in March 2012. This replaced a variety of existing planning guidance.

3.4.5 The key objective of the NPPF is to create a policy context to support economic growth. The principle of the guidance is to place an emphasis on sustainable development, where environmental conditions should be considered alongside economic and social matters.

3.4.6 With particular reference to transport matters relevant to the assessment of the Thames Tideway Tunnel project, the document states: “All developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment. Plans and decisions should take account of whether:

- the opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;
- safe and suitable access to the site can be achieved for all people; and
- improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.”

3.4.7 The NPPF also states that: “Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people. A key tool to facilitate this would be a Travel Plan. All developments which generate significant amounts of movement should be required to provide a Travel Plan”.

3.4.8 The *Transport Assessment* has considered the use of sustainable transport modes for worker travel and has also considered the implications of the *Transport Strategy* for moving construction materials. It has both informed and examined the arrangements for access to, from and around project sites for users of all modes and where appropriate has identified any changes required to the surrounding transport networks to address issues arising from that assessment.

3.4.9 A *Project Framework Travel Plan* has been prepared which includes provisions and guidance for the preparation of site-specific *Travel Plans* to manage the movement of workers to and from sites.

National Policy Statement for Waste Water

3.4.10 The National Policy Statement for Waste Water (the 'NPS') sets out Government policy for the provision of major waste water infrastructure. The NPS indicates that the Thames Tideway Tunnel project is the preferred solution to address discharges of sewage and rainwater into the River Thames.

3.4.11 With particular reference to transport matters the NPS indicates that where significant transport implications are expected, the *Environmental Statement* should be accompanied by a transport assessment which addresses both construction and operational phases.

3.4.12 The NPS encourages engagement with the relevant highway authorities on the assessment methodology, findings and mitigation measures.

3.4.13 The NPS also sets out the need for a travel plan, where appropriate, which includes demand management measures to mitigate transport impacts and measures to reduce the need for parking and improve access by and to public transport, walking and cycling.

3.4.14 In discussing mitigation measures, the NPS indicates that demand management measures should be both feasible and operationally reasonable. It advises that water-borne or rail transport should be preferred for all project stages, where it is cost-effective to do so. Where HGV traffic is likely to be necessary, there should be controls on HGV movements and routes, sufficient provision for HGV parking on sites and appropriate arrangements to deal with abnormal disruption where this might be foreseen.

3.4.15 The Thames Tideway Tunnel project proposals are supported by the *TA* and a *Project Framework Travel Plan* and requirements for site-specific *Travel Plans* have been prepared for the project.

3.4.16 Considerable background work has been undertaken to define the *Transport Strategy* for construction materials, including consideration of water-borne and rail transport. The design of the project has considered the need to accommodate and manage heavy vehicle movements and this is supported by the approach set out in the *CoCP*.

Regional policy

3.4.17 Regional planning policy for London is contained within the London Plan (GLA,2011)[15] published in July 2011. This sets out the spatial strategy for development and infrastructure in London.

3.4.18 The Mayor's Transport Strategy (MTS) (GLA, 2010)[16] published in May 2010 complements the London Plan and forms the basis of transport policy within London and is relevant to the *Transport Assessment* for the Thames Tideway Tunnel project.

The London Plan

3.4.19 The London Plan sets out strategic planning guidance for London planning authorities. It provides an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. The London Plan takes the year 2031 as its formal end date and its over-arching vision is supported by six detailed objectives for London:

- "a city that meets the challenges of economic and population growth;
- an internationally competitive and successful city;
- a city of diverse, strong, secure and accessible neighbourhoods;
- a city that delights the senses;
- a city that becomes a world leader in improving the environment; and
- a city where it is easy, safe and convenient for everyone to access jobs, opportunities and facilities".

3.4.20 The last of these objectives relates specifically to transport. Policies within the London Plan of particular relevance to the *Transport Assessment* of the Thames Tideway Tunnel project are outlined in the following paragraphs.

3.4.21 **Policy 6.1 – Strategic approach** advises that the Mayor will work with all relevant partners to encourage the closer integration of transport and development in order to reduce the need to travel, improve the capacity of and access to sustainable mode networks, increase the efficiency of freight movement and promote more sustainable travel patterns.

3.4.22 **Policy 6.3 – Assessing effects of development on transport capacity** outlines that development proposals should ensure that impacts on the transport network at both a corridor and local level, including impacts on safety, are fully assessed. The policy notes that the use of Travel Plans and addressing freight issues can help reduce the impact of development on the transport network.

3.4.23 **Policy 6.7 – Better streets and surface transport** notes that high levels of priority should be provided to bus routes and there should be direct, secure, accessible and pleasant walking routes to stops.

3.4.24 **Policy 6.9 – Cycling** presents measures to increase cycling mode share in London. To support this, developments should provide cycle parking to at least the minimum standards, showers and changing facilities and facilitate major cycling schemes in London (including Cycle SuperHighways and Barclays Cycle Hire).

3.4.25 **Policy 6.10 – Walking** recommends that developments should ensure high quality pedestrian environments and emphasise the quality of pedestrian and street space. It points to the 'Legible London' pedestrian wayfinding system as a successful measure to support walking journeys.

3.4.26 **Policy 6.13 – Parking** outlines the need to seek an appropriate balance between promoting new development and preventing excessive car parking provision. It suggests that car parking provision should reduce as public transport accessibility increases. The policy requires that transport assessments and travel plans for major developments should give details of proposed measures to improve non-car based access, reduce parking and mitigate adverse transport impacts.

3.4.27 **Policy 6.14 – Freight** notes that freight distribution should be improved and the movement of freight by rail and water should be promoted. To support this, developments that generate high number of freight movements should be located close to major transport routes. In addition, the use of construction logistics plans and delivery and servicing plans together with membership of the Freight Operators Recognition Scheme (FORS) should be promoted.

3.4.28 The transport aspects of the Thames Tideway Tunnel project respond to these strategic policy approaches by:

a. adopting a transport strategy that includes the use of the river to transport construction materials at sites where it is reasonably feasible and practicable to do so

b. promoting best practice for the movement of construction materials that needs to take place by road, including membership of the Freight Operators Recognition Scheme (FORS)

c. assessing the expected impacts on the transport networks, particularly as a result of construction activity

d. identifying a *Project Framework Travel Plan* and associated measures which would discourage workers from travelling by car and maximise the use of sustainable transport modes

e. where necessary ensuring that potential impacts on the highway, public transport, walking and cycling networks are addressed through measures included within the design of the project

f. setting out measures within the *CoCP* to support the proper management of the movement of construction materials, including a requirement to prepare Construction and Logistics Plans for each construction site.

The Mayor's Transport Strategy

3.4.29 The Mayor's Transport Strategy (MTS) supports the London Plan and sets out a number of policy commitments and requirements which provide a framework within which TfL and other delivery partners, including the GLA and the London boroughs, must operate. Policies that are particularly relevant to the Thames Tideway Tunnel project are described in the following paragraphs.

3.4.30 **Policy 4** indicates that the Mayor will seek to improve access to the employment markets, between businesses and access to freight by providing appropriate transport capacity on key radial transport corridors.

3.4.31 **Policy 5** seeks to ensure that access for people and goods to and within central London is both efficient and effective.

3.4.32 **Policy 8** supports consideration of a range of transport improvements for people and freight with the aims of promoting the economic health of town centres and of providing improved travel opportunities for those travelling on foot or by cycle.

3.4.33 **Policy 11** emphasises an approach to encourage greater use of public transport, walking and cycling, in order to reduce congestion, by providing choice and setting parking standards that will support this approach.

3.4.34 **Policy 12** points to a desire to improve freight distribution by improving access to key industrial locations, improved management of deliveries and a range of associated efficiency measures.

3.4.35 **Policy 15 and Policy 16** indicate that the Mayor will seek to reduce emissions of air pollutants and noise impacts from transport respectively.

The London Freight Plan

3.4.36 The London Freight Plan: Sustainable Freight Distribution: a Plan for London (TfL, 2008)[17] supports the London Plan and the MTS. It sets out the steps to be taken over the next five to ten years to identify and begin to address the challenge of delivering freight sustainably in the capital. Principles set in that document are relevant to the consideration of the transport strategy for construction materials associated with the Thames Tideway Tunnel project.

3.4.37 The Thames Tideway Tunnel project responds to these regional policies in relation to transport by considering measures to minimise the number of workers travelling by car, proposing a *Transport Strategy* which is based on river and road transport for construction materials and setting out a range of measures in the *CoCP* to manage and control construction traffic activity.

Local policy

3.4.38 Each of the 33 London boroughs produces its own policies working within the framework of national and London-wide policy guidance.

3.4.39 Borough policies for the 13 London boroughs in which the project sites would be located have been taken into consideration in the assessment. The detail of these policies is contained within the site-specific *TAs* but in general the relevant policy documents comprise:

a. Unitary Development Plans, and/or saved policies from them, where these have not been superseded by subsequent policy documents

b. Local Development Frameworks and associated Development Plan Documents and strategies

c. Local Implementation Plans relating to the transport networks in each borough

d. where relevant, policies and strategies relating to specific areas within a borough which form supplementary planning policy to support wider borough policy objectives.

Technical guidance

3.4.40 In addition to relevant policy documents, a range of technical guidance is available and has been consulted as part of the *Transport Assessment* of the Thames Tideway Tunnel project.

3.4.41 Technical guidance documents are not formal policy documents but provide a basis for addressing particular technical aspects of the preparation of assessments and designs.

3.4.42 The content of the *TA* has been based on guidance issued by TfL in its Transport Assessment Best Practice Guidance (TfL, 2010)[18]. This seeks to ensure that all relevant issues have been addressed in an assessment. Where possible, the *TA* has responded to this guidance; where divergence from the guidance has been necessary, this has been discussed with TfL and an alternative approach agreed.

3.4.43 A range of other technical guidance has been consulted, which includes:

a. the Design Manual for Roads and Bridges[19] (DMRB), (DfT, various dates)

b. the Manual for Streets[20], (DCLG / DfT, 2007)

c. the Manual for Streets 2[21], (CIHT, 2010) – a companion guide to Manual for Streets

d. TfL Traffic Modelling Guidelines[22] (TfL, 2010)

e. TfL Model Auditing Process[23] (MAP): Traffic Schemes in London Urban Networks version 3.0 (TfL, 2011)

f. London Cycling Design Standards[24] (TfL, undated)

g. Accessible Bus Stop Design guidance[25] (TfL, 2010)

h. Walking Good Practice[26] (TfL, 2010)

i. Travel Planning for New Development in London[27] (TfL, 2011)

j. ATTrBuTE[28] (TfL, 2012)

k. Building a Better Future for Freight: Construction Logistic Plans[29], (TfL, 2008)

l. Cyclists at Roadworks – Guidance Document[30], (TfL, 2012)

m. Traffic Signs Manual, Chapter 8 (DfT, 2009)[31].

Pedestrian network and facilities

3.4.44 The pedestrian route network in London is extensive. Pedestrians are able to use footways on the vast majority of the road network in London and in addition there is a range of public footpaths, bridleways and other permissive routes available, including those through open spaces.

3.4.45 The Thames Path forms part of this network and is considered to be one of the strategic walking routes within central London. It is a recognised long-distance path and in central London generally follows the River Thames, on both sides. Typically it is located on the river bank, although there are a number of locations where it moves inland to avoid private property, operational wharves and other features.

3.4.46 The network of routes is complemented by a variety of pedestrian crossing facilities, including footbridges, subways and uncontrolled, zebra and signalled crossings.

3.4.47 A detailed description of the pedestrian network in the vicinity of each of the project sites is given in the site-specific *TA* Sections.

3.4.48 Pedestrian movements associated with construction and operation of the Thames Tideway Tunnel project would be concentrated within the area around each of the worksites. Because of the length of the Thames Tideway Tunnel project and the distance between individual sites, pedestrian movements are unlikely to present a strategic issue and therefore the local pedestrian assessments are reported in the site-specific *TA* sections.

Cycle network and facilities

3.4.49 The cycle route network in London comprises National Cycle Routes and routes which form part of the London Cycle Network, together with the remainder of the road network and particularly a large number of quieter streets which TfL and cycling organisations recommend as being suitable for making connections around London.

3.4.50 The cycle network, and the drive to encourage cycling in general, is supported by a range of features designed to improve the legibility of cycle routes and enhance cyclist safety. These include cycle route signage (both street furniture and road markings), dedicated on- and off-road cycle lanes and advanced cycle stoplines at traffic signal junctions.

3.4.51 In recent years, the Mayor of London has promoted a series of Cycle Superhighways (CS). These are strategic cycle routes linking suburban areas to central London, with the aim of providing greater road space and improved journey times for cyclists. Cycle Superhighways are characterised by blue surfacing on roads and cycle paths, wider routes and an enhanced level of signage and facilities. The implementation of these routes is still continuing at the time of this assessment.

3.4.52 To further encourage the use of cycles, cycle parking facilities are becoming increasingly common in both private buildings and the public realm. London boroughs and TfL have installed public cycle parking stands on many of the streets for which they are responsible, particularly at popular destinations such as town centres and major stations. Cycle parking can be readily found throughout central London.

3.4.53 The Mayor of London has also implemented a public cycle hire scheme within London, currently concentrated in the central areas but with proposals to expand the network into other inner London areas. This is characterised by branded bicycles and docking stations, allowing users to collect and leave cycles at a range of locations.

3.4.54 The individual site-specific *TAs* describe the nature of the cycle network, facilities and parking in the vicinity of each of the project sites. The opportunities for and impacts of cycling have also been assessed in those *TAs*, as they are considered most likely to be relevant at the local rather than the project-wide level.

Public transport

3.4.55 London has one of the densest public transport networks of any city in the world. In 2010, some 34% of trips in Greater London were made by public transport (Travel in London, Report 4 (TfL, 2011)[32]) and the share of public transport trips, as a proportion of the total number of journeys, has been increasing steadily since the early 1990s. Around 90% of all journeys into central London in the morning peak period are made by public transport modes.

3.4.56 The public transport network comprises buses, London Underground, the Docklands Light Railway (DLR) and London Overground services, all of which are managed by TfL either directly or through contracted service operators. In addition, National Rail services provided by a range of train operating companies provide links to suburban locations and beyond. TfL also administer taxis (black cabs) and licence private hire vehicles.

Public Transport Accessibility Level

3.4.57 To measure how accessible a location is by public transport services, TfL has developed a methodology for determining the Public Transport Accessibility Level (PTAL) of individual locations. This is based on the number of public transport services available within certain walking distances of the location and produces a rating based on a scale of 1a (very low accessibility) to 6b (excellent accessibility).

3.4.58 PTAL assessments are based on the number of public transport services within specified 'threshold' distances of the location. These are taken as 640m for bus services and 960m for rail and river services). However, in many cases people may be prepared to walk further than this to access services where there are particular reasons to do so (for instance because a particular service provides a direct connection to a destination, avoiding additional interchanges).

3.4.59 A PTAL assessment has been undertaken within each of the site-specific assessments contained in Sections 4 to 27 of the *TA*. As PTAL is a measure of the availability of public transport at a particular location, it is not directly relevant to the project-wide assessment but provides useful background information for the site-specific *TAs*.

3.4.60 Table 3.4.1 shows the public transport services available with a 640m walking distance (for bus services) or 960m walking distance (for rail and river services) of each of the project sites.

3.4.61 Table 3.4.1 shows that the PTAL for project sites ranges from 1 ('poor') to 6b ('excellent'). The majority of sites have PTAL ratings of at least 3 ('moderate') and eight of the sites have PTAL ratings of 5 ('very good') or more.

3.4.62 Bus services are available within 640m of all of the project sites and the site-specific *TAs* identify the bus routes concerned in detail.

3.4.63 18 of the sites have at least one form of rail service within 960m walking distance. All but the site at Barn Elms have rail services within 1.6km walking distance (20 minutes walk).

3.4.64 Nine sites have river passenger services within 960m walking distance of the site and a further six have those services within 1.6km or 20 minutes walking distance.

Table 3.4.1 Public transport services available at construction sites

Site	PTAL index	Bus (640m)	Underground (960m)	DLR (960m)	Overground (960m)	National Rail (960m)	River (960m)
Acton Storm Tanks	2-3	Y	(Y)		Y		
Hammersmith Pumping Station	5-6a	Y	Y				
Barn Elms	1-2	Y					(Y)
Putney Embankment Foreshore	6a	Y	Y			Y	Y
Carnwath Road Riverside	2	Y	(Y)		(Y)	(Y)	
Dormay Street	5	Y	(Y)			Y	Y
King Georges Park	4	Y	(Y)			(Y)	Y
Falconbrook Pumping Station	6b	Y			Y	Y	
Cremorne Wharf Depot	3	Y	(Y)		Y	Y	Y
Chelsea Embankment Foreshore	3	Y	(Y)			(Y)	(Y)
Kirtling Street	3-4	Y	(Y)			Y	(Y)
Heathwall Pumping Station	3-4	Y	Y			Y	Y
Albert Embankment Foreshore	6b	Y	Y			Y	Y
Victoria Embankment Foreshore	6b	Y	Y			Y	Y
Blackfriars Bridge Foreshore	6b	Y	Y			Y	Y
Chambers Wharf	3	Y	Y				
Shad Thames Pumping Station	3	Y	(Y)			(Y)	(Y)

Site	PTAL index	Bus (640m)	Underground (960m)	DLR (960m)	Overground (960m)	National Rail (960m)	River (960m)
King Edward Memorial Park Foreshore	3	Y		Y	Y	(Y)	(Y)
Bekesbourne Street	6b	Y	(Y)	Y	(Y)	Y	(Y)
Earl Pumping Station	3	Y	(Y)		Y		Y
Deptford Church Street	4	Y		Y		Y	
Greenwich Pumping Station	4	Y		Y		Y	
Abbey Mills Pumping Station	3-4	Y	(Y)	Y	(Y)	(Y)	
Beckton Sewage Treatment Works	2	Y		(Y)			

Y – services available within threshold distance shown
(Y) – services available beyond threshold distance shown but within 1.6km (approximately 20 minutes walk)

Bus services

3.4.65 London has a comprehensive bus network providing a range of daytime, night-time and 24 hour bus services. In 2010, approximately 3.7 million journeys on average were made on London's buses every day (Travel in London, Report 4 (TfL, 2011)[33]) representing 15% of all journeys made in the Greater London area. The bus network carries around 2.3 billion passengers every year.

3.4.66 Buses operate 24 hours a day through a combination of daytime, Night Bus and 24-hour routes. The network is operated using a number of vehicle types with capacities ranging from approximately 40 to 90 passengers per vehicle.

3.4.67 All project sites are served by at least one bus route that passes within 640m walking distance of the site and sites in the central section of the project typically have access to a greater number of bus services with a range of destinations.

London Underground

3.4.68 The London Underground network has 11 lines covering some 400km of route and serving 270 stations. It serves a wide range of destinations in west, north, east and inner south London. This network together with the Docklands Light Railway carries approximately 2.1 million journeys on average every day (Travel in London, Report 4 (TfL, 2011)[34]) or around 8% of all journeys made in the Greater London area.

3.4.69 London Underground trains typically have capacity in the order of 1,000 passengers per train.

3.4.70 At least one London Underground service is available within a 960m walk of seven of the 24 project sites and a further 11 sites have an Underground service within 1.6km or 20 minutes walk.

Docklands Light Railway

3.4.71 The DLR serves a network of stations in east and south-east London, extending between the City of London, Stratford, London Docklands and Greenwich. Trains vary in capacity between approximately 200 and 400 passengers per train, depending on the route and train formation.

3.4.72 The DLR carries around 80 million passenger journeys a year (Travel in London, Report 4 (TfL, 2011)[35]) . DLR services are available within 960m walking distance of five of the project sites.

London Overground

3.4.73 London Overground is operated by TfL and provides heavy rail services on an orbital network. The network has expanded rapidly by integrating former London Underground and Network Rail routes into the London Overground operation. It now encompasses Croydon, Clapham Junction, Willesden Junction, Richmond, Gospel Oak, Walthamstow, Highbury and Islington, Stratford, Barking, Whitechapel, New Cross and Crystal Palace. London Overground also operates over the route from Euston to Watford Junction.

3.4.74 Trains have typical capacities of approximately 400 to 500 passengers per train, depending on formation. The London Overground network carried around 54 million passenger journeys in 2010/11 (Travel in London, Report 4 (TfL, 2011)[36]).

3.4.75 London Overground services are available within a 960m walking distance of five project sites and are within 1.6km of a further three sites.

National Rail

3.4.76 National Rail services are provided by a number of train operators depending on the routes served. Services in central London operate from a number of key rail termini, including London Bridge, Cannon Street, Charing Cross, Waterloo, Paddington, Marylebone, Euston, St Pancras, Kings Cross, Liverpool Street and Fenchurch Street. These stations are also served by London Underground services which allow onward travel to other destinations.

3.4.77 In addition to routes serving these termini, National Rail routes pass through central London on the West London Line via Clapham Junction, Imperial Wharf and Willesden Junction and on the Thameslink route via London Bridge, Blackfriars, Farringdon and Kings Cross St Pancras.

3.4.78 Train formations vary by service and time of day and capacity ranges between 400 and 1,200 passengers per train.

3.4.79 National Rail services at termini or on routes serving them are available within 960m walking distance of 12 project sites and are within 1.6m of a further six sites.

River passenger services

3.4.80 Frequent river bus passenger services operate from 18 piers along the river. Regular services operate between Putney Pier in the west and Woolwich Arsenal Pier in the east, with an increased concentration of services downstream of Westminster Pier. These services typically offer several journeys per hour and operate in the morning and evening peak periods and during the day, depending on the locations served.

3.4.81 In addition there are also a number of individual river tour operators offering services along the river. These operate to frequencies which are different to those for the regular river passenger services listed in para. 3.4.80, and include a service between Westminster and Hampton Court Palace which operates upstream of Putney Pier.

Taxis

3.4.82 Taxis operated by the Public Carriage Office (part of TfL) also provide part of the public transport network around London. Licensed taxis (black cabs) are able to pick up and set down on demand at the kerbside and taxi ranks are provided throughout London, including at major stations.

3.4.83 Private hire vehicles are also licensed by TfL but are not permitted to pick up or set down at will. Pre-booking is necessary and specific ranking or parking facilities are not normally provided for these vehicles.

River movements

3.4.84 Freight operators use the river for a variety of reasons, but the most regular are the transport of waste to and from existing waste transfer stations with river access and the movement of aggregates to concrete batching plants.

3.4.85 The waste transfer stations are located at Smugglers Way and Cringle Dock in the LB of Wandsworth, Walbrook Wharf in the City of London and Northumberland Wharf in the LB of Tower Hamlets. Aggregates are transported to Kirtling Wharf and Pier Wharf in the LB of Wandsworth, and Comley's Wharf in the LB of Hammersmith and Fulham.

3.4.86 The river is also used by marine emergency services including the Police and the Royal National Lifeboat Institution (RNLI). There are also other users of the river, including private leisure craft and rowers, particularly at weekends. The number of these users is lower in the section of the river passing through central London and tends to increase further upstream.

3.4.87 The site-specific *TAs* include, where relevant, consideration of the number of vessel movements on the river in the context of assessing the transport effects of barge movements to and from some of the project sites.

3.4.88 An analysis has been made of the typical volume of river vessel traffic passing each of the construction sites, based on published river passenger service timetables and estimates of freight traffic based on discussions with operators. In addition, river usage surveys were undertaken to supplement this information.

3.4.89 Plate 3.4.1 shows the approximate daily number of river transit movements passing each of the project sites where it is proposed to use construction barges. Plate 3.4.2 shows the peak hourly number of transit movements at the same sites.

Plate 3.4.1 Daily river transit movements passing sites

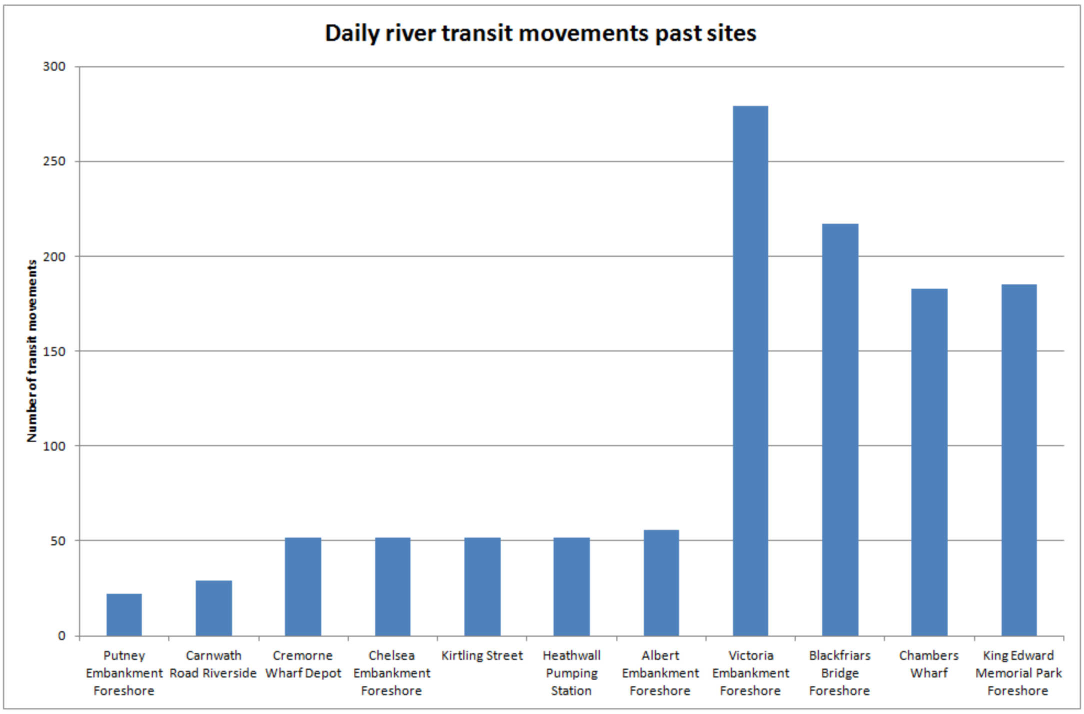
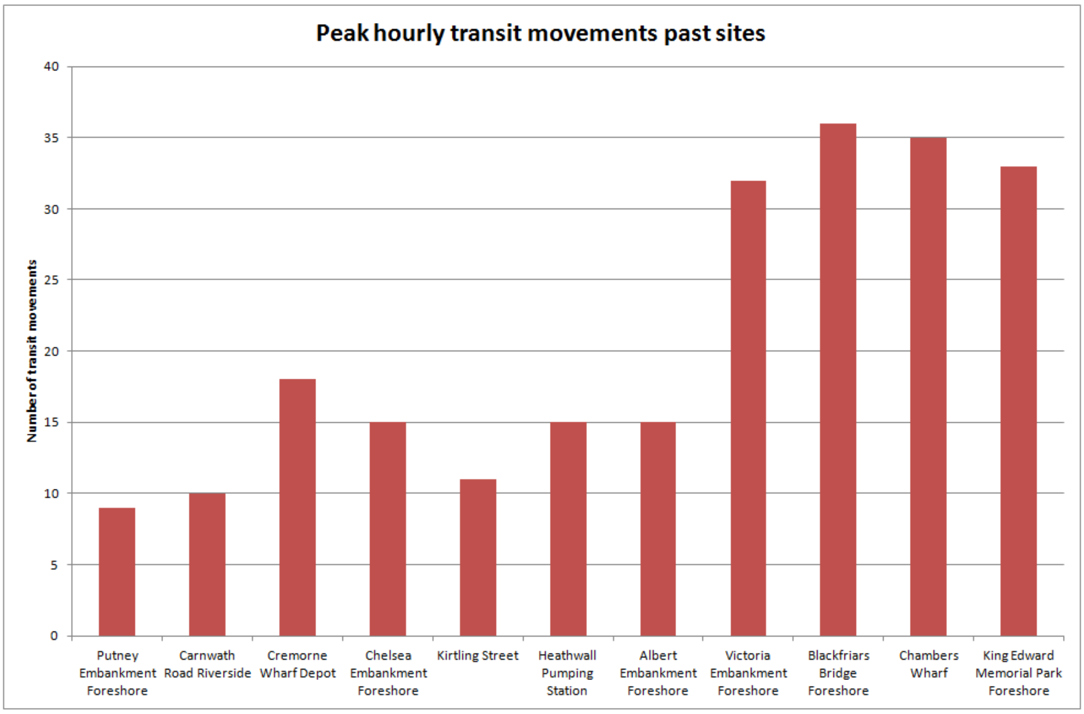


Plate 3.4.2 Peak hourly river transit movements passing sites



Note: the histogram shows the number of transits in the peak hour at each site; peak hours are not necessarily the same at all sites.

3.4.90 Plate 3.4.1 and Plate 3.4.2 show that the daily number of river movements is around 20 movements at Putney Embankment Foreshore, increasing to around 50 movements per day at Cremorne Wharf Depot. River activity then remains relatively constant as far downstream as Albert Embankment

Foreshore. Once in the central London section of the river, however, the level of activity increases markedly. Some 280 movements occur around the Victoria Embankment Foreshore site, which is the busiest section of the river, and the number then reduces to around 180 movements further downstream towards King Edward Memorial Park Foreshore. Peak hourly river transit movements show a very similar pattern, although the peak of activity on an hourly basis is relatively constant in the section of river between Victoria Embankment Foreshore and King Edward Memorial Park Foreshore.

3.4.91 The peak hours for river transit activity vary from location to location. The typical peak number of movements, and their timing, tends to occur with the ebb and flow of tides in order to improve the speed of passage and reduce the fuel consumption of vessels. Peak transit volumes therefore tend to occur on a cyclic basis every ten to 12 days when the tide is at its highest.

Highway network

Road network

3.4.92 The road network in Greater London comprises around 13,800km of route and includes motorways, major arterial roads, strategic distributor routes and a large number of local streets.

3.4.93 The network is managed by a number of highway authorities and in broad terms is divided into:

a. motorways within the GLA boundary, which are managed by the Highways Agency

b. the TLRN, also known as the 'Red Route' network because of the red road marking used on these routes. TfL is the highway authority for the TLRN, which comprises strategic arterial and orbital routes that carry significant volumes of traffic. It covers approximately 580km of London's road network

c. the wider SRN which is a network of some 500km of roads which are considered to be important strategic routes within the capital to facilitate the distribution of traffic. The relevant London boroughs are the highway authorities for roads which are part of the SRN, but TfL has a strategic responsibility to coordinate works and to ensure the free flow of traffic on these routes, as part of its duties under the Traffic Management Act 2004[37]

d. the remainder of the road network, which comprises a range of road types and characters and is the responsibility of the relevant London boroughs as highway authorities.

3.4.94 TfL is also responsible for the management and maintenance of all traffic signal junctions in London, which currently number around 6,000 junctions.

Parking

3.4.95 On most of the higher-order road network parking is not permitted on-street. Many other locations also have parking restrictions. Typically these are denoted by single or double yellow lines (red in the case of the TLRN) and associated time restrictions, which vary from 24 hour prohibition to controls that apply during daytime hours.

3.4.96 On-street parking is also available on many of London's streets. This may take the form of:

a. unrestricted kerbside parking, whether in marked parking bays or not

b. unmarked kerbside parking which is available outside restricted hours (eg. parking may be permitted during night hours on single yellow lines)

c. marked parking bays designated for the use of permit holders only (who may be residents or business occupiers). This arrangement is often associated with CPZs which apply similar controls over a defined set of streets

d. marked parking bays available for public use through payment of a charge, via parking meters, Pay and Display machines or 'Pay by Phone' arrangements. These may also be found within CPZs

e. parking bays designated for use by blue badge holders only (ie, mobility-impaired users). This includes some on-street loading bays where blue badge holders are permitted to park together with delivery vehicles

f. designated spaces used by cars operated by Car Clubs. These organisations allow members to pre-book cars and vans and to collect and return vehicles at these locations using electronic authorisation devices.

3.4.97 On-street coach parking bays are also found in certain locations, particularly within central London. These normally provide for short-stay set down and pick-up activity or for short-term layover and may be subject to charges and time restrictions.

3.4.98 Changes to parking facilities and activity that would be associated with the Thames Tideway Tunnel project have been addressed in the site-specific *TA* Sections, as these would occur in the local area surrounding each site. Parking issues have not been considered at a project-wide level.

Strategic network operation

3.4.99 For the *Transport Assessment*, the baseline situation on the highway network at the project-wide level has been represented by the information contained within the TfL HAMs modelled base year, which is 2008 / 2009. These models provide an indication of how the network is operating at present.

3.4.100 No further development of the TfL base year HAMs has been undertaken for this assessment, as the consideration of the impacts presented by the project is based on comparing the construction base and development cases, which have been derived from the TfL forecast year (2021) HAMs. This is explained in more detail in paras. 3.3.50 to 3.3.56.

3.4.101 A range of key statistics has been extracted from the TfL HAMs to represent the baseline situation. This provides a situation against which the construction base case can be compared, to indicate how overall conditions on the highway network can be expected to change over the next few years without the Thames Tideway Tunnel project.

3.4.102 These key statistics are shown in Table 3.4.2.

Table 3.4.2 Baseline highway network statistics

	Transient queues	Over-capacity queues	Total link cruise times	Total travel time	Total travel distance	Average speed
	pcu-hrs	pcu-hrs	Hours	pcu-hrs	pcu-km	km/h
AM peak hour						
WeLHAM	23,654	10,522	61,668	95,844	3,203,443	33.4
CLoHAM	12,429	1,595	17,196	31,220	554,211	17.8
ELHAM	21,075	7,652	57,088	85,815	2,777,070	32.4
PM peak hour						
WeLHAM	25,176	13,978	62,786	101,941	3,238,912	31.8
CLoHAM	11,305	2,089	16,256	29,650	517,568	17.5
ELHAM	20,965	7,317	55,871	84,153	2,750,265	32.7

* *Notes: Transient queues – total time spent in 'under-capacity' queues (eg. queues which form at a red signal but dissipate during the following green period)*
Over-capacity queues – total time spent in queues which form due to lack of capacity (eg. queues which form at a red signal but do not clear in the following green period)
Total link cruise time – total time spent travelling along links within the modelled network, excluding time spent queuing
Total travel time – sum of transient queue, over-capacity queue and link cruise times
Total travel distance – total distance travelled by all vehicles within the model network during the modelled period
Average speed – speed of vehicles averaged across the whole network and the whole modelled period (total travel distance / total travel time)
pcu – passenger car unit; a unit representing the equivalent of one car. Different vehicle types have different pcu values (eg car = one pcu, vans and three-axle vehicles = 1.5 pcu, buses and coaches = two pcu, four-axle vehicles = 2.3 pcu)

3.4.103 For the baseline situation average speeds provide a useful measure of the operation of the network. Other statistics have been used when comparing the construction base and development cases, and this is explained further in para. 3.6.32.

3.4.104 Table 3.4.2 shows that the overall average speed of vehicles within WeLHAM and ELHAM is in excess of 30 km/h in both the AM and PM peak hours. This reflects the mixture of busier roads within the areas of these models closer to the central London network and the network of less busy and less congested roads towards the outer London parts of these models. Within CLoHAM covering the central London highway network, average speeds are lower at around 17 km/h but are similar in both peak hours.

Sub-area (VISSIM) network operation

3.4.105 The VISSIM model for the sub-area assessment along Victoria Embankment (A3211) allows information on journey times to be extracted for defined routes through the area being modelled. These journey times take account of any delays encountered by traffic along the selected route, whether between or at junctions. The journey times are therefore a good indication of the degree of impact that particular changes to the highway network might produce and form the basis for comparing the baseline, base and development cases.

3.4.106 The methodology for developing the baseline VISSIM model is described in paras. 3.3.98 to 3.3.111, including the basis for calibration and validation.

3.4.107 The calibration exercise for the baseline model included a number of adjustments to give-way priority parameters within the model in order to better represent vehicle behaviour on-street. This behaviour includes:

a. vehicles travelling eastbound on Victoria Embankment (A3211) giving way to vehicles from Savoy Street / Savoy Place when blocking back occurs east of the junction on Victoria Embankment (A3211)

b. vehicles travelling northbound on Victoria Embankment (A3211) giving way to vehicles from Northumberland Avenue when blocking back occurs north of the junction on Victoria Embankment (A3211);

c. vehicles travelling northbound on Victoria Embankment (A3211) giving way to vehicles from Horse Guards Avenue when blocking occurs north of the junction on Victoria Embankment (A3211); and

d. vehicles travelling southbound from New Bridge Street (A201) giving way to vehicles from the Victoria Embankment (A3211) eastbound slip road and Queen Victoria Street when blocking occurs south of the junction (due to queuing at the junction with the westbound slip road).

3.4.108 Adjustments have also been made to the lane change and emergency stop parameters within the model, where required, to encourage vehicles to follow a more realistic path through the network and reduce occurrences of vehicles performing an emergency stop at critical points such as at junction stop lines.

3.4.109 The baseline models have been validated to ensure their suitability as a basis for developing base case and development case models. The baseline model was validated using traffic flows and journey times with reference to the DMRB Volume 12 Section 2 (DfT, 1996)[38]. This provides guidance on determining the acceptability of validation and indicates that the individual flows must have a GEH statistic (which represents the 'goodness of fit' of the model to existing conditions) of less than five in more than 85% of cases and that modelled journey times must be within 15% of the surveyed journey times.

3.4.110 Table 3.4.3 shows the GEH statistics for the baseline models for the AM and PM peak hours. It should be noted that for validation purposes, only the peak hour in each period was examined (08:00 to 09:00 for the AM peak hour and 17:00 to 18:00 for the PM peak hour).

Table 3.4.3 VISSIM model validation, GEH statistics

	AM peak hour modelled flows within GEH statistic		PM peak hour modelled flows within GEH statistic	
GEH statistic	**% of flows**	**Number of flows**	**% of flows**	**Number of flows**
<2	44%	24	46%	25
<5	89%	48	87%	47
<10	100%	54	100%	54

3.4.111 Table 3.4.3 demonstrates that the modelled traffic flows validate satisfactorily against DMRB criteria. A comparison of modelled flows against observed flows produces a GEH statistic of less than 5 in 89% of cases for the AM peak hour and in 87% of cases for the PM peak hour. This exceeds the requirement in DMRB for 85% of modelled flows to have a GEH statistic of less than five.

3.4.112 In terms of journey time, the baseline VISSIM models have been validated against weekday journey time data collected in May 2012. Journey time data was collected along three routes within the area modelled in VISSIM:

a. Bridge Street (A302) to Upper Thames Street (A3211)

b. New Bridge Street (A201) to Westminster Bridge (A302)

c. Blackfriars Bridge (A201) to New Bridge Street (A201).

3.4.113 The surveyed and modelled AM and PM peak journey times are shown in Table 3.4.4. It should be noted that surveyed journey times presented are the average of all the surveyed journey times.

Table 3.4.4 VISSIM model validation, journey times

Route	Journey time (min:sec)		
	Surveyed	**Modelled**	**Difference**
AM peak period			
Bridge Street (A302) to Upper Thames Street (A3211)	06:11	05:18	-14.3%
New Bridge Street (A201) to Westminster Bridge (A302)	07:36	05:58	-18.6%
Blackfriars Bridge (A201) to New Bridge Street (A201)	02:08	01:57	-8.6%

Route	Journey time (min:sec)		
	Surveyed	Modelled	Difference
PM peak period			
Bridge Street (A302) to Upper Thames Street (A3211)	05:05	05:57	+17.0%
New Bridge Street (A201) to Westminster Bridge (A302)	06:43	05:42	-6.9%
Blackfriars Bridge (A201) to New Bridge Street (A201)	01:21	01:16	-6.2%

3.4.114 Table 3.4.4 shows that for four of the six routes analysed, the modelled journey times are within the allowable +/-15% of the average surveyed journey times. Although two of the modelled journey times differ slightly more than 15% from the surveyed journey times, given the level of flow validation achieved the model is still considered robust for the purposes of this assessment.

3.4.115 The VISSIM models are considered suitable for demonstrating the nature of the impacts of the additional vehicles generated by the Thames Tideway Tunnel project by comparing the base and development cases. It is acknowledged that these models may require further refinement as the project moves forward. However, as a period of time would elapse before construction commences, it would be necessary in any case to review and revalidate the models against traffic conditions at that time, as is normal practice.

Accident analysis

3.4.116 For the project-wide assessment, reference has been made to statistics on accident rates per billion HGV kilometres nationally and in London.

3.4.117 Department for Transport (DfT) statistics[39] provide annual information on the number of collisions involving heavy goods vehicles of over 3.5 tonnes gross vehicle weight. These are shown in Table 3.4.5. The table also shows more specific information for London, which was provided by TfL to inform this assessment.

3.4.118 Table 3.4.5 shows a reducing trend in the number of collisions involving heavy goods vehicles with overall rates for Great Britain having almost halved over the last ten years.

3.4.119 Within London, the incidence of collisions involving HGVs is higher than the national average, as might be expected for a dense urban area. However, the statistics also show a marked downward trend in the rate of accidents involving HGVs, with reductions of around 40% in the number of fatal collisions and the number of all collisions, and nearly a 60% reduction in the number of collisions resulting in either fatal or serious injury.

Table 3.4.5 Collisions involving HGV (>3.5 tonnes), Great Britain and London statistics

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Great Britain											
Fatal	20	21	20	19	16	18	16	16	13	11	11
Fatal or serious	108	104	95	86	73	75	71	67	57	53	52
All collisions	539	529	476	462	427	418	391	365	316	285	289
London											
Fatal	32	35	36	32	26	17	26	29	28	23	19
Fatal or serious	217	210	201	193	155	121	165	146	134	113	92
All collisions	1,103	1,147	1,015	914	850	838	781	713	663	633	645

Great Britain statistics taken from Department for Transport statistics. London statistics provided by TfL.

3.5 Proposed construction flows for assessment

Working hours

3.5.1 Details of the anticipated working hours at each site are provided in the *CoCP Part A*.

3.5.2 At all sites, vehicle movements would take place during the typical day shift of ten hours on weekdays (08:00 to 18:00hrs) and five hours on Saturdays (08:00 to 13:00hrs) with up to one hour before and after these hours for mobilisation and de-mobilisation of staff. Mobilisation and de-mobilisation may include loading, unloading and the arrival and departure of the workforce. Mobilisation would not include HGV access unless otherwise agreed with TfL and/or the relevant local authority, as appropriate.

3.5.3 At some sites, extended or continuous working hours would be required at certain times. These would include the construction of major shafts or tunnels which for practicality and safety reasons need to be undertaken over extended periods of time. However, in such cases it is anticipated that construction vehicle movements would be limited to the hours given in para. 3.5.2 where possible.

3.5.4 In exceptional circumstances HGV and abnormal load movements could occur up to 22:00hrs, for example for large concrete pours, or later at night by agreement with the relevant local authority and TfL.

3.5.5 In the case of barge transport, river movements could take place at any time during the day in order to respond to tidal conditions.

Construction barges

3.5.6 The *Transport Strategy* envisages using the river to transport certain construction materials at 11of the sites. The anticipated total numbers of construction barges visiting these construction sites over the duration of the project are presented in Table 3.5.1.

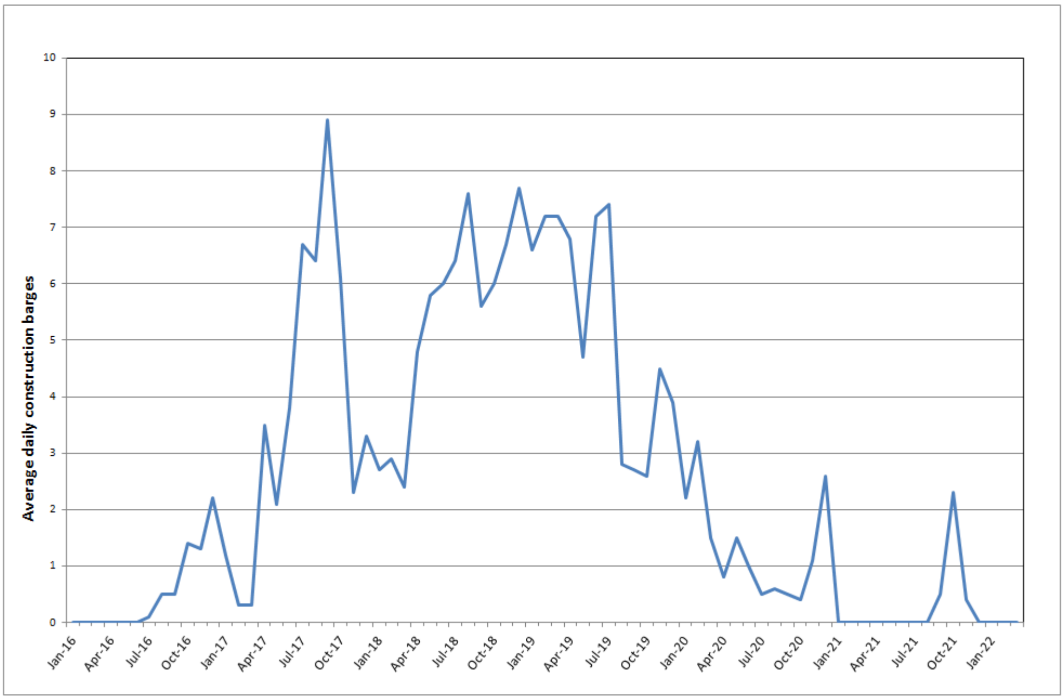
Table 3.5.1 Construction barge movement details (whole project)

Construction site	Total number of construction barges	
	Barges	Movements
Putney Embankment Foreshore	167	334
Carnwath Road Riverside	1,067	2,134
Cremorne Wharf Depot	56	112
Chelsea Embankment Foreshore	209	418
Kirtling Street	1,620	3,240
Heathwall Pumping Station	137	274
Albert Embankment Foreshore	581	1,162

Construction site	Total number of construction barges	
	Barges	Movements
Victoria Embankment Foreshore	144	288
Blackfriars Bridge Foreshore	369	738
Chambers Wharf	834	1,668
King Edward Memorial Park Foreshore	186	372
TOTAL	5,372	10,744

3.5.7 The activity profiles for barge transport at each of the sites have been combined to determine the month in which the overall number of barge movements would be greatest. The combined barge movement profile is shown in Plate 3.5.1.

Plate 3.5.1 Average daily construction barge numbers, project-wide



3.5.8 Plate 3.5.1 indicates that the project-wide peak month for barge movements would occur in Project Year 2. Table 3.5.2 shows the total number of barge deliveries and collections expected at these sites in this project-wide peak month.

3.5.9 Barges would be hauled by tugs which would be capable of hauling two 350T barges together and potentially two 800T barges depending on mooring conditions. The number of transit movements required on the river may therefore be lower than the number of individual barge movements. Table 3.5.2 therefore indicates the typical number of transit movements, taking account of the ability for two barges to be hauled together to and from certain sites.

Table 3.5.2 Barge and typical transit movements in project-wide peak month (Project Year 2)

Construction site	**Average daily barge requirements in project-wide peak month (Project Year 2)**			
	Barges required	**Total barges delivered and collected**	**Total daily river transit movements**	**Typical barge size**
Putney Embankment Foreshore	0	0	0	350T
Carnwath Road Riverside	0	0	0	800T
Cremorne Wharf Depot	0	0	0	350T
Chelsea Embankment Foreshore	2	4	4	800T
Kirtling Street	0	0	0	1000T
Heathwall Pumping Station	1	2	2	350T
Albert Embankment Foreshore	3	6	4	350T
Victoria Embankment Foreshore	2	4	4	800T
Blackfriars Bridge Foreshore	1	2	2	800T
Chambers Wharf	0	0	0	1500T
King Edward Memorial Park Foreshore	0	0	0	1000T
Total	9	18	16	

Transit movements represent the number of passages likely to be required on the river, taking account of the ability of tugs to haul two 350T barges and potentially two 800T barges where possible. For this table, it has been assumed that only 350T barges could be hauled together.

3.5.10 Table 3.5.2 shows that in the project-wide peak month for barge activity (Project Year 2) there would be a total requirement for nine barges per day and this equates to 18 barge movements (nine barges being delivered and nine being collected each day). However, because smaller barges could be hauled in pairs by tugs, it is expected that the number of river transit movements would be 16 per day (eight tugs arriving and eight departing).

3.5.11 Table 3.5.2 also shows that in the project-wide peak month for barge activity, there would be no barge movements at Carnwath Road Riverside, Kirtling Street or Chambers Wharf, all of which would are main tunnel drive sites. This is because these sites would not require or be producing large quantities of materials at this point in the programme.

3.5.12 It is useful to note that the maximum number of barges required at Carnwath Road Riverside would be two per day, at Kirtling Street would be four per day and at Chambers Wharf would be three per day. However, this level of barge activity is not expected to occur at these sites until later in the construction programme (Project Year 3 at Carnwath Road Riverside and Kirtling Street and Project Year 6 at Chambers Wharf), when the total number of barges required at all Thames Tideway Tunnel project sites would be lower than in the peak month in Project Year 2.

Construction lorries

3.5.13 The anticipated total numbers of construction lorries visiting the construction sites over the whole construction period are presented in Table 3.5.3.

Table 3.5.3 Construction lorry movement details (whole project)

Construction site	Total number of construction lorries	
	Lorries	Movements
Acton Storm Tanks	5,920	11,840
Hammersmith Pumping Station	5,270	10,540
Barn Elms	3,360	6,720
Putney Embankment Foreshore	3,330	6,660
Carnwath Road Riverside	25,850	51,700
Dormay Street	5,300	10,600
King Georges Park	2,020	4,040
Falconbrook Pumping Station	3,740	7,480
Cremorne Wharf Depot	3,340	6,680
Chelsea Embankment Foreshore	5,600	11,200
Kirtling Street	51,520	103,040
Heathwall Pumping Station	4,230	8,460
Albert Embankment Foreshore	6,650	13,300
Victoria Embankment Foreshore	5,750	11,500
Blackfriars Bridge Foreshore	13,350	26,700
Chambers Wharf	32,350	64,700
Shad Thames Pumping Station	1,020	2,040

Construction site	Total number of construction lorries	
	Lorries	Movements
King Edward Memorial Park Foreshore	10,610	21,220
Bekesbourne Street	340	680
Earl Pumping Station	9,110	18,220
Deptford Church Street	8,700	17,400
Greenwich Pumping Station	32,320	64,640
Abbey Mills Pumping Station	17,350	34,700
Beckton Sewage Treatment Works	8,590	17,180
TOTAL	265,620	531,240

3.5.14 The activity profiles for construction lorry movements at each of the sites have been combined to determine the months in which the overall number of lorry movements would be greatest. This is shown in Plate 3.5.2.

Plate 3.5.2 Average daily construction lorry numbers, project-wide

3.5.15 It has been agreed with TfL that the highway network assessment should be based on the peak months for aggregated construction vehicle activity for sites in the western, central and eastern sections of the project and for the project as a whole. The scenarios investigated are:

a. the 'project-wide peak month' scenario representing the month in which the aggregate average daily construction lorry movements for the project would be highest. This would occur in Project Year 4 and this 'project-wide peak' scenario has been tested using WeLHAM, CLoHAM and ELHAM

b. the 'western cluster peak' scenario representing the month in which the aggregate average daily construction lorry movements would be highest for the sites located in the WeLHAM area. This would occur in Project Year 2. The estimated flows from all project sites in this month have been aggregated and tested using WeLHAM

c. the 'central cluster peak' scenario representing the month in which the aggregate average daily construction lorry movements would be highest for the sites located in the CLoHAM area. This would occur in Project Year 4, which is the same as the project-wide peak year and therefore there is no need for a separate central cluster peak test

d. the 'eastern cluster peak' scenario representing the month in which the aggregate average daily construction lorry movements would be highest for the sites located in the ELHAM area. This would occur in Project Year 4, which is the same as the project-wide peak year and therefore there is no need for a separate eastern cluster peak test.

3.5.16 Table 3.5.4 shows the number of construction vehicle movements by site in each of these scenarios.

Table 3.5.4 Average daily construction lorry movements in peak months

Strategic model area	Site	Average daily construction lorry movements	
		Project-wide, central, eastern cluster peak (Project Year 4)	Western cluster peak (Project Year 2)
WeLHAM	Acton Storm Tanks	10	0
	Hammersmith Pumping Station	24	26
	Barn Elms	10	22
	Putney Embankment Foreshore	16	4
	Carnwath Road Riverside	88	80
	Dormay Street	10	50
	King Georges Park	2	6
CLoHAM	Falconbrook Pumping Station	36	0
	Cremorne Wharf Depot Site	12	0

Strategic model area	Site	Average daily construction lorry movements	
		Project-wide, central, eastern cluster peak (Project Year 4)	Western cluster peak (Project Year 2)
	Chelsea Embankment Foreshore	8	4
	Kirtling Street	190	20
	Heathwall Pumping Station	12	16
	Albert Embankment Foreshore	26	34
	Victoria Embankment Foreshore	10	10
	Blackfriars Bridge Foreshore	14	46
ELHAM	Chambers Wharf	78	20
	Shad Thames Pumping Station	4	0
	King Edward Memorial Park Foreshore	16	12
	Bekesbourne Street	0	0
	Earl Pumping Station	4	68
	Deptford Church Street	18	10
	Greenwich Pumping Station	154	8
	Abbey Mills Pumping Station	136	0
	Beckton STW	6	38
	Total	884	474

3.5.17 Table 3.5.4 shows that in the western cluster peak month of activity the sites in the WeLHAM area would generate approximately 188 construction lorry movements per day, compared to 160 movements a day from these sites in the project-wide peak month of activity. However, the table also shows that the aggregated total of construction lorry movements in the western cluster peak month would be well below the total for the project-wide peak month (474 and 884 movements respectively).

3.5.18 In addition to the construction lorry movements, allowance has been made in the assessment for journeys made by operational vehicles travelling to and from sites during the working day. These have been assumed to be constant across the construction programme at each site. They include activities such as worker shuttle bus movements to and from local stations, visits by client and contractor supervisors and other workers and small deliveries and maintenance (such as post and office supplies).

Construction workers

3.5.19 In total, the project worksites are expected to require a total workforce of around 2,300 workers[vi]. However, not all workers would be on site at the same time of day (because some sites would require shift working). Table 3.5.5 summarises the number of workers estimated to be required at each site and shows that the total number of workers present during the dayshift would be around 1,640 workers.

Table 3.5.5 Maximum estimated construction worker numbers

Site	Total workers	Dayshift workers
Acton Storm Tanks	40	40
Hammersmith Pumping Station	45	45
Barn Elms	40	40
Putney Embankment Foreshore	50	50
Carnwath Road Riverside	289	165
Dormay Street	92	45
King Georges Park	40	40
Falconbrook Pumping Station	40	40
Cremorne Wharf Depot	65	65
Chelsea Embankment Foreshore	65	65
Kirtling Street	426	235
Heathwall Pumping Station	40	40
Albert Embankment Foreshore	65	65
Victoria Embankment Foreshore	65	65
Blackfriars Bridge Foreshore	70	70
Chambers Wharf	289	165
Shad Thames Pumping Station	24	24
King Edward Memorial Park	40	40

[vi] This estimate is based on a build-up of the likely construction skills and trades required at each worksite. It does not include the off-site workforce eg river transport, segment manufacturing or office based staff. The total amount of construction work created by the project, over the whole construction period, is estimated to be approximately 19,200 man years which at its peak is estimated to equate to approximately 4,250 jobs.

Site	Total workers	Dayshift workers
Foreshore		
Bekesbourne Street	24	24
Earl Pumping Station	40	40
Deptford Church Street	40	40
Greenwich Pumping Station	289	165
Abbey Mills Pumping Station	45	45
Beckton Sewage Treatment Works	65	24
TOTAL	2,288	1,637

Dayshift workers represents the maximum number of workers on site at any one time.

3.5.20 The project aims to minimise the number of car journeys made by workers to and from sites, in order to minimise associated traffic flows and parking activity.

3.5.21 At all sites, with the exception of Abbey Mills Pumping Station and Beckton Sewage Treatment Works which are existing Thames Water operational facilities, there would be no parking provided within the site boundary for workers.

3.5.22 As para 3.2.40 explains, a *Project Framework Travel Plan* has been prepared which addresses project-wide travel planning measures and sets out guidelines and requirements for the preparation of site-specific *Travel Plans* for each of the project sites. These would emphasise the objective of minimising car use and provide initiatives to support travel by non-car modes.

3.5.23 At many of the sites, parking in the surrounding streets is already the subject of controls, restrictions or charges which would discourage workers from travelling by car. Where parking in surrounding streets is not restricted but usage of available space is already heavy, this would have a similar effect.

3.5.24 In addition, public transport accessibility levels are moderate or good at all but four of the project sites (Acton Storm Tanks, Barn Elms, Carnwath Road Riverside and Beckton Sewage Treatment Works). There are therefore good opportunities for construction workers to make use of public transport to access the majority of the project sites.

3.5.25 It is therefore expected that as a result of the *Project Framework Travel Plan*, site-specific *Travel Plans* and the physical characteristics of the surroundings it is highly unlikely that any workers would travel by car to or from most sites where no on-site parking is to be provided for workers.

3.5.26 At some sites, however, it is recognised that parking in the surrounding area is not controlled and that spare capacity exists. Notwithstanding the measures proposed to minimise worker car travel, the assessment has considered the implications for the highway network if a proportion of workers were to drive to and from these sites.

3.5.27 The sites at which it has been assumed that workers might drive, to ensure a robust analysis, are Acton Storm Tanks, Carnwath Road Riverside, Dormay Street, Falconbrook Pumping Station, Earl Pumping Station, Deptford Church Street, Abbey Mills Pumping Station and Beckton Sewage Treatment Works. This assumption for the assessment does not detract from the overall project aims to minimise car travel.

3.5.28 Any implications for the local highway network and parking activity in the streets surrounding these sites have been addressed in the relevant site-specific *TA* sections. For the project-wide assessment, the potential number of workers travelling by car to these sites has been incorporated into the strategic highway network modelling.

3.5.29 The anticipated mode split of worker trips has been generated for each site individually, based on 2001 Census data[vii] for journeys to workplaces within the vicinity of each site and adjusted on a pro-rata basis where necessary to take account of the fact that workers would not drive to sites, other than those listed in para. 3.5.27 for the purposes of the assessment. The site-specific mode shares are detailed in Sections 4 to 27 of the *TA*.

3.5.30 Table 3.5.6 and Table 3.5.7 combine the mode split assumptions made at each of the 24 construction sites to present the overall mode split for worker journeys across the project. For the purposes of demonstrating overall mode share, these tables assume that construction activity would be taking place on all sites at the same time.

[vii] The first release of small area statistics from the 2011 Census has been published but further results are scheduled to be released in December 2012. Journey to workplace information has not yet been released..

Table 3.5.6 Overall worker mode split, AM peak period

Mode	07:00-08:00				08:00-09:00				Overall mode share, AM peak period
	arr	dep	Total	% by mode	arr	dep	Total	% by mode	
Bus	271	3	274	16.5%	0	59	59	19.2%	16.9%
National Rail / London Overground	422	2	424	25.5%	0	77	77	25.3%	25.5%
Underground	347	1	348	20.9%	0	58	58	18.9%	20.6%
DLR	54	1	55	3.3%	0	11	11	3.6%	3.4%
Car driver	200	17	217	13.0%	0	32	32	10.3%	12.6%
Car passenger	12	1	13	0.8%	0	2	2	0.7%	0.8%
Cycle	67	1	68	4.1%	0	13	13	4.4%	4.1%
Walk	194	2	196	11.7%	0	39	39	12.7%	11.9%
River	11	0	11	0.7%	0	2	2	0.7%	0.7%
Other (taxi / motorcycle)	59	1	60	3.6%	0	13	13	4.2%	3.7%
TOTAL	1637	30	1667	100.0%	0	306	306	100.0%	100.0%

Note: Mode splits for arrivals and departures will differ. The mode share shown has been averaged across arrivals and departures at all sites in each hour and assumes that all sites would be under construction at the same time for the purposes of illustration.
Workers have been assumed to travel by car to a small number of construction sites to ensure a robust assessment which considers the implications of this occurring. In practice site-specific Travel Plan measures and the provision of no parking for workers on sites mean that it is unlikely this number of workers would travel by car.
Trips shown include dayshift workers arriving and night shift workers leaving sites, where appropriate. Some dayshift workers would leave sites in mid-afternoon and evening shift workers would arrive in mid-afternoon, outside the peak hours shown.

Table 3.5.7 Overall worker mode split, PM peak period

Mode	17:00-18:00				18:00-19:00				Overall mode share, PM peak period
	arr	dep	Total	% by mode	arr	dep	Total	% by mode	
Bus	18	0	18	18.4%	3	218	221	15.9%	16.0%
National Rail / London Overground	22	0	22	23.4%	2	352	354	25.4%	25.3%
Underground	17	0	17	17.2%	1	295	296	21.2%	20.9%
DLR	4	0	4	3.7%	1	44	45	3.3%	3.3%
Car driver	15	0	15	15.1%	17	177	194	13.9%	14.0%
Car passenger	1	0	1	1.0%	1	11	12	0.9%	0.9%
Cycle	4	0	4	4.3%	1	55	56	4.0%	4.0%
Walk	12	0	12	12.2%	2	158	160	11.4%	11.5%
River	1	0	1	0.7%	0	9	9	0.6%	0.6%
Other (taxi / motorcycle)	4	0	4	4.0%	1	47	48	3.4%	3.5%
TOTAL	96	0	96	100.0%	30	1366	1397	100.0%	100.0%

Note: Mode splits for arrivals and departures will differ. The mode share shown has been averaged across arrivals and departures at all sites in each hour and assumes that all sites would be under construction at the same time for the purposes of illustration.
Workers have been assumed to travel by car to a small number of construction sites to ensure a robust assessment which considers the implications of this occurring. In practice site-specific Travel Plan measures and the provision of no parking for workers on sites mean that it is unlikely this number of workers would travel by car.
Trips shown include dayshift workers leaving and night shift workers arriving at sites, where appropriate. Some dayshift workers would leave sites in mid-afternoon and evening shift workers would arrive in mid-afternoon, outside the peak hours shown.

3.5.31 Table 3.5.6 and Table 3.5.7 show that the predominant form of travel for workers is expected to be public transport, with approximately 67% of workers expected to use bus, rail or river services to travel to and from construction sites in the AM and PM peak periods. Approximately 16% of journeys would be expected to be made by walking or cycling as the main mode of transport.

3.5.32 The tables also indicate that the assessment has been based on around 13% to 14% of all workers driving to construction sites. As noted in para 3.5.27 this would arise from a small number of construction sites at which the assessment assumes workers might drive, in order to be robust. In practice, project-wide and site-specific *Travel Plan* measures would be in place with the objective of minimising car use by workers.

3.5.33 Finally the tables indicate that the proportion of workers travelling as car passengers based on the 2001 Census information would be low, at around 1% of all workers. However, in support of measures to reduce car use, the site-specific *Travel Plans* would also include measures to increase car sharing if workers have to travel by car.

Vehicle movements summary

3.5.34 The total anticipated number of construction-related vehicle movements comprises construction lorries, other construction-related operational vehicles and worker car journeys at certain sites for the purposes of the assessment.

3.5.35 The figures in Table 3.5.8 and Table 3.5.9 show the number of vehicle movements based on the *Transport Strategy* described in paras. 3.2.18 to 3.2.24 and Table 3.2.3.

3.5.36 Table 3.5.8 shows the total number of average daily vehicle movements for the project-wide peak month of activity (which would occur in Project Year 4) and Table 3.5.9 shows the same information for the western cluster peak month of activity (which would occur in Project Year 2). As paras. 3.5.15 explains, the central and eastern cluster peak months of activity would occur in the same year as the project-wide peak month (Project Year 4).

3.5.37 It should be noted that where zero values are shown against a site in these tables, this indicates that construction work would not be taking place at those sites on the dates shown, based on the assumed construction programme.

3.5.38 The peak hour values for construction lorry movements have been based on 10% of the daily HGV construction movements occurring during the peak hours as explained in para. 3.3.64. For the purposes of the assessment the network-wide AM and PM peak hours for construction vehicle movements have been taken as 08:00 to 09:00 and 17:00 to 18:00 respectively as explained in para. 3.3.62.

Table 3.5.8 Project-wide peak vehicle movements (Project Year 4)

	Daily				AM peak hour				PM peak hour			
	Lorries	Op veh	Worker car	Total	Lorries	Op veh	Worker car	Total	Lorries	Op veh	Worker car	Total
Acton Storm Tanks	10	19	38	67	1	5	19	25	1	5	19	25
Hammersmith Pumping Station	24	19	0	43	2	5	0	7	2	5	0	7
Barn Elms	10	19	0	29	1	5	0	6	1	5	0	6
Putney Embankment Foreshore	16	19	0	35	2	5	0	7	2	5	0	7
Carnwath Road Riverside	88	70	219	377	9	7	63	79	9	7	40	56
Dormay Street	10	19	84	113	1	5	28	34	1	5	28	34
King Georges Park	2	19	0	21	0	5	0	5	0	5	0	5
Falconbrook Pumping Station	36	19	32	87	4	5	16	25	4	5	16	24
Cremorne Wharf Depot	12	19	0	31	1	5	0	6	1	5	0	6
Chelsea Embankment Foreshore	8	20	0	28	1	5	0	6	1	5	0	6
Kirtling Street	190	70	0	260	19	7	0	26	19	7	0	26
Heathwall Pumping Station	12	19	0	31	1	5	0	6	1	5	0	6
Albert Embankment Foreshore	26	20	0	46	3	5	0	8	3	5	0	8
Victoria Embankment Foreshore	10	20	0	30	1	5	0	6	1	5	0	6

	Daily				AM peak hour				PM peak hour			
	Lorries	**Op veh**	**Worker car**	**Total**	**Lorries**	**Op veh**	**Worker car**	**Total**	**Lorries**	**Op veh**	**Worker car**	**Total**
Blackfriars Bridge Foreshore	14	20	0	34	1	5	0	6	1	5	0	6
Chambers Wharf	78	70	0	148	8	7	0	15	8	7	0	15
Shad Thames Pumping Station	4	19	0	23	1	5	0	6	1	5	0	6
King Edward Memorial Park Foreshore	16	20	0	36	2	5	0	7	2	5	0	7
Bekesbourne Street	0	19	0	19	0	0	0	0	0	0	0	0
Earl Pumping Station	4	20	42	66	0	5	21	26	0	5	21	26
Deptford Church Street	18	20	40	78	2	5	20	27	2	5	20	27
Greenwich Pumping Station	154	70	0	224	15	7	0	22	15	7	0	22
Abbey Mills Pumping Station	136	20	48	204	14	5	24	43	14	5	24	43
Beckton	6	20	89	115	1	5	27	33	1	5	27	32
Total	**884**	**669**	**592**	**2145**	**90**	**123**	**218**	**431**	**90**	**123**	**195**	**408**

The assessment has been based on 10% of daily construction lorry movements associated with materials taking place in each of the peak hours.
Other construction vehicle movements includes cars and light goods vehicles associated with site operations and contractor activity.
Worker vehicle numbers calculated on the basis that there would be no worker parking on site; on-street parking around many sites is restricted; and site-specific Travel Plan measures will discourage workers from travelling by car. Where non-zero figures are shown, these have been used for the purposes of a robust assessment based on an unconstrained case.

Table 3.5.9 Western cluster peak vehicle movements (Project Year 2)

	Daily				AM peak hour				PM peak hour			
	Lorries	Op veh	Worker car	Total	Lorries	Op veh	Worker car	Total	Lorries	Op veh	Worker car	Total
Acton Storm Tanks	0	0	0	0	0	0	0	0	0	0	0	0
Hammersmith Pumping Station	26	19	0	45	3	5	0	8	3	5	0	8
Barn Elms	22	19	0	41	2	5	0	7	2	5	0	7
Putney Embankment Foreshore	4	19	0	23	1	5	0	6	1	5	0	6
Carnwath Road Riverside	80	70	219	369	8	7	63	78	8	7	40	55
Dormay Street	50	19	84	153	5	5	28	38	5	5	28	38
King Georges Park	6	19	0	25	1	5	0	6	1	5	0	6
Falconbrook Pumping Station	0	0	0	0	0	0	0	0	0	0	0	0
Cremorne Wharf Depot	0	0	0	0	0	0	0	0	0	0	0	0
Chelsea Embankment Foreshore	4	20	0	24	0	5	0	5	0	5	0	5
Kirtling Street	20	70	0	90	2	7	0	9	2	7	0	9
Heathwall Pumping Station	16	19	0	35	2	5	0	7	2	5	0	7
Albert Embankment Foreshore	34	20	0	54	3	5	0	8	3	5	0	8
Victoria Embankment Foreshore	10	20	0	30	1	5	0	6	1	5	0	6

	Daily				AM peak hour				PM peak hour			
	Lorries	**Op veh**	**Worker car**	**Total**	**Lorries**	**Op veh**	**Worker car**	**Total**	**Lorries**	**Op veh**	**Worker car**	**Total**
Blackfriars Bridge Foreshore	46	20	0	66	5	5	0	10	5	5	0	10
Chambers Wharf	20	70	0	90	2	7	0	9	2	7	0	9
Shad Thames Pumping Station	0	0	0	0	0	0	0	0	0	0	0	0
King Edward Memorial Park Foreshore	12	20	0	32	1	5	0	6	1	5	0	6
Bekesbourne Street	0	0	0	0	0	0	0	0	0	0	0	0
Earl Pumping Station	68	20	42	130	7	5	21	32	7	5	21	32
Deptford Church Street	10	20	40	70	1	5	20	26	1	5	20	26
Greenwich Pumping Station	8	70	0	78	1	7	0	8	1	7	0	8
Abbey Mills Pumping Station	0	0	0	0	0	0	0	0	0	0	0	0
Beckton	38	20	89	147	4	5	27	36	4	5	27	36
Total	**474**	**554**	**474**	**1502**	**49**	**98**	**159**	**306**	**49**	**98**	**136**	**283**

The assessment has been based on 10% of daily construction lorry movements associated with materials taking place in each of the peak hours.
Other construction vehicle movements includes cars and light goods vehicles associated with site operations and contractor activity.
Worker vehicle numbers calculated on the basis that there would be no worker parking on site; on-street parking around many sites is restricted; and site-specific Travel Plan measures will discourage workers from travelling by car. Where non-zero figures are shown, these have been used for the purposes of a robust assessment based on an unconstrained case.

3.5.39 Based on the *Transport Strategy*, Table 3.5.8 shows that in the project-wide peak month (in Project Year 4) an average of approximately 2,150 vehicle movements a day in total would be expected, of which around 900 would be construction lorry movements. In the AM peak hour an average of approximately 430 vehicle movements in total across the London road network have been included within the assessment and in the PM peak hour the corresponding figure would be around 410 vehicle movements.

3.5.40 Table 3.5.9 shows that for the western cluster peak month (which would occur in Project Year 2) an average of approximately 1,500 vehicle movements a day in total would be expected, of which around 480 would be construction lorry movements. For the AM and PM peak hours, an average of approximately 300 and 280 vehicle movements in total across the London road network have been included within the assessment.

3.6 Construction assessment

3.6.1 The Project-wide *TA* includes both qualitative and quantitative analysis and has been undertaken drawing on discussions with TfL and the LHAs, knowledge of the transport networks and their operational characteristics in the vicinity of the site and based on the anticipated construction programme, construction activity profile and the *Transport Strategy*.

Construction base case

3.6.2 As described in Section 3.5, the construction assessment years for project-wide transport effects are:

a. Project Year 2 for the assessment of issues associated with construction barge movements

b. Project Year 4 for the 'project peak' assessment of issues associated with construction vehicle movements, as the greatest average daily number of lorry movements in total from all sites, and from the central and eastern clusters of sites, would occur in this year

c. Project Year 2 for the western 'cluster peak' assessment of issues associated with construction vehicle movements, as the greatest number of average daily lorry movements from the sites in the WeLHAM area would occur in this year.

Walking and cycling

3.6.3 As para. 3.3.32 explains, any effects on walking and cycling would occur in the vicinity of the individual project sites and would not present project-wide effects. These networks have not therefore been considered in the project-wide assessment.

Public transport

3.6.4 TfL undertakes a constant review of the bus network, patronage and operator performance as part of its overall management and operational role. Where necessary, changes to routes and services are addressed through contracts with bus operators. This means that bus route changes tend to be more responsive to circumstances and planned over a shorter time horizon than rail service changes. A similar pattern is seen in relation to river passenger services.

3.6.5 TfL has been undertaking a significant upgrade programme on the London Underground network in order to provide new trains, additional capacity, increased service frequency and reliability and improved station facilities. The overall programme is covered in the London Underground Upgrade Plan[40] (TfL, 2011).

3.6.6 In summary, the London Underground Upgrade Plan envisages the following improvements:

a. Jubilee Line to deliver 33% more capacity (against a 2006 baseline). These include the addition of an extra carriage to all trains and an upgrade of the signalling system and have now been completed

b. Victoria Line to deliver 21% more capacity by the end of 2012. These include the introduction of new trains (the full fleet is now in operation) and improved signalling and systems, which are nearing completion at the time of writing

c. Northern Line to deliver 20% more capacity by the end of 2014. This involves signalling upgrades to increase service frequency and thus capacity. Plans for an extension of the Northern Line to Battersea, using private sector funding, are also being taken forward

d. Hammersmith & City and Circle Lines to deliver 65% more capacity by 2018. This includes significant revisions to the service pattern on these lines in 2009, with Circle Line trains now terminating at Hammersmith and Edgware Road, and the introduction of new trains and signalling

e. District Line to deliver 24% more capacity by the end of 2018. This includes the introduction of new trains and signalling

f. Metropolitan Line to deliver 27% more capacity by the end of 2018. This involves the introduction of a new train fleet, which was completed in Autumn 2012, together with signalling improvements

g. Piccadilly and Bakerloo lines which are scheduled to commence in 2014 and which are currently being planned by TfL

3.6.7 Upgrades to many stations have also taken place or are in progress, to provide improved passenger facilities. Major station upgrade work has been completed at Kings Cross St Pancras, is under way at Tottenham Court Road, Paddington, Bond Street and Victoria and is scheduled to commence at Bank in 2014.

3.6.8 There are no advanced plans for further enhancements to Docklands Light Railway (DLR) services and a number of capacity enhancements took place in advance of the London 2012 Olympic and Paralympic Games including the extension of the network between Canning Town and Stratford International and work to accommodate three-car trains across the network.

3.6.9 Work to extend the London Overground network, which is operated by TfL, has now been completed, with services on the final link between Clapham

Junction and Surrey Quays having commenced in December 2012. It is not expected that further capacity or service upgrades will take place in the immediate future.

3.6.10 Changes to National Rail services may occur as a result of enhancement proposals by train operating companies, whether as part of ongoing projects, in response to specific issues that may arise, or as part of franchising contracts and negotiations that will take place from time to time.

3.6.11 The Thameslink programme involves a significant upgrade of the route between Brighton and Bedford, including improved infrastructure and signalling and longer trains. Improvements to Blackfriars Station and Farringdon station were completed in 2012 and a major upgrade of London Bridge station is expected to commence in 2013. The Thameslink programme is scheduled for completion in 2018.

3.6.12 Crossrail will provide a new rail east-west rail link across London and is expected to be operational in 2018. The central section will be in tunnel and will link to existing Underground and/or National Rail stations at Paddington, Bond Street, Tottenham Court Road, Farringdon and Liverpool Street. The entire route will connect Maidenhead and Slough in the west to Stratford, Shenfield, Canary Wharf and Abbey Wood in the east.

3.6.13 It is clear that the changes which will take place on London's public transport networks between the baseline and the base case situations will deliver increased overall capacity and service coverage on each of the public transport networks, in response to changing demand.

3.6.14 It is also expected that patronage on public transport services will change over time. These changes will be driven by a range of complex factors and there are inherent uncertainties involved in setting a specific patronage level for public transport for a future year.

3.6.15 Given the range of changes that might occur, and the general trend towards providing increased capacity on the network in line with increased travel demand, the project-wide assessment assumes that public transport capacity in the construction base case is the same as that in the current baseline situation. This means that the assessment takes no advantage of any additional capacity that might become available in future years and is therefore considered robust.

3.6.16 As paras. 3.3.33 to 3.3.40 explain, the project-wide assessment of the public transport network has been undertaken as a comparison with typical service capacities, as the range of destinations and services used by workers would be extensive and the site-specific *TAs* consider the impacts of workers using specific stations, stops and routes.

River movements

3.6.17 The underlying pattern of river use has not substantially changed in recent years, but the Mayor of London and TfL do actively promote the use of passenger services and encourage the provision of more piers (for example the new St George Wharf Pier at Nine Elms). It is anticipated that river passenger services between Putney and Blackfriars may increase from baseline conditions as a result of planned services which were being tendered at the time of writing. Greater freight use is also encouraged, and both passenger and freight use are promoted through polices in the London Plan (GLA,2011)[41]. Consequently it is possible that the nature and number of vessel movements on the River Thames might change over time and may therefore not be the same in the construction base case as in the baseline.

3.6.18 However, it is difficult to determine what the scale and nature of any change might be, as it may be related to river passenger service changes or to changes in river freight operations.

3.6.19 It is noted that it is anticipated that the Crossrail project currently under construction would make significant use of the river to transport construction materials. However, the current programme for that project suggests that it would be substantially complete before the main periods of barge activity associated with the Thames Tideway Tunnel project.

3.6.20 For the purposes of this assessment, the construction base case for assessing the effects on river movements has therefore been assumed to be the same as the baseline situation.

Highway network and operation

3.6.21 The highway network across London is not expected to undergo significant change at a strategic level, as it already provides a dense network serving a range of purposes, as described in Section 3.4.

3.6.22 Local changes to improve capacity and network efficiency, address safety or provide access to new development are likely to take place in many locations between the baseline and base case situations.

3.6.23 As para. 3.3.54 explains, the construction base case for the highway network assessment has been taken as being represented by the modelled forecast year (2021) in the TfL HAMs. This has been agreed with TfL and provides consistency between this assessment and the work already undertaken by TfL. The construction base case does not include any traffic related to the Thames Tideway Tunnel project sites.

Highway schemes and network alterations

3.6.24 The 2021 HAMs contain changes made to the baseline network by TfL in order to reflect known highway schemes and infrastructure proposals. These are summarised in Table 3.6.1 below.

Table 3.6.1 Highway schemes within TfL HAMs

Model	Highway schemes included in 2021 model
WeLHAM	Cycle Superhighway (CS9) Hounslow to Hyde Park A4 M25 Widening Removal of Western Extension Zone
CLoHAM	Heron Tower Route 38 Bloomsbury Way

Model	Highway schemes included in 2021 model
	Route 38 Piccadilly Circus Aldgate Gyratory Marble Arch Pedestrian Crossings London Bridge Thameslink Exhibition Road Elephant & Castle Gyratory Removal of Western Extension Zone M25 Widening and Hard Shoulder Running
ELHAM	Kender Street and Besson Street A2 / A202 Removal of Western Extension Zone Canning Town Roundabout change to signals Sydenham Road Area Based Scheme A212 M25 widening and hard shoulder running **London 2012 Olympic Games schemes** White Post Lane / Waterden Road / Carpenters Road Lea Interchange / Waterden Road E28 Link and LO3 Safeguarding Highway in the vicinity of Aquatics / Stratford City Southern Access Road Marshgate Lane / Southern Loop Road Park Street / Velodrome Link North Loop Road / Temple Mill Lane Ruckholt Road Highway Link Assessment **Olympic Park Transport and Environmental Management Schemes (OPTEMS)** Cadogan Terrace Traffic Calming Eastway Improvements Balls Pond Road / Southgate Road North-South Residential Traffic Priorities – Implementation Cadogan Terrace and ‘Missing Link’ Enhancements Ruckholt Road Area

Development proposals

3.6.25 Paras. 3.3.85 to 3.3.92 explain how committed developments have been identified and considered in the assessment at both site-specific and project-wide level, using the HAMs as the basis for assessment and applying local changes to the local highway models where necessary to fully represent the local base case situation.

Traffic growth

3.6.26 The outputs of the HAMs for the 2008 / 2009 and 2021 modelled years, without Thames Tideway Tunnel project traffic, have been compared to provide an indication of growth in traffic levels over that period. Growth factors have been derived on the basis of the change in total vehicle kilometres travelled within the model within each local authority area, for each of the AM and PM peak hours. Growth factors for each local authority area in the relevant HAMs are shown in Table 3.6.2.

3.6.27 These growth factors have been used in the local highway modelling for the site-specific assessments by applying them to the baseline traffic flows observed from surveys and related data to create base case traffic flows for the assessment.

Table 3.6.2 Growth in vehicle kilometres from TfL HAMs

	AM peak hour			PM peak hour		
London borough	**WeLHAM**	**CLoHAM**	**ELHAM**	**WeLHAM**	**CLoHAM**	**ELHAM**
City of London	n/a	1.9%	8.4%	n/a	8.4%	7.1%
Ealing	3.2%	0.3%	n/a	3.9%	4.5%	n/a
Greenwich	n/a	3.1%	6.8%	N/A	2.3%	4.5%
Hammersmith and Fulham	5.8%	6.5%	n/a	5.4%	7.4%	n/a
Hounslow	3.7%	4.0%	n/a	3.2%	6.5%	n/a
Kensington and Chelsea	10.7%	9.9%	n/a	14.9%	16.4%	n/a
Lambeth	1.8%	9.1%	n/a	3.0%	11.2%	n/a
Lewisham	n/a	n/a	2.6%	n/a	n/a	3.1%
Newham	n/a	n/a	11.7%	n/a	n/a	12.6%
Richmond upon Thames	1.5%	-0.6%	n/a	-1.5%	-0.2%	n/a
Southwark	n/a	13.6%	3.8%	n/a	12.3%	4.4%
Tower Hamlets	n/a	7.5%	11.1%	n/a	9.7%	11.2%
Wandsworth	3.6%	4.0%	n/a	4.6%	5.3%	n/a
Westminster	7.4%	4.7%	n/a	6.0%	6.1%	n/a

Table shows % change in total veh km from 2008/9 to 2021 modelled years
Where n/a is shown, the authority area is not within the simulation area of the particular HAM.

3.6.28 Table 3.6.2 shows that the growth factors range between 3% and 16% in the AM and PM peak hours. Over a 12-13 year period (between the modelled 2008 / 2009 base and 2021 forecast years in the HAMs) this represents an average of 0.2% to 1% per annum.

3.6.29 The key model statistics from the 2021 HAMs, representing the overall operation of the highway network in the construction base case, are shown in Table 3.6.3 and Table 3.6.4.

Table 3.6.3 Construction base case highway network statistics, AM peak hour

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	pcu-hrs	hours	pcu-hrs	pcu-km	km/h
WeLHAM						
Baseline	23,653	10,522	61,668	95,844	3,203,443	33.4
Base case	26,253	13,458	66,155	105,867	3,454,429	32.6
Change	11.0%	27.9%	7.3%	10.5%	7.8%	-2.4%
CLoHAM						
Baseline	12,429	1,595.1	17,196	31,220	554,211	17.8
Base case	13,637	3,193	20,249	37,078	666,664	18.0
Change	9.7%	100.1%	17.8%	18.8%	20.3%	1.1%
ELHAM						
Baseline	21,075	7,652	57,088	85,815	2,777,070	32.4
Base case	23,663	9,099	62,277	95,039	3,089,251	32.5
Change	12.3%	18.9%	9.1%	10.7%	11.2%	0.3%

** Notes: Transient queues – total time spent in 'under-capacity' queues (eg. queues which form at a red signal but dissipate during the following green period)*
Over-capacity queues – total time spent in queues which form due to lack of capacity (eg. queues which form at a red signal but do not clear in the following green period)
Total link cruise time – total time spent travelling along links within the modelled network, excluding time spent queuing
Total travel time – sum of transient queue, over-capacity queue and link cruise times
Total travel distance – total distance travelled by all vehicles within the model network during the modelled period
Average speed – speed of vehicles averaged across the whole network and the whole modelled period (total travel distance / total travel time)
pcu – passenger car unit; a unit representing the equivalent of one car. Different vehicle types have different pcu values (eg car = one pcu, vans and three-axle vehicles = 1.5 pcu, buses and coaches = two pcu, four-axle vehicles = 2.3 pcu)

Table 3.6.4 Construction base case highway network statistics, PM peak hour

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	pcu-hrs	hours	pcu-hrs	pcu-km	km/h
WeLHAM						

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	pcu-hrs	hours	pcu-hrs	pcu-km	km/h
Baseline	25,176	13,978	62,786	101,941	3,238,912	31.8
Base case	27,671	18,063	67,501	113,235	3,508,154	31.0
Change	9.9%	29.2%	7.5%	11.1%	8.3%	-2.5%
CLoHAM						
Baseline	11,305	2,089	16,256	29,650	517,568	17.5
Base case	12,786	3,713	19,602	36,101	639,045	17.7
Change	13.1%	77.7%	20.6%	21.8%	23.5%	1.1%
ELHAM						
Baseline	20,965	7,317	55,871	84,153	2,750,265	32.7
Base case	24,192	10,997	61,588	96,778	3,067,299	31.7
Change	15.4%	50.3%	10.2%	15.0%	11.5%	-3.1%

** Notes: Transient queues – total time spent in 'under-capacity' queues (eg. queues which form at a red signal but dissipate during the following green period)*
Over-capacity queues – total time spent in queues which form due to lack of capacity (eg. queues which form at a red signal but do not clear in the following green period)
Total link cruise time – total time spent travelling along links within the modelled network, excluding time spent queuing
Total travel time – sum of transient queue, over-capacity queue and link cruise times
Total travel distance – total distance travelled by all vehicles within the model network during the modelled period
Average speed – speed of vehicles averaged across the whole network and the whole modelled period (total travel distance / total travel time)
pcu – passenger car unit; a unit representing the equivalent of one car. Different vehicle types have different pcu values (eg car = one pcu, vans and three-axle vehicles = 1.5 pcu, buses and coaches = two pcu, four-axle vehicles = 2.3 pcu)

3.6.30 Comparing the baseline and construction base case statistics for the AM peak hour, Table 3.6.3 shows that:

a. total travel time within the models would increase by just over 10% in west and east London and by around 19% in central London

b. the overall time spent in transient queues (those which arise at junctions that are generally operating within capacity) would increase by between 10% and 12% across the whole of the network

c. the overall time spent in over-capacity queues (those which tend to occur at junctions operating above capacity, where queues do not fully dissipate within modelled periods) would increase by around 28% in west London, 100% in central London (from a smaller baseline figure) and 19% in east London

d. the total travel time spent on links would increase by 7% to 9% in west and east London and by 18% in central London

e. total travel distance would increase by about 8% in west London, 20% in central London and 11% in east London

f. average speeds would reduce by around 2% in west London, increase by 1% in central London and remain almost unchanged in east London.

3.6.31 A similar comparison for the PM peak hour, using Table 3.6.4, shows the following changes:

a. total travel time would increase by 11% in west London, 22% in central London and 15% in east London

b. the overall time spent in transient queues would increase by 9% in west London, 13% in central London and 15% in east London

c. the total time spent in over-capacity queues would increase by some 30% in west London, 78% in central London and 50% in east London

d. the total travel time spent on links would increase by 8% to 10% in west and east London and by 21% in central London

e. the total distance travelled on the network would increase by 8% in west London, 24% in central London and 12% in east London

f. average speeds would reduce by around 3% in west and east London and increase by around 1% in central London.

3.6.32 The relationship between each of the statistical indicators needs to be considered in order to gain a picture of the changes shown in the HAMs between the baseline and base case situation. Travel times in the models may increase, but total travel distance also increases. The travel distance statistics reflect increased levels of traffic within the base case model, compared to the baseline, as could be expected with the inclusion of increased population and employment numbers over that period. Without significant changes to the highway network it is always likely that travel time will increase as traffic demand increases and this is the pattern seen in the HAMs statistics.

3.6.33 In the AM peak hour, the proportional increase in travel time and in distance travelled in each HAM is of a similar order. This suggests that the overall operation of the highway network would be similar in the baseline and base case situations. Some increase in queuing time is seen which is likely to be a consequence of additional traffic taking up spare capacity in the highway network. The average speed data support this conclusion, suggesting that overall average speeds would be maintained at the strategic level with only a small decrease in west London.

3.6.34 In the PM peak hour, the proportional increases in travel time are slightly greater than the increases in travel distance, which suggest that the operation of the network may deteriorate slightly between the baseline and base case situations. This deterioration in network operation is highlighted by the changes in average speed, which show that although speeds in central London would be similar in the baseline and base case situations, speeds in west and east London would fall by around 3%.

3.6.35 It must be borne in mind that the HAMs, which are highway network models, take no iterative account of the potential for increased uptake of alternative transport modes such as public transport, as capacity on those modes increases over time, and if that were to occur the change in vehicle speeds could potentially be smaller than indicated in the HAMs statistics for the base case.

Sub-area (VISSIM) network

3.6.36 A construction base case VISSIM model has been created for the network between Westminster Bridge (A302) and Blackfriars Bridge (A201), as described in Sections 3.3 and 3.4. To provide a basis for comparing the construction base and development case scenarios, journey times within the VISSIM model have been identified for a number of possible routes through the VISSIM network. These routes are:

a. Route 1: Bridge Street (A302) to Upper Thames Street (A3211)

b. Route 2: Upper Thames Street (A3211) to Bridge Street (A302)

c. Route 3: Blackfriars Bridge (A201) to New Bridge Street (A201)

d. Route 4: New Bridge Street (A201) to Blackfriars Bridge (A201)

e. Route 5: Northumberland Avenue to Upper Thames Street (A3211)

f. Route 6: Upper Thames Street (A3211) to Northumberland Avenue

g. Route 7: Northumberland Avenue to New Bridge Street (A201)

h. Route 8: New Bridge Street (A201) to Northumberland Avenue

i. Route 9: Westminster Bridge (A302) to New Bridge Street (A201)

j. Route 10: New Bridge Street (A201) to Westminster Bridge (A302)

k. Route 11: Upper Thames Street (A3211) to Westminster Bridge (A302)

l. Route 12: Westminster Bridge (A302) to Upper Thames Street (A3211).

3.6.37 Table 3.6.5 and Table 3.6.6 show the journey times measured on these routes from the baseline and base case VISSIM models and identifies the changes that would be expected without the Thames Tideway Tunnel project.

Table 3.6.5 VISSIM base case model results, journey times, AM peak hour

Route		Direction	Modelled journey time (mm:ss)		
			Baseline	Base case	Change
Bridge Street (A302) to Upper Thames Street (A3211)	1	Eastbound	05:18	05:29	+00:11
	2	Westbound	05:50	06:20	+00:30
Blackfriars Bridge (A201) to New Bridge Street (A201)	3	Northbound	01:57	01:42	-00:15
	4	Southbound	01:00	01:21	+00:21

Route		Direction	Modelled journey time (mm:ss) Baseline	Base case	Change
Northumberland Avenue to Upper Thames Street (A3211)	5	Eastbound	04:04	04:16	+00:12
	6	Westbound	04:26	04:32	+00:06
Northumberland Avenue to New Bridge Street (A201)	7	Eastbound	04:49	04:44	-00:05
	8	Westbound	05:13	05:39	+00:26
Westminster Bridge (A302) to New Bridge Street (A201)	9	Eastbound	06:32	06:37	+00:05
	10	Westbound	05:58	06:31	+00:33
Upper Thames Street (A3211) to Westminster Bridge (A302)	11	Westbound	05:48	06:20	+00:32
	12	Eastbound	05:59	06:05	+00:06

Table 3.6.6 VISSIM base case model results, journey times, PM peak hour

Route		Direction	Modelled journey time (mm:ss) Baseline	Base case	Change
Bridge Street (A302) to Upper Thames Street (A3211)	1	Eastbound	05:57	05:55	-00:02
	2	Westbound	05:54	06:56	+01:02
Blackfriars Bridge (A201) to New Bridge Street (A201)	3	Northbound	01:16	01:19	+00:03
	4	Southbound	01:01	01:05	+00:04
Northumberland Avenue to Upper Thames Street (A3211)	5	Eastbound	04:05	04:22	+00:17
	6	Westbound	05:07	05:10	+00:03
Northumberland Avenue to New Bridge Street (A201)	7	Eastbound	04:37	05:00	+00:23
	8	Westbound	06:04	06:21	+00:17
Westminster Bridge (A302) to New Bridge Street (A201)	9	Eastbound	07:04	07:05	+00:01
	10	Westbound	06:15	07:27	+01:12
Upper Thames Street (A3211) to Westminster Bridge (A302)	11	Westbound	06:30	08:07	+01:37
	12	Eastbound	06:28	06:39	+00:09

3.6.38 Table 3.6.5 shows that in the AM peak hour, journey times would increase in the base case compared to the baseline situation on most routes through the VISSIM model network. The changes tend to be greater in the westbound direction along Victoria Embankment (A3211), where increases of up to some 30 seconds are shown.

3.6.39 Table 3.6.6 for the PM peak hour shows a similar pattern with increases to journey times on most routes. The increases would be greatest in the westbound direction, particularly on Routes 2, 10 and 11 which cover the full length of Victoria Embankment (A3211). This suggests that journey time increases in the westbound direction on Victoria Embankment (A3211) are a function of conditions at the eastern end of the VISSIM network, in the Blackfriars area.

Construction development case

3.6.40 This section summarises the findings of the assessment undertaken for the project-wide peak periods of construction activity. The assessment years are described in Sections 3.3 and 3.5.

Bus network

3.6.41 Table 3.5.6 and Table 3.5.7 indicate that in the AM and PM peak hours, approximately 270 and 220 journeys respectively would be made by bus by workers travelling to or from construction sites.

3.6.42 These journeys would be spread across the bus network serving the 24 construction sites. The site-specific assessments show that the number of bus journeys at individual sites would be fewer than 15 journeys at all but the four main tunnel sites, from which between 20 and 50 journeys could be expected in the AM peak hour and up to 30 journeys in the PM peak hour.

3.6.43 To place the overall number of additional journeys in context, the total number of additional bus journeys in the AM and PM peak hours would be equivalent to the capacity of approximately six and five buses respectively, based on an average capacity of 50 passengers per bus, on the whole of the London bus network.

3.6.44 On a London-wide basis this level of additional patronage would be insignificant. The site-specific assessments also conclude that in all cases the impact on bus patronage from additional worker journeys made by bus would not be significant.

3.6.45 It is also relevant to consider whether the additional construction traffic that would be using the highway network at a strategic level would give rise to any adverse impacts on bus journey times.

3.6.46 The outcomes of the assessment of changes to road network delay at the project-wide level are reported in paras. 3.6.93 to 3.6.111 and conclude that across the whole of the London road network there would be very few instances where delays would be increased by more than one minute. Any local impacts on bus services have been identified in the site-specific *TAs*.

3.6.47 The highway network assessment statistics also show that overall, the changes in average speeds on the highway network would be insignificant, amounting to no more than +/- 0.1km/h in the peak hours (Table 3.6.7, Table 3.6.8 and Table 3.6.11).

London Underground network

3.6.48 Table 3.5.6 and Table 3.5.7 show that there would be approximately 350 additional journeys made on the London Underground system in the AM peak hour and 300 in the PM peak hour.

3.6.49 These journeys would be distributed across the Underground network. Underground stations are within 960m walking distance of seven of the project sites and within 1.6km (20 minutes walk) of a further 11 project sites.

3.6.50 The site-specific assessments show that the greatest number of additional journeys made by London Underground to any one site would be around 70 journeys in the AM peak hour and up to 40 journeys in the PM peak hour. Main tunnel sites would produce the highest numbers of Underground journeys.

3.6.51 The total number of Underground journeys in Table 3.5.6 and Table 3.5.7 would be equivalent to approximately 30% to 35% of the typical capacity of a London Underground train, based on a capacity of 1,000 passengers per train. At a project-wide level this would not present any significant impact on Underground services or capacity.

3.6.52 The site-specific assessments also conclude that in all cases the impact on London Underground patronage would not be significant.

Docklands Light Railway network

3.6.53 The number of additional journeys on DLR services would be 45 to 50 trips in each of the AM and PM peak hours, as shown in Table 3.5.6 and Table 3.5.7.

3.6.54 These journeys would be associated with sites in the eastern section of the project (King Edward Memorial Park Foreshore, Bekesbourne Street, Deptford Church Street, Greenwich Pumping Station, Abbey Mills Pumping Station and Beckton Sewage Treatment Works).

3.6.55 The total number of journeys would be the equivalent of 15% to 20% of the typical capacity of a DLR service (based on 300 passengers per DLR train) and as this total would be distributed across the DLR network, there would be no significant impact on patronage.

3.6.56 The site-specific assessments conclude that in all cases there would be no significant impact on DLR patronage at the local level.

London Overground and National Rail networks

3.6.57 Table 3.5.6 and Table 3.5.7 show that there would be approximately 420 additional journeys made on National Rail and London Overground services in the AM peak hour and 350 additional journeys in the PM peak hour.

3.6.58 The number of workers using these services would vary from site to site. In the AM peak hour there would be up to 80 additional journeys from some sites, although all but two sites would generate less than 40 additional journeys. In the PM peak hour there would be up to 50 additional rail journeys from the largest project sites.

3.6.59 National Rail services are available within 960m walking distance of 12 of the project sites and are within 1.6km of a further five sites.

3.6.60 London Overground services are available within 960m walking distance of five project sites and are within 1.6km of a further three sites.

3.6.61 Journeys by National Rail and London Overground would therefore be distributed across a number of routes and stations. The overall number of additional trips would be equivalent to between 60% and 70% of the average capacity of a train (based on 600 passengers per train) although it is acknowledged that train formations vary on different routes.

3.6.62 Given the range of rail routes available both into central London termini and in the vicinity of project sites, there would be no significant project-wide impact on National Rail and London Overground patronage.

3.6.63 Furthermore, the site-specific assessments conclude that in all cases there would be no significant impact on National Rail or London Overground services at the local level.

River passenger services

3.6.64 River services operate between and call at fewer locations than bus or rail-based services. The frequency of services is typically every 30 minutes, with a peak in services taking place between 12:00 and 19:00hrs. Consequently the mode share of journeys made in Greater London by river is relatively low compared to other forms of public transport network.

3.6.65 Table 3.5.6 and Table 3.5.7 show that there would be approximately ten additional journeys made by construction workers on river services across the whole of the project.

3.6.66 Bearing in mind the number of services available and the low level of additional journeys anticipated, this does not represent any significant impact on river passenger service patronage.

3.6.67 Fifteen of the project sites would be located close to the River Thames. However, only nine sites have river passenger piers within a 960m walking distance, though a further six would be within 1.6km of river passenger services.

3.6.68 Recognising the potential to encourage workers to use river transport where feasible, the analysis undertaken for the project-wide and site-specific assessments suggests that even if the share of worker journeys made by river were to be two or three times higher than anticipated (equivalent to 20 or 30 journeys in total), for example, the impact on river passenger service patronage overall would still amount to 10% to 15% of the average capacity of river passenger vessel and would thus remain insignificant.

River movements

3.6.69 The *Transport Strategy* proposes transporting a range of excavated and construction materials by river to and from 11 of the project sites. This is explained in more detail in paras. 3.2.18 to 3.2.24.

3.6.70 The project-wide issues associated with using the river to transport excavation arisings and construction materials relate to the number of additional barge movements that would be introduced to the River Thames. This would fluctuate during the project as the number of movements would depend upon the phasing of the overall construction programme and the nature and volumes of materials being transported at any particular time.

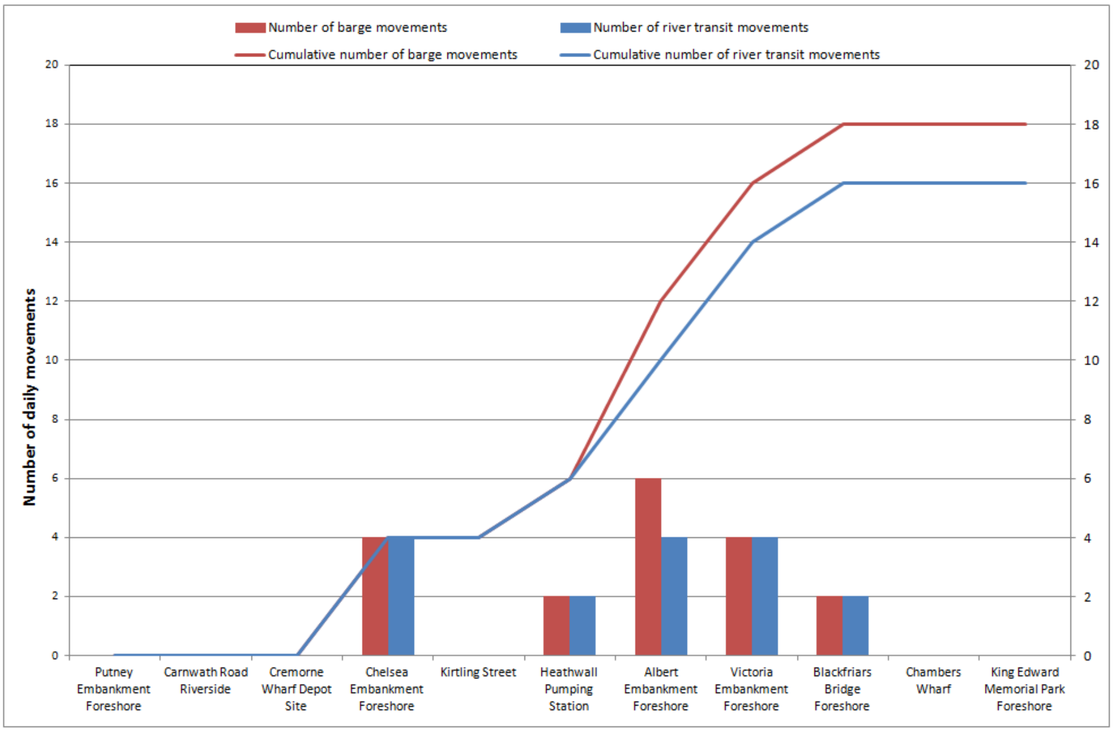
3.6.71 Separate *Navigational Issues and Preliminary Risk Assessments* have been undertaken at sites where it is proposed to use the river to transport construction materials. These are reported separately and the reports accompany the application.

3.6.72 The greatest daily requirement for barges across the project as a whole would occur in Project Year 2. Table 3.5.2 shows that at this time, there would be a total of nine barge deliveries and nine barge collections required..

3.6.73 Para. 3.5.9 explains that barges would be hauled by tugs towing one or two barges at a time. This means that the number of daily river transit movements on the river would be up to 16 in total based on the figures given in Table 3.5.2 and assuming that tugs maximise the number of barges hauled in a single tow where possible.

3.6.74 Plate 3.6.1 shows the number of barge deliveries and collections and river transit movements expected at each of the sites where river transport is proposed within the *Transport Strategy*, for the project-wide peak period of daily barge movements (Project Year 2).

Plate 3.6.1 Number of barge and river transit movements, project-wide peak (Project Year 2)



3.6.75 Plate 3.6.1 shows how the number of barge deliveries and collections and river transit movements would change along the length of the River Thames, reflecting the location of the project sites. It demonstrates that in the project-wide peak month (Project Year 2), there would be no movements upstream of Chelsea Embankment Foreshore.

3.6.76 This figure would increase to an average of around 12 barge deliveries or collections per day, or ten river transit movements, downstream of Albert Embankment Foreshore and the greatest number of movements (18 barge deliveries or collections or 16 river transit movements) would only occur downstream of the site at Blackfriars Bridge Foreshore.

3.6.77 Barge activity may experience some natural mitigation due to the tidal patterns of the River Thames. The transit of barges tends to coincide with the ebb and flow of tides in order to improve speed of passage and fuel consumption of tugs. However, high and low tide times are not static and occur an hour later each day. As a result there would be periods when barge transit does not correspond with high levels of other river use.

3.6.78 However, it should be noted that the impact of construction barge movements on the River Thames would also be influenced by the type of other river users, including leisure users. Leisure use of the river tends to be greater upstream, whilst in the lower reaches the proportion of river passenger and commercial river movements is greater. The profile shown in Plate 3.6.1 indicates how the number of construction barge movements would reduce towards the upstream parts of the river and thus that leisure users would be unlikely to be affected to any significant degree.

3.6.79 There are some location-specific navigational issues in the vicinity of some of the project sites at peak river operational times (eg, the use of wharves at Kirtling Street and access at Blackfriars Bridge Foreshore) and these are addressed in the *Navigational Issues and Preliminary Risk Assessment* studies which are reported separately from the *TA* and *ES*.

3.6.80 Plate 3.6.1 represents the greatest number of river movements associated with construction barges that would be expected in any month of the construction phase. The distribution of barge movements may be different in other months and barges used at Carnwath Road Riverside and Kirtling Street would increase the number of movements around these sites. However, overall the conclusions set out above are considered appropriate for the project-wide assessment for other months and it is useful to note that the number of barge movements would still be at its lowest around the sites which would be furthest upstream.

Highway network

3.6.81 The assessment of transport effects in the *Environmental Statement* has been based on considering three aspects of highway network operation at both project-wide and local levels. These are:

a. changes to road network delay

b. changes to safety and accident risk on the highway network

c. issues associated with the movement of hazardous loads.

3.6.82 In this Section of the *TA*, these aspects have been considered in the context of the project-wide assessment.

Construction vehicle movements

3.6.83 As paras. 3.3.58 to 3.3.60 explain, the operation of the highway network at a strategic level has been assessed for two scenarios based on the *Transport Strategy*:

a. the average daily number of construction vehicle movements in the project-wide peak month of activity, which would occur in Project Year 4

b. the average daily number of construction vehicle movements in the cluster peak months of activity, which would occur in Project Year 2 for sites in the WeLHAM area and in Project Year 4 (coincident with the project-wide peak month) for sites in the CLoHAM and ELHAM areas.

3.6.84 Table 3.5.8 shows that in the project-wide peak scenario, a total of approximately 2,150 vehicle movements would be generated from all project sites per day on average, with AM and PM peak hour totals of around 430 and 410 movements respectively.

3.6.85 In the western cluster peak scenario, Table 3.5.9 shows that the average daily total number of vehicle movements would be around 1,500, with AM and PM peak hour flows of approximately 300 and 280 respectively.

Approach to strategic modelling

3.6.86 The methodology for the strategic assessment of highway network operation during the Thames Tideway Tunnel project construction phase is described in paras. 3.3.47 to 3.3.73.

3.6.87 For the construction development case, the additional construction vehicle movements identified for each of the two scenarios have been assigned to the HAMs as appropriate.

3.6.88 In addition, changes that would be created to the highway network during construction, which could affect network operation at more than a very local level, have been included in the HAMs for the construction development case. These changes would occur at two locations:

a. Blackfriars Bridge Foreshore, where the westbound slip road from Blackfriars Bridge Road (A201) to Victoria Embankment (A3211) would be closed for part of the construction works

b. Deptford Church Street, where the northbound carriageway of Deptford Church Street (A2209) would be closed for part of the construction works and single lane contraflow working would be introduced on the southbound carriageway.

Assignment of project traffic

3.6.89 Figures 3.6.1, 3.6.2 and 3.6.3 (see Project-wide *Transport Assessment* figures) show the OmniTrans assignment of construction lorries for the project-wide peak and western cluster peak scenarios. The OmniTrans plots show how construction lorry movements would be distributed across the network of construction routes (as explained in paras. 3.3.68 to 3.3.71).

3.6.90 For the project-wide peak assessment (Project Year 4) the OmniTrans plots shows the following characteristics:

a. in west London the highest concentrations of construction lorry movements would occur on Nine Elms Lane and in the vicinity of the Vauxhall gyratory (up to nine vehicles per hour per direction) and on Camberwell New Road (A202) and the South Circular Road (A205) (up to five vehicles per hour per direction)

b. in central London the principal flows of construction lorries would be on Shooters Hill Road (A2) east of Deptford (16 vehicles per hour per direction), Newham Way (A13) and the A12 between Blackwall and Bow (seven vehicles per hour per direction) and Peckham Road (A202) between Camberwell and Deptford and on the South Circular Road (A205) (five vehicles per hour per direction in each case)

c. in east London, the highest flows would be on the A2 corridor comprising Shooters Hill Road, Rochester Way Relief Road and East Rochester Way (18 vehicles per hour per direction) and on the A13 (seven vehicles per hour per direction).

3.6.91 These plots demonstrate that the average number of project construction lorry movements per hour would be very low compared to total flows on the road network. Routes where the concentrations of these vehicles would be greatest (for instance the A2 and A13 corridors) are higher capacity radial routes which carry higher volumes of traffic and therefore even on these routes, the number of additional vehicles would be insignificant in the context of their position in the road network hierarchy.

3.6.92 Figure 3.6.4 (see Project-wide *Transport Assessment* figures) shows the OmniTrans plot for the WeLHAM area for the western cluster peak scenario. This shows that the average number of construction vehicle movements on Nine Elms Lane, Camberwell New Road (A202) and the South Circular Road (A205) would be lower than in the project-wide peak scenario. For the western cluster peak, the highest flows of construction vehicles are shown on the A4 / M4 corridor to the west, amounting to five vehicles per hour per direction.

Changes to road network operation

3.6.93 The assessment of road network operation has been based on the results of the strategic modelling using the HAMs.

3.6.94 Table 3.6.7 and Table 3.6.8 present the key statistics for the project-wide AM and PM peak hour modelling respectively. This also covers the central and eastern cluster peaks, which occur at the same point in the programme.

3.6.95 In the AM peak hour, the statistics show small increases in the total travel time within each of the three modelled areas. In all cases this increase is proportionally higher than the increase in total travel distance, suggesting that in overall terms there would be a net additional delay on the highway network in each model. However, the increase in total travel time would be between 0.2 and 0.4% of the construction base case figure. Average speeds in WeLHAM and ELHAM would not change and there would be a marginal reduction in average speed in CLoHAM.

3.6.96 In the PM peak hour, a similar pattern would occur, with small changes of less than 0.4% in overall travel time (including a reduction of around 0.2% in total travel time in WeLHAM). Average speeds would increase slightly in WeLHAM, remain static in CLoHAM and reduce slightly in ELHAM but the change would be no more than +/- 0.1km/h in each case.

3.6.97 These overall statistics indicate that at a strategic level, the impact of construction traffic associated with the project would be extremely small.

Table 3.6.7 Highway network statistics, project-wide AM peak hour development case (Project Year 4)

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	pcu-hrs	hours	pcu-hrs	pcu-km	km/h
WeLHAM						
Base case	26,253	13,458	66,155	105,867	3,454,429	32.6
Devt case	26,292	13,574	66,211	106,077	3,456,492	32.6
Change	0.15%	0.86%	0.08%	0.20%	0.06%	0.00%
CLoHAM						
Base case	13,637	3,193	20,249	37,078	666,664	18.0
Devt case	13,680	3,258	20,273	37,211	667,278	17.9
Change	0.32%	2.05%	0.12%	0.36%	0.09%	-0.56%
ELHAM						
Base case	23,663	9,099	62,277	95,039	3,089,251	32.5
Devt case	23,747	9,188	62,384	95,319	3,093,366	32.5
Change	0.35%	0.97%	0.17%	0.29%	0.13%	0.00%

** Notes: Transient queues – total time spent in 'under-capacity' queues (eg. queues which form at a red signal but dissipate during the following green period)*
Over-capacity queues – total time spent in queues which form due to lack of capacity (eg. queues which form at a red signal but do not clear in the following green period)
Total link cruise time – total time spent travelling along links within the modelled network, excluding time spent queuing
Total travel time – sum of transient queue, over-capacity queue and link cruise times
Total travel distance – total distance travelled by all vehicles within the model network during the modelled period
Average speed – speed of vehicles averaged across the whole network and the whole modelled period (total travel distance / total travel time)
pcu – passenger car unit; a unit representing the equivalent of one car. Different vehicle types have different pcu values (eg car = one pcu, vans and three-axle vehicles = 1.5 pcu, buses and coaches = two pcu, four-axle vehicles = 2.3 pcu)

Table 3.6.8 Highway network statistics, project-wide PM peak hour development case (Project Year 4)

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	pcu-hrs	hours	pcu-hrs	pcu-km	km/h
WeLHAM						
Base case	27,671	18,063	67,501	113,235	3,508,154	31.0
Devt case	27,624	17,921	67,495	113,040	3,510,129	31.1
Change	-0.17%	-0.79%	-0.01%	-0.17%	0.06%	0.32%
CLoHAM						
Base case	12,786	3,713	19,602	36,101	639,045	17.7
Devt case	12,820	3,724	19,630	36,175	639,867	17.7
Change	0.27%	0.30%	0.14%	0.20%	0.13%	0.00%
ELHAM						
Base case	24,192	10,997	61,588	96,778	3,067,299	31.7
Devt case	24,275	11,167	61,656	97,097	3,069,979	31.6
Change	0.34%	1.54%	0.11%	0.33%	0.09%	-0.32%

** Notes: Transient queues – total time spent in 'under-capacity' queues (eg. queues which form at a red signal but dissipate during the following green period)*
Over-capacity queues – total time spent in queues which form due to lack of capacity (eg. queues which form at a red signal but do not clear in the following green period)
Total link cruise time – total time spent travelling along links within the modelled network, excluding time spent queuing
Total travel time – sum of transient queue, over-capacity queue and link cruise times
Total travel distance – total distance travelled by all vehicles within the model network during the modelled period
Average speed – speed of vehicles averaged across the whole network and the whole modelled period (total travel distance / total travel time)
pcu – passenger car unit; a unit representing the equivalent of one car. Different vehicle types have different pcu values (eg car = one pcu, vans and three-axle vehicles = 1.5 pcu, buses and coaches = two pcu, four-axle vehicles = 2.3 pcu)

3.6.98 The outputs from each of the models have been interrogated to identify where changes in delay would be greater than one minute (which is the minimum impact threshold identified in the *Environmental Statement*).

3.6.99 The nature of the strategic models is to undertake dynamic reassignment of traffic within each model simulation to optimise network performance on the basis of modelled delays and journey times. This occurs unless assignments have been fixed, as has been the case for Thames Tideway Tunnel project construction lorries, which is explained in paras. 3.3.71 and 3.3.72. This means that changes may occur anywhere in the model and may not be directly due to the additional demand that has been introduced to the model. This is particularly important when the additional traffic demand is small in comparison to the size of the network and volume of traffic, as is the case for this assessment.

3.6.100 The delay changes described below have been reviewed to determine whether they appear to arise as a direct result of the additional project construction traffic that has been added for the construction development case, or whether they are due to these 'internal' modelling effects.

3.6.101 Table 3.6.9 and Table 3.6.10 present the delay changes of more than one minute for the project-wide AM and PM peak hours. This also represents the changes for the central and eastern cluster peaks.

3.6.102 Table 3.6.9 shows that in the project-wide AM peak hour, there would be two locations experiencing an increase in delay of between one and two minutes. One of these locations is on the outer edge of WeLHAM and the change in delay is not related to additional construction traffic from the project. The other, within CLoHAM, is at the Jamaica Road / Lower Road (A200) roundabout. This is on a route that would be used by project construction traffic and this may therefore contribute to the change in delay at that location. There would also be one location in WeLHAM, at Chelsea Embankment / Royal Hospital Road, experiencing a reduction in delay but examination of the model suggests that this is due to internal reassignment of traffic within the model and is unlikely to be directly related to project construction traffic.

3.6.103 Table 3.6.10 shows that in the project-wide PM peak hour there would be two locations in WeLHAM where increases of one to two minutes in delay would be experienced. Both of these locations are towards the outer areas of WeLHAM; one is not on a route that would be used by project construction traffic and the other is expected to carry only a very low flow of construction vehicles.

3.6.104 The changes in both these locations are therefore likely to be due to other reassignment taking place within the model and not as a direct result of the project construction traffic. There would also be five locations in WeLHAM and one location in CLoHAM experiencing reductions of more than one minute in delay and those changes are also considered to be unrelated to project construction traffic.

Table 3.6.9 Changes in modelled delay, project-wide AM peak hour development case (Project Year 4)

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
W	Increase	+61	91606	Watford Road / North Western Avenue (A41) (Hertfordshire)	No project construction vehicles on this route. Minor route switching occurring at base case overcapacity junction. Change is due to modelling effect and not directly related to the project.
W	Decrease	-79	34268	Chelsea Embankment / Royal Hospital Road (Kensington and Chelsea)	
C	Increase	+66	27992	Jamaica Road / Lower Road / Brunel Road Roundabout (Southwark)	Delay is caused by blocking back from roundabout. There would be an additional seven construction vehicles on this route, which may contribute to the increase in delay.
E		None	None	None	

Table shows only delay changes which are in excess of one minute.
Note: the reasons for reductions in delay within the HAMs development cases have not been investigated in detail as they are typically the result of dynamic reassignment taking place within the model simulation and not directly attributable to the additional construction traffic within the models in the development case.

Table 3.6.10 Changes in modelled delay, project-wide PM peak hour development case (Project Year 4)

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
W	Increase	+75	70343	Entry on to Brent Cross Interchange (A41) from Haley Road (Barnet)	Local re-routing occurring in the model, due to modelling effect and not directly related to the project.
W	Increase	+82	30051	Kingston Road / Roehampton Lane (Wandsworth)	Only one project construction vehicle on this route. Change is due to modelling effect and not directly related to the project.
W	Decrease	-61	70245	Edgware Road / Broadfields Avenue (Barnet)	
W	Decrease	-98	32202	Shepherds Bush Green / Rockley Road (Hammersmith and Fulham)	
W	Decrease	-105	60331	Hogarth Lane entry to Hogarth Roundabout (Hounslow)	
W	Decrease	-105	91021	Latchmere Road / Elspeth Road / Lavender Hill (Wandsworth)	
W	Decrease	-151	59095	Chertsey Road on to Hospital Bridge Roundabout (Richmond)	
C	Decrease	-85	12380	St Johns Wood Road / Lisson Grove / Grove End Road (Westminster)	
E		None	None	None	

Table shows only delay changes which are in excess of one minute.
Note: the reasons for reductions in delay within the HAMs development cases have not been investigated in detail as they are typically the result of dynamic reassignment taking place within the model simulation and not directly attributable to the additional construction traffic within the models in the development case.

3.6.105 Table 3.6.11 presents the statistics for the WeLHAM cluster peak for both AM and PM peak hours. This again shows a similar pattern to the results for the project-wide peak scenario, with very small increases to the total travel time in the model and no significant change to average speeds.

Table 3.6.11 Highway network statistics, western cluster peak development case (Project Year 2), WeLHAM

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	pcu-hrs	hours	pcu-hrs	pcu-km	km/h
AM peak hour						
Base case	26,253	13,458	66,155	105,867	3,454,429	32.6
Devt case	26,263	13,517	66,198	105,977	3,455,671	32.6
Change	0.04%	0.43%	0.06%	0.10%	0.04%	0.00%
PM peak hour						
Base case	27,671	18,063	67,501	113,235	3,508,154	31.0
Devt case	27,660	18,313	67,443	113,416	3,507,864	30.9
Change	-0.04%	1.38%	-0.09%	0.16%	-0.01%	-0.32%

** Notes: Transient queues – total time spent in 'under-capacity' queues (eg. queues which form at a red signal but dissipate during the following green period)*
Over-capacity queues – total time spent in queues which form due to lack of capacity (eg. queues which form at a red signal but do not clear in the following green period)
Total link cruise time – total time spent travelling along links within the modelled network, excluding time spent queuing
Total travel time – sum of transient queue, over-capacity queue and link cruise times
Total travel distance – total distance travelled by all vehicles within the model network during the modelled period
Average speed – speed of vehicles averaged across the whole network and the whole modelled period (total travel distance / total travel time)
pcu – passenger car unit; a unit representing the equivalent of one car. Different vehicle types have different pcu values (eg car = one pcu, vans and three-axle vehicles = 1.5 pcu, buses and coaches = two pcu, four-axle vehicles = 2.3 pcu)

3.6.106 Table 3.6.12 and Table 3.6.13 show the AM and PM peak hour delay changes in excess of one minute for the western cluster peak scenario tested in WeLHAM. The tables show that in the AM peak hour, there would be only one location experiencing an increase in delay of more than one minute and one where a reduction of more than one minute in delay would occur.

3.6.107 In the PM peak hour, Table 3.6.13 shows that there would be three locations in WeLHAM experiencing delay increases of one to two minutes, one where an increase of three and a half minutes is shown and one where the increase is forecast to be six minutes. Analysis of the model outputs suggests that with one exception these changes are not directly related to project construction traffic. The increased delay of six minutes at the Hogarth roundabout appears to occur as a result of dynamic reassignment of traffic within WeLHAM for other reasons, as there would only be three project construction vehicles per hour passing through this location.

3.6.108 Table 3.6.13 also shows that in the western cluster PM peak hour there would be one location experiencing a reduction in delay of one to two minutes and one location where delays would reduce by approximately two and a half minutes. These are towards the boundaries of the model and these changes are not directly related to the additional project construction traffic demand.

Table 3.6.12 Changes in modelled delay, western cluster AM peak hour development case (Project Year 2), WeLHAM

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
W	Increase	+87	60122	Wellesley Road (A3000) / North Circular Road (Hounslow)	Delays caused by blocking back from downstream junction, which may be exacerbated by small flow increase on this route due to project construction traffic.
W	Decrease	-79	34268	Chelsea Embankment / Royal Hospital Road (Kensington and Chelsea)	

Table shows only delay changes which are in excess of one minute.
Note: the reasons for reductions in delay within the HAMs development cases have not been investigated in detail as they are typically the result of dynamic reassignment taking place within the model simulation and not directly attributable to the additional construction traffic within the models in the development case.

Table 3.6.13 Changes in modelled delay, western cluster PM peak hour development case (Project Year 2), WeLHAM

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
W	Increase	+82	30051	Kingston Road / Roehampton Lane (Wandsworth)	Delay arising from re-routing within model. No project construction traffic on this route. Change is due to modelling effect and not directly related to the project.
W	Increase	+94	12621	South Audley Street / Curzon Street (Westminster)	Delay arising from small flow change related to blocking back from downstream junction. Change is due to modelling effect and not directly related to the project.
W	Increase	+102	12805	Bennett Street / Arlington Street (Westminster)	Delay arising from small flow change related to blocking back from downstream junction. Change is due to modelling effect and not directly related to the project.
W	Increase	+225	91665	Cassio Road near West Hertfordshire Sports Ground (Hertfordshire)	Local re-routing within model increases delay at an already overcapacity junction. No project construction traffic on this route. Change is due to modelling effect and not directly related to the project.
W	Increase	+363	60331	Hogarth Lane entry to Hogarth Roundabout (Hounslow)	Delay caused by significant re-routing within model from other radial routes. Project construction traffic on this route is only three vehicles. Change is likely to

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
					be due to modelling effect and not directly related to the project.
W	Decrease	-61	91647	Vicarage Road/A411 Watford (Hertfordshire)	
W	Decrease	-151	59095	Chertsey Road on to Hospital Bridge Roundabout (Richmond)	

Table shows only delay changes which are in excess of one minute.

Note: the reasons for reductions in delay within the HAMs development cases have not been investigated in detail as they are typically the result of dynamic reassignment taking place within the model simulation and not directly attributable to the additional construction traffic within the models in the development case.

3.6.109 The results for the project-wide and cluster peak scenarios show a very small number of locations where delays would increase by more than one minute and not all of these instances are directly related to project construction traffic.

3.6.110 The overall indications from the key model statistics, explained in paras. 3.6.93 to 3.6.97, show that there would be a very limited change to the operation of the highway network within the models as a whole, which would be less than a 0.4% change in total travel time or a 0.1km/h change in average speeds across the networks in the peak hours.

3.6.111 At a strategic highway network level the impact on road network delay as a result of additional construction vehicle movements associated with the Thames Tideway Tunnel project and the changes to the highway network at the Blackfriars Bridge Foreshore and Deptford Church Street sites during construction would not be significant.

Accidents and safety

3.6.112 During the development of the *Transport Strategy*, consideration was given to the potential for an increased incidence of accidents on the highway network across London as a result of construction lorry movements associated with project sites.

3.6.113 For the Project-wide *TA*, a broad estimate has been made of the number of additional accidents that might arise as a result of the total distance travelled by project construction lorries during the construction phase based on the accident rates shown in Table 3.4.5.

3.6.114 The total distance travelled by project construction lorries would depend upon the origins and destinations of construction materials, the routes used and the exact volumes of materials to be transported. For this assessment, an estimate of the total distance travelled has been made based upon the supplier and disposal locations that were investigated in the development of the *Transport Strategy* and are shown in Figure 3.2.2 (see Project-wide *Transport Assessment* figures). Whilst this may change in practice, it provides a reasonable estimate from which the broad impact in terms of accidents and safety can be considered.

3.6.115 It has been estimated that over the whole of the project programme and based on the *Transport Strategy*, the total distance travelled by project construction lorries would be in the order of 11.2 million km.

3.6.116 Using the most recent accident rates (2010) for London shown in Table 3.4.5 this would potentially lead to an additional seven accidents over the duration of the project, or approximately one additional accident per year. The statistics suggest that one of these additional accidents could be serious, with the remaining six being of slight severity.

3.6.117 The *CoCP* sets out the measures through which the objective of safeguarding road safety and minimising the risk of accidents would be pursued. At the project-wide level, measures to promote safety and best practice are set out in the *CoCP Part A*. Measures to manage potential conflicts with other road users and promote safe operations at each site are set out in the *CoCP Part B's* and site-specific assessments in Sections 4 to 27 of the *TA*.

3.6.118 It is also relevant that over time, the general trend is towards a reduction in the rate of accidents involving HGVs as shown in Table 3.4.5.

3.6.119 Statistics from TfL suggest that in 2011 there were over 24,400 road traffic collisions, leading to a total of 29,250 casualties[42]. Against this background and bearing in mind the measures proposed to minimise the risk of accidents, the potential for one additional accident to occur per year as a result of the movement of construction vehicles is not statistically significant.

3.6.120 Accident and safety assessments have been undertaken for the area surrounding each of the construction sites as part of the assessment and these are set out in the site-specific *TAs*. Additionally, Stage 1 *Road Safety Audits* have been undertaken on the proposed highway arrangements at each site and the *Road Safety Audit* reports are contained as appendices to the site-specific *TAs*.

Hazardous loads

3.6.121 The site-specific *TAs* identify the expected number of hazardous loads that would be associated with each site. These loads include fuel deliveries to all sites and the removal of treated hazardous material from a small number of sites.

3.6.122 The transport of hazardous loads by road is covered in the *CoCP Part A* which indicates that the risk of pollution incidents and the need for appropriate mitigation measures would be considered. In addition all relevant legal requirements for transporting hazardous loads would be observed. The majority of loads classified as hazardous in this assessment would be fuel deliveries.

3.6.123 In summary the following numbers of hazardous loads are expected:

a. two hazardous loads per week at Kirtling Street, Chambers Wharf and Greenwich Pumping Station

b. one hazardous load per week at Carnwath Road Riverside

c. one hazardous load every two weeks at all other sites.

3.6.124 In total this represents 17 hazardous loads per week on average across the whole of the Thames Tideway Tunnel project.

3.6.125 The project sites would be spread across a wide area and thus hazardous load movements associated with these sites would be distributed across the highway network in London rather than concentrated in specific locations.

3.6.126 The site-specific *TAs* indicate that the impact from hazardous loads, in terms of highway network operation, has been assessed as being low at 20 of the 24 sites. At four of the sites, the site-specific *Environmental Statement* Volumes identify impacts of greater magnitude based on the greater number of hazardous load movements at those sites.

3.6.127 In terms of highway network operation and given the extent of the strategic highway network, at a project-wide level the impact of hazardous load movements is considered to be very low.

Sub-area (VISSIM) assessment

3.6.128 The scope of the sub-area analysis on Victoria Embankment (A3211) is described in paras. 3.3.98 to 3.3.111.

3.6.129 The VISSIM modelling provides an assessment of how the network on Victoria Embankment (A3211) would be affected by construction at Victoria Embankment Foreshore and Blackfriars Bridge Foreshore, with particular reference to changes in journey time (and thus changes in delay) for a range of route options through the modelled network.

3.6.130 As paras. 3.3.102 to 3.3.105 explain, three scenarios have been tested using the VISSIM model to understand the way in which construction at these two sites, and the associated changes to the highway network, might affect the operation of Victoria Embankment (A3211).

3.6.131 The scenarios tested are:

a. Scenario 1 representing utility diversion works at Victoria Embankment Foreshore and the associated narrowing of the road past the site

b. Scenario 2 representing phase 1 and 2 works at Blackfriars Bridge Foreshore and the associated narrowing of the westbound slip road from Blackfriars Bridge (A201) to Victoria Embankment (A3211)

c. Scenario 3 representing phase 3 works at Blackfriars Bridge Foreshore and the associated closure of the westbound slip road.

3.6.132 In each case the scenarios include construction traffic associated with both sites and with any other Thames Tideway Tunnel project sites, where that construction traffic would travel through the network represented by the VISSIM model.

3.6.133 Table 3.6.14 shows the journey times for the AM peak hour from the VISSIM model for the three construction development case scenarios listed above, together with the journey times from the base case model for comparison. Table 3.6.15 shows the same information for the PM peak hour.

Table 3.6.14 VISSIM model journey time results, AM peak hour

Route		Direction	Modelled journey time (mm:ss)						
			Base case	Scenario 1	Change	Scenario 2	Change	Scenario 3	Change
Bridge Street (A302) to Upper Thames Street (A3211)	1	Eastbound	05:29	05:33	+00:04	05:30	+00:01	05:29	00:00
	2	Westbound	06:20	06:27	+00:07	06:12	-00:08	06:15	-00:05
Blackfriars Bridge (A201) to New Bridge Street (A201)	3	Northbound	01:42	01:38	-00:04	01:42	00:00	01:31	-00:11
	4	Southbound	01:21	01:21	00:00	01:21	00:00	01:08	-00:13
Northumberland Avenue to Upper Thames Street (A3211)	5	Eastbound	04:16	04:17	+00:01	04:17	+00:01	04:18	+00:02
	6	Westbound	04:32	04:32	00:00	04:28	-00:04	04:28	-00:04
Northumberland Avenue to New Bridge Street (A201)	7	Eastbound	04:44	04:45	+00:01	04:48	+00:04	04:50	+00:06
	8	Westbound	05:39	05:49	+00:10	06:13	+00:34	-	-
Westminster Bridge (A302) to New Bridge Street (A201)	9	Eastbound	06:37	06:34	-00:03	06:40	+00:03	06:42	+00:05
	10	Westbound	06:31	06:34	+00:03	06:54	+00:23	-	-
Upper Thames Street (A3211) to Westminster Bridge (A302)	11	Westbound	06:20	06:41	+00:21	06:25	+00:05	06:25	+00:05
	12	Eastbound	06:05	06:09	+00:04	06:10	+00:05	06:04	-00:01

Note: Routes 8 and 10 are not included in Scenario 3 due to the closure of the westbound on-slip at Victoria Embankment (A3211) / Blackfriars Bridge (A201).

Table 3.6.15 VISSIM model journey time results, PM peak hour

Route		Direction	Modelled journey time (mm:ss)						
			Base case	Scenario 1	Change	Scenario 2	Change	Scenario 3	Change
Bridge Street (A302) to Upper Thames Street (A3211)	1	Eastbound	05:55	05:55	00:00	05:47	-00:08	05:52	-00:03
	2	Westbound	06:56	06:54	-00:02	06:38	-00:14	06:12	-00:44
Blackfriars Bridge (A201) to New Bridge Street (A201)	3	Northbound	01:19	01:21	+00:02	01:20	+00:01	01:15	-00:04
	4	Southbound	01:05	01:05	00:00	01:05	00:00	01:00	-00:05
Northumberland Avenue to Upper Thames Street (A3211)	5	Eastbound	04:22	04:21	-00:01	04:14	-00:08	04:17	-00:05
	6	Westbound	05:10	05:08	-00:02	04:54	-00:16	04:35	-00:35
Northumberland Avenue to New Bridge Street (A201)	7	Eastbound	05:00	04:57	-00:03	04:37	-00:23	05:26	+00:26
	8	Westbound	06:21	06:18	-00:03	07:04	+00:43	-	-
Westminster Bridge (A302) to New Bridge Street (A201)	9	Eastbound	07:05	06:59	-00:06	06:49	-00:16	07:27	+00:22
	10	Westbound	07:27	07:24	-00:03	07:49	+00:22	-	-
Upper Thames Street (A3211) to Westminster Bridge (A302)	11	Westbound	08:07	07:51	-00:16	07:36	-00:31	07:16	-00:53
	12	Eastbound	06:39	06:36	-00:03	06:26	-00:13	06:30	-00:03

Note: Routes 8 and 10 are not included in Scenario 3 due to the closure of the westbound on-slip at Victoria Embankment (A3211) / Blackfriars Bridge (A201).

3.6.134 For the AM peak hour, Table 3.6.14 shows that for Scenario 1 (narrowing of lanes on Victoria Embankment (A3211) at the Victoria Embankment Foreshore site) there would be no significant changes to the journey times on any of the routes investigated. The largest increase would be around 20 seconds on the route from Upper Thames Street (A3211) to Westminster Bridge (A302) in the westbound direction. This can be attributed to the narrowing of the carriageway at the Victoria Embankment Foreshore site and the slight reduction in capacity at the junction of Victoria Embankment (A3211) and Horse Guards Avenue that this would cause.

3.6.135 For Scenario 2 (narrowing of the westbound slip road at Blackfriars Bridge Foreshore), Table 3.6.14 shows that in the AM peak hour the largest journey time increase would be 34 seconds for vehicles travelling westbound between New Bridge Street (A201) and Northumberland Avenue. An increase of 23 seconds would occur for vehicles travelling westbound between New Bridge Street (A201) and Westminster Bridge (A302). This additional delay is most likely to arise from the amended highway layout on the westbound slip road from Blackfriars Bridge (A201) to Victoria Embankment (A3211) but is not considered to be significant in the context of total journey times through the area and on the wider highway network.

3.6.136 Table 3.6.14 shows that for Scenario 3 in the AM peak hour, there would be no changes in journey time of more than 15 seconds on any of the routes investigated. Routes 8 and 10 would not be available in this scenario because of the closure of the westbound slip road at Blackfriars Bridge (A201). The VISSIM model does not cover the wider network and therefore the journey times on alternative routes are not recorded. However, it is likely that vehicles approaching from New Bridge Street (A201) would find alternative routes to the north and west, whilst vehicles approaching from Blackfriars Bridge (A201) would find alternative routes to the south.

3.6.137 Furthermore, the results of the strategic highway assessment using the HAMs, which are reported in paras. 3.6.93 to 3.6.104 and include the closure of the westbound slip road at Blackfriars Bridge (A201), show that there would be no changes to journey times of more than one minute on the wider network in this area.

3.6.138 Table 3.6.14 also shows that in the AM peak hour on Routes 3 and 4 between New Bridge Street (A201) and Blackfriars Bridge (A201), the journey times would reduce between the base case and Scenario 3. This can be attributed to a number of factors including the adjustments to the signal timings at the junction of these two roads and the reduction in the traffic flows resulting from traffic diverting to other routes because of the closure of the westbound slip road to Victoria Embankment (A3211).

3.6.139 For the PM peak hour, Table 3.6.15 shows that there would be no significant increases in journey times in Scenario 1, suggesting that the narrowing of Victoria Embankment (A3211) at the Victoria Embankment Foreshore site would not affect overall network operation.

3.6.140 For Scenario 2 in the PM peak hour, Table 3.6.15 shows that the greatest increases in journey time would be experienced on the westbound routes between New Bridge Street (A201) and Northumberland Avenue and Westminster Bridge (A302), with increases of 43 and 22 seconds respectively. As for the AM peak hour this is most likely to result from the narrowing of the westbound slip road from Blackfriars Bridge (A201) but in the context of the overall network these changes are not considered to be significant in the context of total journey times through the area and on the wider highway network.

3.6.141 The results for Scenario 3 in the PM peak hour show that there would be increases in journey times of 22 and 26 seconds on the eastbound routes between Northumberland Avenue and New Bridge Street (A201) and Westminster Bridge (A302) and New Bridge Street (A201) respectively. This is likely to reflect changes to signal timings on the eastbound slip road to New Bridge Street (A201) as a consequence of changes in traffic flows at that junction because of the closure of the westbound slip road. Journey times on the westbound routes would decrease in Scenario 3, which is likely to reflect a reduced level of traffic on Victoria Embankment (A3211) as a result of the closure of the westbound slip road. These changes overall are not considered to be significant in the context of total journey times through the area and on the wider highway network.

Construction mitigation

3.6.142 The project has been designed to limit the issues arising on transport networks as far as possible and many measures have been embedded directly in the design of the project.

3.6.143 Site-specific aspects of the design which are aimed at reducing the impacts that might arise on the transport networks are set out in each of the site-specific *TAs*.

3.6.144 Table 3.6.16 provides an overview of the typical types of measure that have been taken at individual sites and also summarises the approach to reducing impacts at a project-wide level.

Table 3.6.16 Transport measures included within the design of the project

Issues	Design measures
Site access arrangements	• Provision for gated and secure site access points with marshalling as appropriate to control vehicle, cycle and pedestrian movements to ensure safety • Inclusion of sufficient set-back space to allow construction vehicles to stand clear of the highway whilst awaiting entry or exit clearance
Pedestrian and cycle diversion and safety measures	• Provision of pedestrian and cycle diversion routes where existing routes would be interrupted by construction activity or where

Issues	Design measures
	there would otherwise be high levels of conflict between pedestrians, cyclists and construction vehicles • Measures to protect pedestrians and cyclists using diversion routes to reduce conflicts with construction vehicles • Diversion routes designed to cater for the needs of mobility-impaired and vulnerable pedestrians, including temporary crossing points if required • Provision of adequate signage for diversion routes and advance publicity to notify users
Public transport operations	• Measures to ensure that the operation of public transport services, particularly bus routes, would not be unduly affected by construction works (linked to highway measures listed below) • Measures to relocate bus stops where necessary to ensure continuity of operation
Highway alterations	• Two-way traffic operation to be maintained past sites where this currently exists and where possible • Traffic management arrangements designed to ensure appropriate and safe lane widths for all road users • Temporary kerbline and other physical changes to ensure the safe manoeuvring of larger construction vehicles without encroaching into opposing traffic flow • Temporary restrictions on the use of parking spaces in the vicinity of project sites where this would be necessary to facilitate the movement of construction vehicles and/or to ensure highway safety
Management of construction vehicle movements	• Requirements within the *CoCP* to develop *Traffic Management Plans* for each site to address site access and egress arrangements, emergency access and lorry management • Requirements in the *CoCP* to maintain access to neighbouring properties and keep adjacent occupiers informed • Requirements in the *CoCP* to develop lorry management measures covering routes to be used by lorries, arrival and departure

Issues	Design measures
	times and pre-notification of vehicles to avoid queues developing at project site entrances • Requirements in the *CoCP* to adopt best practice measures for road transport, including the use of vehicles compliant with EURO 5 emission standards, the fitting of safety equipment and membership of FORS
Management of construction worker movements	• Measures within the *Project Framework Travel Plan* to actively promote the use of walking, cycling and public transport by workers travelling to and from sites • No provision of parking for workers within site boundaries except at the Abbey Mills Pumping Station and Beckton Sewage Treatment Works sites, which are existing Thames Water operational facilities • Supporting measures to discourage workers from travelling by car and parking in surrounding streets • Requirements for contractors to prepare site-specific Travel Plans which comply with the objectives of the *Project Framework Travel Plan* • Arrangements to monitor the travel patterns of workers and to report and review these on a regular basis, with the local authorities, and amend measures if necessary to address specific issues
Management of construction barge movements	• Requirements in the *CoCP* to maintain navigational channels and limit inconvenience to river users and operators • Requirements in the *CoCP* to develop a *River Transport Management Plan* for each site where river transport would be used, to define roles and responsibilities, an agreed operating methodology and emergency arrangements and contingency plans

Sensitivity testing

3.6.145 The assessment outcomes reported earlier in this Section are based on the *Transport Strategy* as outlined in Section 3.2.

3.6.146 In that scenario, the average number of construction lorries generated by the project as a whole in the project-wide peak month would be approximately 450 lorries or 900 movements per day, equating to around 90 lorry movements in each of the AM and PM peak hours.

3.6.147 A sensitivity test has been undertaken, as explained in paras. 3.3.112 to 3.3.118, to examine how the operation of the highway network might be affected if the number of construction vehicles were to be greater than that associated with the *Transport Strategy*. As para. 3.3.117 explains, this sensitivity test has been based on the number of construction vehicle movements that would be related to moving all construction materials by road.

3.6.148 Bearing in mind the *Transport Strategy* which is proposed, this sensitivity test scenario is considered unlikely to occur in practice and the sensitivity test has been undertaken to demonstrate what the project-wide issues might be if construction vehicle flows of this magnitude were to be experienced for part of the construction period.

Scenarios

3.6.149 The number of construction lorry movements for the sensitivity test has been analysed to identify when the peak months of lorry movement would occur, at project-wide and cluster levels.

3.6.150 Table 3.6.17 shows the years in which the project-wide and cluster peak months of lorry movements would occur for the *Transport Strategy* and the sensitivity test scenarios.

Table 3.6.17 Project-wide and cluster peak years, EIA and sensitivity test scenarios

	Transport Strategy	Sensitivity test
Project-wide peak month	Project Year 4	Project Year 4*
Western cluster peak month	Project Year 2	Project Year 3
Central cluster peak month	Project Year 4	Project Year 4**
Eastern cluster peak month	Project Year 4	Project Year 6

** The project-wide peak month of activity would be the same for the EIA and All By Road scenarios*
*** The project-wide and central cluster peak months of activity in the All By Road scenario would occur in different months in Project Year 4.*

3.6.151 Table 3.6.17 shows that in the sensitivity test scenario, the project-wide and cluster peak months would all be different. The sensitivity test of the operation of the highway network has therefore examined four different months. The numbers of lorries associated with each site in each of these periods are shown in Table 3.6.18.

Table 3.6.18 Average daily construction lorry movements in peak months, sensitivity test scenario

Strategic model area		Average daily construction lorry movements in peak month			
		Project-wide (Project Year 4)	Western peak (Project Year 3)	Central peak (Project Year 4)	Eastern peak (Project Year 6)
WeLHAM	Acton Storm Tanks	10	4	4	0
	Hammersmith Pumping Station	24	12	4	0
	Barn Elms	10	18	18	0
	Putney Embankment Foreshore	16	98	4	0
	Carnwath Road Riverside	318	318	6	0
	Dormay Street	10	14	0	0
	King Georges Park	2	8	0	0
CLoHAM	Falconbrook Pumping Station	36	22	10	0
	Cremorne Wharf Depot Site	12	6	18	0
	Chelsea Embankment Foreshore	18	8	224	0
	Kirtling Street	728	654	694	0
	Heathwall Pumping Station	20	12	6	0
	Albert Embankment Foreshore	54	4	10	0
	Victoria Embankment Foreshore	10	12	20	0
	Blackfriars Bridge Foreshore	22	36	44	4
ELHAM	Chambers Wharf	288	278	292	630
	Shad Thames Pumping Station	6	4	6	0
	King Edward Memorial Park Foreshore	16	28	44	0
	Bekesbourne Street	0	0	0	0
	Earl Pumping Station	4	36	4	0
	Deptford Church Street	18	10	10	0
	Greenwich Pumping Station	154	154	6	0
	Abbey Mills Pumping Station	140	68	18	26
	Beckton	6	14	6	0
	Total	1922	1818	1448	660

3.6.152 Table 3.6.18 shows that in the project-wide peak month for the sensitivity test there would be approximately 1,920 lorry movements per day. This compares with the figure of approximately 890 lorry movements per day for the *Transport Strategy* and shows that the sensitivity test scenario would produce more than double the number of lorry movements than are expected from the *Transport Strategy*.

3.6.153 Table 3.6.18 also shows that the eastern cluster peak month in the sensitivity test scenario would occur towards the end of construction, in Project Year 6. Construction would be complete by this time on the majority of the project sites and the eastern cluster peak month reflects a short intensive peak of lorry movements at Chambers Wharf in this year, which would be associated with the removal of material towards the end of construction at that site. In the *Transport Strategy* scenario, at least 90% of that material would be transported by river.

3.6.154 In line with the methodology used for the assessment of impact of the *Transport Strategy* on the highway network, the four sensitivity test scenarios identified in Table 3.6.18 have been applied to the HAMs as follows:

a. the project-wide peak for the sensitivity test scenario has been tested in WeLHAM, CLoHAM and ELHAM

b. the western cluster peak for the sensitivity test scenario has been tested in WeLHAM

c. the central cluster peak for the sensitivity test scenario has been tested in CLoHAM

d. the eastern cluster peak for the sensitivity test scenario has been tested in ELHAM.

3.6.155 These tests include the operational and worker vehicle movements (where relevant), as explained in paras. 3.3.61 to 3.3.65 and paras. 3.5.34 to 3.5.40.

Highway network impacts for sensitivity test scenarios

Project-wide peak sensitivity test scenario

3.6.156 Figures 3.6.5, 3.6.6 and 3.6.7 (see Project-wide *Transport Assessment* figures) show the OmniTrans assignment of construction traffic for the project-wide peak sensitivity test scenario.

3.6.157 For the project-wide peak sensitivity test scenario (Project Year 4) the OmniTrans plots show the following:

a. in west London the highest flows of construction lorries would be northbound on Nine Elms Lane (up to 37 vehicles per hour), southbound on South Lambeth Road (A203) and Clapham Road (A3) (31 vehicles per hour) and on the South Circular Road (A205) (32 vehicles per hour). Flows on the A4 corridor and on Finborough Road / Warwick Road and Redcliffe Gardens (A3220) would be up to 15 vehicles per hour per direction

b. in central London the same pattern is seen in the Vauxhall, Clapham and Camberwell areas and on the South Circular Road (A205) corridor. On Lower Road / Evelyn Street (A200) and Deptford Church Street (A2209) flows of approximately 15 vehicles per hour per direction would be experienced, increasing to some 26 vehicles per hour per direction on Shooters Hill Road (A2) east of Deptford

c. in east London the highest construction lorry flows would be on the A2 and A20 corridors through east London, where flows of around 28 and 33 vehicles per hour per direction respectively could be expected. Flows on the A13 corridor would be approximately seven vehicles per hour per direction.

3.6.158 When compared with the *Transport Strategy* scenario, these sensitivity test assignments reflect a significantly higher number of lorries at the main tunnel drive sites at Kirtling Street, Carnwath Road Riverside and Chambers Wharf. These three sites would contribute the largest number of construction lorry movements to the total in the sensitivity test project-wide peak scenario.

3.6.159 The summary HAMs performance statistics for the project-wide peak sensitivity test scenario are presented in Table 3.6.19 and Table 3.6.20, which compares these results against the construction base case statistics.

Table 3.6.19 Highway network statistics, project-wide AM peak hour development case, sensitivity test scenario (Project Year 4)

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	pcu-hrs	hours	pcu-hrs	pcu-km	km/h
WeLHAM						
Base case	26,253	13,458	66,155	105,867	3,454,429	32.6
Devt case	26,286	13,599	66,240	106,124	3,457,631	32.6
Change	0.12%	1.04%	0.13%	0.24%	0.09%	0%
CLoHAM						
Base case	13,637	3,193	20,249	37,078	666,664	18.0
Devt case	13,724	3,293	20,305	37,323	668,297	17.9
Change	0.64%	3.16%	0.28%	0.66%	0.24%	-0.56%
ELHAM						
Base case	23,663	9,099	62,277	95,039	3,089,251	32.5
Devt case	23,799	9,262	62,456	95,517	3,095,779	32.4
Change	0.57%	1.79%	0.29%	0.50%	0.21%	-0.31%

* *Notes: Transient queues – total time spent in ‘under-capacity’ queues (eg. queues which form at a red signal but dissipate during the following green period)*
Over-capacity queues – total time spent in queues which form due to lack of capacity (eg. queues which form at a red signal but do not clear in the following green period)
Total link cruise time – total time spent travelling along links within the modelled network, excluding time spent queuing
Total travel time – sum of transient queue, over-capacity queue and link cruise times
Total travel distance – total distance travelled by all vehicles within the model network during the modelled period

Average speed – speed of vehicles averaged across the whole network and the whole modelled period (total travel distance / total travel time)
pcu – passenger car unit; a unit representing the equivalent of one car. Different vehicle types have different pcu values (eg car = one pcu, vans and three-axle vehicles = 1.5 pcu, buses and coaches = two pcu, four-axle vehicles = 2.3 pcu)

Table 3.6.20 Highway network statistics, project-wide PM peak hour development case, sensitivity test scenario (Project Year 4)

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	pcu-hrs	hours	pcu-hrs	pcu-km	km/h
WeLHAM						
Base case	27,671	18,063	67,501	113,235	3,508,154	31.0
Devt case	27,784	18,179	67,575	113,538	3,513,383	30.9
Change	0.41%	0.64%	0.11%	0.27%	0.15%	-0.32%
CLoHAM						
Base case	12,786	3,713	19,602	36,101	639,045	17.7
Devt case	12,856	3,881	19,632	36,370	639,913	17.6
Change	0.55%	4.53%	0.15%	0.75%	0.14%	-0.56%
ELHAM						
Base case	24,192	10,997	61,588	96,778	3,067,299	31.7
Devt case	24,343	11,308	61,736	97,387	3,072,663	31.6
Change	0.62%	2.83%	0.24%	0.63%	0.17%	-0.32%

** Notes: Transient queues – total time spent in ‘under-capacity’ queues (eg. queues which form at a red signal but dissipate during the following green period)*
Over-capacity queues – total time spent in queues which form due to lack of capacity (eg. queues which form at a red signal but do not clear in the following green period)
Total link cruise time – total time spent travelling along links within the modelled network, excluding time spent queuing
Total travel time – sum of transient queue, over-capacity queue and link cruise times
Total travel distance – total distance travelled by all vehicles within the model network during the modelled period
Average speed – speed of vehicles averaged across the whole network and the whole modelled period (total travel distance / total travel time)
pcu – passenger car unit; a unit representing the equivalent of one car. Different vehicle types have different pcu values (eg car = one pcu, vans and three-axle vehicles = 1.5 pcu, buses and coaches = two pcu, four-axle vehicles = 2.3 pcu)

3.6.160 The statistics in Table 3.6.19 and Table 3.6.20 can be compared with the results for the *Transport Strategy* scenario shown in Table 3.6.7 and Table 3.6.8.

3.6.161 Table 3.6.19 shows that in the AM peak hour, the changes in total travel time in WeLHAM for the sensitivity test would be very similar to those observed in the project-wide peak for the *Transport Strategy.* Changes in central and east London would be approximately twice those observed for the *Transport Strategy* scenario. However, the greatest change in travel time would still be less than 0.7% which is not significant at the strategic highway network level.

3.6.162 Changes in total travel distance follow a similar pattern although in CLoHAM would be approximately three times greater than for the project-wide peak for the *Transport Strategy*. The only difference in changes to average speeds would be in ELHAM, which shows a reduction of 0.1km/h compared to the *Transport Strategy* scenario.

3.6.163 In the PM peak hour, a very similar pattern can be seen from Table 3.6.20. Generally, total travel time would increase by more than the figures shown for the project-wide peak for the *Transport Strategy*, particularly in WeLHAM where the *Transport Strategy* scenario showed a slight decrease in overall travel time. However, the increases in total travel time remain below 1% and are therefore not significant.

3.6.164 The increase in total travel distance in all three of the HAMs would be slightly greater than the equivalent changes for the project-wide peak for the *Transport Strategy* scenario (because the sensitivity test implies a greater number of construction vehicles) but in all cases would be less than 0.2%. Average speeds would reduce by 0.1km/h in all three HAM areas.

3.6.165 Overall these statistics show that for the project-wide peak sensitivity test scenario, which would occur in Project Year 4, the changes on the highway network at the strategic level would not be significant.

3.6.166 The model outputs have been interrogated to identify changes in delay of more than one minute. For the project-wide peak sensitivity test scenario, the locations and scale of those changes are shown in Table 3.6.21 and Table 3.6.22.

Table 3.6.21 Changes in modelled delay, project-wide AM peak hour development case, sensitivity test scenario (Project Year 4)

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
W	Increase	+85	14263	Cricklewood Broadway / Mapesbury Road / Mill Lane (Brent – Camden)	Very minor changes in flow at overcapacity junction causes large changes in delay. Change is due to modelling effect and not directly related to the project.
W	Decrease	-79	34268	Chelsea Embankment / Royal Hospital Road (Kensington and Chelsea)	
C	Increase	+68	26189	Tower Bridge Road / Abbey Street (Southwark)	Local reassignment due to background noise creates increased traffic through the junction, which is close to capacity and generates delays. Change is due to modelling effect and not directly related to the project
C	Increase	+86	32210	Wandsworth Bridge (Wandsworth – Hammersmith and Fulham)	Extra 30 construction vehicles (two way) on this route increases flow through a junction which blocks back in the base case.
C	Decrease	-66	32093	Wandsworth Bridge (Wandsworth – Hammersmith and Fulham)	
E		None	None	None	

Table shows only delay changes which are in excess of one minute.
Note: the reasons for reductions in delay within the HAMs development cases have not been investigated in detail as they are typically the result of dynamic reassignment taking place within the model simulation and not directly attributable to the additional construction traffic within the models in the development case.

Table 3.6.22 Changes in modelled delay, project-wide PM peak hour development case, sensitivity test scenario (Project Year 4)

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
W	Increase	+82	30051	Kingston Road / Roehampton Lane (Wandsworth)	Delay arising from re-routing within model. No project construction traffic on this route. Change is due to modelling effect and not directly related to the project.
W	Decrease	-63	60331	Hogarth Lane entry to Hogarth Roundabout (Hounslow)	
W	Decrease	-98	32202	Shepherds Bush Green / Rockley Road (Hammersmith and Fulham)	
W	Decrease	-104	70425	Edgware Road / Broadfields Avenue (Barnet)	
W	Decrease	-105	59095	Chertsey Road on to Hospital Bridge Roundabout (Richmond)	
W	Decrease	-151	91021	Latchmere Road / Elspeth Road / Lavender Hill (Wandsworth)	
C	Increase	+63	34268	Chelsea Embankment / Royal Hospital Road (Kensington and Chelsea	Delay increases due to increased flow on Chelsea Embankment blocking back from Albert Bridge. May be modelling effect or may be response to construction vehicles along Nine Elms Lane leading to consequent flow and delay changes, although construction

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
					traffic would not use Albert Bridge.
C	Increase	+162	30123	Prince of Wales Drive/Albert Bridge Road/Cambridge Road (Wandsworth)	Increased construction vehicle flow causes additional queuing leading to knock on effects at other junctions.
C	Increase	+167	30122	Battersea Bridge Road/Prince of Wales Drive/Surrey Lane (Wandsworth)	Additional delay caused by queues blocking back from Albert Bridge Road, with 30 construction vehicles (two way) passing through this junction.
C	Decrease	-85	12380	St Johns Wood Road / Lisson Grove / Grove End Road (Westminster)	
E		None	None	None	

Table shows only delay changes which are in excess of one minute.
Note: the reasons for reductions in delay within the HAMs development cases have not been investigated in detail as they are typically the result of dynamic reassignment taking place within the model simulation and not directly attributable to the additional construction traffic within the models in the development case.

3.6.167 The specific locations where increases in delay are observed for the project-wide peak sensitivity test scenario differ from those identified from the modelling of the project-wide peak for the *Transport Strategy*.

3.6.168 Table 3.6.21 shows that in the AM peak hour, there would be increases of between one and two minutes in delay at one location in WeLHAM and two locations in CLoHAM. Examination of these changes suggests that the changes at the location in WeLHAM, in the Cricklewood area, are not directly related to project construction traffic but are a function of internal reassignments of traffic within the model simulation. Within CLoHAM, increases in delay at Tower Bridge Road / Abbey Street are also a function of traffic reassignment within the model and not directly related to additional construction traffic.

3.6.169 The increase in delay in CLoHAM in the AM peak at Wandsworth Bridge is related to additional construction traffic demand at a junction which is already operating close to capacity in the base case. The local impacts of this additional construction traffic flow in this area have been addressed in the site-specific *TA* for the Carnwath Road Riverside site.

3.6.170 There would also be one location within WeLHAM where delays would reduce. This location was also identified for the project-wide peak scenario for the *Transport Strategy* and is likely to be a function of reassignment within the model simulation rather than directly related to construction traffic.

3.6.171 Table 3.6.22 shows that in the PM peak hour, one location in WeLHAM and three locations on CLoHAM would experience delay increases of more than one minute and in two of those cases, in CLoHAM, the increase would be just over two and a half minutes.

3.6.172 The change identified at Kingston Road / Roehampton Lane in WeLHAM is not considered to be due to project construction traffic and the change at this location is the same as that identified for the project-wide peak for the *Transport Strategy*.

3.6.173 In CLoHAM, the three locations where increased delays are observed are in the Chelsea Embankment and Battersea Bridge areas. Investigation of the models suggests that these changes may be related to construction traffic. The local impacts have been addressed in the relevant site-specific *TAs*.

3.6.174 Decreases in delay are observed in five locations in WeLHAM and one in CLoHAM for this project-wide peak sensitivity test scenario. All of these locations also indicated reduced delays in the project-wide peak for the *Transport Strategy* and this suggests that these results are related to internal aspects of the model simulation rather than to the additional construction traffic.

Western cluster peak sensitivity test scenario

3.6.175 Figure 3.6.8 (see Project-wide *Transport Assessment* figures) shows the OmniTrans assignment plot for the WeLHAM area for the western cluster peak sensitivity test scenario (Project Year 3). This shows that construction lorry flows around the Vauxhall, Clapham and Camberwell areas would be slightly lower and flows on the A4 / M4 corridor would be similar to those in the project-wide sensitivity test scenario. However, overall the differences between the western cluster and project-wide sensitivity test scenarios are not great.

3.6.176 The summary performance statistics from WeLHAM for the western cluster peak in the sensitivity test scenario are shown in Table 3.6.23.

Table 3.6.23 Highway network statistics, western cluster peak development case, sensitivity test scenario, WeLHAM (Project Year 3)

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	**pcu-hrs**	**hours**	**pcu-hrs**	**pcu-km**	**km/h**
AM peak hour						
Base case	26,253	13,458	66,155	105,867	3,454,429	32.6
Devt case	26,358	13,539	66,241	106,138	3,457,823	32.6
Change	0.41%	0.60%	0.13%	0.26%	0.10%	0.00%
PM peak hour						
Base case	27,671	18,063	67,501	113,235	3,508,154	31.0
Devt case	27,742	18,421	67,494	113,667	3,509,599	30.9
Change	0.29%%	1.98%	-0.01%	0.38%	0.04%	-0.32%

** Notes: Transient queues – total time spent in 'under-capacity' queues (eg. queues which form at a red signal but dissipate during the following green period)*
Over-capacity queues – total time spent in queues which form due to lack of capacity (eg. queues which form at a red signal but do not clear in the following green period)
Total link cruise time – total time spent travelling along links within the modelled network, excluding time spent queuing
Total travel time – sum of transient queue, over-capacity queue and link cruise times
Total travel distance – total distance travelled by all vehicles within the model network during the modelled period
Average speed – speed of vehicles averaged across the whole network and the whole modelled period (total travel distance / total travel time)
pcu – passenger car unit; a unit representing the equivalent of one car. Different vehicle types have different pcu values (eg car = one pcu, vans and three-axle vehicles = 1.5 pcu, buses and coaches = two pcu, four-axle vehicles = 2.3 pcu)

3.6.177 Table 3.6.23 shows that whilst total travel time and total travel distance in the WeLHAM area would increase in both peak hours, the increases are less than 0.4% when compared to the construction base case figures. Average speeds in WeLHAM would not change in the AM peak hour and would reduce by just 0.1km/h in the PM peak hour.

3.6.178 The key changes in delays on links or at junctions for the western cluster peak in the sensitivity test scenario are shown in Table 3.6.24 and Table 3.6.25.

Table 3.6.24 Changes in modelled delay, western cluster AM peak hour development case, sensitivity test scenario, WeLHAM (Project Year 3)

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
W	Increase	+72	91606	Watford Road / North Western Avenue (A41) (Hertfordshire)	Minor route switching at overcapacity junction. Change is due to modelling effect and not directly related to the project.
W	Decrease	-79	34268	Chelsea Embankment / Royal Hospital Road (Kensington and Chelsea)	

Table shows only delay changes which are in excess of one minute.
Note: the reasons for reductions in delay within the HAMs development cases have not been investigated in detail as they are typically the result of dynamic reassignment taking place within the model simulation and not directly attributable to the additional construction traffic within the models in the development case.

Table 3.6.25 Changes in modelled delay, western cluster PM peak hour development case, sensitivity test scenario, WeLHAM (Project Year 3)

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
W	Increase	+69	91205	Hampton Road / Sixth Cross Road / South Road (Richmond)	No construction vehicles in this area. Increase in delay caused by local re-assignment due to background noise. Change is due to modelling effect and not directly related to the project
W	Increase	+81	30051	Kingston Road / Roehampton Lane (Wandsworth)	Delay arising from re-routing within model. No project construction

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
					traffic on this route. Change is due to modelling effect and not directly related to the project.
W	Increase	+86	12805	Bennett Street / Arlington Street (Westminster)	No construction vehicles at this location. Change is due to modelling effect and not directly related to the project.
W	Increase	+214	91665	Cassio Road near West Hertfordshire Sports Ground (Hertfordshire)	Local reassignment unrelated to construction increases delay at an already overcapacity junction. Change is due to modelling effect and not directly related to the project.
W	Decrease	-61	91647	Vicarage Road/A411 Watford Hertfordshire	
W	Decrease	-154	59095	Chertsey Road on to Hospital Bridge Roundabout (Richmond)	

Table shows only delay changes which are in excess of one minute.
Note: the reasons for reductions in delay within the HAMs development cases have not been investigated in detail as they are typically the result of dynamic reassignment taking place within the model simulation and not directly attributable to the additional construction traffic within the models in the development case.

3.6.179 The only increase in delay observed in the AM peak hour in WeLHAM for the western cluster peak sensitivity test scenario would occur well to the northwest of central London and is not directly related to project construction traffic. The reduction in delay at Chelsea Embankment / Royal Hospital Road is similar to that shown for the project-wide peak for both the *Transport Strategy* and the sensitivity test scenarios.

3.6.180 In the PM peak hour, Table 3.6.25 shows increases in delay at four locations. Investigation of the model outputs suggests that none of these changes arise as a direct result of project construction traffic and all are due to internal reassignment effects within the model simulation. The decreases in delay observed Table 3.6.25 are located towards the outer boundaries of WeLHAM and are also considered unlikely to be directly related to construction traffic from the project.

Central cluster peak sensitivity test scenario

3.6.181 Figure 3.6.9 (see Project-wide *Transport Assessment* figures) shows the OmniTrans assignment plot for the CLoHAM area for the central cluster peak sensitivity test scenario (Project Year 4). This shows that construction traffic flows in this scenario would be comparable with the project-wide sensitivity test peak, but would be slightly higher on the Lower Road / Evelyn Street (A200) and Deptford Church Street (A2209) routes.

3.6.182 The summary statistics from CLoHAM for the central cluster peak in the sensitivity test scenario are shown in Table 3.6.26.

Table 3.6.26 Highway network statistics, central cluster peak development case, sensitivity test scenario, CLoHAM (Project Year 4)

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	pcu-hrs	hours	pcu-hrs	pcu-km	km/h
AM peak hour						
Base case	13,637	3,193	20,249	37,078	666,664	18.0
Devt case	13,690	3,315	20,299	37,305	668,194	17.9
Change	0.40%	3.84%	0.25%	0.61%	0.23%	-0.56%
PM peak hour						
Base case	12,786	3,713	19,602	36,101	639,045	17.7
Devt case	12,853	3,852	19,641	36,346	640,220	17.6
Change	0.53%	3.74%	0.20%	0.68%	0.18%	-0.56%

* *Notes: Transient queues – total time spent in 'under-capacity' queues (eg. queues which form at a red signal but dissipate during the following green period)*
Over-capacity queues – total time spent in queues which form due to lack of capacity (eg. queues which form at a red signal but do not clear in the following green period)
Total link cruise time – total time spent travelling along links within the modelled network, excluding time spent queuing
Total travel time – sum of transient queue, over-capacity queue and link cruise times
Total travel distance – total distance travelled by all vehicles within the model network during the modelled period

Average speed – speed of vehicles averaged across the whole network and the whole modelled period (total travel distance / total travel time)
pcu – passenger car unit; a unit representing the equivalent of one car. Different vehicle types have different pcu values (eg car = one pcu, vans and three-axle vehicles = 1.5 pcu, buses and coaches = two pcu, four-axle vehicles = 2.3 pcu)

3.6.183 Table 3.6.26 shows that the total distance travelled in the CLoHAM area would increase by around 0.6% to 0.7% compared to the construction base case statistics. The corresponding change in total distance travelled would be around 0.2% to 0.25% and overall this would lead to a reduction in average speeds within the model of 0.1km/h in both peak hours. At the strategic level this is not considered to be significant.

3.6.184 The key changes in delay within CLoHAM for the central cluster peak in the sensitivity test scenario are shown in Table 3.6.27 and Table 3.6.28.

Table 3.6.27 Changes in modelled delay, central cluster AM peak hour development case, sensitivity test scenario, CLoHAM (Project Year 4)

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
C	Increase	+66	27992	Jamaica Road / Lower Road / Brunel Road Roundabout (Southwark)	Delay caused by blocking back from roundabout. Route includes an additional seven vehicles through this junction, which may contribute to the increase in delay.
C	Decrease	-66	32093	Wandsworth Bridge (Wandsworth – Hammersmith and Fulham)	

Table shows only delay changes which are in excess of one minute.
Note: the reasons for reductions in delay within the HAMs development cases have not been investigated in detail as they are typically the result of dynamic reassignment taking place within the model simulation and not directly attributable to the additional construction traffic within the models in the development case.

Table 3.6.28 Changes in modelled delay, central cluster PM peak hour development case, sensitivity test scenario, CLoHAM (Project Year 4)

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
C	Increase	+137	30122	Battersea Bridge Road/Prince of Wales Drive/Surrey Lane (Wandsworth)	Additional delay caused by queues blocking back from Albert Bridge Road, with 40 construction vehicles (two way) passing through this junction.

Model	Increase / decrease in delay	Change in delay (seconds)	Node no.	Location	Comment
C	Increase	+230	30123	Prince of Wales Drive/Albert Bridge Road/Cambridge Road (Wandsworth)	Increased construction vehicle flow causes additional queuing leading to knock on effects at other junctions.
C	Decrease	-60	14704	Eversholt Street / Cranleigh Street (Camden)	
C	Decrease	-85	12380	St Johns Wood Road / Lisson Grove / Grove End Road (Westminster)	

Table shows only delay changes which are in excess of one minute.
Note: the reasons for reductions in delay within the HAMs development cases have not been investigated in detail as they are typically the result of dynamic reassignment taking place within the model simulation and not directly attributable to the additional construction traffic within the models in the development case.

3.6.185 Table 3.6.27 shows that there would only be one location in CLoHAM in the AM peak hour where delay would increase by more than one minute for the central cluster peak sensitivity test scenario. This is at the Jamaica Road / Lower Road roundabout and this change is similar to that indicated in the project-wide peak for the *Transport Strategy* in Table 3.6.9. Investigation of the model suggests that project construction traffic may contribute to this increase in delay. The local changes in highway network operation have been considered in the relevant site-specific *TAs* (Section 20 for Chambers Wharf and Section 22 for Earl Pumping Station).

3.6.186 Table 3.6.28 for the PM peak hour indicates increases of around two and a quarter minutes at Battersea Bridge Road and just under four minutes at Prince of Wales Drive. Project construction traffic would pass through these locations and is therefore a contributor to these changes. However, the detailed issues have been considered in the relevant site-specific *TAs* (Section 14 for Kirtling Street, Section 15 for Heathwall Pumping Station and Section 16 for Albert Embankment Foreshore) and at a strategic level, there are no other locations where delay would increase by more than one minute.

3.6.187 The decreases in delay seen in CLoHAM for the PM peak are not on routes that would be taken by construction vehicles and are therefore likely to be due to the model simulation process.

Eastern cluster peak, sensitivity test scenario

3.6.188 Figure 3.6.10 (see Project-wide *Transport Assessment* figures) shows the OmniTrans assignment plot for the ELHAM area for the eastern cluster peak sensitivity test scenario (Project Year 6). This shows that in this scenario construction lorry flows would be concentrated on the Lower Road / Evelyn Street (A200), Deptford Church Street (A2209) and A2 corridors. They would be slightly higher than the equivalent flows for the project-wide sensitivity test scenario and this reflects the fact that the eastern cluster peak would be dominated by activity at Chambers Wharf towards the end of the construction programme in this scenario.

3.6.189 The summary results from ELHAM for the eastern cluster peak in the sensitivity test scenario are shown in Table 3.6.29.

Table 3.6.29 Highway network statistics, eastern cluster peak development case, sensitivity test scenario, ELHAM (Project Year 6)

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	pcu-hrs	hours	pcu-hrs	pcu-km	km/h
AM peak hour						
Base case	23,663	9,099	62,277	95,039	3,089,251	32.5
Devt case	23,771	9,236	62,392	95,400	3,093,122	32.4
Change	0.46%	1.51%	0.18%	0.38%	0.13%	-0.31%
PM peak hour						

	Transient queues	Over-capacity queues	Link cruise times	Total travel time	Travel distance	Average speed
	pcu-hrs	pcu-hrs	hours	pcu-hrs	pcu-km	km/h
Base case	24,192	10,997	61,588	96,778	3,067,299	31.7
Devt case	24,258	11,306	61,644	97,208	3,069,225	31.6
Change	0.27%	2.80%	0.09%	0.44%	0.06%	-0.32%

** Notes: Transient queues – total time spent in 'under-capacity' queues (eg. queues which form at a red signal but dissipate during the following green period)*
Over-capacity queues – total time spent in queues which form due to lack of capacity (eg. queues which form at a red signal but do not clear in the following green period)
Total link cruise time – total time spent travelling along links within the modelled network, excluding time spent queuing
Total travel time – sum of transient queue, over-capacity queue and link cruise times
Total travel distance – total distance travelled by all vehicles within the model network during the modelled period
Average speed – speed of vehicles averaged across the whole network and the whole modelled period (total travel distance / total travel time)
pcu – passenger car unit; a unit representing the equivalent of one car. Different vehicle types have different pcu values (eg car = one pcu, vans and three-axle vehicles = 1.5 pcu, buses and coaches = two pcu, four-axle vehicles = 2.3 pcu)

3.6.190 The statistics in Table 3.6.29 show a similar pattern to those observed in the modelling of other sensitivity test scenarios. Increases in total travel time would be around 0.4% and in total travel distance would be around 0.1%, leading to reductions in average speed of 0.1km/h in each of the peak hours. This does not represent a significant change at the strategic highway network level.

3.6.191 Examination of the changes in delay within ELHAM for the eastern cluster peak in the sensitivity test scenario indicates that there are no locations within the model where delay would change by more than one minute compared to the construction base case in either peak hour.

Summary of model results for sensitivity test scenario

3.6.192 The assessments of the sensitivity test scenario for the project-wide and cluster peaks suggest whilst there would be a very slight deterioration in the operation of the highway network overall, at a strategic level the changes would not be significant.

3.6.193 The number of locations at which delays would increase by more than one minute would be very small in all of the scenarios assessed and in the context of the number of links and junctions in the modelled networks, these locations do not present any strategic network operation issues.

3.6.194 At sites where the *Transport Strategy* envisages using the river to transport construction materials, local highway modelling has been used to understand the specific implications of a sensitivity test scenario in the vicinity of those sites and this is reported in the relevant site-specific *TAs*.

Accidents and safety

3.6.195 The sensitivity test scenario involves a larger number of lorry journeys than the *Transport Strategy* and therefore this would also lead to a higher total number of lorry kilometres travelled during the life of the project.

3.6.196 It is estimated that if the sensitivity test scenario were to be used throughout the construction period, which is extremely unlikely. The total distance travelled by project construction lorries would be in the order of 24.5 million km. If this figure is applied to the most recent (2010) accident rates shown in Table 3.4.5, it implies that there would be the potential for an additional 16 accidents, which equates to between two and three additional accidents per year during the construction period. Based on the rates in Table 3.4.5 there could be one extra fatal, two serious and 13 slight accidents over this period.

3.6.197 Para. 3.6.117 describes the measures that would be taken as part of the project to minimise the potential for accidents. Taking these measures into account and in the context of the total number of accidents occurring in London per year, the additional two to three accidents per year implied by the sensitivity test scenario would not be statistically significant.

Overall conclusions

3.6.198 The outcomes of the sensitivity test assessment show that in absolute terms this would produce a greater number of lorry movements than the *Transport Strategy* on the routes used by project construction traffic, if it were to occur.

3.6.199 The key model statistics from the HAMs show that whilst overall travel time in the modelled areas would increase by more than would be the case for the *Transport Strategy*, this would be offset by a corresponding increase in total travel distance resulting from the greater number of lorries in the sensitivity test scenario. The statistics confirm that in terms of overall average speeds in the models, the changes for the sensitivity test scenario would be of a similar order of magnitude to those seen in the assessment of the *Transport Strategy*.

3.6.200 The greater use of lorry transport in the sensitivity test scenario would inevitably lead to an increased risk of accidents occurring as a result of the additional distance travelled by construction lorries. However, all practicable measures would be taken to reduce the risk of accidents occurring, as would be the case with the *Transport Strategy* in any event.

3.6.201 The sensitivity test scenario is considered unlikely to occur as the intention is to transport construction materials by river at 11 of the sites as part of the *Transport Strategy*.

3.6.202 The sensitivity test scenario therefore represents a reasonable worst case assessment which addresses the possibility that river transport might not be available for certain materials or periods of time at certain sites. However, given the *Transport Strategy* which is proposed, this situation is highly unlikely to arise at all sites and/or for all materials concurrently or for an extended period of time.

3.7 Summary of Transport Assessment findings

3.7.1 The key outcomes of the project-wide assessment are indicated in Table 3.7.1.

Table 3.7.1 Project-wide transport assessment outcomes

Mode of transport	Key Findings
Pedestrians	It is not anticipated that there would be any project-wide issues relevant to the pedestrian network. Local issues in the vicinity of each of the project sites have been addressed in the site-specific *TA*s.
Cyclists	It is not anticipated that there would be any project-wide issues relevant to the pedestrian network. Local issues in the vicinity of each of the project sites have been addressed in the site-specific *TA*s.
Bus service patronage and operation	Additional bus patronage from construction workers would not present any significant issues when considered at a strategic, project-wide level. The total number of additional bus journeys would be between 220 and 270 in the peak hours, distributed across the bus network. The strategic highway modelling indicates that there would be no significant changes to network operation at a strategic level. The site-specific *TAs* address any issues that might arise on local bus services and routes in the vicinity of each of the project sites.
London Underground patronage	Additional London Underground patronage from construction workers would not present any significant issues when considered at a strategic, project-wide level. The total number of additional Underground journeys would be between 300 and 350 in the peak hours, distributed across the London Underground network. The site-specific *TAs* address any issues that might arise on London Underground services in the vicinity of each of the project sites.
Docklands Light Railway patronage	Additional DLR patronage from construction workers would not present any significant issues when considered at a strategic, project-wide level. The total number of additional Underground journeys would be between 45 and 50 in the peak hours, distributed across the DLR network. The site-specific *TAs* address any issues that might arise on DLR services in the vicinity of each of the project sites.
London Overground and National Rail patronage	Additional patronage from construction workers travelling on London Overground or National Rail services would not present any significant issues when considered at a strategic, project-wide level. The total number of additional journeys would be between 350 and 420 in the peak hours, distributed across the London Overground network and National Rail routes to, from and within

Mode of transport	Key Findings
	London. The site-specific *TAs* address any issues that might arise on London Overground and National Rail services in the vicinity of each of the project sites.
River passenger service patronage	There would be no significant impact on river passenger service patronage. Approximately ten additional journeys are anticipated on river services, although the conclusions of the assessment would not be altered if this figure were two or three times higher.
River movements	In total approximately 18 barge deliveries or collections per day could be expected in the peak month of activity for barge use (Project Year 2). This would equate to approximately 16 river transit movements, assuming barges are hauled in pairs by tugs where possible. The aggregated number of barges and river transit movements required would be lower towards the upstream end of the project, with the highest total numbers experienced downstream of Chambers Wharf. Separate *Navigational Issues and Preliminary Risk Assessments* have been undertaken for all of the sites where river transport is proposed. Overall, the use of the river to transport construction materials is not expected to present any significant issues for river movements.
Parking	There would be no project-wide issues associated with parking, which has been addressed in each of the site-specific *TAs*.
Highway network operation	The key corridors for construction lorry movements would be the A4/M4 corridor; South Circular Road (A205); the Nine Elms / Vauxhall / Clapham areas; the A20 / A2 corridors; Lower Road / Evelyn Street (A200) and the A13. In the project-wide peak month of activity (Project Year 4) the highest flow in any of these corridors would be 18 lorries per hour per direction. The analysis of the western cluster peak of activity (Project Year 2) shows that flows on these corridors would be lower in that year. The results of the strategic highway modelling indicate that at a strategic level, the changes in total travel time and total travel distance in each of the HAMS would be less than 1% compared to the construction base case and in many instances less than 0.5%. Changes to average speed, where they would occur, would be only 0.1km/h in all cases. The potential for an increased incidence of accidents resulting from the distance travelled by project construction lorries has been examined based on published accident rate statistics. This suggests that over the whole of the construction period, the additional distance travelled by construction lorries could result in an additional seven accidents or one per year during the overall construction period. All practicable measures would be taken to minimise the risk of accidents, and in the context of the total

Mode of transport	Key Findings
	number of accidents observed in London per annum, this additional accident potential would be very small. The project would generate approximately 17 hazardous load movements per week during periods of peak construction activity. When distributed across the London highway network the impact of these movements would be very small and all necessary measures would be taken to minimise the risk of incident. The results of the sub-area assessment using the VISSIM model indicate that whilst journey times might change as a result of construction works at Victoria Embankment Foreshore and Blackfriars Bridge Foreshore, and the associated highway changes, none of the increases would amount to more than 45 seconds over the route between Westminster Bridge (A302) and Blackfriars Bridge (A201) when compared to the base case and changes of this magnitude would not significantly affect the operation of Victoria Embankment (A3211). When the westbound slip road at Blackfriars Bridge Foreshore is closed, some journeys would be diverted onto other parts of the highway network; however the strategic modelling using the HAMs shows that this would not result in significant increases in delay to journeys on the wider network. The local issues associated with this re-routing have been considered within the relevant site-specific *TAs*. The issues associated with highway network operation in the vicinity of each of the project sites have been addressed in the site-specific *TAs*. Sensitivity testing of the operation of the highway network has been undertaken which shows that at a strategic level, the impacts on the highway network if all construction materials were to be transported by road at all sites would not be significant. In practice this would be a highly unlikely scenario.

References

[1] Transport for London, *Travel planning for new development in London* (2011).

[2] Transport for London, *Assessment Tool for Travel plan Building Testing and Evaluation (ATTrBuTE),* http://www.attrbute.org.uk/ (site last accessed October 2012).

[3] Fruin, JJ. *Pedestrian Planning and Design*, Metropolitan Associated of Urban Designers and Environmental Planners (1971).

[4] Transport for London, *Transport Assessment Best Practice Guidance* (2010).

[5] TfL Planning Information Database, http://webpid.elgin.gov.uk (site last accessed December 2012).

[6] Transport for London website, http://www.tfl.gov.uk (site last accessed December 2012).

[7] Sustrans website, http://www.sustrans.org.uk (site last accessed December 2012).

[8] Walk London website, http://www.walklondon.org.uk (site last accessed December 2012).

[9] Transport for London, *Traffic Modelling Guidelines* (2010).

[10] Transport for London, *Model Auditing Process (MAP): Traffic Schemes in London Urban Networks Version 3.0* (2011).

[11] Greater London Authority, *The London Plan – Spatial Development Strategy for London* (2011).

[12] Department for Transport, *Design Manual for Roads and Bridges, Volume 12 Section 2* (1996)

[13] Department for Communities and Local Government, *National Planning Policy Framework* (2012).

[14] Department of Environment, Food and Rural Affairs, *National Policy Statement for Waste Water* (2012).

[15] Greater London Authority, 2001. See citation above.

[16] Greater London Authority, *The Mayor's Transport Strategy* (2010).

[17] Transport for London, *London Freight Plan, sustainable freight distribution: a plan for London* (2007).

[18] Transport for London, 2010. See citation above.

[19] Department for Transport, *Design Manual for Roads and Bridges* (various Volumes) (various dates).

[20] Department for Transport and Department for Communities and Local Government, *Manual for Streets* (2007).

[21] Chartered Institution of Highways and Transportation, *Manual for Streets 2 – a companion guide to Manual for Streets* (2010).

[22] Transport for London, 2010. See citation above.

[23] Transport for London, 2011. See citation above.

[24] Transport for London, *London Cycling Design Standards* (undated).

[25] Transport for London, *Accessible Bus Stop Design Guidance, BP1/06* (2006).

[26] Transport for London, *Walking Good Practice version 3.0* (2010).

[27] Transport for London, 2011. See citation above.

[28] Transport for London, http://www.attrbute.org.uk/. See citation above.

[29] Transport for London, *Building a better future for freight: Construction Logistics Plans* (2008).

[30] Ringway Jacobs Ltd, Transport for London, and AECOM. *Cyclists at Roadworks – Guidance Document*, (2012)

[31] Department for Transport, *Traffic Signs Manual Chapter 8 – Traffic Safety Measures and Signs for Road Works and Temporary Situations*, (2009).

[32] Transport for London. *Travel in London, Report 4* (2011).

[33] Transport for London, 2011. See citation above.

[34] Transport for London, 2011. See citation above.

[35] Transport for London, 2011. See citation above.

[36] Transport for London, 2011. See citation above.

[37] HM Government, *Traffic Management Act 2004* (2004)

[38] Department for Transport, 1996. See citation above.

[39] Department for Transport. *RAS20001 – Vehicles involved in reported accidents and involvement rates by vehicle type and severity of accident, Great Britain, annual for latest 11 years* (September 2011)

[40] Transport for London. *London Underground Upgrade Plan* (2011)

[41] Greater London Authority, 2011. See citation above.

[42] Transport for London. *Fact sheet: Casualties in Greater London during 2011* (2012)

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Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Transport Assessment

Doc Ref: **7.10**

Appendix A

APFP Regulations 2009: Regulation **5(2)(q)**

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Thames Tideway Tunnel

Transport Assessment

Sections 1-3 Introduction, engagement and project-wide assessment appendices

Appendix A: Baseline Data Report

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1 Introduction

1.1 Scheme overview

1.1.1 This report has been prepared in order to inform the Transport Assessment (TA) being undertaken for the Thames Tideway Tunnel project. The TA comprises a strategic assessment for the scheme as a whole and 24 local assessments for each of the construction sites which would be required as part of the project.

1.1.2 The report summarises the baseline data obtained and sets out the survey specification and methodology adopted within each Borough and for each type of survey activity.

1.1.3 At each site there is the potential to affect transport in some or all of the following ways:

a. effects on pedestrian routes

b. effects on cycle routes

c. effects on bus routes and patronage

d. effects on London Underground and National Rail services

e. effects on river passenger services and river navigation

f. effects on car and coach parking

g. effects on highway layout, operation, capacity and safety.

1.1.4 Baseline data (both primary data from field surveys and secondary data from other sources) have been collected in order to understand the existing situation. The data collected are summarised in this report and cover all transport modes.

1.2 Status of baseline data report

1.2.1 The scope of data required for the project is dependent on a number of criteria, including:

a. the proposed design of the project

b. the approach and methodology for the Transport Assessment

c. the proposed construction logistics strategy, in particular the degree to which construction materials would be transported by river and by road at each site and the proposed strategic routing of construction traffic.

1.2.2 The data collection has taken place in several phases in order to gather sufficient data for the assessment. Later phases of data collection have been identified and informed by ongoing engagement with Transport for London (TfL) and the relevant Local Highway Authorities (LHAs) and by the evolution of the assessment work.

1.2.3 Five phases of data collection have been undertaken:

a. Phase 1 of data collection was carried out between May and June 2011

b. Phase 2 of data collection was carried out between June and July 2011

c. Phase 3 of data collection was carried out between August and September 2011

d. Phase 4 of data collection was carried out between November and December 2011

e. Phase 5 of data collection was carried out in May 2012.

1.2.4 At this stage, no further surveys are to be undertaken. However, if required, this document will be updated to incorporate any additional data obtained.

1.3 Assessment approach and scope of data collection

1.3.1 Through discussions with TfL it was agreed that the combined impact of all construction sites would be tested at a strategic level using the TfL Highway Assignment Models (HAMs). This was the primary approach for assessing the wider impacts of the scheme on the strategic road network (including the Transport for London Road Network (TLRN) and Strategic Road Network (SRN)), with more detailed assessment in the area around individual construction sites to be undertaken using local highway modelling and assessment techniques if necessary. As a result, data collection has been primarily focussed on the locations around each construction site.

1.3.2 The scope of the primary data collection includes traffic, pedestrian / cycle and parking data around each construction site, collected through field surveys. At some construction sites, river usage surveys and journey time surveys were undertaken. Secondary data comprising traffic flows, bus, rail and river passenger data, and Personal Injury Accident data were also obtained for the areas around each construction site from TfL or other available sources.

1.3.3 Primary and secondary data obtained have been compiled into an electronic GIS database using Arc Reader, which is located in **Annex A**. This provides the ability to review the raw data and understand the relative data locations.

1.3.4 Survey field work was undertaken by specialist survey subconsultants with relevant experience, using a combination of manual and automatic data collection techniques and working to an agreed specification and methodology.

1.4 Engagement with relevant stakeholders

1.4.1 Discussions with the relevant LHAs and TfL have been held in order to discuss the network assessment coverage, and the likely construction vehicle routings, which also influenced the data collection requirements.

1.4.2 All relevant stakeholders were notified of the survey scope, times and dates prior to any of the survey companies collecting fieldwork being undertaken. Where necessary, relevant permits were also arranged for installing Automatic Traffic Counters (ATCs) and other data collection equipment.

1.5 Report structure

1.5.1 This report provides an overview of the baseline data obtained, and the survey methodology and specification. The remainder of the report comprises:

a. Chapter 2 provides details of the survey specification and methodology for collecting primary data through field surveys

b. Chapter 3 provides general commentary on the results of the data collection, details of comments from stakeholders, and the validation process

c. Chapter 4 summarises the types of secondary data that have been obtained

d. Chapters 5 to 17 set out the baseline data that has been obtained for each Borough and discuss how this relates to each proposed construction site.

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2 Primary data collection – survey specification

2.1 Introduction

2.1.1 Two specialist survey companies (Vincent Knight and Nationwide Data Collection) were commissioned to undertake the data collection across west, central and east London in the local vicinities of each construction site.

2.1.2 The surveys undertaken comprised:

a. classified traffic counts (MCCs) at junctions

b. queue length surveys

c. Automatic Traffic Counts (ATCs)

d. pedestrian and cycle movement surveys

e. parking surveys

f. journey time surveys

g. river usage surveys.

2.2 Data collection phases

2.2.1 Data collection was undertaken in five phases.

2.2.2 Phase 1 surveys were undertaken between 7th May and 25th June 2011.

2.2.3 Phase 2 surveys were undertaken between 27th June and 15th July 2011.

2.2.4 Phase 3 surveys were undertaken between 24th August and 14th September 2011. In this particular phase many of the surveys were parking, pedestrian and cycle surveys, some of which repeated work undertaken in Phases 1 and 2. These were programmed during August specifically in order to capture any seasonal variation in these activities that might occur during the school summer holiday period. A number of these surveys were undertaken on the Thames Path and in public parks, where it was anticipated that activity might be higher during the summer months.

2.2.5 Phase 4 surveys were undertaken between 26th November and 1st December 2011. In this particular phase, the surveys comprised classified traffic counts, parking surveys and pedestrian / cycle surveys. These surveys were undertaken to supplement earlier information or to cover any gaps in previously collected data.

2.2.6 Phase 5 surveys were undertaken between 10th and 13th May and 20th and 29th May 2012. In this particular phase, the surveys comprised river usage and vehicle journey time surveys. In addition, supplementary ATCs, classified traffic counts, parking surveys and pedestrian / cycle surveys to provide supporting information for journey time surveys or to provide additional information for the assessment.

2.2.7 Where possible, surveys in all phases were programmed in order to avoid major events and known roadworks, road closures or unusual occurrences which might have affected the validity of the results. Data were also obtained during school term time (unless otherwise stated).

2.2.8 The precise survey locations relevant to each construction site are detailed within each particular Borough chapter. The survey specification for each survey type is provided below.

2.2.9 In addition, a detailed review of incidents, occurrences, roadworks, events, and stakeholder comments was undertaken in order to ensure any data collected was suitable to use in any assessment.

2.3 Classified traffic counts and queue length surveys

2.3.1 A set of fully classified turning movement surveys, known as ‘Manual Classified Counts (MCCs), and queue length surveys were undertaken at various locations.

2.3.2 Turning movements were collected using video cameras, which were in operation on a weekday (Tuesday, Wednesday or Thursday) and a Saturday, between 07:00 – 00:00 and 10:00 – 16:00 respectively. In addition, pedestrian and cycle movements at junctions, traffic signal green times and traffic signal cycle times were obtained at each junction from these video surveys.

2.3.3 The readings for traffic signal green times and cycle times were collected ten times per hour.

2.3.4 Turning movements were collected by lane on all approaches to the surveyed junctions.

2.3.5 The aggregated vehicle totals for each movement and on each arm of a junction were recorded at 15-minute intervals and fully classified by vehicle type.

2.3.6 Pedestrian and cycle crossing movements were collected directionally at all formal crossing points at or within 20m of the junction.

2.3.7 For the Phase 1 weekday surveys turning movements, pedestrian and cycle movements and traffic signal green times and cycle times were extracted from the recorded data for the following time periods:

a. 07:00 to 10:00

b. 12:00 to 14:00

c. 16:00 to 19:00

d. 22:00 to 00:00.

2.3.8 For the Phase 2 and 3 weekday surveys, the data were only extracted for the following periods which represent the two highway network peak periods:

a. 07:00 to 10:00

b. 16:00 to 19:00.

2.3.9 For the Phase 4 weekday surveys, data were extracted for the following periods:

a. 07:00 to 10:00

b. 12:00 to 14:00

c. 16:00 to 19:00.

2.3.10 On a Saturday the turning movements, pedestrian and cycle movements and traffic signal information were extracted for the entire six hour period (10:00 – 16:00) of the surveys.

2.3.11 Vehicle queue lengths at junctions were measured both on a weekday and a Saturday for Phases 1, 2 and 3 of data collection. Queue lengths were measured and recorded at five minute intervals.

2.3.12 On a weekday these were collected manually, using enumerators observing queues on site, between:

a. 07:00 and 10:00

b. 12:00 and 14:00

c. 16:00 and 19:00.

2.3.13 On a Saturday this information was collected manually for the entire six hour period (10:00 – 16:00).

2.4 Automatic Traffic Counts (ATCs)

2.4.1 ATCs for each direction of traffic flow were undertaken for a two to three week period, with data recorded in 15 minute intervals across the whole period for which data was collected.

2.4.2 In Phase 1, the majority of ATC surveys were programmed to occur over dates ranging between the end of May and mid-June 2011. It is acknowledged that this period covered the school half term and therefore that any data for this particular week might not be representative of typical term-time conditions for any assessment. Nevertheless, it does allow an indication of holiday variations to be gained.

2.4.3 All of the ATC surveys which were in place during the school half term were therefore programmed to last a period of at least 3 weeks in order to ensure sufficient term-time data was also obtained.

2.4.4 In addition, Monday 30th May 2011 was a Bank Holiday, and was therefore not representative of non-holiday conditions.

2.4.5 ATCs were undertaken using pneumatic tubes stretched across and secured to the carriageway, connected to a detection and counting unit to record the passage of vehicles over the tubes. These were monitored during the course of the data collection periods to ensure that any detachment or malfunction of the equipment could be rectified within a short timescale.

2.4.6 The ATC data were fully classified into vehicle types, with average speeds also recorded at one hour intervals.

2.4.7 Data outputs were recorded for each vehicle type and reported in terms of numbers of vehicles and Passenger Car Units (PCUs). PCUs are a standard unit used within junction capacity analysis in order to represent the road space occupied by different vehicle types. For example, a car has a PCU value of one, whereas a coach or articulated lorry may have a PCU value of two or more.

2.5 Stand alone pedestrian and cycle surveys

2.5.1 Stand alone pedestrian and cycle counts were collected in locations which were not covered by surveys at junctions. These included formal crossing points, a number of footways and other paths in the vicinity of construction sites and, where relevant, the Thames Path.

2.5.2 Directional information was collected in each case. These surveys were undertaken using both video camera and manual methods.

2.5.3 Information was collected on both a weekday (Tuesday, Wednesday, or Thursday) and a Saturday.

2.5.4 On a weekday this information was collected between:

a. 07:00 and 10:00

b. 12:00 and 14:00

c. 16:00 and 19:00.

2.5.5 On a Saturday data was collected between 10:00 and 16:00.

2.6 Parking surveys

2.6.1 Parking surveys were undertaken in a number of areas in order to understand the types of parking available, parking bay occupancies and spare capacity during certain time periods.

2.6.2 The total number of vehicles parked on each road within the survey areas, for each parking or restriction type, was recorded on both a weekday (Tuesday, Wednesday or Thursday) and a Saturday. This included both legal parking within marked bays or other permitted zones and illegal parking (eg. parking on red or yellow line restrictions within the restricted periods).

2.7 Journey time surveys

2.7.1 Journey time surveys were undertaken in a number of areas in order to provide information to support the assessment of potential changes to journey times on specific parts of the highway network.

2.7.2 Journey times were measured by enumerators making a number of ‘runs’ by car through the network being evaluated. Several recordings were made of the time taken to travel between specific start and finish points on this network on each occasion.

2.7.3 This information was collected on both a weekday (Tuesday, Wednesday, or Thursday) and a Saturday.

2.7.4 On a weekday this information was collected between:

a. 07:00 and 10:00

b. 12:00 and 14:00

c. 16:00 and 19:00

2.7.5 On a Saturday data was collected between 10:00 and 16:00.

2.8 River usage surveys

2.8.1 River usage surveys were undertaken at piers in the vicinity of project construction sites where it was considered there might be a potential conflict with other river users or an impact on pedestrians, cyclists or other users on riverside routes.

2.8.2 Typically this information was captured using video cameras observing two forms of activity: vessel movement patterns to, from and passing the respective survey locations and pedestrian flows arriving and departing from the piers being observed.

2.8.3 Using video data capture allowed not only a count of river traffic and pedestrian movements at each pier observed but also an overview of prevailing conditions in the proximity of each pier, providing a qualitative dimension to the quantitative data.

2.8.4 Due to restrictions or impracticalities on the placement of video cameras at certain sites, a number of manual counts of pedestrian movements were also included as part of the river usage surveys.

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3 Baseline data collection – commentary and general results

3.1 Engagement with relevant stakeholders

3.1.1 Stakeholders including LHAs and TfL were informed of the detailed survey proposals, including the methods for obtaining information, equipment used, programmed dates and health and safety procedures.

3.1.2 In a number of cases comments were received from stakeholders, which were dealt with accordingly. This included requests for additional information (such as precise locations of video cameras), comments on the validity of the surveys given the proposed programme (which in some cases meant certain surveys were either rescheduled or postponed), requests for additional authorisation and comments on the proposed equipment installation procedures and methodology.

3.1.3 In addition, there were comments on certain survey proposals where these were close to planned junction or network layout alterations or to proposed developments which could be anticipated to change local conditions in the immediate future.

3.1.4 Any network alterations or committed developments were accounted for in the assessments. A detailed review of committed developments in close proximity to each construction site was undertaken and the TfL HAMs were also reviewed in order to determine whether adjustments needed to be made to any of the collected survey data in order to reflect a future ‘base case’ condition.

3.2 Data validation

3.2.1 In order to ensure that the survey data collected was reasonably representative of the existing situation (and therefore suitable for undertaking any assessment), surveys were programmed to avoid, where possible, any potential disruptions caused by scheduled events, roadworks and road closures.

3.2.2 However, it should be noted that:

a. avoiding all such occurrences was not always possible (for example if there were long term roadworks in place)

b. despite information searches and discussions with the LHAs, some planned works may not have been identified prior to the surveys

c. unplanned situations may also have occurred whilst surveys were being undertaken (for example accidents).

3.2.3 All scheduled works in the vicinity of each the proposed survey locations were recorded (works that were scheduled to conflict with the survey programme). However it should be noted that in some instances scheduled works may not have been in place at the location and/or time of the surveys.

3.2.4 The information source used to determine the timing of scheduled works was London's Register of Roadworks administered by TfL (http://public.londonworks.gov.uk/roadworks/home). In a number of cases, the descriptions included on that database do not provide extensive details of the works scheduled, and therefore it was not always easy to determine the potential level of effect on any survey results.

3.2.5 Therefore, where possible, further information was sought from each of the specialist survey companies, to identify whether there appeared to be any issues during data collection that may have affected the validity of the surveys. Where there was no evidence to suggest otherwise it has been assumed that the survey data is valid for use in the assessment.

3.2.6 Some ATC surveys were subject to numerous failures during the 3 week period, due to damage or tubes coming out of position. Additionally some instance were noted where vehicles parking on the tubes, or slow moving / queuing traffic across the tubes might have affected the recorded results.

3.2.7 Where ATC equipment was found to be subject to regular damage or to a failure or other anomaly, equipment was left in place for an extended period in order to ensure sufficient data was obtained.

4 Secondary baseline data

4.1 Introduction

4.1.1 Secondary data were obtained from a range of available sources in order to assist understanding of the baseline situation at each construction site and to inform the scope of the primary data collection and field surveys.

4.1.2 Detailed information on the exact information obtained is set out within each relevant Borough chapter.

4.2 Traffic data

4.2.1 Where information relevant to the assessment were available, traffic flow data were obtained from TfL databases. These comprise include data collected by TfL itself as part of regular monitoring and other ad-hoc information gathered as part of TfL studies into specific locations or as part of development planning applications. This information includes vehicle turning movement data, queue data, ATCs, and pedestrian movements. Where possible, these were obtained for both weekdays and weekend days.

4.2.2 The TfL HAMs were also interrogated as another source of traffic data, mainly for strategic assessments, but also in order to make comparisons against the primary data collected.

4.2.3 Publicly available traffic data, such as 'GB National Road Traffic Survey' information compiled by the Department for Transport were also obtained to assist in validating data collected from other sources, although it was recognised that this information is generally available at a much coarser level than was required for this assessment.

4.3 Public transport data

4.3.1 Public transport data were also collected from TfL for London Overground, London Underground and DLR services. National Rail information was collected from material published by the Office of Rail Regulation (ORR). Where possible, this included information on boardings, alightings, station entry / exit flow data and ridership information. In addition, bus passenger data were obtained where necessary following discussions with TfL and other relevant stakeholders.

4.3.2 Public transport service information was obtained from current timetables at the time of undertaking the assessment. Generally these were sourced online from the TfL website (www.tfl.gov.uk) and the National Rail website (www.nationalrail.co.uk) as being the most up to date source of timetable information.

4.4 River usage data

4.4.1 Where possible information relating to river usage was obtained from TfL's River Services division for locations in close proximity to the proposed construction sites. Discussions were also held with the Port of London Authority (PLA) and a number of commercial river operators to supplement this information and aid understanding of river usage.

4.5 Accident data

4.5.1 Accident data were obtained from police records, via TfL, for the most recent five year period (generally between 2006 and 2011) in areas surrounding each construction site. The geographical extent of accident data that were obtained are shown in **Annex B**.

5 Baseline data summary – London Borough of Ealing

5.1 Introduction

5.1.1 Primary and secondary data were obtained for the London Borough of Ealing in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction site at Acton Storm Tanks, and are summarised below.

5.2 Primary data collection

5.2.1 The field survey locations for each borough are shown in **Annex C**.

5.2.2 No field survey data in Ealing was collected during the Phase 1 survey period. This was due to major highway works that could have affected the validity of a number of the proposed surveys. It was therefore agreed to reschedule all Ealing surveys to the Phase 2 survey period. Some additional surveys were undertaken in Phases 4 and 5.

MCC and queue length surveys

5.2.3 Junction surveys were undertaken in order to collect turning movements, queue lengths, pedestrian / cycle movements and green times / cycle times.

5.2.4 Table 5.1 summarises the junction surveys undertaken in the London Borough of Ealing, as well as the dates of the surveys.

Table 5.1: Junction surveys – London Borough of Ealing

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
No surveys were undertaken during Phase 1.			
Phase 2 Surveys			
E-J1	Junction of The Vale (A4020) / Larden Rd	05/07/2011	02/07/2011
E-J2	Junction of The Vale (A4020) / East Acton Lane / Warple Way	05/07/2011	02/07/2011
E-J3	Junction of The Vale (A4020) / Stanley Gardens	05/07/2011	02/07/2011
E-J4	Junction of The Vale (A4020) / Uxbridge Rd (A4020) / Old Oak Rd / Askew Rd (B408)	05/07/2011	02/07/2011
E-J5a	Junction of Uxbridge Rd (A4020) / High Street (A4020) / Steyne Rd (A4000) / Gunnersbury Lane (A4000)	13/07/2011	02/07/2011
E-J5b	Junction of Uxbridge Rd (A4020) / Hanger Lane A406Rd / Gunnersbury Ave	13/07/2011	02/07/2011
E-J6	Junction of Gunnersbury Ave A406Rd / Gunnersbury Lane (A4000) / Pope's Lane (B4491)	05/07/2011	02/07/2011
E-J8	The Vale / Eastman Road	12/07/2011	09/07/2011
E-J9	Eastman Road / Acton Park Industrial Estate	12/07/2011	09/07/2011
E-J10	Stanley Gardens / Acton park Industrial Estate	12/07/2011	09/07/2011
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

ATC surveys

5.2.5 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

5.2.6 Table 5.2 summarises the ATC surveys that were undertaken in the London Borough of Ealing, as well as the dates these surveys were undertaken.

Table 5.2: ATC surveys – London Borough of Ealing

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
No surveys were undertaken during Phase 1.		
Phase 2 Surveys		
E-A1	The Vale (A4020)	04/07/2011 – 19/07/2011
E-A2	The Vale (A4020)	04/07/2011 – 19/07/2011
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
E-A3	The Vale (A4020)	20/05/2012 – 26/05/2012

Stand-alone pedestrian and cycle surveys

5.2.7 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements at other locations. These surveys were undertaken on both weekdays and Saturdays.

5.2.8 Table 5.3 summarises the pedestrian / cycle surveys undertaken in the London Borough of Ealing, as well as the dates these surveys were undertaken.

Parking surveys

5.2.9 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

5.2.10 Table 5.4 summarises the parking surveys undertaken in the London Borough of Ealing, and the dates these surveys were undertaken.

Table 5.3: Pedestrian and cycle Surveys – London Borough of Ealing

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
No surveys were undertaken during Phase 1.			
Phase 2 Surveys			
E-P1	The Vale (A4020)	05/07/2011	02/07/2011
E-P2	The Vale (A4020)	05/07/2011	02/07/2011
E-P3	Stanley Gardens / Canham Rd/Rugby Rd	05/07/2011	02/07/2011
E-P4	Southfield Rd	05/07/2011	02/07/2011
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4			
Phase 5 Surveys			
E-P5	Warple Way	24/05/2012	26/05/2012

Table 5.4: Parking surveys – London Borough of Ealing

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
No surveys were undertaken during Phase 1.			
Phase 2 Surveys			
E-PK1	Dordrecht Rd / Larden Rd / Warple Lane / Stanley Gardens / Canham Rd / Valetta Rd	05/07/2011	02/07/2011
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
E-PK2	Northern and southern section of site off Warple Way	01/12/2011	26/11/2011
Phase 5 Surveys			
E-PK3	Warple Way / Canham Road / Stanley Gardens	29/05/2012	26/05/2012

Journey time surveys

5.2.11 No journey time surveys were undertaken in the London Borough of Ealing.

River usage surveys

5.2.12 No river usage surveys were undertaken in the London Borough of Ealing.

Data validation

5.2.13 There were no major issues that affected the validity of the data collected in the London Borough of Ealing.

5.3 Secondary baseline data

5.3.1 This section summarises the data obtained from secondary sources in the London Borough of Ealing.

Traffic data

5.3.2 No traffic data from other sources were obtained for locations in the London Borough of Ealing.

Bus passenger data

5.3.3 No bus passenger data from other sources were obtained for locations in the London Borough of Ealing.

Rail passenger data

5.3.4 Rail passenger data for National Rail and London Overground were obtained in the London Borough of Ealing. A summary of the data obtained is shown in Table 5.5.

5.3.5 London Overground data were obtained from TfL and National Rail data were obtained from the Office of Rail Regulation's (ORR) official published annual passenger data.

Table 5.5: Rail data – London Borough of Ealing

Type	Station	Data obtained	Survey date(s)
National Rail	Acton Central	Passengers entering and exiting stations yearly	2009-2010
London Overground	Acton Central	Weekday boarding and alighting data	2009

Accident data

5.3.6 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

6 Baseline data summary – London Borough of Hammersmith and Fulham

6.1 Introduction

6.1.1 Primary and secondary data were obtained for the London Borough of Hammersmith and Fulham in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction sites at Hammersmith Pumping Station and Carnwath Road Riverside, and are summarised below.

6.2 Primary data collection

6.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

6.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

6.2.3 Table 6.1 summarises the junction surveys undertaken in the London Borough of Hammersmith and Fulham, as well as the dates of the surveys.

ATC surveys

6.2.4 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

6.2.5 Table 6.2 summarises the ATC surveys that were undertaken in the London Borough of Hammersmith and Fulham, as well as the dates these surveys were undertaken.

Table 6.1: Junction surveys – London Borough of Hammersmith and Fulham

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
H-J1	Cobbold Road / Emlyn Road / Larden Road	12/05/2011	14/05/2011
H-J11	Yeldham Road / A219 Fulham Palace Road / Chancellors Road	12/05/2011	14/05/2011
H-J12	A3218 Lillie Road / A219 Fulham Palace Road / Silverton Road	12/05/2011	14/05/2011
H-J13	A304 Fulham Road / A219 Putney Bridge Approach / A219 Fulham Palace Road	12/05/2011	14/05/2011
H-J14	New Kings Road / A219 Putney Bridge Approach / Church Gate	12/05/2011	14/05/2011
H-J16	Town Mead Road / Wandsworth Bridge Road / Carmwath Road	12/05/2011	14/05/2011
Phase 2 Surveys			
H-J15	Junction of New King's Road (A308) / Wandsworth Bridge Rd (A217)	07/07/2011	09/07/2011
H-J17	Junction of New King's Road (A308) / Munster Rd	07/07/2011	09/07/2011
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Table 6.2: ATC surveys – London Borough of Hammersmith and Fulham

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
H-A2	A219 Fulham Palace Road	21/05/2011 – 24/06/2011
H-A4	Wandsworth Bridge Road	21/05/2011 – 12/06/2011
H-A5	Wandsworth Bridge Road	21/05/2011 – 12/06/2011
Phase 2 Surveys		
H-A6	New King's Road (A308)	04/07/2011 – 20/07/2011
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
No surveys were undertaken during Phase 5.		

Stand-alone pedestrian and cycle surveys

6.2.6 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements at other locations. These surveys were undertaken on both weekdays and Saturdays.

6.2.7 Table 6.3 summarises the pedestrian / cycle surveys undertaken in the London Borough of Hammersmith and Fulham, as well as the dates these surveys were undertaken.

Table 6.3: Pedestrian and cycle surveys – London Borough of Hammersmith and Fulham

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
H-P1	River Side - Between Winslow Road and Chancellor's Road	12/05/2011	14/05/2011
H-P2	River Side - West of Wandsworth Bridge Rd, Alongside Currys, Topps Tiles, Reed Harris Stores	12/05/2011	14/05/2011
Phase 2 Surveys			
H-P3	Along Huggon Rd near Dymock St junction	07/07/2011	09/07/2011
H-P4	Carnwath Rd	07/07/2011	09/07/2011
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Parking surveys

6.2.8 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

6.2.9 Table 6.4 summarises the parking surveys undertaken in the London Borough of Hammersmith and Fulham, and the dates these surveys were undertaken.

Table 6.4: Parking surveys – London Borough of Hammersmith and Fulham

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
H-PK1	Covering area between Warple Way in the West and Holley Road/Mayfield Road in the East, Valetta Road in the North and Stamford brook Road in the South	09/06/2011	11/06/2011
H-PK2	Streets between Queen Caroline Street North / Manbre Road South / Fulham Palace Road / Crisp Road East to West	09/06/2011	11/06/2011
H-PK3	Between Broomhouse Lane West / Wandsworth Bridge Road / East - Sullivan / Hugon Road North / Carnwath Road in the South	09/06/2011	11/06/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Journey time surveys

6.2.10 No journey time surveys were undertaken in the London Borough of Hammersmith and Fulham.

River usage surveys

6.2.11 No river usage surveys were undertaken in the London Borough of Hammersmith and Fulham.

Data validation

6.2.12 There were no major issues that affected the validity of the data collected in the London Borough of Hammersmith and Fulham.

6.2.13 The main issues that were experienced were failures and damage to the ATC tubes that were installed on Fulham Palace Road and Wandsworth Bridge Road. In order to ensure sufficient data was obtained, H-A5 (Wandsworth Bridge Road) was kept down for 3 weeks, whilst H-A2

(Fulham Palace Road) was left down for 5 weeks, as this was particularly affected by failure of and damage of equipment.

6.3 Secondary baseline data

6.3.1 This section summarises the data obtained from secondary sources in the London Borough of Hammersmith and Fulham.

Traffic data

6.3.2 The secondary traffic data listed in Table 6.5 were obtained from TfL for locations in the London Borough of Hammersmith and Fulham. All TfL traffic data have been included in the GIS baseline database.

Table 6.5: TfL traffic data – London Borough of Hammersmith and Fulham

TfL survey ID	TfL survey type	Survey date(s)
51	ATC Survey	2011
1171	Manual Turning Count	13/11/2007
1172	Manual Turning Count	13/11/2007
1476	Manual Turning Count	03/12/2008

Bus passenger data

6.3.3 No secondary bus passenger data from other sources were obtained in the London Borough of Hammersmith and Fulham.

Rail passenger data

6.3.4 Rail passenger data for National Rail, London Underground and London Overground were obtained in the London Borough of Hammersmith and Fulham. A summary of the data obtained is shown in Table 6.6.

6.3.5 All rail data were obtained from TfL, with the exception of the National Rail data which were obtained from the Office of Rail Regulation's (ORR) official published annual passenger data.

Table 6.6: Rail data – London Borough of Hammersmith and Fulham

Type	Station	Data obtained	Survey date(s)
National Rail	Imperial Wharf	Passengers entering and exiting stations yearly	2009-2010
	Shepherds Bush		
London Underground	Barons Court	Passengers entering and exiting stations. Boarding and alightings by line, line loads at stations. Data in 15min periods weekday and Saturday. Station entry also includes Sunday. Internal passenger movements within stations.	2010
	Fulham Broadway		
	Hammersmith		
	Putney Bridge		
	Shepherds Bush		
	Turnham Green		
London Overground	Imperial Wharf	Weekday board and alight data	2009

Accident data

6.3.6 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

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7 Baseline data summary – London Borough of Richmond upon Thames

7.1 Introduction

7.1.1 Primary and secondary data were obtained for the London Borough of Richmond upon Thames in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction site at Barn Elms, and are summarised below.

7.2 Primary data collection

7.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

7.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

7.2.3 Table 7.1 summarises the junction surveys undertaken in the London Borough of Richmond upon Thames, as well as the dates of the surveys.

ATC surveys

7.2.4 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

7.2.5 Table 7.2 summarises the ATC surveys that were undertaken in the London Borough of Richmond upon Thames, as well as the dates these surveys were undertaken.

Table 7.1: Junction surveys – London Borough of Richmond upon Thames

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
RT-J1	A306 Castelnau / Queen Elizabeth Walk / A306 Rocks Lane / Elm Grove Road / Church Road	17/05/2011	21/05/2011
RT-J2	A306 Rocks Lane / B349 Mill Hill Rd / Common Road	17/05/2011	21/05/2011
RT-J3	A306 Rocks Lane / Queen's Ride / A205 Upper Richmond Road / Roehampton Lane	17/05/2011	21/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Table 7.2: ATC surveys – London Borough of Richmond upon Thames

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
RT-A1	A306 Rocks Lane (just north of Pavillion access)	20/05/2011 – 12/06/2011
RT-A2	A306 Rocks Lane (just south of Station Rd junction)	20/05/2011 – 12/06/2011
Phase 2 Surveys		
RT-A3	Queen Elizabeth Walk	04/07/2011 – 19/07/2011
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
RT-A3	Queen Elizabeth Walk	20/05/2012 – 26/05/2012

Stand-alone pedestrian and cycle surveys

7.2.6 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements in other locations. These surveys were undertaken on both weekdays and Saturdays.

7.2.7 Table 7.3 summarises the pedestrian / cycle surveys undertaken in the London Borough of Richmond upon Thames, as well as the dates these surveys were undertaken.

Table 7.3: Pedestrian and cycle surveys – London Borough of Richmond upon Thames

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
RT-P1	Path along river near Boat House	17/05/2011	21/05/2011
Phase 2 Surveys			
RT-P2	Footpath in Barn Elms Playing Fields	12/07/2011	09/07/2011
RT-P3	Queen Elizabeth Walk	07/07/2011	09/07/2011
Phase 3 Surveys			
RT-P1	Path along river near Boat House	24/08/2011	27/08/2011
RT-P2	Footpath in Barn Elms Playing Fields	24/08/2011	27/08/2011
RT-P3	Queen Elizabeth Walk	24/08/2011	27/08/2011
RT-P4	Rocks Lane west side	24/08/2011	27/08/2011
RT-P5	Rocks Lane east side	24/08/2011	27/08/2011
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5			

Parking surveys

7.2.8 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

7.2.9 Table 7.4 summarises the parking surveys undertaken in the London Borough of Richmond upon Thames, and the dates these surveys were undertaken.

Table 7.4: Parking surveys – London Borough of Richmond upon Thames

Survey ref.	Roads / area covered	Weekday	Saturday

		survey date	survey date
Phase 1 Surveys			
No surveys were undertaken during Phase 1.			
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
RT-PK1	Rocks Lane / Mill Hill Rd / Ranelagh Avel; Cardigan Rd / Rectory Rd / Elm Grove Rd / Bellvue Rd	13/09/2011	10/09/2011
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5			

Journey time surveys

7.2.10 No journey time surveys were undertaken in the London Borough of Richmond upon Thames.

River usage surveys

7.2.11 No river usage surveys were undertaken in the London Borough of Richmond upon Thames.

Data validation

7.2.12 There were no issues that affected the validity of the data collected in the London Borough of Richmond upon Thames.

7.3 Secondary baseline data

7.3.1 This section summarises the data obtained from secondary sources in the London Borough of Richmond upon Thames.

Traffic data

7.3.2 The secondary traffic data listed in Table 7.5 were obtained from TfL in the London Borough of Richmond upon Thames. All TfL traffic data have been included in the GIS baseline database.

Table 7.5: TfL traffic data – London Borough of Richmond upon Thames

TfL survey ID	TfL survey type	Survey date(s)
1633	Manual Turning Count	10/02/2009

Bus passenger data

7.3.3 No secondary bus passenger data were obtained in the London Borough of Richmond upon Thames.

Rail passenger data

7.3.4 Rail passenger data for National Rail were obtained in the London Borough of Richmond upon Thames. A summary of the data obtained is shown in Table 7.6.

7.3.5 National Rail data were obtained from the Office of Rail Regulation's (ORR) official published annual passenger data.

Table 7.6: Rail data – London Borough of Richmond upon Thames

Type	Station	Data obtained	Survey date(s)
National Rail	Barnes Bridge	Passengers entering and exiting stations yearly	2009-2010

Accident data

7.3.6 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

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8 Baseline data summary – Royal Borough of Kensington and Chelsea

8.1 Introduction

8.1.1 Primary and secondary data were obtained in the Royal Borough of Kensington and Chelsea in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction sites at Cremorne Wharf Depot and Chelsea Embankment Foreshore and are summarised below.

8.2 Primary data collection

8.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

8.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

8.2.3 Table 8.1 summarises the junction surveys undertaken in the Royal Borough of Kensington and Chelsea, as well as the dates of the surveys.

Table 8.1: Junction surveys – Royal Borough of Kensington and Chelsea

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
KC-J7	Gunter Grove (A3220), King's Road (A308) / Ashburnham Road (A3220)	12/05/2011	14/05/2011
KC-J8	Edith Grove / King's Road (A308)	12/05/2011	14/05/2011
KC-J9	Cremorne Road (A3220) / Cheyne Walk / Lots Road	12/05/2011	14/05/2011
KC-J11	Chelsea Embankment (A3212) / Battersea Bridge (A3220) / Cheyne Walk / Beaufort St	12/05/2011	14/05/2011
KC-J12	Chelsea Embankment (A3212) / Albert Bridge (A3031) / Oakley Street (B304)	12/05/2011	14/05/2011
KC-J13	Chelsea Embankment (E) (A3212) / Royal Hospital Road (B302)	12/05/2011	14/05/2011
KC-J16	Grosvenor Rd (A3212) / Chelsea Bridge / Chelsea Embankment (A3212) / Chelsea Bridge Rd (A3216)	12/05/2011	14/05/2011
Phase 2 Surveys			
KC-J10	Junction of King's Rd (A3217) / Beaufort St (A3212)	05/07/2011	02/07/2011
KC-J14	Royal Hospital Rd / Chelsea Bridge Rd / Pimlico Road / Lower Sloane St	12/07/2011	09/07/2011
KC-J15	Chelsea Bridge Road / Ebury Bridge Road	12/07/2011	09/07/2011
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

ATC surveys

8.2.4 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

8.2.5 Table 8.2 summarises the ATC surveys that were undertaken in the Royal Borough of Kensington and Chelsea, as well as the dates these surveys were undertaken.

Table 8.2: ATC surveys – Royal Borough of Kensington and Chelsea

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
KC-A2	A3212 Chelsea Embankment	21/05/2011 – 12/06/2011
Phase 2 surveys		
No surveys were undertaken during Phase 2		
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
No surveys were undertaken during Phase 5.		

Stand-alone pedestrian and cycle surveys

8.2.6 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements in other locations. These surveys were undertaken on both weekdays and Saturdays.

8.2.7 Table 8.3 summarises the pedestrian / cycle surveys undertaken in the Royal Borough of Kensington and Chelsea, as well as the dates these surveys were undertaken.

Parking surveys

8.2.8 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

8.2.9 Table 8.4 summarises the parking surveys undertaken in the Royal Borough of Kensington and Chelsea, and the dates these surveys were undertaken.

Table 8.3: Pedestrian and cycle surveys – Royal Borough of Kensington and Chelsea

Survey ref.	Pedestrian andcycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
KC-P1	Cheyne Walk crossing	12/05/2011	14/05/2011
KC-P2	Cremorne Road / Cheyne Walk / Lots Road crossing	12/05/2011	14/05/2011
KC-P3	Pedestrian crossing on Chelsea Embankment	12/05/2011	14/05/2011
KC-P4	Pedestrian crossing on Chelsea Embankment	12/05/2011	14/05/2011
KC-P5	Thames Path (on Chelsea Embankment south side)	12/05/2011	14/05/2011
Phase 2 surveys			
No surveys were undertaken during Phase 2			
Phase 3 Surveys			
KC-P1	Thames Path along Lots Road	01/09/2011	03/09/2011
KC-P2	Cremorne Road / Cheyne Walk / Lots Road crossing	01/09/2011	03/09/2011
KC-P4	Pedestrian crossing on Chelsea Embankment	01/09/2011	03/09/2011
KC-P5	Thames Path (on Chelsea Embankment south side)	01/09/2011	03/09/2011
KC-J16 (pedestrians only)	Grosvenor Rd (A3212) / Chelsea Bridge / Chelsea Embankment (A3212) / Chelsea Bridge Rd (A3216)	01/09/2011	03/09/2011
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Table 8.4: Parking surveys – Royal Borough of Kensington and Chelsea

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
KC-PK1	Lots Road / Tetcott Road / Upcenrne Road / Burnaby Street / Uverdale Road / Tadema Road / Ashburnham Road / Stadium Street	09/06/2011	11/06/2011
KC-PK2	Chelsea Embankment / Embankment Gardens / Tite Street / Paradise Walk / Dike Street / Swan Walk / Cheyne Walk	09/06/2011	11/06/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Journey time surveys

8.2.10 No journey time surveys were undertaken in the Royal Borough of Kensington and Chelsea.

River usage surveys

8.2.11 No river usage surveys were undertaken in the Royal Borough of Kensington and Chelsea.

Data validation

8.2.12 Data from a number of surveys in Kensington and Chelsea was considered to have been affected by issues in the vicinity.

8.2.13 The main issue was the closure of Albert Bridge, which was closed 30th November 2011. This is considered to have affected a number of junction surveys, namely KC-J9 (Cremorne Road, Cheyne Walk, Lots Road), KC-J11 (Chelsea Embankment, Battersea Bridge, Cheyne Walk, Beaufort Street), KC-J12 (Chelsea Embankment, Albert Bridge, Oakley Street), KC-J13 (Chelsea Embankment, Royal Hospital Road).

8.2.14 The survey results obtained were reviewed against TfL Highway Assignment Model turning movements and any other available TfL data.

Adjustments to survey data were applied in the assessment work,if necessary, to replicate turning flows observed from other data sources.

8.2.15 Another minor issue with the surveys undertaken in Kensington and Chelsea was the. The data recorded in the ATC survey KC-A2 (A312 Chelsea Embankment) may have also been affected by the Albert Bridge closure, and the ATC tubes were also damaged between 26th May and 29th May.

8.2.16 The ATC survey was in place for 3 weeks in order to ensure a sufficient amount of data was obtained. In addition, the survey results were reviewed against TfL Highway Assignment Model data and any other available TfL data, with adjustments applied in the assessment if necessary.

8.3 Secondary baseline data

8.3.1 This section summarises the data obtained from secondary sources in the Royal Borough of Kensington and Chelsea.

Traffic data

8.3.2 The secondary traffic data listed in Table 8.5 were obtained from TfL in the Royal Borough of Kensington and Chelsea. All TfL traffic data have been included in the GIS baseline database.

Table 8.5: TfL traffic data – Royal Borough of Kensington and Chelsea

TfL survey ID	TfL survey type	Survey date(s)
19	ATC Survey	01/02/2011
26	ATC Survey	01/02/2011
1266	Speed Survey	July 2008
1660	Manual Turning Count	23-Jan
2208	Manual Turning Count	15/12/2010
2209	Manual Turning Count	18/03/2010

Bus passenger data

8.3.3 No secondary bus passenger data were obtained in the Royal Borough of Kensington and Chelsea.

Rail passenger data

8.3.4 Rail passenger data for London Underground were obtained in the Royal Borough of Kensington and Chelsea. A summary of the data obtained is shown in Table 8.6.

8.3.5 All London Underground rail data were obtained from TfL.

Table 8.6: Rail data – Royal Borough of Kensington and Chelsea

Type	Station	Data obtained	Survey date(s)
London Underground	Sloane Square	Passengers entering and exiting stations. Boarding and alightings by line, line loads at stations. Data in 15min periods weekday and Saturday. Station entry also includes Sunday. Internal passenger movements within stations.	2010

Accident data

8.3.6 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

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9 Baseline data summary – London Borough of Wandsworth

9.1 Introduction

9.1.1 Primary and secondary data were obtained for the London Borough of Wandsworth in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction sites at Putney Embankment Foreshore, Dormay Street, King George's Park, Kirtling Street, Heathwall Pumping Station and Falconbrook Pumping Station. The data are summarised below.

9.2 Primary data collection

9.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

9.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

9.2.3 Table 9.1 summarises the junction surveys undertaken in the London Borough of Wandsworth, as well as the dates of the surveys.

Table 9.1: Junction surveys – London Borough of Wandsworth

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
W-J4	A218 Buckhold Road / Neville Gill Close	10/05/2011	07/05/2011
W-J8	The Causeway / Dormay Street	10/05/2011	07/05/2011
W-J9	Armoury Way / Dormay Street	10/05/2011	07/05/2011
W-J11	A3 Old York Road / Ram Street / A3 Armoury Way	10/05/2011	07/05/2011
W-J14	Swandon Way / Old York Road / A217 Swandon Way / Smugglers Way	10/05/2011	07/05/2011
W-J15	Marl Road / Smugglers Way	10/05/2011	07/05/2011
W-J16	A217 Wandsworth Bridge Road / Jews Row	10/05/2011	07/05/2011
W-J25	A219 Putney Bridge Approach / A219 Putney High Street / B306	10/05/2011	07/05/2011

	Lower Richmond Road slip		
W-J26	B306 Lower Richmond Road, Embankment	10/05/2011	07/05/2011
W-J27	B306 Lower Richmond Road / Thames Place	10/05/2011	07/05/2011
W-J29	A3025 York Road / Bridges Court	17/05/2011	21/05/2011
W-J34	A3205 Battersea Park Road / Nine Elms Lane / A3205 Battersea Park Road / Kirtling Street	17/05/2011	21/05/2011
W-J35	Nine Elms Lane / Cringle Street	17/05/2011	21/05/2011
Phase 2 Surveys			
W-J5	Junction of Wandsworth High St (A3) / Buckhold Road (A218)	07/07/2011	09/07/2011
W-J24	Junction of Upper Richmond Road (A205) / Putney Hill (A219)	07/07/2011	09/07/2011
W-J28	Junction of York Rd (A3205) / Plough Rd	07/07/2011	09/07/2011
W-J31	Junction of Battersea Park Rd (A3205) / Latchmere Rd (A320) / Battersea Bridge Rd	07/07/2011	09/07/2011
W-J36	Junction of Putney Hill (A219) / Putney Bridge Rd (A3209)	07/07/2011	09/07/2011
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
W-J36	Junction of Putney Hill (A219) / Putney Bridge Rd (A3209)	29/05/2012	26/05/2012

ATC surveys

9.2.4 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

9.2.5 Table 9.2 summarises the ATC surveys that were undertaken in the London Borough of Wandsworth, as well as the dates these surveys were undertaken.

Table 9.2: ATC surveys – London Borough of Wandsworth

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
W-A3	A217 Swandon Way	20/05/2011 – 24/06/2011
W-A7	York Road	20/05/2011 – 09/06/2011 EB 20/05/2011 – 12/06/2011 WB
W-A10	Nine Elms Lane	20/05/2011 – 12/06/2011
Phase 2 Surveys		
W-A12	Putney Bridge Road (A3209)	04/07/2011 – 19/07/2001
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
No surveys were undertaken during Phase 5.		

Stand-alone pedestrian and cycle surveys

9.2.6 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements in other locations. These surveys were undertaken on both weekdays and Saturdays.

9.2.7 Table 9.3 summarises the pedestrian / cycle surveys undertaken in the London Borough of Wandsworth, as well as the dates these surveys were undertaken.

Table 9.3: Pedestrian and cycle surveys – London Borough of Wandsworth

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
W-P1	Bell Lane Creek - (The Causeway - Enterprise Way Link)	10/05/2011	07/05/2011
W-P2	The Causeway (North of Rail line towards River Wandle)	10/05/2011	07/05/2011
W-P3	Pier Terrace - North of Mercedez-Benz (Chelsea) After Sales	10/05/2011	07/05/2011
W-P4	Tow Path / Putney Pier - Embankment (in front of Star and Garter)	10/05/2011	07/05/2011

W-P5	Battersea Barge - Between Chelsea Bridge Road and Vauxhall Bridge Road	17/05/2011	21/05/2011
W-P6	Battersea Park Road Stretch (Thesssaly Road - Sleaford Street)	17/05/2011	21/05/2011
Phase 2 Surveys			
W-P7	Lower Richmond Rd (B306)	07/07/2011	09/07/2011
Phase 3 Surveys			
W-P1	Bell Lane Creek - (The Causeway - Enterprise Way Link)	01/09/2011	03/09/2011
W-P2	The Causeway (North of Rail line towards River Wandle)	01/09/2011	03/09/2011
W-P4	Tow Path / Putney Pier - Embankment (in front of Star and Garter)	01/09/2011	03/09/2011
W-P5	Battersea Barge - Between Chelsea Bridge Road and Vauxhall Bridge Road	01/09/2011	03/09/2011
W-P7	Lower Richmond Rd (B306)	01/09/2011	03/09/2011
W-P8	Armoury Way/Dormay Street/The Causeway junction	14/09/2011	10/09/2011
W-P9	Armoury Way South Side	14/09/2011	10/09/2011
W-P10	Plough Road footpath	14/09/2011	10/09/2011
W-P11	Entrance of York Gardens from Plough Road	14/09/2011	10/09/2011
W-P12	Nine Elms Lane across Kirtling Street	14/09/2011	10/09/2011
W-P13	Nine Elms Lane across Cringle Street	14/09/2011	10/09/2011
W-P14	Footpath adjacent to Nine Elms Lane	14/09/2011	10/09/2011
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
W-P15	King George's Park	29/05/2012	26/05/2012
W-P16	Neville Gill Close (E)	29/05/2012	26/05/2012
W-P17	Neville Gill Close (W)	29/05/2012	26/05/2012

Parking surveys

9.2.8 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

9.2.9 Table 9.4 summarises the parking surveys undertaken in the London Borough of Wandsworth, and the dates these surveys were undertaken.

Table 9.4: Parking surveys – London Borough of Wandsworth

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
W-PK1	Embankment in the North to Felsham Road in the South / Festing Road in the West to Putney High St in the East	09/06/2011	11/06/2011
W-PK2	The Causeway (Stretch from Armoury Way to Rail Line)	09/06/2011	11/06/2011
W-PK3	Northwest of WJ-17 - Smugglers Way, Marl Road, Jews Row, Pier Terrace	09/06/2011	11/06/2011
W-PK4	Area around Battersea Park Rd / Nine Elms Lane - Sleaford St / Kirtling Street / Cringle Street	09/06/2011	11/06/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
W-PK5		01/12/2011	26/11/2011
Phase 5 Surveys			
W-PK6	Grant Road / Winstanley Road / Darien Road	24/05/2012	26/05/2012
W-PK7	Glendarvon Street	24/05/2012	26/05/2012

Journey time surveys

9.2.10 No journey time surveys were undertaken in the London Borough of Wandsworth.

River usage surveys

9.2.11 River usage surveys were undertaken to establish levels of activity and interface between river users and other footpath and road users during certain periods of the day. These surveys were undertaken on weekdays and weekends.

9.2.12 Table 9.5 summarises the river usage surveys undertaken at Putney Pier and Wandsworth Riverside Quarter Pier in the London Borough of Wandsworth, and the dates these surveys were undertaken.

Table 9.5: River usage surveys – London Borough of Wandsworth

Locations covered	Weekday survey date	Saturday survey date
Phase 1 Surveys		
No surveys were undertaken during Phase 1.		
Phase 2 Surveys		
No surveys were undertaken during Phase 2.		
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
Putney Pier	10/05/2012 - 11/05/2012	12/05/2012 - 13/05/2012
Wandsworth Riverside Quarter Pier	24/05/2012	26/05/2012

Data validation

9.2.13 No major issues affecting the validity of the surveys were experienced in the London Borough of Wandsworth. The only minor issues experienced were at W-J29, W-A3, W-A7, and W-A10.

9.2.14 W-J29 (York Road, Bridges Court) was subject to planned works which involved some lane closures in the vicinity of the junction and at the junction itself (although all movements at the junction were still possible). This is considered to have limited impact on the validity of the survey as traffic was still moving freely in all peak periods and throughout the day.

9.2.15 ATC surveys at W-A3 (Swandon Way), W-A7 (York Road) and W-A10 (Nine Elms Lane) were all subject to some damage during the survey period, however all surveys were kept down for 3-4 weeks in order to ensure sufficient data was obtained.

9.3 Secondary baseline data

9.3.1 This section summarises the data obtained from secondary sources in the London Borough of Wandsworth.

Traffic data

9.3.2 The secondary traffic data listed in Table 9.6 were obtained from TfL in the London Borough of Wandsworth. All TfL traffic data have been included in the GIS baseline database.

Table 9.6: TfL traffic data – London Borough of Wandsworth

TfL survey ID	TfL survey type	Survey date(s)
6	ATC Survey	01/02/2011
965	Pedestrian Count	10/01/2008 – 19/01/2008
966	Pedestrian Count	10/01/2008 – 19/01/2008
967	Pedestrian Count	10/01/2008 – 19/01/2008
968	Pedestrian Count	10/01/2008 – 19/01/2008
969	Pedestrian Count	10/01/2008 – 19/01/2008
970	Pedestrian Count	10/01/2008 – 19/01/2008
971	Pedestrian Count	10/01/2008 – 19/01/2008
973	Pedestrian Count	10/01/2008 – 19/01/2008
974	Pedestrian Count	10/01/2008 – 19/01/2008
975	Pedestrian Count	10/01/2008 – 19/01/2008
976	Pedestrian Count	10/01/2008 – 19/01/2008
977	Pedestrian Count	10/01/2008 – 19/01/2008
978	Pedestrian Count	10/01/2008 – 19/01/2008
979	Pedestrian Count	10/01/2008 – 19/01/2008
980	Pedestrian Count	10/01/2008 – 19/01/2008
981	Pedestrian Count	10/01/2008 – 19/01/2008
1335	Manual Turning Count	13/01/2011
1528	ATC / Speed	08/07/2008
1529	Speed / Cycle Count	21/09/2010
1532	ATC / Speed	08/07/2008
1544	Manual Turning Count	02/03/2010
1600	Manual Turning Count	12/03/2010
1601	Manual Turning Count	04/03/2009
1605	Manual Turning Count	13/01/2011
1644	Manual Turning Count	05/03/2009

1645	Manual Turning Count	05/03/2009
1646	Manual Turning Count and queues	13/05/2010
1672	Manual Turning Count and queues	13/05/2010
1673	Manual Turning Count and queues	13/05/2010
1674	Queue length survey	13/05/2010

Bus passenger data

9.3.3 No secondary bus passenger data were obtained in the London Borough of Wandsworth.

Rail passenger data

9.3.4 Rail passenger data for National Rail and London Underground were obtained in the London Borough of Wandsworth. A summary of the data obtained is shown in Table 9.7.

9.3.5 All London Underground data were obtained from TfL and National Rail data were obtained from the Office of Rail Regulation's (ORR) official published annual passenger data.

Table 9.7: Rail data – London Borough of Wandsworth

Type	Station	Data obtained	Survey date(s)
National Rail	Battersea Park	Passengers entering and exiting stations yearly	2009-2010
	Clapham Junction		
	Wandsworth Town		
London Underground	East Putney	Passengers entering and exiting stations. Boarding and alightings by line, line loads at stations. Data in 15min periods weekday and Saturday. Station entry also includes Sunday. Internal passenger movements within stations.	2010

Accident data

9.3.6 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

10 Baseline data summary – City of Westminster

10.1 Introduction

10.1.1 Primary and secondary data were obtained for the City of Westminster in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction site at Victoria Embankment Foreshore, and are summarised below.

10.2 Primary data collection

10.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

10.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

10.2.3 Table 10.1 summarises the junction surveys undertaken in the City of Westminster, as well as the dates of the surveys.

Table 10.1: Junction surveys – City of Westminster

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
CW-J4	Northumberland Ave (A308) / Victoria Embankment (A3211)	10/05/2011	07/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

ATC surveys

10.2.4 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

10.2.5 Table 10.2 summarises the ATC surveys that were undertaken in the City of Westminster, as well as the dates these surveys were undertaken.

Table 10.2: ATC surveys – City of Westminster

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
CW-A2	A308 Northumberland Avenue	21/05/2011 – 10/06/2011
Phase 2 Surveys		
No surveys were undertaken during Phase 2		
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
No surveys were undertaken during Phase 5.		

Stand-alone pedestrian and cycle surveys

10.2.6 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements in other locations. These surveys were undertaken on both weekdays and Saturdays.

10.2.7 Table 10.3 summarises the pedestrian / cycle surveys undertaken in the City of Westminster, as well as the dates these surveys were undertaken.

Table 10.3: Pedestrian and cycle surveys – City of Westminster

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
CW-P1	Pedestrian crossing on Victoria Embankment	10/05/2011	07/05/2011
CW-P2	Pedestrian crossing on Victoria Embankment	10/05/2011	07/05/2011
CW-P3	Thames Path on Victoria Embankment - river side walkway	10/05/2011	07/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2			
Phase 3 Surveys			
CW-P4	Pedestrian crossing on Northumberland Avenue to the west of the junction with the A3211	24/08/2011	27/08/2011
CW-P5	Pedestrian crossing on Victoria Embankment to the south of the junction with Northumberland Avenue	24/08/2011	27/08/2011
CW-P6	Pedestrian crossing on Victoria Embankment to the south of the junction with Horse Guards Avenue	24/08/2011	27/08/2011
CW-P7	Pedestrian crossing on Victoria Embankment opposite Embankment Tube Station	24/08/2011	27/08/2011
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Parking surveys

10.2.8 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

10.2.9 Table 10.4 summarises the parking surveys undertaken in the City of Westminster, and the dates these surveys were undertaken.

Table 10.4: Parking surveys – City of Westminster

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
CW-PK1	Essex Street, Milford Lane, Maltravers Street, Arundel Street, Temple Place, Surrey Street, Victoria Embankment, Craig's Ct, Great Scotland Yard, Scotland Place, Whitehall Place, Whitehall Ct, Horse Guards Avenue, Whitehall Gardens, Richmond Terrace	10/05/2011	07/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Journey time surveys

10.2.10 Table 10.5 summarises the journey time surveys undertaken in the City of Westminster, and the dates these surveys were undertaken.

Table 10.5: Journey time surveys – City of Westminster

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
No surveys were undertaken during Phase 1.			
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
CW-JS1	Victoria Embankment, Blackfriars Road, New Bridge Street, Queen Victoria Street, Upper Thames Street	29/05/2012	26/05/2011

River usage surveys

10.2.11 River usage surveys were undertaken to establish levels of activity and interface between river users and other footpath and road users during certain periods of the day. These surveys were undertaken on weekdays and weekends.

10.2.12 Table 10.6 summarises the river usage surveys undertaken at Victoria Embankment Foreshore in the City of Westminster, and the dates these surveys were undertaken.

Table 10.6: River usage surveys – City of Westminster

Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys		
No surveys were undertaken during Phase 1.		
Phase 2 Surveys		
No surveys were undertaken during Phase 2.		
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
Victoria Embankment Foreshore	10/05/2012 - 11/05/2012	12/05/2012 - 13/05/2012

Data validation

10.2.13 There were no major issues experienced in the City of Westminster that were considered to have an effect on the validity of the survey data.

10.2.14 The only issue identified was at CW-J4 (Northumberland Ave, Victoria Embankment), which may have been affected by the closure of Strand (between Aldwych and Trafalgar Square). This was reviewed against TfL Highway Assignment Model data and other traffic data from TfL and amendments made to the survey data for the purposes of assessment if deemed necessary.

10.3 Secondary baseline data

10.3.1 This section summarises the data obtained from secondary sources in the City of Westminster.

Traffic data

10.3.2 The secondary traffic data listed in Table 10.7 were obtained from TfL in the City of Westminster. All TfL traffic data have been included in the GIS baseline database.

Table 10.7: TfL traffic data – City of Westminster

TfL survey ID	TfL survey type	Survey date(s)
144	Manual Turning Count	04/08/2009
145	Manual Turning Count	04/08/2009
181	ATC Survey	01/02/2011
182	ATC Survey	01/02/2011
1609	Manual Turning Count	17/06/2009
1610	Manual Turning Count	17/06/2009
1612	Manual Turning Count	17/06/2009
1796	Manual Turning Count	19/10/2010
1798	Manual Turning Count	20/08/2009
1799	Manual Turning Count	20/08/2009
1800	Manual Turning Count	20/08/2009
1801	Manual Turning Count	20/08/2009
1901	Manual Turning Count	04/08/2009
2016	Parking Survey	28/11/2010

Bus passenger data

10.3.3 No secondary bus passenger data were obtained in the City of Westminster.

Rail passenger data

10.3.4 Rail passenger data for National Rail and London Underground were obtained in the City of Westminster. A summary of the data obtained is shown in Table 10.8.

10.3.5 All London Underground data were obtained from TfL and National Rail data were obtained from the Office of Rail Regulation's (ORR) official published annual passenger data.

Table 10.8: Rail data – City of Westminster

Type	Station	Data obtained	Survey date(s)
National Rail	Charing Cross	Passengers entering and exiting stations yearly	2009-2010
London Underground	Charing Cross	Passengers entering and exiting stations. Boarding and alightings by line, line loads at stations. Data in 15min periods weekday and Saturday. Station entry also includes Sunday. Internal passenger movements within stations.	2010
	Embankment		
	Leicester Square		
	Westminster		

River usage data

10.3.6 Secondary river usage data were obtained, where available, in order to understand the existing level of usage at piers in close proximity to construction sites. Table 10.9 summarises the information obtained within the City of Westminster.

Table 10.9: Pier usage data – City of Westminster

Pier name / location	Information obtained	Date(s)
Embankment Pier	Monthly passenger numbers	1999-2010
Millbank Pier	Monthly passenger numbers	2003-2010
Westminster Pier	Monthly passenger numbers	1999-2010

Accident data

10.3.7 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

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11 Baseline data summary – London Borough of Lambeth

11.1 Introduction

11.1.1 Primary and secondary data were obtained for the London Borough of Lambeth in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction site at Albert Embankment Foreshore, and are summarised below.

11.2 Primary data collection

11.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

11.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

11.2.3 Table 11.1 summarises the junction surveys undertaken in the London Borough of Lambeth, as well as the dates of the surveys.

Table 11.1: Junction surveys – London Borough of Lambeth

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
L-J3	Lambeth Palace Road / Lambeth Road / Albert Embankment, Lambeth Bridge	19/05/2011	21/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
L-J4	Camelford House Access / Albert Embankment	14/09/2011	10/09/2011
L-J5	Duck Tours Slipway / Albert Embankment	14/09/2011	10/09/2011
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

ATC surveys

11.2.4 ATC surveys were not undertaken in the London Borough of Lambeth.

Stand-alone pedestrian and cycle surveys

11.2.5 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements in other locations. These surveys were undertaken on both weekdays and Saturdays.

11.2.6 Table 11.2 summarises the pedestrian / cycle surveys undertaken in the London Borough of Lambeth, as well as the dates these surveys were undertaken.

Table 11.2: Pedestrian and cycle surveys – London Borough of Lambeth

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
L-P1	Albert Embankment crossing- South of New Spring Gardens Walk	19/05/2011	21/05/2011
Phase 2 Surveys			
L-P2	Thames Path South Bank - in front of Tintagel House and No. 93 Albert Embankment	14/07/2011	16/07/2011
L-P3	Albert Embankment crossing - between New Spring Gardens Walk and Glasshouse Walk	14/07/2011	16/07/2011
Phase 3 Surveys			
L-P1	Albert Embankment crossing - South of New Spring Gardens Walk	01/09/2011	03/09/2011
L-P2	Thames path South Bank - in front of Tintagel House and No. 93 Albert Embankment	01/09/2011	03/09/2011
L-P3	Albert Embankment crossing - between New Spring Gardens Walk and Glasshouse Walk	01/09/2011	03/09/2011
L-P4	Albert Embankment across Camelford House (Duck Tours slipway footpath)	01/09/2011	03/09/2011
L-P5	Albert Embankment east side (opposite L-P4)	01/09/2011	03/09/2011
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			

No surveys were undertaken during Phase 5.

Parking surveys

11.2.7 No parking surveys were undertaken in the London Borough of Lambeth.

Journey time surveys

11.2.8 No journey time surveys were undertaken in the London Borough of Lambeth.

River usage surveys

11.2.9 No river usage surveys were undertaken in the London Borough of Lambeth.

Data validation

11.2.10 There were no major issues experienced in the London Borough of Lambeth that were considered to have an effect on the validity of the survey data.

11.2.11 One minor issue was identified at L-J3 (Lambeth Palace Road, Lambeth Road, Albert Embankment, Lambeth Bridge). Resurfacing work was scheduled to take place between April and August 2011 along Albert Embankment, York Road and Stamford Street. The survey company also noted on site that there were an additional 4 sets of temporary traffic lights at the junction.

11.2.12 This is therefore potentially likely to have had an impact on traffic movements and operation of the junction. The survey results were reviewed against TfL Highway Assignment Model data and available TfL traffic data. Adjustments to the survey data were made for the assessment if necessary.

11.3 Secondary baseline data

11.3.1 This section summarises the data obtained from secondary sources in the London Borough of Lambeth.

Traffic data

11.3.2 The secondary traffic data listed in Table 11.3 were obtained from TfL in the London Borough of Lambeth. All TfL traffic data have been included in the GIS baseline database.

Table 11.3: TfL traffic data – London Borough of Lambeth

TfL survey ID	TfL survey type	Survey date(s)
176	ATC Survey	01/02/2011
289	Manual Turning Count	10/02/2009
917	Manual Turning Count	06/02/2007
1482	Manual Turning Count	12/11/2008
1483	Manual Turning Count	12/11/2008
1484	Manual Turning Count	12/11/2008
1485	Manual Turning Count	13/11/2008
1486	Manual Turning Count	12/11/2008
1489	Manual Turning Count	06/11/2008
1519	ATC / Speed	08/07/2008
1534	Speed Report	08/07/2008
1541	Speed Report	08/07/2008
1542	Speed Report	08/07/2008

Bus passenger data

11.3.3 No secondary bus passenger data were obtained in the London Borough of Lambeth.

Rail passenger data

11.3.4 Rail passenger data for National Rail and London Underground were obtained in the London Borough of Lambeth. A summary of the data obtained is shown in Table 11.4.

11.3.5 All London Underground data were obtained from TfL. National Rail data were obtained from the Office of Rail Regulation's (ORR) official published annual passenger data.

Table 11.4: Rail data – London Borough of Lambeth

Type	Station	Data obtained	Survey date(s)
National Rail	Vauxhall	Passengers entering and exiting stations yearly	2009-2010
London Underground	Vauxhall	Passengers entering and exiting stations. Boarding and alightings by Line, Line loads at stations. Data in 15min periods Weekday and Saturday. Station Entry also includes Sunday. Internal Passenger movements within stations	2010

River usage data

11.3.6 Secondary river usage data were obtained, where available, in order to understand the existing level of usage at piers in close proximity to construction sites. Table 11.5 summarises the information obtained within the London Borough of Lambeth.

Table 11.5: Pier usage data – London Borough of Lambeth

Pier name / location	Information obtained	Date(s)
Festival Pier	Monthly passenger numbers	1999-2010
Waterloo Pier	Monthly passenger numbers	1999-2003

Accident data

11.3.7 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

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12 Baseline data summary – City of London

12.1 Introduction

12.1.1 Primary and secondary data were obtained for the City of London in order to understand the baseline situation. These data have informed the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction site at Blackfriars Bridge Foreshore, and are summarised below.

12.2 Primary data collection

12.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

12.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

12.2.3 Table 12.1 summarises the junction surveys undertaken in the City of London, as well as the dates of the surveys.

ATC surveys

12.2.4 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

12.2.5 Table 12.2 summarises the ATC surveys that were undertaken in the City of London, as well as the dates these surveys were undertaken.

Table 12.1: Junction Surveys – City of London

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
C-J1	Temple Ave / Victoria Embankment (A3211)	10/05/2011	07/05/2011
Phase 2 Surveys			
C-J2	Junction of Farringdon St (A201) / Ludgate Hill / New Bridge St (A201)/Fleet St	14/07/2011	16/07/2011
Phase 3 Surveys			
C-J3	Blackfriars Underpass / Upper Thames Street A3211	14/09/2011	10/09/2011
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
C-J4	New Bridge Street / Queen Victoria Street/Blackfriars Bridge/Embankment	29/05/2012	26/05/2012
C-J5	New Bridge Street / Queen Victoria Street / Blackfriars Bridge / Embankment	29/05/2012	26/05/2012
C-J6	Queen Victoria Street / Puddle Dock	29/05/2012	26/05/2012

Table 12.2: ATC surveys – City of London

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
C-A1	A3211 Victoria Embankment	21/05/2011 – 10/06/2011
C-A2	A3211 Victoria Embankment	21/05/2011 – 10/06/2011
C-A3	A3211 Victoria Embankment	21/05/2011 – 10/06/2011
Phase 2 Surveys		
No surveys were undertaken during Phase 2		
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4		
Phase 5 Surveys		
No surveys were undertaken during Phase 5.		

Stand-alone pedestrian and cycle surveys

12.2.6 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements in other locations. These surveys were undertaken on both weekdays and Saturdays.

12.2.7 Table 12.3 summarises the pedestrian / cycle surveys undertaken in the City of London, as well as the dates these surveys were undertaken.

Table 12.3: Pedestrian and cycle surveys – City of London

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
C-P1	Thames Path – to the west of Blackfriars Bridge	10/05/2011	07/05/2011
C-P2	Thames Path – Paul's Walk	10/05/2011	07/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2			
Phase 3 Surveys			
C-P1	Pedestrian subway under the A3211 to the west of Blackfriars Bridge	25/08/2011	03/09/2011
C-P2	Upper level footway to the west of Blackfriars Bridge	01/09/2011	03/09/2011
C-P3	Lower level footway to the west of Blackfriars Bridge (Thames Path)	01/09/2011	03/09/2011
C-P4	Stairs from Blackfriars Bridge to the pedestrian underpass (west side of Blackfriars Bridge)	25/08/2011	03/09/2011
C-P5	Pedestrian walkway under Blackfriars Bridge (Thames Path)	25/08/2011	03/09/2011
Phase 4 Surveys			
No surveys were undertaken during Phase 4			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Parking surveys

12.2.8 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

12.2.9 Table 12.4 summarises the parking surveys undertaken in the City of London, and the dates these surveys were undertaken.

Table 12.4: Parking surveys – City of London

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
C-PK1	A3211 Victoria Embankment, Temple Avenue, Bouverie Street, Pleydell Street, Lombard Lane, Temple Lane, Tudor Street, Whitefriars Street, Tallis Street, Camelite Street, John Carpenter Street, Hutton Street, Primrose Hill, Kingscote Street, Bride Lane, Dorset Rise, Salisbury Ct, Bridewell Pl	10/05/2011	07/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Journey time surveys

12.2.10 Table 12.5 summarises the journey time surveys which were undertaken in the City of London, and the dates these surveys were undertaken.

Table 12.5: Journey time surveys – City of London

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
No surveys were undertaken during Phase 1.			
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
C-JS1	Victoria Embankment, Blackfriars Road, New Bridge Street, Queen Victoria Street, Upper Thames Street	29/05/2012	26/05/2011

River usage surveys

12.2.11 River usage surveys were undertaken to establish levels of activity and interface between river users and other footpath and road users during certain periods of the day. These surveys were undertaken on weekdays and weekends.

12.2.12 Table 12.6 summarises the river usage surveys undertaken at Blackfriars Bridge Foreshore in the City of London, and the dates these surveys were undertaken.

Table 12.6: River usage surveys – City of London

Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys		
No surveys were undertaken during Phase 1.		
Phase 2 Surveys		
No surveys were undertaken during Phase 2.		
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
Blackfriars Bridge Foreshore	10/05/2012 - 11/05/2012	12/05/2012 - 13/05/2012

Data validation

12.2.13 There were no major issues experienced in the City of London which affected the validity of the survey data. There were some minor issues experienced, at surveys including C-A2 and C-PK1.

12.2.14 C-A2 (A3211 Victoria Embankment) was affected by the closure of Blackfriars Underpass during week nights (2200 – 0345) and over weekends throughout the course of the ATC survey. Where the ATC data has been used for any weekday assessments the data will have been suitable for the assessment. Where data have been used in order to determine 24 hour or 18 hour traffic flows (5 day or 7 day), other TfL traffic data and information from the TfL Highway Assignment Models has been used in order to estimate the overall flow.

12.2.15 C-PK1, a parking survey to the west of Blackfriars junction, which includes Victoria Embankment and a number of local roads, experienced a loss of spaces due to roadworks, including 4 spaces and 2 disabled spaces on Dorset Rise, and 1 disabled space on John Carpenter Street. However this is not a considerable loss in spaces and therefore is not considered to be a significant issue.

12.3 Secondary baseline data

12.3.1 This section summarises the data obtained from secondary sources in the City of London.

Traffic data

12.3.2 The secondary traffic data listed in Table 12.7 were obtained from TfL in the City of London. All TfL traffic data have been included in the GIS baseline database.

Table 12.7: TfL traffic data – City of London

TfL survey ID	TfL survey type	Survey date(s)
45	Queue length survey	23/02/2010
302	Manual Turning Count	30/06/2009
318	Manual Turning Count	30/11/2010
319	Manual Turning Count	30/06/2009
556	Manual Turning Count	17/06/2009
2069	Manual Turning Count	30/11/2010

Bus passenger data

12.3.3 No secondary bus passenger data were obtained in the City of London.

Rail passenger data

12.3.4 Rail passenger data for National Rail and London Underground were obtained in the City of London. A summary of the data obtained is shown in Table 12.8.

12.3.5 All London Underground data were obtained from TfLand National Rail data were obtained from the Office of Rail Regulation's (ORR) official published annual passenger data.

Table 12.8: Rail data – City of London

<table>
<tr><th>Type</th><th>Station</th><th>Data obtained</th><th>Survey date(s)</th></tr>
<tr><td>National Rail</td><td>Blackfriars</td><td>Passengers entering and exiting stations yearly</td><td>2009-2010</td></tr>
<tr><td rowspan="2">London Underground</td><td>Blackfriars</td><td rowspan="2">Passengers entering and exiting stations. Boarding and alightings by line, line loads at stations. Data in 15min periods weekday and Saturday. Station entry also includes Sunday. Internal passenger movements within stations.</td><td rowspan="2">2010</td></tr>
<tr><td>Temple</td></tr>
</table>

River usage data

12.3.6 Secondary river usage data were obtained, where available, in order to understand the existing level of usage at piers in close proximity to construction sites. Table 12.9 summarises the information obtained within the City of London.

Table 12.9: Pier usage data – City of London

Pier name / location	Information obtained	Date(s)
Blackfriars Pier	Monthly passenger numbers	1999-2010
Tower Pier	Monthly passenger numbers	1999-2010

Accident data

12.3.7 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

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13 Baseline data summary – London Borough of Tower Hamlets

13.1 Introduction

13.1.1 Primary and secondary data were obtained for the London Borough of Tower Hamlets in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction site at King Edward Memorial Park and the minor works site at Bekesbourne Street, and are summarised below.

13.2 Primary data collection

13.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

13.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

13.2.3 Table 13.1 summarises the junction surveys undertaken in the London Borough of Tower Hamlets, as well as the dates of the surveys.

ATC surveys

13.2.4 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

13.2.5 Table 13.2 summarises the ATC surveys that were undertaken in the London Borough of Tower Hamlets, as well as the dates these surveys were undertaken.

Table 13.1: Junction surveys – London Borough of Tower Hamlets

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
T-J4	Glamis Road / A1203 The Highway	18/05/2011	21/05/2011
T-J5	Brodlove Lane / A1203 The Highway	18/05/2011	21/05/2011
T-J6	Butcher Row / A1203 The Highway / A1203 Limehouse Link	26/05/2011	21/05/2011
T-J7	Butcher Row / Ratcliffe Lane	19/05/2011	21/05/2011
T-J8	White Horse Road / A13 Commercial Road / Butcher Row	19/05/2011	21/05/2011
T-J9	Flamborough Street / Yorkshire Road / A13 Commercial Street / A101 Branch Road	19/05/2011	21/05/2011
Phase 2 Surveys			
T-J11	Cable St (B126) / Schoolhouse Lane	12/07/2011	09/07/2011
T-J12	Schoolhouse Lane / The Hwy (A1203)	12/07/2011	09/07/2011
T-J13	Cable St (B126) / Butcher Row (B126)	12/07/2011	09/07/2011
T-J14	Cable St (B126) / Brodlove Lane	12/07/2011	09/07/2011
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
T-P7		01/12/2011	26/11/2011
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Table 13.2: ATC surveys – London Borough of Tower Hamlets

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
T-A2	Glamis Road	21/05/2011 – 10/06/2011
T-A3	A13 Commercial Road	21/05/2011 – 10/06/2011
Phase 2 Surveys		
T-A7	Cable St (B126)	
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
No surveys were undertaken during Phase 5.		

Stand-alone pedestrian and cycle surveys

13.2.6 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements in other locations. These surveys were undertaken on both weekdays and Saturdays.

13.2.7 Table 13.3 summarises the pedestrian / cycle surveys undertaken in the London Borough of Tower Hamlets, as well as the dates these surveys were undertaken.

Parking surveys

13.2.8 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

13.2.9 Table 13.4 summarises the parking surveys undertaken in the London Borough of Tower Hamlets, and the dates these surveys were undertaken.

Table 13.3: Pedestrian and cycle surveys – London Borough of Tower Hamlets

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
T-P1	A13 Commercial Road - between Brodlove Lane and Glamis Road	18/05/2011	21/05/2011
T-P2	River frontage - King Edward Memorial Park	18/05/2011	21/05/2011
T-P3	From Butcher Row, past Theology Centre to Community Centre	18/05/2011	21/05/2011
Phase 2 Surveys			
T-P4	King Edward Memorial Park	14/07/2011	09/07/2011
Phase 3 Surveys			
T-P1	King Edward Memorial Park	24/08/2011	27/08/2011
T-P2	King Edward Memorial Park - Entrance from the The Highway	24/08/2011	27/08/2011
T-P4	King Edward Memorial Park	24/08/2011	27/08/2011
T-P5	Glamis Road east side	24/08/2011	27/08/2011
T-P6	Glamis Road west side	24/08/2011	27/08/2011
Phase 4 Surveys			
T-P7	Bekesbourne Street	01/12/2011	26/11/2011
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Table 13.4: Parking surveys – London Borough of Tower Hamlets

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
T-PK1	Includes Milk Yard, Monza Street, Wapping Wall, Glamis Road, Redcastle Close, Glamis Place	18/05/2011	21/05/2011
T-PK2	Between Stepney Causeway to the west, Cranford Street to the south, Commercial Road to the north, and Butcher Row to the east	19/05/2011	21/05/2011
T-PK3	Between Branch Road to the east, Bekesbourne Street to the south, Commercial Road to the north, and Butcher Row to the west	19/05/2011	21/05/2011
T-PK4	Between Belgrave Street to the west, Salmon Lane to the north, Yorkshire Road to the east, and Commercial Road to the south	19/05/2011	21/05/2011
T-PK5	Includes Narrow Street to river to the east , Horseferry Road	19/05/2011	21/05/2011
Phase 2 Surveys			
T-PK6	Devonport St, Barnardo St, Cable St, Brodlove Lane, Elf Row, Schoolhouse Lane, Spinner Court, Glasshouse Fields, Heckford St., Barnado Gardens	12/07/2011	09/07/2011
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Journey time surveys

13.2.10 No journey time surveys were undertaken in the London Borough of Tower Hamlets.

River usage surveys

13.2.11 No river usage surveys were undertaken in the London Borough of Tower Hamlets.

Data validation

13.2.12 There were no major issues in the London Borough of Tower Hamlets that affected the validity of the survey data. The one minor issue was at T-J4 (Glamis Road / the Highway), where it was stated by the survey company that on the Saturday a vehicle broke down and was obstructing a lane between 10:00 and 10:30. This was an off peak occurrence and therefore not considered tohave significantly influenced the data collected as far as the assessment is concerned.

13.3 Secondary baseline data

13.3.1 This section summarises the data obtained from secondary sources in the London Borough of Tower Hamlets.

Traffic data

13.3.2 The secondary traffic data listed in Table 13.5 were obtained from TfL in the London Borough of Tower Hamlets. All TfL traffic data have been included in the GIS baseline database.

Table 13.5: TfL traffic data – London Borough of Tower Hamlets

TfL survey ID	TfL survey type	Survey date(s)
1	ATC Survey	01/02/2011
24	ATC Survey	01/02/2011
33	ATC Survey	01/02/2011
1713	Manual Turning Count	23/04/2009
1724	Manual Turning Count	07/05/2009
1727	Manual Turning Count	18/09/2009
1729	Manual Turning Count	13/05/2008
2001	Cycle/Ped Count	06/11/2009 - 07/11/2009

Bus passenger data

13.3.3 No secondary bus passenger data were obtained in the London Borough of Tower Hamlets.

Rail passenger data

13.3.4 Rail passenger data for the Docklands Light Railway were obtained in the London Borough of Tower Hamlets. A summary of the data obtained is shown in Table 13.6.

13.3.5 All DLR data were obtained from TfL.

Table 13.6: Rail data – London Borough of Tower Hamlets

Type	Station	Data obtained	Survey date(s)
DLR	Limehouse	Weekday board and alight data	01/05/2011 – 25/06/2011

Accident data

13.3.6 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

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14 Baseline data summary – London Borough of Southwark

14.1 Introduction

14.1.1 Primary and secondary data were obtained in the London Borough of Southwark in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction site at Chambers Wharf and the minor works site at Shad Thames Pumping Station, and are summarised below.

14.2 Primary data collection

14.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

14.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

14.2.3 Table 14.1 summarises the junction surveys undertaken in the London Borough of Southwark, as well as the dates of the surveys.

Table 14.1: Junction surveys – London Borough of Southwark

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
S-J6	Tanner Street (A200) / Druid Street (A200)	10/05/2011	07/05/2011
S-J7	Jamaica Road (A200) / Tooley Street (A200) / Tanner Street (A200)	10/05/2011	07/05/2011
S-J8	Jamaica Road (A200) / Abbey Street (B202)	11/05/2011	14/05/2011
S-J9	Bevington St / Jamaica Rd (A200) / St. James's Rd	11/05/2011	14/05/2011
S-J10	Bevington St / Scott Lidgett Crescent / Bevington St / Scott Lidgett Crescent	11/05/2011	14/05/2011
S-J11	Chambers St / Bevington St	12/05/2011	07/05/2011
S-J12	West Lane / Paradise Street	12/05/2011	07/05/2011
S-J13	Jamaica Road (A200) / Southwark Park Road / West Lane	12/05/2011	07/05/2011

S-J14	Cathay Street / Paradise Street	12/05/2011	07/05/2011
S-J21	Lower Road N (A200) / Plough Way / Rotherhithe New Rd	12/05/2011	07/05/2011
S-J22	Plough Way (B202) / Yeoman Street / Plough Way (B202)	12/05/2011	07/05/2011
Phase 2 Surveys			
S-J3	Junction of Tower Bridge Rd (A100) / Tooley St (A200)	12/07/2011	09/07/2011
S-J4	Junction of Tower Bridge Rd (A100) / Druid St (A200)	12/07/2011	09/07/2011
S-J15	Junction of Jamaica Rd (A200) / Brunel Rd (B205) / Rotherhithe Tunnel (A101) / Lower Rd (A200)	12/07/2011	16/07/2011
S-J16	Junction of Lower Rd (A200) / Surrey Quays Rd	12/07/2011	16/07/2011
S-J17	Juction of Lower Rd (A200) / Hawkstone Rd (A2208) / Rotherhithe Old Rd (A200)	14/07/2011	16/07/2011
S-J18	Junction of Lower Rd (A200)/Redriff Rd (B205)	14/07/2011	16/07/2011
S-J20	Junction of Rotherhithe New Rd (A2208) / Rotherhithe Old Rd (A200)	14/07/2011	16/07/2011
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

ATC surveys

14.2.4 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

14.2.5 Table 14.2 summarises the ATC surveys that were undertaken in the London Borough of Southwark, as well as the dates these surveys were undertaken.

Table 14.2: ATC surveys – London Borough of Southwark

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
S-A3	A200 Tooley Street	21/05/2011 – 10/06/2011
S-A4	A100 Tower Bridge Road	21/05/2011 – 10/06/2011
S-A6	A200 Jamaica Road	21/05/2011 – 10/06/2011
S-A7	A200 Jamaica Road	21/05/2011 – 10/06/2011
S-A8	A200 Lower Road	21/05/2011 – 10/06/2011
Phase 2 Surveys		
No surveys were undertaken during Phase 2		
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
No surveys were undertaken during Phase 5.		

Stand-alone pedestrian and cycle surveys

14.2.6 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements in other locations. These surveys were undertaken on both weekdays and Saturdays.

14.2.7 Table 14.3 summarises the pedestrian / cycle surveys undertaken in the London Borough of Southwark, as well as the dates these surveys were undertaken.

Table 14.3: Pedestrian and cycle surveys – London Borough of Southwark

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
S-P1	Thames Path – Shad Thames	10/05/2011	07/05/2011
S-P2	Pedestrian crossing on Tooley Street	10/05/2011	07/05/2011
S-P3	Pedestrian crossing on Tanner Street	10/05/2011	07/05/2011
S-P4	Pedestrian crossing on Jamaica Road	11/05/2011	14/05/2011
S-P5	Pedestrian crossing on Jamaica Road	11/05/2011	14/05/2011
S-P6	Pedestrian crossing on Jamaica Road	12/05/2011	07/05/2011
S-P7	Thames Path – between Fulford Street and King Stairs Close	12/05/2011	07/05/2011
S-P8	King Stairs Gardens – east to west	12/05/2011	07/05/2011
S-P9	King Stairs Gardens – north to south	12/05/2011	07/05/2011
S-P10	Pedestrian crossing on Rotherhithe Tunnel	12/05/2011	07/05/2011
S-P11	Pedestrian crossing on A200 Lower Road	12/05/2011	07/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2			
Phase 3 Surveys			
S-P1	Thames Path – Shad Thames	24/08/2011	27/08/2011
S-P7	Thames Path – between Fulford Street and King Stairs Close	24/08/2011	27/08/2011
S-P9	King Stairs Gardens	24/08/2011	27/08/2011
S-P12	Thames Path along Chambers Street, Loftie Street (to the east) and Bermondsey Wall West (to the west)	24/08/2011	27/08/2011
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Parking surveys

14.2.8 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

14.2.9 Table 14.4 summarises the parking surveys undertaken in the London Borough of Southwark, and the dates these surveys were undertaken.

Table 14.4: Parking surveys – London Borough of Southwark

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
S-PK1	Shad Thames, Brewery Square, Horselydown Lane, Copper Row, Lafone Street, Queen Elizabeth Street, Boss Street, Curlew Street, Gainsford Street, Maguire Street, Three Oak Lane	12/05/2011	14/05/2011
S-PK2	Cherry Garden Street, Pottery Street, Bermondsey Wall East, Marigold Street, Wilson Grove, Emba Street, Jeneway Street, Jeneway Place, Bevington Street, Waterside Close, Scott Lidgett Crescent, Loftie Street, Chambers Street, Llewellyn Street, Flockton Street, George Row, East Lane, Mill Street, Jacob Street, Wolseley Street, Parker's Row, Dockhead, Fulford Street, Cathay Street, Paradise Street, West Lane, Elephant Lane, King Stairs Close, Rotherhithe Street, Cottle Lane, St. Marychurch Street, Tunnel Road, Railway Avenue, Rupack Street	12/05/2011	14/05/2011
S-PK3	Greenland Quay Rope Street Chilton Grove B206 Plough Way Lighter Close Croft Street Sweden Gate Yeoman Street Trident Street	11/05/2011	07/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Journey time surveys

14.2.10 Table 14.5 summarises the journey time surveys undertaken in the London Borough of Southwark, and the dates these surveys were undertaken.

Table 14.5: Journey time surveys – London Borough of Southwark

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date

Phase 1 Surveys			
No surveys were undertaken during Phase 1.			
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
S-JS1	Victoria Embankment, Blackfriars Road, New Bridge Street, Queen Victoria Street, Upper Thames Street	29/05/2012	26/05/2011

River usage surveys

14.2.11 No river usage surveys were undertaken in the London Borough of Southwark.

Data validation

14.2.12 There were no major issues in the London Borough of Southwark that affected the validity of the survey data. There were a number of minor issues that affected surveys S-J13, S-J21, S-A4, S-PK1, and S-PK3.

14.2.13 At S-J13 (Jamaica Road, Southwark Park Road, West Lane), there were roadworks, which caused some delays and queues during the Saturday survey. This has been considered in preparing the assessment, with adjustments made to the data if necessary based on reference to available TfL traffic data and other surveys undertaken in the local vicinity, such as S-A7 and S-J15 to understand if the works had an effect on traffic volumes and/or movements.

14.2.14 At S-J21 (Lower Road A200, Plough Way, Rotherhithe New Road) it was recorded there was roadworks on Plough Road during the Saturday survey between 10:00 and 13:00. However this was not recorded to have any significant effect on the operation of the junction. This has been reviewed against other surveys undertaken in the vicinity, including S-J22 to understand if there were any effects on traffic volumes.

14.2.15 The ATC survey S-A4 (Tower Bridge Road) was subject to failures, between 21st – 24th May and 4th – 7th May, but it was considered that sufficient data was available from this survey to inform the assessment.

14.2.16 In addition there were some minor issues observed at parking surveys S-PK1 and S-PK3. At S-PK1 there were some areas unavailable for parking due to roadworks. These totaleed 15 parking bays which are subject to time restrictions and the loss of these bays was therefore considered unlikely to affect the recorded parking demand. At S-PK3 it was reported that there were 6 unrestricted bays and 1restricted bay unavailable for use. This is not considered to have a significant impact on the recorded parking demand.

14.3 Secondary baseline data

14.3.1 This section summarises the data obtained from secondary sources in the London Borough of Southwark.

Traffic data

14.3.2 The secondary traffic data listed in Table 14.6 were obtained from TfL in the London Borough of Southwark. All TfL traffic data have been included in the GIS baseline database.

Table 14.6: TfL traffic data – London Borough of Southwark

TfL survey ID	TfL survey type	Survey date(s)
18	ATC Survey	01/02/2011
1040	Manual Turning Count	23/03/2010
1124	Manual Turning Count	20/03/2008
1125	Manual Turning Count	24/03/2010
1703	Manual Turning Count	23/10/2008
1744	Manual Turning Count	25/06/2009
2145	Manual Turning Count	05/11/2009
2146	Manual Turning Count	05/11/2009
2147	Manual Turning Count	04/11/2009
2148	Manual Turning Count	05/11/2009
2160	Manual Turning Count	20/10/2009
2161	Manual Turning Count	20/10/2009
2162	Manual Turning Count	20/10/2009
2163	Manual Turning Count	21/10/2009
2228	Manual Turning Count	24/03/2010
2229	Manual Turning Count	23/03/2010
2230	Manual Turning Count	25/03/2010
2231	Manual Turning Count	25/03/2010
2232	Manual Turning Count	25/03/2010
2233	Manual Turning Count	28/03/2010
2234	Manual Turning Count	25/03/2010
2235	Manual Turning Count	24/03/2010
2236	Manual Turning Count	24/03/2010
2510	Manual Turning Count	19/06/2010
2511	ATC - link flow	02/03/2010
2519	Manual Turning Count	22/07/2010

Bus passenger data

14.3.3 No secondary bus passenger data were obtained in the London Borough of Southwark.

Rail passenger data

14.3.4 Rail passenger data for National Rail, London Underground and London Overground were obtained in the London Borough of Southwark. A summary of the data obtained is shown in Table 14.7.

14.3.5 All rail data were obtained from TfL, with the exception of the National Rail data which were obtained from the Office of Rail Regulation's (ORR) official published annual passenger data.

Table 14.7: Rail data – London Borough of Southwark

<table>
<tr><th>Type</th><th>Station</th><th>Data obtained</th><th>Survey date(s)</th></tr>
<tr><td>National Rail</td><td>London Bridge</td><td>Passengers entering and exiting stations yearly</td><td>2009-2010</td></tr>
<tr><td rowspan="4">London Underground</td><td>Bermondsey</td><td rowspan="4">Passengers entering and exiting stations. Boarding and alightings by line, line loads at stations. Data in 15min periods weekday and Saturday. Station entry also includes Sunday. Internal passenger movements within stations.</td><td rowspan="4">2010</td></tr>
<tr><td>Canada Water</td></tr>
<tr><td>London Bridge</td></tr>
<tr><td>Southwark</td></tr>
<tr><td>London Overground</td><td>Surrey Quays</td><td>Weekday board and alight data</td><td>2010</td></tr>
</table>

River usage data

14.3.6 Secondary river usage data have been obtained, where available, in order to understand the existing level of usage at piers in close proximity to construction sites. Table 14.8 summarises the information obtained within the London Borough of Southwark.

Table 14.8: Pier usage data – London Borough of Southwark

Pier name / location	Information obtained	Date(s)
Bankside Pier	Monthly passenger numbers	1999-2010

Accident data

14.3.7 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

15 Baseline data summary – London Borough of Lewisham

15.1 Introduction

15.1.1 Primary and secondary data were obtained in the London Borough of Lewisham in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction sites at Earl Pumping Station and Deptford Church Street, and are summarised below.

15.2 Primary data collection

15.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

15.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

15.2.3 Table 15.1 summarises the junction surveys undertaken in the London Borough of Lewisham, as well as the dates of the surveys.

ATC surveys

15.2.4 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

15.2.5 Table 15.2 summarises the ATC surveys that were undertaken in the London Borough of Lewisham, as well as the dates these surveys were undertaken.

Table 15.1: Junction surveys – London Borough of Lewisham

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
LW-J1	Lower Road, Evelyn Street (A200), Bestwood Street	12/05/2011	07/05/2011
LW-J3	A2209 Deptford Church Street , Coffey Street , Bronze Street	11/05/2011	14/05/2011
LW-J6	Deptford Church St (A2209), Deptford Bridge (A2), Brookmill Rd (A2210), New Cross Rd (A2)	11/05/2011	14/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Table 15.2: ATC surveys – London Borough of Lewisham

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
LW-A1	A200 Evelyn Street to west of junction with Alloa Road	21/05/2011 – 10/06/2011
LW-A3	A2209 Deptford Church Street	21/05/2011 – 10/06/2011
LW-A4	A2 New Cross Road to east of junction with Watson’s Street	21/05/2011 – 10/06/2011
Phase 2 Surveys		
No surveys were undertaken during Phase 2.		
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
No surveys were undertaken during Phase 5.		

Stand-alone pedestrian and cycle surveys

15.2.6 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements in other locations. These surveys were undertaken on both weekdays and Saturdays.

15.2.7 Table 15.3 summarises the pedestrian / cycle surveys undertaken in the London Borough of Lewisham, as well as the dates these surveys were undertaken.

Table 15.3: Pedestrian and cycle surveys – London Borough of Lewisham

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
LW-P1	A200 Evelyn Street pedestrian crossing south of junction with Alloa Road	12/05/2011	07/05/2011
LW-P2	A200 Evelyn Street pedestrian crossing south of Grove Street	12/05/2011	07/05/2011
LW-P3	A200 Evelyn Street pedestrian crossing	12/05/2011	07/05/2011
LW-P4	A200 Evelyn Street pedestrian crossing west of junction with New King Street	12/05/2011	07/05/2011
LW-P5	Deptford High Street pedestrian crossing to north of junction with Crossfield Street	12/05/2011	07/05/2011
LW-P6	Deptford High Street pedestrian crossing adjacent to the railway station	12/05/2011	07/05/2011
LW-P7	Deptford Church Street pedestrian crossing at junction with Coffey Street	11/05/2011	14/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Parking surveys

15.2.8 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

15.2.9 Table 15.4 summarises the parking surveys undertaken in the London Borough of Lewisham, and the dates these surveys were undertaken.

Table 15.4: Parking surveys – London Borough of Lewisham

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
LW-PK1	Yeoman Street, Croft Street, Woodcroft Mews, Acacia Close	11/05/2011	07/05/2011
Phase 2 Surveys			
LW-PK2	Albury Street, Mary Ann Buildings, Hyde Street, Hamilton Street E, Deptford High Street, Ffinch Street, Crossfield Street, Coffey Street, Resolution Way, Giffin Street, Frankham Street, Deptford Church Street A2209, Bronze Street, Creekside	13/07/2011	09/07/2011
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Journey time surveys

15.2.10 No journey time surveys were undertaken in the London Borough of Lewisham.

River usage surveys

15.2.11 No river usage surveys were undertaken in the London Borough of Lewisham.

Data validation

15.2.12 There were no major issues in the London Borough of Lewisham that were considered to affect the validity of the survey results.

15.2.13 Two ATC surveys (LW-A1 and LW-A4) were subject to minor failures, however these were both rectified in less than 24 hours. In addition, it was observed by the survey company that at LW-P6 (Deptford High Street pedestrian crossing) the majority of pedestrians did not use the formal crossing point, as traffic volumes were relatively low. Pedestrian movements were also collected for pedestrians crossing 10m either side of the pedestrian crossing facility.

15.3 Secondary baseline data

15.3.1 This section summarises the data obtained from secondary sources in the London Borough of Lewisham.

Traffic data

15.3.2 The secondary traffic data listed in Table 15.5 were obtained from TfL in the London Borough of Lewisham. All TfL traffic data have been included in the GIS baseline database.

Table 15.5: TfL traffic data – London Borough of Lewisham

TfL survey ID	TfL survey type	Survey date(s)
1331	Bus Journey Time	2007
2149	Manual Turning Count	25/11/2010
2151	Manual Turning Count	24/11/2010

Bus passenger data

15.3.3 No secondary bus passenger data were obtained in the London Borough of Lewisham.

Rail passenger data

15.3.4 Rail passenger data for National Rail were obtained in the London Borough of Lewisham. A summary of the data obtained is shown in Table 15.6.

15.3.5 National Rail data were obtained from the Office of Rail Regulation's (ORR) official published annual passenger data.

Table 15.6: Rail data – London Borough of Lewisham

Type	Station	Data obtained	Survey date(s)
National Rail	Deptford Bridge	Passengers entering and exiting stations yearly	2009-2010

Accident data

15.3.6 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

16 Baseline data summary – Royal Borough of Greenwich

16.1 Introduction

16.1.1 Primary and secondary data were obtained in the Royal Borough of Greenwich in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction site at Greenwich Pumping Station, and are summarised below.

16.2 Primary data collection

16.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

16.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

16.2.3 Table 16.1 summarises the junction surveys undertaken in the Royal Borough of Greenwich, as well as the dates of the surveys.

Table 16.1: Junction surveys – Royal Borough of Greenwich

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
G-J3	Creek Rd (A200), Deptford Church Street	17/05/2011	14/05/2011
G-J4	Glaisher Street, Creek Rd (A200)	17/05/2011	14/05/2011
G-J5	Norway Street, Creek Road, Norman Rd (B208)	17/05/2011	14/05/2011
G-J7	Greenwich High Rd (A206), Norman Rd (B208)	17/05/2011	14/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			

No surveys were undertaken during Phase 5.

ATC surveys

16.2.4 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

16.2.5 Table 16.2 summarises the ATC surveys that were undertaken in the Royal Borough of Greenwich, as well as the dates these surveys were undertaken.

Table 16.2: ATC surveys – Royal Borough of Greenwich

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
G-A1	A200 Creek Road	21/05/2011 – 10/06/2011
Phase 2 Surveys		
No surveys were undertaken during Phase 2		
Phase 3 Surveys		
No surveys were undertaken during Phase 3.		
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
No surveys were undertaken during Phase 5.		

Stand-alone pedestrian and cycle surveys

16.2.6 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements in other locations. These surveys were undertaken on both weekdays and Saturdays.

16.2.7 Table 16.3 summarises the pedestrian / cycle surveys undertaken in the Royal Borough of Greenwich, as well as the dates these surveys were undertaken.

Table 16.3: Pedestrian and cycle surveys – Royal Borough of Greenwich

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
G-P1	Pedestrian crossing	17/05/2011	14/05/2011
G-P2	Pedestrian crossing on Creek Road	17/05/2011	14/05/2011
G-P3	Pedestrian crossing on Creek Road	17/05/2011	14/05/2011
G-P4	Pedestrian crossing on Greenwich High Road	17/05/2011	14/05/2011
G-P5	Pedestrian route at junction of Borthwick Street / Deptford Green and footpath to Glaisher Street	17/05/2011	14/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Parking surveys

16.2.8 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

16.2.9 Table 16.4 summarises the parking surveys undertaken in the Royal Borough of Greenwich, and the dates these surveys were undertaken.

Table 16.4: Parking surveys – Royal Borough of Greenwich

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
G-PK1	Norman Road, Thornham Street, Claremont Street, Roan Street, Tarves Way, Ashburnham Place, Ashburnham Grove, Devonshire Dr, Haddo Street, Waller Way, Langdale Rd	17/05/2011	14/05/2011
G-PK2	Trevithick Street, Brig Mews, Carrick Mews, Borthwick Street, Benbow Street, McMillan Street, Deptford Green, Henrietta Close, Hamilton Crescent, Glaisher Street, Basevi Way, Stowage, Gonson Street	17/05/2011	14/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Journey time surveys

16.2.10 No journey time surveys were undertaken in the Royal Borough of Greenwich.

River usage surveys

16.2.11 No river usage surveys were undertaken in the Royal Borough of Greenwich.

Data Validation

16.2.12 There were no major issues in the London Borough of Greenwich that were considered to have an effect on the validity of the survey results.

16.2.13 At G-J4 (Glaisher Street, Creek Road) it was recorded that there were no traffic lights in operation at Glaisher Road on the 17th May. This is a 3 arm junction, with Glaisher Road being a minor arm to a residential area, and is therefore not considered to have had a significant effect on the operation of the junction. The data collected have been compared with TfL Highway Assignment Model and local model datawith amendments made in the course of the assessment if necessary.

16.2.14 At G-J5 (Norway Street, Creek Road, Norman Road) it was recorded that there were roadworks on Creek Road during the Saturday, with temporary traffic lights in place, causing queues and congestion. The recorded data has been compared against other data sources, such as the ATC survey G-A1, to understand if these works had any significant implications on traffic volumes, with amendments made as part of the assessment if necessary.

16.3 Secondary baseline data

16.3.1 This section summarises the data obtained from secondary sources in the Royal Borough of Greenwich.

Traffic data

16.3.2 The secondary traffic data listed in Table 16.5 were obtained from TfL in the Royal Borough of Greenwich. All TfL traffic data have been included in the GIS baseline database.

Table 16.5: TfL traffic data – Royal Borough of Greenwich

TfL survey ID	TfL survey type	Survey date(s)
1342	Pedestrian Count	07/05/2008
2150	Manual Turning Count	23/11/2010

Bus passenger data

16.3.3 No secondary bus passenger data were obtained in the Royal Borough of Greenwich.

Rail passenger data

16.3.4 Rail passenger data for National Rail and the Docklands Light Railway were obtained in the Royal Borough of Greenwich. A summary of the data obtained is shown in Table 16.6.

16.3.5 All DLR data were obtained from TfL and National Rail data were obtained from the Office of Rail Regulation's (ORR) official published annual passenger data.

Table 16.6: Rail data – Royal Borough of Greenwich

Type	Station	Data obtained	Survey date(s)
National Rail	Greenwich	Passengers entering and exiting stations yearly	2009-2010
DLR	Greenwich	Passengers entering and exiting stations. Boarding and alightings by line, line loads at stations. Data in 15min periods weekday and Saturday. Station entry also includes Sunday. Internal passenger movements within stations.	2010
DLR	Greenwich	Weekday board and alight data	01/05/2011 – 25/06/2011

River usage data

16.3.6 Secondary river usage data were obtained, where available, in order to understand the existing level of usage at piers in close proximity to construction sites. Table 16.7 summarises the information obtained.

Table 16.7: Pier usage data – Royal Borough of Greenwich

Pier name / location	Information obtained	Date(s)
Greenwich Pier	Monthly passenger numbers	1999-2010

Accident data

16.3.7 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

17 Baseline data summary – London Borough of Newham

17.1 Introduction

17.1.1 Primary and secondary data were obtained in the London Borough of Newham in order to understand the baseline situation. These data have informed part of the assessment of the transport effects associated with the Thames Tideway Tunnel project, including the assessment of the construction sites at Abbey Mills Pumping Station and Beckton Sewage Treatment Works, and are summarised below.

17.2 Primary data collection

17.2.1 The field survey locations for each borough are shown in **Annex C**.

MCC and queue length surveys

17.2.2 Junction surveys were undertaken in order to collect turning movements; queue lengths; pedestrian / cycle movements; and green times / cycle times.

17.2.3 Table 17.1 summarises the junction surveys undertaken in the London Borough of Newham, as well as the dates of the surveys.

Table 17.1: Junction surveys – London Borough of Newham

Survey ref.	Junction survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
N-J1	A118 Stratford High Street, Abbey Lane	19/05/2011	21/05/2011
N-J4	Jenkins Lane, exit to Alfred's Way (A13)	19/05/2011	21/05/2011
N-J5	Jenkins Lane, Entrance to car park, exit from car park, Spur Rd	19/05/2011	21/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

ATC surveys

17.2.4 ATC surveys were undertaken in order to obtain fully classified volumetric data, as well as recording speeds.

17.2.5 Table 17.2 summarises the ATC surveys that were undertaken in the London Borough of Newham, as well as the dates these surveys were undertaken.

Table 17.2: ATC surveys – London Borough of Newham

ATC survey ref.	ATC survey location description	Dates and duration of ATC survey
Phase 1 Surveys		
N-A3	Jenkins Lane	21/05/2011 – 10/06/2011
Phase 2 Surveys		
No surveys were undertaken during Phase 2		
Phase 3 Surveys		
N-A4	Abbey Lane	07/09/2011 – 22/09/2011
Phase 4 Surveys		
No surveys were undertaken during Phase 4.		
Phase 5 Surveys		
No surveys were undertaken during Phase 5.		

Stand-alone pedestrian and cycle surveys

17.2.6 Pedestrian and cycle surveys in addition to those which formed part of the junction counts were undertaken in order to record pedestrian and cycle movements in other locations. These surveys were undertaken on both weekdays and Saturdays.

17.2.7 Table 17.3 summarises the pedestrian / cycle surveys undertaken in the London Borough of Newham, as well as the dates these surveys were undertaken.

Table 17.3: Pedestrian and cycle surveys – London Borough of Newham

Survey ref.	Pedestrian and cycle survey location description	Weekday survey date	Saturday survey date
Phase 1 Surveys			
N-P1	Pedestrian route from Bisson Road across Prescott Channel	19/05/2011	21/05/2011
N-P2	Pedestrian route from Gay Road to Willis Road	19/05/2011	21/05/2011
N-P3	Junction of Abbey Lane / Abbotsbury Close – east to west	19/05/2011	21/05/2011
N-P4	Junction of Abbey Lane / Abbotsbury Close – north to south	19/05/2011	21/05/2011
N-P5	Pedestrian route south of J5	19/05/2011	21/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
N-P1	Pedestrian route from Bisson Road across Prescott Channel	01/09/2011	03/09/2011
N-P2	Pedestrian route from Gay Road to Willis Road	01/09/2011	03/09/2011
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Parking surveys

17.2.8 Parking surveys were undertaken in order to understand the parking occupancy levels during certain periods of the day. These surveys were undertaken on both a weekday and Saturday.

17.2.9 Table 17.4 summarises the parking surveys undertaken in the London Borough of Newham, and the dates these surveys were undertaken.

Table 17.4: Parking surveys – London Borough of Newham

Survey ref.	Roads / area covered	Weekday survey date	Saturday survey date
Phase 1 Surveys			
N-PK1	Abbey Lane, Godfrey St, Abbotsbury Close, Britten Court, Gay Road, Delius Grove, Riverside Road, Streimer Road, Leggatt Road, Bisson Road, Claypole Road	19/05/2011	21/05/2011
N-PK2	Retail car park	19/05/2011	21/05/2011
Phase 2 Surveys			
No surveys were undertaken during Phase 2.			
Phase 3 Surveys			
No surveys were undertaken during Phase 3.			
Phase 4 Surveys			
No surveys were undertaken during Phase 4.			
Phase 5 Surveys			
No surveys were undertaken during Phase 5.			

Journey time surveys

17.2.10 No journey time surveys were undertaken in the London Borough of Newham.

River usage surveys

17.2.11 No river usage surveys were undertaken in the London Borough of Newham.

Data validation

17.2.12 There were no major issues in the London Borough of Newham that were considered to have an effect on the validity of the survey results.

17.2.13 The one minor issue was at N-A3 (Jenkins Lane), where the ATC tubes failed between 6th – 7th June 2011 and 9th – 10th June 2011. However it is still considered that sufficient data was obtained to inform the assessment.

17.3 Secondary baseline data

17.3.1 This section summarises the data obtained from secondary sources in the London Borough of Newham.

Traffic data

17.3.2 The secondary traffic data listed in Table 17.5 were obtained from TfL in the London Borough of Newham. All TfL traffic data have been included in the GIS baseline database.

Table 17.5: TfL traffic data – London Borough of Newham

TfL survey ID	TfL survey type	Survey date(s)
17	ATC Survey	01/02/2011
30	ATC Survey	01/02/2011
94	ATC Survey	01/02/2011
388	Manual Turning Count	30/04/2009
786	Manual Turning Count	12/10/2010

Bus passenger data

17.3.3 No secondary bus passenger data were obtained in the London Borough of Newham.

Rail passenger data

17.3.4 Rail passenger data for London Underground and the Docklands Light Railway were obtained in the London Borough of Newham. A summary of the data obtained is shown in Table 17.6.

17.3.5 All London Underground and DLR data were obtained from TfL.

Table 17.6: Rail data – London Borough of Newham

Type	Station	Data obtained	Survey date(s)
London Underground	West Ham	Passengers entering and exiting stations. Boarding and alightings by line, line loads at stations. Data in 15min periods weekday and Saturday. Station entry also includes Sunday. Internal passenger movements within stations.	2010
DLR	Gallions Reach	Weekday board and alight data	01/05/2011 – 25/06/2011

Accident data

17.3.6 Personal Injury Accident record data were obtained from TfL for the period between 2006 and 2011. The extent of this information is shown in **Annex B**.

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Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Transport Assessment

Doc Ref: **7.10**

Appendix A Figures

APFP Regulations 2009: Regulation **5(2)(q)**

Hard copy available in

Box **49** Folder **A**
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

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Annexes

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Annex A – Baseline data GIS database (using Arc Reader) – CD

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Annex B – Accident data

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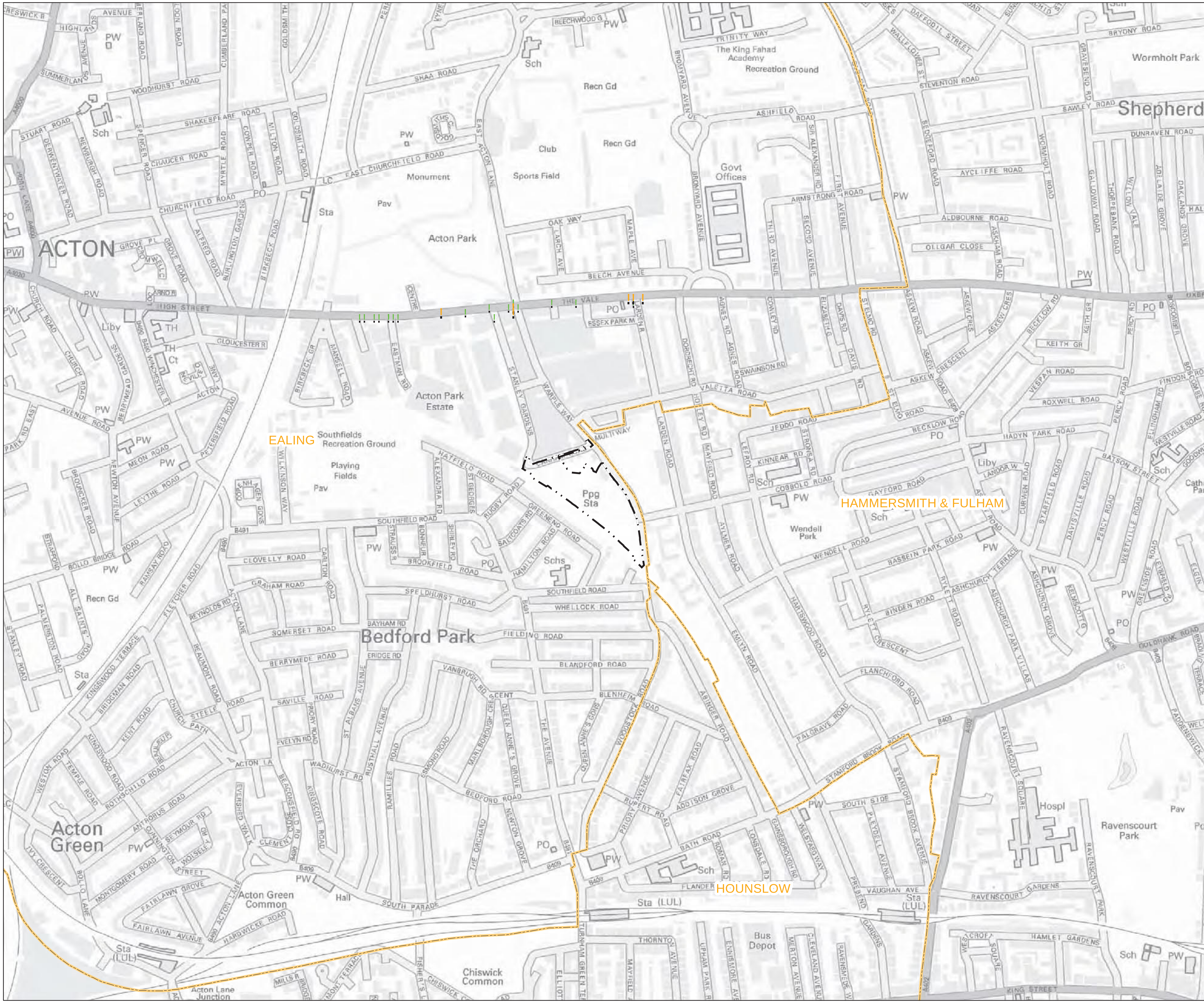

Keyplan:

Key

- Slight
- Serious
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Acton Storm Tanks

London Borough of Ealing

Document Information

Transport Assessment

Transport - accident locations

Figure 4.4.7

1PL03-TT-50761

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water

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Keyplan:

Key

- Slight
- Serious
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location
Hammersmith Pumping Station
London Borough of Hammersmith & Fulham

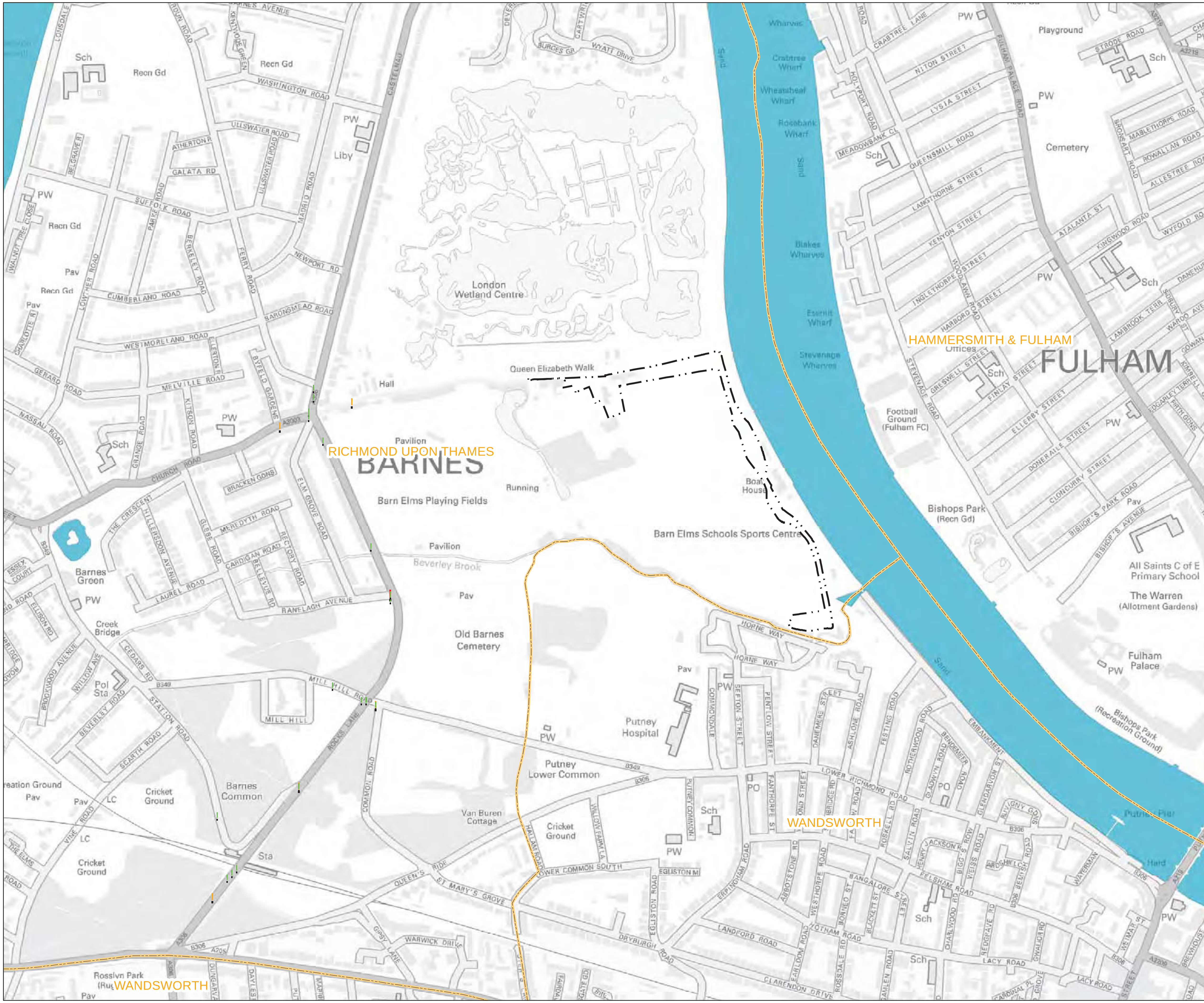
Document Information
Transport Assessment
Transport - accident locations

Figure 5.4.7

1PL03-TT-50749
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



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Keyplan:

Key

- ! Slight
- ! Serious
- ! Fatal
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location
Barn Elms
London Borough of Richmond

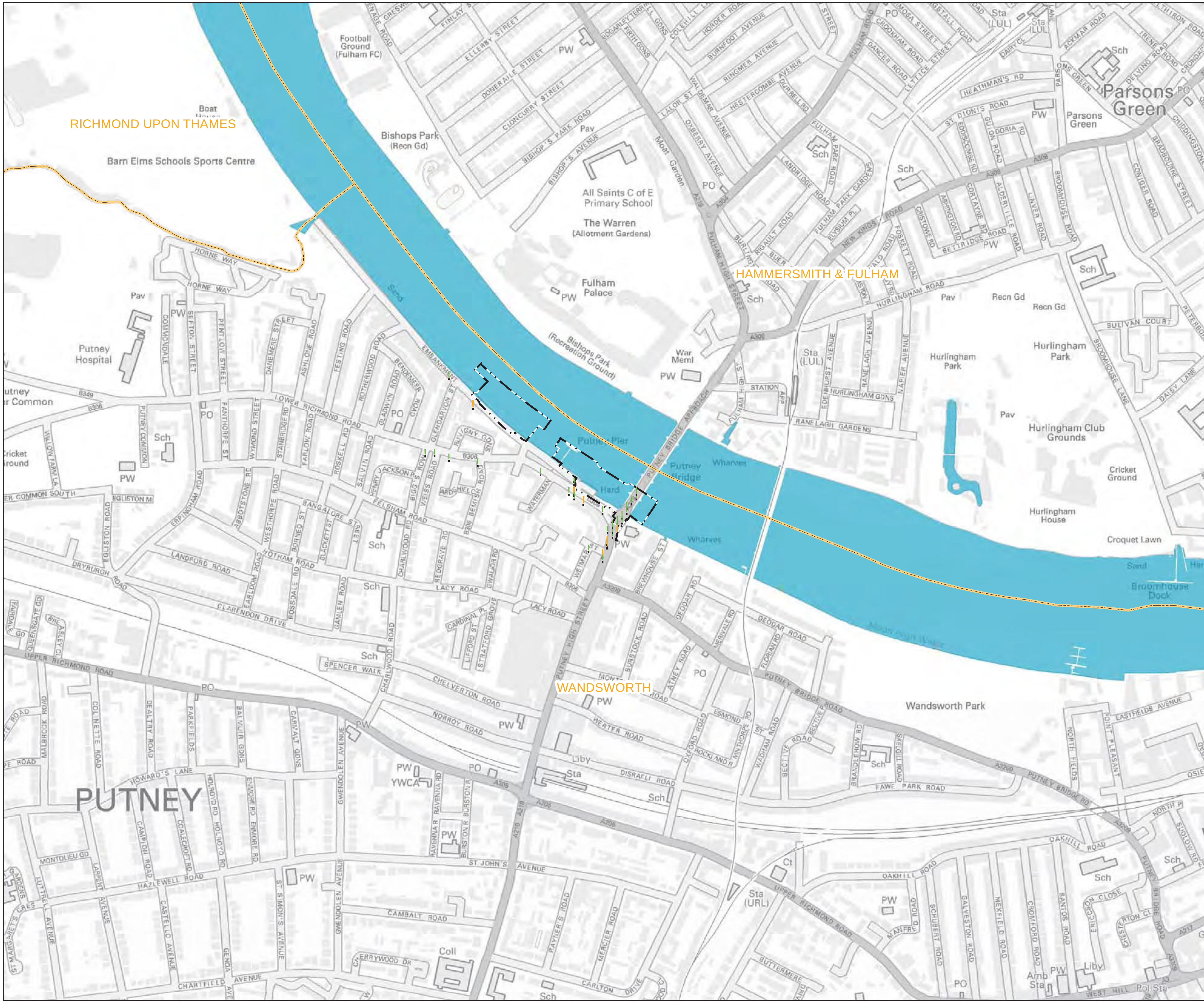
Document Information
Transport Assessment
Transport - accident locations

Figure 6.4.7

1PL03-TT-50763
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Slight
- Serious
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Putney Embankment Foreshore

London Borough Of Wandsworth

Document Information

Transport Assessment

Transport - accident locations

Figure 7.4.7

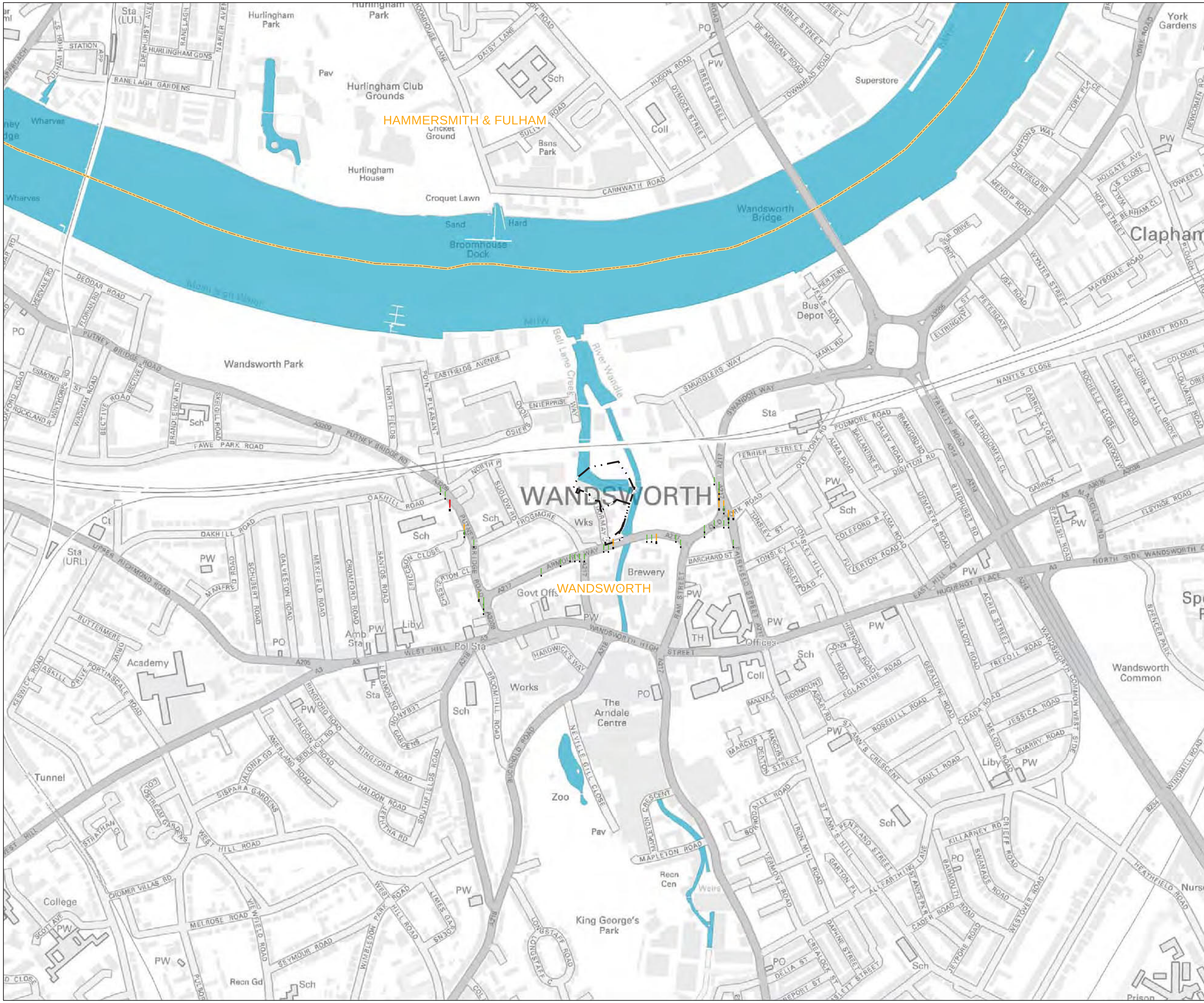
1PL03-TT-50758

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Slight
- Serious
- Fatal
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Dormay Street

London Borough of Wandsworth

Document Information

Transport Assessment

Transport - accident locations

Figure 8.4.7

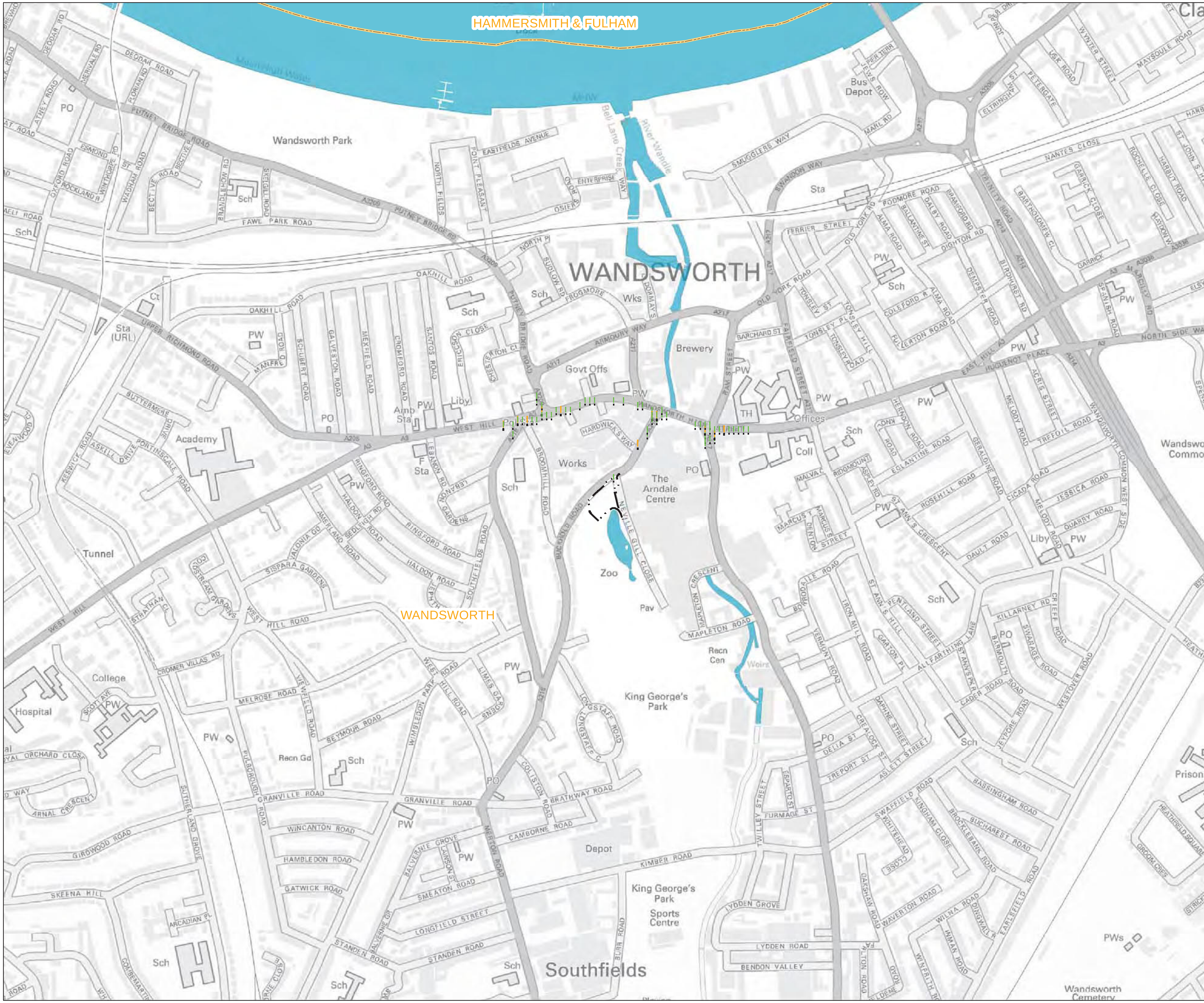
1PL03-TT-50764

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Slight
- Serious
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

King George's Park

London Borough of Wandsworth

Document Information

Transport Assessment

Transport - accident locations

Figure 9.4.7

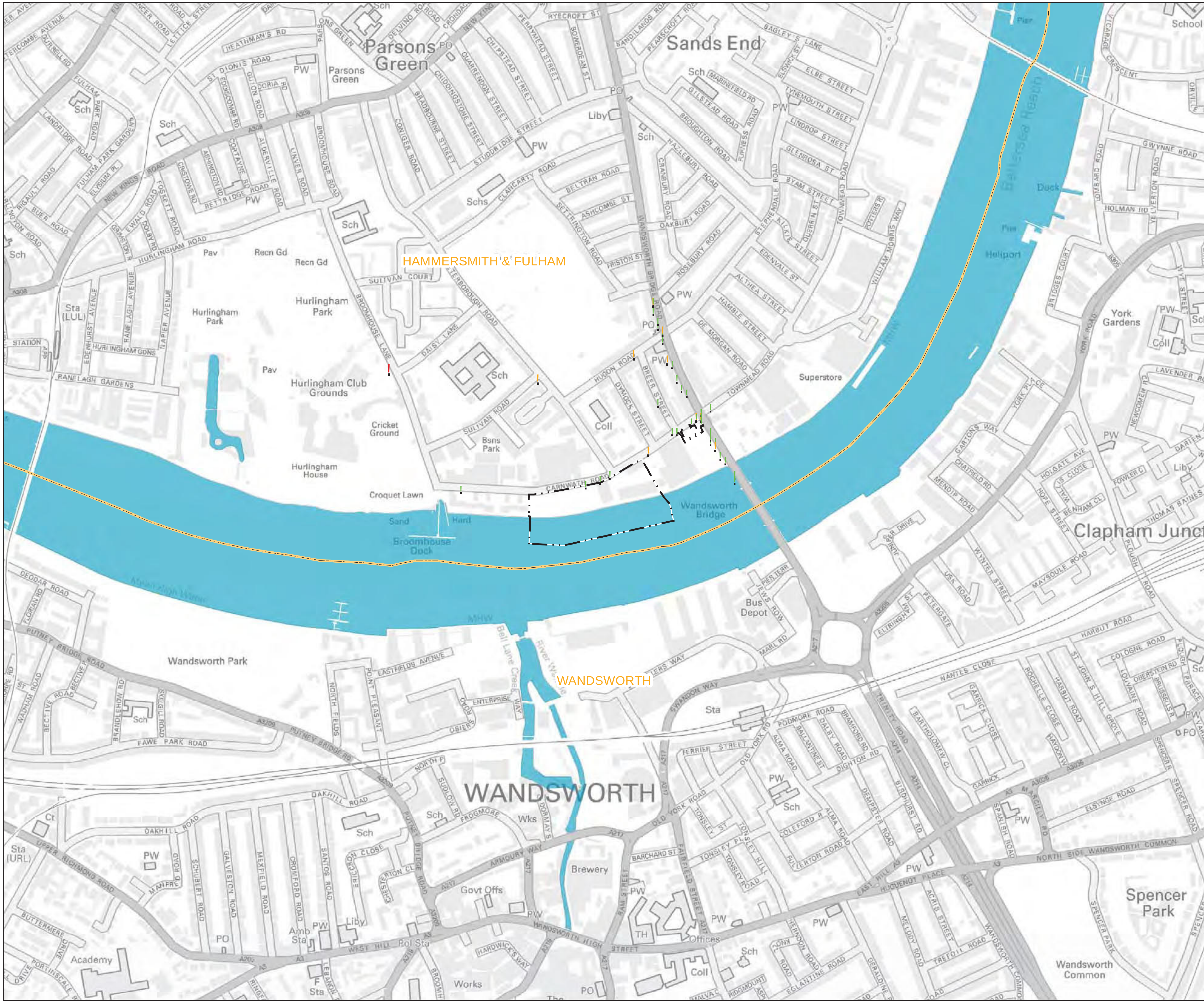
1PL03-TT-50751

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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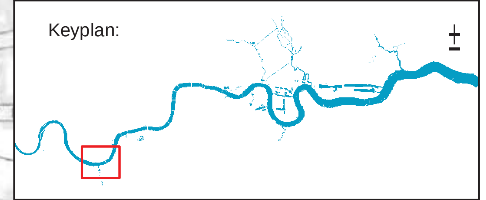


Key

- Slight
- Serious
- Fatal
- Limits of Land to be Acquired or Used
- Local authority boundary

FOR INFORMATION

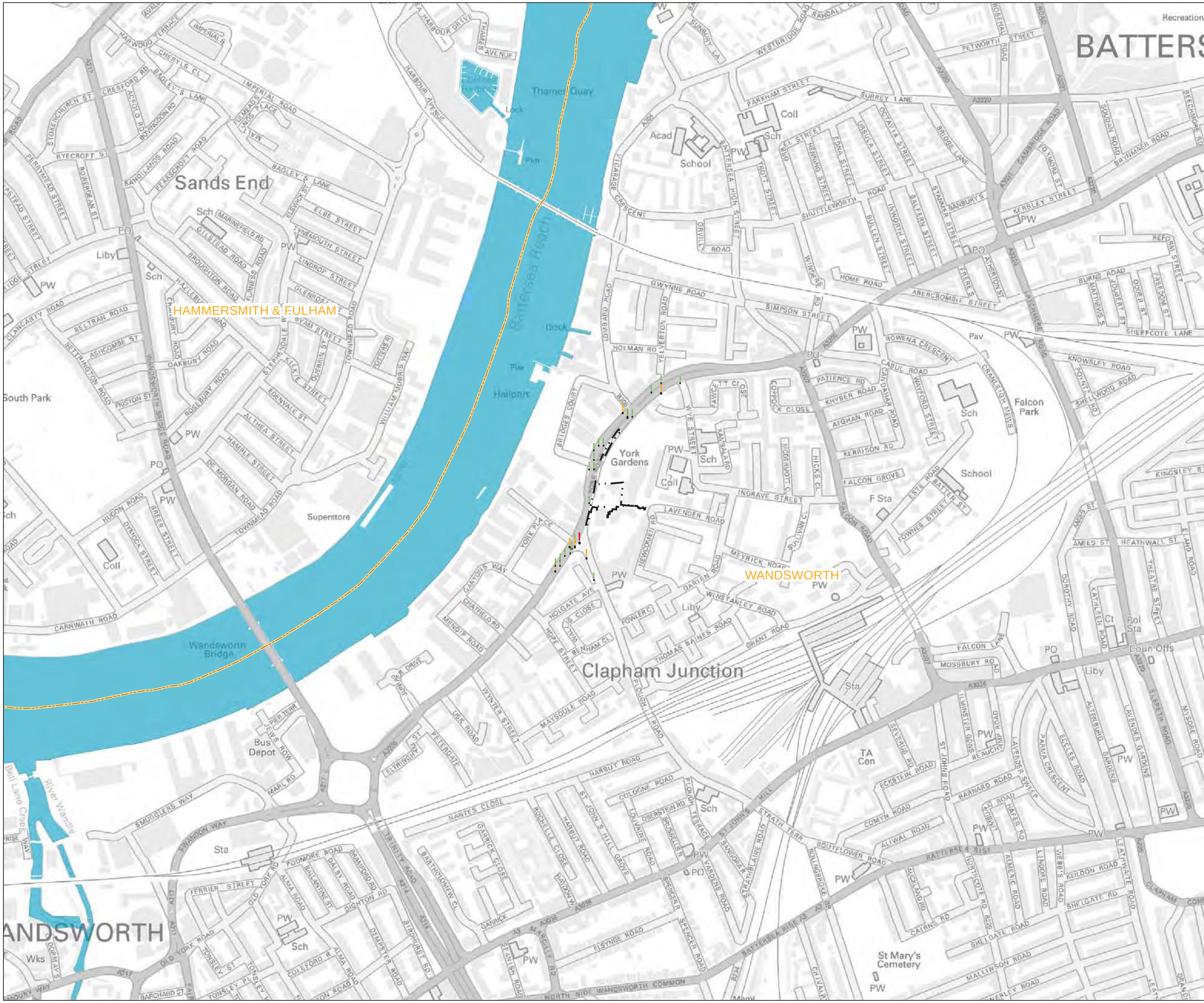
Location
Carnwah Road Riverside
London Borough of Hammersmith & Fulham

Document Information
Transport Assessment
Transport - accident locations

Figure 10.4.7
1PL03-TT-50744
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

! Slight

! Serious

! Fatal

Limits of Land to be Acquired or Used

Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Falconbrook Pumping Station

London Borough of Wandsworth

Document Information

Transport Assessment

Transport - accident locations

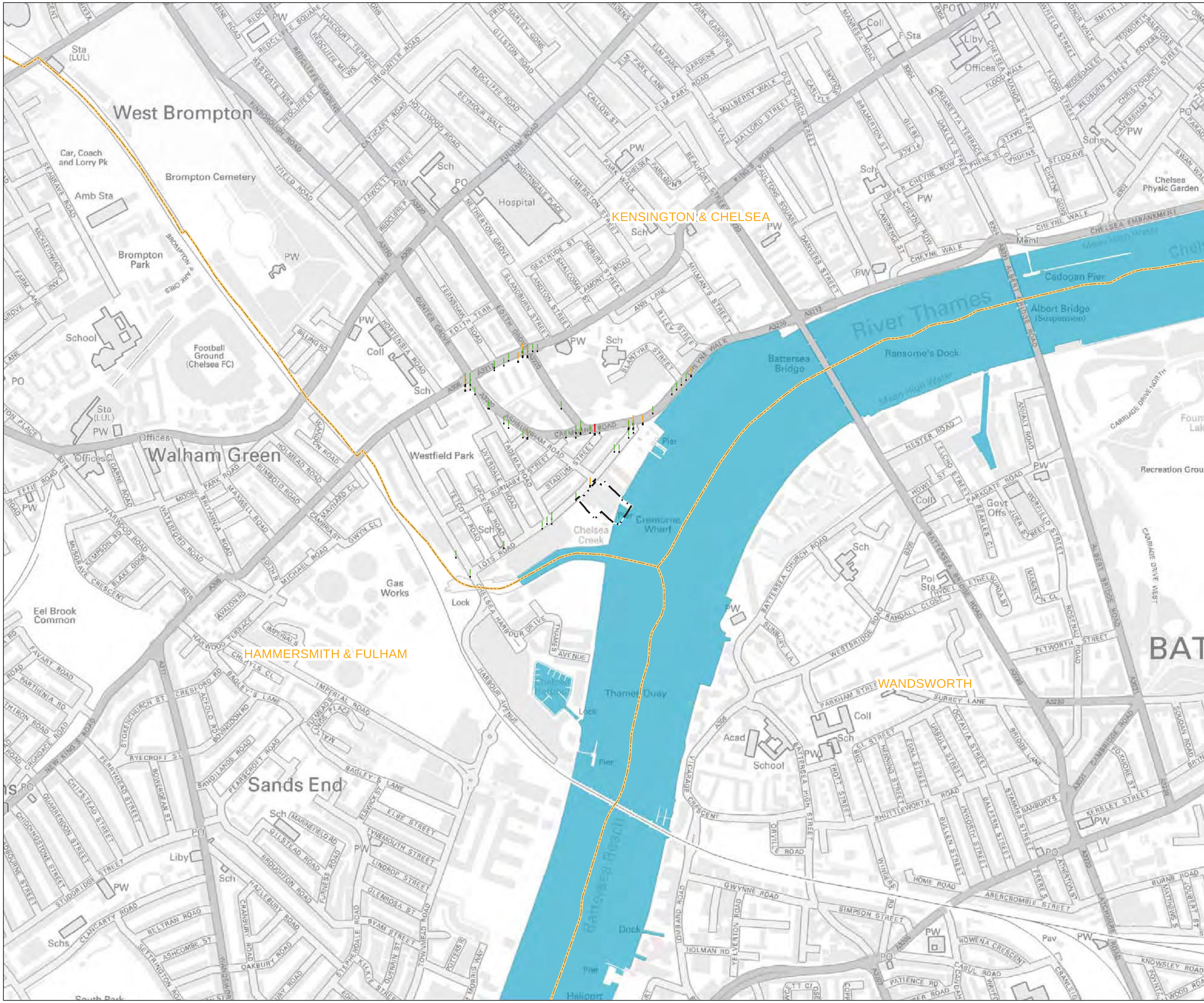
Figure 11.4.7

1PL03-TT-50766

January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Slight
- Serious
- Fatal
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Cremorne Wharf Depot

Royal Borough of Kensington and Chelsea

Document Information

Transport Assessment

Transport - accident locations

Figure 12.4.9

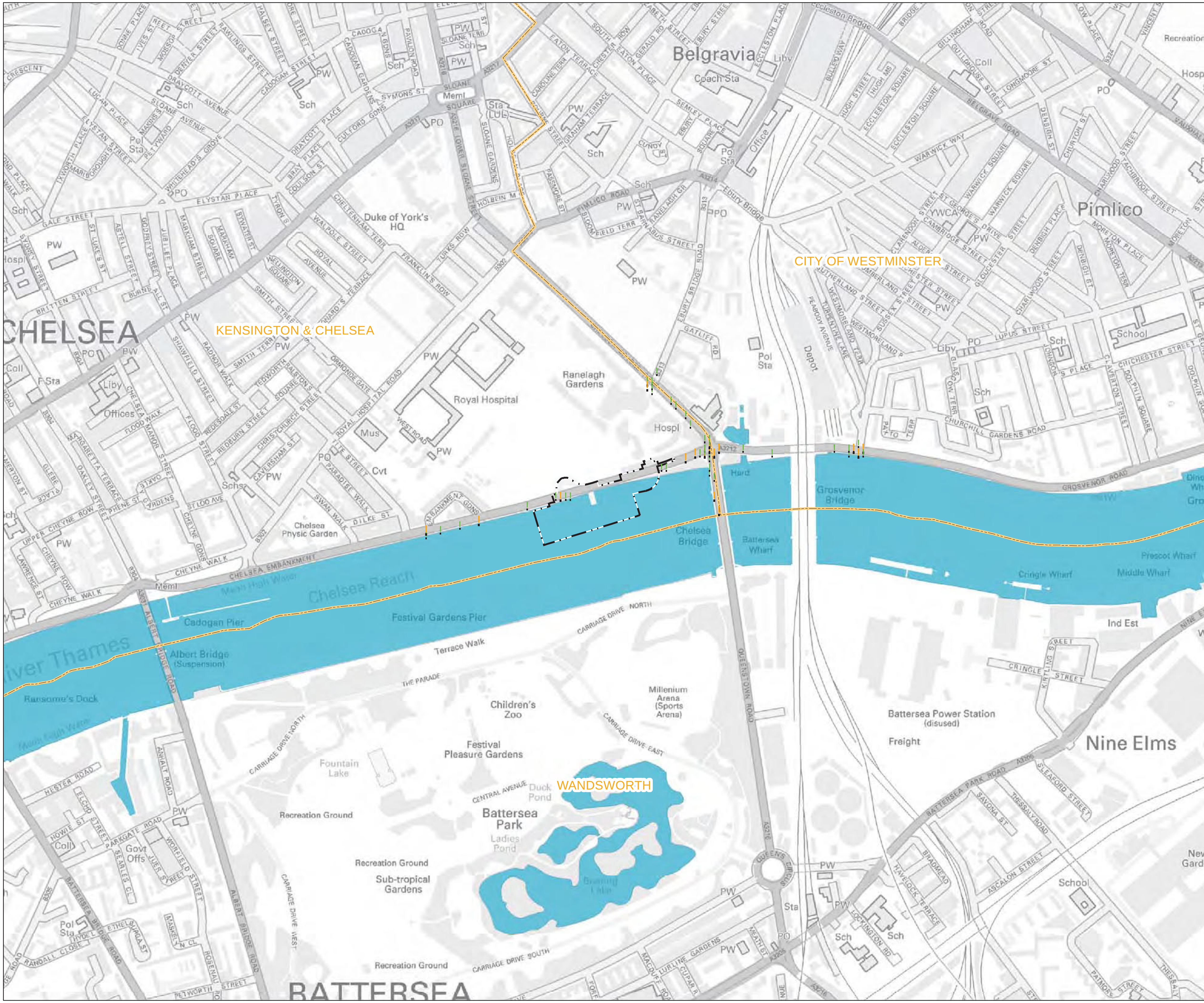
1PL03-TT-50747

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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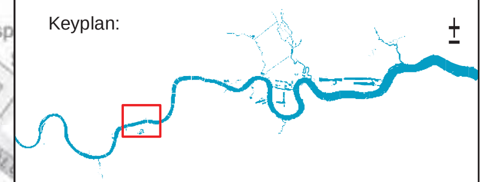


Key

- Slight
- Serious
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Chelsea Embankment Foreshore

Royal Borough of Kensington and Chelsea

Document Information

Transport Assessment

Transport - accident locations

Figure 13.4.9

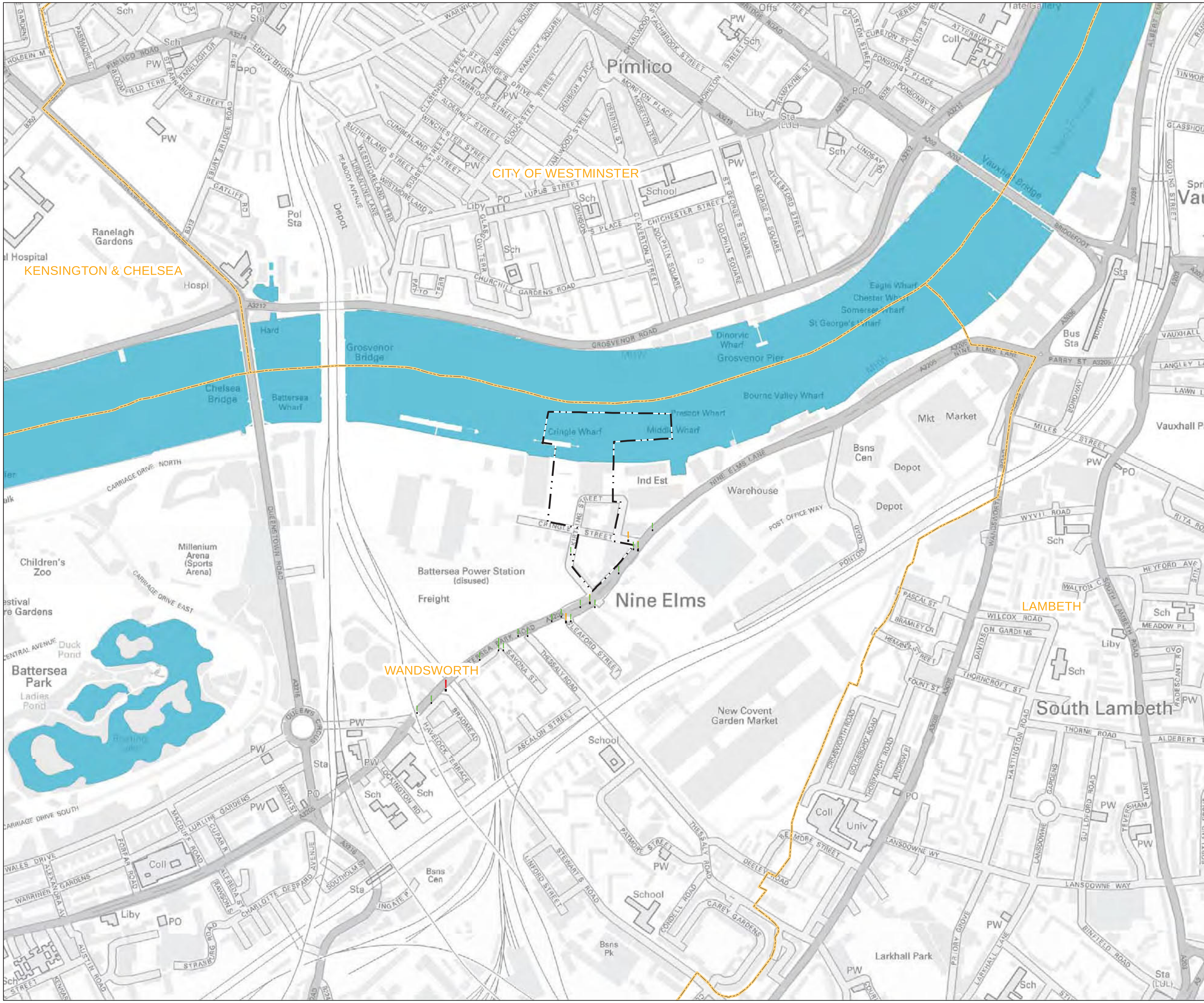
1PL03-TT-50746

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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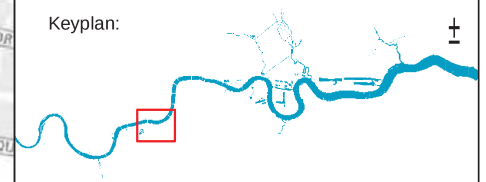


Key

- Slight
- Serious
- Fatal
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Kirtling Street

London Borough Of Wandsworth

Document Information

Transport Assessment

Transport - accident locations

Figure 14.4.7

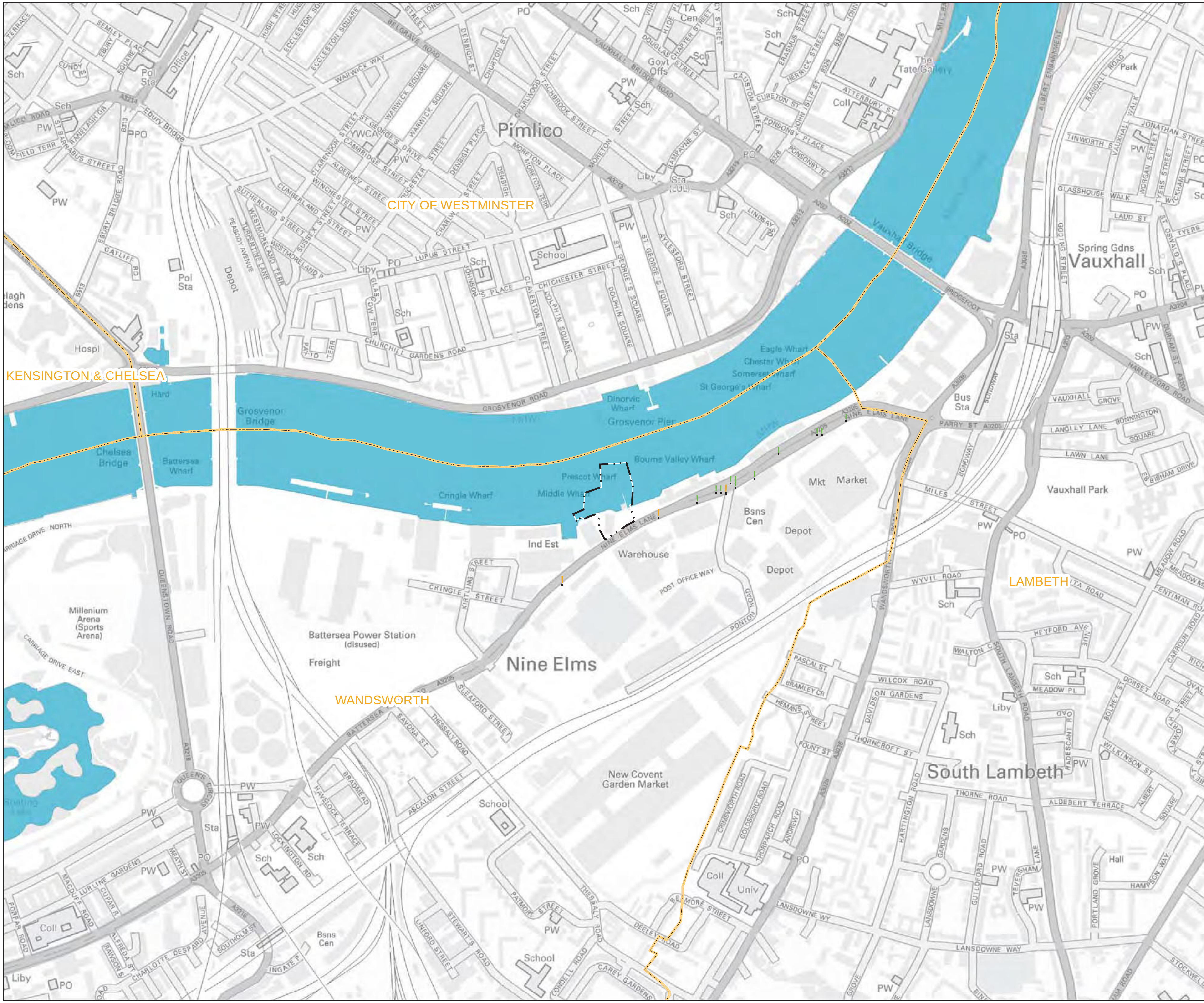
1PL03-TT-50757

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Slight
- Serious
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Heathwall Pumping Station

London Borough Of Wandsworth

Document Information

Transport Assessment

Transport - accident locations

Figure 15.4.7

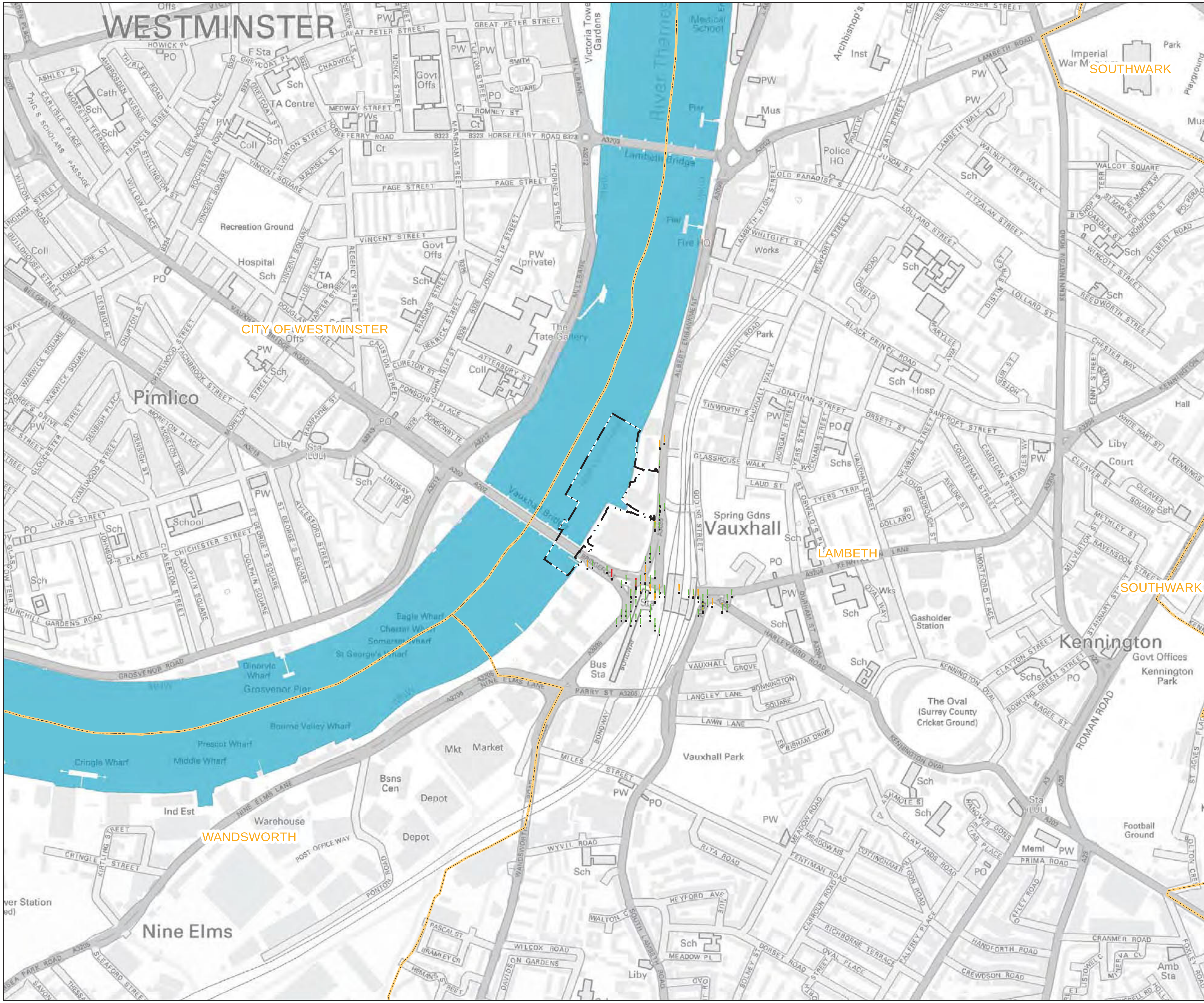
1PL03-TT-50756

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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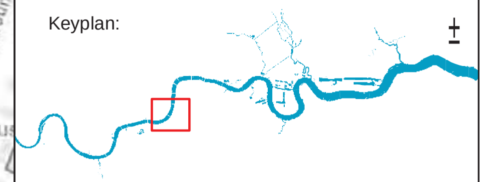


Key

Slight

Serious

Fatal

Limits of Land to be Acquired or Used

Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Albert Embankment Foreshore

London Borough of Lambeth

Document Information

Transport Assessment

Transport - accident locations

Figure 16.4.7

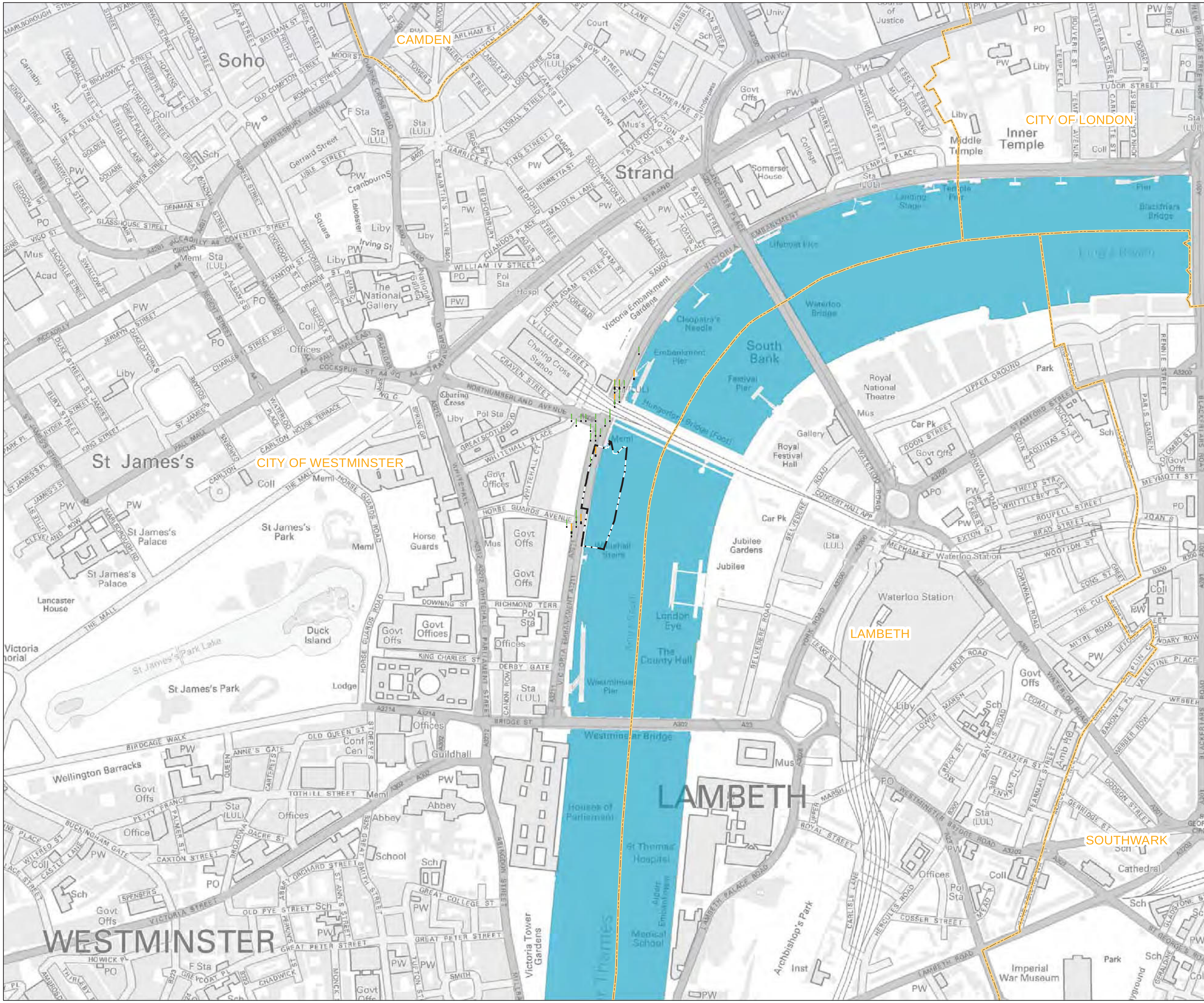
1PL03-TT-50762

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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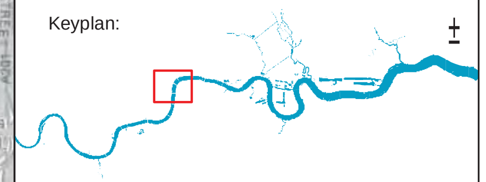


Key

- Slight
- Serious
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Victoria Embankment Foreshore

City Of Westminster

Document Information

Transport Assessment

Transport - accident locations

Figure.17.4.9

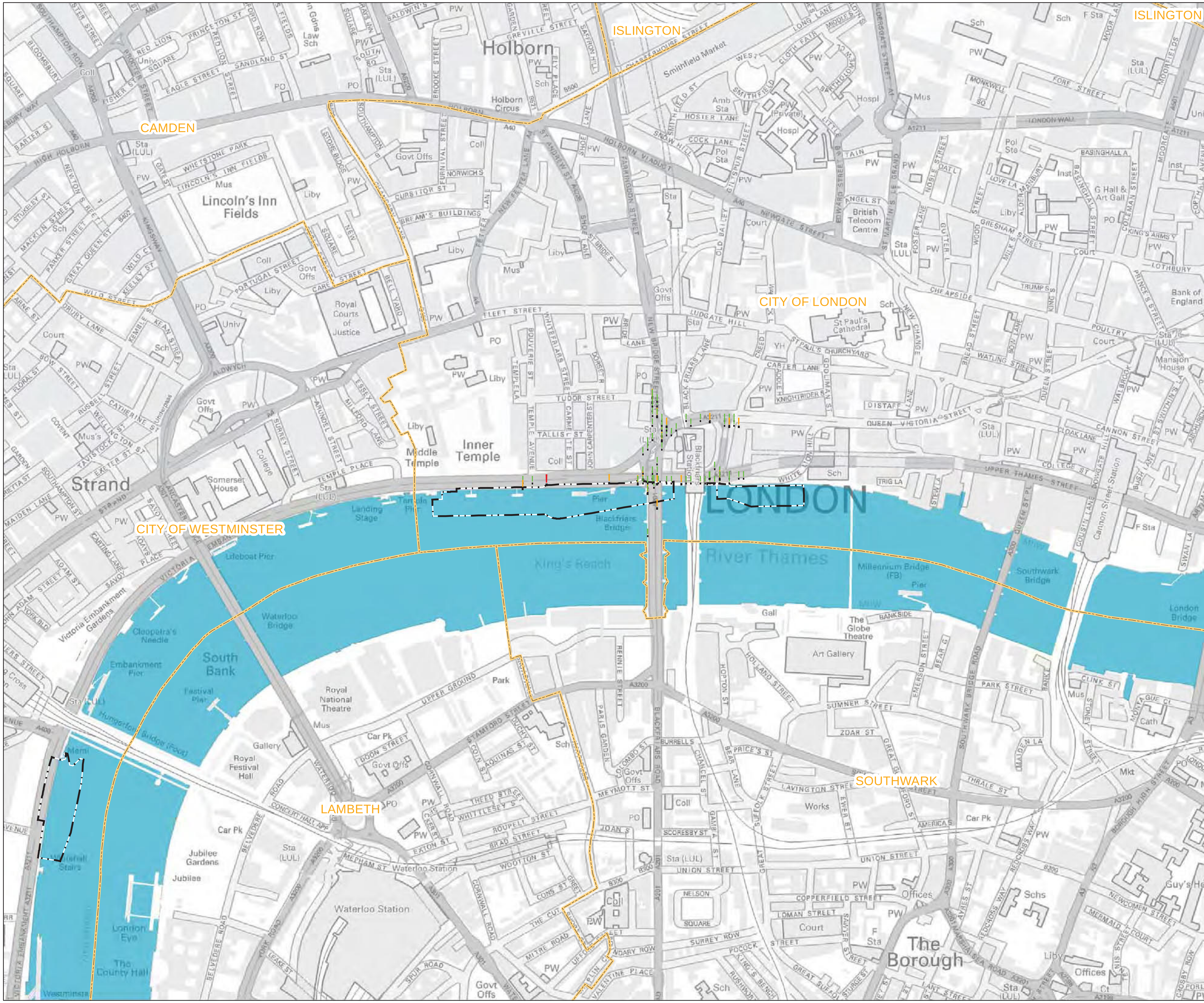
1PL03-TT-50759

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Slight
- Serious
- Fatal
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Blackfriars Bridge Foreshore

City Of London

Document Information

Transport Assessment

Transport - accident locations

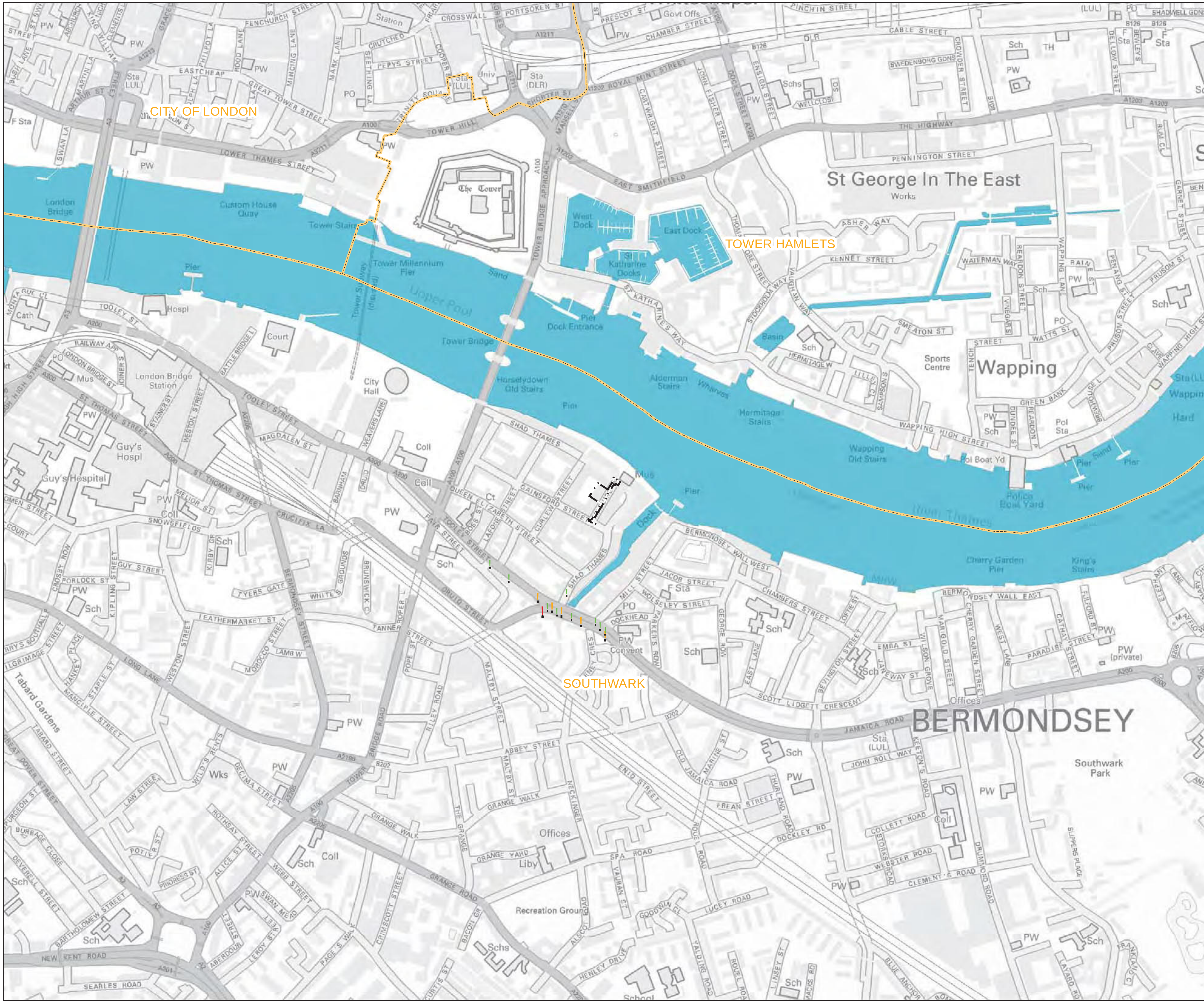
Figure 18.4.9

1PL03-TT-50753

January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



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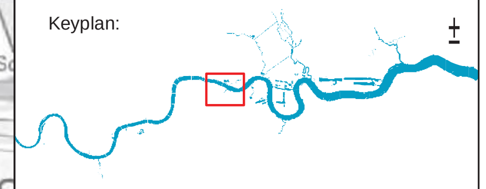


Key

- Slight
- Serious
- Fatal
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Shad Thames Pumping Station

London Borough of Southwark

Document Information

Transport Assessment

Transport - accident locations

Figure 19.4.7

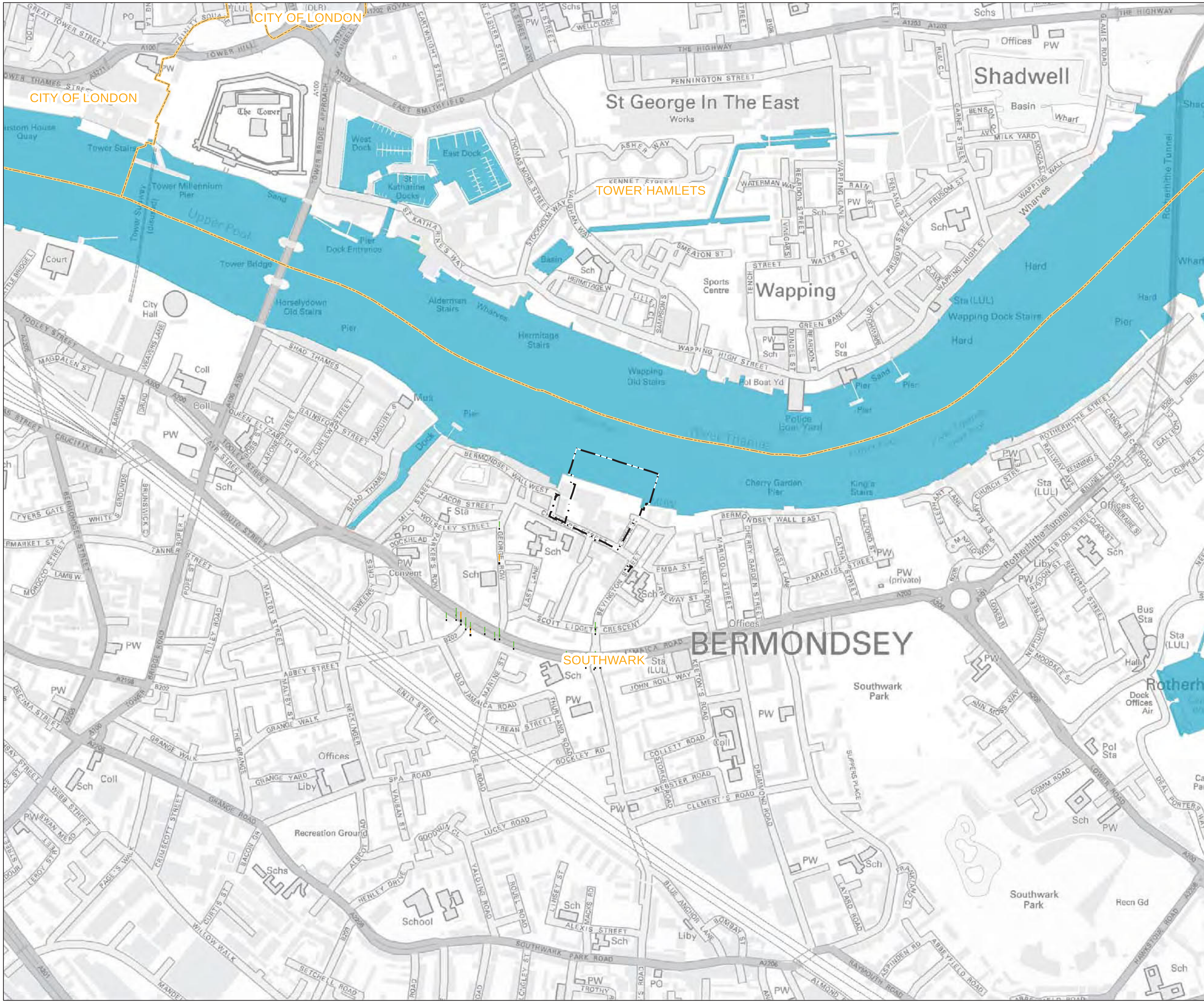
1PL03-TT-50767

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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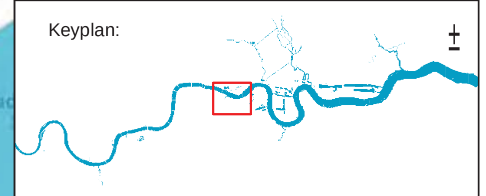


Key

- Slight
- Serious
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location
Chambers Wharf
London Borough of Southwark

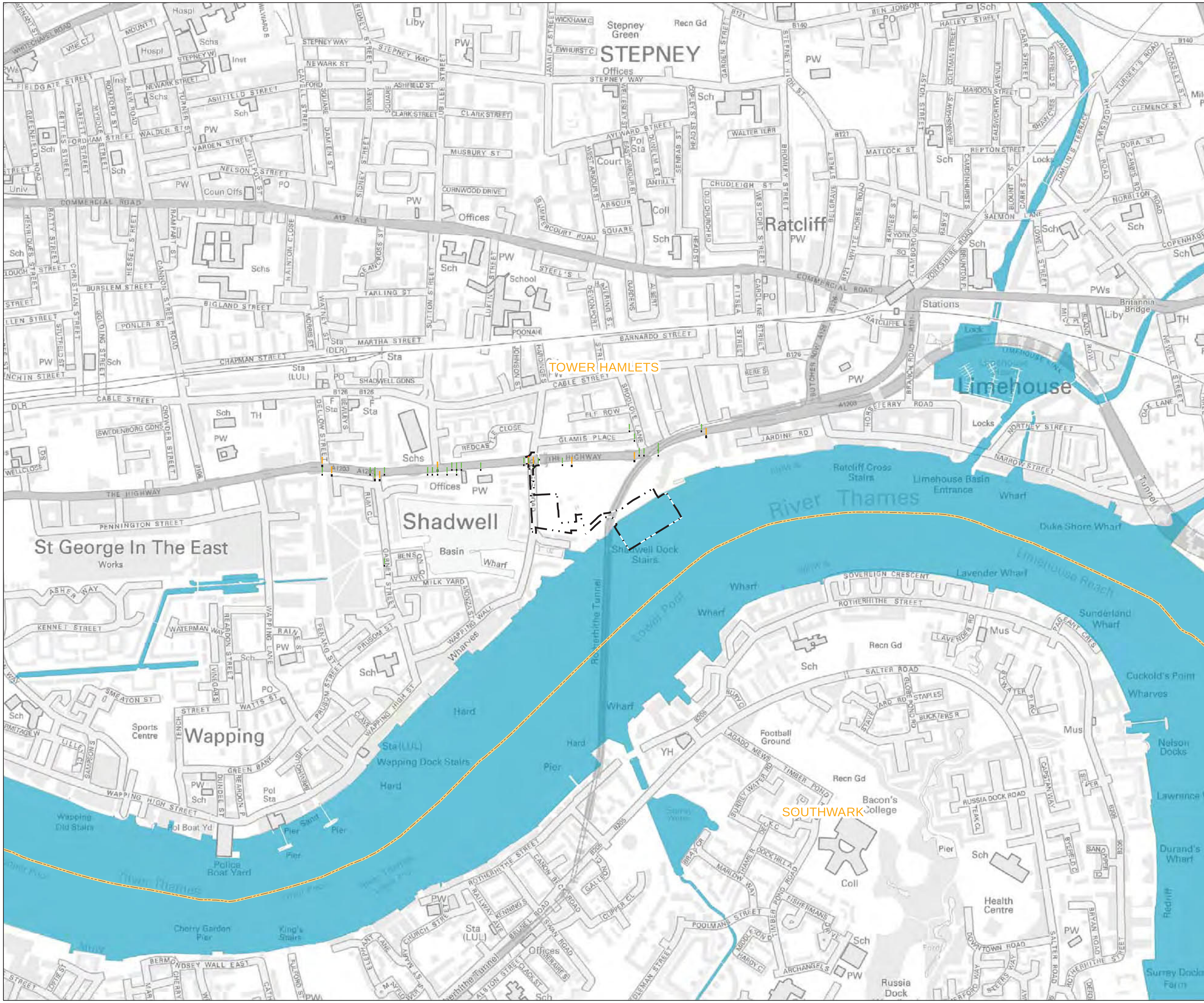
Document Information
Transport Assessment
Transport - accident locations

Figure 20.4.7

1PL03-TT-50745
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Slight
- Serious
- Fatal
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

King Edward Memorial Park Foreshore

London Borough of Tower Hamlets

Document Information

Transport Assessment

Transport - accident locations

Figure 21.4.7

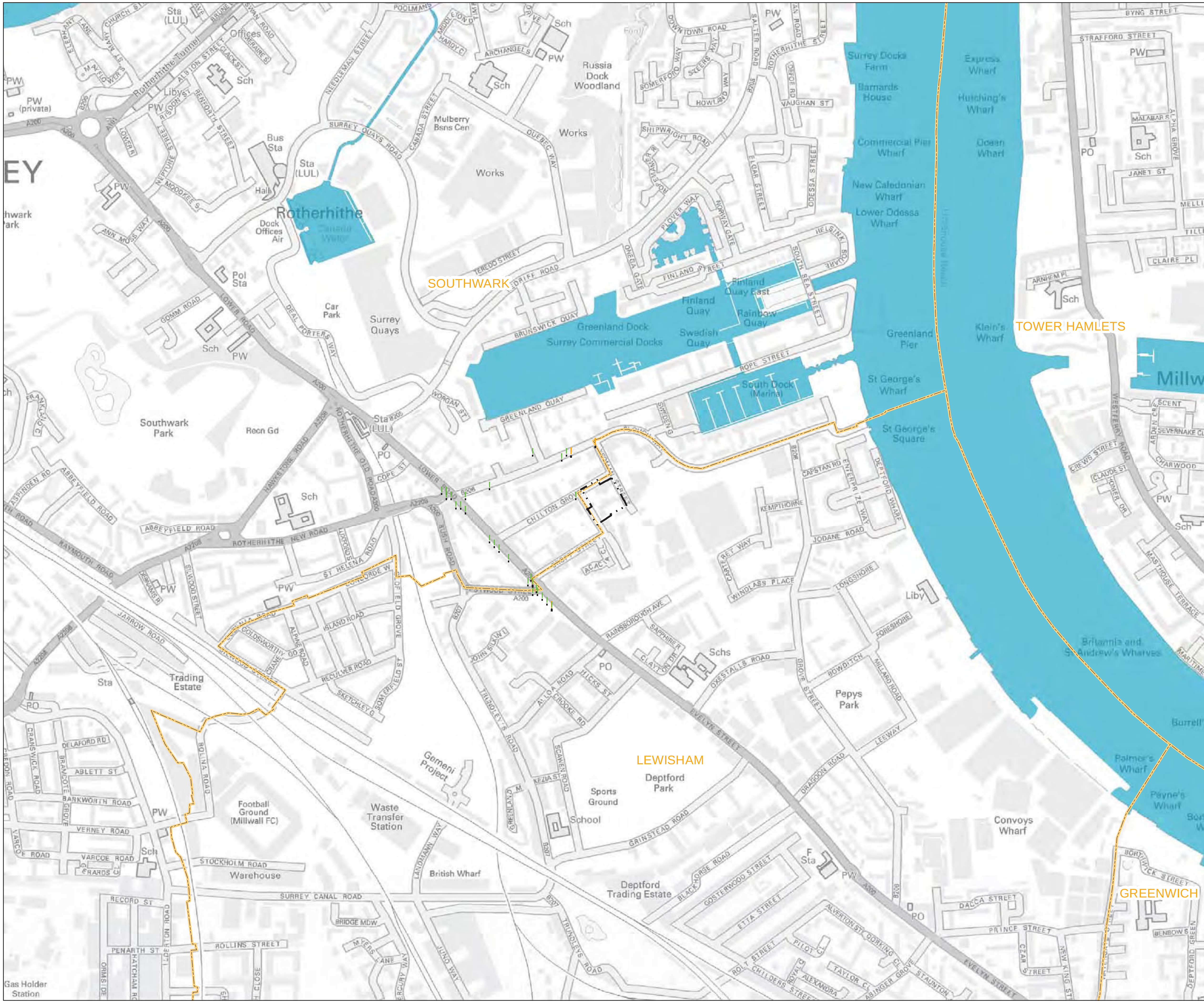
1PL03-TT-50750

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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Keyplan:

Key

! Slight

! Serious

Limits of Land to be Acquired or Used

Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Earl Pumping Station

London Borough of Lewisham

Document Information

Transport Assessment

Transport - accident locations

Figure 22.4.9

1PL03-TT-50765

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water

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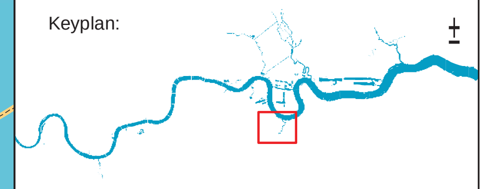
Keyplan:



Key

- Slight
- Serious
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Deptford Church Street

London Borough Of Lewisham

Document Information

Transport Assessment

Transport - accident locations

Figure 23.4.9

1PL03-TT-50755

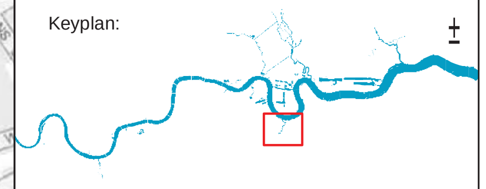
January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water

Keyplan:



Key

- ! Slight
- ! Serious
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Greenwich Pumping Station

Royal Borough of Greenwich

Document Information

Transport Assessment

Transport - accident locations

Figure 24.4.7

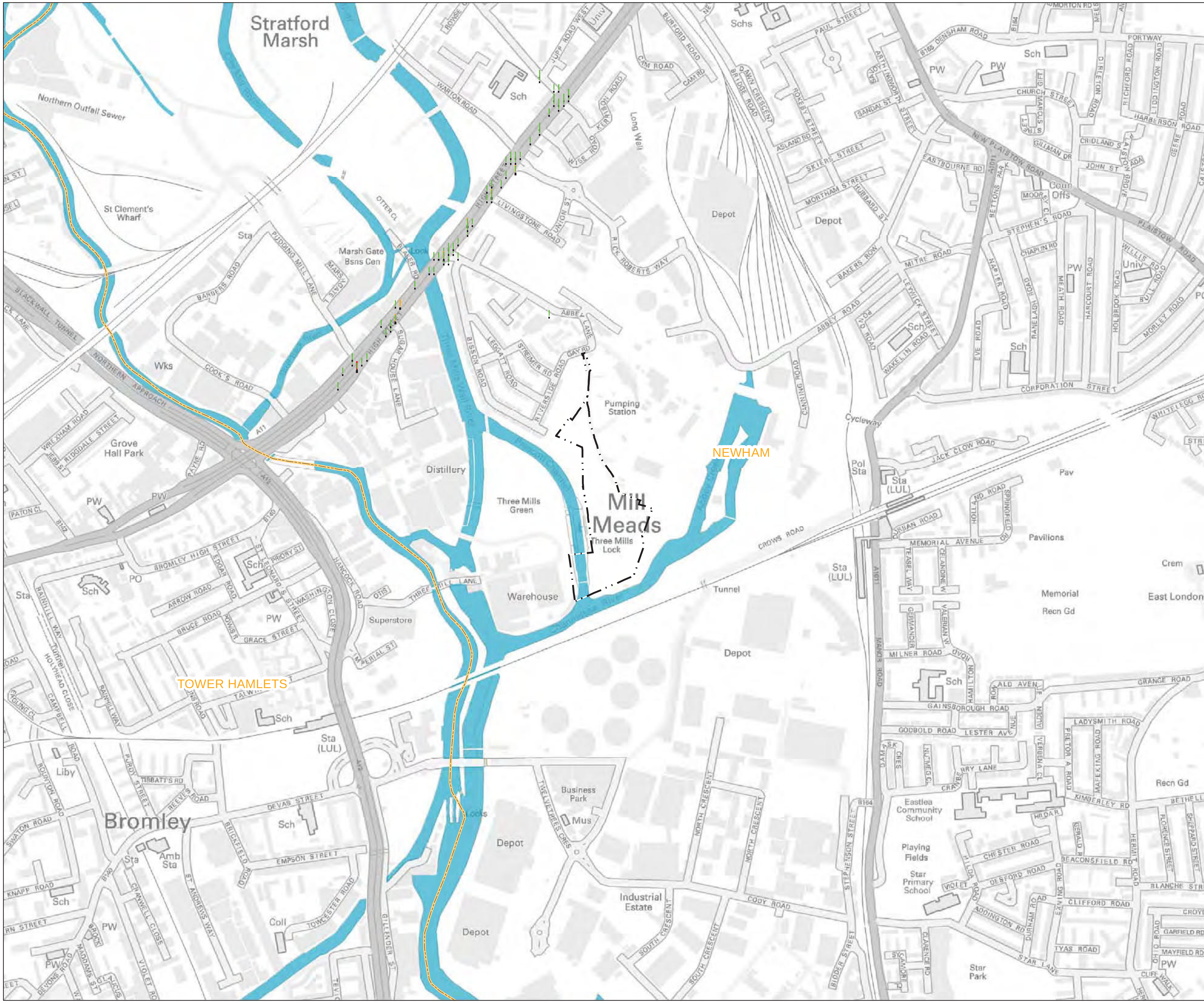
1PL03-TT-50748

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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Keyplan:

Key

- Slight
- Serious
- Fatal
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Abbey Mills Pumping Station

London Borough of Newham

Document Information

Transport Assessment

Transport - accident locations

Figure 25.4.7

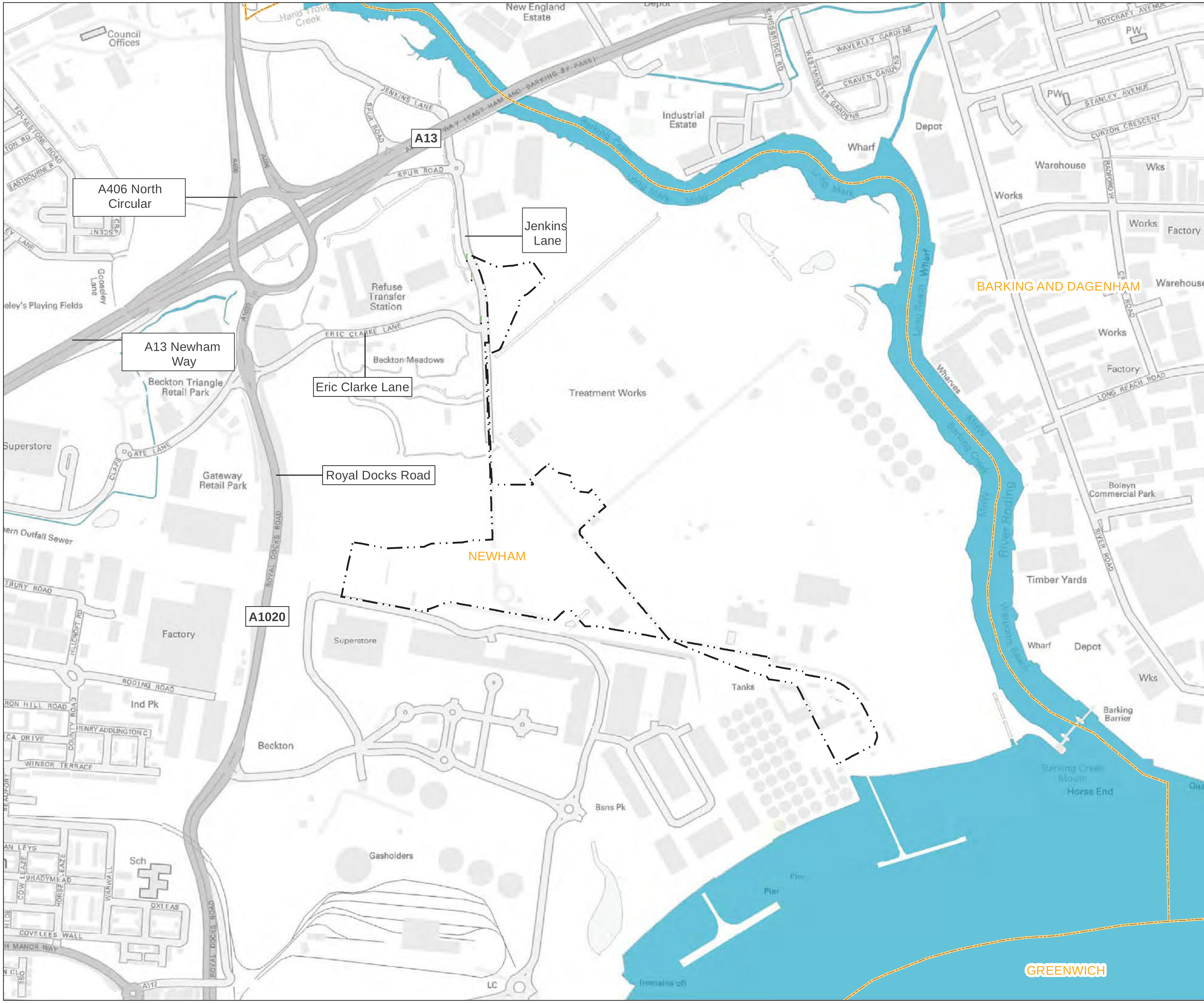
1PL03-TT-50760

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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Keyplan:

Key

- Slight
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location
Beckton Sewage Treatment Works
London Borough of Newham

Document Information
Transport Assessment
Transport - accident locations

Figure 26.4.7

1PL03-TT-50752
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- Slight
- Serious
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Bekesbourne Street

London Borough Of Tower Hamlets

Document Information

Transport Assessment

Transport - accident locations

Figure 27.4.7

1PL03-TT-50754

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water

Annex C – Survey location plans

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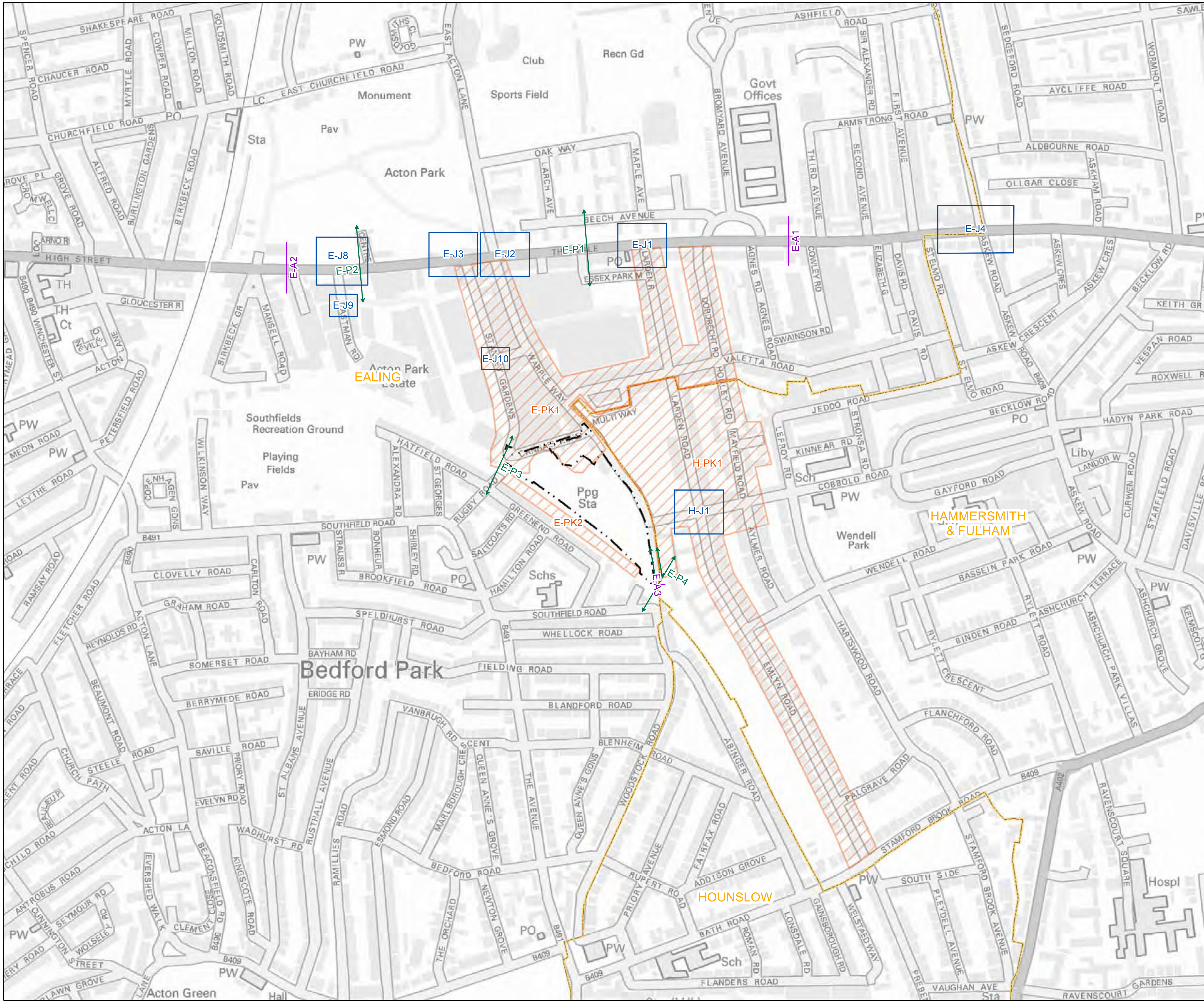


Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

90 45 0 90 m

Scale 1 : 6,000 at A3

FOR INFORMATION

Location
Acton Storm Tanks
London Borough of Ealing

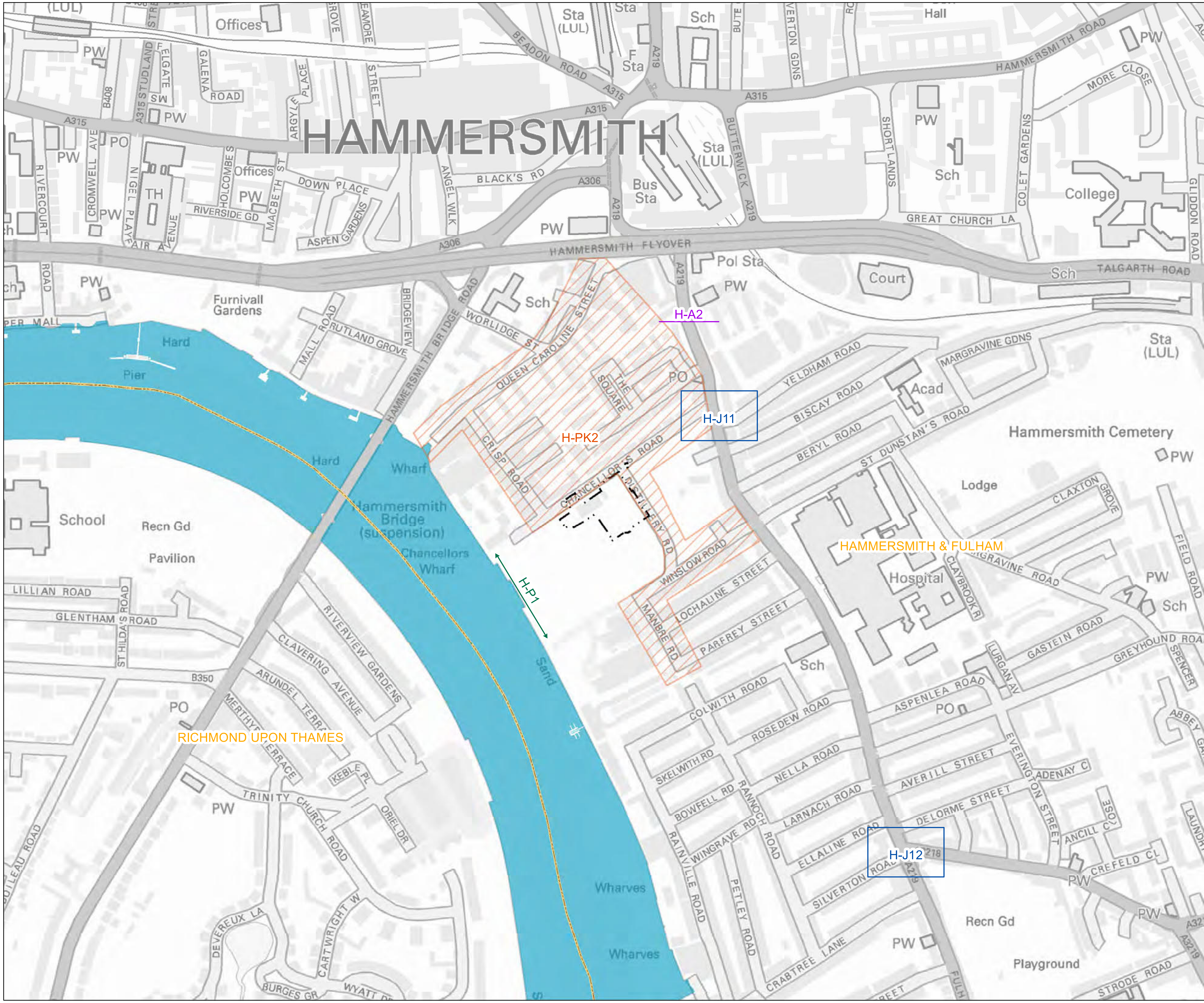
Document Information
Transport Assessment
Transport - survey locations

Figure 4.4.4

1PL03-TT-50737
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



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Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

80 40 0 80 m

Scale 1 : 5,000 at A3

FOR INFORMATION

Location

Hammersmith Pumping Station

London Borough of Hammersmith & Fulham

Document Information

Transport Assessment

Transport - survey locations

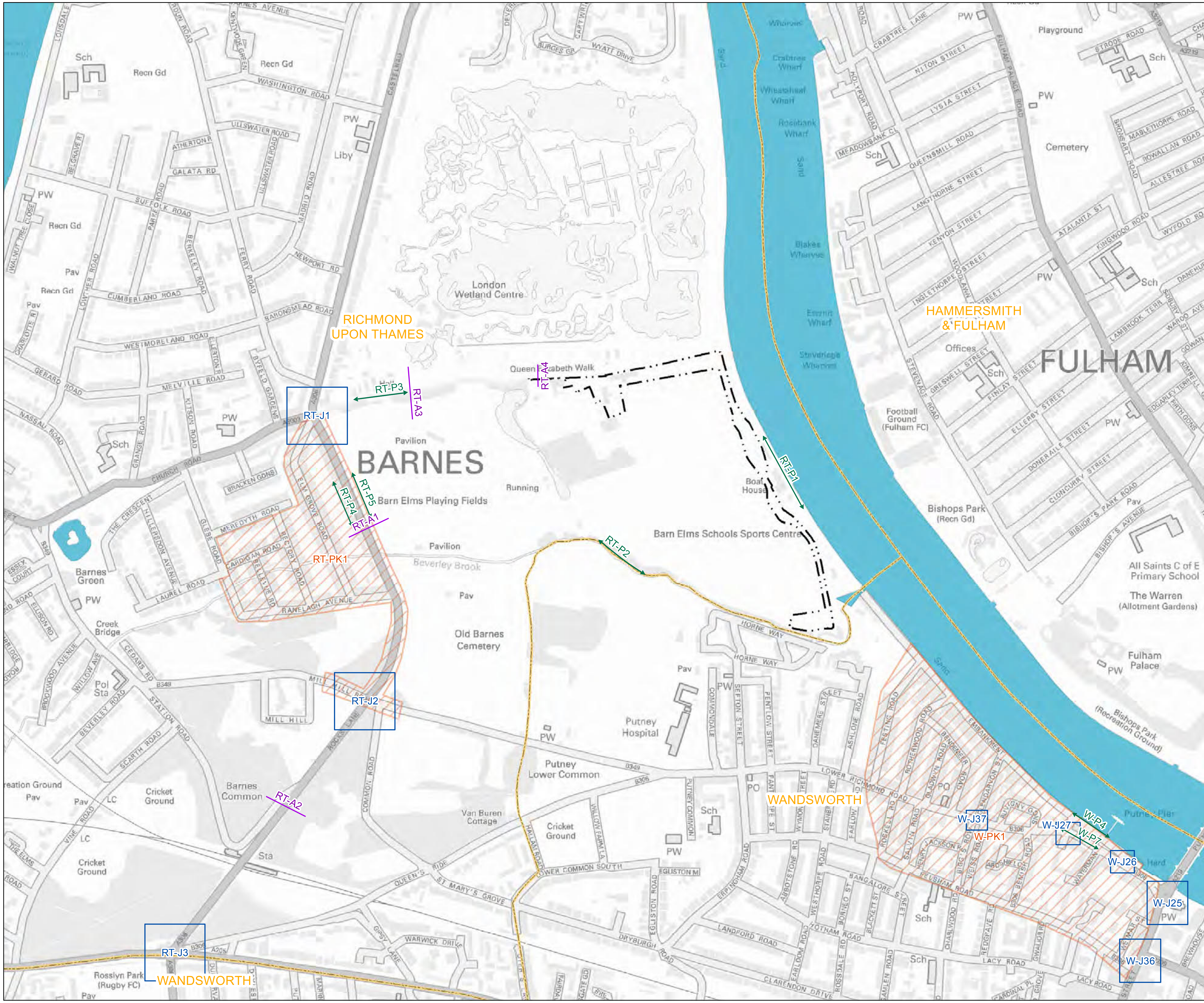
Figure 5.4.4

1PL03-TT-50645

January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Barn Elms

London Borough of Richmond

Document Information

Transport Assessment

Transport - survey locations

Figure 6.4.4

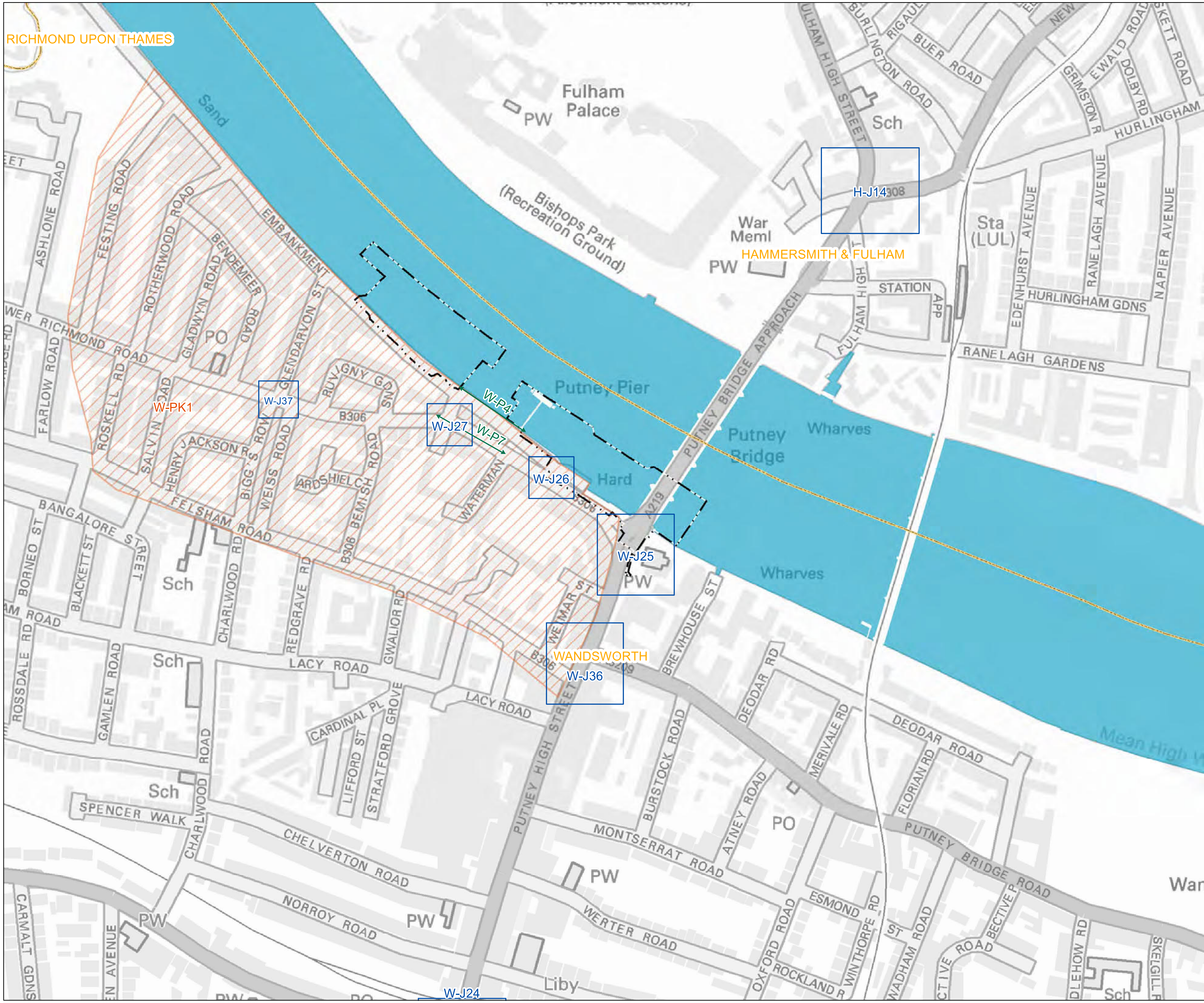
1PL03-TT-50739

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

60 30 0 60 m

Scale 1 : 4,000 at A3

FOR INFORMATION

Location

Putney Embankment Foreshore
London Borough Of Wandsworth

Document Information

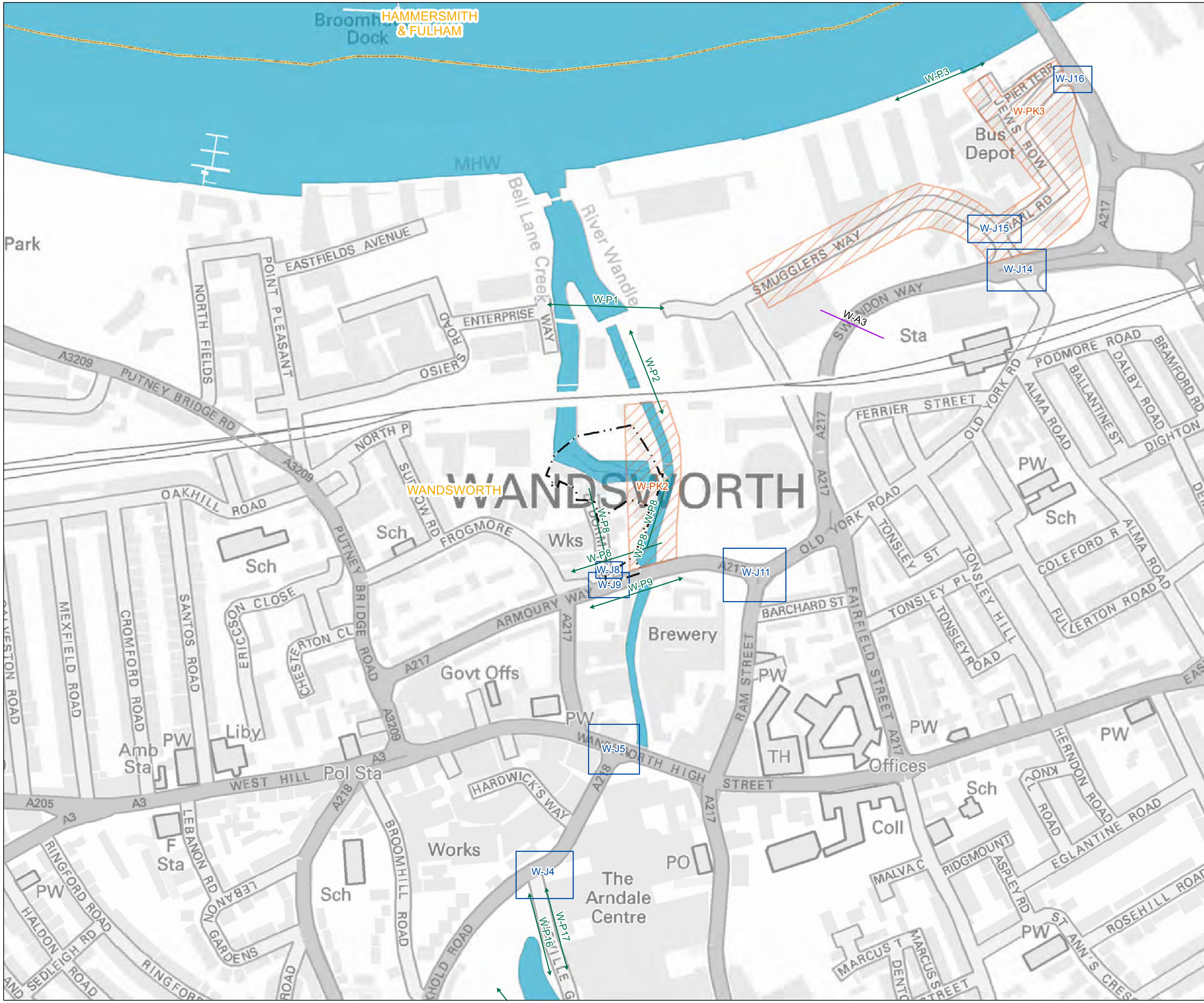
Transport Assessment
Transport - survey locations

Figure 7.4.4

1PL03-TT-50694
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



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Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

60 30 0 60 m

Scale 1 : 4,000 at A3

FOR INFORMATION

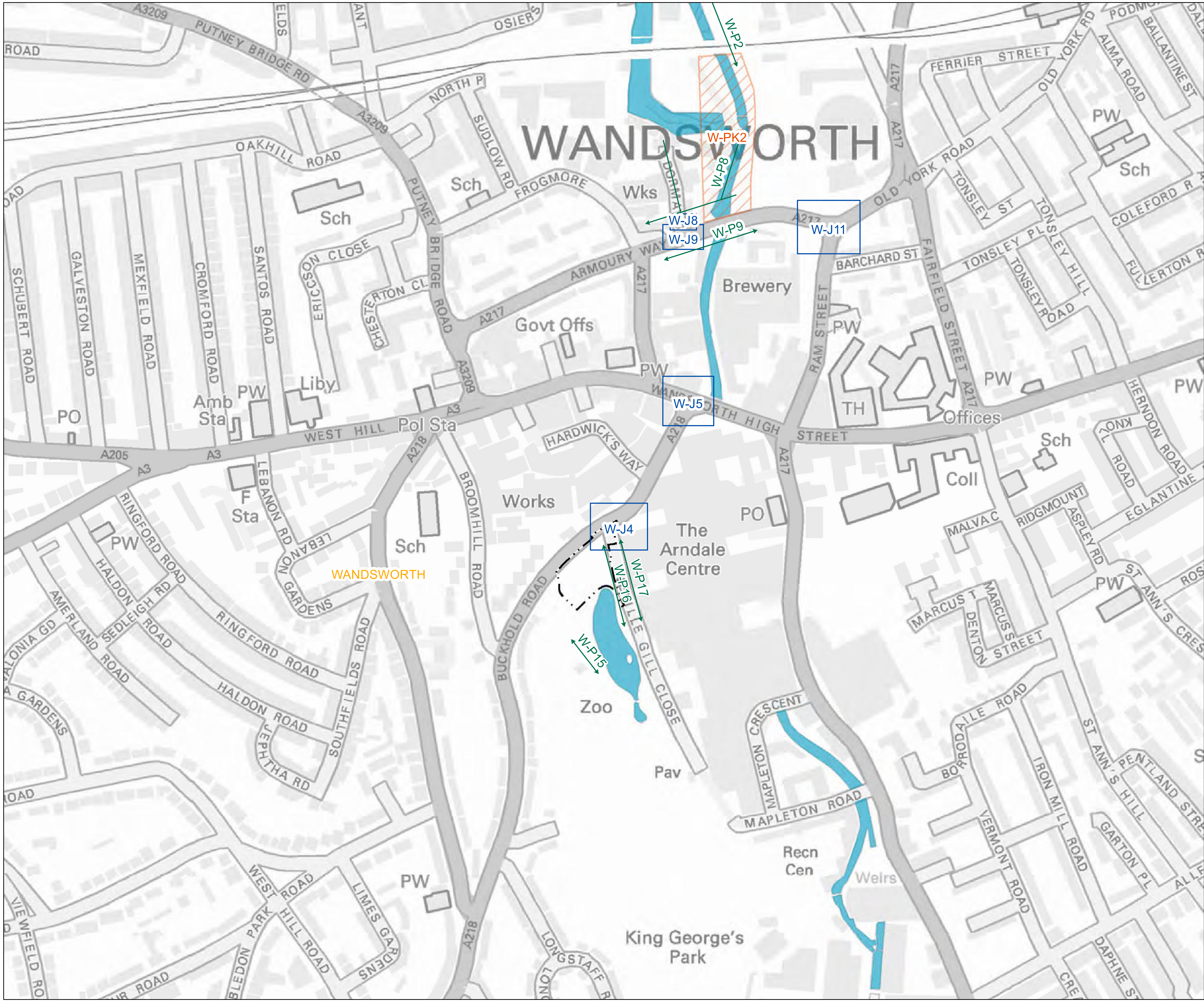
Location
Dormay Street
London Borough of Wandsworth

Document Information
Transport Assessment
Transport - survey locations

Figure 8.4.4
1PL03-TT-50740
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



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Keyplan:

Key

- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

60 30 0 60 m

Scale 1 : 4,000 at A3

FOR INFORMATION

Location

King George's Park

London Borough of Wandsworth

Document Information

Transport Assessment

Transport - survey locations

Figure 9.4.4

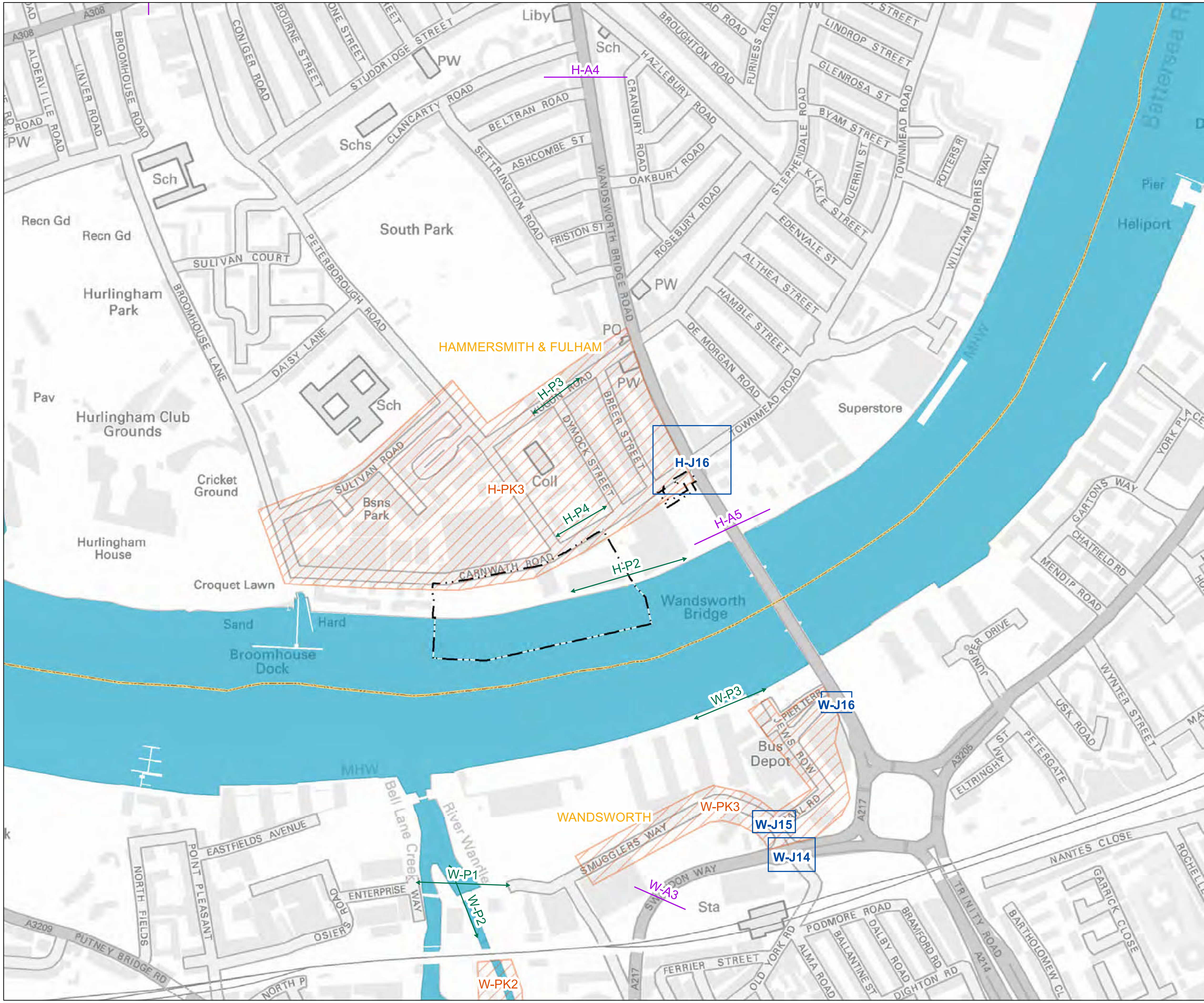
1PL03-TT-50647

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- *Junction surveys*
- *Parking surveys*
- Limits of Land to be Acquired or Used
- Local authority boundary

80 40 0 80 m

Scale 1 : 5,000 at A3

FOR INFORMATION

Location

Carnwath Road Riverside

London Borough of Hammersmith & Fulham

Document Information

Transport Assessment

Transport - survey locations

Figure 10.4.4

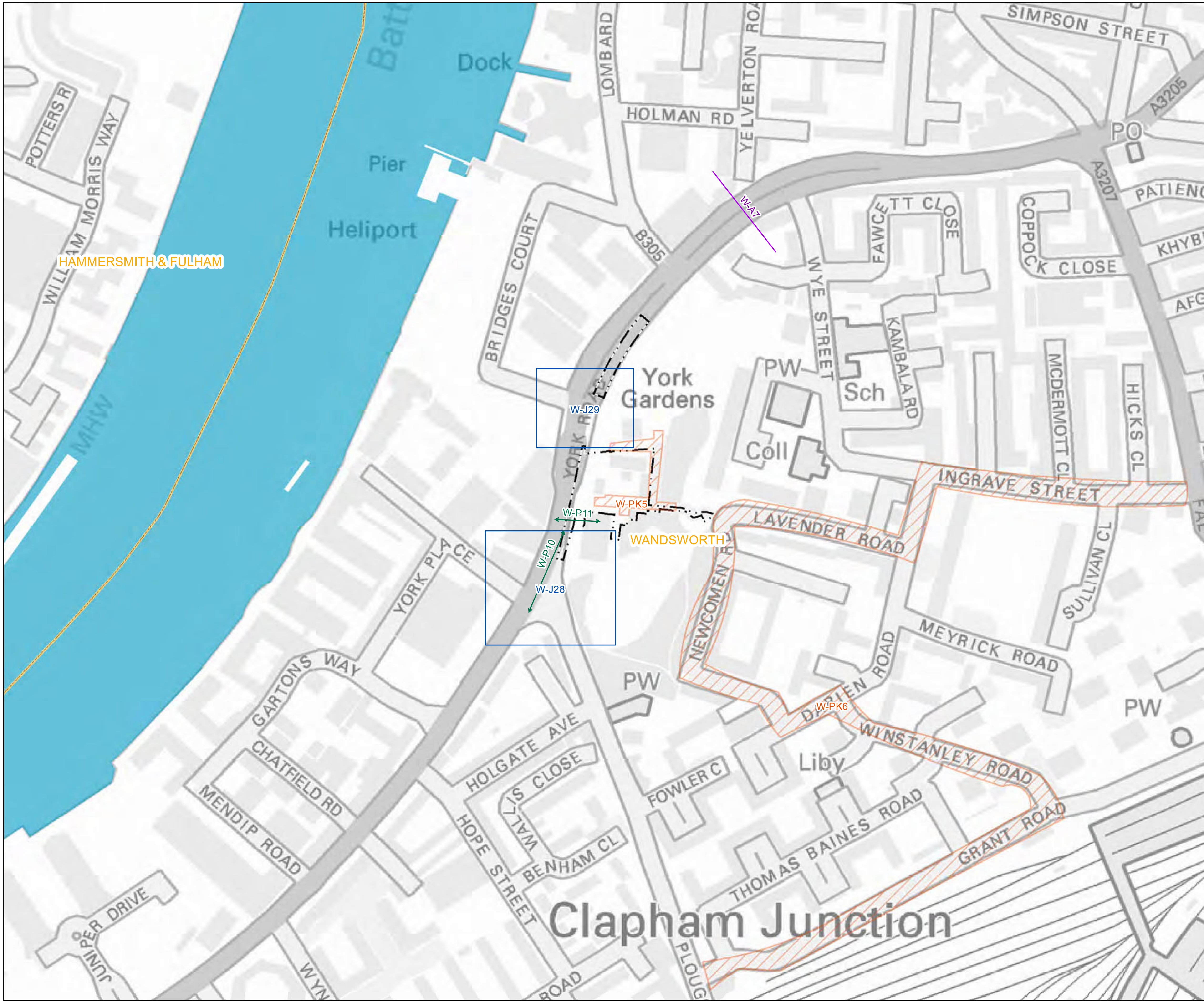
1PL03-TT-50640

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

40 20 0 40 m

Scale 1 : 3,000 at A3

FOR INFORMATION

Location

Falconbrook Pumping Station

London Borough of Wandsworth

Document Information

Transport Assessment

Transport - survey locations

Figure 11.4.4

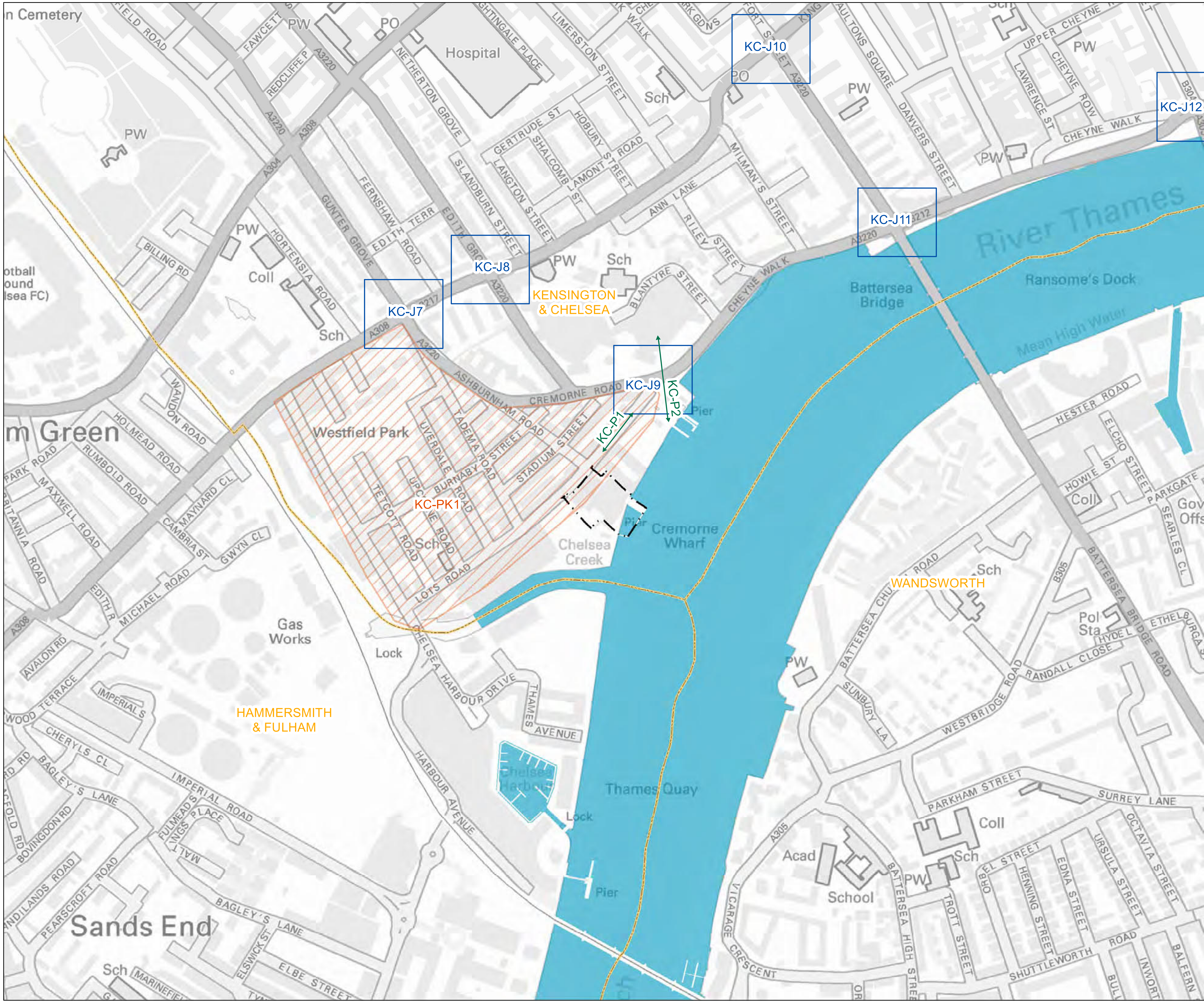
1PL03-TT-50742

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

Scale 1 : 5,000 at A3

FOR INFORMATION

Location
Cremorne Wharf Depot
Royal Borough of Kensington and Chelsea

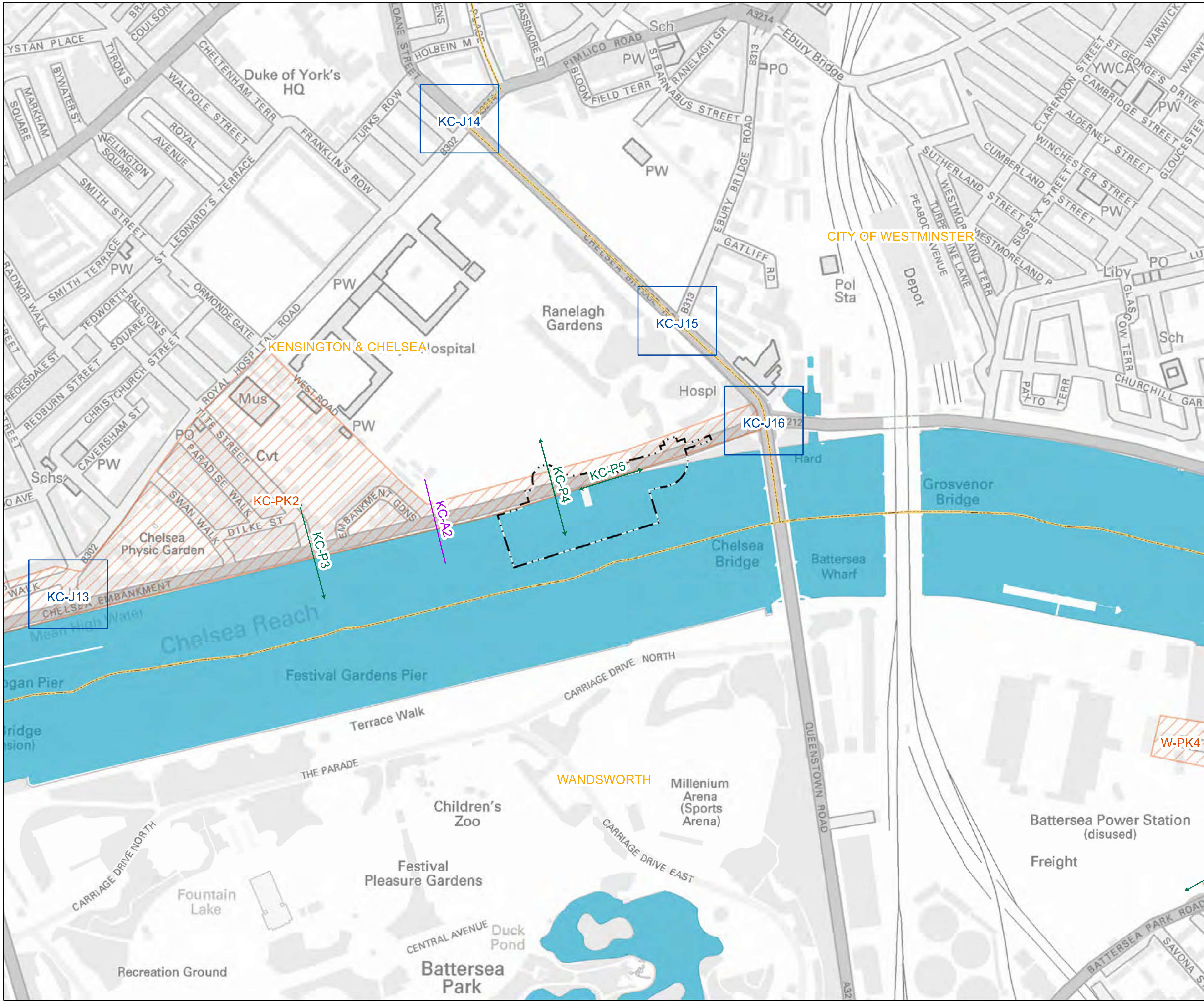
Document Information
Transport Assessment
Transport - survey locations

Figure 12.4.4

1PL03-TT-50643
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

80 40 0 80 m

Scale 1 : 5,000 at A3

FOR INFORMATION

Location

Chelsea Embankment Foreshore

Roal Borough of Kensington and Chelsea

Document Information

Transport Assessment

Transport - survey locations

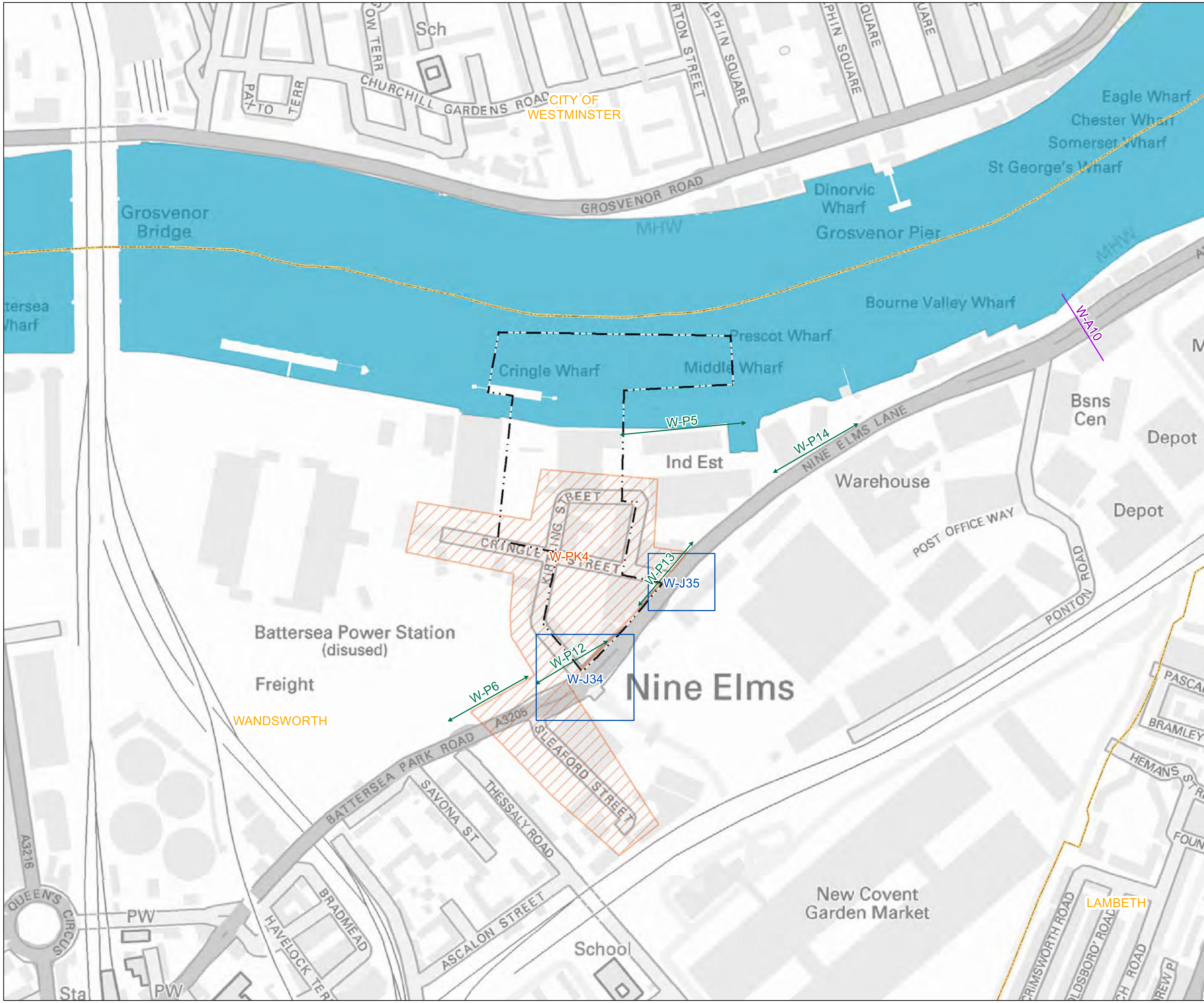
Figure 13.4.4

1PL03-TT-50642

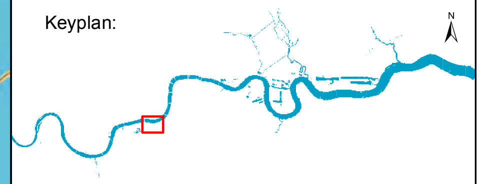
January 2013

Thames Tideway Tunnel Creating a cleaner, healthier River Thames

Thames Water



Keyplan:



Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

Scale 1 : 4,000 at A3

FOR INFORMATION

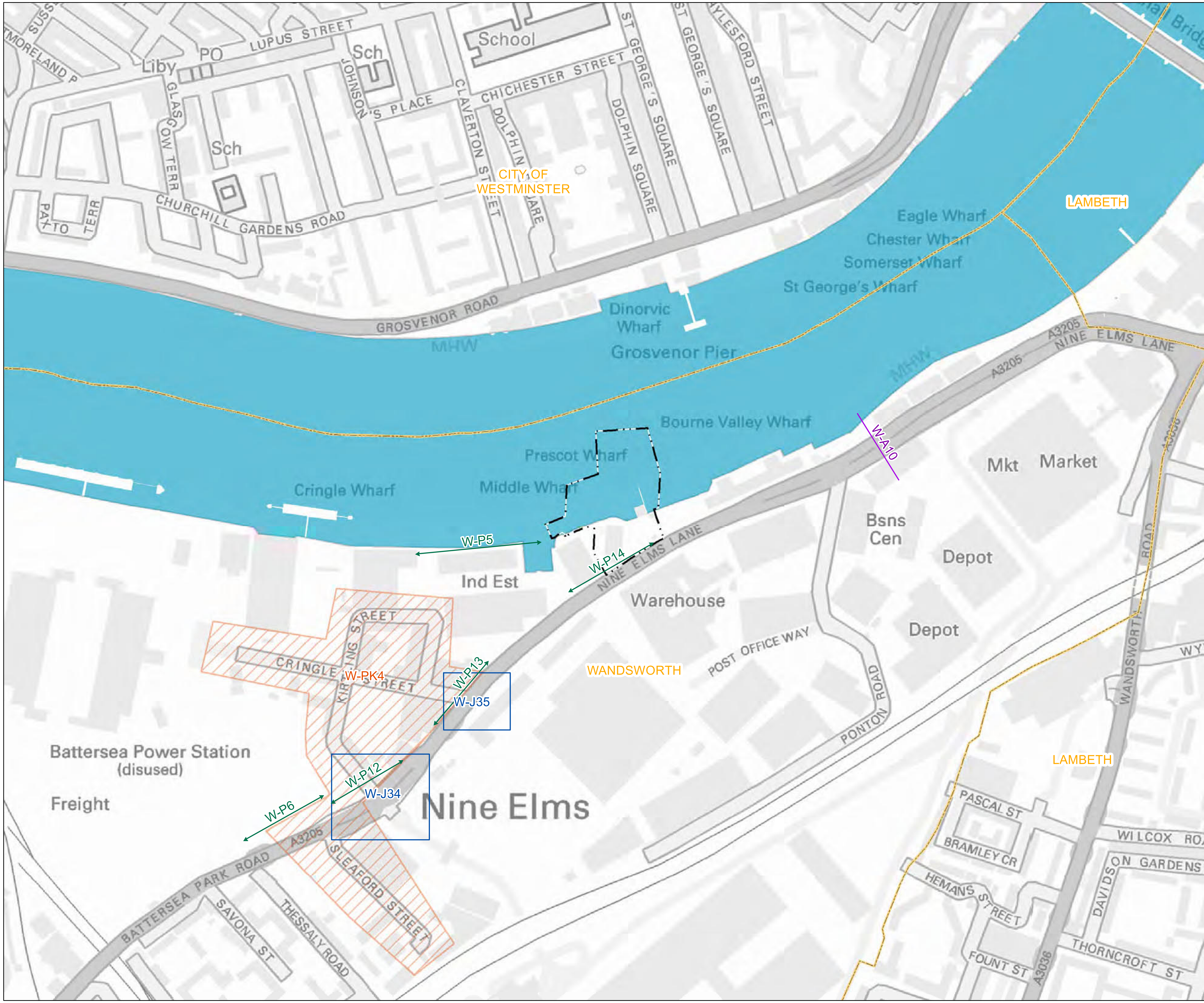
Location
Kirtling Street
London Borough Of Wandsworth

Document Information
Transport Assessment
Transport - survey locations

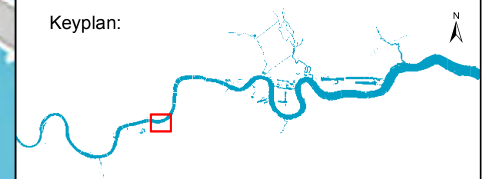
Figure 14.4.4
1PL03-TT-50693
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:



Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

60 30 0 60 m

Scale 1 : 4,000 at A3

FOR INFORMATION

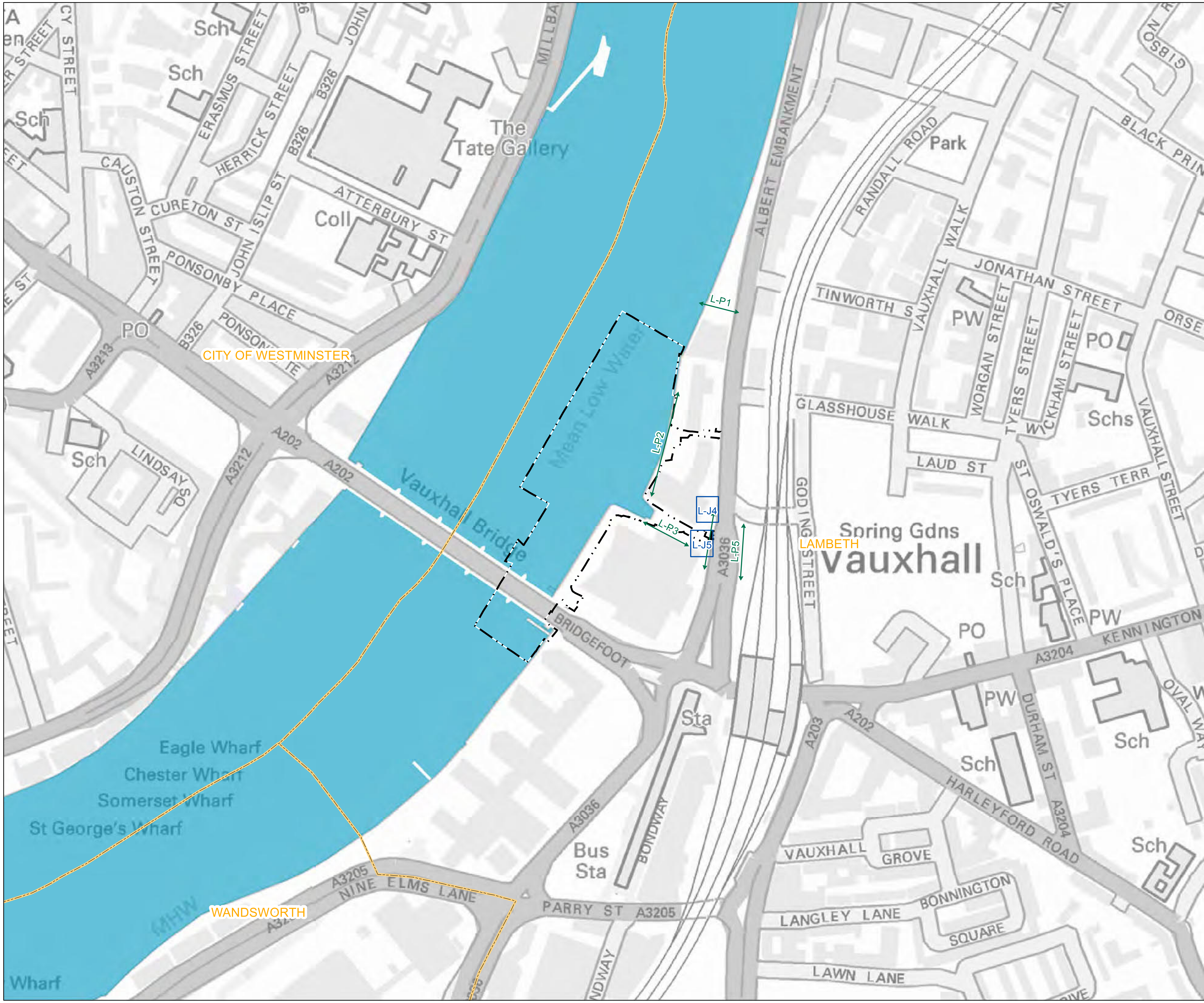
Location
Heathwall Pumping Station
London Borough Of Wandsworth

Document Information
Transport Assessment
Transport - survey locations

Figure 15.4.4
1PL03-TT-50692
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Pedestrian annd cycle surveys
- Junction surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

50 25 0 50 m

Scale 1 : 3,500 at A3

FOR INFORMATION

Location

Albert Embankment Foreshore

London Borough of Lambeth

Document Information

Transport Assessment

Transport - survey locations

Figure 16.4.4

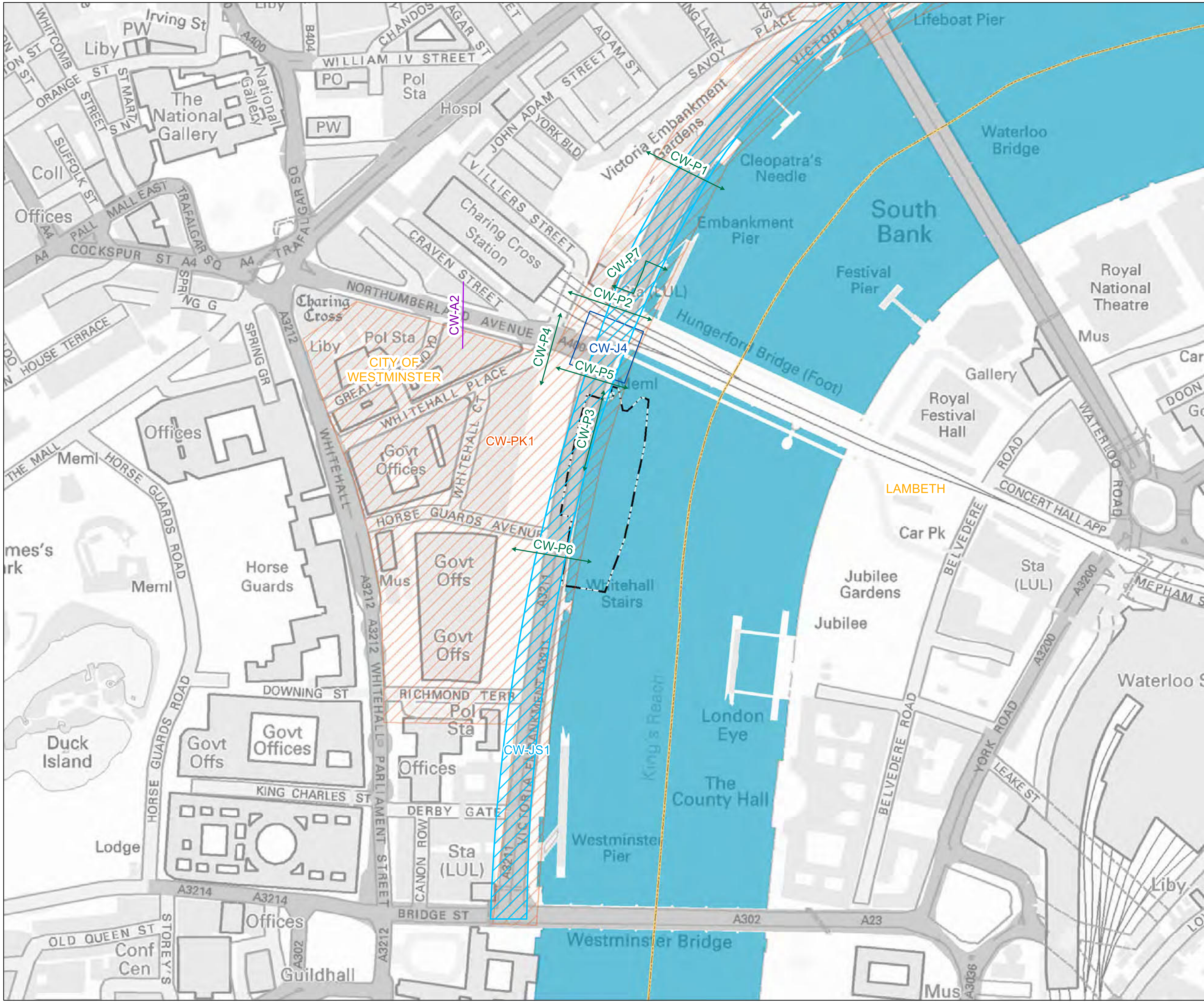
1PL03-TT-50738

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Journey time surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

60 30 0 60 m

Scale 1 : 4,000 at A3

FOR INFORMATION

Location

Victoria Embankment Foreshore

City Of Westminster

Document Information

Transport Assessment

Transport - survey locations

Figure 17.4.4

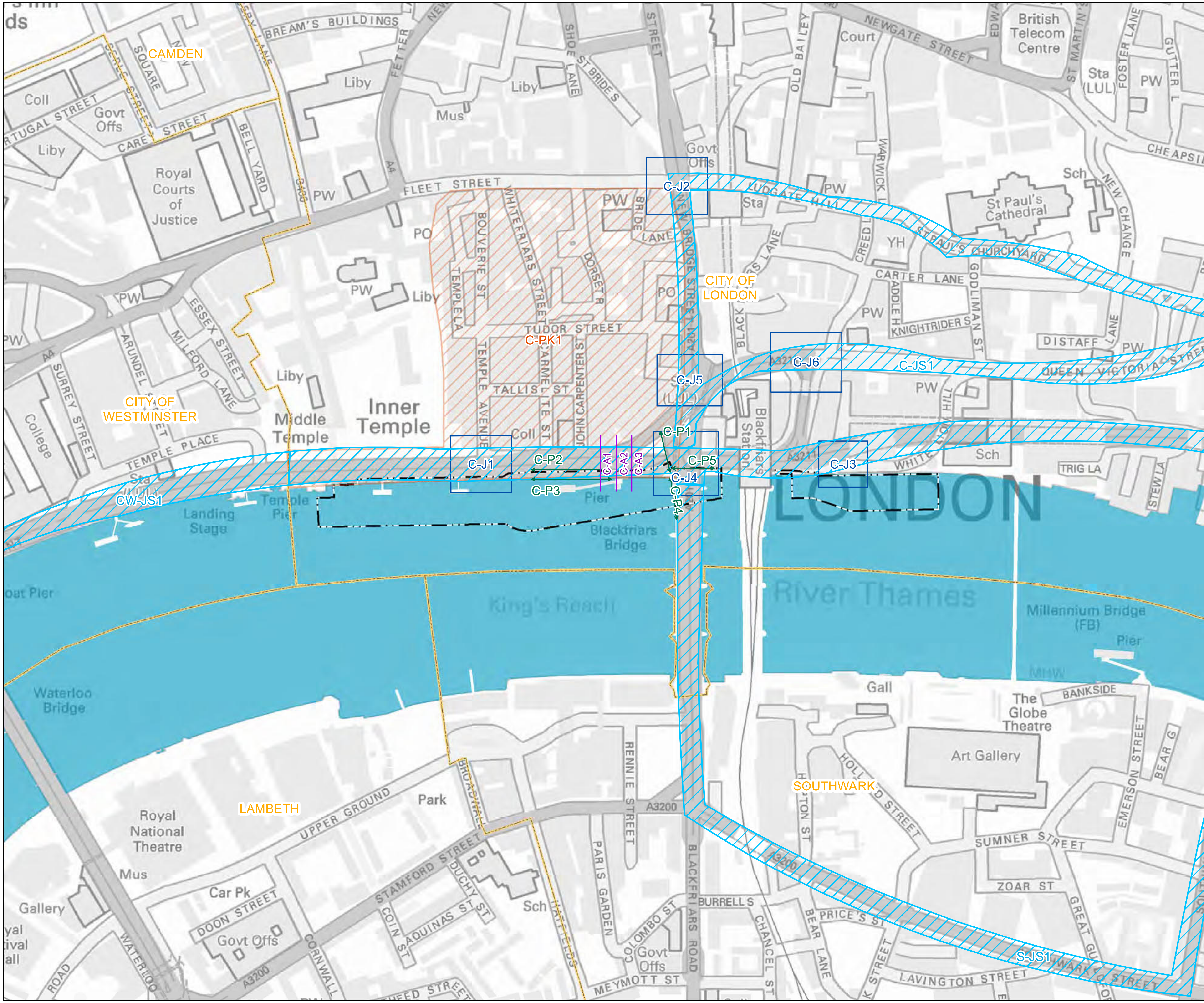
1PL03-TT-50695

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Journey time surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

70 35 0 70 m

Scale 1 : 4,500 at A3

FOR INFORMATION

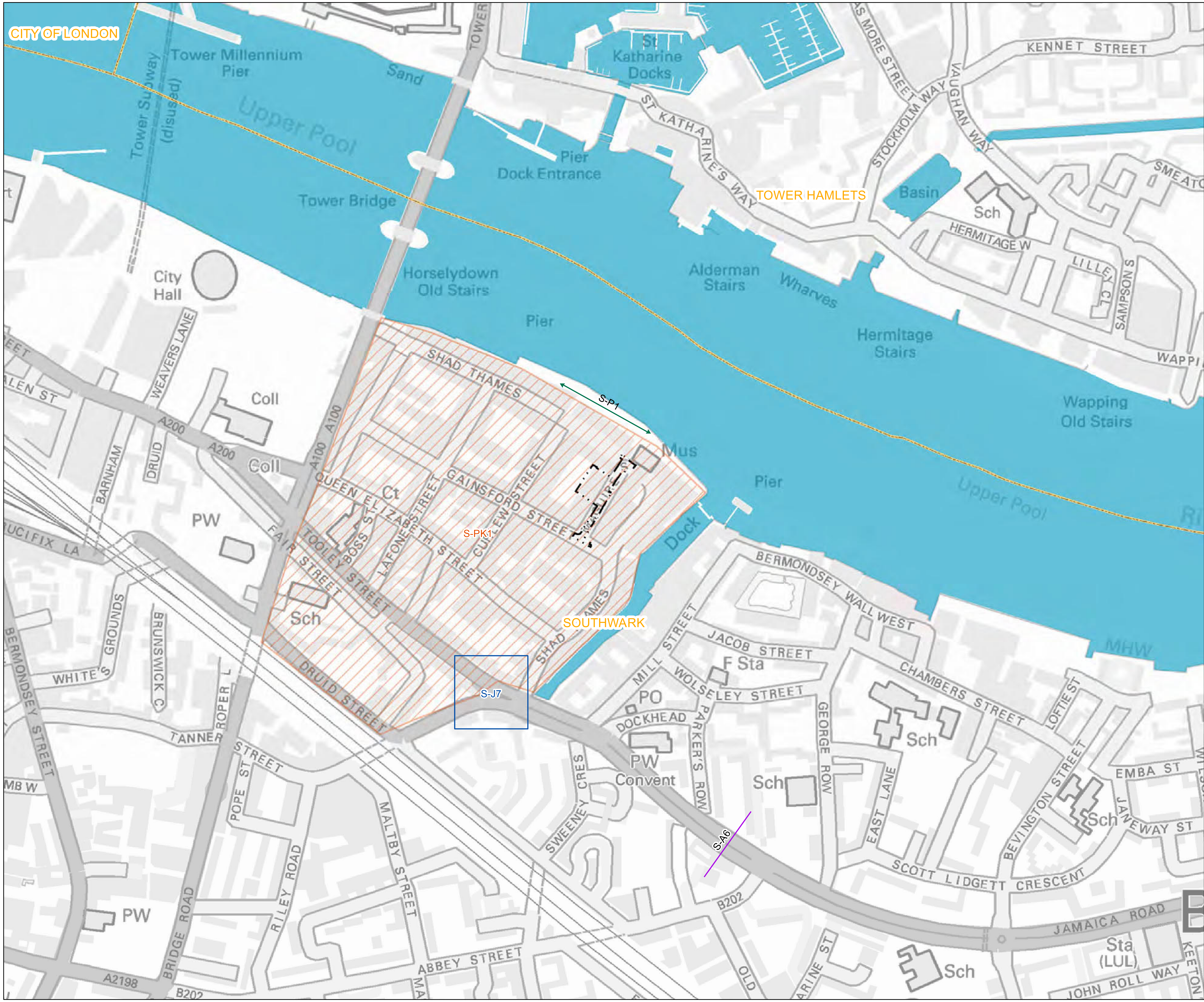
Location
Blackfriars Bridge Foreshore
City Of London

Document Information
Transport Assessment
Transport - survey locations

Figure 18.4.4
1PL03-TT-50689
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



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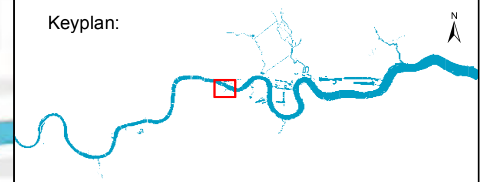


Key
- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

60 30 0 60 m

Scale 1 : 4,000 at A3

FOR INFORMATION

Location
Shad Thames Pumping Station
London Borough of Southwark

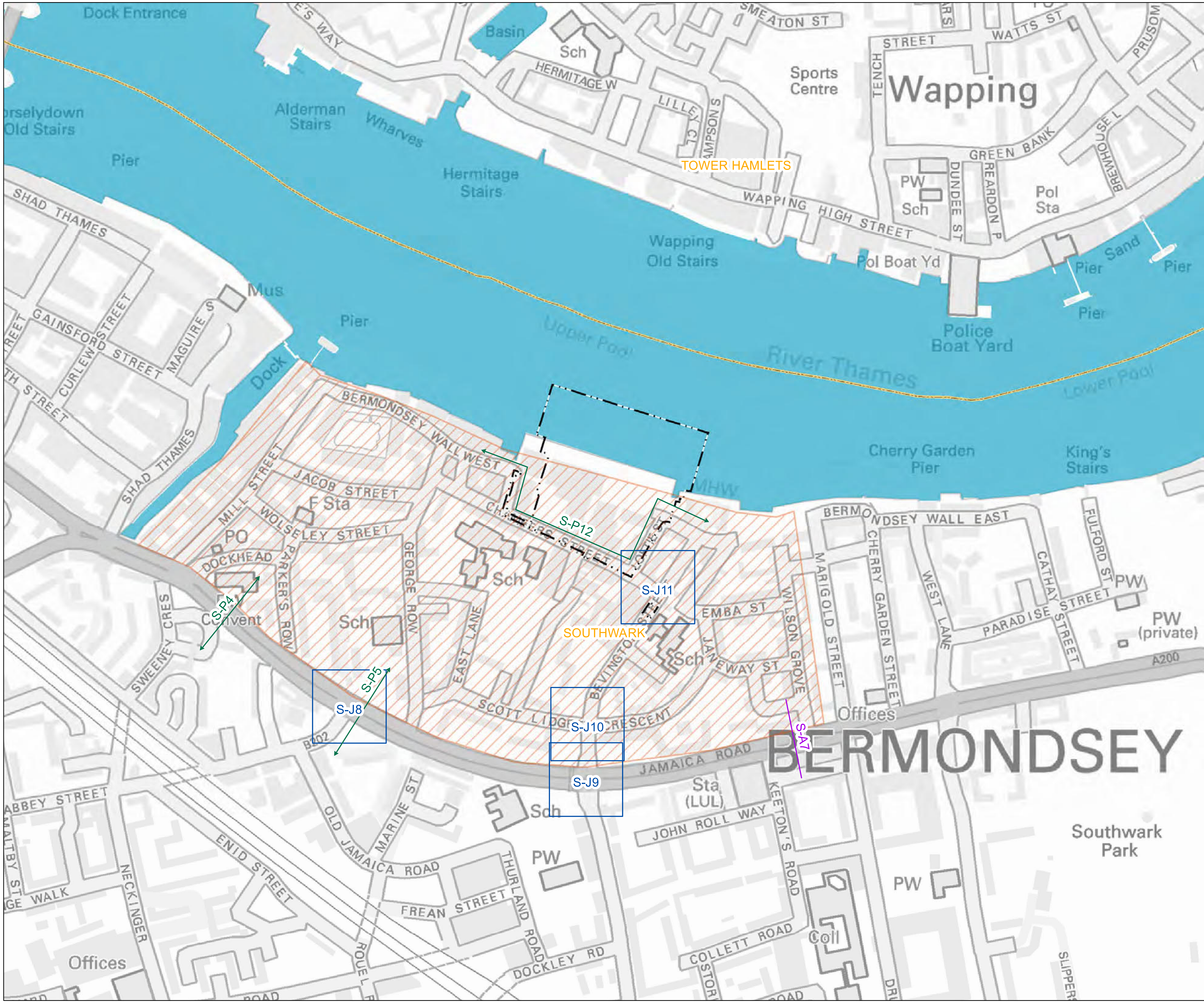
Document Information
Transport Assessment
Transport - survey locations

Figure 19.4.4

1PL03-TT-50743
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

Scale 1 : 4,000 at A3

FOR INFORMATION

Location

Chambers Wharf

London Borough of Southwark

Document Information

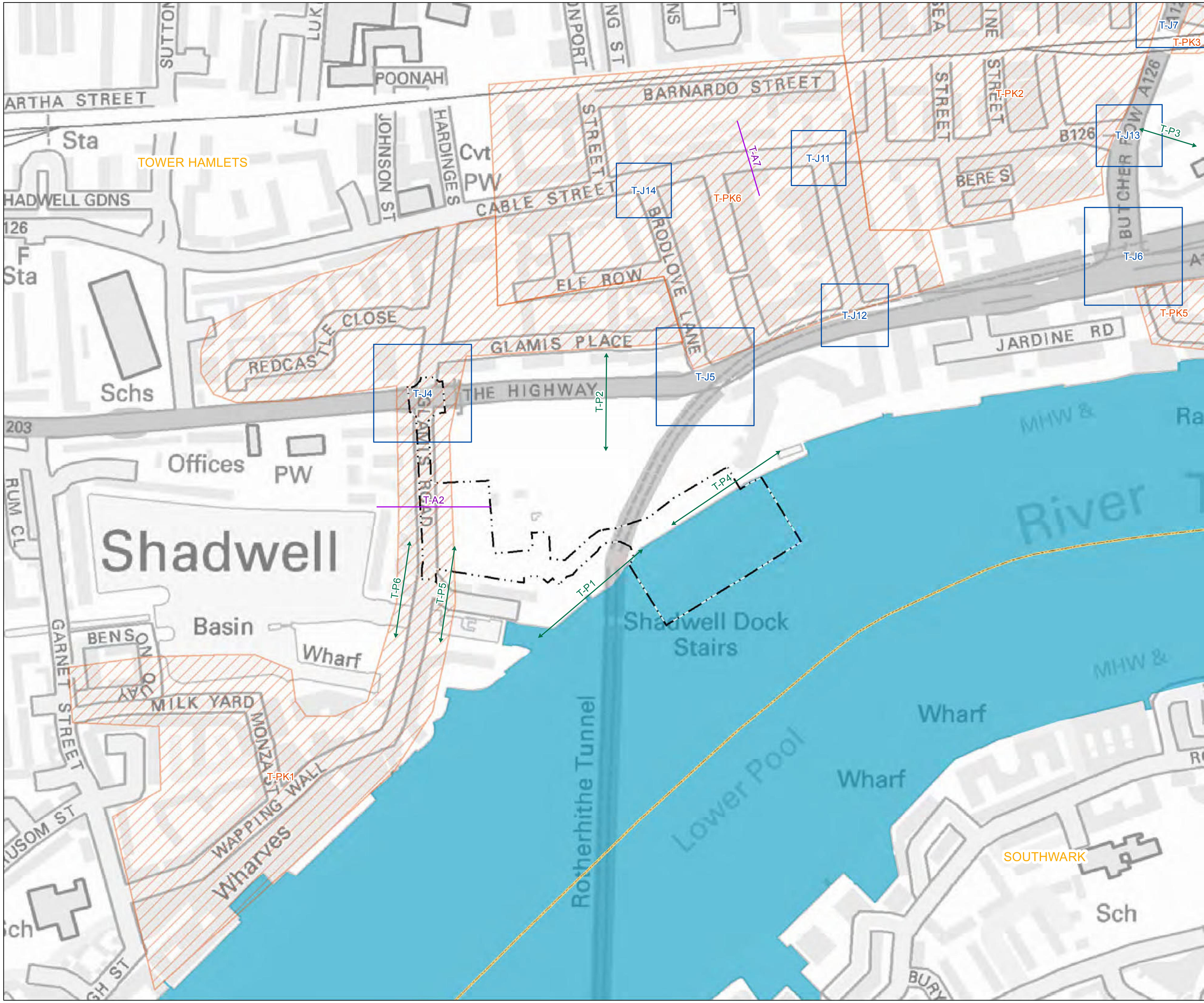
Transport Assessment

Transport - survey locations

Figure 20.4.4

1PL03-TT-50641

January 2013



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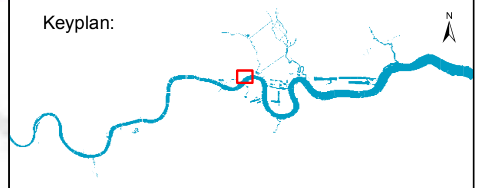
Keyplan:



Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

40 20 0 40 m

Scale 1 : 3,000 at A3

FOR INFORMATION

Location

King Edward Memorial Park Foreshore

London Borough of Tower Hamlets

Document Information

Transport Assessment

Transport - survey locations

Figure 21.4.4

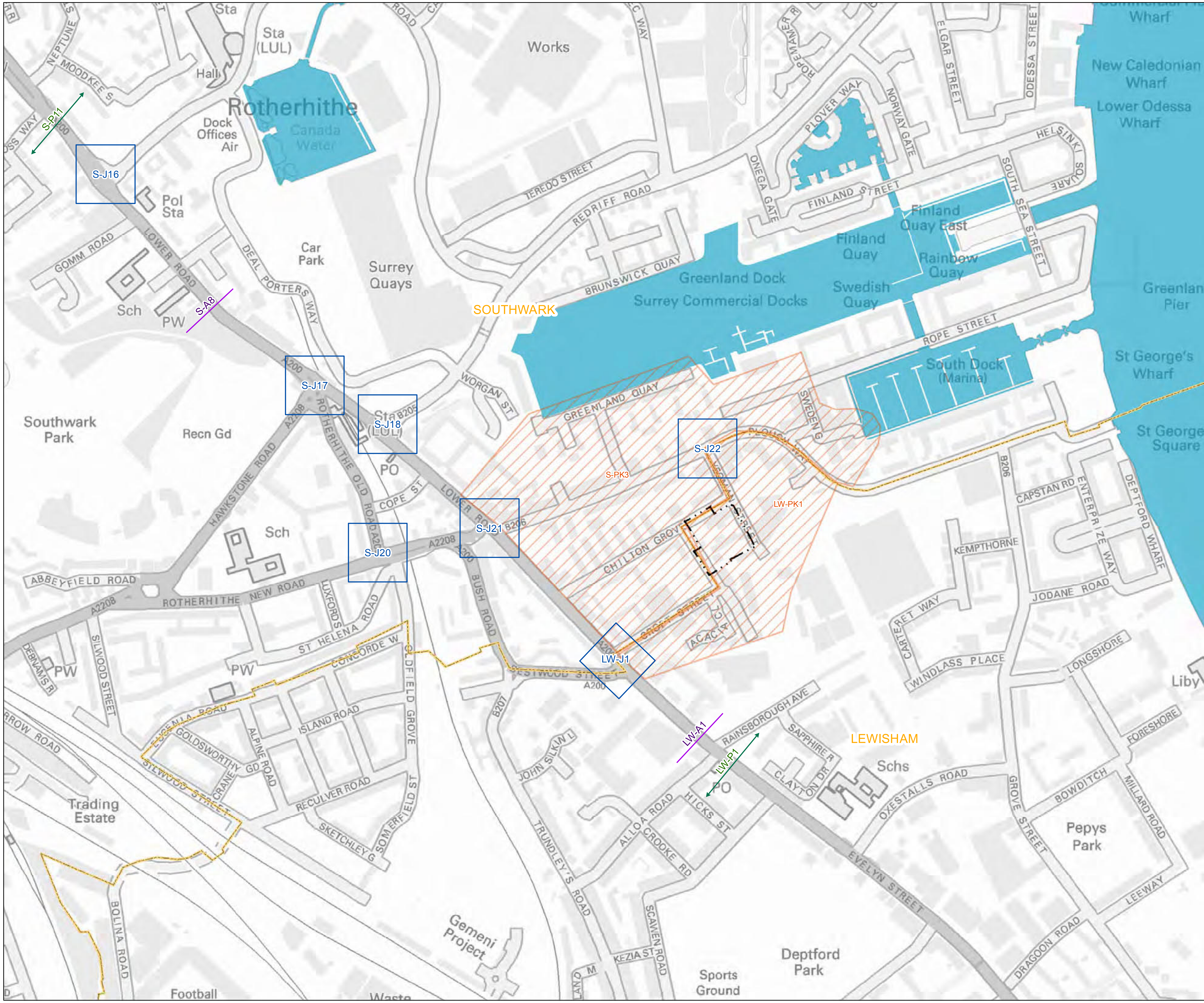
1PL03-TT-50646

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

80 40 0 80 m

Scale 1 : 5,000 at A3

FOR INFORMATION

Location
Earl Pumping Station
London Borough of Lewisham

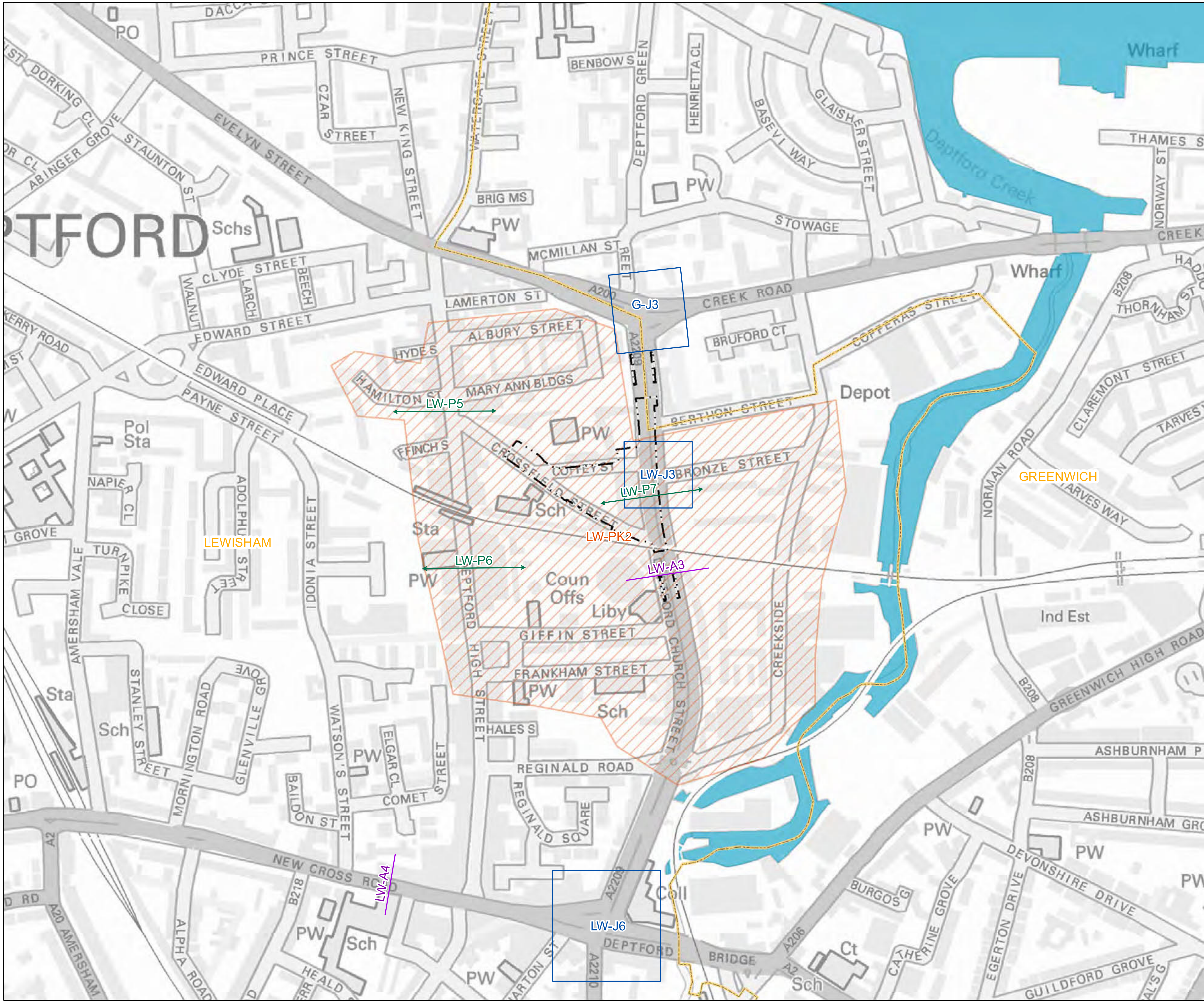
Document Information
Transport Assessment
Transport - survey locations

Figure 22.4.4

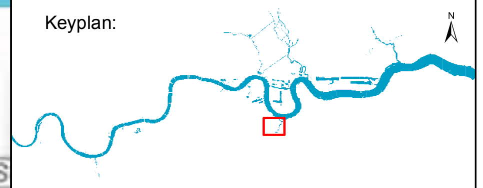
1PL03-TT-50741
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:



Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

60 30 0 60 m

Scale 1 : 4,000 at A3

FOR INFORMATION

Location

Deptford Church Street

London Borough Of Lewisham

Document Information

Transport Assessment

Transport - survey locations

Figure 23.4.4

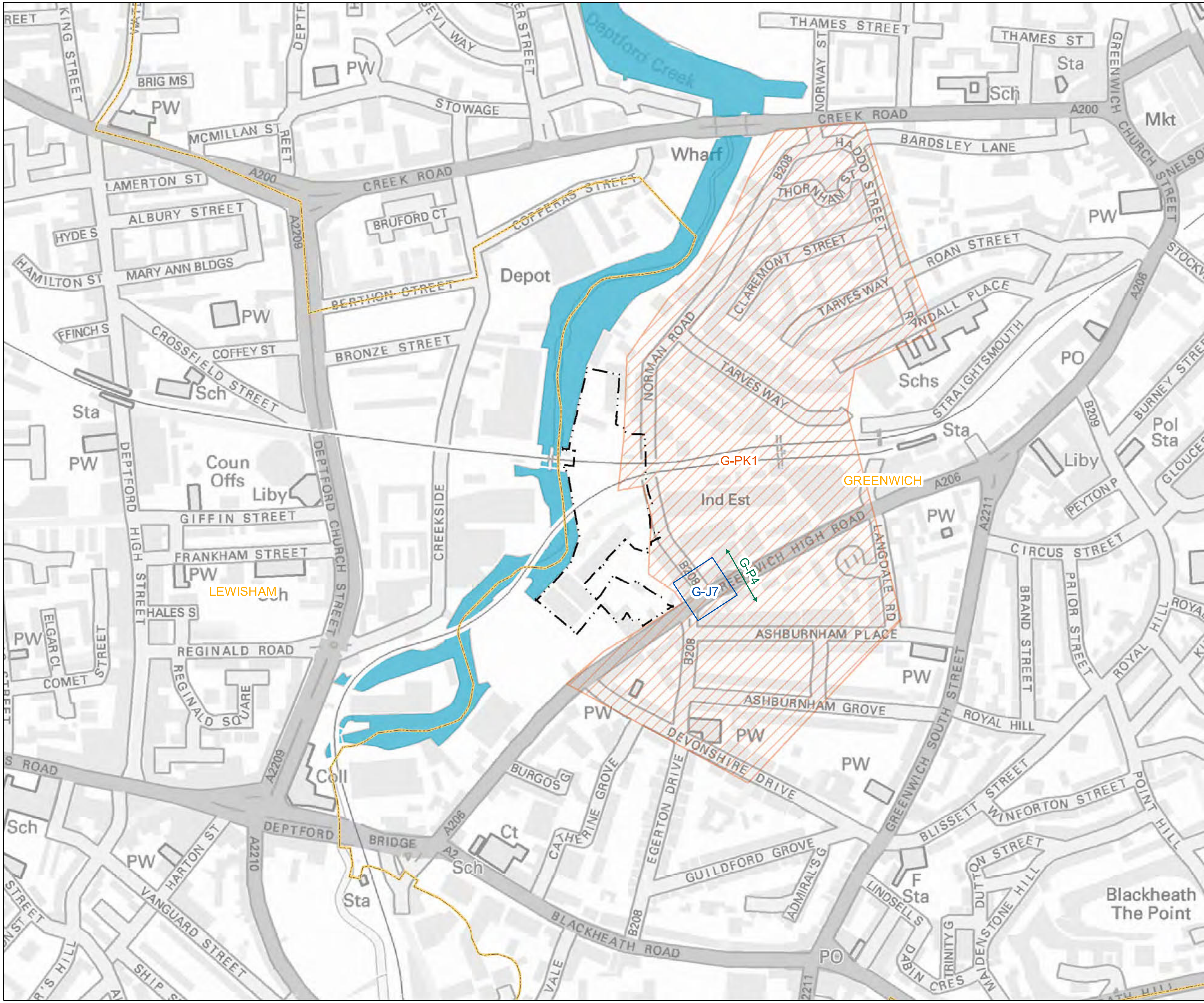
1PL03-TT-50691

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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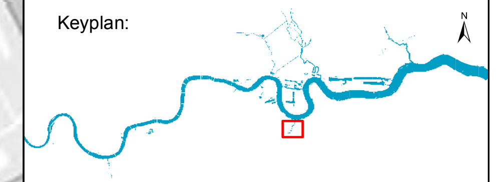
Keyplan:



Key

- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

60 30 0 60 m

Scale 1 : 4,000 at A3

FOR INFORMATION

Location

Greenwich Pumping Station

Royal Borough of Greenwich

Document Information

Transport Assessment

Transport - survey locations

Figure 24.4.4

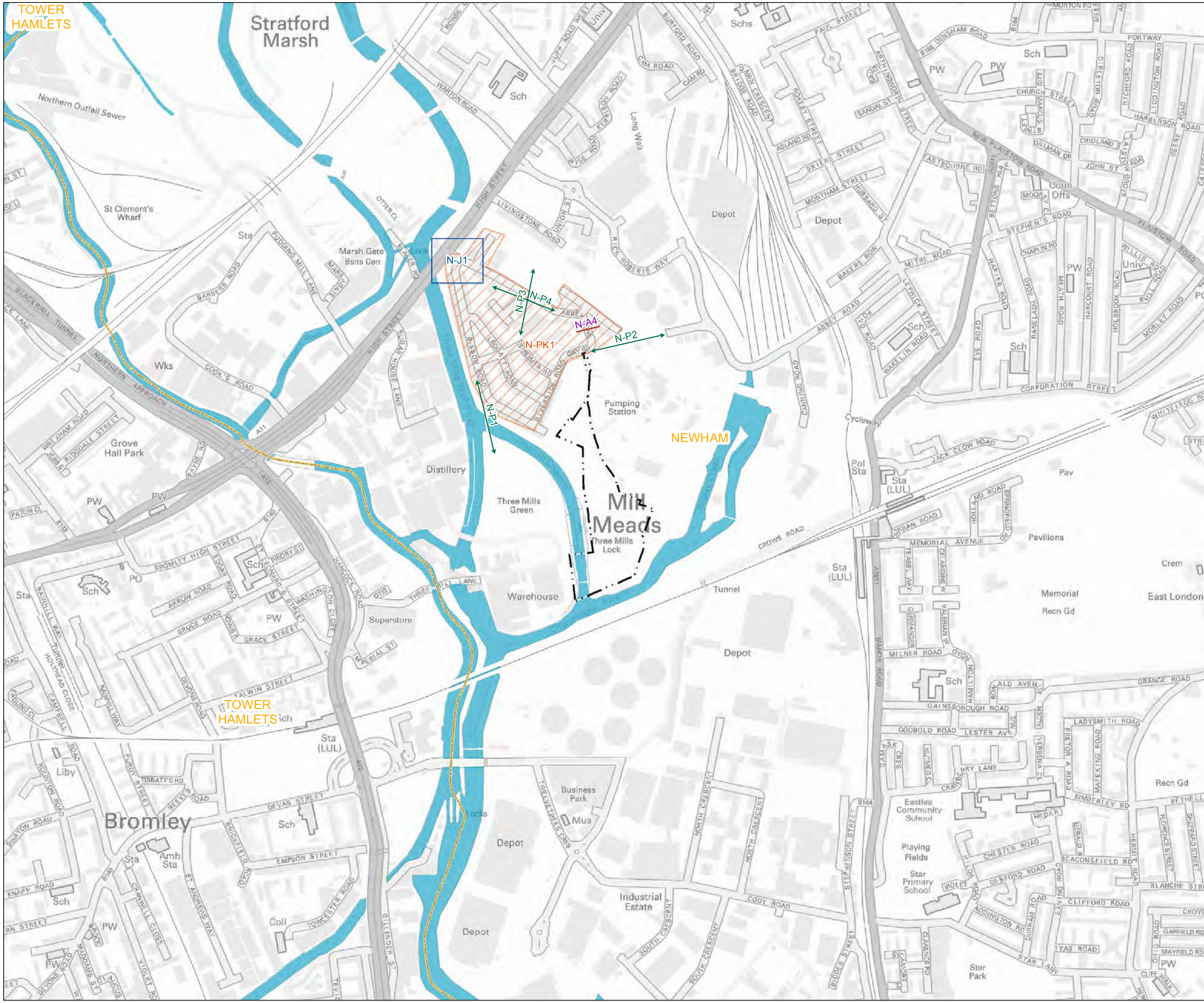
1PL03-TT-50644

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



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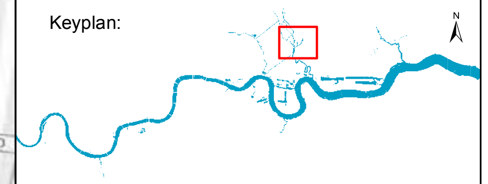
Keyplan:



Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Parking surveys
- Junction surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

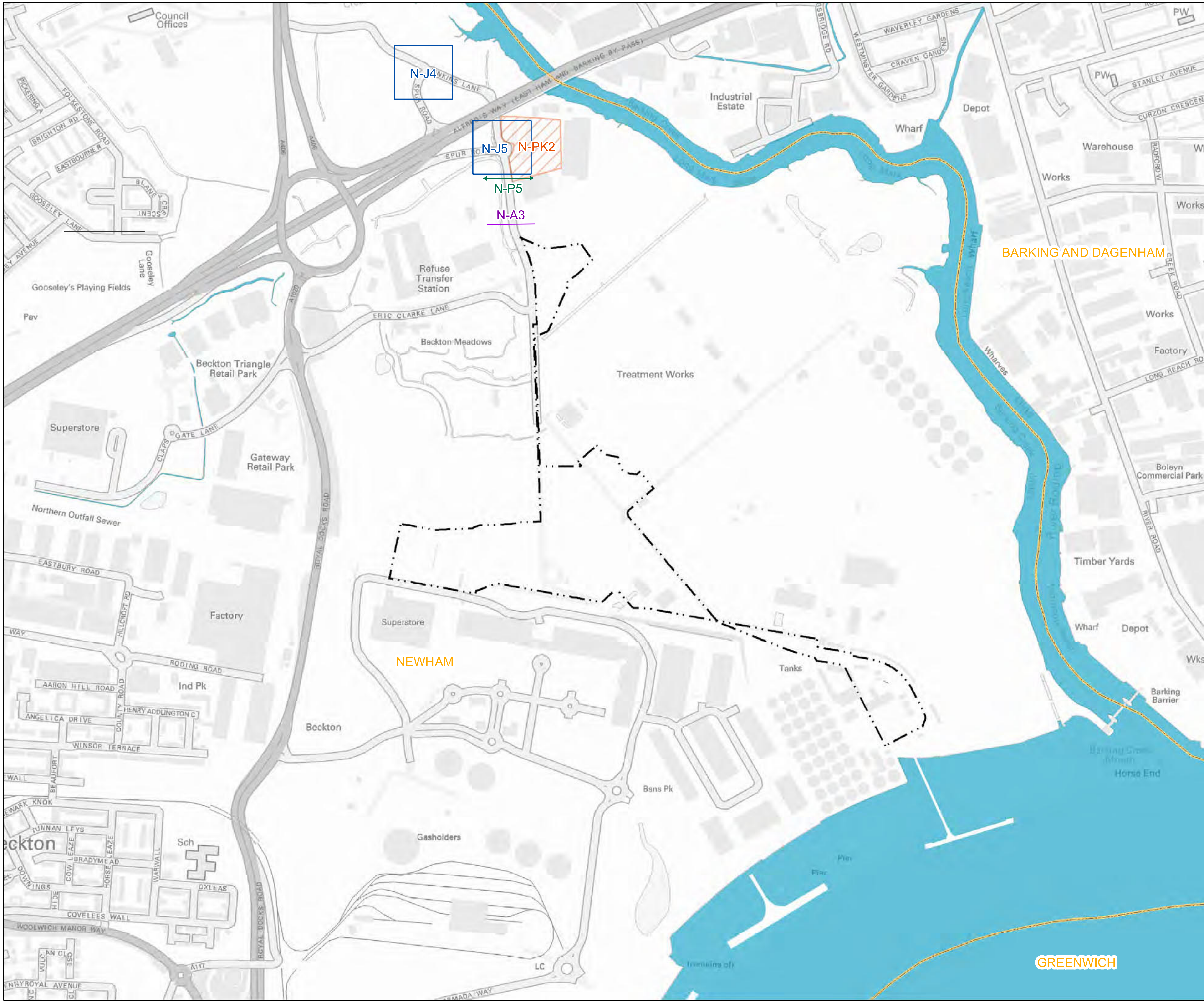
Location
Abbey Mills Pumping Station
London Borough of Newham

Document Information
Transport Assessment
Transport - survey locations

Figure 25.4.4
1PL03-TT-50736
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Beckton Sewage Treatment Works

London Borough of Newham

Document Information

Transport Assessment

Transport - survey locations

Figure 26.4.4

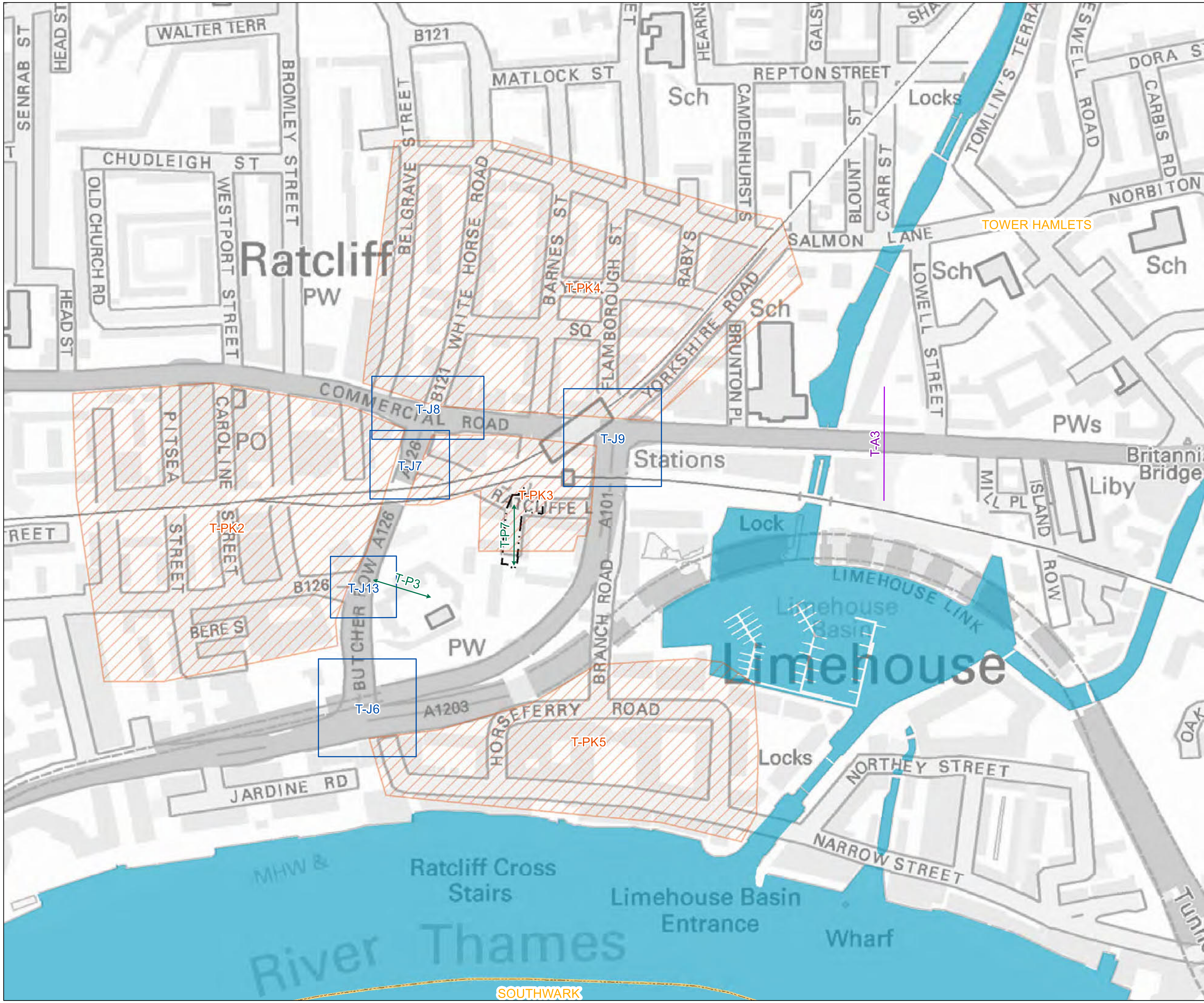
1PL03-TT-50688

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

Scale 1 : 3,000 at A3

FOR INFORMATION

Location

Bekesbourne Street

London Borough Of Tower Hamlets

Document Information

Transport Assessment

Transport - survey locations

Figure 27.4.4

1PL03-TT-50690

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water

Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Transport Assessment

Doc Ref: **7.10**

Appendix B

APFP Regulations 2009: Regulation **5(2)(q)**

Hard copy available in

Box **49** Folder **A**
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

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Thames Tideway Tunnel

Transport Assessment

Sections 1-3 Introduction, engagement and project-wide assessment appendices

Appendix B: Strategic Modelling Methodology Report

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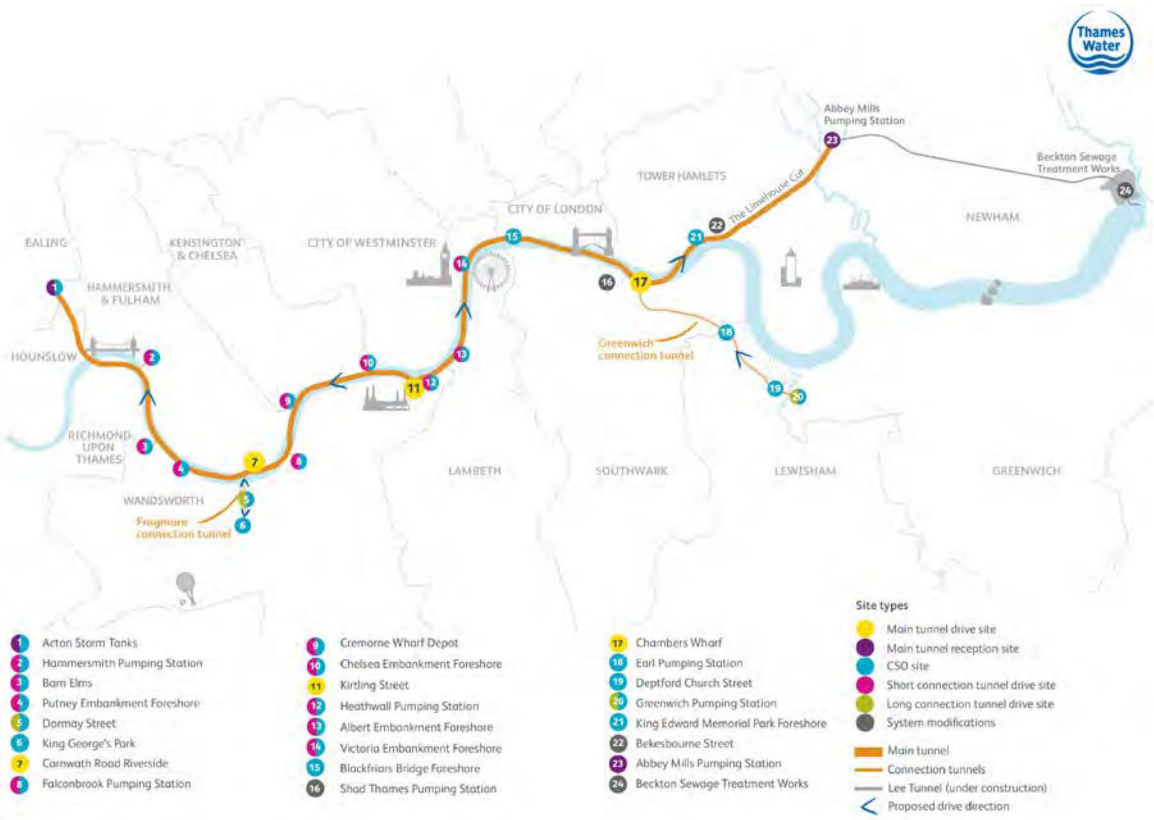
1 Introduction

1.1.1 The Thames Tideway Tunnel would involve the construction of a 25 km long tunnel between Acton and Beckton. There would also be connection tunnels from Greenwich Pumping Station to the main tunnel in Southwark (Greenwich connection tunnel) and King George's Park in Wandsworth to the main tunnel (Frogmore connection tunnel). The route is shown on Plate 1 below.

1.1.2 This report has been prepared to present the rationale behind and approach to the strategic modelling assessment which supports the Transport Assessment. The methodology has been discussed with Transport for London (TfL) at a number of meetings.

Plate 1 Thames Tideway Tunnel route



1.1.3 Section 2 of this report describes the modelling tools available for testing both the strategic and local traffic impacts of the project, the approach and methodology adopted and the types of trip that have been considered.

1.1.4 Section 3 describes the modelling scenarios that have been examined, including the need for sensitivity testing. Section 4 compares the scenarios and determines those which have been used for the assessment.

1.1.5 Section 5 describes the model runs that have been undertaken and Section 6 explains how strategic modelling outputs have been integrated into other assessment work.

2 Strategic and local modelling

2.1 Transport for London strategic models

2.1.1 TfL has developed five strategic Highway Assignment Models (HAMs) that cover London and its surrounding area. These comprise:

a. the West London Highway Assignment Model (WeLHAM)

b. the Central London Highway Assignment Model (CLoHAM)

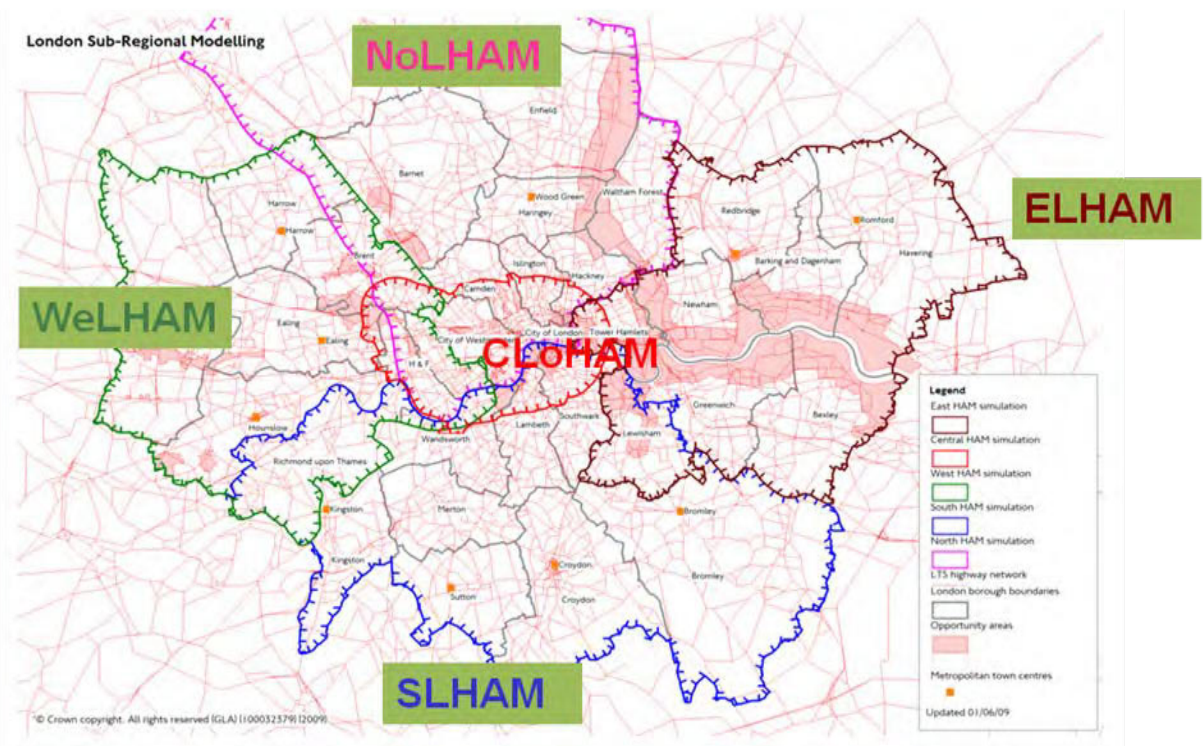
c. the East London Highway Assignment Model (ELHAM)

d. the North London Highway Assignment Model (NoLHAM)

e. the South London Highway Assignment Model (SLoHAM)

2.1.2 The extent of each model is shown in Plate 2 below. The base years for the models are 2008 for CLoHAM and NoLHAM and 2009 for the other models. The model forecast year is 2021 and the modelled time periods are the AM peak hour (8am – 9am), the average interpeak hour between 10am and 4pm and the PM peak hour (5pm – 6pm). The highway models were built using SATURN software.

Plate 2 Extent of the five TfL strategic Highway Assignment Models



2.1.3 The Thames Tideway Tunnel would run from Acton, which lies in the WeLHAM model simulation area, through the CLoHAM area and on to

Beckton which is in the ELHAM model simulation area. The section between Chambers Wharf and Greenwich Pumping Station also runs through ELHAM.

2.1.4 It has been agreed with TfL that it was desirable to minimise the number of HAMs used within the assessment, if possible, in order to achieve maximum consistency in the assessment of the impacts on the highway network. The Thames Tideway Tunnel proposals have therefore been tested using WeLHAM, CLoHAM and ELHAM, which between them cover all of the proposed construction sites.

2.2 Purpose of strategic modelling

2.2.1 The strategic modelling assessment has been undertaken to understand the scope and nature of any project wide and significant traffic effects of the project.

2.2.2 The strategic models being used provide a useful indication of the effects of the project at a strategic level, but are less suited to identifying traffic-related impacts at a local level.

2.2.3 Local highway capacity modelling has therefore been undertaken for the assessments of each individual site location, as described in Section 2.4, which has been informed by the outputs from the strategic models.

2.3 Approach to strategic modelling

2.3.1 The key elements of the approach to modelling for each of the different types of trip generated by the project are set out below.

Trip types

2.3.2 There are four trip types associated with the construction of the Thames Tideway Tunnel which have been considered in the strategic modelling work:

a. Construction lorries

b. Worker trips

c. Operational trips

d. Office trips

2.3.3 **Construction lorries** refers to trips made by heavy goods vehicles in connection with the work at each site. These include vehicles associated with plant deliveries, concrete deliveries both ready mix and ingredients if mixed on site, excavation spoil, imported fill, cement works, grouting, tunnel segments, equipment and parts such as pipes, track and oils.

2.3.4 **Worker trips** are the commuting trips made by employees travelling to and from the sites where they are employed during the construction phase.

2.3.5 **Operational trips** are 'employers business' journeys made to and between sites by employees of the project and its contractors during the construction phase.

2.3.6 **Office trips** are journeys made by light goods vehicles delivering office supplies to each site during the construction phase.

2.3.7 The estimated numbers of trips in each category and the scenarios considered in the strategic modelling work are described in Section 3.

Construction lorries

2.3.8 The origin of construction lorries transporting materials to a site would be determined by the assumed source location of the materials which need to be delivered. The destination of material being transported away from a site such as excavated material would be determined by the assumed location of the site where the material is to be deposited. These origin and destination assumptions were identified as part of earlier studies into likely locations. It is recognised that these locations could vary, depending on future conditions and market circumstances, and therefore the locations used represent assumptions for the purposes of assessment.

2.3.9 It has been assumed that a vehicle, when empty, would return to the same place where it started its trip, i.e. the outward and return leg of a journey would have transposed origin and destinations.

2.3.10 These trips, which would be made by heavy goods vehicles, have been allocated to fixed routes defined for each origin / destination pair. The routes were identified using the following criteria:

a. using the quickest route from the site to the Strategic Road Network (SRN) or Transport for London Road Network (TLRN)

b. keeping to the SRN / TLRN where possible and minimising use of lower class roads

c. avoiding routes with height / weight / width restrictions and banned turns

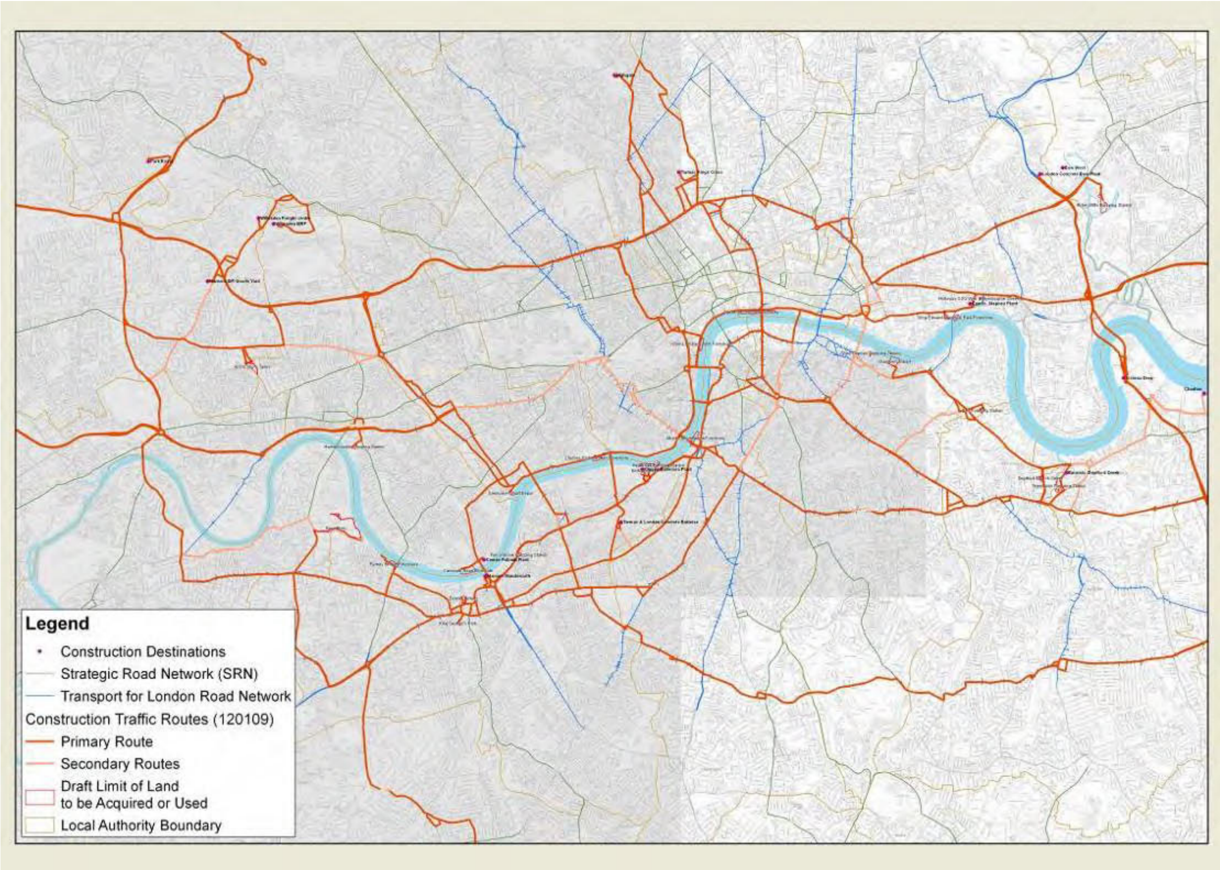
d. avoiding where possible heavily congested routes.

2.3.11 The proposed construction lorry routes were discussed with TfL and the Boroughs and changes to the assumed routes were made in response to their comments. Plate 3 below shows the routings of construction vehicles at a strategic scale.

2.3.12 OmniTrans software has been used to develop a model of the construction route network and to assign the construction lorry movements from each of the sites onto the identified network of construction routes. This enabled an overall assignment of construction lorries to be identified.

2.3.13 The construction lorry movements derived from the OmniTrans work were coded into Saturn as pre-loaded fixed flows, using a passenger car unit (pcu) factor of 2, which means that each additional construction vehicle contributes to the delay on a link it uses the equivalent of an additional 2 cars. This approach means that when the construction lorries were assigned in the WeLHAM, CLoHAM and ELHAM models the construction lorries were kept to these fixed routes and were not reassigned by the SATURN software. However, depending on the changes in journey time that arise on these routes, the SATURN models may reassign some existing traffic away from these links.

Plate 3 Main routes for construction vehicles



Worker trips

2.3.14 It was assumed that the origins of worker trips to each site would be similar to the origins of existing trips to the zones containing the sites in the car vehicle matrices within the strategic models. The distribution of worker trips therefore reflects the distributions in the HAMs.

2.3.15 However as the numbers of worker trips would be low in relation to the number of zones in the strategic models, in order to avoid allocating small fractions of vehicles to each zone, the HAMs were sectored to Borough level. The distribution of trips to each Borough, and to four additional zones which covered the area external to London, has been used for the distribution of worker trips.

2.3.16 When the origin – destination matrices were built for assignment to the HAMs, a representative zone for each Borough was chosen using a random number selector. The worker trips form a separate user class when assigned in the HAMs and this allows the vehicles to use any route available to car trips.

Operational and office trips

2.3.17 The matrices for operational and office trips were prepared using a similar approach as used for worker trips. In this case however, the trip distribution was based on the light goods vehicle matrices in the HAMs. The matrices of additional trips were assigned to the model as a separate user class using the characteristics of light goods vehicles and allowing vehicles to be able to use any route available to light goods vehicles.

2.4 Approach to local modelling

2.4.1 To assess the impacts of Thames Tideway Tunnel traffic in the vicinity of each of the construction sites, local highway capacity modelling has been undertaken. This is a more appropriate way of examining local issues, as the HAMs do not contain sufficient detail to model the impacts of traffic at a local level with an appropriate level of confidence.

2.4.2 Local highway capacity modelling software has been used for this work, including:

a. PICADY software to model priority (uncontrolled) junctions

b. LinSig software to model individual traffic signal junctions

c. TRANSYT software to model linked networks of traffic signals

d. VISSIM microsimulation software to model the 'sub-area' network along Victoria Embankment between the Blackfriars Bridge Foreshore and Victoria Embankment sites.

2.4.3 Baseline local highway models were constructed based either on existing models that were made available by TfL, or on observed and measured highway geometry and signal timing information. Baseline traffic flows from field survey data were incorporated into these models to represent current conditions and the model outputs were validated against observed queue lengths to ensure that they were reasonably representative.

2.4.4 Models for the construction base case (the future case without the Thames Tideway Tunnel construction traffic) were created by applying growth factors to the baseline flows. The growth factors were derived from the HAMs by comparing the number of trips in the modelled base and forecast years in the HAMs at a Borough level, and deriving growth factors which were applied to the baseline flows in the local models.

2.4.5 These growth factors enable the local highway modelling to take account of changes in traffic flow that would arise as a result of employment and population growth and new development, forecasts for which are already contained in the HAMs. In the area around Nine Elms, however, the scale of new development is significant and for the three sites in the immediate area (Kirtling Street, Heathwall Pumping Station and Albert Embankment Foreshore), the local models were supplemented with information obtained on the changes expected in that area. This drew on existing Transport Assessments and other information related to planning applications in the area.

2.4.6 To create construction development case models (which include the Thames Tideway Tunnel traffic), the changes in turning movements at the relevant junctions were identified by comparing the base and development case HAM outputs. This means that the local models take account not only of additional Thames Tideway Tunnel traffic passing through a junction but also allow for any other reassignment effects on the wider network that are produced by the HAMs.

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3 Modelling scenarios

3.1 Identification of scenarios

3.1.1 Discussions have taken place with TfL on the scenarios that should be considered within the strategic and local modelling work. This section outlines the scenarios discussed and those which have been used in the assessment.

EIA scenario

3.1.2 The proposals for the transport of construction materials are set out in the Transport Strategy. This includes a combination of river transport for certain construction materials at certain sites, combined with road transport for the remaining materials at those sites and for all materials at other sites. The sites at which river transport is proposed are:

a. Putney Embankment Foreshore

b. Carnwath Road Riverside

c. Cremorne Wharf Depot

d. Chelsea Embankment Foreshore

e. Kirtling Street

f. Heathwall Pumping Station

g. Albert Embankment Foreshore

h. Victoria Embankment Foreshore

i. Blackfriars Bridge Foreshore

j. Chambers Wharf

k. King Edward Memorial Park Foreshore.

3.1.3 The ‘core’ scenario used in the Environmental Impact Assessment is based on the Transport Strategy and in this report is referred to as the ‘EIA’ scenario.

3.1.4 For the EIA scenario, the assessment has been based on the month in which the aggregate number of construction lorry movements from all Thames Tideway Tunnel sites would be greatest. At other times, the number of movements would be lower and therefore this approach is considered to be a reasonable scenario for testing.

3.1.5 Discussions with TfL also acknowledged that whilst the EIA scenario described above would establish the impacts for the project-wide peak month of construction vehicle movements, it was possible that there could be other times at which the groups of sites in each of the three HAMs would experience more localised ‘cluster’ peaks – ie. that the aggregate number of construction lorries within each of those three groups could reach a maximum in a different month to the project-wide peak month.

3.1.6 To address this possibility, it was agreed with TfL that 'cluster' peak scenarios would also be investigated as part of the EIA scenario. This would identify whether the month of greatest construction vehicle activity within each cluster of sites was different to the project-peak wide month, and would undertake a strategic model run, using the relevant HAM, if that were the case.

Sensitivity test scenarios

3.1.7 In the course of discussions, TfL has requested that a strategic sensitivity test should be considered to reflect the potential for periodic variation of forecast construction traffic, and the potential for increased coincidence of construction peaks between sites. A sensitivity test to address the non-availability of river transport was also discussed.

3.1.8 In general terms, the potential for these factors to result in significant increases in the level of construction traffic is limited because:

a. the potential for increased coincidence of construction traffic peaks across the sites is limited by virtue of the sequential nature of the construction programme

b. any day-to-day variation on construction vehicle numbers would be most likely to have an impact on a limited number of days during the project, and is unlikely to generate a project wide strategic impact, particularly since the EIA scenario already examines the month of greatest aggregated construction lorry movements

c. the Transport Strategy contains commitments to the use of the river and restrictions on river transport which might arise as a result of an incident at a particular site, or a wider navigational restriction on the river (such as the closure of the Thames Barrier) are likely to be infrequent and short term.

3.1.9 Nevertheless, it was agreed that a sensitivity test should be investigated as part of the strategic modelling work.

3.1.10 It was proposed that the sensitivity test would be based on the number of construction lorry movements that would occur if all materials were to be transported by road to and from all sites concurrently. Whilst this is expected to be an unlikely situation, bearing in mind the commitments made to river transport in the Transport Strategy, it was agreed that these figures should form the basis for the test. This scenario has been referred to as the 'all by road' scenario (ABR).

3.1.11 In discussion, TfL questioned whether the ABR scenario would be an appropriate maximum sensitivity test, particularly if a situation were to arise in which all sites experienced peak traffic movements in the same month of the project programme.

3.1.12 The construction process for the Thames Tideway Tunnel inevitably mitigates against this 'combined peak' scenario occurring, because of the sequential and interlinked nature of the construction activities and tunnel drive arrangements.

3.1.13 However, in order to demonstrate what the implications might be, the construction lorry numbers implied by this scenario have been calculated, based on the EIA scenario. It is not considered appropriate to investigate a 'combined peak, ABR' scenario as this would be highly unlikely to occur in practice for the reasons outlined in para. 3.1.8 and would therefore represent an unrealistically onerous test.

Selected scenarios

3.1.14 The scenarios that were examined therefore comprise:

a. the EIA scenario, for both project-wide and cluster peaks

b. the ABR scenario, for both project-wide and cluster peaks

c. a 'combined peak EIA' scenario on a project-wide basis.

3.2 Scenario details and assumptions

3.2.1 This section sets out the vehicle movements which would be associated with each of the scenarios that have been considered, treating each trip type in turn. The only trip type for which the number of movements varies between scenarios is construction lorries; worker, operational and office trips would remain the same in each scenario.

3.3 Worker trips

3.3.1 Table 1 shows the highest anticipated number of trips by people working at each site arriving and departing each day. The figure is derived by taking the highest number of workers at each site during the peak month of activity for that site. The number of worker trips is identical for each scenario.

3.3.2 The 2001 Census journey to work data was examined to calculate the percentage of workers who commute by car currently working at workplaces within 1 km of each construction site.

3.3.3 At most sites, car parking would not be provided on site for workers and in many of these cases, car parking in surrounding streets is also restricted. In addition, a Project Framework Travel Plan has been developed with the aim of minimising worker car trips as far as possible.

3.3.4 Where there would be no worker parking on site, but inspection revealed that there is unrestricted car parking in the surrounding area, the assessment included the possibility that workers might travel by car in order to provide a robust test of the impacts on the highway network. These sites comprise those at Acton Storm Tanks, Carnwath Road Riverside, Dormay Street, Falconbrook Pumping Station, Earl Pumping Station and Deptford Church Street. In addition it is expected that worker parking may be available on the sites at Abbey Mills Pumping Station and Beckton Sewage Treatment Works, within existing Thames Water facilities.

3.3.5 Other than at the sites listed above, the Census 2001 mode share data was therefore adjusted on a pro-rata basis to remove the element of car mode share. At the remaining sites, the Census 2001 mode shares were adopted. The percentages of workers driving at each site were then applied to the number of workers at each site to derive the number of workers driving to work at each site.

Table 1 Worker trips

Construction Sites	Veh Mode Split	Daily		AM Peak Hour		PM Peak Hour	
		Arr	Dep	Arr	Dep	Arr	Dep
Acton Storm Tanks	49%	19	19	19	0	0	19
Hammersmith Pumping Station	0%	0	0	0	0	0	0
Barn Elms	0%	0	0	0	0	0	0
Putney Embankment Foreshore	0%	0	0	0	0	0	0
Carnwath Road Riverside	38%	110	110	63	0	0	40
Dormay Street	46%	42	42	21	7	7	21
King Georges Park	0%	0	0	0	0	0	0
Falconbrook Pumping Station	40%	16	16	16	0	0	16
Cremorne Wharf Depot	0%	0	0	0	0	0	0
Chelsea Embankment Foreshore	0%	0	0	0	0	0	0
Kirtling Street	0%	0	0	0	0	0	0
Heathwall Pumping Station	0%	0	0	0	0	0	0
Albert Embankment Foreshore	0%	0	0	0	0	0	0
Victoria Embankment Foreshore	0%	0	0	0	0	0	0
Blackfriars Bridge Foreshore	0%	0	0	0	0	0	0
Chambers Wharf	0%	0	0	0	0	0	0
Shad Thames Pumping Station	0%	0	0	0	0	0	0
King Edward Memorial Park Foreshore	0%	0	0	0	0	0	0
Bekesbourne Street	0%	0	0	0	0	0	0
Earl Pumping Station	52%	21	21	21	0	0	21
Deptford Church Street	50%	20	20	20	0	0	20
Greenwich Pumping Station	0%	0	0	0	0	0	0
Abbey Mills Pumping Station	54%	24	24	24	0	0	24
Beckton Sewage Treatment Works	68%	44	44	16	10	10	16
TOTAL		**296**	**296**	**200**	**17**	**17**	**177**

3.3.6 The arrival and departure time of workers depends upon the shift patterns at the site, which in turn depends upon the nature of the activity at the site. The sites are grouped into three types, drive sites, tunnel sites and dayshift only sites. The drive sites would be Carnwath Road Riverside, Kirtling Street, Chambers Wharf and Greenwich Pumping Station where the shifts would cover a 24 hour working day. For all sites the busiest arrival hour for workers would be 7am – 8am and the busiest departure time for workers would be between 6pm and 7pm, although the percentage of workers arriving and departing during these hours would vary by the site type. Table 2 shows the daily number of worker trips arriving and departing at each site and the number of trips during the busiest peak hours (7am-8am and 6pm- 7pm). These figures were used to give the peak hour movements for workers.

3.3.7 These figures represent the worst case as the actual number of worker vehicle trips is likely to be lower following the implementation of travel planning measures for each site.

3.4 Operational trips

3.4.1 It is expected that there would be a small number of parking spaces provided at each site for 'operational' visits, that is trips by workers for business only, during the course of the day. It is assumed that these spaces would not be available for workers at the site but only for staff travelling between sites on business trips. By assuming the average dwell time on a space is 1.5 hours and that they are used constantly and evenly throughout the working day, the number of arrivals and departures each hour at each site would be the *number of spaces* / *hours in working day* x 1.5. For the four drive sites (Carnwath Road Riverside, Kirtling Street, Greenwich Pumping Station and Chambers Wharf) the spaces would be used through the 24 hour working day, whereas at the other sites a maximum of a 12 hour working day has been assumed for the purposes of the strategic modelling. The resulting number of arrivals and departures is shown in Table 2. The number of operational trips is identical for each scenario.

Table 2 Operational trips

Construction Sites	Parking Spaces	AM Peak Hour		PM Peak Hour	
		Arrivals	Departures	Arrivals	Departures
Acton Storm Tanks	5	2	2	2	2
Hammersmith Pumping Station	5	2	2	2	2
Barn Elms	5	2	2	2	2
Putney Embankment Foreshore	5	2	2	2	2
Carnwath Road Riverside	15	3	3	3	3
Dormay Street	5	2	2	2	2
King Georges Park	5	2	2	2	2
Falconbrook Pumping Station	5	2	2	2	2
Cremorne Wharf Depot	5	2	2	2	2
Chelsea Embankment Foreshore	5	2	2	2	2
Kirtling Street	15	3	3	3	3
Heathwall Pumping Station	5	2	2	2	2
Albert Embankment Foreshore	5	2	2	2	2
Victoria Embankment Foreshore	5	2	2	2	2
Blackfriars Bridge Foreshore	5	2	2	2	2
Chambers Wharf	15	3	3	3	3
Shad Thames Pumping Station	2	2	2	2	2
King Edward Memorial Park Foreshore	5	2	2	2	2
Bekesbourne Street	2	2	2	2	2
Earl Pumping Station	5	2	2	2	2
Deptford Church Street	5	2	2	2	2
Greenwich Pumping Station	15	3	3	3	3
Abbey Mills Pumping Station	5	2	2	2	2
Beckton Sewage Treatment Works	5	2	2	2	2
TOTAL	**154**	**41**	**41**	**41**	**41**

3.5 Office trips

3.5.1 Finally, the project has identified the need for delivery of office supplies at each site but proposes a maximum of one vehicle per hour per site. For completeness these vehicle trips are given in Table 3. The number of office trips is identical for each scenario.

Table 3 Office trips

Construction Sites	AM Peak Hour		PM Peak Hour	
	Arrivals	Departures	Arrivals	Departures
Acton Storm Tanks	1	0	0	1
Hammersmith Pumping Station	1	0	0	1
Barn Elms	1	0	0	1
Putney Embankment Foreshore	1	0	0	1
Carnwath Road Riverside	1	0	0	1
Dormay Street	1	0	0	1
King Georges Park	1	0	0	1
Falconbrook Pumping Station	1	0	0	1
Cremorne Wharf Depot	1	0	0	1
Chelsea Embankment Foreshore	1	0	0	1
Kirtling Street	1	0	0	1
Heathwall Pumping Station	1	0	0	1
Albert Embankment Foreshore	1	0	0	1
Victoria Embankment Foreshore	1	0	0	1
Blackfriars Bridge Foreshore	1	0	0	1
Chambers Wharf	1	0	0	1
Shad Thames Pumping Station	0	0	0	0
King Edward Memorial Park Foreshore	1	0	0	1
Bekesbourne Street	0	0	0	0
Earl Pumping Station	1	0	0	1
Deptford Church Street	1	0	0	1
Greenwich Pumping Station	1	0	0	1
Abbey Mills Pumping Station	1	0	0	1
Beckton Sewage Treatment Works	1	0	0	1
TOTAL	**22**	**0**	**0**	**22**

3.6 Construction lorries

3.6.1 The project has produced a schedule of the level of activity programmed at each site for all activities and this shows that the number of vehicles associated with each site would vary over time as the construction of the tunnel progresses. This assessment is necessarily based on assumptions about the quantities to be used during the construction process, but provides an indication of how construction lorry movements would vary over time.

3.6.2 It is expected that the construction traffic movements at sites would occur for approximately ten hours a day. It has been assumed that construction vehicles would arrive evenly over ten hours and so the daily number of trips is divided by ten to provide an hourly figure for the purposes of the assessment.

3.6.3 Annex A includes histograms which show the total ABR scenario lorry movements and EIA scenario movements for each site across the construction programme. It also includes a histogram showing the total lorry movements for the EIA scenario and ABR scenario across the programme.

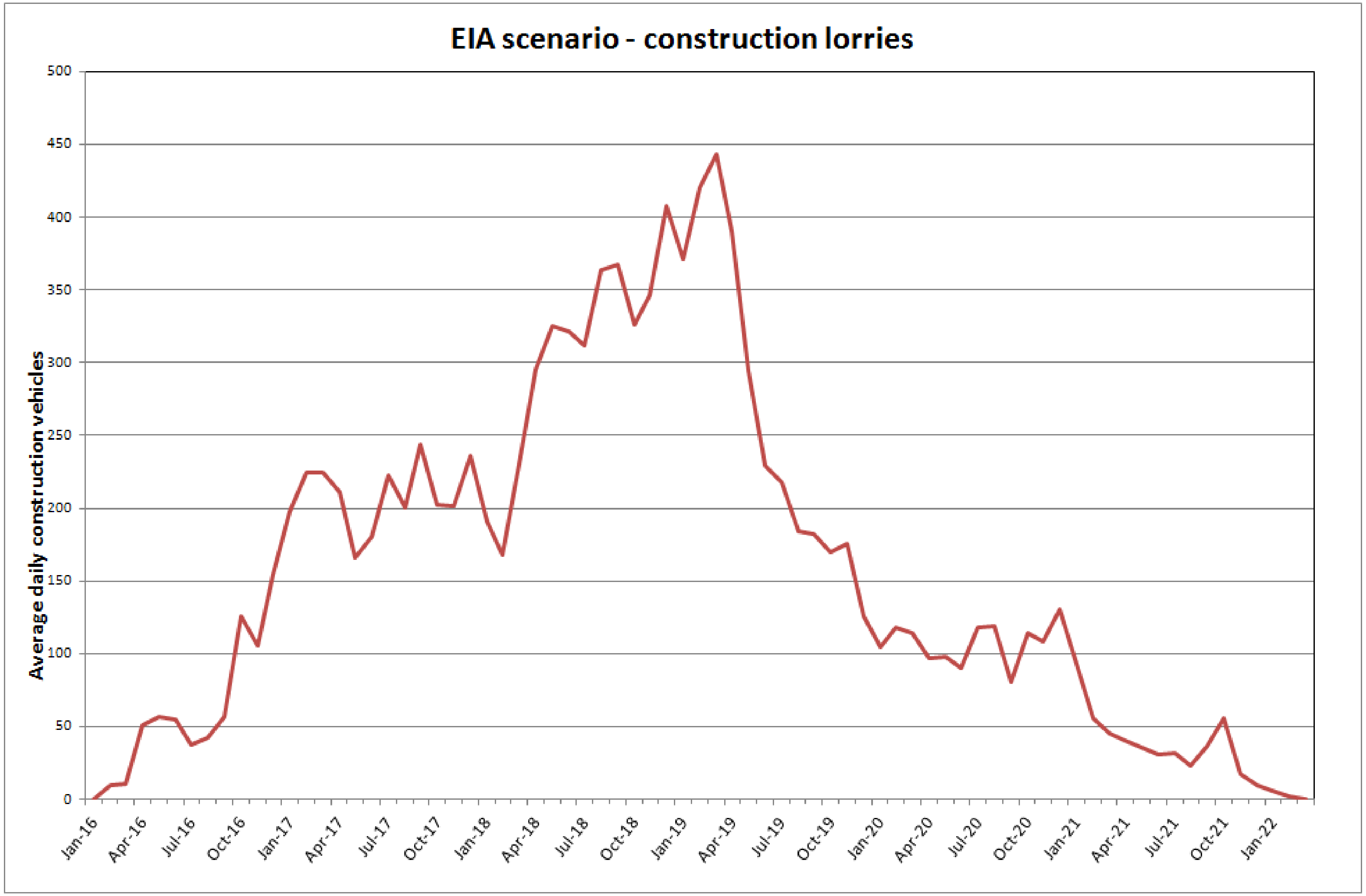
EIA scenario

3.6.4 Plate 4 shows the construction lorry profile for all sites and in total across the construction programme. This shows that the project peak for the EIA scenario would be March 2019. Table 4 shows the associated average daily construction lorry movements per site during the project-wide peak month.

3.6.5 The total number of average daily lorry movements for all construction sites for March 2019 would be approximately 884 (442 each way), which equates to approximately 89 movements per hour.

3.6.6 In addition to the project peak, the cluster peak months have also been considered. Analysis of the figures for the three groups of sites (those in the WeLHAM, CLoHAM and ELHAM areas) shows that the peak month for the central and eastern clusters would occur in March 2019 which is the same as the project-wide peak month. The peak month for the western cluster would be December 2017, during which there would be approximately 474 average daily lorry movements (237 each way). Table 4 also shows the average daily movements associated with these cluster peaks.

Plate 4 EIA scenario: construction lorry profile



Note: histogram shows illustrative movements based upon assumed timings for the works. It is not a schedule and remains subject to change

Table 4 EIA scenario: average daily construction lorry movements – project-wide and cluster peak months

Construction Site (Cluster)	**March 2019** Project peak, central and eastern cluster peak		**December 2017** Western cluster peak	
	Average daily lorry mvts	**Hourly lorry mvts**	**Average daily lorry mvts**	**Hourly lorry mvts**
Acton Storm Tanks (W)	10	1	0	0
Hammersmith Pumping Station (W)	24	2	26	3
Barn Elms (W)	10	1	22	2
Putney Embankment Foreshore (W)	16	2	4	1
Carnwath Road Riverside (W)	88	9	80	8
Dormay Street (W)	10	1	50	5
King Georges Park (W)	2	0	6	1
Falconbrook Pumping Station (C)	36	4	0	0
Cremorne Wharf Depot Site (C)	12	1	0	0
Chelsea Embankment Foreshore (C)	8	1	4	0
Kirtling Street (C)	190	19	20	2
Heathwall Pumping Station (C)	12	1	16	2
Albert Embankment Foreshore (C)	26	3	34	3
Victoria Embankment Foreshore (C)	10	1	10	1
Blackfriars Bridge Foreshore (C)	14	1	46	5
Chambers Wharf (E)	78	8	20	2
Shad Thames Pumping Station (E)	4	1	0	0
King Edward Memorial Park Foreshore (E)	16	2	12	1
Bekesbourne Street (E)	0	0	0	0
Earl Pumping Station (E)	4	0	68	7
Deptford Church Street (E)	18	2	10	1
Greenwich Pumping Station (E)	154	15	8	1
Abbey Mills Pumping Station (E)	136	14	0	0
Beckton Sewage Treatment Works (E)	6	1	38	4
TOTAL	**884**	**90**	**474**	**49**

Note: table shows illustrative movements based upon assumed timings for the works. Numbers have been rounded.

Combined peak EIA scenario

3.6.7 Although it is not possible for the peak months of construction lorry movements to occur simultaneously at all sites, TfL have requested some assurance that the implications of this happening have been considered as a way of reflecting the potential for variation of forecast construction traffic during the peak construction periods. Table 5 outlines the average daily lorry numbers associated with the peak month for each site.

3.6.8 This table shows that if the peak for all sites occurred simultaneously then there could be approximately 1534 average daily construction lorry movements (767 in each direction).

Table 5 Combined peak EIA scenario: average daily construction lorry movements

Construction Site (Cluster)	Date	Average daily lorry mvts	Hourly lorry mvts
Acton Storm Tanks (W)	Nov 2019	44	4
Hammersmith Pumping Station (W)	Apr 2018	42	4
Barn Elms (W)	Sep 2017	44	4
Putney Embankment Foreshore (W)	Sep 2018	40	4
Carnwath Road Riverside (W)	Jun 2018	90	9
Dormay Street (W)	Dec 2017	50	5
King Georges Park (W)	Apr 2017	16	2
Falconbrook Pumping Station (C)	Mar 2019	36	4
Cremorne Wharf Depot Site (C)	Apr 2018	24	2
Chelsea Embankment Foreshore (C)	Jul 2019	82	8
Kirtling Street (C)	Mar 2019	190	19
Heathwall Pumping Station (C)	Apr 2017	34	3
Albert Embankment Foreshore (C)	Oct 2017	38	4
Victoria Embankment Foreshore (C)	Sep 2017	26	3
Blackfriars Bridge Foreshore (C)	May 2018	92	9
Chambers Wharf (E)	Feb 2017	110	11
Shad Thames Pumping Station (E)	Jul 2018	12	1
King Edward Memorial Park Foreshore (E)	Sep 2017	82	8
Bekesbourne Street (E)	Feb 2020	10	1
Earl Pumping Station (E)	Dec 2017	68	7
Deptford Church Street (E)	Jun 2017	64	6
Greenwich Pumping Station (E)	Dec 2018	154	15
Abbey Mills Pumping Station (E)	Mar 2019	136	14
Beckton Sewage Treatment Works (E)	Nov 2017	50	5
TOTAL		**1534**	**153**

Note: table shows illustrative movements based upon assumed timings for the works. Numbers have been rounded.

ABR scenario

3.6.9 It has been proposed that the ABR scenario is used as a maximum sensitivity test for the strategic traffic assessment to reflect the potential for variation in construction lorry numbers, above the EIA scenario, for a range of potential reasons.

3.6.10 Plate 5 shows the ABR lorry movement profile for all sites across the construction programme. This illustrates that the project-wide peak month for the ABR scenario would occur in March 2019. Table 6 shows that the associated average daily construction lorry movements per site during the peak month would be approximately 1922 (811 movements each way), which equates to 192 per hour.

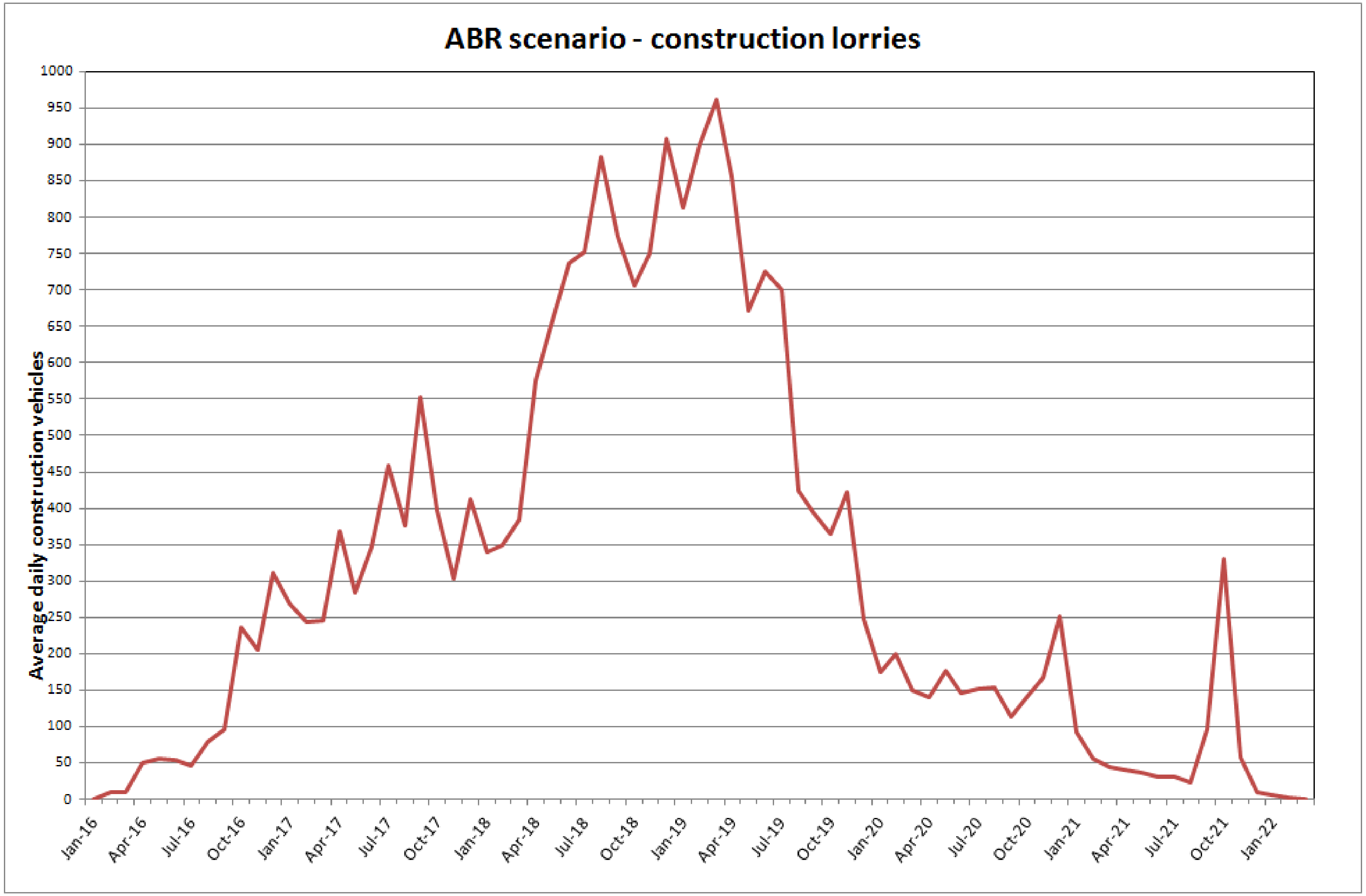
3.6.11 In addition to the project peak, the cluster peak months have also been considered. The peak month for the western cluster in the ABR scenario would be December 2018 during which there would be approximately 1818 average daily lorry movements (909 in each direction). The peak month for the central cluster in the ABR scenario would be June 2019, during which there would be approximately 1448 average daily lorry movements (724 each way).

3.6.12 The peak month for the eastern cluster in the ABR scenario would be October 2021, during which there would be approximately 660 average daily lorry movements (330 each way). This timing is different from that of the peak month for the eastern cluster under the EIA scenario and is directly related to a significant short-term peak of activity at Chambers Wharf (as indicated in the graphs in Annex A), late in the construction programme, which would contribute a large number of vehicle movements if all material were to be moved by road. At that point in the overall project programme, construction work on many of the other sites would have been completed.

3.6.13 It is helpful to note that the only sites in the eastern cluster at which river transport is proposed are at Chambers Wharf and King Edward Memorial Park. The individual site graphs in Annex A show that if instead all materials were to be moved by road at these sites, there would be a period around mid-2019 where at there would be approximately 100 additional vehicle movements Chambers Wharf and 80 at King Edward Memorial Park Foreshore.

3.6.14 This would potentially increase the total number of vehicle movements from the eastern cluster from 416 (Table 4 total of eastern sites for EIA) to around 600. That figure would still be lower than the ABR eastern cluster peak of 660 movements (Table 6 total of eastern sites for ABR) and therefore as far as the eastern cluster of sites is concerned, the figures given in Table 6 for the ABR remain the worst case.

Plate 5 ABR scenario: construction traffic profile



Note: histogram shows illustrative movements based upon assumed timings for the works. It is not a schedule and remains subject to change

Table 6 ABR scenario: average daily construction lorry movements – project-wide and cluster peak months

Construction Site (Cluster)	Mar 2019 Project peak		Dec 2018 W cluster peak		Jun 2019 C cluster peak		Oct 2021 E cluster peak	
	Ave daily	Hourly	Ave daily	Hourly	Ave daily	Hourly	Ave daily	Hourly
Acton Storm Tanks (W)	10	1	4	0	4	0	0	0
Hammersmith Pumping Station (W)	24	2	12	1	4	0	0	0
Barn Elms (W)	10	1	18	2	18	2	0	0
Putney Embankment Foreshore (W)	16	2	98	10	4	0	0	0
Carnwath Road Riverside (W)	318	32	318	32	6	1	0	0
Dormay Street (W)	10	1	14	1	0	0	0	0
King Georges Park (W)	2	0	8	1	0	0	0	0
Falconbrook Pumping Station (C)	36	4	22	2	10	1	0	0
Cremorne Wharf Depot Site (C)	12	1	6	1	18	2	0	0
Chelsea Embankment Foreshore (C)	18	2	8	1	224	22	0	0
Kirtling Street (C)	728	73	654	65	694	69	0	0
Heathwall Pumping Station (C)	20	2	12	1	6	1	0	0
Albert Embankment Foreshore (C)	54	5	4	0	10	1	0	0
Victoria Embankment Foreshore (C)	10	1	12	1	20	2	0	0
Blackfriars Bridge Foreshore (C)	22	2	36	4	44	4	4	0
Chambers Wharf (E)	288	29	278	28	292	29	630	63
Shad Thames Pumping Station (E)	6	1	4	0	6	1	0	0
King Edward Memorial Park Foreshore (E)	16	2	28	3	44	4	0	0
Bekesbourne Street (E)	0	0	0	0	0	0	0	0
Earl Pumping Station (E)	4	0	36	4	4	0	0	0
Deptford Church Street (E)	18	2	10	1	10	1	0	0
Greenwich Pumping Station (E)	154	15	154	15	6	1	0	0
Abbey Mills Pumping Station (E)	140	14	68	7	18	2	26	3
Beckton Sewage Treatment Works (E)	6	1	14	1	6	1	0	0
TOTAL	**1922**	**192**	**1818**	**181**	**1448**	**145**	**660**	**66**

Note: table shows illustrative movements based upon assumed timings for the works. Numbers have been rounded.

4 Scenario comparisons

4.1 Core scenario

4.1.1 As the EIA scenario represents the basis on which the Environmental Assessment for the project has been undertaken, and reflects the current level of commitment to non-road transport. This has been assessed as the core scenario.

4.2 Sensitivity test

4.2.1 The ABR scenario has been proposed to reflect a maximum sensitivity test, and this is reviewed below in the context of all sites and cluster sites only to ensure that it is sufficiently robust to address variation in the timing of peak construction activities, day-to-day variation in lorry movement numbers and the potential for short-term non-availability of river transport. Paras. 3.1.7 to 3.1.14 explain the background to the derivation of the sensitivity test.

Project-wide context: all sites

4.2.2 Table 7 summarises the total number of average daily lorry movements for the three scenarios outlined in Section 3. It demonstrates that the project-wide ABR scenario contains just over 25% more lorry movements in the project peak month than the project-wide Combined EIA scenario.

4.2.3 The ABR scenario for the western cluster peak also has a higher level of construction traffic than the project-wide Combined EIA scenario.

4.2.4 For the central cluster peak month, the project-wide ABR scenario is approximately 5% less than the Combined EIA scenario for the same period. This difference is relatively small and should be considered in the context of the limitations outlined in Section 3.

4.2.5 For the eastern cluster peak month, the ABR project-wide total is some 45% of the Combined EIA scenario figure. However, for the reasons explained in paras. 3.6.12 and 3.6.13, this is linked to a specific short-term peak of activity at Chambers Wharf, at a point when activity on many of the other construction sites would have been completed. For this cluster peak, the EIA scenario represents the worst case in terms of total vehicle generation across the project at that time, and forms part of the core assessment in any event.

Table 7 Summary of possible scenarios – all sites

Possible Scenarios	Total average daily lorry movements Cluster peaks (all sites)			
	Project peak	Western	Central	Eastern

EIA scenario	884	474	884	884
Combined EIA scenario	1534	N/A	N/A	N/A
ABR scenario	1922	1818	1448	660

Local context: cluster sites

4.2.6 Table 8 summarises the total number of average daily lorry movements for the three clusters of sites in the relevant cluster peak months for each scenario.

4.2.7 This shows that for the western cluster, the ABR scenario exceeds the Combined EIA scenario by around 45%.

4.2.8 For the central cluster the ABR scenario exceeds the Combined EIA scenario by approximately 95%.

4.2.9 For the eastern cluster, the ABR scenario is approximately 5% lower than the Combined EIA scenario. However the project wide 'all sites' comparison in Table 7 shows the EIA scenario to be the worst case, suggesting that strategic movements through the eastern area would be greater than the Combined EIA scenario, thus counterbalancing this effect.

Table 8 Summary of possible scenarios – cluster sites and cluster peak months

Possible Scenarios	Total average daily lorry movements Cluster peak (cluster sites only)		
	Western cluster sites	Central cluster sites	Eastern cluster sites
EIA scenario	188	308	416
Combined EIA scenario	326	522	686
ABR scenario	472	1026	656

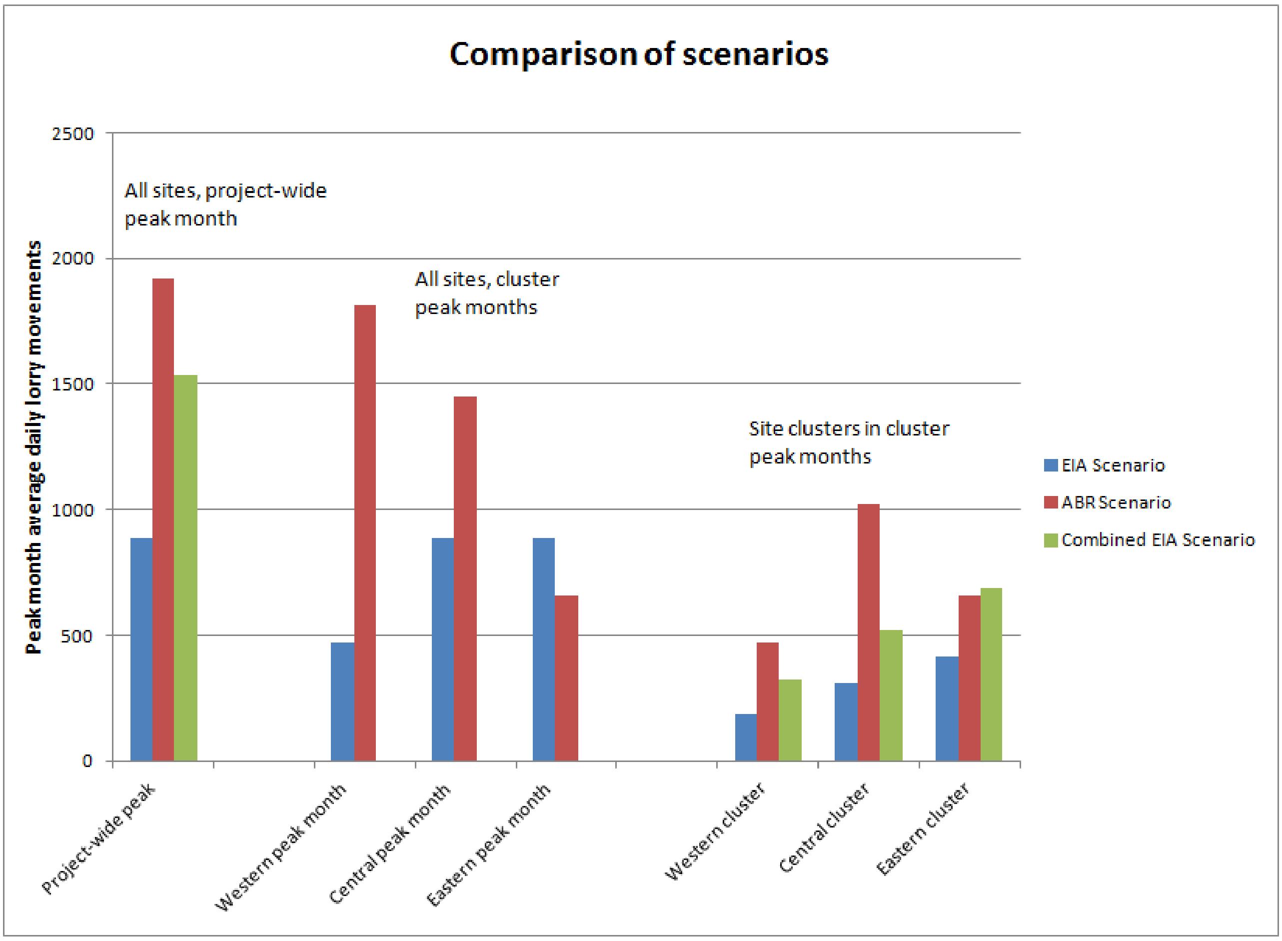
Summary

4.2.10 Plate 6 summarises the data comparison between the project-wide peak and cluster peaks (for all sites and clusters of sites) for the three proposed scenarios.

4.2.11 Taking account of the commitment to the Transport Strategy, the limitations outlined in Section 3 and the data in Table 7 and Table 8, it is considered that for the strategic modelling assessment the adoption of the ABR scenario as the maximum sensitivity test is a reasonable basis.

4.2.12 In terms of the total number of construction lorry movements across the project at the date of the eastern cluster peak, Plate 6 and Table 7 and Table 8 indicate that the EIA scenario represents the greatest number of construction lorry movements and therefore the reasonable maximum number of vehicle movements will be covered by that scenario which forms part of the core assessment.

Plate 6 Summary of possible scenarios



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5 Strategic model runs

5.1 Scope of model runs

5.1.1 For this assessment, tests have been undertaken using the HAMs in order to examine:

a. the degree to which physical changes proposed on the highway network, as part of traffic management requirements associated with construction at sites, would change traffic patterns on the strategic network

b. the degree to which additional construction traffic movements would change traffic patterns on the strategic network.

5.2 Runs to test physical highway changes

5.2.1 Prior to examining the effects of construction traffic movements associated with the Thames Tideway Tunnel, a series of tests were undertaken to identify whether any of the physical changes anticipated to be required during construction would be sufficiently significant, in terms of change within the strategic model networks, that they should be included as part of the construction development case model runs.

5.2.2 These tests were discussed with TfL in December 2011. The tests used the base year and future year reference case networks and matrices within the HAMs (ie without the addition of Thames Tideway Tunnel construction traffic).

5.2.3 Many of the local changes proposed in the vicinity of construction sites could not be modelled in the strategic model in any event as they involved the provision of access points onto links that are not included in the HAM networks. These minor and localised changes to the network have therefore been addressed in the local highway capacity modelling associated with each site.

5.2.4 This initial round of tests suggested that many of the proposed interventions for the Thames Tideway Tunnel fall outside the scope of the HAM tests, being either too minor to represent with any confidence in a strategic model (e.g. lane width reductions) or relating to minor or unmodelled junctions and links within the HAM networks.

5.2.5 At two sites, proposed highway changes were found to be capable of being included within the HAMs and these were::

a. at Blackfriars Bridge Foreshore, restrictions to the westbound slip road from Blackfriars Bridge Road to Victoria Embankment (which were modelled in CLoHAM). Two options were tested, comprising either a reduction to one lane on the slip road, or the complete closure of the slip road

b. at Deptford Church Street, the removal of bus lanes and proposals to operate two way single lane working on the existing southbound carriageway of Deptford Church Street, while works are carried out in the northbound carriageway (which was modelled in ELHAM).

5.2.6 Three time periods (AM peak hour, average interpeak hour and PM peak hour) were assigned for each test of these changes, and comparisons made against identical 2021 demand matrices assigned to the equivalent 2021 reference networks. In each case, a single run required the assignment of a pre-peak hour followed by the modelled hour using PASSQ, from which results were taken. Checks were made in each case on the level of convergence achieved. Whilst these were generally satisfactory (with Gap values of less than 0.05 achieved for four successive iterations at convergence), such a value was still thought significant given the relatively minor scale of the interventions modelled.

Blackfriars Bridge Foreshore results

5.2.7 The tests indicated that assuming a reduced capacity (one lane) for both the Blackfriars westbound slip and westbound Upper Thames Street / Victoria Embankment, the changes in assignment were relatively small in each peak and effectively indistinguishable from model ‘noise’, despite the good degree of convergence achieved.

5.2.8 The reduction in flow on Upper Thames Street / Victoria Embankment in the AM peak model was 116 pcus/hr and the conclusion from examining all three time periods was that the modelled impacts were small compared to the total flows on affected links..

5.2.9 With the closure of the westbound on-slip the tests suggested that the changes in flow would be more significant, with a reduction in the AM peak of 156 pcu/hr on the westbound Upper Thames Street / Victoria Embankment and an increase of 81 pcu/hr in northbound traffic north of Blackfriars Bridge. No significant congestion problems were identified in any time periods.

Deptford Church Street results

5.2.10 The tests in ELHAM on the removal of the northbound and southbound bus lanes from Deptford Church Street (leaving the equivalent of a single lane in each direction) showed an increase in traffic flows on the remaining lanes which were used by cars and buses. However even with the good level of convergence achieved for the model, the induced flow changes were still of the same order as the ‘noise’ present within the models.

Conclusion

5.2.11 Following these initial tests, it was concluded that the construction development case model runs should, with Thames Tideway Tunnel traffic included, should use a network which included the closure of the westbound on-slip at Blackfriars Bridge Foreshore and the removal of the bus lanes from Deptford Church Street.

5.3 Runs to test the impact of construction traffic

5.3.1 In order to undertaken the construction development case model runs, the construction traffic movements associated with the Thames Tideway Tunnel were assigned to the 2021 networks, modified as discussed in Section 5.2.

5.3.2 Construction lorry movements, worker, operational and office traffic movements were assigned using the approach described in Section 2.

5.3.3 The model runs comprised runs for the EIA scenario (both project-wide and cluster peaks) and the ABR scenario (both project-wide and cluster peaks). As described in Sections 3 and 4, the ABR has been used as a reasonable maximum sensitivity test for this assessment.

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6 Input to other modelling and assessment work

6.1 Traffic flows for local highway capacity modelling

6.1.1 Traffic information for the local highway capacity modelling work in the vicinity of each of the construction sites has been drawn from the HAMs, as described in Section 2.4, to ensure that there is a link between the strategic and local highway capacity modelling for the Thames Tideway Tunnel.

6.2 Traffic flows for air quality and noise assessment

6.2.1 The strategic modelling using the HAMs has also been used to provide traffic information for the air quality and noise assessments which have been undertaken as part of the EIA.

6.2.2 For the base year assessments the traffic information for the air quality and noise modelling has used existing traffic flows (including % HGV) obtained from surveys carried out, or link flows from SATURN extracted from the 2008/9 base HAMs.

6.2.3 For future year assessments the HAMs provide factors for the increase in vehicle- kilometres in each borough between the base year and 2021, as described in para. 2.4.4. The relevant growth factor for each site was then applied to the base year flows to produce 2021 base case flows for existing traffic.

6.2.4 Construction traffic and worker, office and operational trips were assigned to the HAMs using the EIA scenario and the project peak month of March 2019. The assigned flows were added to the 2021 base case flows to provide the link flows for air quality and noise modelling.

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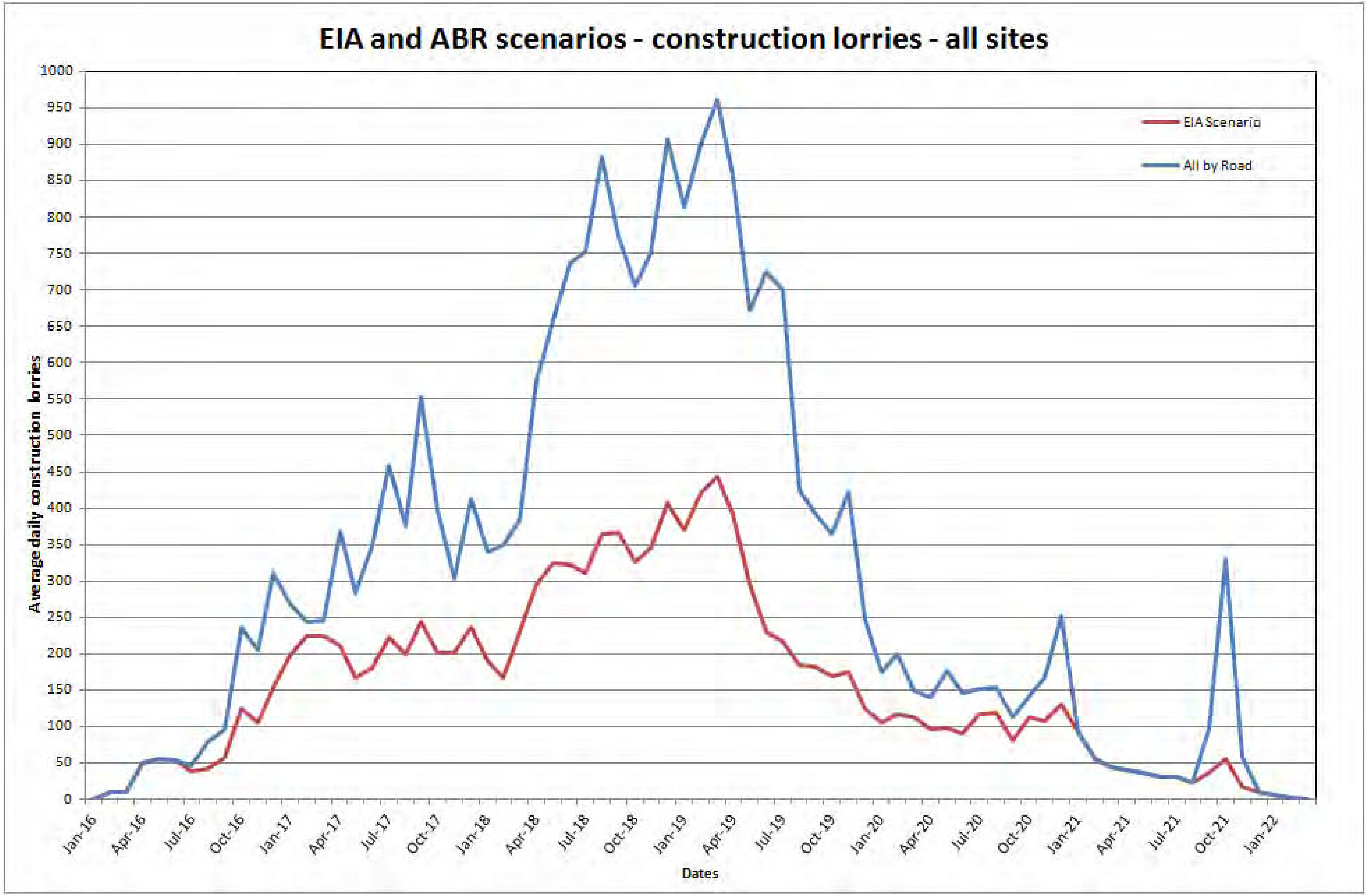
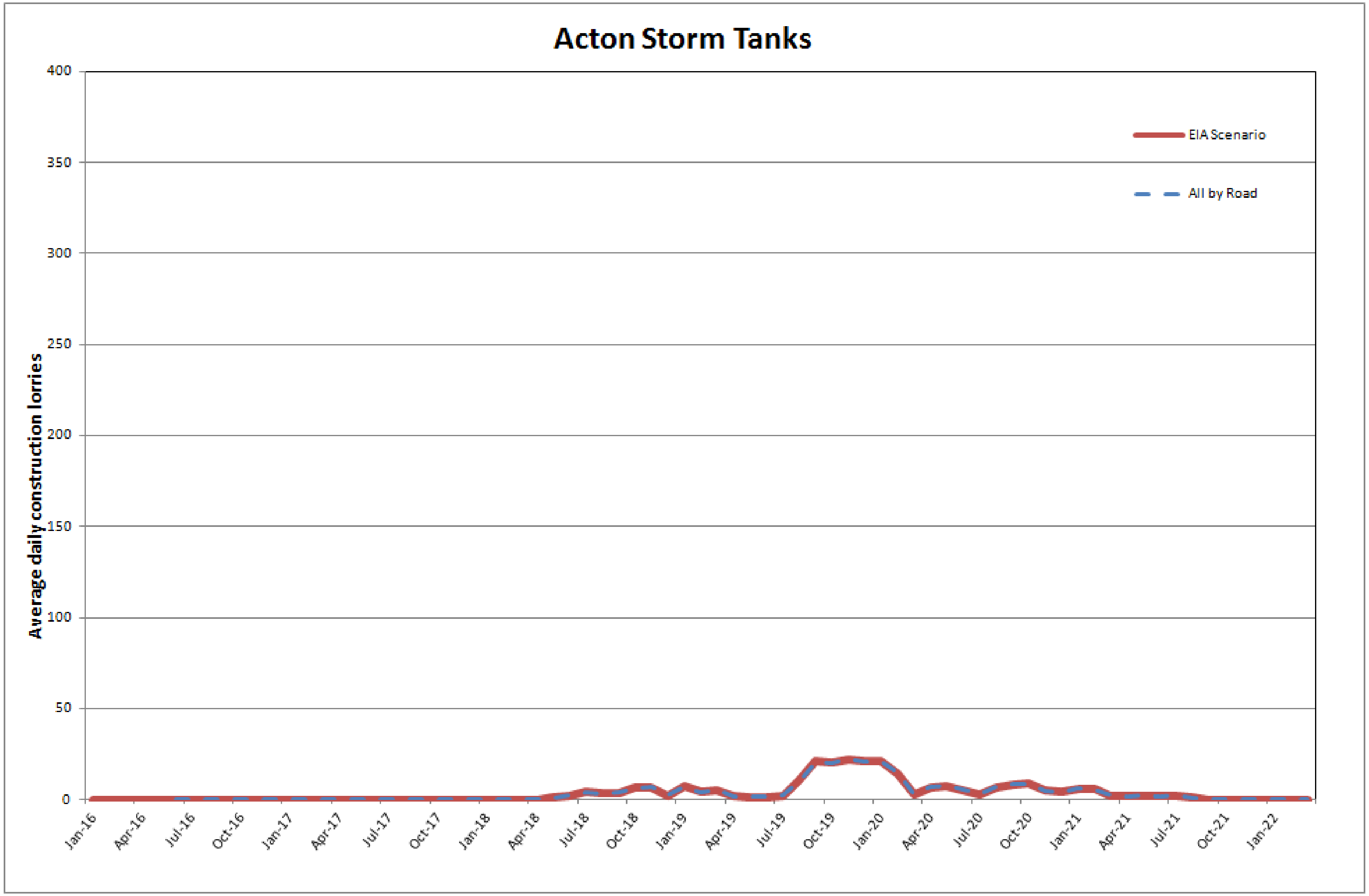
Annex A – EIA and ABR histograms



Note: histogram shows illustrative movements based upon assumed timings for the works. It is not a schedule and remains subject to change



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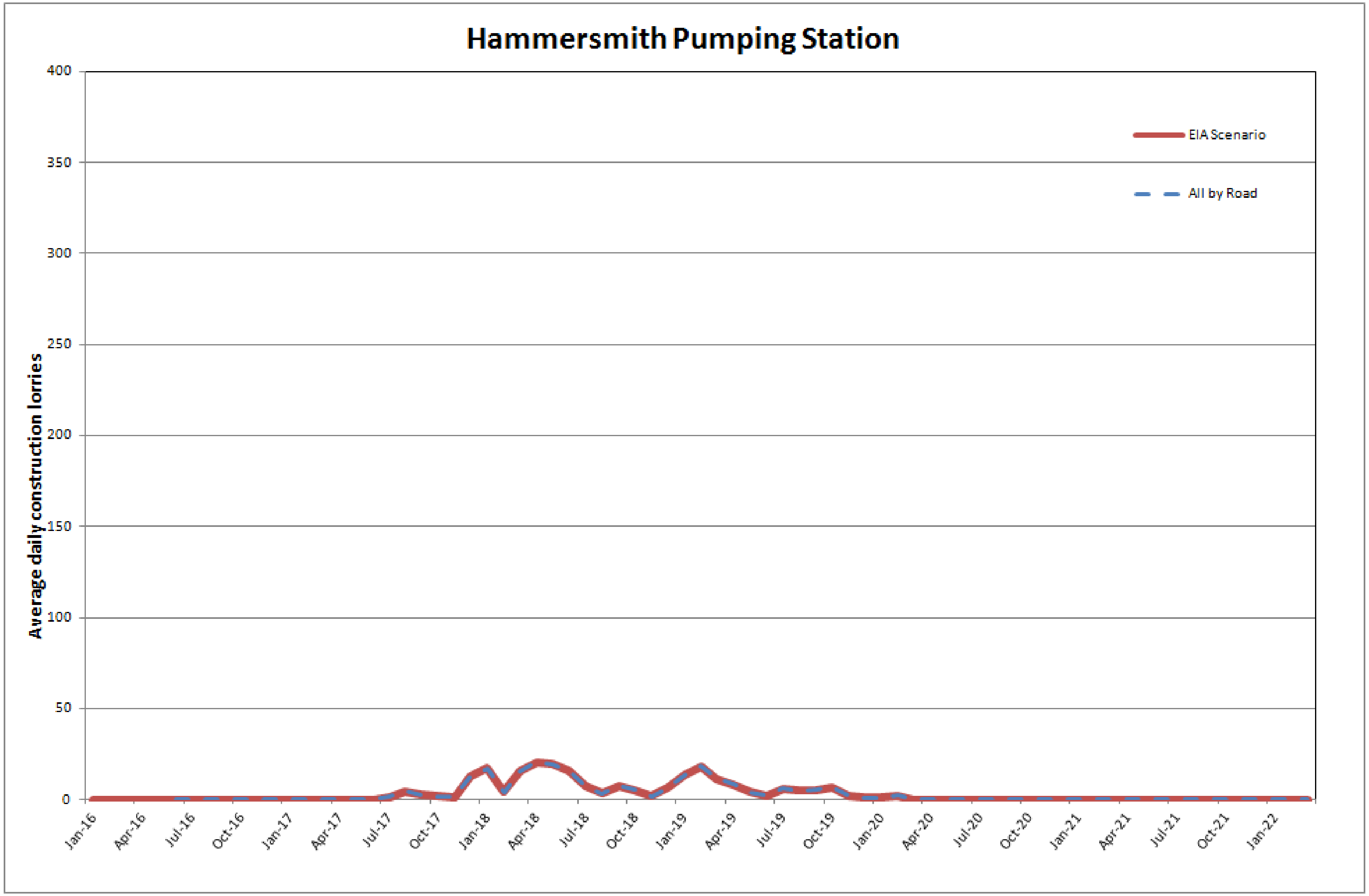

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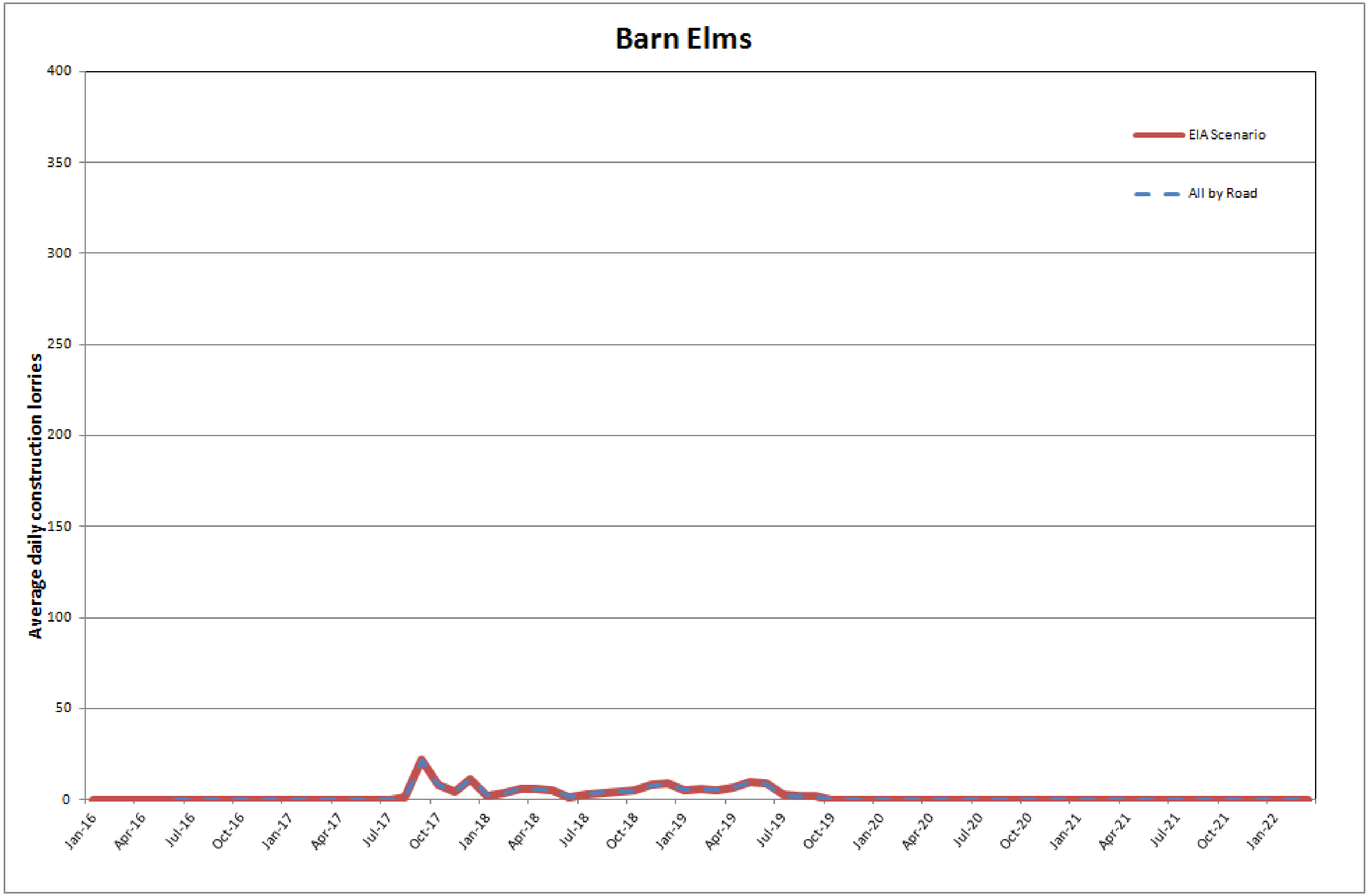

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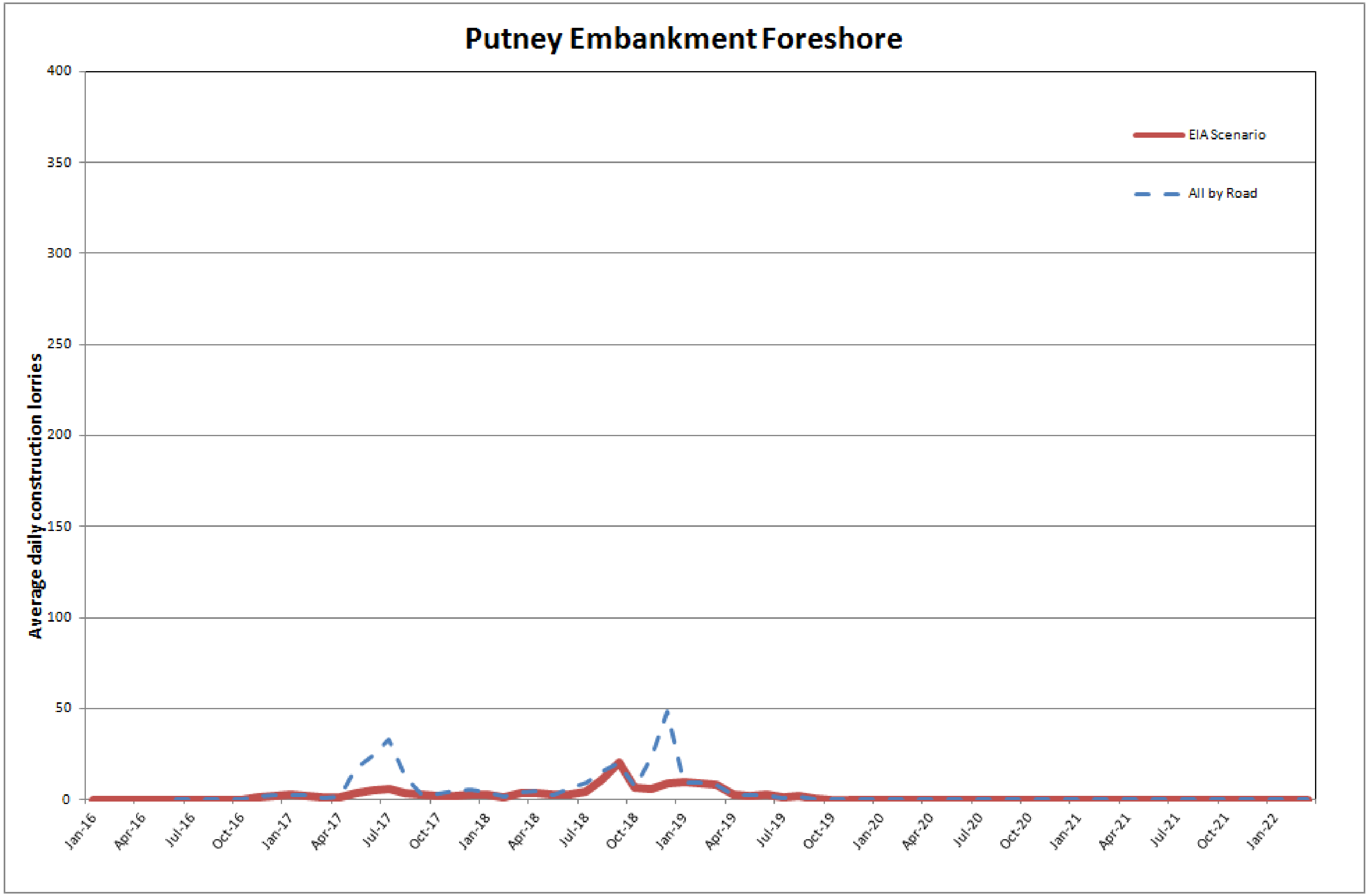

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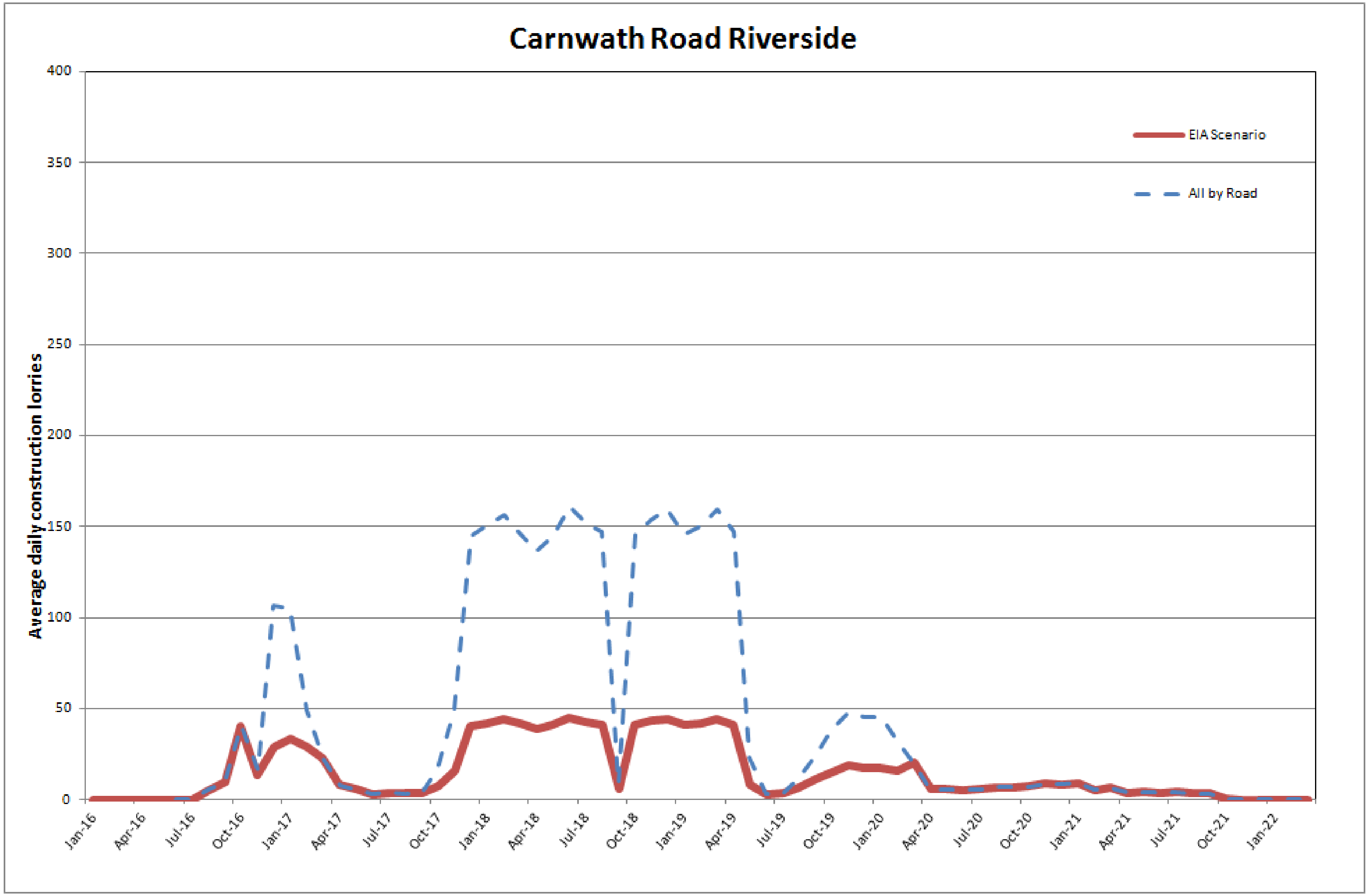

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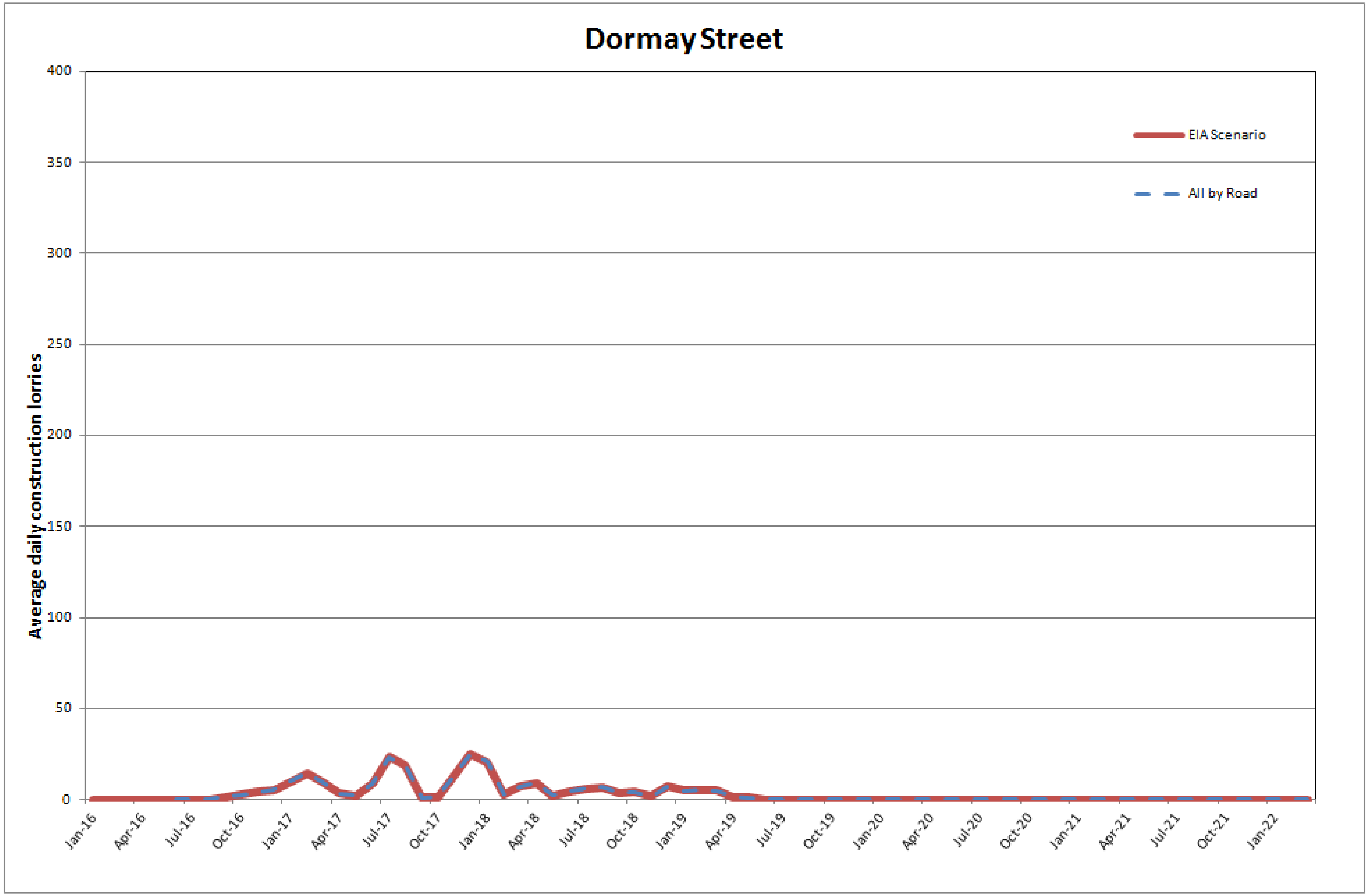

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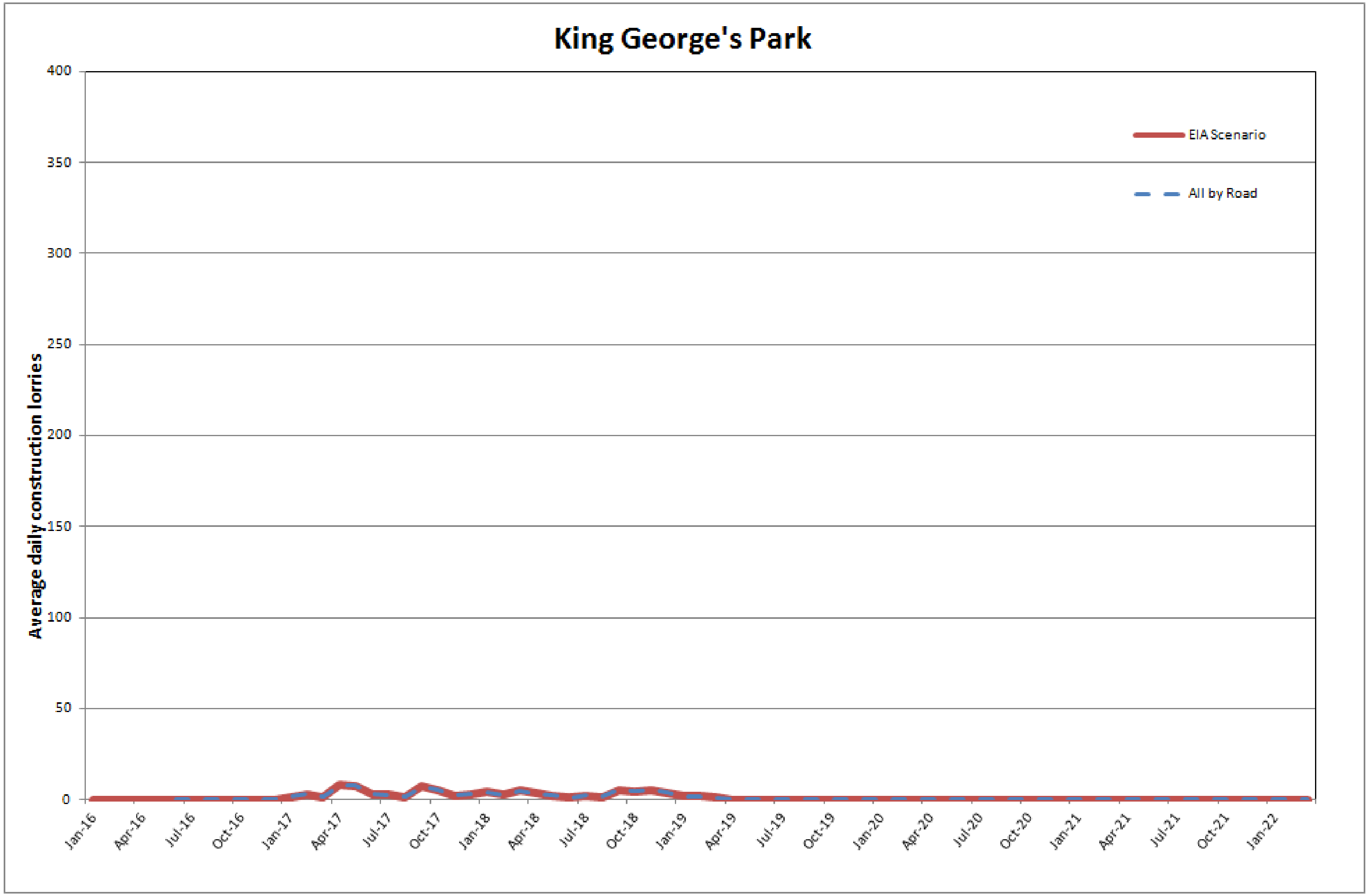

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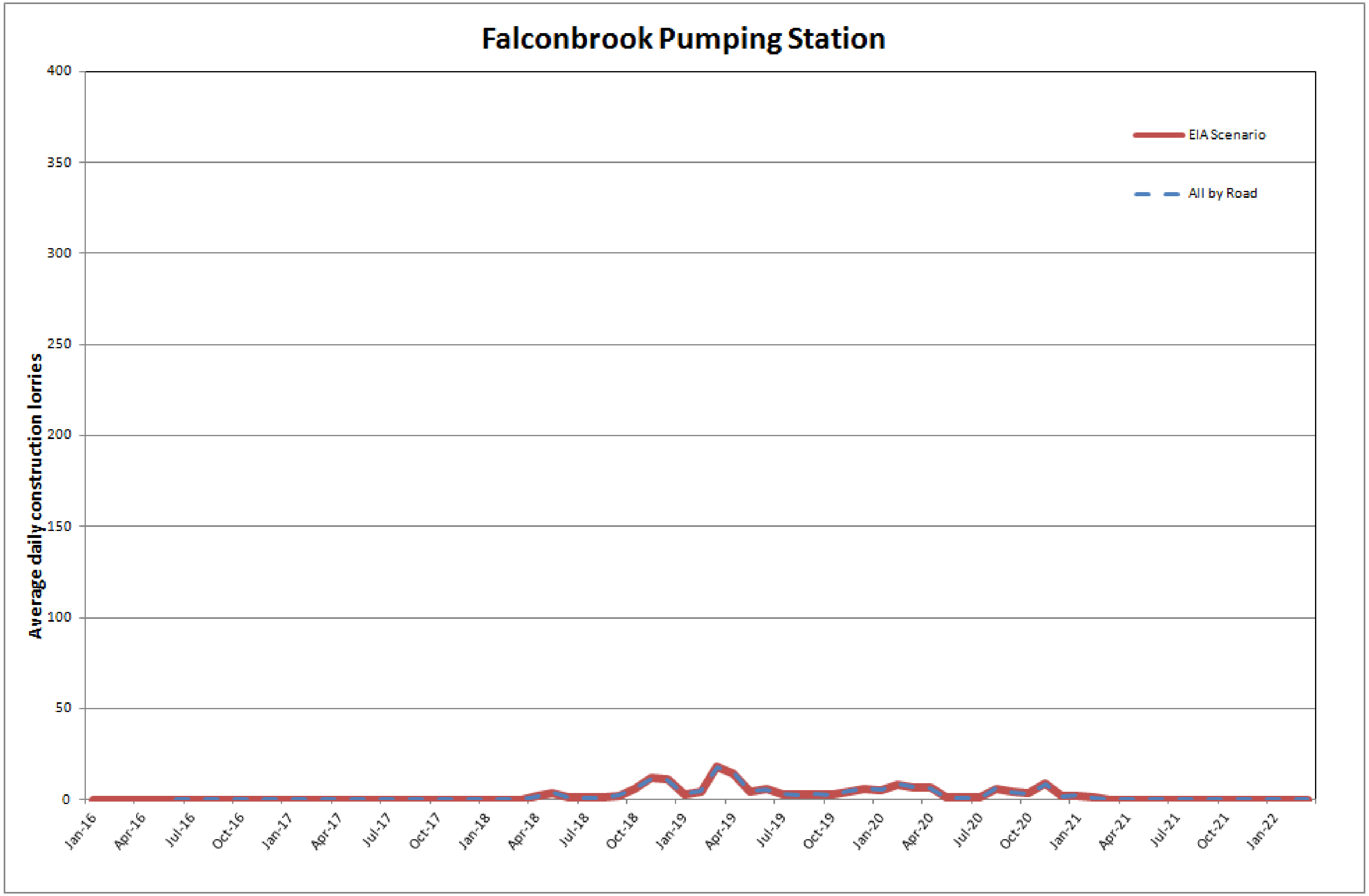

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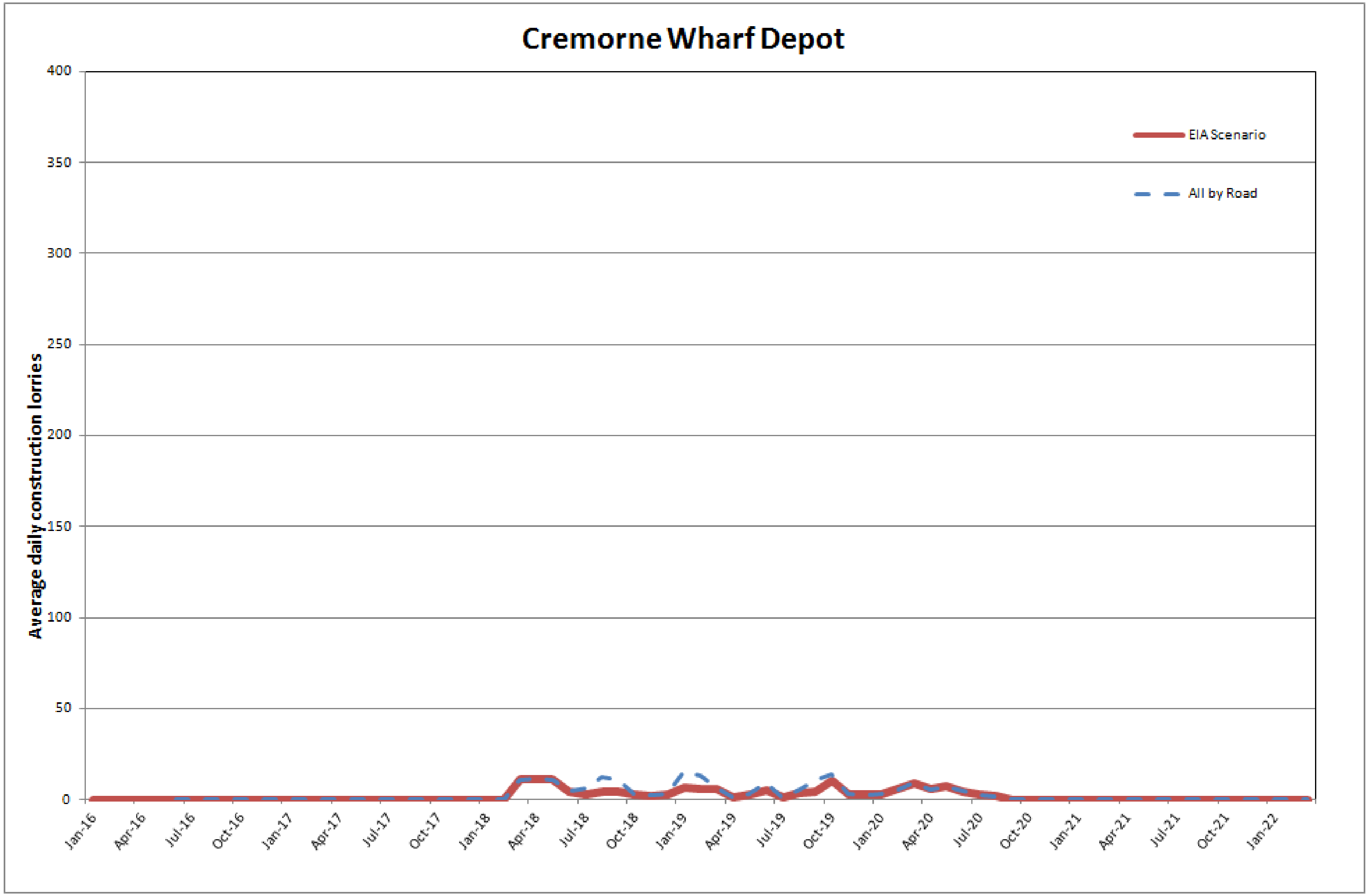

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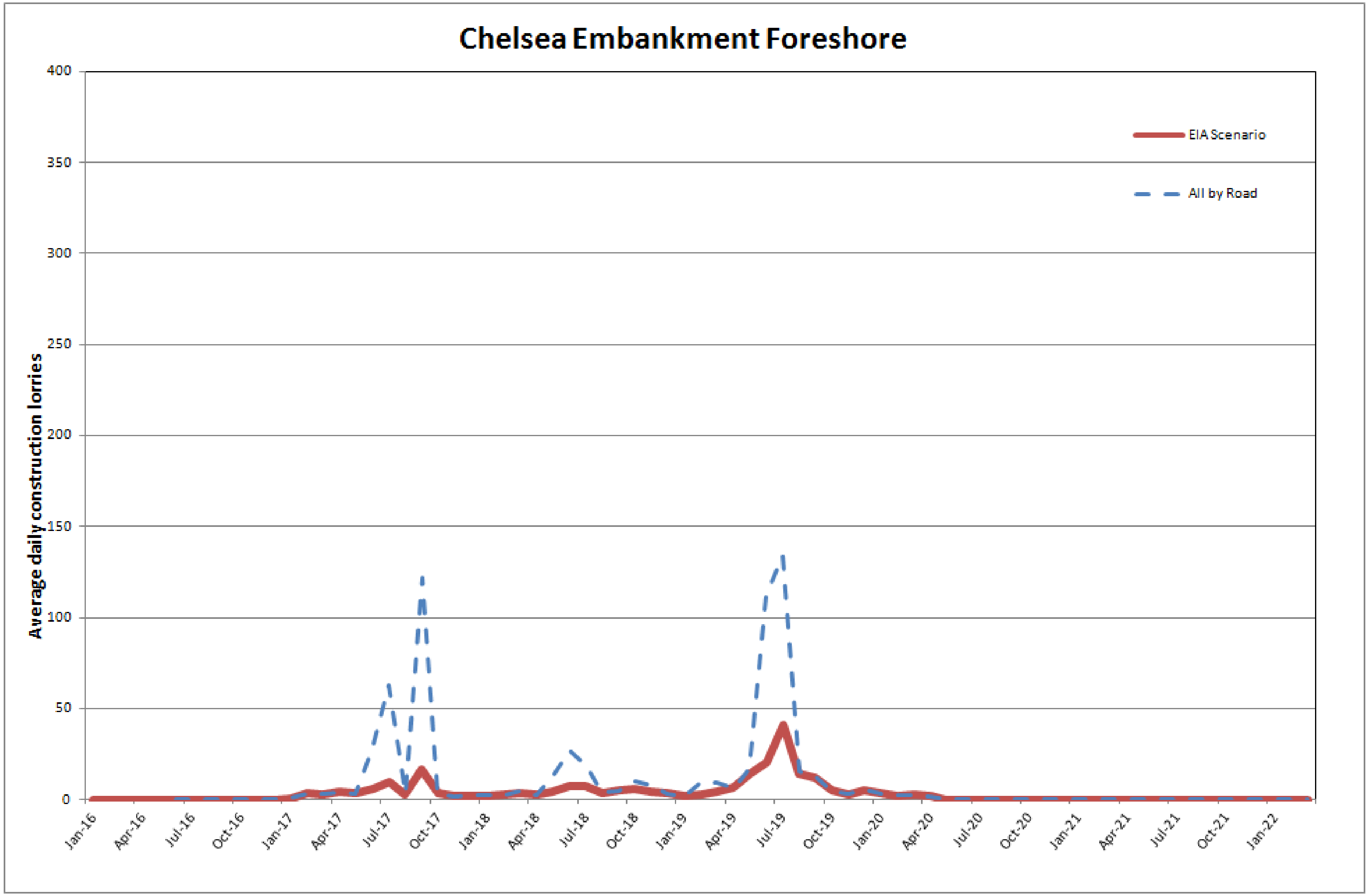

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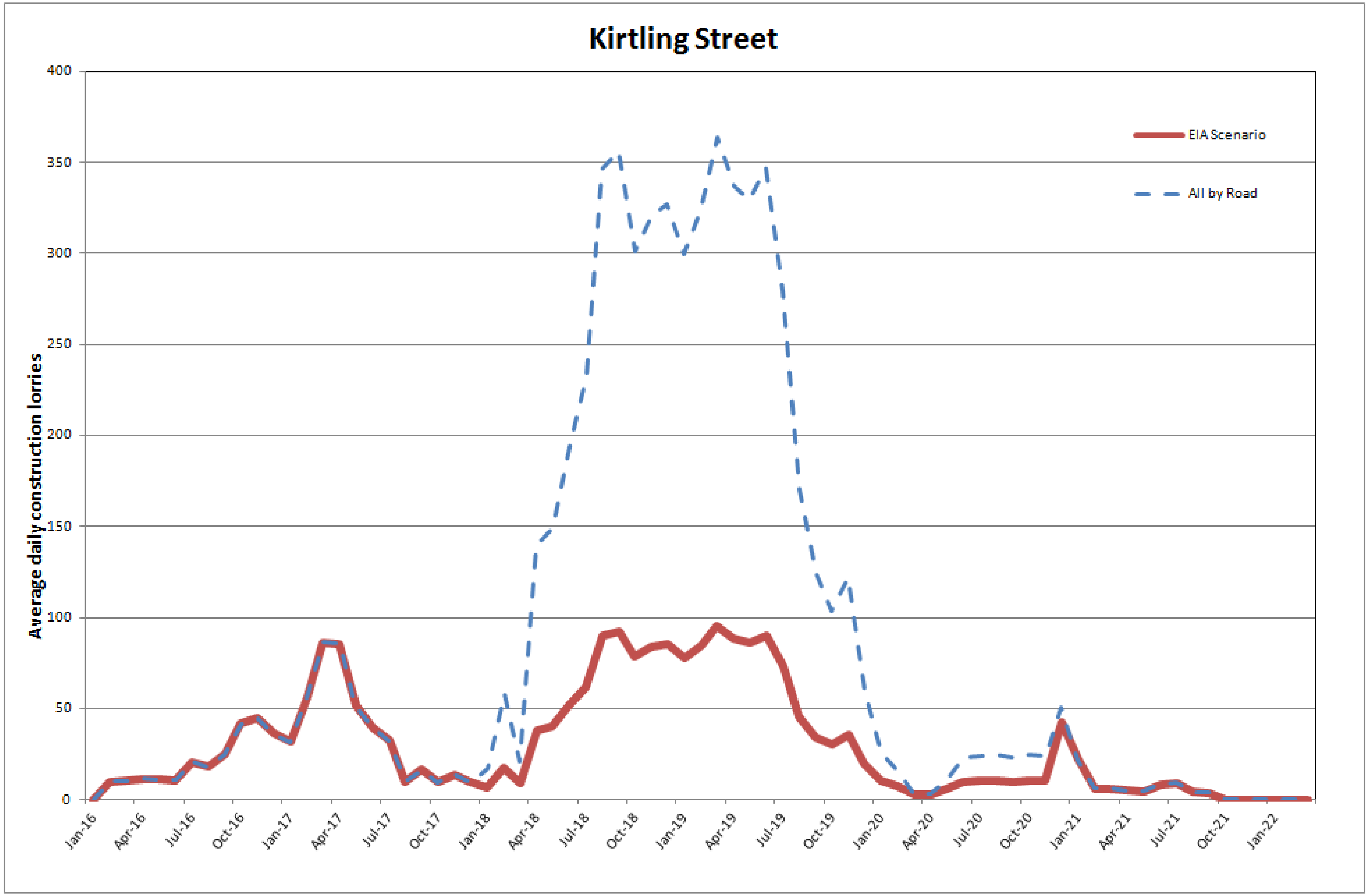

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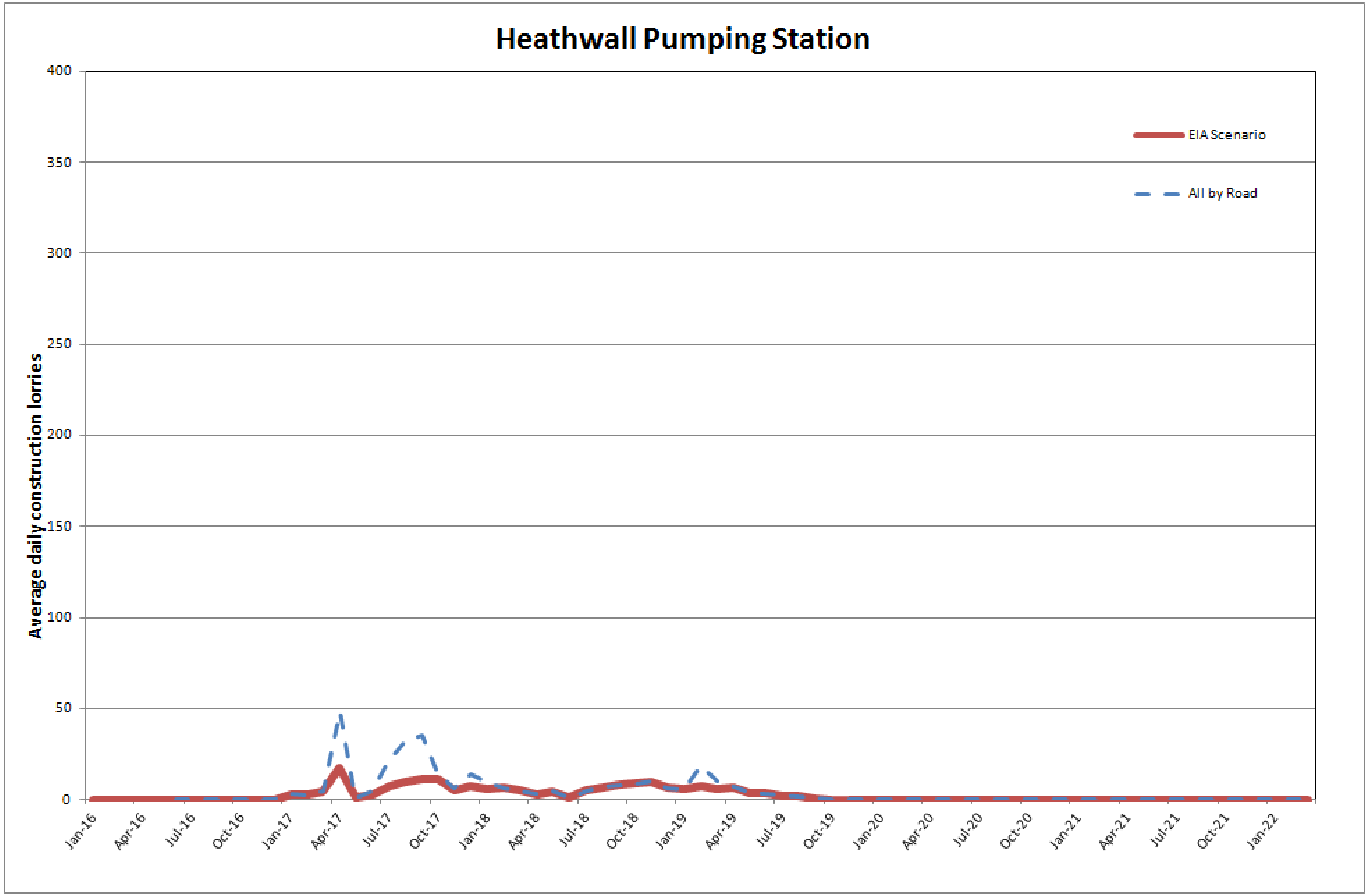

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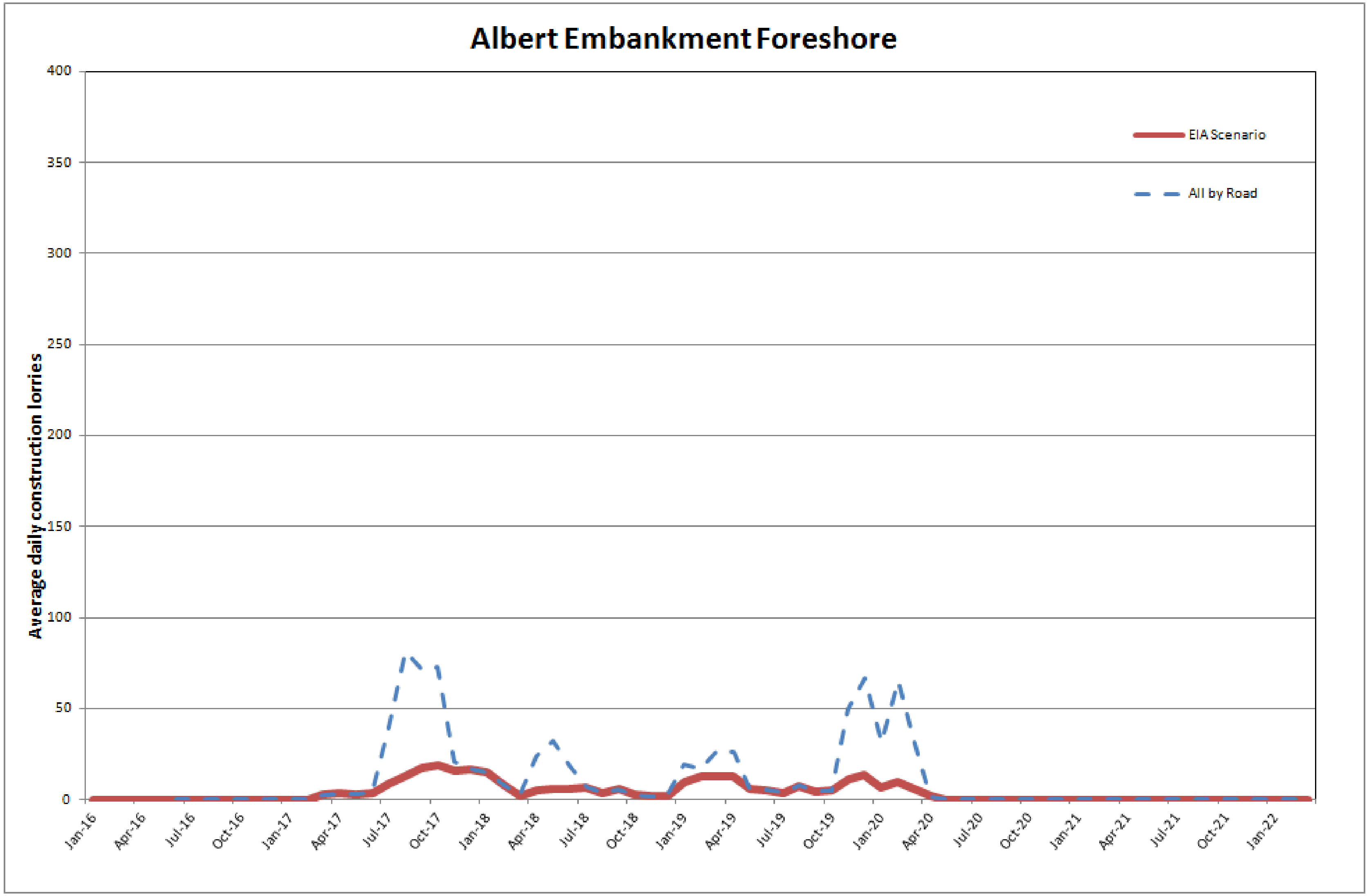

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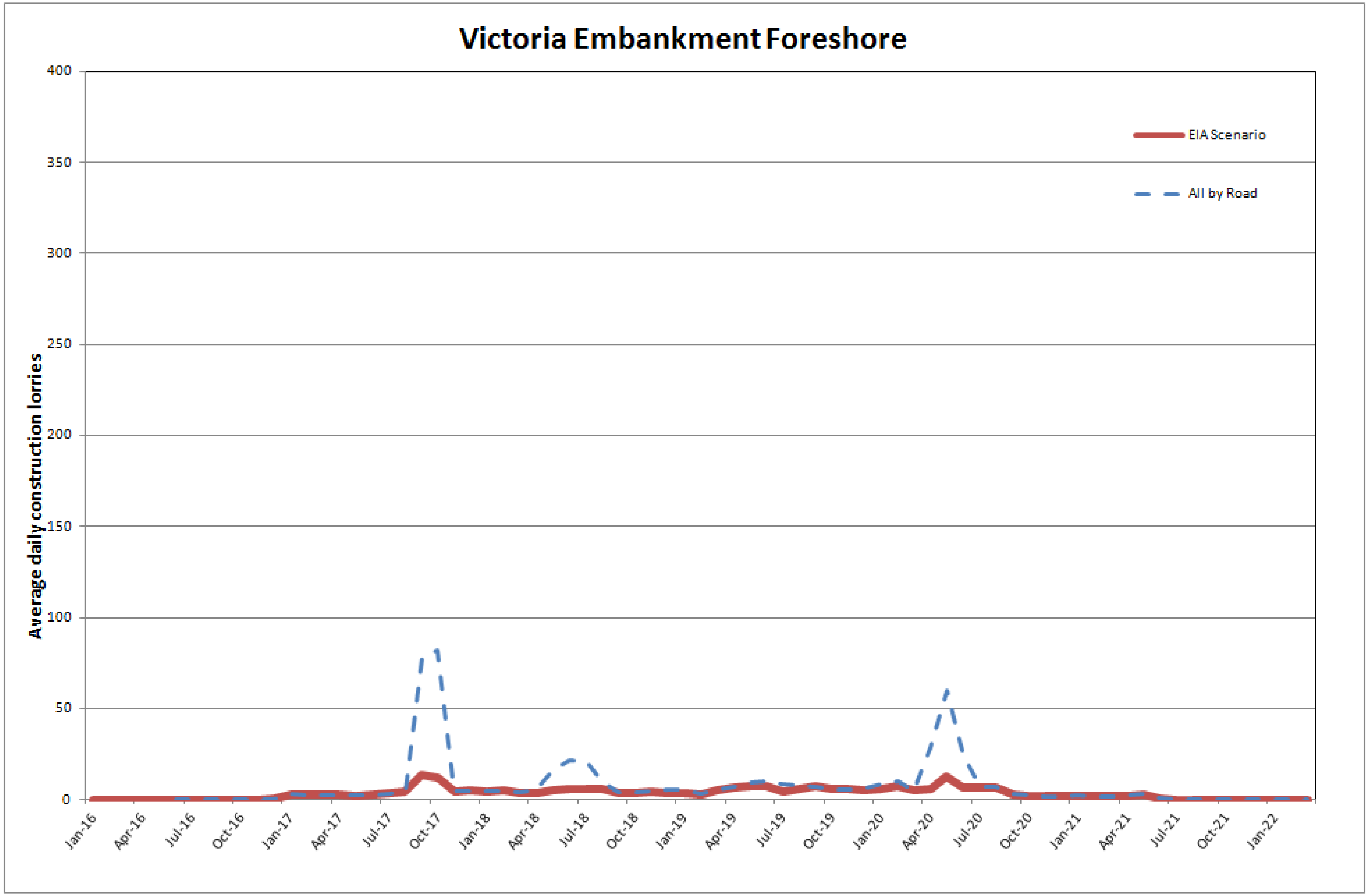

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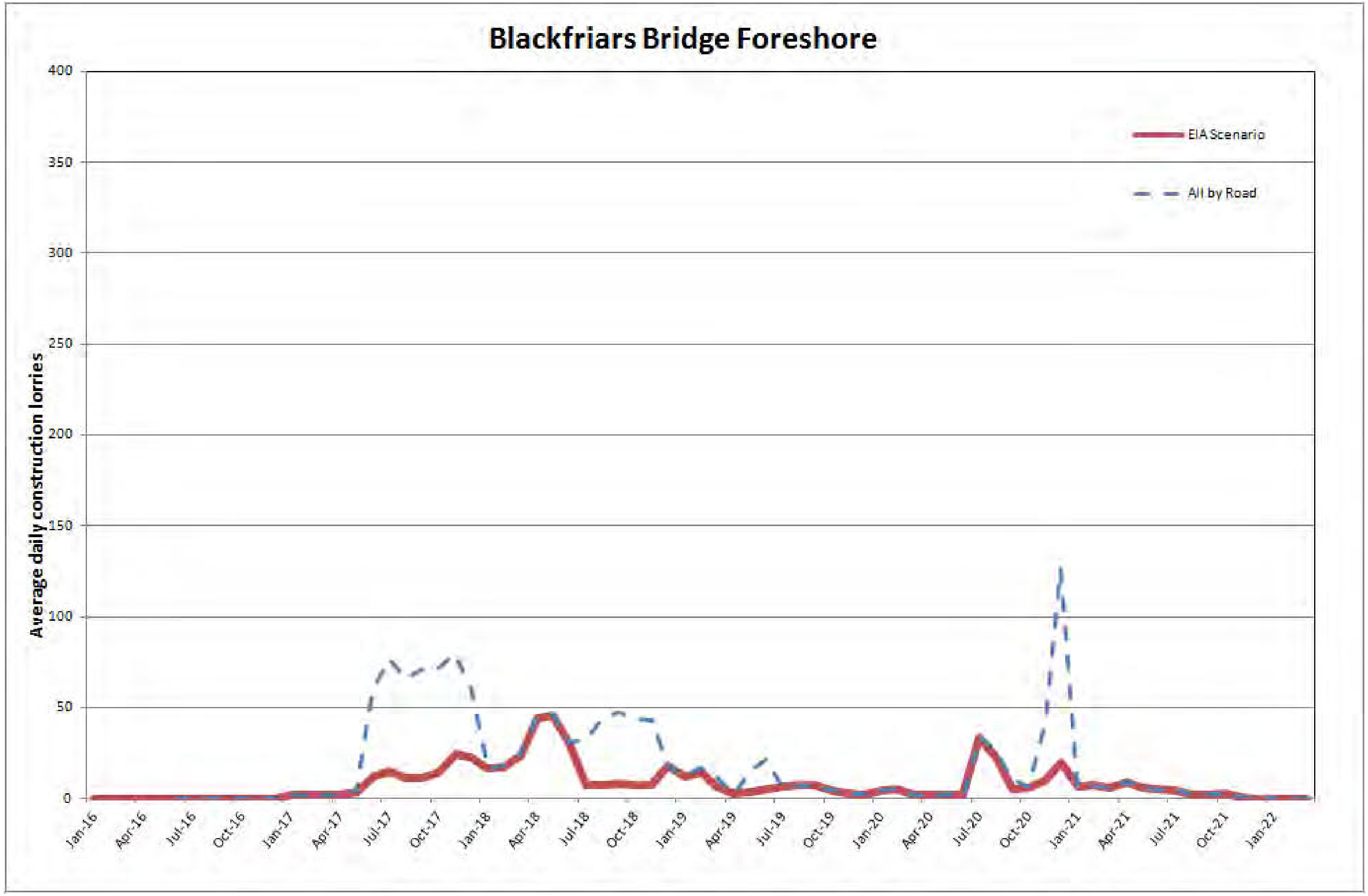

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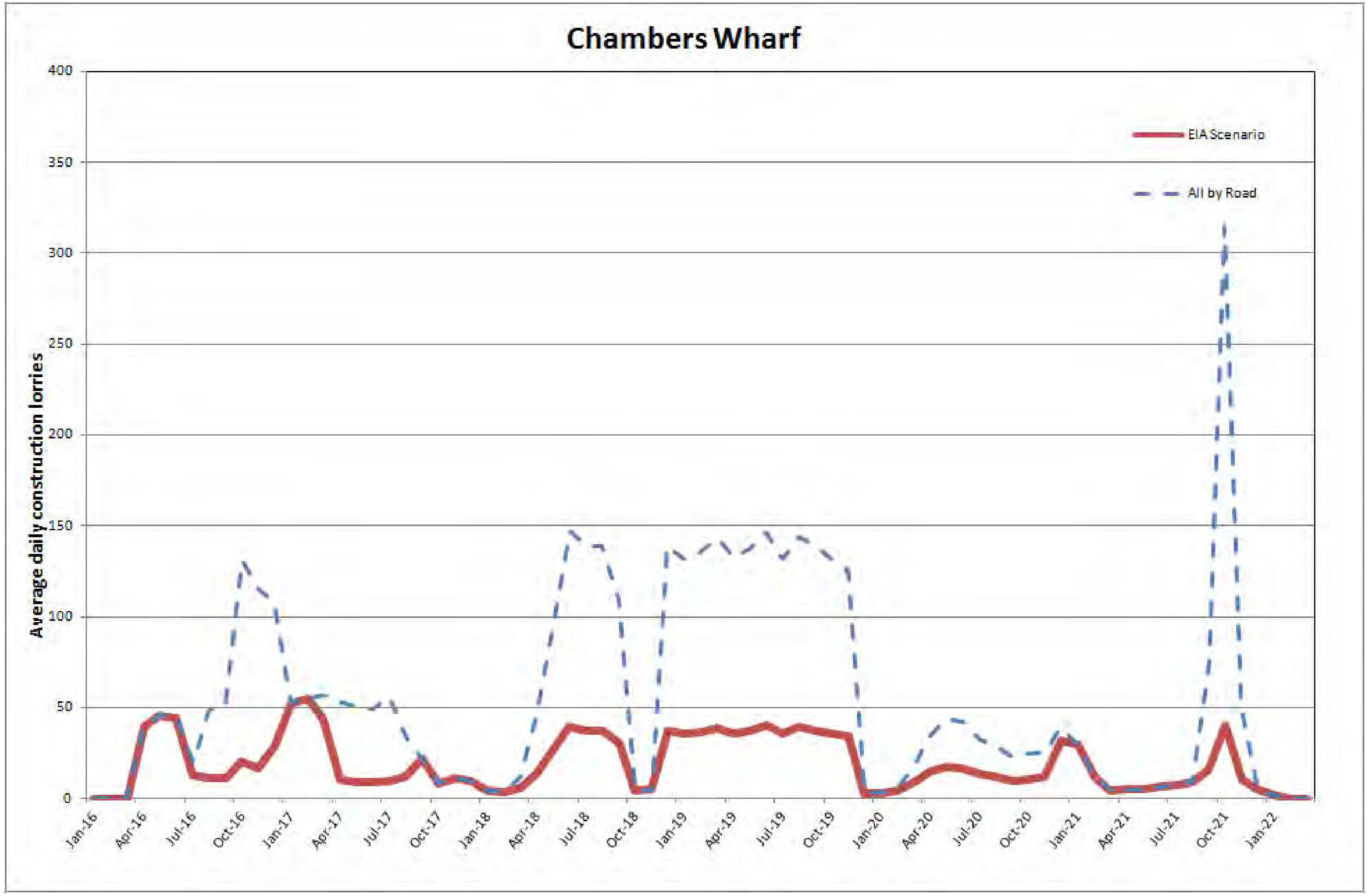

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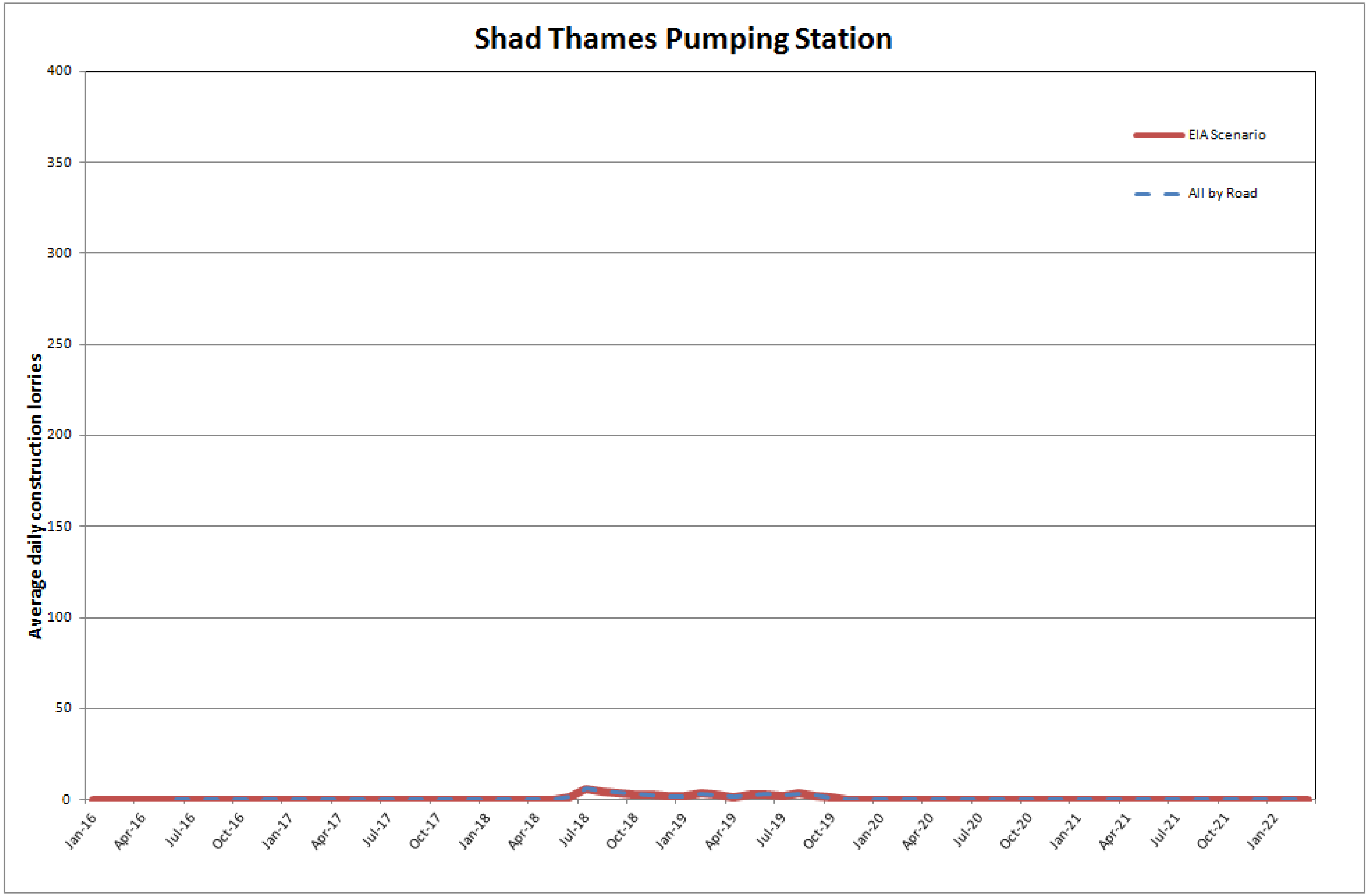

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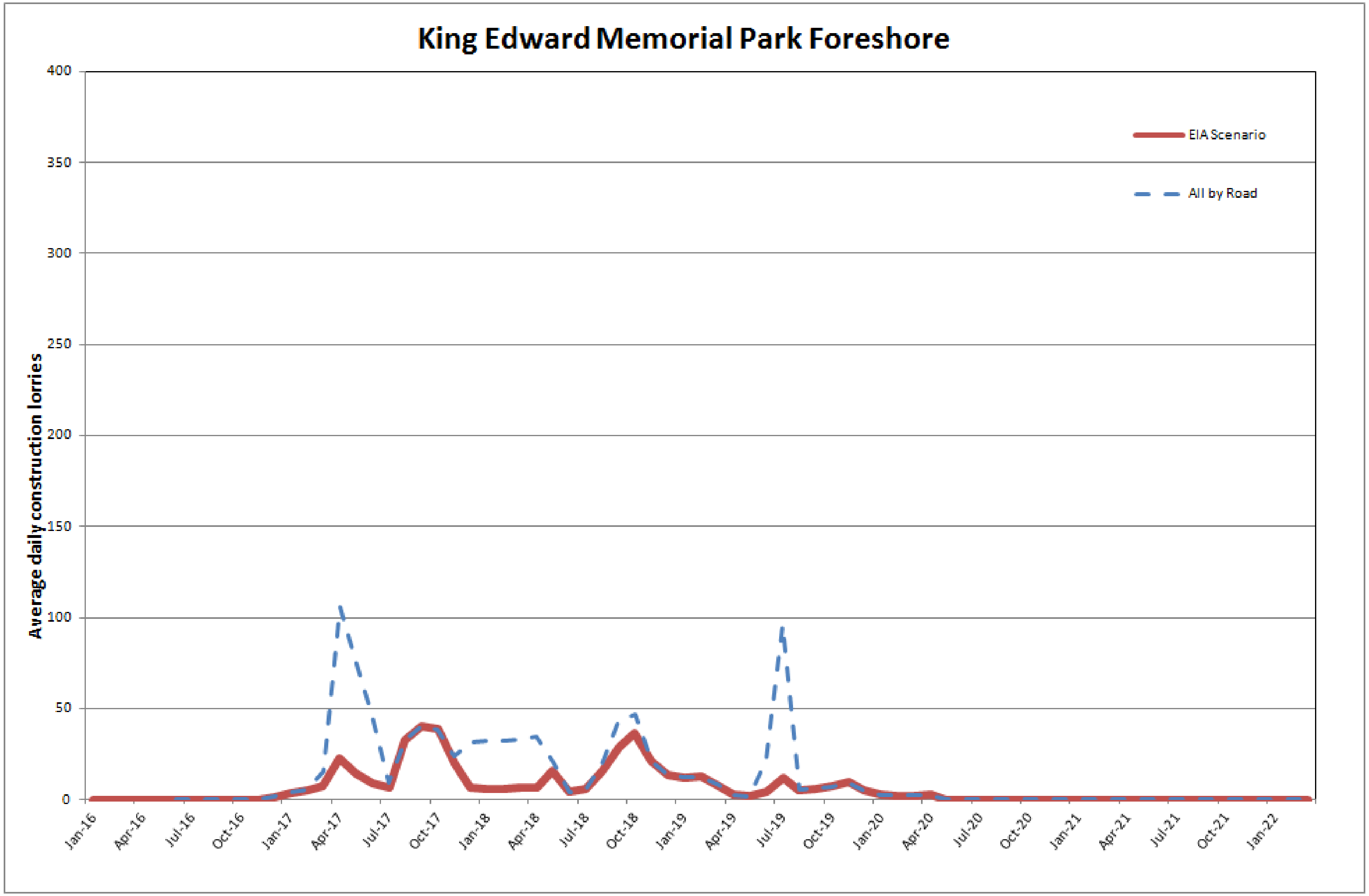

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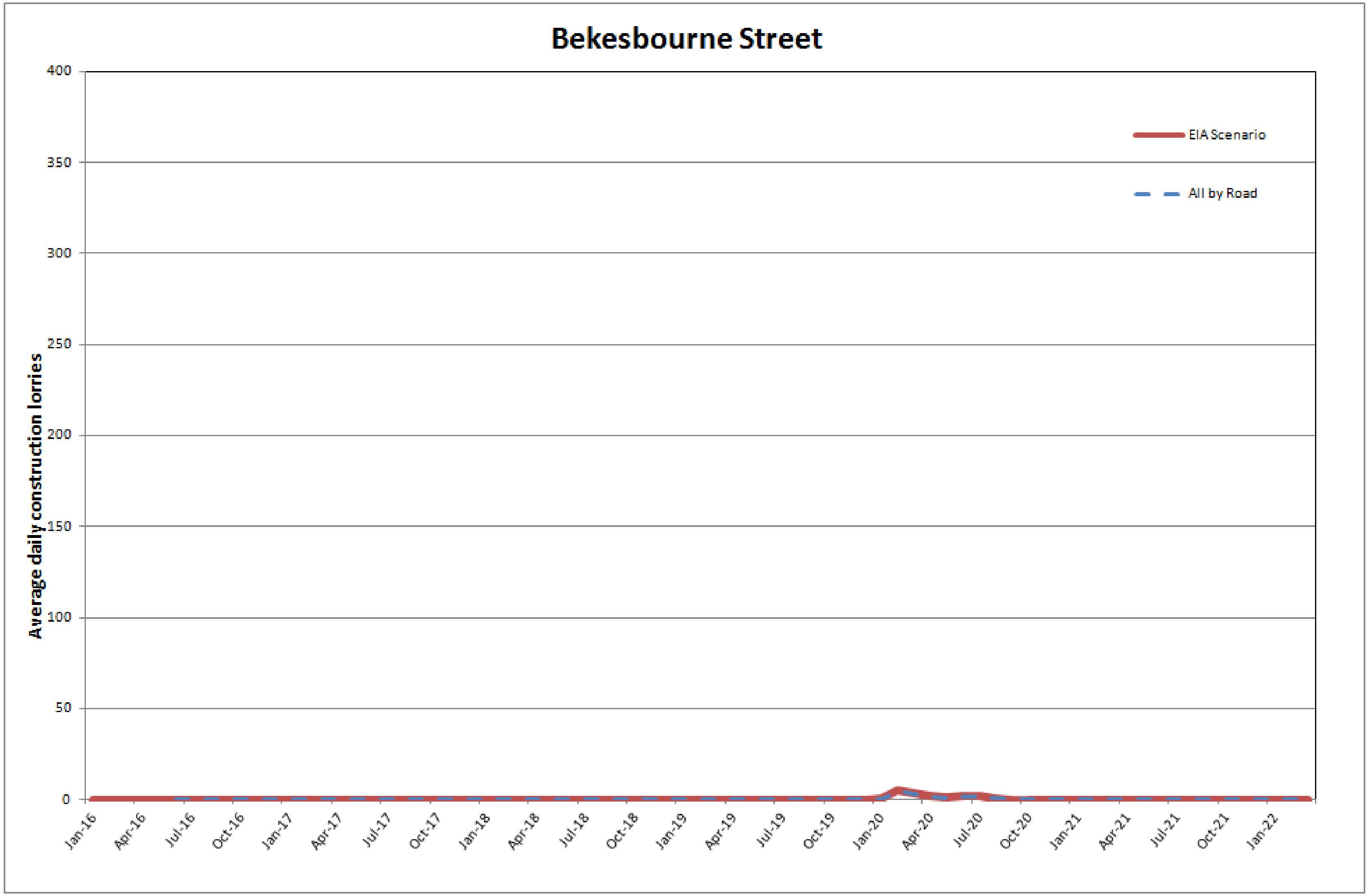

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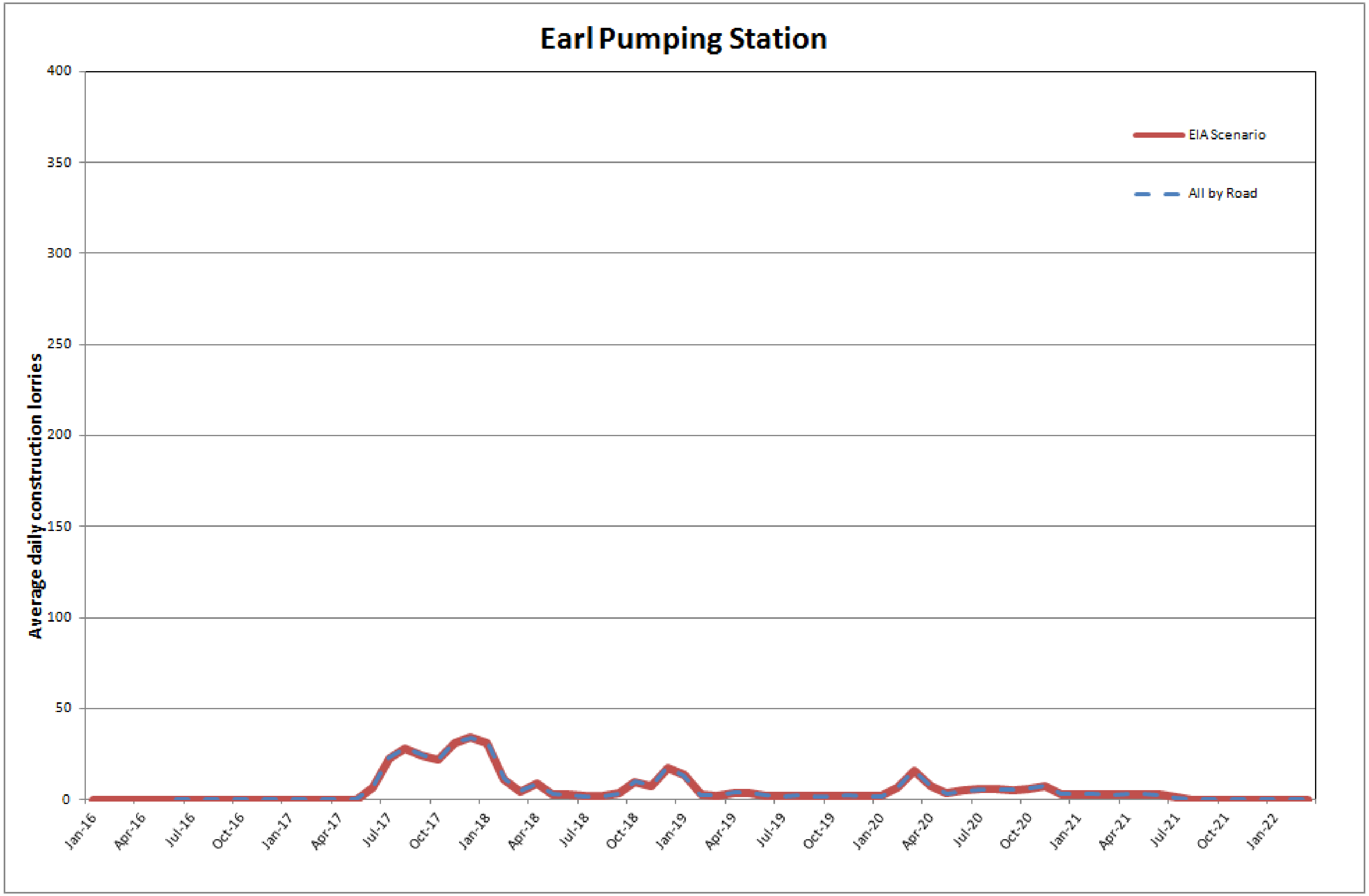

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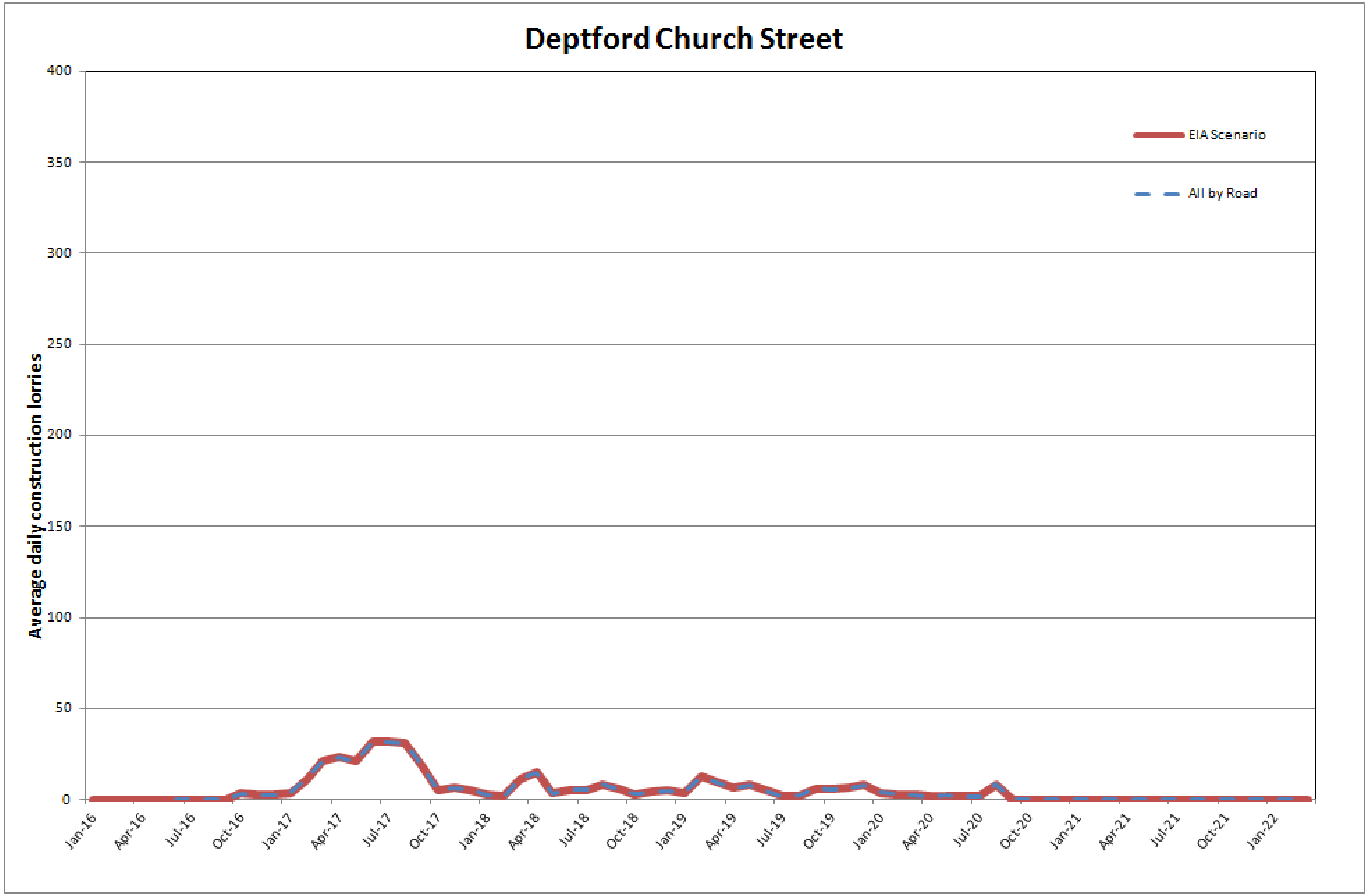

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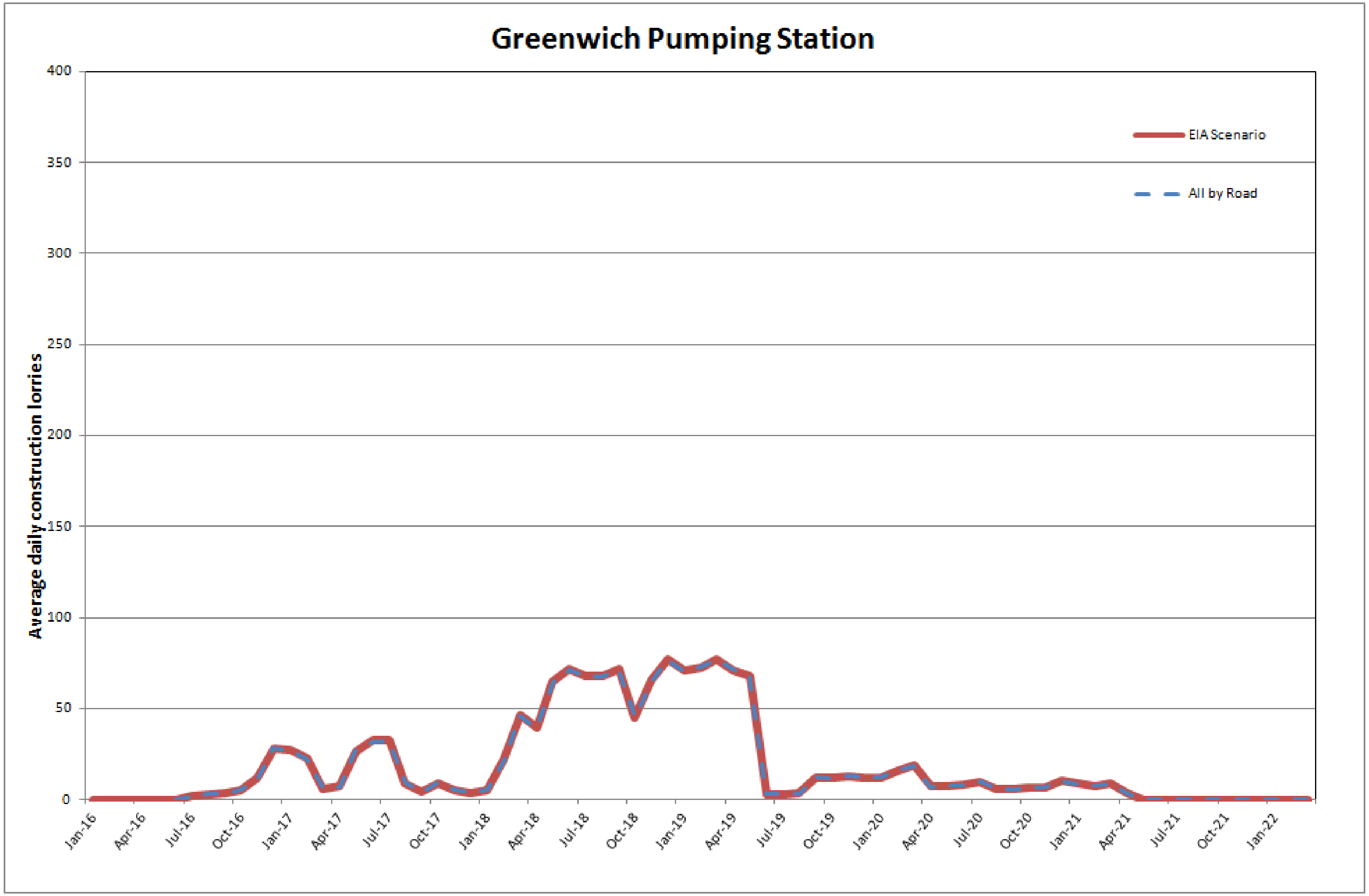

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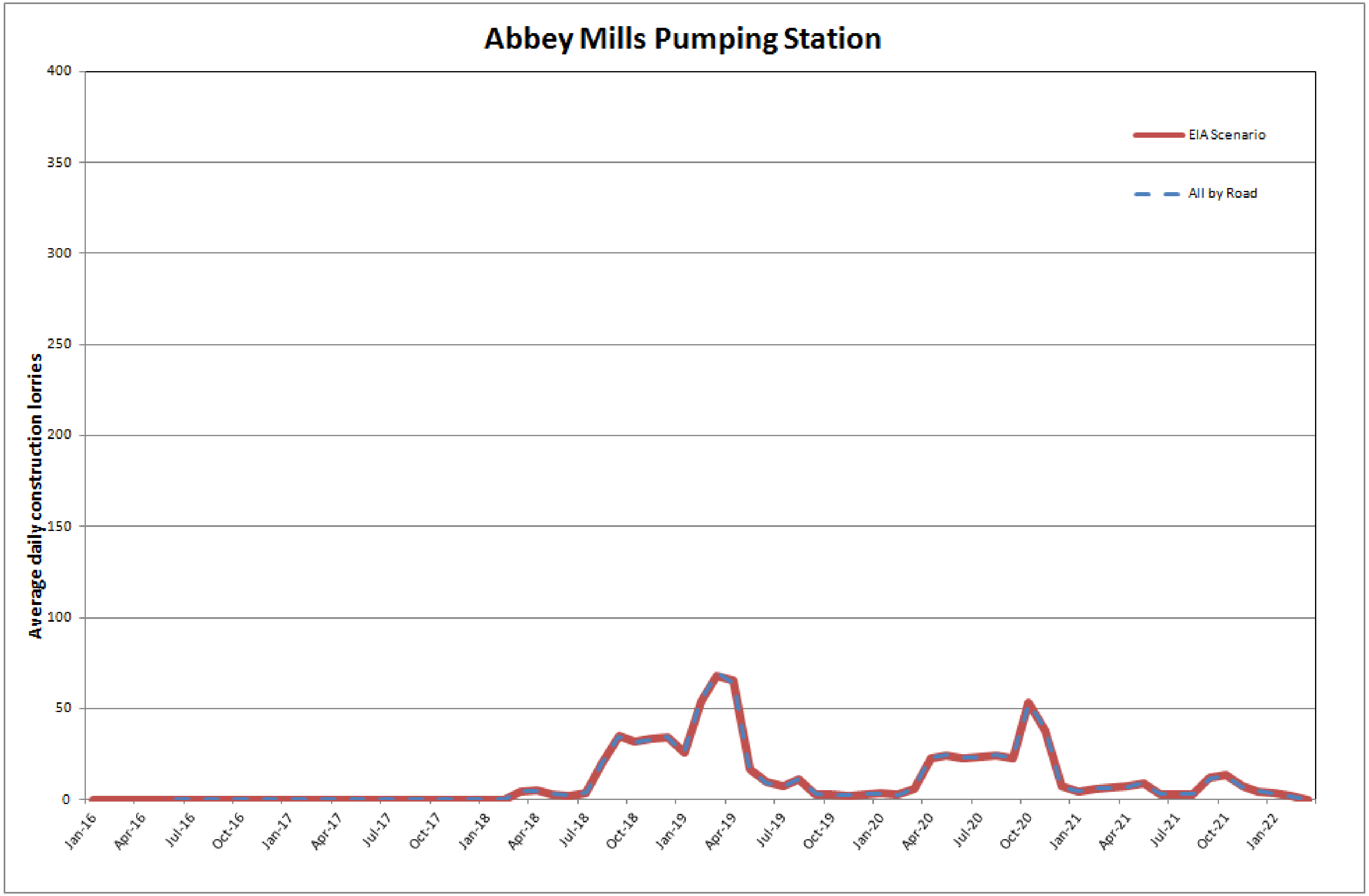

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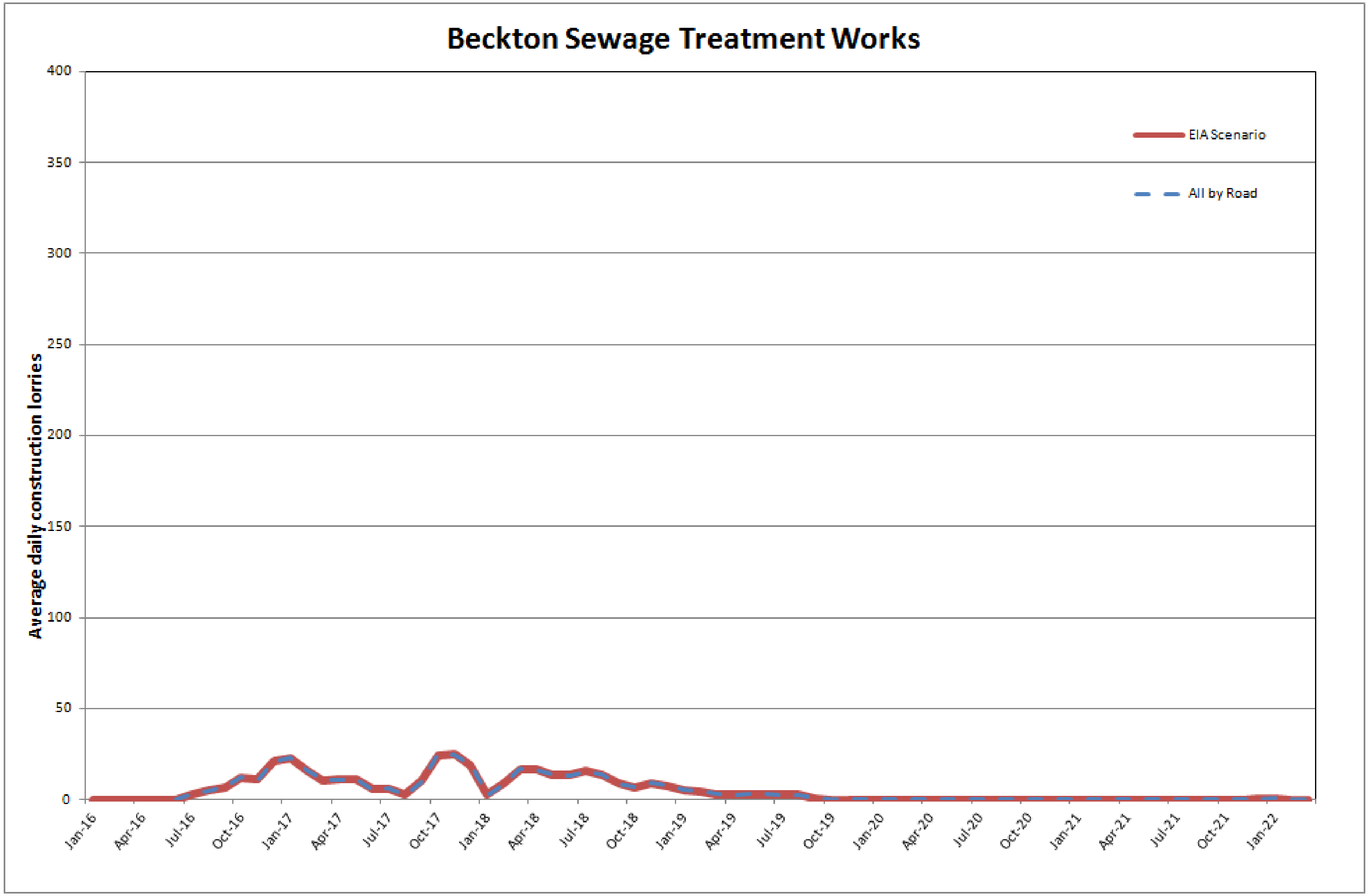

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Clearwater Court, Vastern Road, Reading RG1 8DB

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