Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Transport Assessment

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Greenwich Pumping Station

Main Report

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Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

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Thames Tideway Tunnel

Transport Assessment

Section 24: Greenwich Pumping Station

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24.1 Introduction

24.1.1 This site-specific *Transport Assessment* (*TA*) presents the findings of the assessment of the transport issues of the Thames Tideway Tunnel project at the Greenwich Pumping Station site located within the Royal Borough (RB) of Greenwich.

24.1.2 The assessment takes into consideration the changes as a result of all other Thames Tideway Tunnel project sites to ensure that results indicate the significance of each individual site in combination with construction works being undertaken at other sites.

24.1.3 The site lies on the western boundary of RB Greenwich. The local authority boundary with the London Borough (LB) of Lewisham lies immediately to the west. The site at Greenwich Pumping Station comprises two elements, the existing Thames Water site and Phoenix Wharf / Harts Wharf to the north. The proposed works will cover an area of approximately 2.0ha.

24.1.4 The purpose of this *TA* is to identify the site context, development proposals and any transport implications arising from these proposals to ensure that appropriate mitigation measures are identified, where necessary.

24.1.5 The *TA* draws on a number of project-wide or 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*.

24.1.6 The *TA* structure is as follows:

a. Section 24.2 includes a description of the proposed development. This details construction phasing, vehicle and person trip generation and construction traffic routing. It also provides details on transport during the operational phase.

b. Section 24.3 outlines the assessment methodology used for the *TA* for the construction and operational phases.

c. Section 24.4 details the baseline conditions on the transport network surrounding the site, including survey data analysis and accident analysis.

d. Section 24.5 provides the assessment of the construction phase of the project, including a comparison between the construction base case and the construction development case. This section also outlines sensitivity testing for the highway network.

e. Section 24.6 provides the assessment of the operational phase of the project.

f. Section 24.7 summarises the *TA* findings.

24.2 Proposed development

24.2.1 The proposed development site currently comprises the existing Greenwich Pumping Station in RB of Greenwich together with the builders' yard north of the Dockland Light Rail (DLR) viaduct known as Phoenix Wharf and Harts Wharf. This includes an area under the existing Network Rail viaduct. The western boundary of the site fronts onto Deptford Creek.

24.2.2 The site is bounded to the east by Norman Road (B208), south by Greenwich High Road (A206) and west by Deptford Creek. Beyond Deptford Creek there are a number of warehouses, industrial buildings and the Creekside Centre. The site can be accessed from Greenwich High Road (A206) and Norman Road (B208). Figure 24.2.1 in the Greenwich Pumping Station *Transport Assessment* figures shows the Greenwich Pumping Station site location.

Construction

24.2.3 Construction at the Greenwich Pumping Station site is anticipated to last for approximately five and a half years. There would be three phases of construction phase 1 - covering site set-up and shaft construction, phase 2 - tunnelling and secondary lining, and phase 3 - construction of other structures. The highway layout during construction plan is provided in the Greenwich Pumping Station *Transport Assessment* figures.

24.2.4 *Stage 1 Road Safety Audits* have been carried out on the illustrative highway layouts proposed for this site. The Road Safety Audit reports for this site are contained in Section 24 Appendix E.

24.2.5 Construction would occupy the whole site during all phases of construction. During construction it is anticipated that the transport networks could be affected as a result of the additional construction traffic associated with Greenwich Pumping Station and other construction sites with construction routes along Norman Road (B208) and Greenwich High Road (A206). Pedestrian and cycling diversions would also be implemented in the vicinity of the site.

24.2.6 Construction vehicle access to the site would only take place using a left in arrangement from the northbound carriageway of Norman Road (B208). To egress the site construction vehicles would turn right onto the southbound carriageway of Norman Road (B208). Some light vehicles may use the existing access along Greenwich High Road (A206). To accommodate construction vehicle access along Norman Road (B208) one new gated access would be created, and four existing access would be modified to accommodate construction vehicle access.

24.2.7 A shared pedestrian and cycle footpath links Norman Road (B208) to Creekside running alongside the National Rail viaduct across Deptford Creek over a bridge (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 Greenwich Pumping Station site. This would be necessary throughout the construction period.

24.2.8 During construction all construction material would be transported by road.

24.2.9 Parking for 15 essential maintenance/ operational vehicles would be provided on site. No worker parking would be provided.

24.2.10 Construction details for the site relevant to the construction transport assessment are summarised in Table 24.2.1.

Table 24.2.1 Construction traffic details

Description	Assumption
Assumed peak period of construction lorry movements	Site Year 3 of construction
Assumed average peak daily construction lorry vehicle movements (in peak month of Site Year 3 of construction)	154 movements per day (77 vehicle trips)
Types of lorry requiring access (comprising rigid-bodies, flatbed and articulated vehicles)	Excavation lorries Tunnel precast concrete linings lorries Imported fill lorries Aggregate lorries Cement tankers lorries Ready mix mixer lorries Steel reinforcement lorries Office delivery lorries Plant and equipment lorries Temporary construction material lorries including pipe/track/oils/greases lorries

Note: a movement is a construction vehicle moving either to or from the site. A Site Year is a 12 month period, one in a series of Site Years; Site Year 1 commences at the start of construction.

Construction routes

24.2.11 Figure 24.2.2 in the Greenwich Pumping Station *Transport Assessment* figures shows the primary construction routes for the Greenwich Pumping Station site. These have been discussed with both Transport for London (TfL) and the Local Highway Authority.

24.2.12 The Greenwich Pumping Station site is approximately 350m from the nearest Transport for London Road Network (TLRN) route which is on Blackheath Road (A2) and Deptford Bridge (A2) and approximately 470m from the nearest part of the Strategic Road Network (SRN) on Creek Road (A200).

24.2.13 The routes for construction vehicles in all phases at Greenwich Pumping Station would be to and from Blackheath Road (A2) and Deptford Bridge (A2) via Greenwich High Road (A206) and Norman Road (B208).

24.2.14 The main junctions along the construction traffic route are:

a. Greenwich High Road (A206) / Norman Road (B208)

b. Blackheath Road (A2) / Deptford Bridge (A2) / Greenwich High Road (A206)

c. Deptford Bridge (A2) / Deptford Broadway (A2) / Deptford Church Street (A2209).

24.2.15 During all phases of construction at the Greenwich Pumping Station site, construction vehicles would use Blackheath Road (A2) which forms part of the TLRN. They would approach the site northeast bound along Greenwich High Road (A206) and northbound along Norman Road (B208), using a 'left-turn in' 'right-turn out' basis to enter and exit the site. Vehicles leaving the site would travel southbound along Norman Road (B208) and southwest bound along Greenwich High Road (A206) to Blackheath Road (A2).

24.2.16 The exact routing of construction traffic depends on the origins and destinations of construction materials which are detailed in the *Project-wide TA* (contained within Section 3).

Proposed construction flows

Construction vehicles

24.2.17 Vehicle movements would take place during the standard day shift of ten hours on weekdays (08:00 to 18:00) and five hours on Saturdays (08:00 to 13:00). In exceptional circumstances HGV and abnormal load movements could occur up to 22:00 on weekdays for large concrete pours and later at night on agreement with RB of Greenwich.

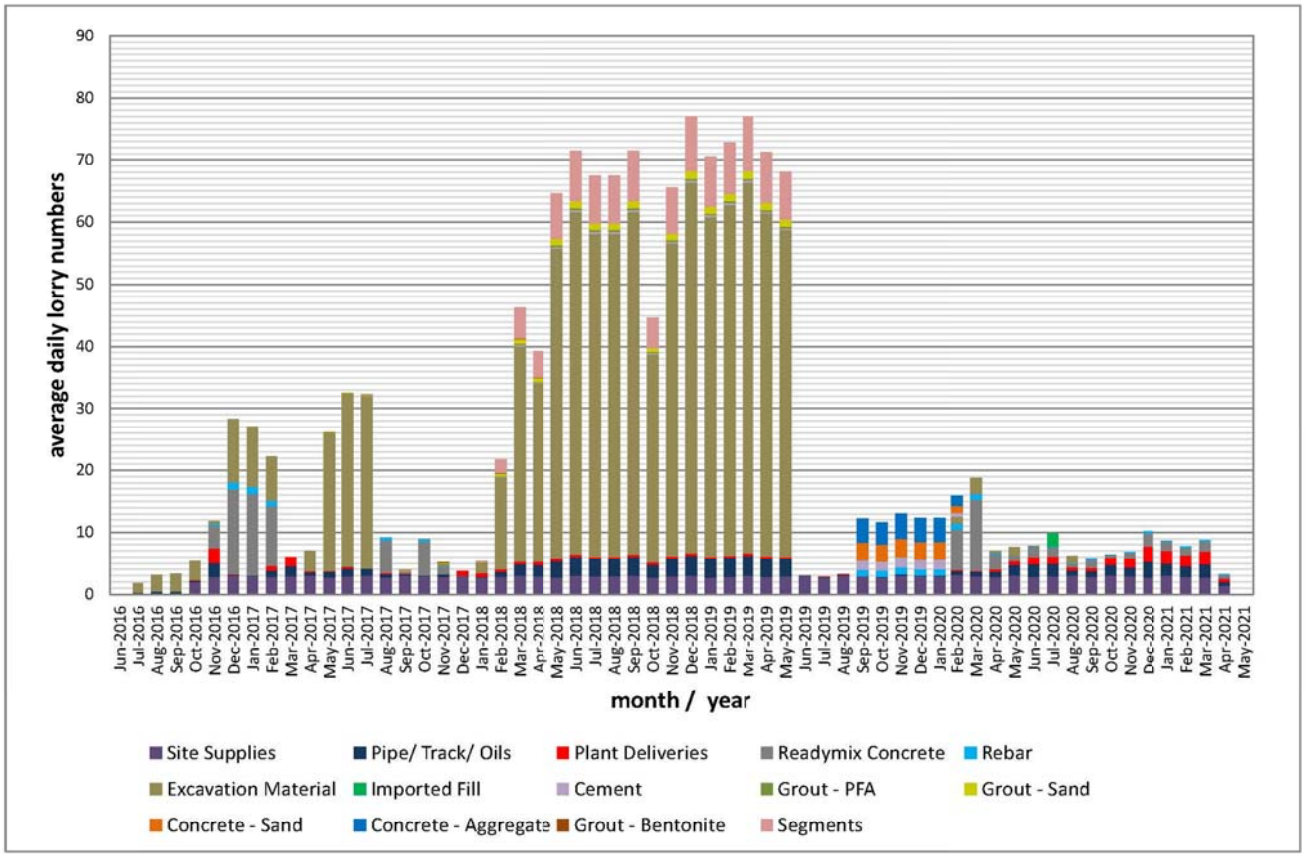
24.2.18 The site would also require continuous working hours when tunnel construction activities are taking place. However, construction vehicle movements would be limited to the hours stated in para. 24.2.17 other than in exceptional circumstances.

24.2.19 A site-specific peak construction assessment year has been identified. The histogram in Plate 24.2.1 shows that the peak site-specific activity at the Greenwich Pumping Station site would occur in Site Year 3 of construction. This site-specific peak is earlier than the overall project-wide construction peak activity year of 2019.

24.2.20 This *TA* assesses this site-specific peak construction year. As detailed in Plate 24.2.1 there would be an estimated 154 average peak daily construction lorry vehicle movements in the peak month of this peak year and Plate 24.2.1 shows how the number of vehicular movements would vary throughout the construction period.

24.2.21 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. It is recognised that it may be desirable to reduce the number of construction lorry movements in peak hours and the mechanisms for addressing this would form part of the *Traffic Management Plans* which are required as part of the *Code of Construction Practice*

Plate 24.2.1 Estimated construction lorry profile



** Note: Figure shows approximate volumes and number of vehicle trips based upon assumed timings for the works. It is not a programme and remains subject to change.*

24.2.22 As the *Project-wide TA* explains, the TfL Highway Assignment Models (HAMs) used for the strategic highway modelling represent peak hours of 08:00 to 09:00 and 17:00 to 18:00 and these have been taken as being the network-wide AM and PM peak hours in the project-wide and site-specific assessments.

24.2.23 The 07:00 to 09:00 and 17:00 to 19:00 periods identified from the local traffic surveys are busier on the network in the weekday than those encountered at the weekends (this is discussed in Section 24.4). Whilst the AM and PM peak hours differ slightly from these network-wide peak hours, in practice the number of vehicle movements at this site would be low in comparison to base case traffic flows on the adjacent network and is expected to be constant throughout the day.

24.2.24 Hourly construction vehicle trips during the inter-peak period are not expected to exceed the hourly trips assumed for the 08:00 to 09:00 and 17:00 to 18:00 periods used in this assessment. The peak travel periods used for the modelling in this assessment are therefore the weekday periods between 08:00 and 09:00 and 17:00 and 18:00.

24.2.25 Other construction vehicle movements associated with site operations and contractor activities would be cars and light goods vehicles (LGVs). The construction worker vehicle movements expected to be generated by the Greenwich Pumping Station site are shown in Table 24.2.4.

Construction workers

24.2.26 The construction site is expected to require a maximum workforce of 165 workers on site at any one time. The number and type of workers is shown in Table 24.2.2. It is noted that the table shows the maximum number of workers required (289), however, as a result of shift patterns the maximum workforce on site would be 165 occurring during the dayshift (08:00-18:00).

Table 24.2.2 Maximum estimated construction worker numbers

Contractor					Client	
Staff*		Labour**			Staff***	
08:00-18:00	18:00-08:00	08:00-15:00	15:00-23:00	23:00-08:00	08:00-18:00	18:00-08:00
60	15	60	60	45	45	4

** Staff Contractor – engineering and support staff to direct and project manage the engineering work and site.*
***Labour – those working on site doing engineering, construction and manual work.*
****Staff Client – engineering and support staff managing the project and supervising the Contractor.*

24.2.27 The mode split outlined in Table 24.2.3 has been used to assess the changes as a result of the worker journeys on the highway and public transport networks. It has been derived using the 2001 Census[i] journey to

[i] Based on 2001 Census. This type of data had not been released from the 2011 Census at the time of the assessment..

work data for the area in the vicinity of the Greenwich Pumping Station site. The Census data indicates that the predominant mode of travel for journeys to work in this area is public transport.

24.2.28 At this site there would be no parking provided within the site boundary for workers, parking on surrounding streets is also restricted and measures to reduce car use would be incorporated into site-specific *Travel Plan* requirements. It is therefore highly unlikely that any workers would travel by car. The Census mode shares have therefore been adjusted in Table 24.2.3 to reflect increased levels of non-car use by workers at this site. The assessment has been undertaken on this basis.

24.2.29 It should be noted that the figures quoted in Table 24.2.3 allow for a change over of the day shift and the night shift movements during the AM peak hour. The PM peak allows for departures of staff not working shift patterns.

Table 24.2.3 Transport mode split

Mode	Percentage of trips to site	Equivalent number of worker trips (based on 165 worker trips)	
		AM peak hour (07:00-8:00)	PM peak hour (18:00-9:00)
Bus	29%	48	31
National Rail	25%	41	26
DLR	16%	27	17
Car driver	<1%*	0	0
Car passenger	<1%*	0	0
Cycle	5%	9	6
Walk	19%	31	20
River	1%	2	1
Other (taxi/motorcycle)	4%	7	4
Total	**100%**	**165**	**105**

** Assumed to be zero for the purpose of this assessment*

24.2.30 As indicated in Table 24.2.3, it is assumed that the predominant mode of travel for journeys to work in this area is public transport and it is assumed that the primary public transport services used would be DLR and National Rail services at Greenwich Station and the bus stops on Greenwich High Road (A206) and Creek Road (A200).

Vehicles movements summary

24.2.31 The total anticipated number of construction-related vehicle movements in the peak month of activity at this site is set out in Table 24.2.4.

Table 24.2.4 Peak construction works vehicle movements

Vehicle type	Vehicle movements per time period				
	Total daily	0700 to 0800	0800 to 0900	1700 to 1800	1800 to 1900
Construction lorry vehicle movements 10%*	154	0	15	15	0
Other construction vehicle movements**	134	6	6	6	6
Worker vehicle movements***	nominal	0	0	0	0
Total	**288**	**6**	**21**	**21**	**6**

** The assessment has been based on 10% of the 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 are based on less than 1% of workers driving, on the basis that there would be no worker parking on site, on-street parking in the area is restricted, and site-specific Travel Plan measures would discourage workers from driving by car. In practical terms, this would be close to zero.*

24.2.32 Based on all materials being transported by road, an average peak flow of 288 vehicle movements a day is expected during the months of greatest activity during Site Year 3 of construction at this site. At other times in the construction period, vehicle flows would be lower than this average peak figure.

24.2.33 Table 24.2.4 shows that the Greenwich Pumping Station site would generate approximately 21 movements per hour during the AM and PM peak periods.

Code of Construction Practice

24.2.34 Measures incorporated into the *Code of Construction Practice* (*CoCP*)[ii] *Part A* (Section 5) to reduce transport effects include:

a. site specific *Traffic Management Plans* (*TMP*): to set out how vehicular access to the site would be managed so as to minimise impact on the local area and communicate this with the local borough and other stakeholders. This includes any works on the highway, diversion or temporary closure of the highway or public right of way

[ii] The Code of Construction Practice (CoCP) is provided in Vol 1 Appendix A. It contains general requirements (Part A), and site specific requirements for this site (Part B).

b. HGV management and control: to ensure construction vehicles use appropriate routes to the sites and the vehicle fleet and/or drivers meet current safety and environmental standards.

24.2.35 In addition to the general measures within the *CoCP Part A*, the *CoCP Part B* (Section 5) relating to the Greenwich Pumping Station site includes the following site-specific measures:

a. the overall site is separated into a number of areas around the existing operating Pumping Station. Each access is required to have adequate security arrangements

b. at the main site entrances the security barrier would be positioned to allow a standard rigid tipper vehicle to be wholly off the road while awaiting barrier operation

c. construction traffic would access the site from Greenwich High Road (A206) and Norman Road (B208), from the direction of Blackheath Road (A2). Traffic would egress via the same routes

d. the existing entrance to the site from Greenwich High Road (A206) would be restricted to cars and light goods vehicles apart from during site set-up and removal. The entrance is shared with Thames Water Operations access to the Pumping Station

e. the site layout would ensure that lorries can turn on site and no reversing onto the adjacent roads is required. Any exceptions such as abnormal loads would be agreed in advance.

f. the existing public footpath from Norman Road (B208) to Creekside would be realigned and suitable access for disabled users would be maintained unless agreed otherwise with the local authority.

24.2.36 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 *Draft Project Framework Travel Plan* 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 contains requirements and guidelines for the development of site-specific *Travel Plans*. The site-specific travel planning requirements of relevance to the *Draft Project Framework Travel Plan* are as follows:

a. information on existing transport networks and travel initiatives for the Greenwich Pumping Station site

b. a mode split established for the Greenwich Pumping Station site construction workers to establish and monitor travel patterns

c. site-specific targets and interim targets would be established based on the mode share which would link to objectives based on local, regional and national policy

a. a nominated person with responsibility for managing the *Travel Plan* monitoring and action plans specifically for this site.

Operation

24.2.37 During the operational phase it is anticipated that the area around Greenwich Pumping Station site will be returned to the existing layout and that there will be no public access to the Pumping Station or the permanent structures for the Thames Tideway Tunnel project.

24.2.38 Once the Thames Tideway Tunnel project is operational there would be no significant changes to the transport infrastructure and operation within the local area, because maintenance trips to the site would be infrequent and short-term. On this basis the only issues considered during the operational phase are those affecting highway layout and operation.

24.2.39 There would be potential for some operational issues to arise as a result of the short-term changes to the physical aspects of access to the site for maintenance. These have only been considered qualitatively because the changes required to the highway network during maintenance activity would be minor and temporary, meaning that a quantitative assessment is not required. The scope of this analysis has been discussed with RB Greenwich and TfL.

24.2.40 Access would be required for a light commercial vehicle on a three to six monthly maintenance schedule. During ten-yearly inspections, space to locate two large cranes and other support vehicles within the site area would be required. The cranes would facilitate lowering and recovery of tunnel inspection teams and to provide duty/standby access for personnel.

24.2.41 During operation, the site would be accessed from Norman Road (B208) and the maintenance vehicles would approach the site from the Greenwich High Road (A206) / Norman Road (B208) junction. The highway layout during operation plans are provided in the Greenwich Pumping Station *Transport Assessment* figures and indicate the operational phase permanent works.

24.3 Assessment methodology

Engagement

24.3.1 An extensive scoping and technical engagement process has been undertaken. All consultee comments relevant to this site are presented in Volume 24 of the *Environmental Statement*.

24.3.2 Whilst the effects associated with transport for the operational phase have been scoped out of the *Environmental Statement*, the *TA* examines the operational phase in order to satisfy the relevant stakeholders that technical issues have been addressed (for example, those associated with access for maintenance activities).

Consultees

24.3.3 Throughout the scoping and technical engagement process, the key stakeholders with regards to transport, primarily TfL and the relevant local authority for each site, have been consulted. For Greenwich Pumping Station, RB Greenwich has been consulted and the comments which have

arisen relating directly to Greenwich Pumping Station have been recorded and responded to accordingly.

24.3.4 The key issues arising from the stakeholder engagement are:

a. the need to be aware of Borough aspirations to implement a one-way traffic system along Norman Road (B208)

b. the need to assess each access/egress point for construction vehicles

c. ensuring that pedestrian access to Deptford Creek adjacent to the construction site is maintained if the site incorporates land to the north of Greenwich Pumping Station

d. all lorry routing should avoid Greenwich town centre

e. ensuring that footpath diversions remain accessible for wheelchair users

f. the need for signal optimisation to improve pedestrian crossing time and junction capacity, especially on Greenwich High Road (A206)

g. the impact on bus journey times must be understood and minimised

h. the works must not interact with the DLR and access to it be maintained at all times

i. all proposed site accesses, traffic management arrangements, diversionary routes (for vehicles, pedestrians and cyclists) etc must all be designed and appropriately assessed (safety audit) so as to minimise the risk of accidents.

Construction

24.3.5 The assessment methodology for the construction phase follows that described in the *Project-wide TA*. There are no site-specific variations for undertaking the construction assessment of this site.

24.3.6 The effect of all other Thames Tideway Tunnel project sites on the area surrounding the Greenwich Pumping Station site has been taken into account within the assessment of the peak year of construction at this site.

Construction assessment area

24.3.7 The assessment area for the Greenwich Pumping Station site includes the site accesses directly from Norman Road (B208) and Greenwich High Road (A206) and the Greenwich High Road (A206) / Norman Road (B208) junction approximately 130m to the south of the site.

24.3.8 Consideration has also been given to the potential impacts on pedestrian and cycle routes, including the Thames Path, and on bus services and rail services within 640m and 960m of the site respectively. The Public Transport Accessibility Level (PTAL) of the site, calculated using TfL's approved PTAL methodology assumes a walking speed of 4.8km/h and considers rail stations within a 12 minute walk (960m) of the site and bus stops within an eight minute walk (640m).

24.3.9 The extent of the assessment area for the local highway network modelling has been informed by considering the volume of construction traffic at this site and the degree of impact that would be experienced at

the nearest junction of the construction vehicle route with the SRN or TLRN. Where the assessment shows that the forecast impacts at this junction would not be significant, junctions further afield on the strategic network have not been assessed. Where impacts are forecast to be significant, a wider area of the local network has been considered in the assessment.

Construction assessment year

24.3.10 To assess the busiest case scenario for the Greenwich Pumping Station locality, the peak construction traffic year has been identified. This ensures that the assessment for Greenwich Pumping Station takes into consideration the heaviest flow of construction vehicles at this site on local roads for the local modelling assessment.

24.3.11 The site-specific peak construction traffic year at Greenwich Pumping Station is Site Year 3 of construction.

24.3.12 The assessment of the aggregated Thames Tideway Tunnel project construction traffic flows on the wider highway network is included within the *Project-wide TA*.

Highway network modelling

24.3.13 The assessment for each site takes account of construction vehicle movements associated with Greenwich Pumping Station, together with construction traffic from other Thames Tideway Tunnel project sites that would use the highway network in the vicinity of this site in Site Year 3 of construction.

24.3.14 As indicated in the *Project-wide TA*, the TfL HAMs have been used as part of the assessment. The strategic highway modelling has used three of the HAMs, which cover west, central and east London. These three models cover the locations of all of the Thames Tideway Tunnel project sites and this approach has been agreed with TfL.

24.3.15 The HAMs have been developed by TfL using GLA employment and population forecasts, which are based on the employment and housing projections set out in the London Plan[3]. As a result the assessment inherently takes into account a level of future growth and development across London.

24.3.16 For future year assessments for the Greenwich Pumping Station site, the TfL East London HAM (ELHAM) has been used to test the strategic highway network impacts associated with this site. Construction traffic associated with other Thames Tideway Tunnel project sites using routes in this area has been included in the ELHAM scenarios.

24.3.17 Construction lorry, operational and worker vehicle trips (where relevant) associated with the project peak month were assigned to ELHAM to create the scenarios for testing strategic highway impacts.

24.3.18 ELHAM also provides factors for the increase in vehicle-kilometres in the borough between the ELHAM model base and forecast years (2008/9 and 2021 respectively). The relevant growth factor for RB of Greenwich was applied to the traffic data collected in 2011 in the vicinity of the Greenwich

Pumping Station site to produce base case traffic flows for the purposes of local highway modelling.

24.3.19 Construction lorry, operational and worker vehicle movements (where relevant) associated with the Greenwich Pumping Station site for the site-specific peak month were added to the 2021 base case flows to provide the development case flows for local modelling.

24.3.20 This approach provides a robust assessment case for local modelling as the baseline traffic has grown to 2021, which is later than the site-specific peak year of construction, and no allowance has been made for existing traffic that might divert to other routes as a consequence of the use of local roads by the project related traffic.

Operation

24.3.21 The assessment methodology for the operational phase follows that described in the *Project-wide TA*. There are no site specific variations for undertaking the operational assessment of this site.

24.3.22 Given the level of the transport activity associated with the Thames Tideway Tunnel project during the operational phase, only the localised transport issues around the Greenwich Pumping Station site have been assessed. Other Thames Tideway Tunnel project sites would not affect the area around Greenwich Pumping Station in the operational phase and therefore they have not been considered in the assessment.

Operational assessment area

24.3.23 The assessment area for the operational assessment remains the same as for the construction assessment as outlined in paras. 24.3.7 and 24.3.8.

Operational assessment year

24.3.24 The operational assessment year has been taken as Year 1 of operation which is the year in which it is assumed that the Thames Tideway Tunnel project would become operational. As transport activity associated with the operational phase would be very low, there is no requirement to assess any other year beyond that date.

24.4 Baseline

24.4.1 This section sets out the baseline conditions on the local transport network in the vicinity of the Greenwich Pumping Station site in 2012, with the exception of the traffic survey data which was collected in 2011.

Policy review

24.4.2 The site is located within RB of Greenwich. A review of the relevant national, regional and local policy documents is included in Appendix A.

Existing land use

24.4.3 The site is located within the existing Thames Water Greenwich Pumping Station and on the adjacent builders' yard at Phoenix Wharf and Harts Wharf. The site is crossed by both a National Rail and a Docklands Light Railway viaduct.

24.4.4 The nearest residential area is located adjacent to the site (43-81 Greenwich High Road).

Existing access

24.4.5 The site is currently accessible by vehicle from Greenwich High Road (A206) and Norman Road (B208). The site is not accessible to pedestrians and cyclists with the exception of the footpath between Norman Road (B208) and Creekside across Deptford Creek which is indicated in Figure 24.4.1 in the Greenwich Pumping Station *Transport Assessment* figures.

Pedestrian network and facilities

24.4.6 The key pedestrian network related to the Greenwich Pumping Station site comprises:

a. Greenwich High Road (A206) providing a northeast/ southwest link between Greenwich town centre to the northeast and Blackheath Road (A2) to the southwest

b. Norman Road (B208) provides a north south link between Creek Road (A200) to the north and Greenwich High Road (A206) to the south

c. a public footpath between Norman Road (B208) and Creekside, crossing Deptford Creek, located between the DLR and National Rail viaducts.

24.4.7 The existing pedestrian network and facilities in the vicinity of the site are described below and shown on Figure 24.4.1 in the Greenwich Pumping Station *Transport Assessment* figures.

24.4.8 The Thames Path (a Public Right of Way) routes along the north side of Creek Road (A200) to the west of the junction with Norman Road (B208), approximately 680m walking distance from the site to the north. The Thames Path continues to the east along Norway Street and Thames Street and to the west along Creek Road (A200), Stowage and Glaisher Street.

24.4.9 Greenwich High Road (A206) has footways of between 1m and 4.8m in width on both sides of the single two-way carriageway as shown in Plate 24.4.1, providing a continuous northeast-southwest link between Romney Road (A206) and Greenwich town centre to the northeast and Blackheath Road (A2) and Deptford Bridge (A2) to the southwest.

24.4.10 At the junction of Greenwich High Road (A206) and Norman Road (B208), signalised pedestrian crossings with pedestrian refuge islands and dropped kerbs are provided to the east of the junction. There is also a pedestrian refuge island on Greenwich High Road (A206), 5m to the south of the entrance to Greenwich Pumping Station.

Plate 24.4.1 Footway along Greenwich High Road (A206)

24.4.11 To the northeast of the site, at the signalised T-junction of Greenwich High Road (A206) and Greenwich South Street (A2211), signalised pedestrian crossings with dropped kerbs are provided to the south and east of the junction.

24.4.12 At the junction of Greenwich High Road (A206) / Deptford Bridge (A2) / Blackheath Road (A2) to the south of the site, signalised pedestrian crossings with dropped kerbs and refuge islands are provided on all approaches to the junction.

24.4.13 Plate 24.4.2 shows Norman Road (B208) which has footways of between 2.4m and 3.6m in width on both sides of the road. The road provides a north-south link between Creek Road (A200) to the north and Greenwich High Road (A206) to the south.

24.4.14 There is a shared pedestrian and cycle footpath to the north of the entrance to Greenwich Pumping Station on Norman Road (B208). This runs east-west through the site and across Deptford Creek.

24.4.15 No controlled crossings are provided for pedestrians along the length of Norman Road (B208). There is one uncontrolled pedestrian crossing to the south of the Creek Road (A200) / Norman Road (B208) junction with dropped kerbs and a pedestrian refuge island provided, and one uncontrolled pedestrian crossing to the north of the junction of Greenwich High Road (A206) and Norman Road (B208) with dropped kerbs provided.

Plate 24.4.2 Footway along Norman Road (B208)

Cycle network and facilities

24.4.16 The existing cycle network and facilities in the vicinity of the site are described below and shown on Figure 22.4.1 in the Greenwich Pumping Station *Transport Assessment* figures.

24.4.17 There is a shared pedestrian and cycle footpath to the north of the entrance to Greenwich Pumping Station on Norman Road (B208) shown in Plate 24.4.3. This runs east-west through the site and across Deptford Creek and links to National Cycle Network (NCN) Route 21 on Creekside.

24.4.18 NCN Route 21 runs to the west and south of the site on a traffic free route alongside Brookmill Road (A2210). It passes over Deptford Bridge (A2) before continuing on-road along Creekside where it joins NCN Route 4 (Tower Bridge to Greenwich) in the north.

Plate 24.4.3 Shared pedestrian and cycle footpath on Norman Road (B208)

Barclays Cycle Superhighways

24.4.19 Currently, there is no Barclays Cycle Superhighway (CS) close to the site. However, CS5 which runs between Lewisham and Victoria is planned to be opened in 2013, and route CS4 running between Woolwich and London Bridge is planned to be opened in 2015.

Barclays Cycle Hire Scheme

24.4.20 There are no Barclays Cycle Hire docking stations within a 640m walking distance of the site.

Cycle parking

24.4.21 The closest cycle parking facilities are located on the northern footway of Greenwich High Road (A206) to the west of the junction with Norman Road (B208) approximately 100m walking distance to the southeast of the site, with two Sheffield Cycle Stands provided.

24.4.22 Six Sheffield Cycle Stands capable of accommodating up to 12 bicycles are provided outside Greenwich National Rail station on Greenwich High Road (A206) approximately 250m walking distance to the east of the site. A further three Sheffield Cycle Stands are located outside Greenwich DLR station on Greenwich High Road (A206) approximately 170m to the east of the site, which accommodate up to six bicycles.

24.4.23 A further seven Sheffield Cycle Stands are provided outside Greenwich DLR station on Tarves Way, approximately 250m to the northeast of the site and 14 Sheffield Cycle Stands are located on the western footway of Straightsmouth approximately 280m to the northeast of the site.

Public transport

Public Transport Accessibility Level

24.4.1 The Public Transport Accessibility Level (PTAL) of the site, calculated using TfL's approved PTAL methodology[4] (analysis is included in Appendix B) and assumes a walking speed of 4.8km/h and considers rail stations within a 12 minute walk (960m) of the site and bus stops within an eight minute walk (640m).

24.4.2 The site has a PTAL rating of 4, rated as 'good' (with 1 being the lowest accessibility and 6b being the highest accessibility). The following sections detail the public transport services in the vicinity of the site which are shown on Figure 24.4.2 in the Greenwich Pumping Station *Transport Assessment* figures.

Bus services

24.4.3 A total of seven daytime bus routes and two night bus routes operate within 640m walking distance of the site. These bus services form a comprehensive network, extending outwards in all directions from the site. Table 24.4.1 provides a summary of the bus services and their frequencies during the weekday peaks.

24.4.4 The bus routes operate from the following bus stops:

a. Miller House bus stop on Greenwich High Road (A206) - northbound and southbound, 55m walking distance to the south

b. Greenwich Station bus stop on Greenwich South Street (A2211) - northbound and southbound, 416m walking distance to the northeast

c. Deptford Bridge bus stop on Deptford Bridge (A2) - eastbound and westbound, 428m walking distance to the southwest

d. Creek Road / Norman Road on Creek Road (A200) - eastbound and westbound, 488m walking distance to the northeast.

24.4.5 On average there are approximately 84 daytime bus services in total per hour in the AM peak and 86 bus services in total per hour in the PM peak within 640m walking distance of the site.

24.4.6 There are approximately six night-time bus services per hour Monday – Friday between 00:00 – 06:00 and a total of nine night-time bus services per hour on Saturdays between 00:00 – 06:00 within 640m walking distance of the site.

Table 24.4.1 Existing daytime weekday peak hour local bus services and frequency (number of buses per hour)

Bus number	Origin – destination	Nearest bus stop to Greenwich Pumping Station site	Approximate walking distance from Greenwich Pumping Station site (m)	Weekday peak hour two-way frequencies	
				AM peak (08:00-09:00)	PM peak (17:00-18:00)
53	Orchard Road – Horse Guards Parade	Deptford Bridge	500	15	16
177	Thamesmead Town Centre – Peckham Bus Station	Miller House	70	14	14
180	Crabtree Manorway North – Lewisham Centre	Ashburnham Grove	400	11	11
188	North Greenwich Station – Euston Bus Station	Creek Road/ Norman Road	320	7	7
199	Canada Water Bus Station – Catford Bus Garage	Ashburnham Grove	400	12	12
386	Woolwich High Street – Royal Parade	Ashburnham Grove	400	8	8
453	Deptford Bridge – Great Central Street	Deptford Bridge	500	16	16

** Source: Transport for London (TfL) (2011) Timetables. Available at www.tfl.gov.uk (site last accessed December 2012)*

Docklands Light Railway

24.4.7 Greenwich is the nearest DLR station to the site. As shown on Figure 24.4.2 in the Greenwich Pumping Station *Transport Assessment* figures, the station is located approximately 300m walking distance to the northeast of the site.

24.4.8 The DLR from Greenwich provides services between Lewisham and Bank, and Lewisham and Stratford as well as allowing interchange at Poplar for other eastern destinations.

24.4.9 Bank to Lewisham services operate at AM and PM peak frequencies of approximately every four minutes. This equates to approximately 15 trains per hour in each direction. Services between Stratford and Lewisham operate during the AM peak at a frequency of approximately every 12 minutes, equating to approximately five services per hour in each direction. At all other times those wishing to travel between Stratford and Lewisham must change at Canary Wharf. The same services can also be accessed at Cutty Sark DLR station, approximately 700m to the northeast of the site.

24.4.10 Table 24.4.2 provides a summary of the DLR services and their frequencies during the weekday peaks.

National Rail

24.4.11 As shown in Figure 24.4.2 in the Greenwich Pumping Station *Transport Assessment* figures, the closest national rail station to the site is Greenwich which is located approximately 300m walking distance to the east of the site. The station is served by Southeastern train services to and from London Charing Cross, London Cannon Street, London Bridge, Dartford, Slade Green, Barnehurst, Gillingham (Kent), Gravesend, and Crayford.

24.4.12 In each of the AM and PM peak hours there are approximately 30 and 28 services calling at Greenwich station.

24.4.13 Table 24.4.3 provides a summary of the National Rail services and their frequencies during the weekday peaks.

Table 24.4.2 Existing DLR peak hour services and frequencies (number of services per hour)

Line	Origin – destination	Approximate walking distance from Greenwich Pumping Station site (m)	Weekday peak hour two-way frequencies	
			AM peak (08:00-09:00)	PM peak (17:00-18:00)
DLR	Bank - Lewisham	300m	30	30
DLR	Stratford - Lewisham	300m	10	-

** Source: Transport for London (TfL) (2012) Timetables. Available at www.tfl.gov.uk (site last accessed December 2012)*

Table 24.4.3 Existing National Rail weekday peak hour services and frequencies (number of services per hour)

National Rail station	Origin – destination	Approximate walking distance from Greenwich Pumping Station site (m)	Weekday peak hour two-way frequency	
			AM peak (08:00-09:00)	PM peak (17:00-18:00)
Greenwich	London Charing Cross, London Cannon Street, London Bridge, Dartford, Slade Green, Barnhurst, Gillingham, Gravesend, Crayford.	300m	30	28

** Source: Railplanner information and timetables: www.nationalrail,co,uk (site last accessed December 2012)*

River passenger services

24.4.14 There are no river passenger services within 960m of the Greenwich Pumping Station site.

Highway network and operation

24.4.15 The site is bounded by Greenwich High Road (A206) and Norman Road (B208) as shown in Figure 24.2.1 in the Greenwich Pumping Station *Transport Assessment* figures.

24.4.16 To the south of the site is Greenwich High Road (A206), a two way single carriageway with a speed limit of 30mph which provides a continuous northeast-southwest link between Romney Road (A206) and Greenwich town centre to the northeast and Blackheath Road (A2) and Deptford Bridge (A2) to the southwest.

24.4.17 Greenwich High Road (A206) and Greenwich South Street (A2211) meet at a signalised junction 380m to the northeast of the site. To the northeast, Greenwich High Road (A206) links to Trafalgar Road (A206) and Creek Road (A200) which both are part of the SRN.

24.4.18 Greenwich High Road (A206) links to Blackheath Road (A2) and Deptford Bridge (A2) to the south at a signalised junction, 370m to the southwest of the site. Both Blackheath Road (A2) and Deptford Bridge (A2) are part of the TLRN.

24.4.19 To the east of the site, Norman Road (B208) provides a north-south link between Creek Road (A200) to the north and Greenwich High Road (A206) to the south. Norman Road (B208) is a two-way road with one lane in each direction and a speed limit of 30mph. Greenwich High Road (A206) and Norman Road (B208) meet at a signalised junction.

24.4.20 Local highway modelling has been undertaken to determine the operation of the Greenwich High Road (A206) / Norman Road (B208) junction in the baseline situation. This is discussed in paras. 24.4.53 to 24.4.63.

Parking

24.4.21 Figure 24.4.3 in the Greenwich Pumping Station *Transport Assessment* figures shows the locations of the existing car and coach parking within the vicinity of the site. The existing off-street/private car parking and car club parking spaces are also shown in this figure.

Existing on-street car parking

24.4.22 There are 14 resident and business permit holders parking bays along Norman Road (B208) which are restricted between 09:00 and 10:00 Monday to Friday.

24.4.23 Five parking meter bays are located along Norman Road (B208) to the north of the junction with Greenwich High Road (A206) with charges of 60p per 20 minutes and a maximum stay of four hours.

24.4.24 On Ashburnham Grove, Ashburnham Place, Claremont Street, Devonshire Drive, Egerton Drive, Greenwich High Road (A206), Haddo Street, Langdale Road, Norman Road (B208), Randall Place, and Tarves Way,

there are a total of 296 resident parking bays which are restricted between 09:00 and 17:00 Monday to Saturday and between 09:00 to 18:00 on Sunday.

24.4.25 In total, there are 34 pay and display parking bays on the roads close to the site which are limited to a maximum stay of four hours.

24.4.26 There are no motorcycle parking bays in the vicinity of the Greenwich Pumping Station site.

24.4.27 Table 24.4.4 summarises the parking restrictions and the number of bays on the roads in the vicinity of the site. The availability and usage of parking capacity on a weekday and a Saturday on the roads in the vicinity of the site is summarised later in this section in Table 24.4.8.

Table 24.4.4 Existing on-street car parking in the vicinity of Greenwich Pumping Station

Road name	Type of parking restrictions and number of bays				
	Pay and display	Resident	Blue badge	Unrestricted	Short-term*
Ashburnham Grove	0	33	0	0	0
Ashburnham Place	0	66	0	0	0
Claremont Street	0	12	0	0	0
Devonshire Drive	2	26	0	1	0
Egerton Drive	7	19	0	0	0
Greenwich High Road (A206)	0	7	0	0	2
Haddo Street	5	29	0	0	0
Langdale Road	9	29	0	0	0
Norman Road (B208)	5	14	0	0	0
Randall Place	0	16	0	0	0
Tarves Way	6	45	0	0	0

**The maximum stay for short-term parking bays is 20 minutes.*

Existing off-street/private car parking

24.4.28 There are no large off-street public or private car parks in the vicinity of the site.

Coach parking

24.4.29 Two coach parking bays are located along the northbound carriageway of Norman Road (B208), approximately 500m walking distance northeast from the site between the junction with Tarves Way and the junction with Thornham Street. No charge or time restriction is applied to these coach parking bays. A further coach parking bay is located on Stockwell Street approximately 750m walking distance to the northeast of the site, which is restricted between 09:00 and 17:00 with a maximum stay of 20 minutes.

Car clubs

24.4.30 Car clubs provide members with easy access to cars for short-term use. Cars are available as and when needed and allow members to access a car without purchase, storage and operational costs associated with owning a private car.

24.4.31 When surveys were undertaken in May 2011, there were two car club parking spaces on Devonshire Drive outside number 2, located approximately 120m walking distance to the southeast of the site.

Servicing and deliveries

24.4.32 A loading / blue badge holder parking bay is located along Greenwich High Road (A206) (northbound) to the north of the junction with Deptford Bridge (A2) and Blackheath Road (A2) approximately 360m walking distance to the southwest of the site. The parking bay is restricted to a maximum of 20 minutes for loading and a maximum of three hours for blue badge holders between 07:00 and 19:00 Monday to Saturday.

Baseline survey data

Description of data

24.4.33 Baseline survey data were collected in May 2011 to establish the existing transport movements in the area. Figure 24.4.4 in the Greenwich Pumping Station *Transport Assessment* figures indicates the survey locations in the vicinity of the site. Appendix A of Section 3 of the *TA* includes the baseline data report which further details the surveys undertaken and the data collected.

24.4.34 As part of surveys in May 2011, manual and automated traffic surveys were undertaken to establish specific traffic, pedestrian and cycle movements including turning volumes, queue lengths, saturation flows, degree of saturation and traffic signal timings. Parking surveys were undertaken to establish the availability and usage of parking in the vicinity of the site.

24.4.35 The scope of the surveys in terms of location and time periods was considered to ensure that the data required for assessment was collected. Pedestrian and cycle count data was collected at locations where flows could be affected by pedestrian and cycle diversions during construction, the generation of additional trips or where conflicts could occur with construction vehicles. Parking survey data was collected where it was possible that parking restrictions would be necessary or where additional parking demand might be generated by the proposed development.

24.4.36 Traffic surveys were carried out on a weekday and a weekend to represent a weekly profile of traffic at particular locations. Where two weekly profiles have been surveyed, the busiest survey was used.

24.4.37 The surveys undertaken and their locations are summarised in Table 24.4.5.

Table 24.4.5 Survey types and locations

Survey type and location	Date
Junction survey (including pedestrian and cycle movements)	
Greenwich High Road (A206) / Norman Road (B208) / Ashburnham Place	17 May 2011
Pedestrian and cycle surveys	
Pedestrian crossing on Greenwich High Road (A206) to the east of the junction with Norman Road (B208)	17 May 2011
Parking surveys	
Ashburnham Grove	17 May 2011
Ashburnham Place	
Ashburnham Retreat	
Claremont Street	
Devonshire Drive	
Egerton Drive	
Greenwich High Road (A206)	
Haddo Street	
Langdale Road	
Norman Road (B208)	
Randall Place	
Tarves Way	

24.4.38 Pedestrian and cyclist flow data from the surveys provided the baseline pedestrian traffic data sets which are set out in Table 24.4.6 and Table 24.4.7.

24.4.39 Vehicular traffic flow data from the junction turning movement surveys provided the baseline vehicular traffic data sets which were input into the junction assessment models described in paragraphs 24.4.53 to 24.4.60.

24.4.40 The following junction surveys are on construction traffic routes to and from the Greenwich Pumping Station site:

a. Greenwich High Road (A206) / Norman Road (B208) / Ashburnham Place junction

Results of the surveys

24.4.41 The surveys inform the baseline situation in the area surrounding the site and are summarised in the following paragraphs.

Pedestrians

24.4.42 Table 24.4.6 indicates the pedestrian flows along the pedestrian crossings located to the north and east of Greenwich High Road (A206) / Norman Road (B208) junction.

24.4.43 Pedestrian surveys on the controlled pedestrian crossing located on Greenwich High Road (A206) to the east of the junction with Norman Road (B208) indicate that during the AM peak hour the flow is heavier with approximately 158 northbound pedestrians and eight southbound pedestrians. During the PM peak hour, there is a relatively balanced flow of pedestrians of approximately 30 pedestrians in each direction.

24.4.44 Pedestrian surveys on the uncontrolled pedestrian crossing to the north of the Greenwich High Road (A206) and Norman Road (B208) junction show that during the AM peak hour, the predominant flow of pedestrians is eastbound with approximately 106 pedestrians and 29 westbound pedestrians. In the PM peak hour, the flow is heavier with approximately 110 westbound pedestrians and 64 eastbound pedestrians.

Cyclists

24.4.45 Table 24.4.7 indicates the flows of bicycles along Greenwich High Road (A206) and Norman Road (B208). There is a two-way flow of approximately 111 and 33 cycles along Greenwich High Road (A206) and Norman Road (B208) respectively during the AM peak hour, and 70 and 20 cycles during the PM peak hour.

Table 24.4.6 Existing pedestrian flows

Pedestrian crossing	Direction	Weekday			Weekend
		AM peak (08:00-09:00)	Inter-peak (12:00-13:00)	PM peak (17:00-18:00)	(13:00-14:00)
Controlled pedestrian crossing to the east of Greenwich High Road / Norman Road junction	Northbound	158	14	34	19
	Southbound	8	9	26	9
Uncontrolled pedestrian crossing to the north of Greenwich High Road / Norman Road junction	Eastbound	106	58	64	81
	Westbound	29	38	110	60

Table 24.4.7 Existing cycle flows

Road/route	Direction	Weekday			Weekend
		AM peak (08:00-09:00)	Inter-peak (12:00-13:00)	PM peak (17:00-18:00)	(13:00-14:00)
Greenwich High Road (A206)	Northeast	71	10	29	17
	Southwest	40	16	41	8
Norman Road (B208)	Northbound	28	3	5	3
	Southbound	5	2	15	4

Traffic flows

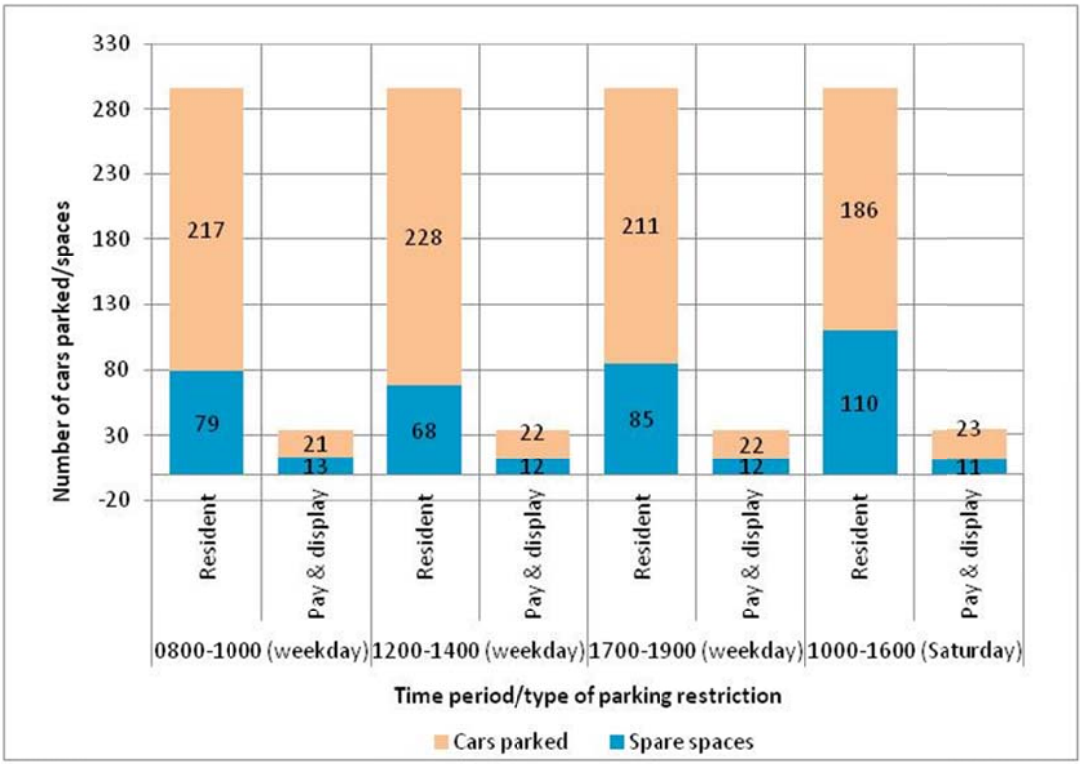
24.4.46 Traffic flow diagrams for the AM and PM peak hours indicate the traffic flow information collected during the junction surveys in 2011 and are shown in Figures 24.4.5 to 24.4.6 in the Greenwich Pumping Station *Transport Assessment* figures.

24.4.47 The junction surveys indicate that there is a total traffic flow of 592 and 870 vehicles in the AM and PM peak hours respectively using the junction of Greenwich High Road (A206) / Norman Road (B208). The dominant flows are 224 vehicles heading south west along Greenwich High Road (A206) during the AM peak hour. During the PM peak hour the dominant flow is 342 vehicles turning left from Norman Road (B208) into Greenwich High Road (A206).

Parking

24.4.48 Plate 24.4.4 shows a histogram of the car and motorcycle parking survey results as well as loading bay availability and usage in the area surrounding the Greenwich Pumping Station site during the AM, inter-peak, PM peaks on a weekday and during the weekend peak period.

Plate 24.4.4 Existing on-street car parking availability and usage



24.4.49 Table 24.4.8 indicates the parking capacity available throughout a weekday and on Saturday on the roads in the vicinity of the site.

Table 24.4.8 Resident and pay and display parking bay availability and usage

Location	Number and type of bays		No. of spaces available			
			Weekday			Saturday
			08:00-10:00	12:00-14:00	17:00-19:00	12:00-14:00
Ashburnham Grove	Resident	33	4	3	8	8
Ashburnham Place	Resident	66	13	15	11	19
Claremont Street	Resident	12	5	6	8	8
Devonshire Drive	Resident	26	3	6	8	9
	Pay and Display	2	0	2	1	1
Egerton Drive	Resident	19	1	2	4	10
	Pay and Display	7	3	5	3	0
Greenwich High Road (A206)	Resident	7	2	1	1	3
Haddo Street	Resident	29	16	13	14	17
	Pay and Display	5	0	0	0	1
Langdale Road	Resident	29	1	4	4	6
	Pay and Display	9	6	5	5	5
Norman Road (B208)	Resident	14	3	0	5	1
	Pay and Display	5	4	0	3	4
Randall Place	Resident	16	4	3	8	12
Tarves Way	Resident	45	27	15	14	17
	Pay and Display	6	0	0	0	0

24.4.50 The results of the parking surveys indicate that usage of resident parking bays surrounding the site is heavy, with between 71% and 77% being occupied during weekdays. Approximately 63% of resident parking bays are occupied during the weekend. However, there is still spare capacity available on weekdays and weekends.

24.4.51 Pay and display parking in the vicinity of the site is also heavily used with between 62% and 65% being occupied on a weekday and 68% occupied on weekends. Despite a high rate of occupancy, the surveys have demonstrated that there is some spare capacity available during weekdays and weekends.

24.4.52 Surveys were also undertaken to establish the availability of coach parking along Norman Road (B208) to understand existing occupancy and capacity. Results indicate there is ample capacity as the coach parking spaces along Norman Road (B208) are not heavily used for the majority of the day.

Local highway modelling

24.4.53 To establish the existing capacity on the local highway network, a scope was discussed with TfL and RB Greenwich to model the Greenwich High Road (A206) / Norman Road (B208) junction using a LinSig model.

24.4.54 Traffic models for this junction have been developed for this assessment and where possible suitable models from TfL have been used. The models have been constructed using on-site measurements of classified vehicle volumes and queue lengths.

24.4.55 The signal timings used in the assessment have been obtained from the TfL Signal Timing Sheet for this junction.

24.4.56 The TfL Modelling Guidelines[5] and Modelling Audit Process (MAP)[6] have been used as the basis for preparing and checking models and their outputs. All required input data has been used in order to calibrate the model. Where TfL models have been used, saturation flows have been retained where no change is proposed to junctions; where changes are proposed, saturation flows have been calculated and compared with site observations to determine suitable values. Validation of the models has been based on observed data including signal timings, vehicle volumes and queue lengths to provide the key criteria for comparison with modelled queue lengths.

24.4.57 The models are considered suitable for this planning stage and are intended to demonstrate the nature of the effects of the additional vehicles generated by the Thames Tideway Tunnel project in this location. It is acknowledged that these models may require further refinement as the project moves from planning to detailed design stage; however as a period of time will elapse before construction commences at this site, it will be necessary in any case to review and revalidate the models against traffic conditions at that time, as is normal practice.

24.4.58 The baseline model therefore accounts for the current traffic and transport conditions within the vicinity of the site. As the strategic modelling has not

identified any major issues at other junctions in the vicinity of the site, no local modelling is required for other junctions.

24.4.59 The weekday AM and PM baseline model queues for the junction were compared against observed queue lengths for the peak periods (from junction surveys) to validate the model and ensure reasonable representation of existing conditions.

24.4.60 Figure 24.4.5 and 24.4.6 in the Greenwich Pumping Station *Transport Assessment* figures indicate the traffic flows which were used for the baseline AM and PM peak hour assessments which take into account the survey data.

Table 24.4.9 Baseline LinSig model outputs

Approach	Movement	Weekday							
		AM peak hour (08:00-09:00)				PM peak hour (17:00-18:00)			
		Flow (PCUs)	DoS	MMQ (PCUs)	Delay per PCU (Seconds)	Flow (PCUs)	DoS	MMQ (PCUs)	Delay per PCU (Seconds)
Greenwich High Road (A206) westbound	Ahead	224	21%	2	9	177	18%	2	9
	Right	0	0%	0	0	0	0%	0	0
Greenwich High Road (A206) eastbound	Ahead Left	262	36%	3	17	332	45%	5	18
Norman Road (B208) southbound	Right Left	106	29%	2	27	361	99%	14	106
		PRC		Total Delay (PCU Hours)		PRC		Total Delay (PCU Hours)	
Overall junction performance		152.2%		3		-9.5%		13.8	

Notes: DoS represents Degree of Saturation; the ratio of flow to capacity. MMQ represents Mean Maximum Queue for the busiest-case 15 minute modelled period (in vehicle lengths). Delay represents the mean delay per PCU. PCU represents Passenger Car Unit. PRC represents Practical Reserve Capacity; measure of how much additional traffic could pass through a junction whilst maintaining a maximum DoS of 90% on all lanes. PCU value for a car is one PCU. Vans and three-axle vehicles are 1.5 PCUs, vehicles with four or more axles are 2.3 PCUs. Buses and coaches are two PCUs. Motorcycles are 0.4 PCUs and pedal cycles are 0.2 PCUs.

24.4.61 Table 24.4.9 shows the modelling outputs for the baseline case. They demonstrate that the network is currently operating within capacity in the AM peak hour and slightly above capacity in the PM peak hour. The model indicates that the longest queue is during the PM peak hour on Greenwich High Road (A206) eastbound with 14 vehicles. The greatest delay is on Norman Road (B208) during the PM peak hour, which currently experiences an average of 106 seconds of delay per vehicle.

24.4.62 The LinSig junction model output shows that total junction delay is 3 PCU Hours in the AM peak period assessed and 13.8 PCU Hours in the PM peak period assessed. These equate to 18 seconds per PCU in the AM peak period assessed and 57 seconds per PCU in the PM peak period assessed.

24.4.63 More detailed model outputs are included in Appendix C which also supplies diagrams showing the lane structure used for the assessment of the junction.

Accident analysis

24.4.64 Accident data in the assessment area for the most recent five-year period available (April 2006 to March 2010) have been obtained from TfL.

24.4.65 A total of 41 accidents occurred in the vicinity of the site over the five year accident data analysed. Of these accidents, 31 were classified as slight and ten as serious. There were no fatal accidents.

24.4.66 During the five year period, the largest number of road traffic accidents occurred at the junction of Greenwich High Road (B206) / Deptford Bridge (A2) / Blackheath Road (A2), and at the junction of Creek Road (A200) / Norman Road (B208) / Haddo Street. Most of the accidents which occurred at these two junctions were classified as slight, with six serious accidents.

24.4.67 Reckless driving, failing to look properly, poor manoeuvres, and failing to judge another person's path or speed were the main causes of the serious accidents. This suggests that the serious accidents which occurred within the study area did not happen as a result of the road geometry.

24.4.68 Of the total accidents, eight accidents occurred in the study area which involved LGVs, Medium Good Vehicles, and HGVs. All these accidents were classified as slight accidents.

24.4.69 A total of 13 pedestrians and 12 cyclists were involved in accidents, three pedestrian and 12 cyclist accidents were classed as serious. Ten pedestrians were also involved in slight accidents.

24.4.70 Of the five year accident data analysed, the information available suggests that none of the accidents happened as a result of the road layout.

24.4.71 Table 24.4.10 and Figure 24.4.7 in the Greenwich Pumping Station *Transport Assessment* figures indicate the accidents that occurred within the vicinity of the site.

Table 24.4.10 Accident severity from 2006 to 2011

Location	Slight	Serious	Fatal	Total
Norman Road (B208)	1	0	0	1
Greenwich High Road (A206)	6	2	0	8
Greek Road (A200) / Norman Road (B208) / Haddo Street junction	5	3	0	8
Norman Road (B208) / Thornham Street junction	0	0	0	0
Norman Road (B208) / Tarves Way junction	0	0	0	0
Greenwich High Road (A206)) / Norman Road (B208) junction	1	1	0	2
Greenwich High Road (B206) / Greenwich South Street (A2211) junction	5	1	0	6
Greenwich High Road (B206) / Kay Way / Langdale Road junction	1	0	0	1
Greenwich High Road (B206) / Waller Way junction	1	0	0	1
Greenwich High Road (A206) / Egerton Drive junction	0	0	0	0
Greenwich High Road (A206) / Devonshire Drive junction	1	0	0	1
Greenwich High Road (A206) / Burgos Grove junction	2	0	0	2
Greenwich High Road (A206) / Deptford Bridge (A2) / Blackheath Road (A2) junction	8	3	0	11
Total	**31**	**10**	**0**	**41**

24.4.72 Of the 13 pedestrian-injury accidents, all occurred on the roads expected to be used by construction vehicles within the study area. Inspection of the data showed that two of these occurred at junctions with signalised pedestrian crossing facilities, with the remaining accidents occurring at locations without signal control. Of the 12 cyclist-injury accidents, all occurred on the roads expected to be used by construction vehicles within the study area. Figure 20.4.8 in the Greenwich Pumping Station *Transport Assessment* figures shows pedestrian and cyclists accidents by severity.

24.4.73 In the context of the construction HGV movements associated with the Greenwich Pumping Station site, the accident risk to these modes of travel would be managed by providing pedestrian and cyclist awareness training for commercial drivers associated with the construction works as set out in

the *CoCP*. For sections of road affected by roadworks, the risk to all road users would be managed by the contractor(s) in accordance with the provisions made under the Traffic Signs Manual Chapter 8 - Traffic Safety Measures and Signs for Road Works[7].

24.4.74 Appendix D provides a full analysis of accidents within the local area surrounding the Greenwich Pumping Station site.

24.5 Construction assessment

24.5.1 The *TA* for the Greenwich Pumping Station site including both qualitative and quantitative analysis has been undertaken drawing on discussions with TfL and the Local Highway Authorities, knowledge of the transport networks and their operational characteristics in the vicinity of the site and the anticipated construction programme, duration and levels of construction activity.

24.5.2 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 Thames Tideway Tunnel project under construction. The construction base case does not include any traffic related to the Thames Tideway Tunnel project, whether from the Greenwich Pumping Station site or from other sites.

Construction base case

24.5.3 As described in Section 24.3 above, the construction assessment year for transport issues in relation to this site is Site Year 3 of construction.

Pedestrians and cyclists

24.5.4 A new walking and cycling route will be introduced linking Greenwich and Deptford stations. This is expected to be complete in 2012/13. The route will utilise a combination of existing infrastructure, notably the Ha'penny Hatch Bridge, which carries the Norman Road to Creekside leg of the route over Deptford Creek crossing the Greenwich Pumping Station site.

24.5.5 Cycle Superhighway route five (CS5) is scheduled to open in 2013 running between Lewisham and Victoria. Its closest approach to the site would be at Blackheath Road (A2), approximately 375m to the south west of the site. It is also proposed that by 2015 Cycle Superhighway route four (CS4) will be opened, running from Woolwich to London Bridge. The nearest approach to the site would be at Creek Road (A200), approximately 470m to the northeast of the site.

Public transport

24.5.6 There are no proposals to alter bus, DLR or National Rail services in the Greenwich area from the current baseline conditions and therefore the construction base case remains similar to the baseline position.

24.5.7 Due to the traffic growth in the construction base case compared to baseline situation, bus journey times along Greenwich High Road (A206) and Norman Road (B208) and within the wider area will be affected. The effect on journey times is detailed under the highway operation and

network assessment (para 24.1.1) the greatest change to road network delay for buses in the AM peak hour would be a reduction of five seconds on the Greenwich High Road (A206) eastbound arm. During the PM peak hour there would be a reduction in delay of approximately 45 seconds on the Norman Road (B208) arm. This improvement is due to signal optimisation and it is assumed that this would be carried out by TfL as part of their ongoing maintenance regime.

24.5.8 It is anticipated that patronage on public transport services may change between the baseline situation and Site Year 3 of construction. Future patronage changes on bus and rail 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 a busiest case scenario is addressed in assessing the result of additional construction worker journeys by public transport, the capacity for public transport services in the construction base case has been assumed to remain the same as capacity in the baseline situation. This ensures a robust assessment.

Highway network and operation

24.5.9 Baseline traffic flows (determined from the junction surveys) have been used and forecasting carried out to understand the capacity on the highway network in the vicinity of the Greenwich Pumping Station site in Site Year 3 of construction without the Thames Tideway Tunnel project. The scope of this analysis has been discussed with RB Greenwich and TfL.

24.5.10 Strategic highway network modelling has been undertaken at a project-wide level using the TfL HAMs, which include forecasts of employment and population growth in line with the London Plan[8]. Growth factors have been derived at individual borough level by comparing the 2008/9 base and 2021 forecast years in the HAMs, as described in the *Project-wide TA*.

24.5.11 For the Greenwich Pumping Station site, ELHAM has been used. The relevant growth factor for this site is described in para. 24.5.15 which was applied to the survey flows undertaken in 2011 to produce flows for the base and development cases.

24.5.12 It should be noted that these factors represent growth over the period to 2021, which is beyond Site Year 3 of construction at Greenwich Pumping Station and therefore ensures that the construction base case for the highway network is robust.

Committed developments

24.5.13 The construction base case takes into account new developments that would be complete or under construction within the vicinity of the site by Site Year 1 of construction at Greenwich Pumping Station. The committed developments in the immediate vicinity of the site are:

a. redevelopment of Block E 43-81 Greenwich High Road (A206) (mixed use commercial and residential scheme)

b. development of 83-87 Greenwich High Road (A206) (mixed use commercial and residential scheme)

c. redevelopment of Greenwich Industrial Estate (mixed use residential, education, leisure and community uses)

d. Hilton's Wharf (mixed residential and office scheme)

e. Development on site of old Seagar Distillery and Norfolk House (mixed use commercial and residential scheme)

f. Greenwich Reach East (mixed use commercial and residential scheme)

g. Bardsley Lane development (mixed use commercial and residential scheme)

h. Development on land at Stockwell Street and John Humphries House (mixed use commercial, education and residential scheme)

i. Development on land opposite North Greenwich Pier (installation of a temporary amusement attraction).

24.5.14 The strategic and local highway modelling has taken these committed developments into consideration.

Local highway modelling

24.5.15 The growth factors for RB of Greenwich based on ELHAM have been discussed with TfL and RB of Greenwich and applied equally to all of the baseline traffic flow movements. The growth factors are:

a. Weekday AM Peak growth factor – +4.7%

b. Weekday PM Peak growth factor – +3.8%

24.5.16 Para 24.3.9 explains the definition of the assessment area for local highway network modelling. At this site, the assessment examines only the nearest junction of the construction vehicle route with the SRN / TLRN.

Table 24.5.1 Construction base case LinSig model outputs

Approach	Movement	Weekday							
		AM peak hour (08:00-09:00)				PM peak hour (17:00-18:00)			
		Flow (PCUs)	DoS	MMQ (PCUs)	Delay per PCU (Seconds)	Flow (PCUs)	DoS	MMQ (PCUs)	Delay per PCU (Seconds)
Greenwich High Road (A206) east	Ahead	235	22%	2	9	184	23%	2	14
	Right	0	0%	0	0	0	0%	0	0
Greenwich High Road (A206) west	Ahead Left	274	32%	3	14	344	60%	6	26
Norman Road (B208) southbound	Right Left	111	33%	2	29	375	63%	6	25
		PRC		Total Delay (PCU Hours)		PRC		Total Delay (PCU Hours)	
Overall junction performance		174.2%		2.73		42%		7.03	

Notes: 1. DoS represents Degree of Saturation; the ratio of flow to capacity. MMQ represents Mean Maximum Queue for the busiest-case 15 minute modelled period (in vehicle lengths). Delay represents the mean delay per PCU. PCU represents Passenger Car Units. PRC represents Practical Reserve Capacity; measure of how much additional traffic could pass through a junction whilst maintaining a maximum DoS of 90% on all lanes. PCU value for a car is one PCU. Vans and three-axle vehicles are 1.5 PCUs, vehicles with four or more axles are 2.3 PCUs. Buses and coaches are two PCUs. Motorcycles are 0.4 PCUs and pedal cycles are 0.2 PCUs.

2. Assessment has assumed that traffic signal optimisation has been undertaken as detailed in Section 3 of the TA.

24.5.17 The results of the construction base case LinSig model for the Greenwich High Road (A206) / Norman Road (B208) junction are shown in Table 24.5.1. The table indicates that the junction will be operating within capacity in the weekday AM and PM peak hours. Norman Road (B208) and Greenwich High Road (A206) west will experience the greatest queue during the PM peak hour with an average of six vehicles; Norman Road (B208) also experiences the greatest delay, with approximately 29 seconds per vehicle on average during the AM peak hour. Overall total delay at the junction will reduce compared to the baseline situation. The construction development case includes the optimisation of traffic signal timings in order to minimise journey time increases within the local area.

24.5.18 The LinSig junction model output shows that total junction delay is 2.73 PCU Hours in the AM peak period assessed and 7.03 PCU Hours in the PM peak period assessed. These equate to 16 seconds per PCU in the AM peak period assessed and 28 seconds per PCU in the PM peak period assessed.

Construction development case

24.5.19 This section summarises the findings of the assessment undertaken for the peak year of construction at the Greenwich Pumping Station site (Site Year 3 of construction).

Pedestrian routes

24.5.20 As discussed in Section 24.2 the realignment of the shared footpath / cycleway crossing the site and the additional construction worker trips would result in changes to the pedestrian movements around Greenwich Pumping Station. The highway layout plans during construction phases plans are provided in the Greenwich Pumping Station *Transport Assessment* figures and show the footway closures during construction. The shared footpath/ cycleway would require minor realignment during the construction works and it would be made suitable for use by those with mobility impairments.

24.5.21 To assess a busiest case scenario, it has been anticipated that all worker trips would finish their journeys by foot. As a result the 165 and 105 worker trips generated by the site during the AM and PM peak hours respectively have been added to the construction base case pedestrian flows.

24.5.22 Pedestrians would have to cross site access points on Greenwich High Road (A206) and Norman Road (B208) but would not be diverted from the existing footways. These additional crossing points could add a maximum of 30 seconds at each access point, as a consequence of vehicle movements into and out of the site.

24.5.23 For pedestrians walking along the northern footway of Greenwich High Road (A206), a journey time increase of less than 30 seconds is expected at the single access point into and out of the site from Greenwich High Road (A206).

24.5.24 For pedestrians walking along the western footway of Norman Road (B208), five access points to the site would need to be crossed which

could lead to a journey time increase of up to 2 minutes 30 seconds. However, in practice it is extremely unlikely that all site access points would be in use at the same time or that pedestrians would suffer this level of delay at every access point. Typically therefore it is expected that delays to pedestrians should amount to no more than one minute at most along Norman Road (B208).

24.5.25 The diversion of the footpath from Norman Road (B208) to Creekside would add approximately 10m to the journey distance and therefore would introduce a very small increase in journey times in the order of ten seconds for pedestrians using this route.

24.5.26 The site accesses would be marshalled and have appropriate signage to ensure that pedestrian and vehicle conflicts are minimised and that construction vehicle movements into and out of the site are supervised to minimise the risk of pedestrian accidents.

24.5.27 During all construction work and on any section of road subject to temporary diversions or restrictions imposed by roadworks associated with the Greenwich Pumping Station site, the risk to all road-users would be managed by the contractor(s) in accordance with the provisions made under the Traffic Signs Manual Chapter 8 - Traffic Safety Measures and Signs for Road Works[9]. This will include compliance with the Equality Act 2010[10] to ensure safe passage for mobility and vision impaired pedestrians.

Cycle routes

24.5.28 As stated in Section 24.2, diversion of the shared pedestrian and cycle route located to the north of the existing Greenwich Pumping Station access point from Norman Road (B208) to Creekside is anticipated throughout the duration of the construction works. The cycle diversion is shown in Figure 20.5.1 of the Greenwich Pumping Station *Transport Assessment* figures.

24.5.29 The diversion from the exiting shared pedestrian and cycle footpath to the new foot and cycle path would result in a very small increase in journey time for cyclists, as noted in para. 24.5.30.

24.5.30 Cyclists using Greenwich High Road (A206) and Norman Road (B208) would experience a slight delay to journey time as a result of an increase in construction traffic flow serving the site. The delay to journey times is identified in the highway operation and network assessment (paras. 24.5.43 to 24.4.63). Based on this information and the spare capacity available in the network it is expected that there would be approximately 12 seconds of additional delay.

24.5.31 Measures set out in the *CoCP* described in paragraphs 24.2.34 and 24.2.38 include increasing driver awareness of restrictions on the road network and marshalling of traffic at the site access. During all construction work and on any section of road subject to temporary diversions or restrictions imposed by roadworks associated with the Greenwich Pumping Station site, the risk to all road-users would be managed by the contractor(s) in accordance with the provisions made under the Traffic Signs Manual Chapter 8 - Traffic Safety Measures and

Signs for Road Works[11]. This would include compliance with TfL guidance (Cyclists at Roadworks – Guidance[12]) to ensure safe passage for cyclists.

24.5.32 During the construction period, the operation and layout of the road network will not change. A minimum carriageway width of either 4m (where HGVs can safely overtake cyclists) or 3.25m (where HGVs cannot overtake cyclists) would be retained for traffic in each direction. Where necessary, carriageway widths of less than 3.25m would be agreed with the RB of Greenwich prior to execution of any works.

Bus routes and patronage

24.5.33 Additional construction vehicles serving the site may affect some bus routes and bus journey times along Greenwich High Road (A206) and within the wider area. The effect on journey times is identified in the LinSig modelling outlined in the highway operation and network assessments. Based on this analysis and the spare capacity available in the network it is expected that there would be approximately 12 seconds additional.

24.5.34 In the context of the local area and general journey times for bus services, this is not considered a significant change for bus users.

24.5.35 It is expected that approximately 48 and 31 additional two-way worker trips would be made by bus during the AM and PM peak hours respectively. The area is served by a number of bus routes with multiple origins and destinations, providing a total of 84 and 86 buses within 640m walking distance during the AM and PM peak hours. On this basis the additional worker trips made by bus in the peak hours would equate to less than one additional journey per service and be capable of being accommodated on the base case bus services.

DLR and patronage

24.5.36 No DLR stations are directly adjacent to the site and therefore none would be directly affected by the construction works.

24.5.37 It is anticipated that there would be approximately 27 additional person trips on DLR services during the AM peak hour and 17 during the PM peak hour. This equates to less than one person per train during the AM and PM peak hours based on a frequency of 40 and 30 trains in the AM and PM peak hours respectively. This could be easily accommodated within existing capacity.

National Rail and patronage

24.5.38 No rail stations are directly adjacent to the site and therefore none would be directly affected by the works at Greenwich Pumping Station. It is expected that there would be 41 additional person trips on National Rail services during the AM peak hour and 26 during the PM peak hour.

24.5.39 On National Rail services from Greenwich this equates to less than two additional passengers per train based on the AM peak service of 30 trains per hour and PM peak service of 28 trains per hour.

24.5.40 This equates to an insignificant number of additional passengers on National Rail services in the local area, which could be easily accommodated within existing capacity.

Parking

24.5.41 There would be no need to alter car or coach parking provision as part of the construction works at the Greenwich Pumping Station site and parking would therefore remain the same as in the construction base case. Similarly, there would be no need to alter loading bay provision or restrictions as part of the construction works, therefore the loading bay on Greenwich High Road (A206) would remain as in the construction base case.

24.5.42 Parking for 15 essential maintenance vehicles would be provided on site. However, there would be no on-site parking for workers, parking on surrounding streets is restricted and site-specific *Travel Plan* measures would discourage workers from travelling by car to and from the site. There would therefore be no impact on local parking from construction workers.

Highway assessment

Highway layout

24.5.43 The highway layout during construction phases are provided in the Greenwich Pumping Station *Transport Assessment* figures. No modification to highway or junction layouts would be required as a result of construction activity at the Greenwich Pumping Station site.

24.5.44 The site would use existing and new access points on Greenwich High Road (A206) and Norman Road (B208). The existing access point to Greenwich Pumping Station located along Greenwich High Road (A206) would not require any modification as part of the construction works at the site. One new gated access points able to accommodate construction vehicles would be created along Norman Road (B208). It would be located along Norman Road (B208) approximately 85m north of the junction with Greenwich High Road (A206). Four existing accesses to the site along Norman Road (B208) would require modification to accommodate construction vehicle access. They are located approximately 140m, 170m, 200m and 220m north of the junction of Greenwich High Road (A206) and Norman Road (B208).

24.5.45 The swept path movements plans are provided in the Greenwich Pumping Station *Transport Assessment* figures and show that the construction vehicles would be able to safely enter and leave the site.

Highway network

24.5.46 Construction lorry movements would be limited to the day shift only (08:00 to 18:00). In exceptional circumstances HGV and abnormal load movements could occur up to 22:00 for large concrete pours and later at night on agreement with RB of Greenwich.

24.5.47 Table 24.2.4 in Section 24.2 shows the construction lorry movement assumptions for the local peak traffic periods. These are based on the peak months of construction activity at this site.

24.5.48 Assuming that all construction material is transported by road, Table 24.2.4 shows an average peak flow of 288 vehicle movements a day is expected during the months of greatest activity during Site Year 3 of construction at this site. In the AM and PM peak hours, the Greenwich Pumping Station site would generate approximately 21 vehicle movements.

24.5.49 The busiest peak in the AM and PM period for each type of movement (construction, other and worker) has been combined in the development case and assessment against the peak hour operation of the highway network. In reality, not all peaks for these movements will occur concurrently and the peak for worker trips will be outside of the highway network peak hour, therefore, the assessment is considered to be robust.

24.5.50 In addition to the construction HGV movements associated with the Greenwich Pumping Station site, it is anticipated that there would be five additional two-way HGV movements on the surrounding network during the peak hours associated with other Thames Tideway Tunnel project sites during Site Year 3 of construction at Greenwich Pumping Station.

24.5.51 The *Project-wide TA* explains the method used to assign construction traffic to the HAMs, from which the likely changes in turning movements at local junctions have been identified and added to the construction base case flows.

24.5.52 The assignment of construction lorry trips has been undertaken using OmniTrans[iii] software, which enables a fixed assignment to be created for these trips in order to ensure that they are assigned only to the proposed construction routes. The OmniTrans outputs also identify lorry traffic which would be associated with the Greenwich Pumping Station site, or with other Thames Tideway Tunnel project sites, that would use routes in the vicinity of the Greenwich Pumping Station site. Figure 24.5.2 in the Greenwich Pumping Station *Transport Assessment* figures shows the OmniTrans plot for the local road network around the Greenwich Pumping Station site.

24.5.53 The additional construction traffic generated by the project may lead to local changes in traffic flow and capacity. Local modelling has been undertaken to assess the effect on the highway operation resulting from these changes.

24.5.54 The local LinSig model for the Greenwich High Road (A206) / Norman Road (B208) junction has been used to apply the construction traffic demands to the construction base case to determine the changes in the highway network operation due to the project (ie, comparison of base and development cases). The construction development case model includes

[iii] 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.

the optimisation of traffic signal timings in order to maximise capacity and minimise overall delay at this junction.

24.5.55 A summary of the construction assessment results for the weekday AM and PM peak hours is presented in Table 24.5.2 and Table 24.5.3.

Table 24.5.2 Construction development case LinSig model outputs (AM peak)

Approach	Arm	Flow (PCUs)	Weekday								
			AM peak hour (08:00-09:00)								
			DoS			MMQ (PCUs)			Delay per PCU (Seconds)		
			Base case	Devt case	Change	Base case	Devt case	Change	Base case	Devt case	Change
Greenwich High Road (A206) east	Ahead	235	22%	23%	+1%	2	2	0	9	9	0
	Right	3	0%	0%	+0%	0	0	0	0	8	+8
Greenwich High Road (A206) west	Ahead Left	293	32%	36%	+4%	3	4	+1	14	15	+1
Norman Road (B208) southbound	Right Left	132	33%	36%	+3%	2	2	0	29	28	-1
			PRC						Total Delay (PCU Hours)		
Overall junction performance			174.2%	149.8%	-24.4%				2.73	3.09	+0.36

Notes: 1. DoS represents Degree of Saturation; the ratio of flow to capacity. MMQ represents Mean Maximum Queue for the busiest-case 15 minute modelled period (in vehicle lengths). Delay represents the mean delay per PCU. PCU represents Passenger Car Units. PRC represents Practical Reserve Capacity; measure of how much additional traffic could pass through a junction whilst maintaining a maximum DoS of 90% on all lanes. PCU value for a car is one PCU. Vans and three-axle vehicles are 1.5 PCUs, vehicles with four or more axles are 2.3 PCUs. Buses and coaches are two PCUs. Motorcycles are 0.4 PCUs and pedal cycles are 0.2 PCUs. Thames Tideway Tunnel construction vehicles would be a mixture of three- and four-axle vehicles and have therefore been given a PCU value of two.

2. Assessment has assumed that traffic signal optimisation has been undertaken as detailed in Section 3 of the TA.

Table 24.5.3 development case LinSig model outputs (PM peak)

Approach	Arm	Flow (PCUs)	Weekday								
			PM peak hour (17:00-18:00)								
			DoS			MMQ (PCUs)			Delay per PCU (Seconds)		
			Base case	Devt case	Change	Base case	Devt case	Change	Base case	Devt case	Change
Greenwich High Road (A206) east	Ahead	184	23%	24%	+1%	2	2	0	14	15	0
	Right	3	0%	0%	0%	0	0	0	0	14	+12
Greenwich High Road (A206) west	Ahead Left	362	60%	67%	+4%	6	6	0	26	29	+3
Norman Road (B208) southbound	Right Left	397	63%	64%	+1%	6	6	0	25	24	-1
			PRC						Total Delay (PCU Hours)		
Overall junction performance			42%	35%	-7%				7.03	7.63	+0.6

Notes: 1. DoS represents Degree of Saturation; the ratio of flow to capacity. MMQ represents Mean Maximum Queue for the busiest-case 15 minute modelled period (in vehicle lengths). Delay represents the mean delay per PCU. PRC represents Practical Reserve Capacity; measure of how much additional traffic could pass through a junction whilst maintaining a maximum DoS of 90% on all lanes. PCU value for a car is one PCU. Vans and three-axle vehicles are 1.5 PCUs, vehicles with four or more axles are 2.3 PCUs. Buses and coaches are two PCUs. Motorcycles are 0.4 PCUs and pedal cycles are 0.2 PCUs. Thames Tideway Tunnel construction vehicles would be a mixture of three- and four-axle vehicles and have therefore been given a PCU value of two.

2. Assessment has assumed that traffic signal optimisation has been undertaken as detailed in Section 3 of the TA.

24.5.56 The local LinSig model indicates that the junction will be operating within capacity without the Thames Tideway Tunnel project. The results indicate that the project would result in a slight reduction in capacity along Greenwich High Road (A206) and Norman Road (B208) in both peak hours in the construction development case although the junction would still be operating within capacity.

24.5.57 The construction traffic generated by the Thames Tideway Tunnel project would produce a slight increase to delay on this part of the network with a maximum increase of eight seconds delay per vehicle on Greenwich High Road (A206) (eastbound - right turn) in the AM peak hour and a maximum increase of 12 seconds per vehicle during the PM peak hour on the same movement. The results indicate that there would be little change to average queue lengths on the junction approaches.

24.5.58 The LinSig junction model output shows that total junction delay is 3.09 PCU Hours in the AM peak period assessed and 7.63 PCU Hours in the PM peak period assessed. These equate to 17 seconds per PCU in the AM peak period assessed and 29 seconds per PCU in the PM peak period assessed.

Construction mitigation

24.5.59 The project has been designed to limit the issues on transport networks as far as possible and many measures have been embedded directly in the design of the project. These are summarised in Table 24.5.4.

Table 24.5.4 Greenwich Pumping Station design measures

Phase	Issues	Design measures
Construction	Creation of site access points	Enlargement of existing gated access point along Greenwich High Road (A206) Enlargement of existing gated access point along Norman Road (B208) Creation of gated access point along Norman Road (B208).
	Realignment of existing footpath and relocation	Diversion of pedestrians and cyclists from the existing footpath crossing the site to a temporarily realigned footpath The diversion would be adequately signed.
	Movement of construction traffic flows on the local highway network	Traffic signal optimisation at the junction of Greenwich High Road (A206) and Norman Road (B208) to improve pedestrian crossing times and junction capacity

Phase	Issues	Design measures
Operation	Creating access point	Modification of existing access point, including traffic management (removable bollard or similar) for maintenance vehicles To accommodate ten yearly maintenance vehicles.

24.5.60 The outcomes indicate that with these measures in place the changes to be expected in the transport networks are not significant and therefore no additional measure are required for the construction or operational phases.

24.6 Operational assessment

24.6.1 This section summarises the findings of the assessment undertaken for Year 1 of operation at the Greenwich Pumping Station site.

24.6.2 The assessment of the operational phase is limited to the physical issues associated with accessing the site from the highway network as outlined in Section 24.2. This has been discussed with RB Greenwich and TfL.

Operational base case

24.6.3 The operational assessment year for transport is Year 1 of operation.

24.6.4 As explained in para. 24.2.38 the only element of the transport network that would be affected during operation is highway layout and operation. For the purposes of the operational base case, it is anticipated that the highway layout will be as indicated in the construction base case.

Operational development case

24.6.5 The operational development case for the site includes any permanent changes in the vicinity of the Greenwich Pumping Station site as a result of the Thames Tideway Tunnel project and takes into consideration the occasional maintenance activities required at the site.

24.6.6 As outlined in Section 24.2, during the operational phase, the area surrounding Greenwich Pumping Station would be reinstated to the current layout. With the exception of the existing access point along Norman Road (B208) approximately 170m north of the junction of Greenwich High Road (A206) and Norman Road (B208), which would require modification to allow maintenance vehicles to access and egress the site.

24.6.7 The transport demands created by the development in the operational phase would be extremely low and limited to occasional

maintenance visits every three to six months, and larger cranes required for access to the shaft and tunnel every ten years.

24.6.8 The operational assessment has taken into consideration the short-term changes to the highway layout and operation when maintenance visits are made to the site.

24.6.9 The highway layout during operation plans are provided in the Greenwich Pumping Station *Transport Assessment* figures and indicate the operational phase permanent works.

24.6.10 When maintenance activity takes place during the operational phase, pedestrians would not be diverted but would have to cross the site access point. When large maintenance vehicles are required to access the site, pedestrian movements could be assisted by a banksman in order to ensure pedestrian safety.

Highway layout and operation

24.6.11 During the operational phase, the site would be served from the existing access point that serves the existing Thames Water facility on Norman Road (B208).

24.6.12 To assess the effect of the operational traffic movements on the highway layout, swept paths have been undertaken to ensure that the highway layout is adequate for the largest vehicles required to access the site during this phase. These include an 11.36m mobile crane, a 10m articulated vehicle and a 10.7m articulated vehicle. The swept path movements plans are contained in the Greenwich Pumping Station *Transport Assessment* figures and show safe acess/ egress at the site for the operational phase.

24.6.13 When larger vehicles are required to serve the site, there may be some temporary, short-term delay to other road users while manoeuvres are made. However it is anticipated that the arrival of large vehicles would normally be scheduled to take place outside of the peak hours to minimise the effect on the local highway network.

24.6.14 Due to the infrequent nature of maintenance trips there is anticipated to be no significant change to the operation of the surrounding highway network during the operational phase at Greenwich Pumping Station.

24.7 Summary of Transport Assessment findings

24.7.1 The key outcomes of this *TA* are indicated in Table 24.7.1.

Table 24.7.1 Greenwich Pumping Station transport assessment results

Phase	Mode of transport	Key findings
Construction	Pedestrians	A theoretical maximum of two minutes 30 seconds delay to pedestrian journeys crossing the site access points on Norman Road (B208), with a likely overall maximum of one minute given that individual pedestrians are unlikely to encounter delay at every access on a single journey. A minor increase in journey time in the order of ten seconds on the footpath from Norman Road (B208) to Creekside.
	Cyclists	Minor increases in delay (maximum of approximately 12 seconds) experienced by cyclists using Greenwich High Road (A206) and Norman Road (B208) as a result of additional construction traffic demand. A minor increase in journey time in the order of 12 seconds on the footpath from Norman Road (B208) to Creekside.
	Bus patronage and operators	Approximately 48 and 31 worker trips would be made by bus during the AM and PM peak hours respectively. These could be accommodated on base case bus services. A maximum delay of approximately 12 seconds to bus services would be anticipated due to additional construction traffic demand.
	DLR and National Rail patronage	Approximately 27 and 17 worker trips would be made by DLR services during the AM and PM peak hours respectively. These could be accommodated on base case services. Approximately 41 and 26 worker trips would be made by National Rail services during the AM and PM peak hours respectively. These could be accommodated on base case services.
	Highway network and operation	Approximately 288 additional daily vehicle movements would be produced by the construction works at Greenwich Pumping Station in the peak month of activity in Site Year 3 of construction. Approximately 21 vehicle movements are anticipated in the AM

Phase	Mode of transport	Key findings
		and PM peak hours. The Greenwich High Road (A206) junction with Norman Road (B208) would continue to operate below theoretical capacity during construction works. Additional delays of a maximum of approximately 12 seconds could occur at the junction as a result of increased traffic demand.
Operation	Highway layout and operation	Some network delay may be experienced by other road users when large vehicles are accessing the site; however, this would be infrequent and temporary.

References

[1] Transport for London. *Travel Planning for new development in London*, Transport for London (2011).

[2] Transport for London. *ATTrBuTE guidance.* Assessment Tool for Travel Plan Building Testing and Evaluation (ATTrBuTE) is a web based travel planning tool, which ensures that Travel Plans are in accordance with Transport for London's published guidance on travel planning for new development in London. Available at: http://www.attrbute.org.uk/

[3] Greater London Authority, *London Plan*, July 2011.

[4] Transport for London, *Transport Assessment Best Practice guidance,* April 2010.

[5] Transport for London (TfL), *Modelling Guidelines*, 2010.

[6] Transport for London (TfL), *Modelling Audit Process (MAP)*, 2011.

[7] Department for Transport (DfT), Traffic Signs Manual Chapter 8 - Traffic Safety Measures and Signs for Road Works and Temporary Situations, 2009.

[8] See citation above.

[9] See citation above.

[10] HM Government, Equality Act 2010 – Guidance, 2010.

[11] See citation above.

[12] Department for Transport (DfT), Traffic Advisory Leaflet 15/99 - *Cyclists at Road Works*, December 1999.

Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Transport Assessment

Doc Ref: **7.10.21**

Greenwich Pumping Station

Appendices

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

Hard copy available in

Box **53** Folder **B**
January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

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Thames Tideway Tunnel

Transport Assessment

Section 24 Appendices: Greenwich Pumping Station

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Appendix A: Policy review

A.1 Introduction

A.1.1 There are a number of documents containing planning policies that are relevant to transport matters for the proposed development at Greenwich Pumping Station. This includes national, regional and local policies relevant to the site.

A.1.2 This section reviews current documents relevant to the proposed development which is situated within the Royal Borough (RB) of Greenwich.

A.2 National Policy

National Planning Policy Framework (March 2012)

A.2.1 The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) in March 2012. The NPPF replaces a variety of existing planning guidance, most notable the following document, Planning Policy Guidance 13: Transport (November 2010).

A.2.2 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 economical and social matters.

A.2.3 It outlines the importance of local development plans and notes that where development accords with an up to date development plan then the proposals should be approved. Moreover, it suggests that local authorities should follow the approach of the presumption in favour of sustainable development.

A.2.4 With particular reference to transport matters the documents states:

"*In preparing local plans, local planning authorities should therefore support a pattern of development which, where reasonable to do so, and facilitates the use of sustainable modes of transport."*

A.2.5 The guidance goes on to advise at paragraph 32:

"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:

a. 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;

b. safe and suitable access to the site can be achieved for all people; and

c. 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."

A.2.6 The document also states that:

"Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people". Therefore:

"A key tool to facilitate this would be a Travel Pan. *All developments which generate significant amounts of movement should be required to provide a Travel Plan".*

National Policy Statement for Waste Water (March 2012)

A.2.7 The National Policy Statement for Waste Water (NPS) was published by the Department of Environment, Food and Rural Affairs in March 2012. The NPS sets out Government policy for the provision of major waste water infrastructures. The NPS does not recognise the Thames Tideway Tunnel project within the original thresholds which is contained within the Planning Act. However the document indicates that *"the Government has already stated its intention that the project should be considered at a national level"*.

A.2.8 The Secretary of State announced that development consent for the Thames Tideway Tunnel project should also be dealt with under the regime for nationally significant infrastructure projects under the Planning Act 2008.

A.2.9 The NPS seeks a sustainable long term solution to address the untreated sewage discharged into the river Thames and Thames Tideway Tunnel has been considered as the preferred solution.

A.2.10 With particular reference to transport matters the document states:

"The ES should include a transport assessment, using the NATA/WebTAG methodology stipulated in Department for Transport (DfT), or any successor to such methodology. Applicants should consult the Highways Agency and/or the relevant highway authority, as appropriate, on the assessment and on mitigation measures. The assessment should distinguish between the construction, operation and decommissioning project stages as appropriate".

A.2.11 The document states that the impacts on the surrounding transport infrastructure should be mitigated and where the mitigation measures are not sufficient the requirements to mitigate adverse impacts on transport networks should be considered.

A.2.12 Therefore it is advised to prepare a *Travel Plan* which includes demand management measures to mitigate transport impacts, and *"to provide details of proposed measures to improve access by public transport, walking and cycling, to reduce the need for parking associated with the proposal and to mitigate transport impacts".*

A.2.13 The NPS prefers water-borne or rail transport over road transport and where there is likely to be substantial HGV traffic, the following measures should be looked:

a. *"control numbers of HGV movements to and from the site in a specified period during its construction and possibly on the routing of such movements;*

b. *make sufficient provision for HGV parking, either on the site or at dedicated facilities elsewhere, to avoid 'overspill' parking on public roads, prolonged queuing on approach roads and uncontrolled on-street HGV parking in normal operating conditions; and*

c. *ensure satisfactory arrangements for reasonably foreseeable abnormal disruption, in consultation with network providers and the responsible police force".*

A.2.14 The proposed development is located at a relatively good accessible transport hub and the proposed location has a Public Transport Accessibility Level (PTAL) rating of 4, rated as 'good'. It is assumed that construction workers would not travel by car to and from the site on the basis that there would be no worker parking on site; on-street parking in the area is restricted; and site-specific *Travel Plan* measures will discourage workers from travelling by car.

A.3 Regional policy

The London Plan (July 2011)

A.3.1 The London Plan 2011 is produced by the Greater London Authority (GLA) and sets out the strategic planning guidance for London planning authorities. The Mayor of London is responsible for strategic planning and the production of a Spatial Development Strategy called The London Plan. The London plan sets out the integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. The Plan takes the year 2031 as its formal end date and its over-arching vision is supported by six detailed objectives for London:

a. A city that meets the challenges of economic and population growth;

b. An internationally competitive and successful city;

c. A city of diverse, strong, secure and accessible neighbourhoods;

d. A city that delights the senses;

e. A city that becomes a world leader in improving the environment; and

f. A city where it is easy, safe and convenient for everyone to access jobs, opportunities and facilities.

A.3.2 The last objective of the plan relates specifically to transport. Policies within the London Plan of relevance to the proposed development are outlined as follows:

A.3.3 **Policy 6.1 – Strategic Approach** advises that the mayor will work with all relevant partners to encourage the closer integration of transport and development by:

a. Encouraging patterns and nodes of development that reduce the need to travel, especially by car;

b. Seeking to improve the capacity and accessibility of public transport, walking and cycling, particularly in areas of greater demand;

c. Supporting development that generates high levels of trips at locations with high public transport accessibility and/or capacity, either currently or via committed, funded improvement;

d. Seeking to increase the use of the Blue Ribbon Network, especially the Thames, for passenger and freight use;

e. Facilitating the efficient distribution of freight whilst minimising its impacts on the transport network;

f. Supporting measures that encourage shifts to mode sustainable modes and appropriate demand management; and

g. Promoting greater use of low carbon technology so that carbon dioxide and other contributors to global warming are reduced.

A.3.4 **Policy 6.2 – Providing public transport capacity and safeguarding land for transport** which notes that development proposals that do not provide adequate safeguarding for the schemes should be refused.

A.3.5 **Policy 6.3 – Assessing effects of development on transport capacity** outlines that development proposals should ensure that impacts on transport capacity and the transport network, at both a corridor and local level, are fully assessed. Development should not adversely affect safety on the transport network. Where existing transport capacity is insufficient for the travel generated by proposed developments, and no firm plans exist for an increase in capacity, boroughs should ensure that the development proposals are phased until it is known that these requirements can be met. The policy notes that the use of *Travel Plans* and addressing freight issues can help reduce the impact of development on the transport network.

A.3.6 **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. The development would include provision of transport to and from public transport nodes where sites are at a distance from public transport services.

A.3.7 **Policy 6.9 – Cycling** presents measures to increase cycling mode share in London to 5 percent by 2026. Measures include completing the Cycle Super Highways and expanding the London cycle hire scheme. To support this, developments should provide cycle parking to at least the minimum standards, provide showers and changing facilities and facilitate the major cycling schemes in London (Super Highways / Cycle Hire).

A.3.8 **Policy 6.10 – Walking** recommends the use of shared space principles with simplified streetscape, de-cluttering and access for all. Developments should therefore 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.

A.3.9 **Policy 6.13 – Parking** outlines the need to seek an appropriate balance between promoting new development and preventing excessive car parking provision that can undermine cycling, walking and public transport use. As such, car parking should reduce as public transport accessibility (measured by PTAL) increases. The policy advises 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.

A.3.10 **Policy 6.14 – Freight** notes that freight distribution should be improved and movement of freight by rail and waterway 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 Freight Operators Recognition Scheme, construction logistics plans and delivery and servicing plans should be promoted. The policy also advises the increase in the use of the Blue Ribbon Network for freight transport.

The Mayors Transport Strategy (GLA, 2010)

A.3.11 In addition to the London Plan, the Mayor has prepared a number of strategies that are essentially an extension of the London Plan. Published by the GLA in 2010, the Mayor's Transport Strategy (MTS) (Greater London Authority, May 2010) envisages *"London's Transport system excelling among that of global cities, providing access to opportunities for all people and enterprises while achieving the highest environmental standards and leading the world in its move towards tackling the urban transport challenges of the 21st century"*.

A.3.12 The MTS sets out a number of policy commitments or requirements which have implications for TfL and a range of other delivery partners including the GLA and the London boroughs. The policies that are relevant to the proposed development are:

h. **Policy 4** indicating that the Mayor will seek "*to improve people's access to jobs, business' access to employment markets, business to business access, and freight access by seeking to ensure appropriate transport capacity and connectivity is provided on radial corridors into central London*";

i. **Policy 5** seeks "*to ensure efficient and effective access for people and goods within central London*";

j. **Policy 8** supports "*a range of transport improvements within metropolitan town centres for people and freight that help improve connectivity and promote the vitality and viability of town centres, and that provide enhanced travel facilities for pedestrians and cyclists*";

k. **Policy 9** states that the Mayor "*will use the local and strategic development control processes*";

l. **Policy 11** specifies that the Mayor will "*encourage the use of more sustainable, less congesting modes of transport, set appropriate*

parking standards, and aim to increase public transport, walking and cycling mode share";

m. **Policy 12** states that the Mayor "*will seek to improve the distribution of freight through the provision of better access to/from Strategic Industrial Locations, delivery and servicing plans, and other efficiency measures across London*"; and

n. **Policy 15** and **Policy 16** indicate that the Mayor will seek to reduce emissions of air pollutants and noise impacts from transport respectively.

A.3.13 The *London Freight Plan, Sustainable Freight Distribution: a Plan for London* (TfL, June 2008) sets out the steps that have 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 expected to be relevant to the consideration of the construction logistics strategy for the proposed development.

A.4 Local policy

A.4.1 The RB of Greenwich has a number of policies relevant to transport. These are the Draft Core Strategy with Development Management Policies and the Unitary Development Plan (UDP). Both reflects regionally focused policies and are referred to where appropriate.

Draft Core Strategy with Development Management Policies (2011)

A.4.2 The Government replaced the previous local plan system by introducing *Local Development Frameworks* in 2004. The *Local Development Framework* (LDF) is a series of planning policy documents which, once adopted, will replace the Greenwich *Unitary Development Plan* (2006). The new plan will guide decisions about the developments over the next 15 years until 2027 within the borough.

A.4.3 **Policy E2 – Flood Risk** relates carrying out work in close proximity to flood defences, the council will seek to maintain or increase public access to the waterfront.

A.4.4 **Policy CH2 – Healthy Communities** sets out how the council will improve resident's health, by:

a. improving access to the Borough's parks, play areas, open spaces and leisure facilities; and

b. improving walking and cycling connections.

A.4.5 **Policy C1 – Infrastructure** addresses infrastructure provision. Planning obligations and conditions will be used to provide infrastructure required to support developments and to mitigate any planning loss that they may cause. Appropriate planning obligations in accordance with the council's Planning Obligations SPD will be sought.

A.4.6 **Policy C4 – Sustainable Travel** outlines how the council will encourage the use of sustainable modes. All developments within the borough are expected to contribute towards facilitating:

a. Accessibility;

b. Safety;

c. Public transport use; and

d. Discouraging private car use.

A.4.7 Existing riverside footpaths and walkways and Thames Path will be safeguarded. Developments along the riverside are expected to contribute the provision of riverside walkways where it is required.

A.4.8 **Policy DH(j) Thames Policy Area** relates to adhering the high quality design in areas surrounding the River Thames. Development in the area is expected to contribute towards:

a. Providing a continuous public riverside footway and cycleway;

b. Increasing the use of sustainable modes, for passengers, tourists and freight; and

c. Ensuring the local views and the environment are considered.

A.4.9 **Policy E(a) – Pollution** states developments producing the following will not usually be acceptable:

a. High levels of light;

b. Vibrations;

c. Odours;

d. Fumes;

e. Dust;

f. Water and soil pollutants; or

g. Grit.

A.4.10 **Policy E(c) – Air Pollution** directly relates to reducing emissions associated with transport. All major developments are required to reduce carbon dioxide (CO_2), particulate matter (PM_{10}) and nitrogen dioxide (NO_2) emissions from transport. It is suggested that this be achieved by following the DEFRA guidance 'Low Emissions Strategies: using the planning system to reduce transport emissions Good Practice Guidance - January 2010'.

A.4.11 **Policy E(d) – Hazardous Materials** states that the storage, handling, production or disposal of hazardous materials will be permitted if the public health and the ecology of the natural environment can be maintained.

A.4.12 **Policy C(a) – Transport Infrastructure** details that developers are expected integrate developments with the borough's wider transport infrastructure. It is expected that the needs of the following groups are prioritised:

a. Pedestrians;

b. Cyclists;

c. People with disabilities; and

d. Public transport users.

A.4.13 Developers are also expected to pay regard to the impact upon public transport capacity, the road hierarchy and make provision for servicing.

A.4.14 **Policy C(b) – Walking and Cycling** asks development in the borough to:

a. Integrate with the existing footway, the London and local cycle networks;

b. Consider the needs of pedestrians, cyclists and other users;

c. Provide changing and shower facilities for cyclists;

d. Provide cycle parking;

e. Promote walking and cycling safety; and

f. Consider routes to local shops, services, schools and public transport nodes.

A.4.15 **Policy C(d) – Freight** indicates that developments with high number of freight movements should be located in close proximity to major transport routes. There is also a wish to transfer road freight to water where possible. As a result, sites that facilitate this will be protected and proposals that support water transport will be supported.

Greenwich Unitary Development Plan (RB of Greenwich, 2006)

A.4.16 The UDP was adopted by the RB of Greenwich in July 2006. It is a technical town planning document that acts as a land use strategy document and also sets out policies that planning applications will be considered against.

A.4.17 In terms of transport, the UDP has two key themes, which are to secure high quality transport connections for the borough and to achieve a greater level of sustainability by reducing the need to travel.

A.4.18 **Policy J5 – Employment Sites Outside Defined Employment Locations** states that developments promoting alternative employment will be acceptable, as long as there is no unacceptable impact on traffic levels, road safety or parking congestion.

A.4.19 **Policy O16 – Recreational Footpaths** makes it clear that the footpath between Deptford and Thamesmead must be protected. Therefore developments located on riverside sites must provide footway facilities.

A.4.20 **Policy O16 – Recreational Cycleways** seeks to safeguard and promote the provision of cycleways along the riverside.

A.4.21 **Policy SE2 – To protect and improve the environment in terms of air and water quality, and reduce the impact of pollution, noise, smell and toxic materials, especially from transport and industrial processes.**

A.4.22 **Policy E6 and E7 – Air Pollution** states that developments with the potential to cause significant deterioration in air quality will be unacceptable, unless mitigation methods are employed. Directly concerning transport, the council wishes to promote traffic restraint and measures to promote the use of alternative fuels.

A.4.23 **Policy D1 – Urban Design** seeks to promote design that takes into account patters of activity, movement and circulation.

A.4.24 **Policy D5 – Parking and Access Arrangements** states that *"the design and layout of access roads, cyclepaths, footpaths, parking and service areas should be attractive, safe, convenient and appropriate to the type and scale of the development".*

A.4.25 **Policy SM3 – To encourage the use of sustainable forms of transport, such as walking, cycling and public transport** is designed to promote the use of sustainable modes of transport. This is achieved through several mechanisms, including:

a. Traffic management;

b. Parking control; and

c. Development control.

A.4.26 **Policy M1 and M2 – Development and Transport General Principles** outlines several policies that are intended to deliver development and its related transport in a sustainable way. Developers are expected to consider:

a. Designing for the needs of pedestrians, people with disabilities, cyclists and public transport users first;

b. As relevant, building into development provision for Waterfront Transit as well as more conventional highways, cycle networks and pedestrian networks; and

c. Existing and proposed utilisation of public transport and impact upon capacity of networks. Close liaison with Transport for London (TfL) and the relevant railway undertakers will be necessary.

A.4.27 The council will also usually require a Transport Assessment for any development it considers to be large, or having the potential to generate a significant number of trips.

A.4.28 **Policy M3 – Travel Plans** will be required for large developments. They have to aim of reducing trips by single occupancy private car, and encouraging the use of more sustainable modes, including:

a. Walking;

b. Cycling;

c. Public transport; and

d. Car sharing.

A.4.29 **Policy M17 – Road Hierarchy** outlines the council's road hierarchy, there are three tiers:

a. Strategic roads;

b. London distributor roads; and

c. Local distribution and access road.

A.4.30 **Policy M18 – Environmental Areas** details a number of designated environmental zones, which are areas, surrounded by:

a. Strategic / TLRN roads;

b. London distributor roads; and

c. Local distribution roads.

A.4.31 Traffic management schemes are necessary to reduce traffic in these areas. Developments in these zones will be required under a planning obligation to contribute towards traffic management schemes.

A.4.32 **Policy M29 – Service Areas** states that new industrial developments are expected, where possible to provide service areas within the curtilage of the site, which allow vehicles to exit forwards. This is to prevent intrusion into the street scene, and to mitigate any potentially hazardous movements taking place on the public highway.

A.4.33 **Policy M35 – Restriction on Road Freight** stresses that lorries should be confined to suitable roads, with residential roads being utilised for direct access only when strictly necessary. This will be ensured by:

a. Designating and signing lorry routes, making sure that Strategic and London Distributor roads are the main freight network;

b. Local lorry bans;

c. Considering pinch points;

d. Implementing road improvement; and

e. Supporting development that minimise freight movements by road.

A.4.34 **Policy M37 – Water Borne Freight** makes it clear that the council will support developments that enable freight to be delivered by water. This is due to its potential to reduce congestion and environmental impacts.

A.4.35 **Policy W2 - Thameside Policy Area** states that the council will seek to protect and enhance the character of the river, by:

a. Developing and enhance the area's links with the river, and contribute to the completion of a continuous public riverside footpath and cycleway from Deptford to Thamesmead; and

b. Incorporating sustainable modes of passenger, freight and tourist transport as appropriate.

A.4.36 **Policy W6 – Floating Vessels** refers to proposals to moor temporary or permanent vessels on the Thames. There are a number of requirements relating to the vessel, including:

a. That it must be sympathetic to the historic waterfront;

b. Positively contribute to the rivers life and scene;

c. Not compromise river traffic's operation;

d. Not cause an undue impact on the river's ecology; and
e. Not conflict with any of the river's other uses.

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Appendix B: PTAL analysis

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PTAI Study Report File Summary

PTAI Run Parameters

PTAI Run 20121709180333
Description 20121709180333
Run by user PTAL web application
Date and time 17/09/2012 18:03

Walk File Parameters

Walk File PLSQLTest
Day of Week M-F
Time Period AM Peak
Walk Speed 4.8 kph
BUS Walk Access Time (mins) 8
BUS Reliability Factor 2.0
LU LRT Walk Access Time (mins) 12
LU LRT Reliability Factor 0.75
NATIONAL_RAIL Walk Access Time (mins) 12
NATIONAL_RAIL Reliability Factor 0.75
Coordinates: 537797, 177160

Mode	Stop	Route	Distance (metres)	Frequency (vph)	Weight	Walk time (mins)	SWT (mins)	TAT (mins)	EDF	AI
BUS	ASHBURNHAM GROVE	180	415.07	5.0	0.5	5.19	8.0	13.19	2.27	1.14
BUS	ASHBURNHAM GROVE	386	415.07	4.0	0.5	5.19	9.5	14.69	2.04	1.02
BUS	ASHBURNHAM GROVE	199	415.07	5.0	0.5	5.19	8.0	13.19	2.27	1.14
BUS	GREENWICH H RD NORMAN RD	177	87.59	6.0	1.0	1.09	7.0	8.09	3.71	3.71
BUS	B'HEATH RD ROYAL ALBERT	53	427.36	8.0	0.5	5.34	5.75	11.09	2.7	1.35
BUS	DEPTFORD BRIDGE	453	515.11	12.0	0.5	6.44	4.5	10.94	2.74	1.37
LU LRT	GREENWICH DLR	DOCKLANDS LIGHT RAILWAY BANK TO LEWISHAM DLR	394.46	15.0	1.0	4.93	2.75	7.68	3.91	3.91
NATIONAL_RAIL	GREENWICH	LONDON CANNON STREET to LONDON CANNON STREET	341.01	0.67	0.5	4.26	45.53	49.79	0.6	0.3
NATIONAL_RAIL	GREENWICH	DARTFORD to LONDON CHARING CROSS	341.01	1.0	0.5	4.26	30.75	35.01	0.86	0.43
NATIONAL_RAIL	GREENWICH	DARTFORD to LONDON CANNON STREET	341.01	1.0	0.5	4.26	30.75	35.01	0.86	0.43
NATIONAL_RAIL	GREENWICH	BARNEHURST BR to LONDON	341.01	0.33	0.5	4.26	91.66	95.92	0.31	0.16

Mode	Stop	Route	Distance (metres)	Frequency (vph)	Weight	Walk time (mins)	SWT (mins)	TAT (mins)	EDF	AI
		CHARING CROSS								
NATIONAL_RAIL	GREENWICH	SLADE GREEN to LONDON CANNON STREET	341.01	1.33	1.0	4.26	23.31	27.57	1.09	1.09
NATIONAL_RAIL	GREENWICH	LONDON CHARING CROSS to DARTFORD	341.01	1.0	0.5	4.26	30.75	35.01	0.86	0.43
NATIONAL_RAIL	GREENWICH	LONDON CHARING CROSS to GRAVESEND BR	341.01	0.33	0.5	4.26	91.66	95.92	0.31	0.16
NATIONAL_RAIL	GREENWICH	LONDON CHARING CROSS to GILLINGHAM (KENT)	341.01	0.67	0.5	4.26	45.53	49.79	0.6	0.3
NATIONAL_RAIL	GREENWICH	SLADE GREEN to LONDON CHARING CROSS	341.01	1.0	0.5	4.26	30.75	35.01	0.86	0.43

Total AI for this POI is 17.37.

PTAL Rating is 4.

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Appendix C: Local modelling outputs

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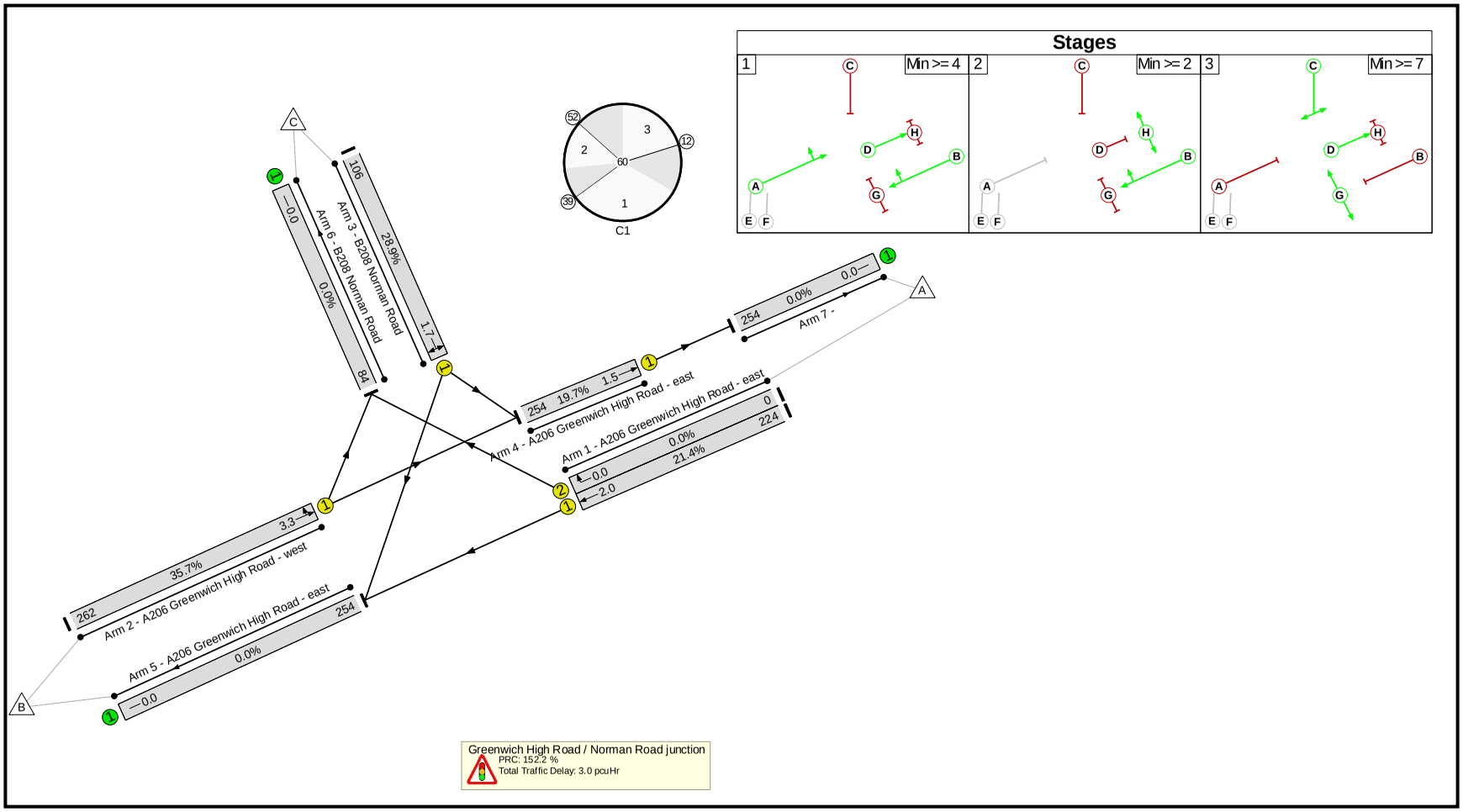
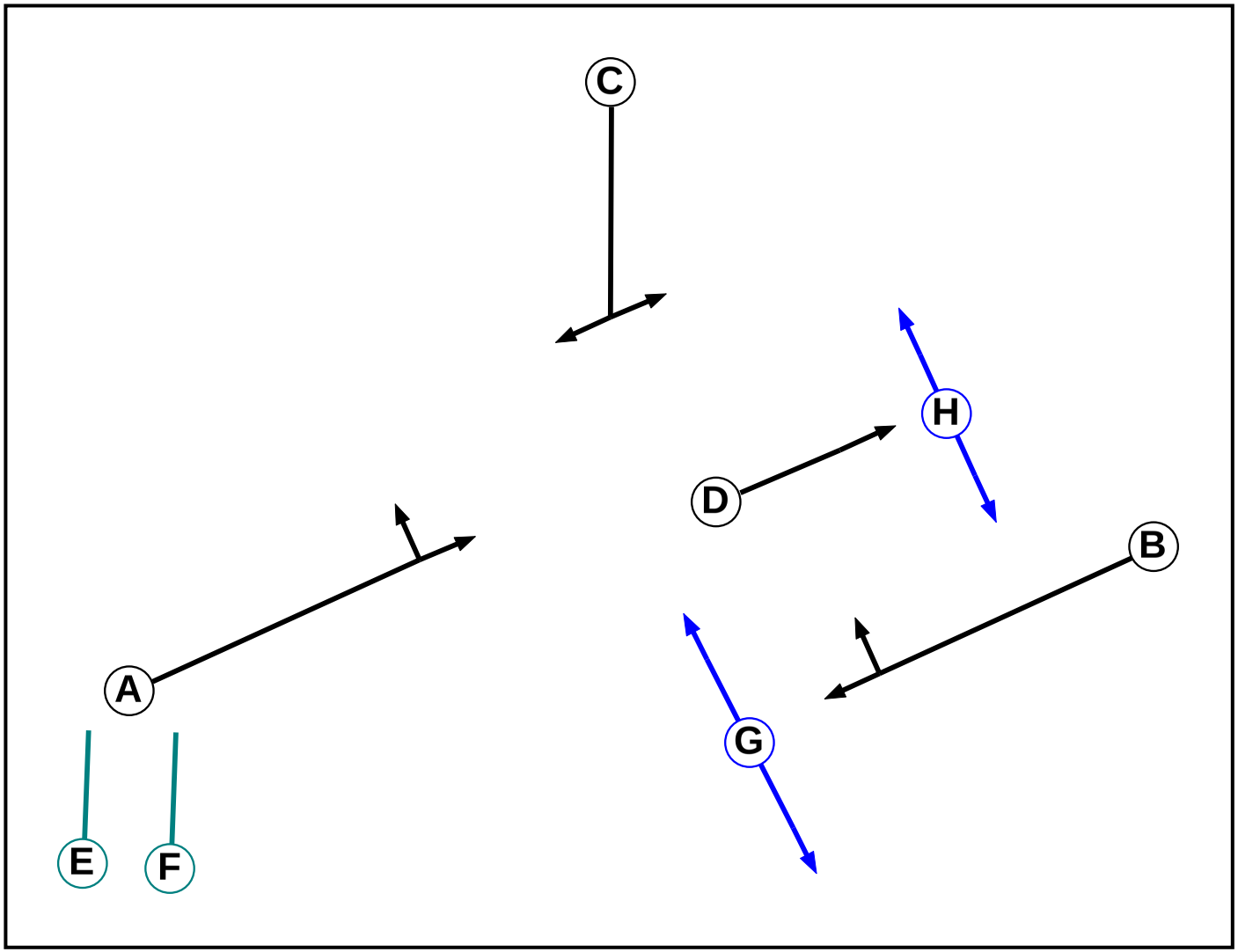
C.1 Baseline results, AM peak hour

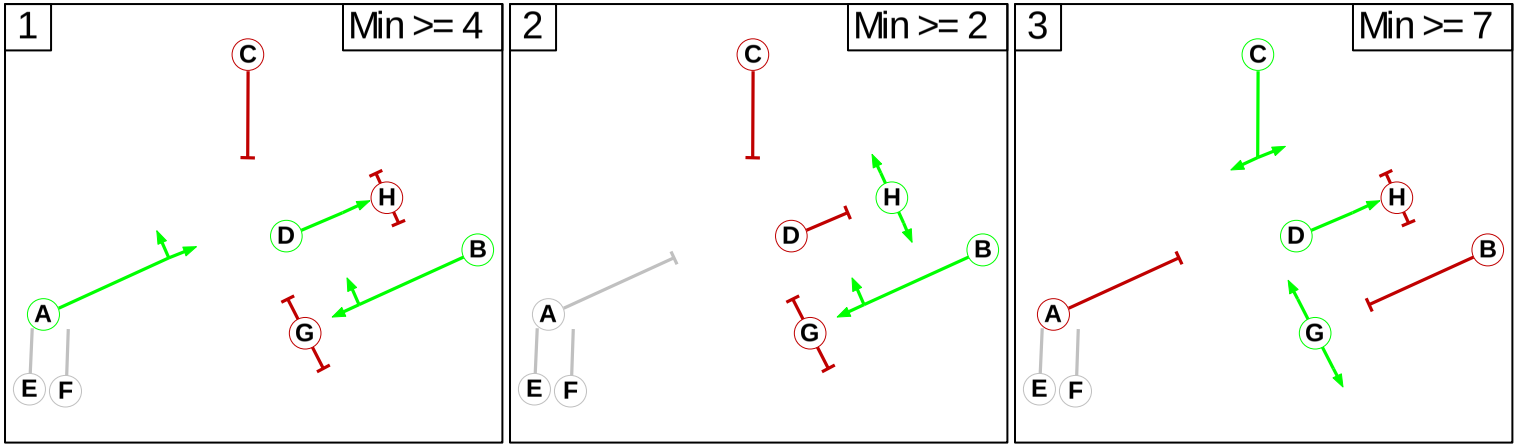
Network Layout Diagram



Phase Diagram



Stage Diagram



Phases in Stage

Stage No.	Phases in Stage
1	A B D
2	B H
3	C D G

Phase Intergreens Matrix

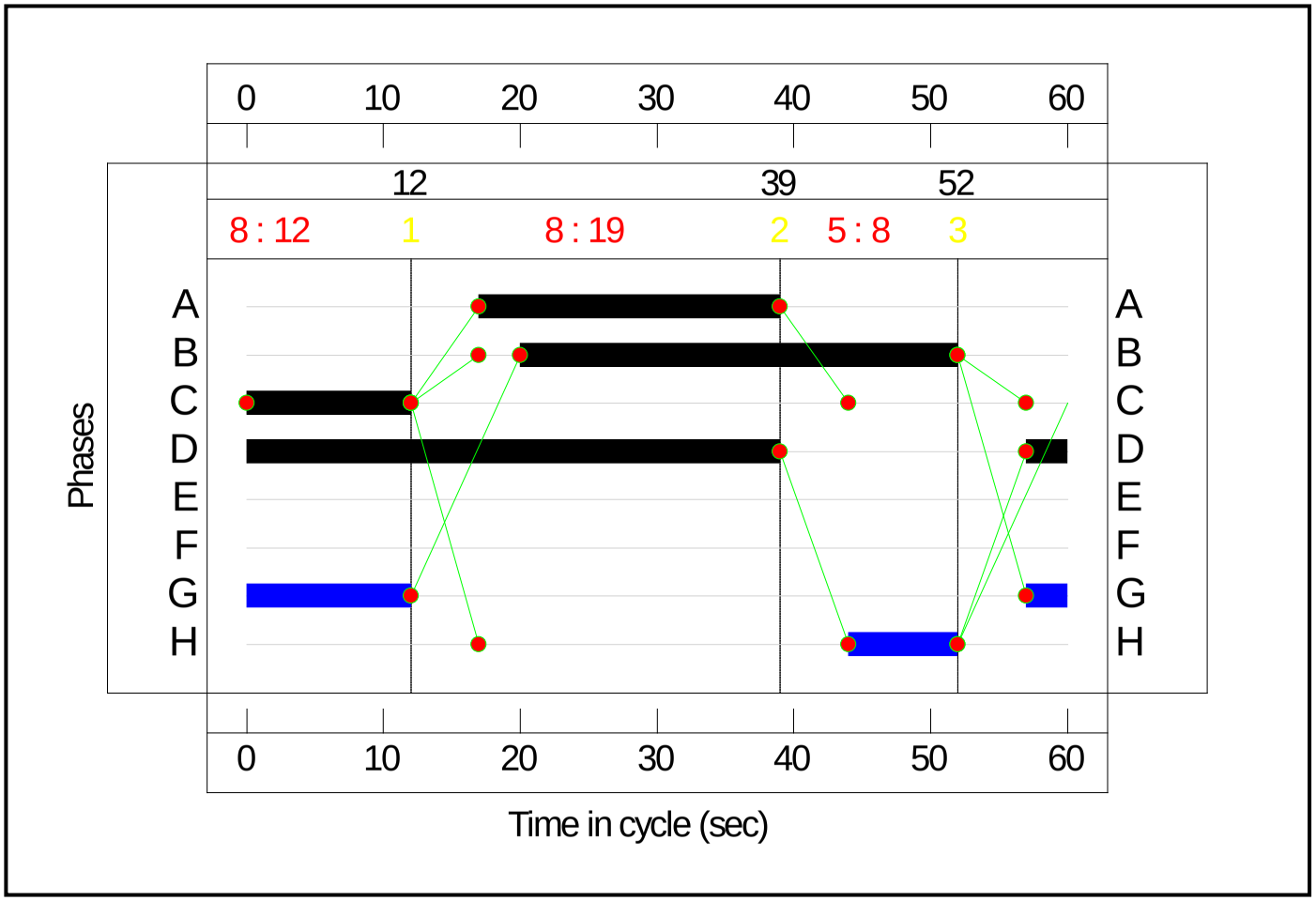
Terminating Phase	Starting Phase								
		A	B	C	D	E	F	G	H
	A		-	5	-	-	-	-	-
	B	-		5	-	-	-	5	-
	C	5	5		-	-	-	-	5
	D	-	-	-		-	-	-	5
	E	-	-	-	-		-	-	-
	F	-	-	-	-	-		-	-
	G	-	8	-	-	-	-		-
	H	-	-	8	5	-	-	-	

Traffic Flows, Desired

Desired Flow:

Origin	Destination				
		A	B	C	Tot.
	A	0	224	0	224
	B	178	0	84	262
	C	76	30	0	106
	Tot.	254	254	84	592

Signal Timings Diagram



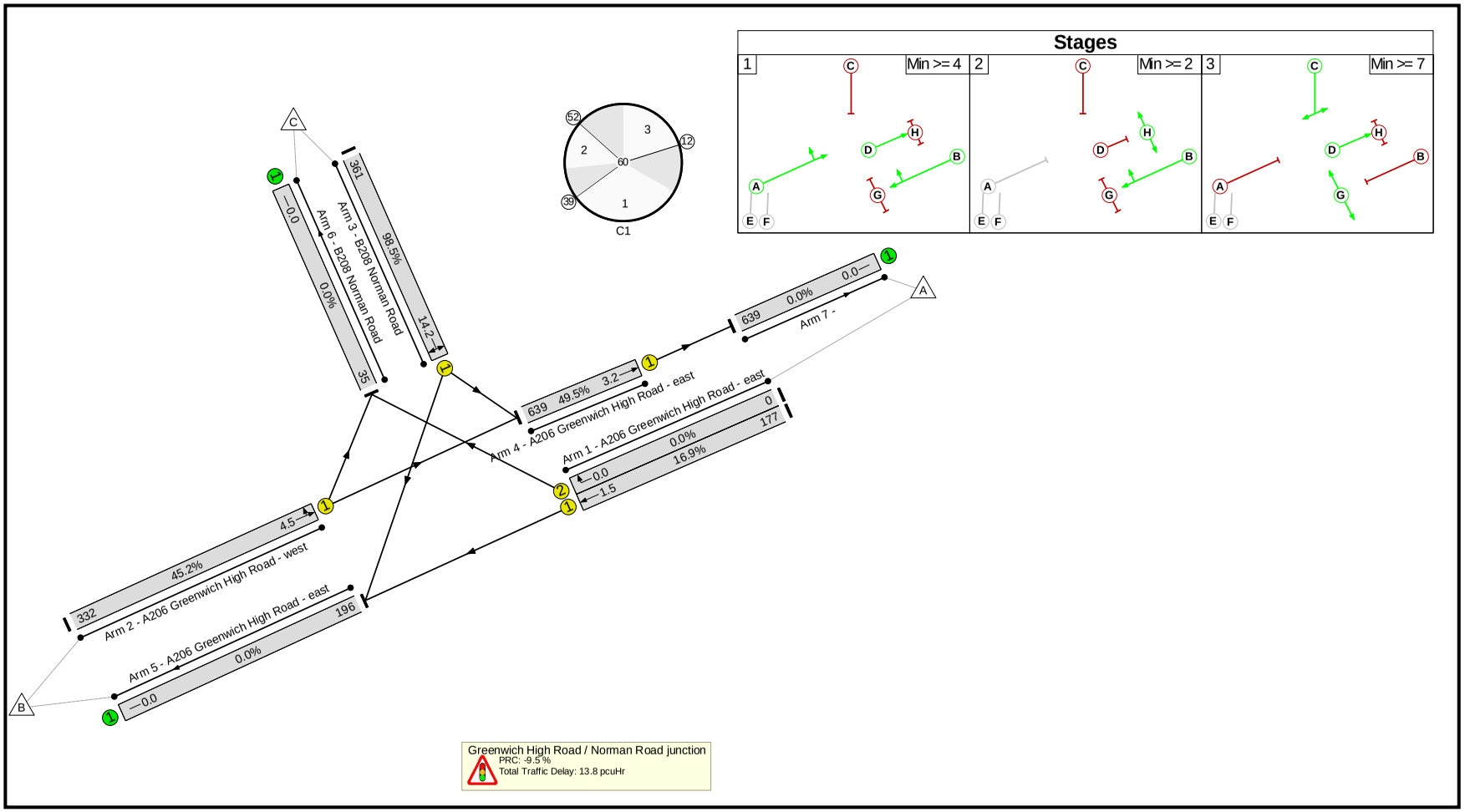
Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Greenwich Pumping Station	-	-	-		-	-	-	-	-	-	**35.7%**	**0**	**0**	**0**	**3.0**	-	-
Greenwich High Road / Norman Road junction	-	-	-		-	-	-	-	-	-	**35.7%**	**0**	**0**	**0**	**3.0**	-	-
1/1	A206 Greenwich High Road - east Ahead	U	B		1	32	-	224	1900	1045	21.4%	-	-	-	0.6	9.1	2.0
1/2	A206 Greenwich High Road - east Right	U	B		1	32	-	0	1773	975	0.0%	-	-	-	0.0	0.0	0.0
2/1	A206 Greenwich High Road - west Ahead Left	U	A		1	22	-	262	1915	734	35.7%	-	-	-	1.2	17.0	3.3
3/1	B208 Norman Road Left Right	U	C		1	12	-	106	1691	366	28.9%	-	-	-	0.8	26.6	1.7
4/1	A206 Greenwich High Road - east Ahead	U	D		1	42	-	254	1800	1290	19.7%	-	-	-	0.4	5.4	1.5

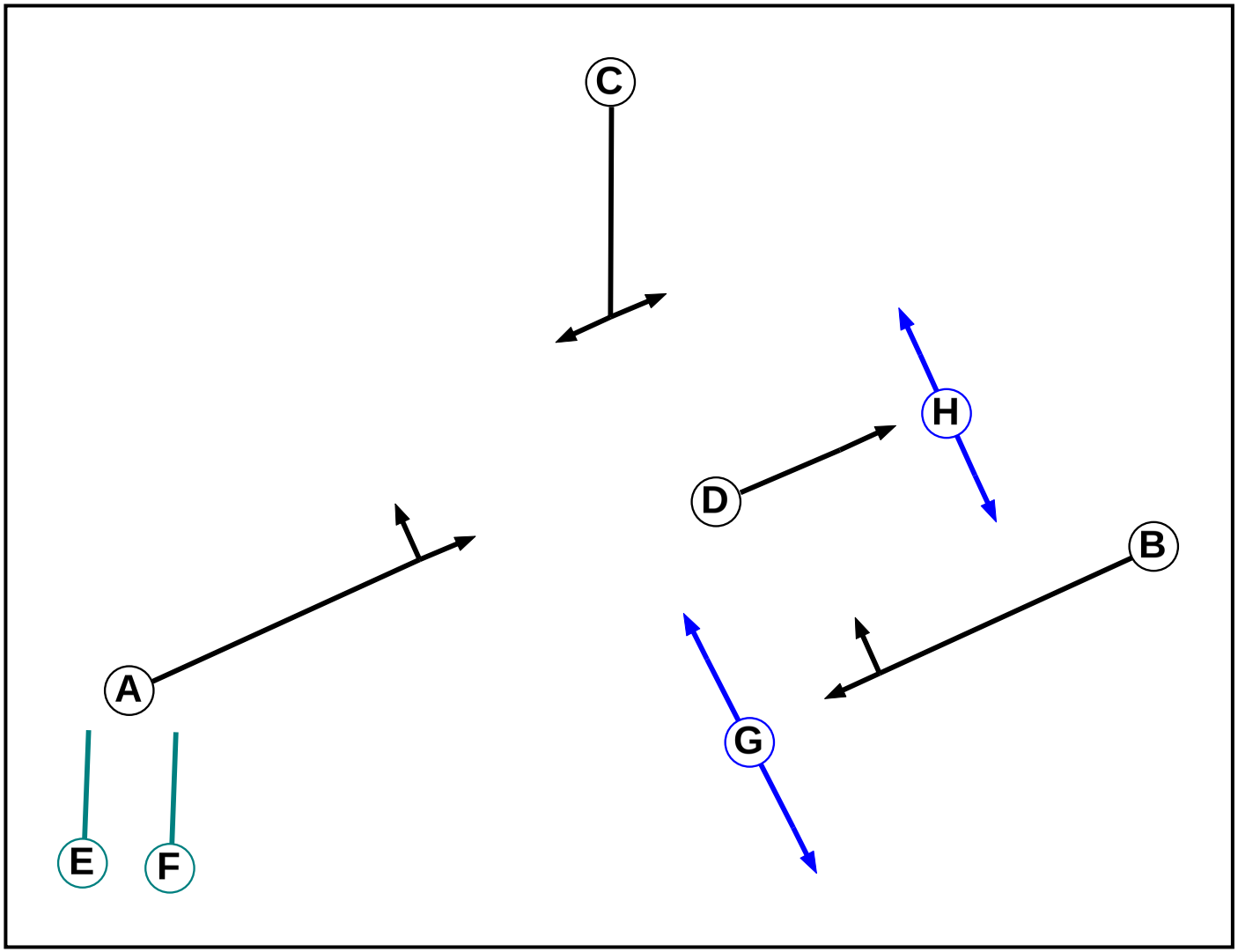
C1 PRC for Signalled Lanes (%): 152.2 Total Delay for Signalled Lanes (pcuHr): 2.97 Cycle Time (s): 60
PRC Over All Lanes (%): 152.2 Total Delay Over All Lanes(pcuHr): 2.97

C.2 Baseline results, PM peak hour

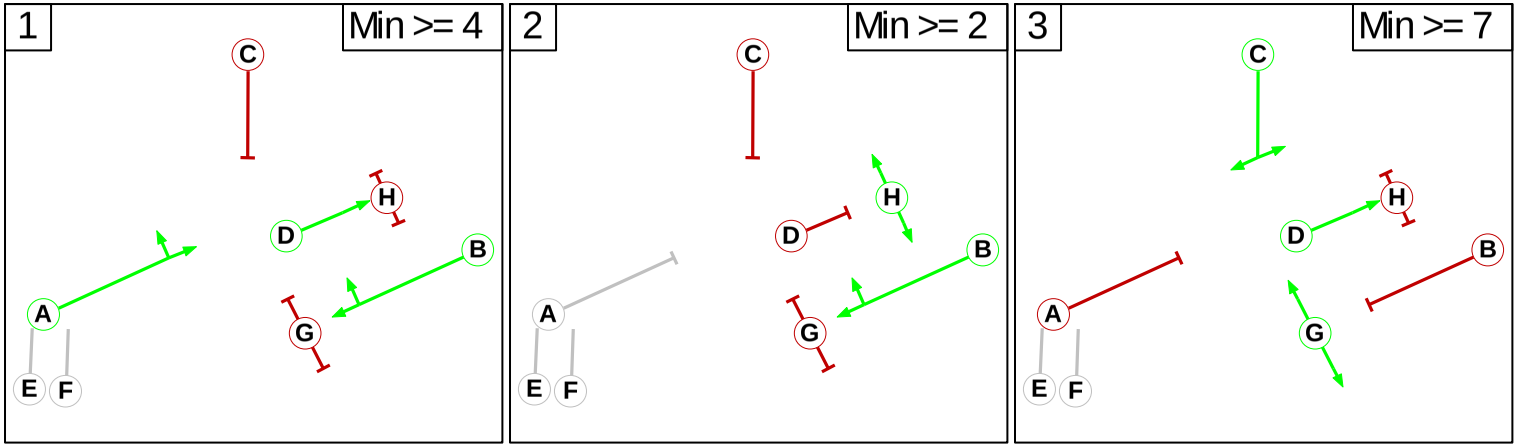
Network Layout Diagram



Phase Diagram



Stage Diagram



Phases in Stage

Stage No.	Phases in Stage
1	A B D
2	B H
3	C D G

Phase Intergreens Matrix

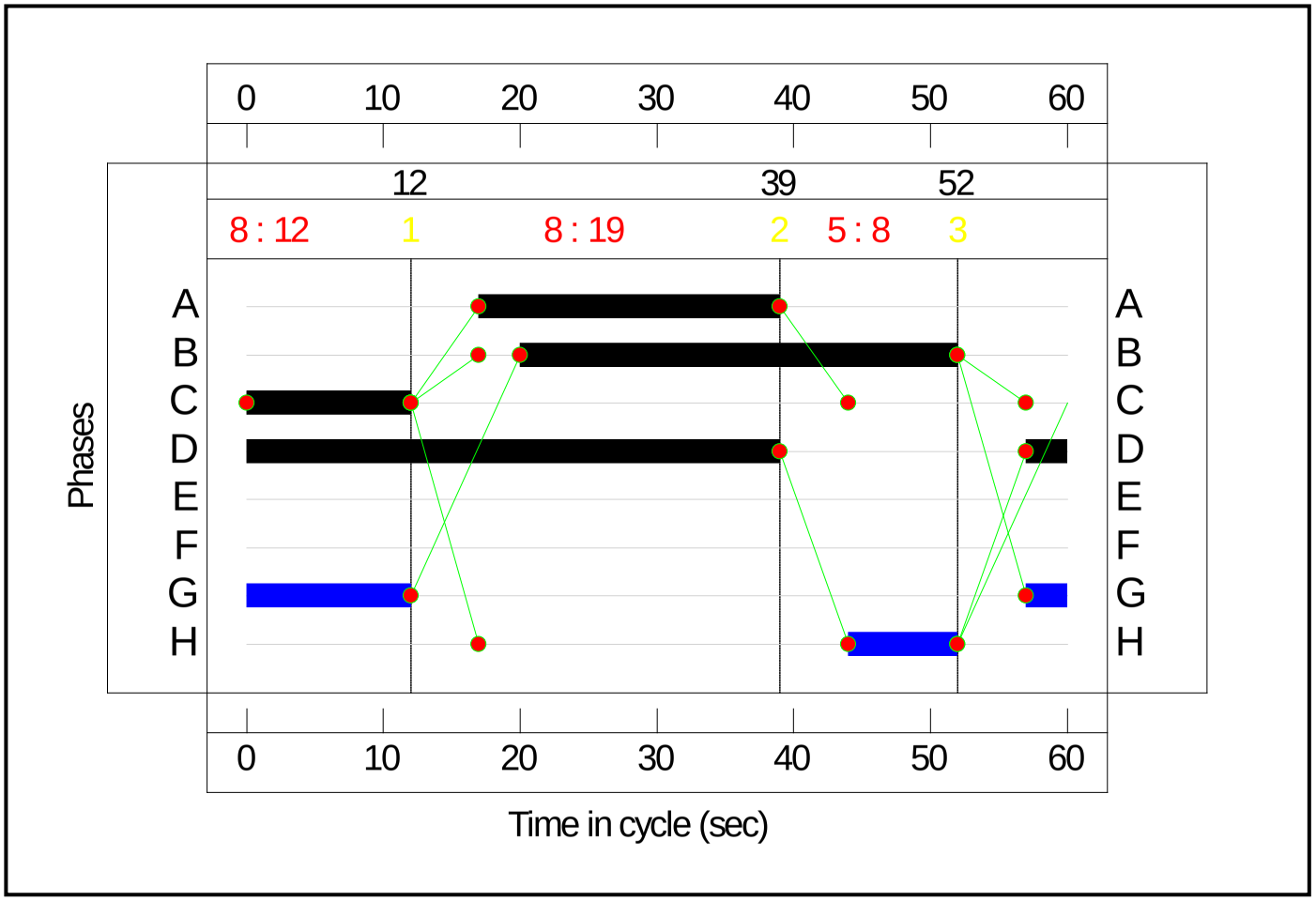
Terminating Phase	Starting Phase								
		A	B	C	D	E	F	G	H
	A		-	5	-	-	-	-	-
	B	-		5	-	-	-	5	-
	C	5	5		-	-	-	-	5
	D	-	-	-		-	-	-	5
	E	-	-	-	-		-	-	-
	F	-	-	-	-	-		-	-
	G	-	8	-	-	-	-		-
	H	-	-	8	5	-	-	-	

Traffic Flows, Desired

Desired Flow :

Origin	Destination				
		A	B	C	Tot.
	A	0	177	0	177
	B	297	0	35	332
	C	342	19	0	361
	Tot.	639	196	35	870

Signal Timings Diagram



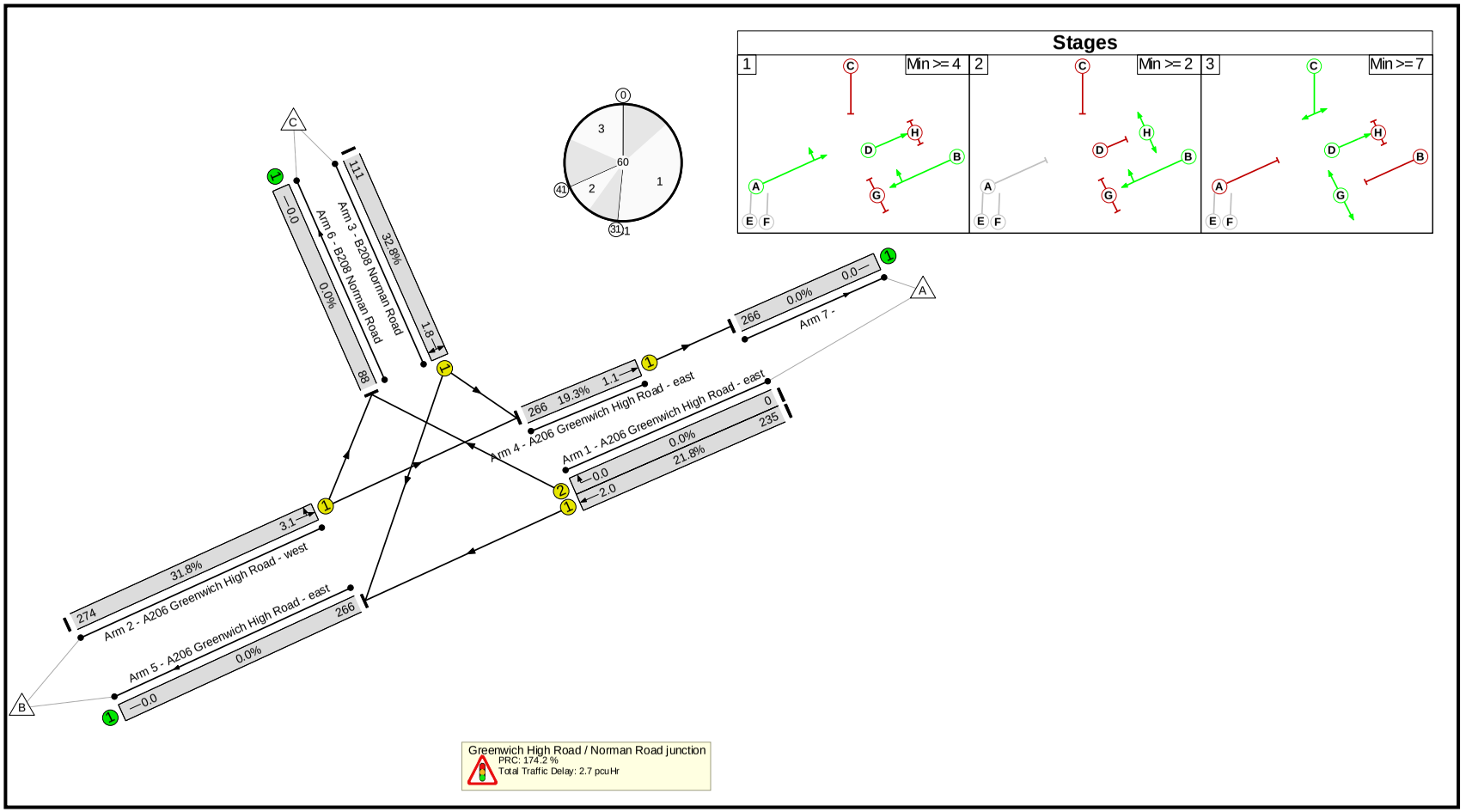
Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Greenwich Pumping Station	-	-	-		-	-	-	-	-	-	**98.5%**	**0**	**0**	**0**	**13.8**	-	-
Greenwich High Road / Norman Road junction	-	-	-		-	-	-	-	-	-	**98.5%**	**0**	**0**	**0**	**13.8**	-	-
1/1	A206 Greenwich High Road - east Ahead	U	B		1	32	-	177	1900	1045	16.9%	-	-	-	0.4	8.8	1.5
1/2	A206 Greenwich High Road - east Right	U	B		1	32	-	0	1773	975	0.0%	-	-	-	0.0	0.0	0.0
2/1	A206 Greenwich High Road - west Ahead Left	U	A		1	22	-	332	1915	734	45.2%	-	-	-	1.7	18.3	4.5
3/1	B208 Norman Road Left Right	U	C		1	12	-	361	1691	366	98.5%	-	-	-	10.6	105.7	14.2
4/1	A206 Greenwich High Road - east Ahead	U	D		1	42	-	639	1800	1290	49.5%	-	-	-	1.1	5.9	3.2

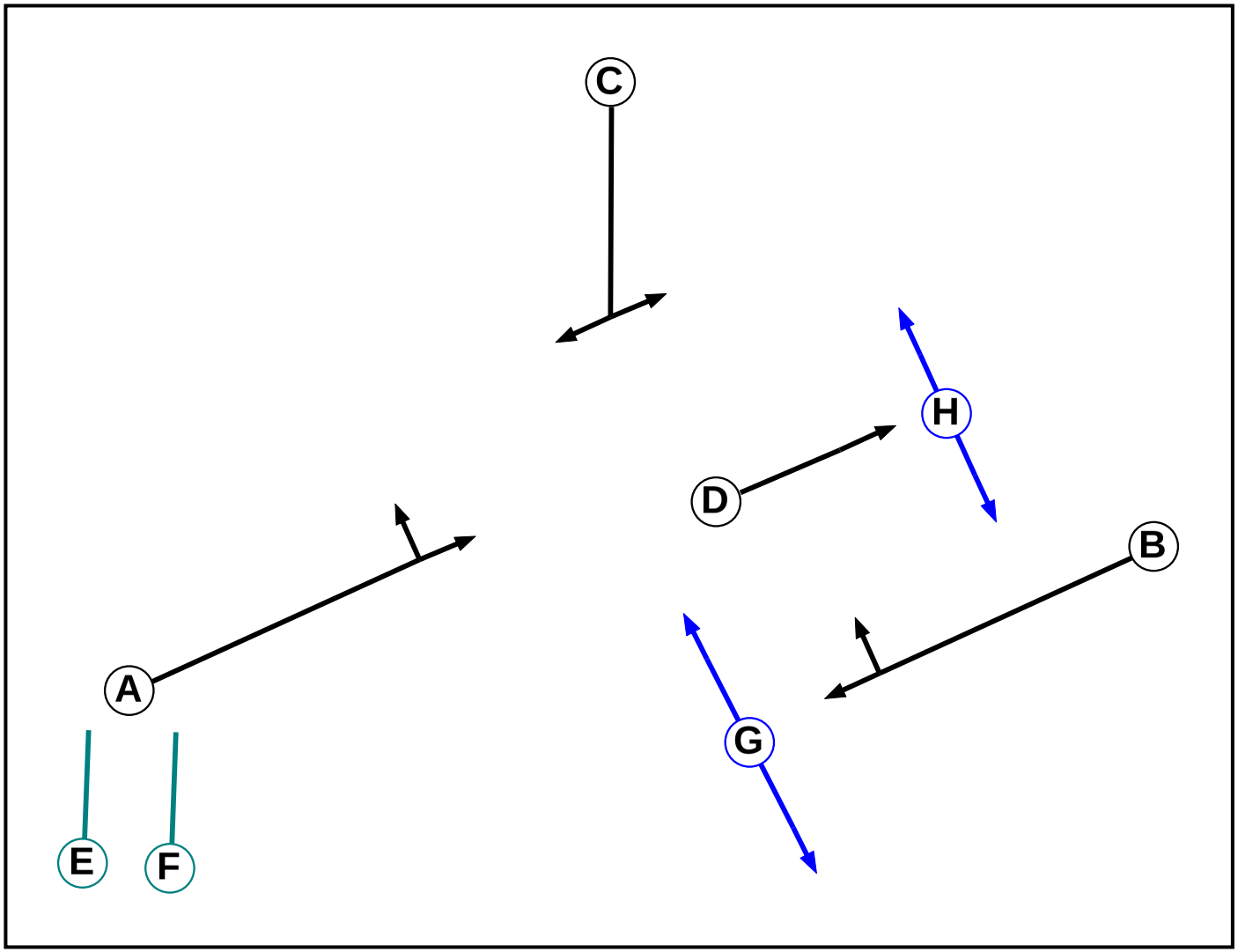
C1 PRC for Signalled Lanes (%): -9.5 Total Delay for Signalled Lanes (pcuHr): 13.77 Cycle Time (s): 60
PRC Over All Lanes (%): -9.5 Total Delay Over All Lanes(pcuHr): 13.77

C.3 Construction base case results, AM peak hour

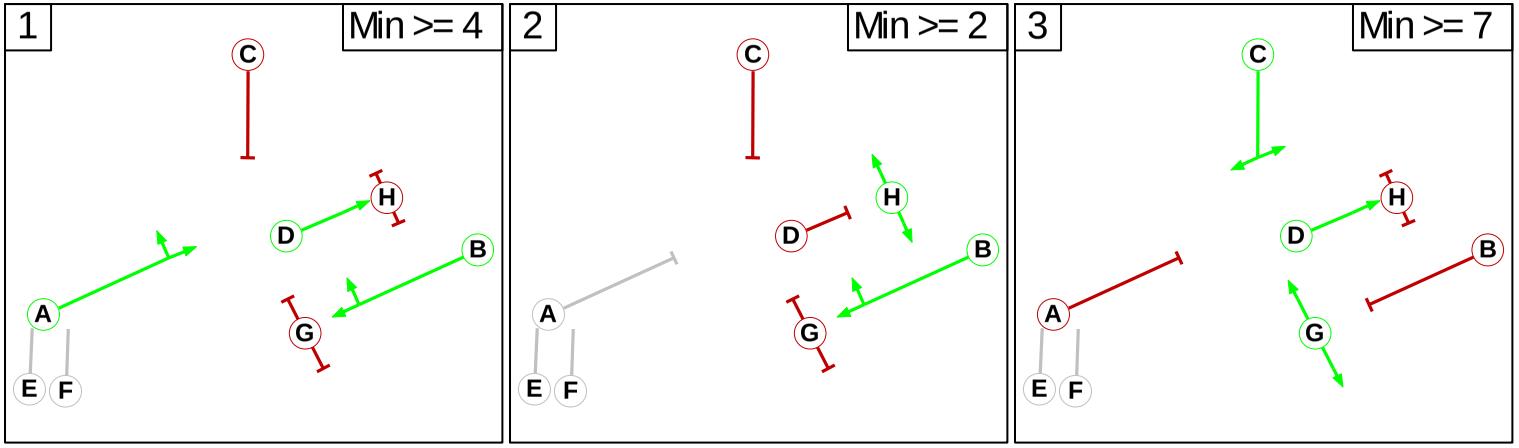
Network Layout Diagram



Phase Diagram



Stage Diagram



Phases in Stage

Stage No.	Phases in Stage
1	A B D
2	B H
3	C D G

Phase Intergreens Matrix

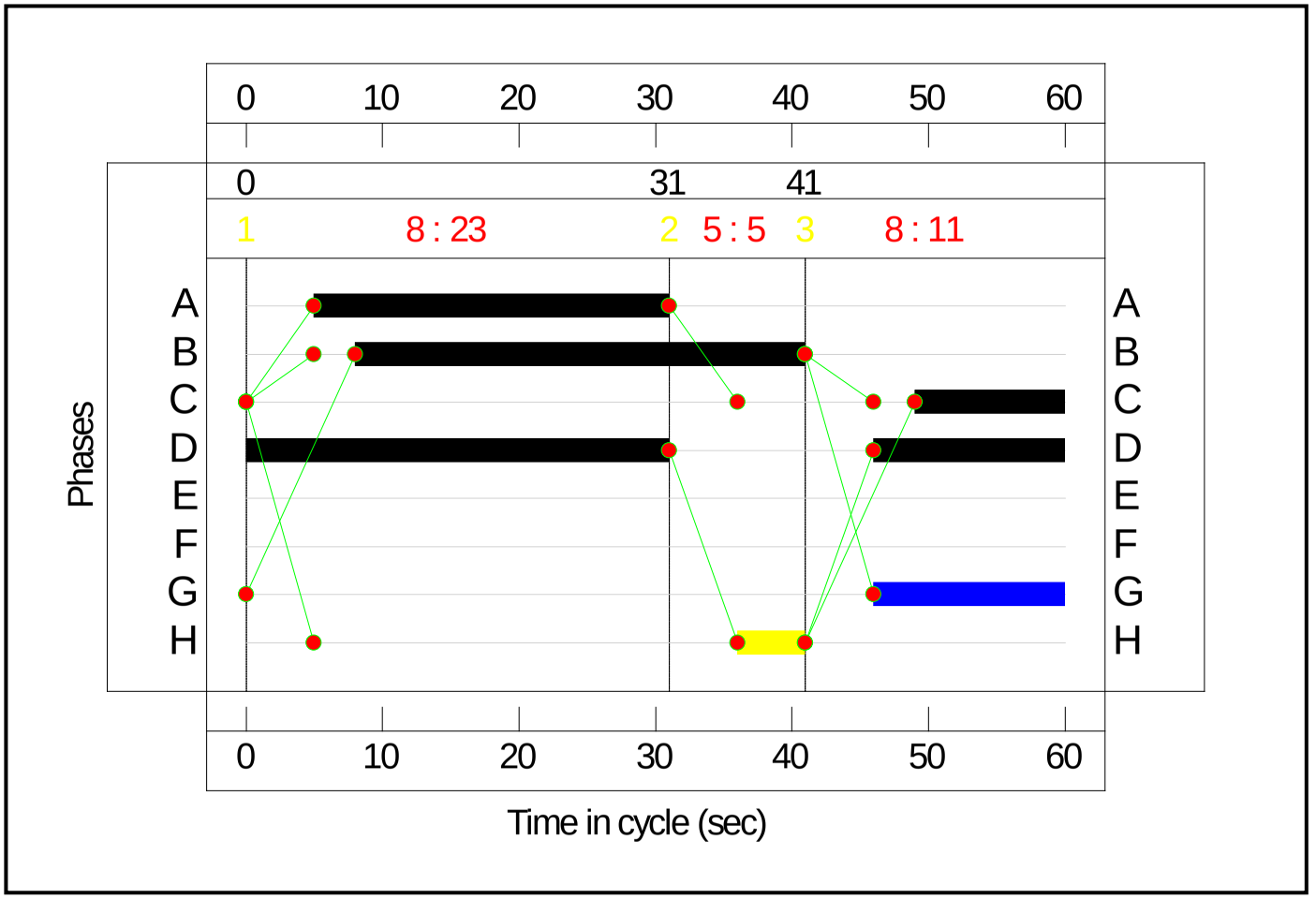
Terminating Phase	Starting Phase								
		A	B	C	D	E	F	G	H
	A		-	5	-	-	-	-	-
	B	-		5	-	-	-	5	-
	C	5	5		-	-	-	-	5
	D	-	-	-		-	-	-	5
	E	-	-	-	-		-	-	-
	F	-	-	-	-	-		-	-
	G	-	8	-	-	-	-		-
	H	-	-	8	5	-	-	-	

Traffic Flows, Desired

Desired Flow :

Origin	Destination				
		A	B	C	Tot.
	A	0	235	0	235
	B	186	0	88	274
	C	80	31	0	111
	Tot.	266	266	88	620

Signal Timings Diagram



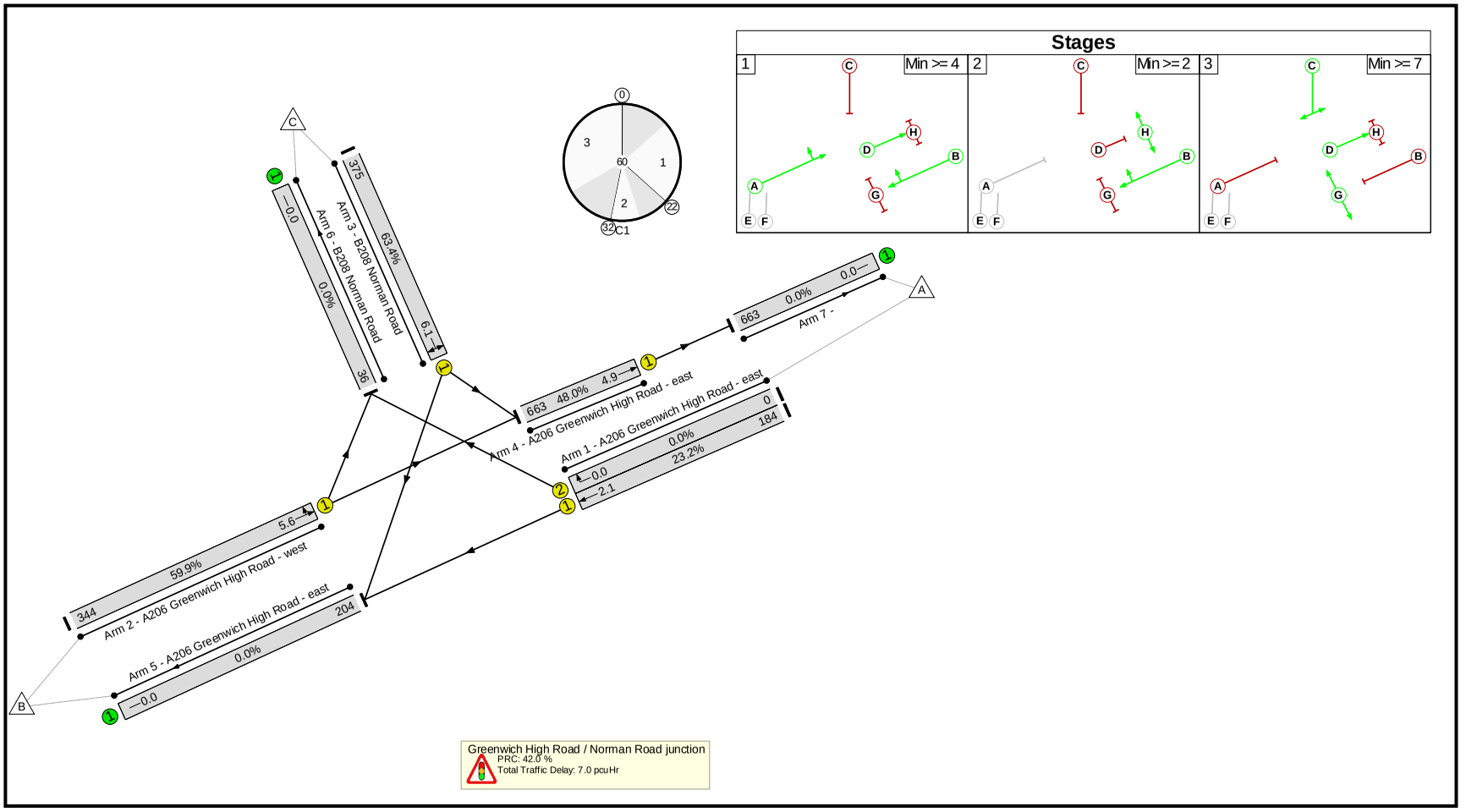
Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Greenwich Pumping Station	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**32.8%**	**0**	**0**	**0**	**2.7**	**-**	**-**
Greenwich High Road / Norman Road junction	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**32.8%**	**0**	**0**	**0**	**2.7**	**-**	**-**
1/1	A206 Greenwich High Road - east Ahead	U	B		1	33	-	235	1900	1077	21.8%	-	-	-	0.6	8.6	2.0
1/2	A206 Greenwich High Road - east Right	U	B		1	33	-	0	1773	1005	0.0%	-	-	-	0.0	0.0	0.0
2/1	A206 Greenwich High Road - west Ahead Left	U	A		1	26	-	274	1915	862	31.8%	-	-	-	1.0	13.7	3.1
3/1	B208 Norman Road Left Right	U	C		1	11	-	111	1691	338	32.8%	-	-	-	0.9	28.5	1.8
4/1	A206 Greenwich High Road - east Ahead	U	D		1	45	-	266	1800	1380	19.3%	-	-	-	0.3	3.4	1.1

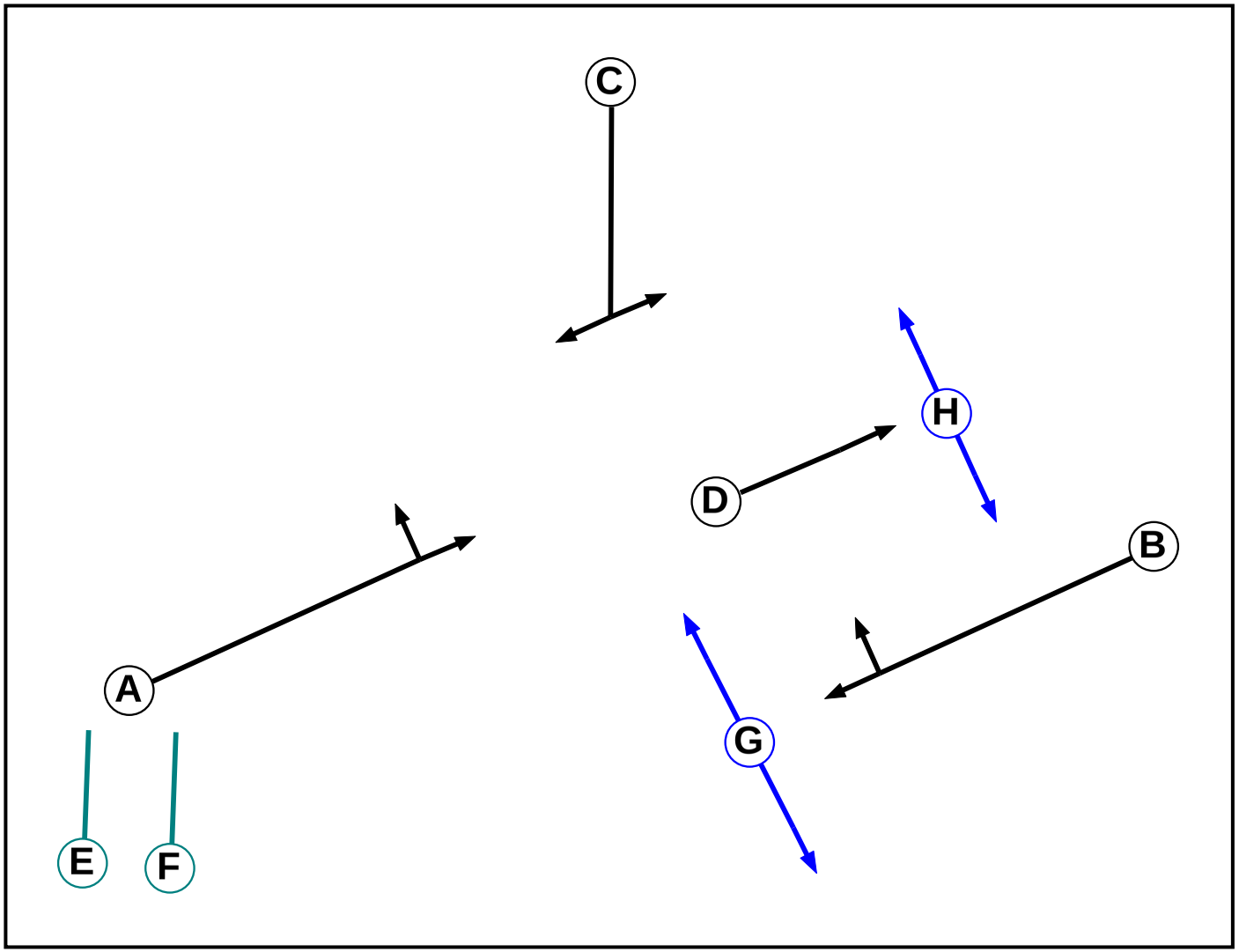
C1 PRC for Signalled Lanes (%): 174.2 Total Delay for Signalled Lanes (pcuHr): 2.73 Cycle Time (s): 60
PRC Over All Lanes (%): 174.2 Total Delay Over All Lanes(pcuHr): 2.73

C.4 Construction base case results, PM peak hour

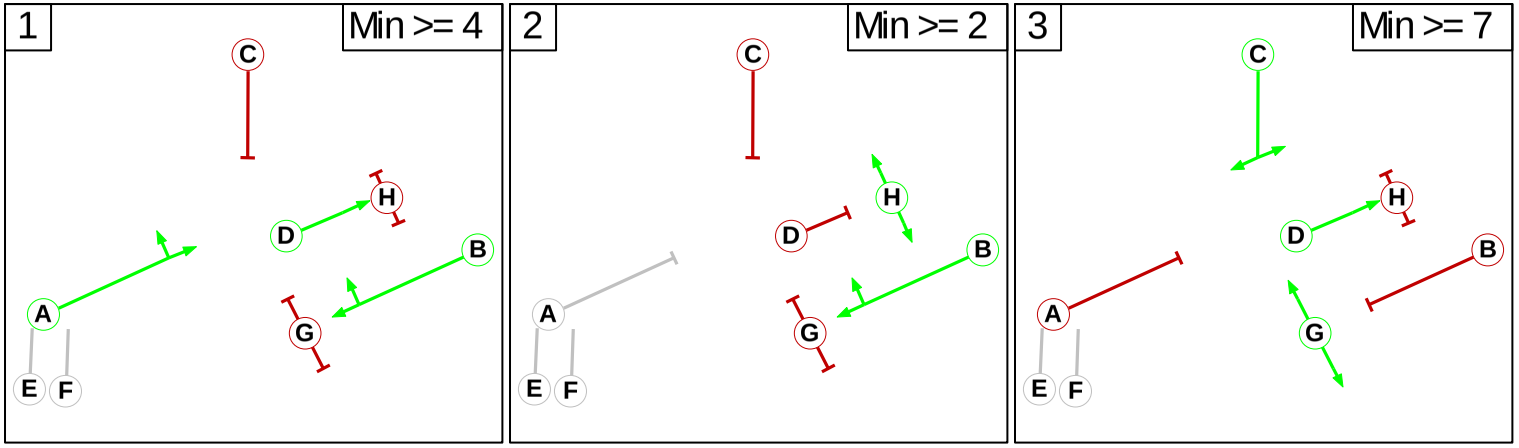
Network Layout Diagram



Phase Diagram



Stage Diagram



Phases in Stage

Stage No.	Phases in Stage
1	A B D
2	B H
3	C D G

Phase Intergreens Matrix

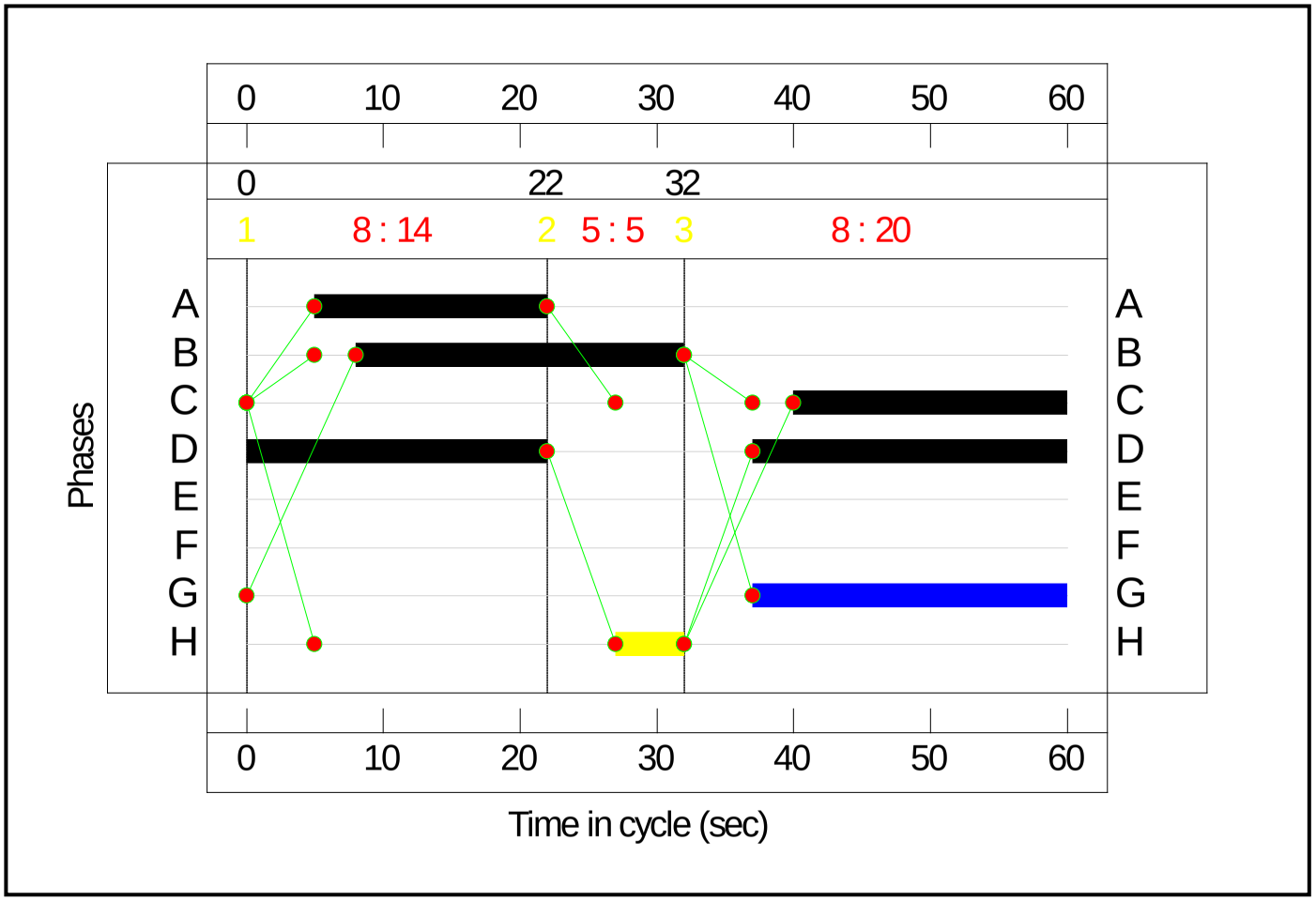
Terminating Phase	Starting Phase								
		A	B	C	D	E	F	G	H
	A		-	5	-	-	-	-	-
	B	-		5	-	-	-	5	-
	C	5	5		-	-	-	-	5
	D	-	-	-		-	-	-	5
	E	-	-	-	-		-	-	-
	F	-	-	-	-	-		-	-
	G	-	8	-	-	-	-		-
	H	-	-	8	5	-	-	-	

Traffic Flows, Desired

Desired Flow :

Origin	Destination				
		A	B	C	Tot.
	A	0	184	0	184
	B	308	0	36	344
	C	355	20	0	375
	Tot.	663	204	36	903

Signal Timings Diagram



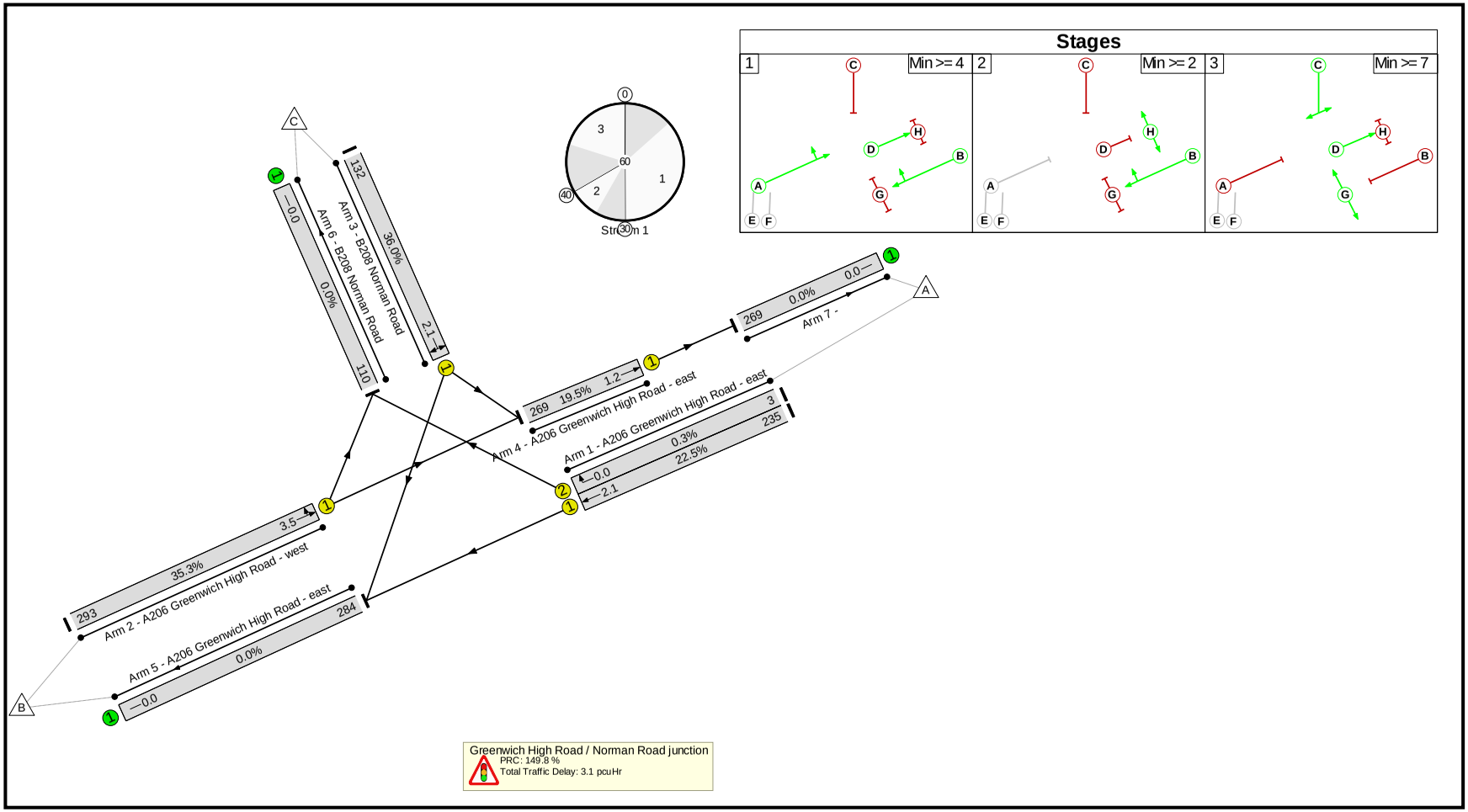
Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Greenwich Pumping Station	-	-	-		-	-	-	-	-	-	**63.4%**	**0**	**0**	**0**	**7.0**	-	-
Greenwich High Road / Norman Road junction	-	-	-		-	-	-	-	-	-	**63.4%**	**0**	**0**	**0**	**7.0**	-	-
1/1	A206 Greenwich High Road - east Ahead	U	B		1	24	-	184	1900	792	23.2%	-	-	-	0.7	14.3	2.1
1/2	A206 Greenwich High Road - east Right	U	B		1	24	-	0	1773	739	0.0%	-	-	-	0.0	0.0	0.0
2/1	A206 Greenwich High Road - west Ahead Left	U	A		1	17	-	344	1915	574	59.9%	-	-	-	2.5	25.7	5.6
3/1	B208 Norman Road Left Right	U	C		1	20	-	375	1691	592	63.4%	-	-	-	2.6	24.5	6.1
4/1	A206 Greenwich High Road - east Ahead	U	D		1	45	-	663	1800	1380	48.0%	-	-	-	1.3	7.0	4.9

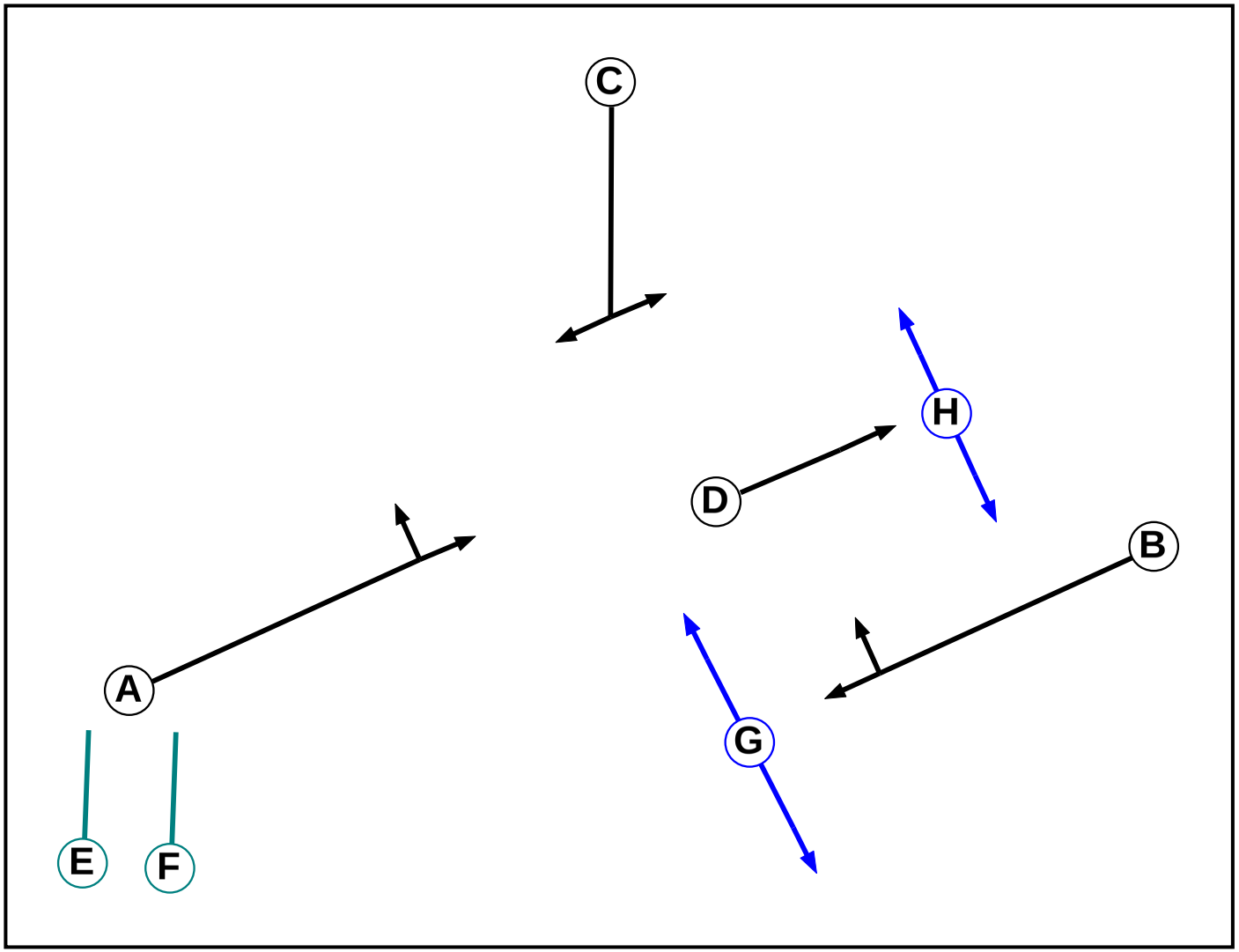
C1 PRC for Signalled Lanes (%): 42.0 Total Delay for Signalled Lanes (pcuHr): 7.03 Cycle Time (s): 60
PRC Over All Lanes (%): 42.0 Total Delay Over All Lanes(pcuHr): 7.03

C.5 Construction development case results, AM peak hour

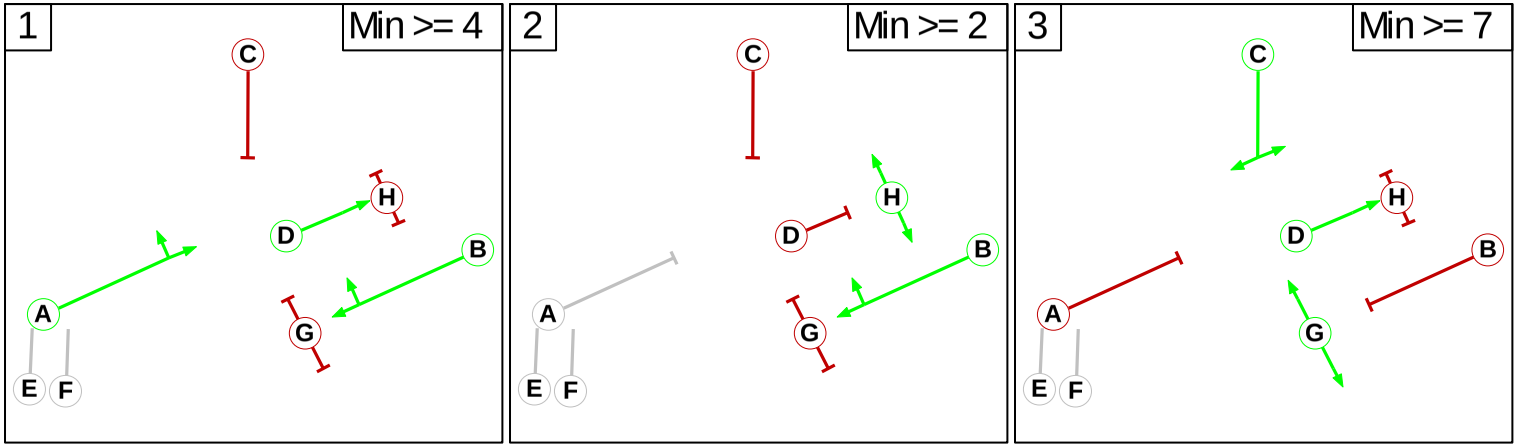
Network Layout Diagram



Phase Diagram



Stage Diagram



Phases in Stage

Stage No.	Phases in Stage
1	A B D
2	B H
3	C D G

Phase Intergreens Matrix

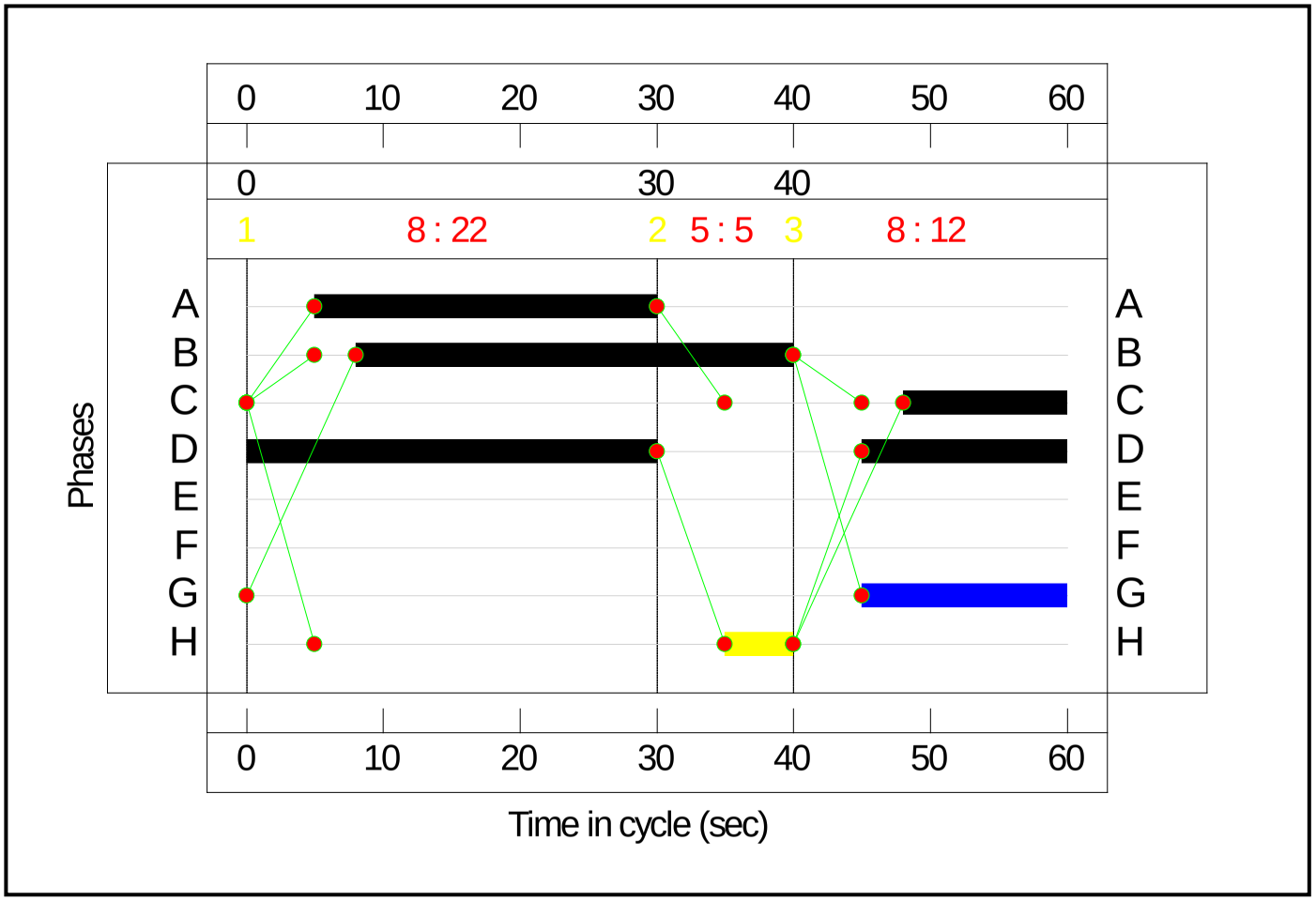
Terminating Phase	Starting Phase								
		A	B	C	D	E	F	G	H
	A		-	5	-	-	-	-	-
	B	-		5	-	-	-	5	-
	C	5	5		-	-	-	-	5
	D	-	-	-		-	-	-	5
	E	-	-	-	-		-	-	-
	F	-	-	-	-	-		-	-
	G	-	8	-	-	-	-		-
	H	-	-	8	5	-	-	-	

Traffic Flows, Desired

Desired Flow :

Origin	Destination				
		A	B	C	Tot.
	A	0	235	3	238
	B	186	0	107	293
	C	83	49	0	132
	Tot.	269	284	110	663

Signal Timings Diagram



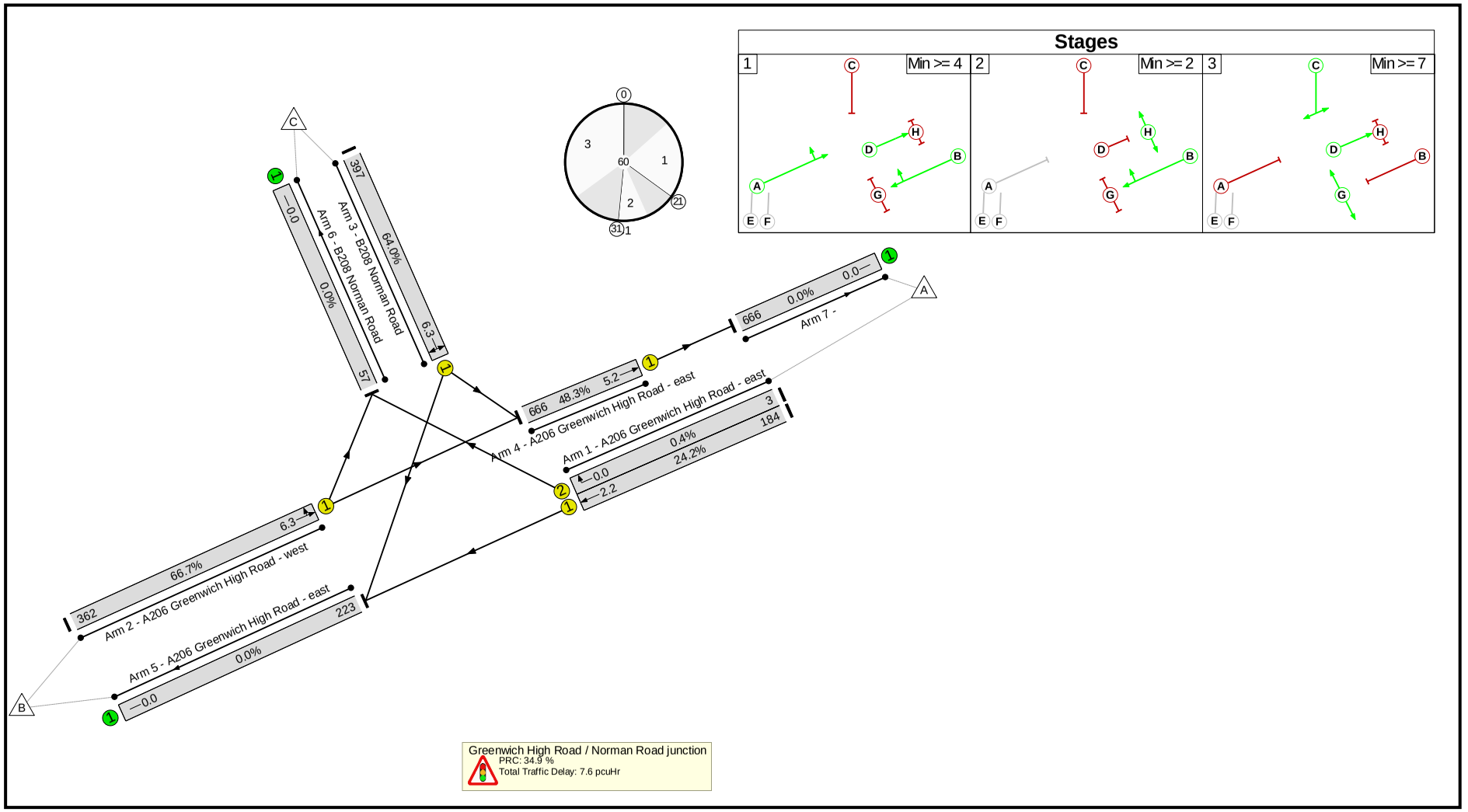
Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Greenwich Pumping Station	-	-	-		-	-	-	-	-	-	**36.0%**	**0**	**0**	**0**	**3.1**	-	-
Greenwich High Road / Norman Road junction	-	-	-		-	-	-	-	-	-	**36.0%**	**0**	**0**	**0**	**3.1**	-	-
1/1	A206 Greenwich High Road - east Ahead	U	B		1	32	-	235	1900	1045	22.5%	-	-	-	0.6	9.2	2.1
1/2	A206 Greenwich High Road - east Right	U	B		1	32	-	3	1773	975	0.3%	-	-	-	0.0	8.2	0.0
2/1	A206 Greenwich High Road - west Ahead Left	U	A		1	25	-	293	1915	830	35.3%	-	-	-	1.2	14.7	3.5
3/1	B208 Norman Road Left Right	U	C		1	12	-	132	1691	366	36.0%	-	-	-	1.0	27.6	2.1
4/1	A206 Greenwich High Road - east Ahead	U	D		1	45	-	269	1800	1380	19.5%	-	-	-	0.3	3.6	1.2

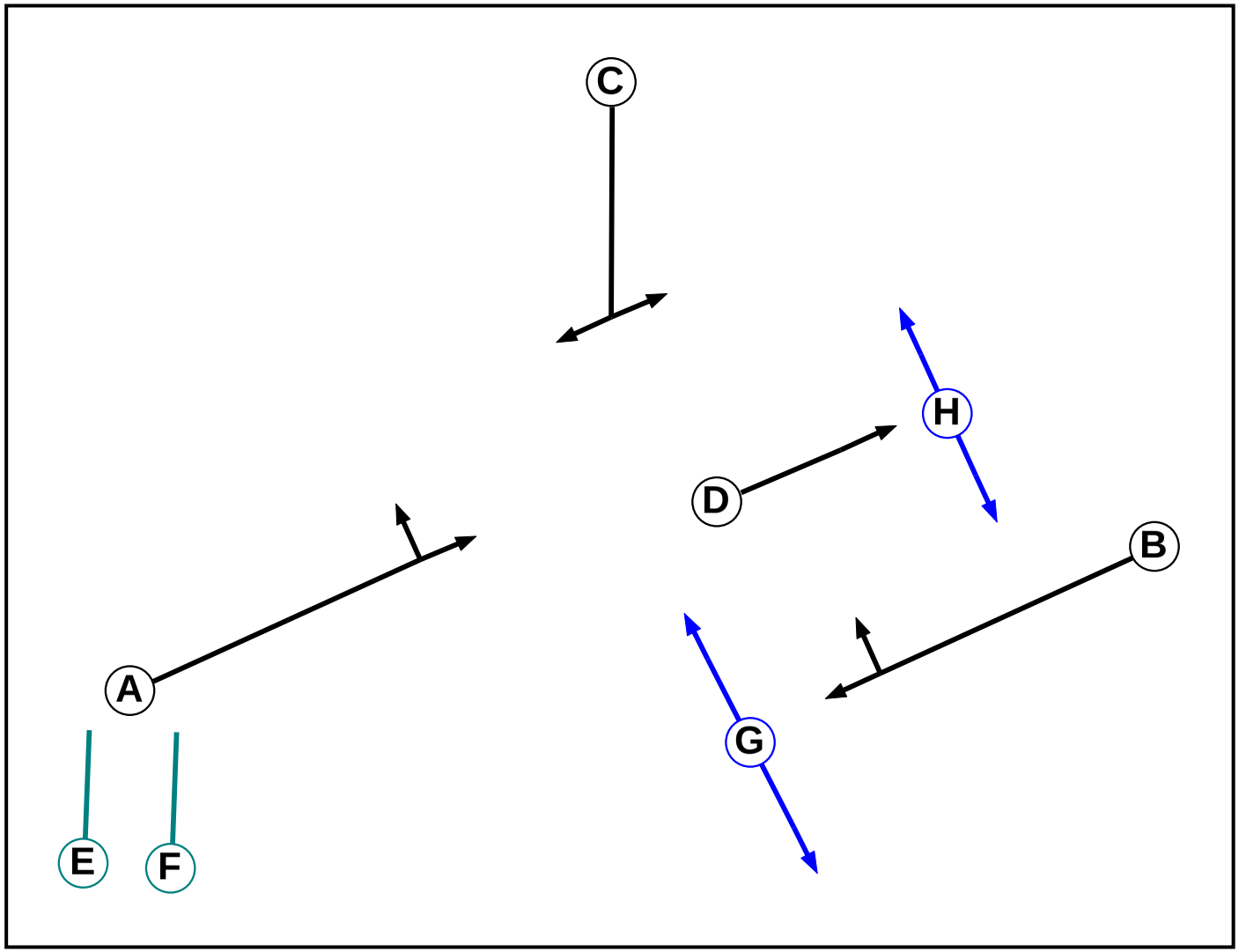
C1 PRC for Signalled Lanes (%): 149.8 Total Delay for Signalled Lanes (pcuHr): 3.09 Cycle Time (s): 60
PRC Over All Lanes (%): 149.8 Total Delay Over All Lanes(pcuHr): 3.09

C.6 Construction development case results, PM peak hour

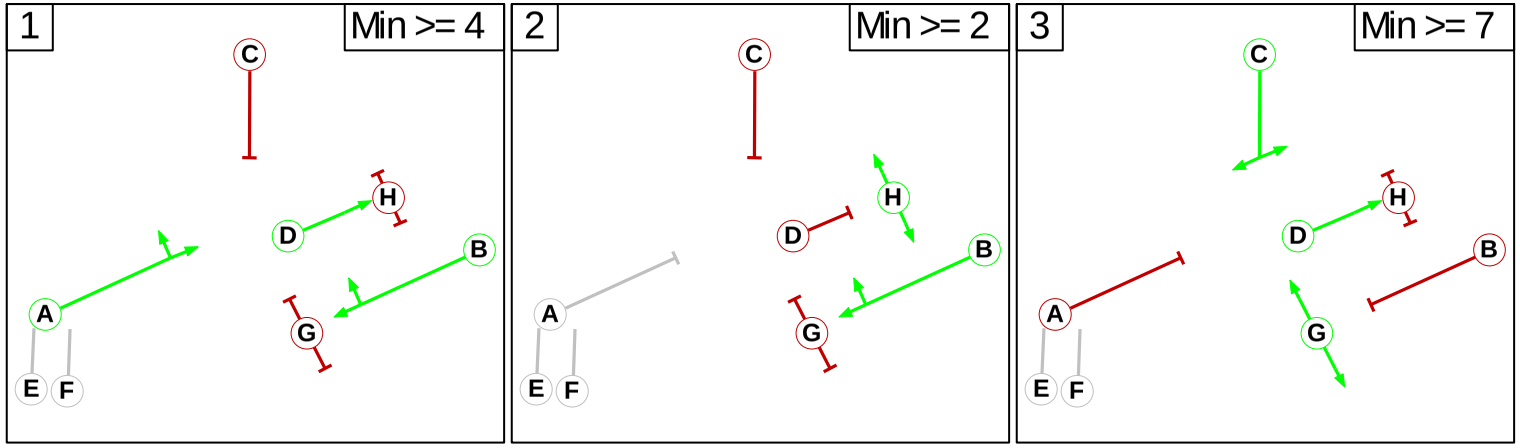
Network Layout Diagram



Phase Diagram



Stage Diagram



Phases in Stage

Stage No.	Phases in Stage
1	A B D
2	B H
3	C D G

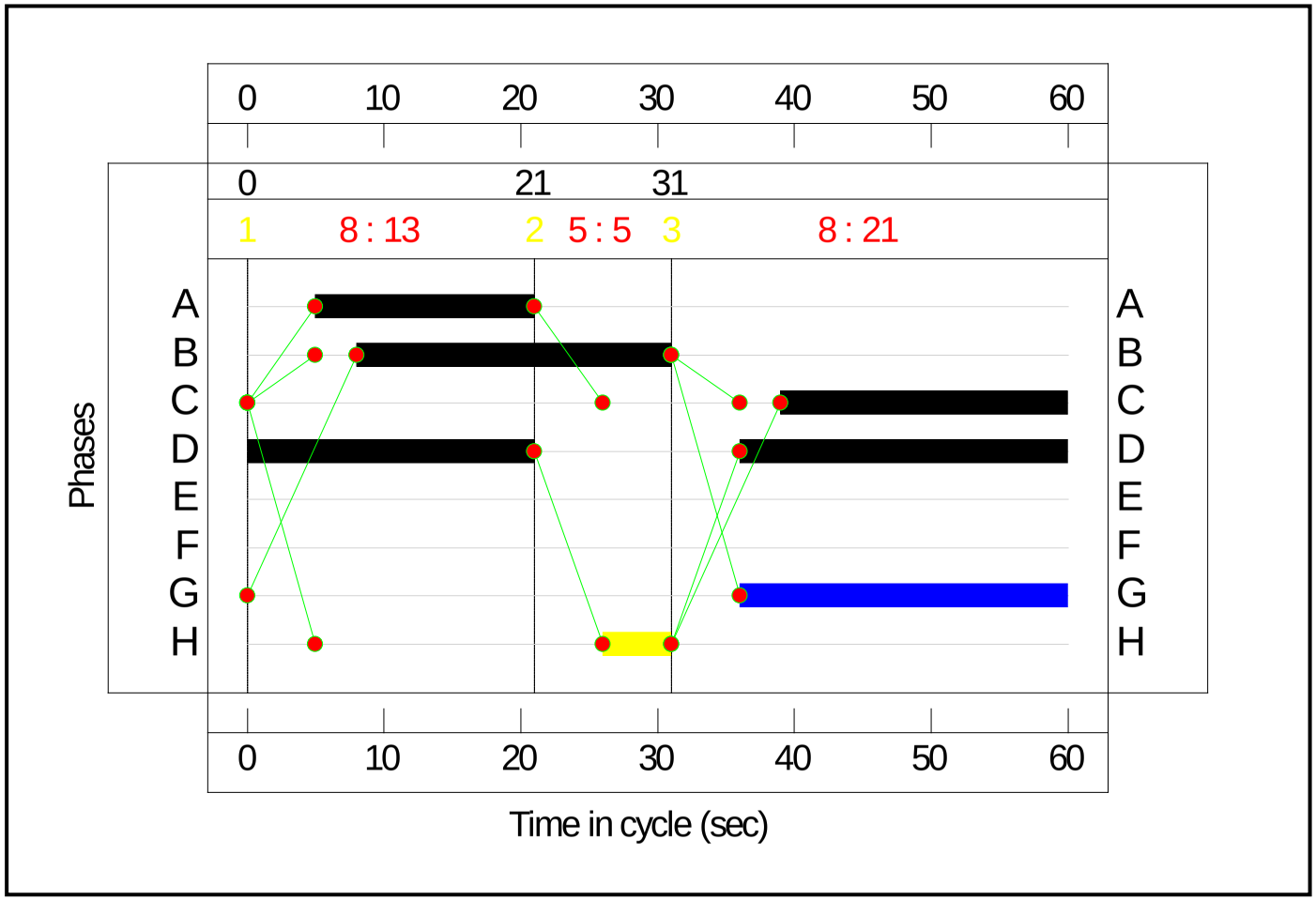
Phase Intergreens Matrix

Terminating Phase	Starting Phase								
		A	B	C	D	E	F	G	H
	A		-	5	-	-	-	-	-
	B	-		5	-	-	-	5	-
	C	5	5		-	-	-	-	5
	D	-	-	-		-	-	-	5
	E	-	-	-	-		-	-	-
	F	-	-	-	-	-		-	-
	G	-	8	-	-	-	-		-
	H	-	-	8	5	-	-	-	

Traffic Flows, Desired Flow:

Origin	Destination				
		A	B	C	Tot.
	A	0	184	3	187
	B	308	0	54	362
	C	358	39	0	397
	Tot.	666	223	57	946

Signal Timings Diagram



Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Greenwich Pumping Station	-	-	-		-	-	-	-	-	-	**66.7%**	**0**	**0**	**0**	**7.6**	-	-
Greenwich High Road / Norman Road junction	-	-	-		-	-	-	-	-	-	**66.7%**	**0**	**0**	**0**	**7.6**	-	-
1/1	A206 Greenwich High Road - east Ahead	U	B		1	23	-	184	1900	760	24.2%	-	-	-	0.8	15.1	2.2
1/2	A206 Greenwich High Road - east Right	U	B		1	23	-	3	1773	709	0.4%	-	-	-	0.0	13.6	0.0
2/1	A206 Greenwich High Road - west Ahead Left	U	A		1	16	-	362	1915	543	66.7%	-	-	-	2.9	28.9	6.3
3/1	B208 Norman Road Left Right	U	C		1	21	-	397	1691	620	64.0%	-	-	-	2.6	23.7	6.3
4/1	A206 Greenwich High Road - east Ahead	U	D		1	45	-	666	1800	1380	48.3%	-	-	-	1.3	7.2	5.2

C1 PRC for Signalled Lanes (%): 34.9 Total Delay for Signalled Lanes (pcuHr): 7.63 Cycle Time (s): 60
PRC Over All Lanes (%): 34.9 Total Delay Over All Lanes(pcuHr): 7.63

Appendix D: Accident analysis

D.1 Existing highway safety analysis

D.1.1 Details of road traffic accident within the vicinity of the site have been obtained from Transport for London (TfL) and have been reviewed to determine whether there are particular problems or trends on the local highway network.

D.1.2 Data on accidents for the most recent five-year period from April 2006 until March 2011 has been analysed for the following junctions and surrounding roads:

- Norman Road (B208)
- Greenwich High Road (A206)
- Greek Road (A200) / Norman Road (B208) / Haddo Street junction
- Norman Road (B208) / Thornham Street junction
- Norman Road (B208) / Tarves Way junction
- Greenwich High Road (A206) / Norman Road (B208) junction
- Greenwich High Road (A206) / Greenwich South Street (A2211) junction
- Greenwich High Road (A206) / Kay Way / Langdale Road junction
- Greenwich High Road (A206) / Waller Way junction
- Greenwich High Road (A206) / Egerton Drive junction
- Greenwich High Road (A206) / Devonshire Drive junction
- Greenwich High Road (A206) / Burgos Grove junction
- Greenwich High Road (A206) / Deptford Bridge (A2) / Blackheath Road (A2) junction.

D.1.3 Based on the DfT Design Manual for Roads and Bridges, Volume 13 Economic Assessment of Road Schemes, accidents have been analysed according to the method outlined in this guidance which states that accidents that have occurred within 20m of each junction are associated with that specific junction, and the remaining accidents are grouped to the relevant links.

D.1.4 The area of interest together with the locations of the recorded road traffic accidents and the severity of the accidents are indicated in Table D.1.

Table D.1 Accident severity 2006 to 2011

Location	Slight	Serious	Fatal	Total
Norman Road (B208)	1	0	0	1
Greenwich High Road (A206)	6	2	0	8

Location	Slight	Serious	Fatal	Total
Greek Road (A200) / Norman Road (B208) / Haddo Street junction	5	3	0	8
Norman Road (B208) / Thornham Street junction	0	0	0	0
Norman Road (B208) / Tarves Way junction	0	0	0	0
Greenwich High Road (A206)) / Norman Road (B208) junction	1	1	0	2
Greenwich High Road (B206) / Greenwich South Street (A2211) junction	5	1	0	6
Greenwich High Road (B206) / Kay Way / Langdale Road junction	1	0	0	1
Greenwich High Road (B206) / Waller Way junction	1	0	0	1
Greenwich High Road (A206) / Egerton Drive junction	0	0	0	0
Greenwich High Road (A206) / Devonshire Drive junction	1	0	0	1
Greenwich High Road (A206) / Burgos Grove junction	2	0	0	2
Greenwich High Road (A206) / Deptford Bridge (A2) / Blackheath Road (A2) junction	8	3	0	11
Total	**31**	**10**	**0**	**41**

D.1.5 A total of 41 accidents occurred in the vicinity of the site over the five years of accident data analysed. Of these accidents, 31 were classified as slight and ten as serious. There were no fatal accidents.

D.1.6 Road traffic accident analysis for individual junctions and roads within the vicinity of the site is discussed below.

Norman Road (B208)

D.1.7 To the east of the site, Norman Road (B208) provides a north-south link between Creek Road (A200) to the north and Greenwich High Road (A206) to the south. Norman Road (b208) is a two-way road with one lane per direction and a speed limit of 30mph.

D.1.8 In total, nine accidents occurred along Norman Road (B208) and at the junctions associated. Those junctions included within this analysis are as follow:

- Creek Road (A200) / Norman Road (B208) / Haddo Street junction
- Norman Road (B208) / Thornham Street junction
- Norman Road (B208) / Tarves Way junction.

D.1.9 Of the total accidents, eight accidents occurred at the junction of Greek Road (A200) / Norman Road (B208) / Haddo Street and one accident occurred along Norman Road (B208) to the north of the junction with Tarves Way.

D.1.10 Three of the total nine accidents which occurred along Norman Road (B208) and at the junctions associated were classified as serious and the remaining six accidents were classified as slight.

D.1.11 The three serious accidents happened at the junction of Greek Road (A200) / Norman Road (B208) / Haddo Street. One of the serious accidents involved a pedestrian hit by a car as she crossed in front of stationary vehicle into path of the car. The pedestrian was a minor and the accident caused by the pedestrian not looking properly and carelessly crossing the road and masked by stationary or parked vehicle.

D.1.12 One serious accident involved a pedal cycle collided with two cars. The accident happened as the cyclist turned left and collided with oncoming vehicle passing parked cars. Failing to look properly, reckless riding and travelling too fast were the main causes of the accident.

D.1.13 The other serious accident involved a car and a motorcycle. The accident caused by the road users not looking properly and failing to judge another person's path or speed.

D.1.14 Of the six slight accidents occurred along Norman Road (B208) and at the junctions associated, three accidents involved pedestrians. One of the pedestrians hit by a motorcycle, one hit by a car, and the other hit by a medium good vehicles (MGV). The three accidents occurred at the junction of Greek Road (A200) / Norman Road (B208) / Haddo Street. Not look properly, driving carelessly and failing to judge the pedestrian's path or speed were the main causes of the accidents.

D.1.15 Of the remaining slight accidents, two accidents involved goods vehicles. One of the accidents involved a car and a light goods vehicles (LGV) collided along Norman Road (B208) to the north of the junction with Tarves Way. The accident happened because the car driver had a hypoglycaemic attack and drove into the back of the LGV.

D.1.16 The other accident involved a LGV and a heavy goods vehicles (HGV) and happened at the junction of Greek Road (A200) / Norman Road (B208) / Haddo Street. The accident happened due to the defective traffic signals.

D.1.17 There was also a slight accident at the junction of Greek Road (A200) / Norman Road (B208) / Haddo Street which involved a car and a motorcycle. Distraction in the car, failing to look properly and sudden braking were the main causes of the accident.

D.1.18 Of the accidents occurred along Norman Road (B208) and the junctions associated, none happened as a result of the road geometry.

Greenwich High Road (A206)

D.1.19 To the south of the site is Greenwich High Road (A206), a two way single carriageway with a speed limit of 30mph which provides a continuous northeast-southwest link between Romney Road (A206) and Greenwich town centre to the northeast and Blackheath Road (A2) and Deptford Bridge (A2) to the southwest.

D.1.20 Greenwich High Road (A206) and Greenwich South Street (A2211) meet at a signalised junction 380m to the northeast of the site. To the northeast, Greenwich High Road (A206) links to Trafalgar Road (A206) and Creek Road (A200).

D.1.21 In total, 32 accidents occurred along Greenwich High Road (A206) and at the junctions associated. Those junctions included within this analysis are as follow:

- Greenwich High Road (A206) / Norman Road (B208) junction
- Greenwich High Road (A206) / Greenwich South Street (A2211) junction
- Greenwich High Road (A206) / Kay Way / Langdale Road junction
- Greenwich High Road (A206) / Waller Way junction
- Greenwich High Road (A206) / Egerton Drive junction
- Greenwich High Road (A206) / Devonshire Drive junction
- Greenwich High Road (A206) / Burgos Grove junction
- Greenwich High Road (A206) / Deptford Bridge (A2) / Blackheath Road (A2) junction.

D.1.22 Of the total 32 accidents occurred along Greenwich High Road (A206) and at the junctions associated, seven were classified as serious with the majority occurred at the junction of Greenwich High Road (A206) / Deptford Bridge (A2) / Blackheath Road (A2), and along Greenwich High Road (A206) away from junctions.

D.1.23 One of the serious accidents which occurred along Greenwich High Road (A206) involved a car which lost control while turning left and mainly caused by driving carelessly and making poor manoeuvres.

D.1.24 Two of the serious accidents involved pedestrians, one occurred at the junction of Greenwich High Road (A206) / Greenwich South Street (A2211) and the other accident happened at the junction of Greenwich High Road (A206) / Norman Road (B208). In both accidents the pedestrians hit by cars. The accidents were caused by aggressive driving, not looking properly and exceeding speed limits.

D.1.25 Two of the serious accidents involved bicycles colliding with cars and they happened at the junction of Greenwich High Road (A206) / Deptford Bridge (A2) / Blackheath Road (A2). The major contributory for the accidents were driving carelessly and travelling too fast or too close.

D.1.26 The remaining two serious accidents involved motorcycles; one occurred at the junction of Greenwich High Road (A206) / Deptford Bridge (A2) /

Blackheath Road (A2) and the other accident happened along Greenwich high Road (A206) away from junctions. Both motorcycles hit by cars and failing to look properly and driving recklessly were the main causes of the accidents.

D.1.27 The remaining 25 accidents were recorded as slight. Seven of these accidents involved pedestrians, one was hit by a HGV at the junction of Greenwich High Road (A206) / Greenwich South Street (A2211), the accident happened due to the pedestrian crossing as the HGV was moving off. The other pedestrian was hit by a motorcycle at the junction of Greenwich High Road (A206) / Waller Way where the motorcycle which was making away from police entered pedestrian area and collided with the pedestrian.

D.1.28 The other five pedestrians were hit by cars, three along Greenwich High Road (A206) away from junctions, one at the junction of Greenwich High Road (A206) / Norman Road (B208), and one at the junction of Greenwich High Road (A206) / Kay Way / Langdale Road. These accidents predominately happened as a result of aggressive driving and the road users failing to look properly.

D.1.29 Nine of the slight accidents involved collisions of bicycles with other vehicles including cars and a HGV. Half of these accidents occurred at the junction of Greenwich High Road (A206) / Deptford Bridge (A2) / Blackheath Road (A2). Failing to judge another person's path or speed, not looking properly, and one vehicle passing too close to cyclists were the main factors to these accidents.

D.1.30 There was one accident which involved a LGV which collided with a bus, and two accidents which involved MGVs, one collided with a car and a HGV, and one collided with a motorcycle. All these accidents happened at the junction of Greenwich High Road (A206) / Deptford Bridge (A2) / Blackheath Road (A2) and mainly caused by not looking properly and making poor manoeuvres.

D.1.31 The remaining six slight accidents involved cars, motorcycles, a taxi, and a bus/coach which predominately occurred at the junctions associated with Greenwich High Road (A206). Reckless driving and failing to look properly were the main causes of the accidents.

D.1.32 Of the accidents occurred along Greenwich High Road (A206) and the junctions associated, none happened as a result of the road geometry.

D.2 Summary and conclusion

D.2.1 During the five year period, the largest number of road traffic accidents occurred at the junction of Greenwich High Road (A206) / Deptford Bridge (A2) / Blackheath Road (A2), and the junction of Greek Road (A200) / Norman Road (B208) / Haddo Street. Most of the accidents which occurred at these two junctions were classified as slight, with six serious accidents.

D.2.2 In total, ten serious accidents occurred in the study area with the majority happened at the junction of Greenwich High Road (B206) / Deptford

Bridge (A2) / Blackheath Road (A2), and the junction of Greek Road (A200) / Norman Road (B208) / Haddo Street. Reckless driving, failing to look properly, poor manoeuvre, and failing to judge other person's path or speed were the main causes of the serious accidents. Hence, the serious accidents which occurred within the study area did not happen as a result of the road geometry.

D.2.3 Of the total accidents, eight accidents occurred in the study area which involved LGVs, MGVs, and HGVs. All these accidents were classified as slight accidents.

D.2.4 Of the five year accident data analysed, the information available suggests that the accidents were primarily the result of road users not looking properly or reckless driving and none of the accidents happened as a result of the road layout.

Appendix E: Road Safety Audits

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Thames Water Utilities

Thames Tideway Tunnel - Greenwich Pumping Station

Stage 1 Road Safety Audit

Project Ref: 27016/033

Doc Ref: 001

February 2013

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Document Control Sheet

Project Name: **Thames Tideway Tunnel - Greenwich Pumping Station**

Project Ref: **27016/033**

Report Title: **Stage 1 Road Safety Audit**

Doc Ref: **001**

Date: **February 2013**

	Name	Position	Signature	Date
Prepared by:	Philip Edwards	Principal Engineer	Philip Edwards	13th February 2013
Reviewed by:	James Horne	Senior Engineer	James Horne	13th February 2013
Approved by:	Alan Fry	Divisional Director pp	Philip Edwards	13th February 2013
For and on behalf of Peter Brett Associates LLP				

Revision	Date	Description	Prepared	Reviewed	Approved

Contents

Appendices

1 Introduction

1.1 Peter Brett Associates LLP have been commissioned to undertake a series of Stage 1 Road Safety Audits on proposals associated with the construction of the Thames Tideway Tunnel project in London.

1.2 This Audit has been undertaken on the highway aspects of the proposal at Greenwich Pumping Station, Greenwich and considers both the situation during the construction phase and post construction.

1.3 The surrounding highway network is urban in nature, within a 30mph speed limit, is illuminated by a system of street lighting, generally with footways on both sides of the carriageways.

1.4 The scheme proposals that affect the existing highway consist of the following design aspects:-

- Construction Phases:-
  - Use existing access serving the existing pumping station off Greenwich High Road;
  - Use a combination of 4 existing accesses and 1 new access off Norman Road (for the purposes of this report referred to as Norman Road Accesses 1 to 5 – refer to site reference plan);
  - Temporary diversion of pedestrian / cycle link from Norman Road to Creekside;
  - Estimated 154 construction vehicles per day between 8:00 and 18:00;
- Operational Phase:-
  - Highway layout to be returned to its current layout i.e. parking bay reinstated pedestrian / cycle link to Creekside returned to original alignment;
  - 6 monthly maintenance access required by transit van off Norman Road;
  - 10 yearly maintenance required by rigid HGV / mobile crane off Norman Road;

1.5 The Audit Team Membership was as follows:-

Audit Team Leader:-

Philip Edwards Peter Brett Associates, Northampton

Team member:-

James Horne Peter Brett Associates, Northampton

The Audit Team are independent of the Design Team.

1.6 The Audit took place during December 2012 / January / February 2013. The Audit Team visited the site on 6th December 2012 between 10:15 and 10:45. The weather during the site visit was cold but sunny. The Audit comprises of an examination of the documents listed in Appendix A.

1.7 The Audit Team have not been made aware of any Departure from Standards identified with this proposed scheme. The Audit Team have not been provided with a specific Audit Brief but have received a number of documents that describe the proposed works.

1.8 The Audit Team have received a document summarising the recorded collision data within the surrounding highway network for a 5 year period (April 2006 to March 2011). The Audit Team have not been provided with the raw collision data, therefore, a full review and analysis of the recorded collisions cannot be undertaken as part of this Audit.

1.9 The Terms of Reference of this Audit are as described in Transport for London (TfL) Procedure SQA-0170. The Audit Team has examined and reported only on the road safety implications of the scheme as presented and has not examined or verified the compliance of the designs to any other criteria. However, to clearly explain a safety problem or the recommendation to resolve a problem the Audit Team may, on occasion, have referred to a design standard without touching on technical Audit.

1.10 This Audit has a maximum shelf life of 2 years. Should the scheme not progress to the next stage in its development within this period it should be re-audited.

1.11 Problems identified in the report are indicated by location and are shown on the site reference plan in Appendix B.

2 Items Raised from this Stage 1 Road Safety Audit

Construction Phase

2.1 Problem

Location - All Accesses

Summary - Vehicle Swept Paths Not Fully Tested

The swept path drawing provided illustrates turning manoeuvres for vehicles arriving and departing via Norman Road south to Greenwich High Road, but not to the north towards A200 Creek Road (Norman Road Access 5 is also illustrated with vehicles departing to the north). Therefore, it is not clear that all manoeuvres can be achieved without vehicles conflicting with opposing traffic or overrunning footways. Furthermore, the speed of the Design Vehicles used for the swept path analysis is not stated.

Recommendation

Further swept path analysis should be undertaken to check that all anticipated manoeuvres of construction traffic associated with the site can be achieved without conflicting with opposing traffic or overrunning footways. These should be completed at realistic speeds for the respective manoeuvres.

2.2 Problem

Location - All Accesses

Summary - Site boundary Walls and Fences Restrict Visibility

The existing boundary walls and fences around the perimeter of the site adjacent to all proposed access are high. Intervisibility between drivers emerging from the site and pedestrians on the footway will be severely restricted when vehicles are exiting from the site.

Recommendation

The detailed design should ensure that there will be adequate intervisibility at the back of footway.

2.3 Problem

Location - Access on Greenwich High Road

Summary - Existing Access Unsuitable for use by Large Vehicles

The proposed access point in Greenwich High Road is an existing access to the pumping station. No details of swept path movements have been provided for this particular access. It is noted that this access is designated for “light vehicles” on the various Construction Phase drawings. However, it is not clear what will define “light vehicles. By inspection on site, it would appear that the access is narrow and even “Transit” sized vehicles are likely to overrun the footway. Pedestrians will be at risk from vehicles turning. Also, the footway may be

damaged by turning vehicles resulting to an uneven surface and trip hazards. The existing access comprises cobbles with evidence of reinstatements leaving an uneven surface which may deteriorate further with heavy use.

Recommendation

The suitability of the access for use by “light vehicles” vehicles should be reviewed. If it is to be used it is recommended that the access is reconstructed to provide a heavy duty vehicular crossing with amended geometry suitable to accommodate intended vehicles turning in and out of the access.

2.4 Problem

Location - Norman Road Access 2

Summary - Parking Bays Restrict Manoeuvring Vehicles

There are parking bays opposite Norman Road Access 2. These affect the swept path for vehicles exiting at this location resulting in rear axles passing over the vehicular crossing at an acute angle and necessitating a wider vehicular crossing. This is likely to increase the risk to pedestrians using the footway being struck by a vehicle.

Recommendation

In order to provide more space for manoeuvring vehicles and to minimise the conflict with pedestrians on the footway, parking bays opposite Norman Road Access 2 should be suspended.

See also 2.8 below.

2.5 Problem

Location - Norman Road Access 5

Summary - Visibility Restricted by Parked Vehicles

Visibility from Norman Road Access 5 will be restricted to the north by vehicles in the on-street parking bays.

Recommendation

Parking bays north of Norman Road Access 5 should be suspended in order to safeguard adequate visibility for drivers exiting from the site.

2.6 Problem

Location - Norman Road Access 2

Summary - Vegetation Restricts Visibility

The information provided implies this will be used for egress from part of the site. There is existing vegetation to the south of the access which could restrict visibility of approaching traffic especially for a driver in a high cab.

Recommendation

Existing vegetation should be cut back to ensure adequate visibility is achieved. Vegetation should be maintained clear of visibility splays through the period the access is in use.

See also 2.9 below.

2.7 Problem

Location - Pedestrian / Cycle Link Diversion

Summary - Boundary Walls Restrict Visibility

It is proposed to realign the pedestrian cycle link form Norman Road towards Creek Side. The path will be bounded by existing walls which will restrict intervisibility between pedestrians on the footway and pedestrians and cyclists approaching Norman Road on the pedestrian / cycle link. Also, drivers on Norman Road would have restricted visibility to any pedestrian or, more likely, cyclists emerging from the link onto the carriageway without giving way.

Recommendation

Ideally, the pedestrian / cycle link should be retained on its existing alignment. (By inspection, it appears that that Norman Road Access 3 may not be essential). Should this not be possible, visibility at the end of the pedestrian / cycle link should be improved. Recognising that to the north this will be impractical due to the proximity of the existing bridge abutment, measures should also be provided to deflect people approaching Norman Road on the link from the adjacent walls, and encourage them to approach slowly and be prepared to stop.

Operational Phase (Post Construction)

2.8 Problem

Location - Norman Road Access 2

Summary - Parking Bays Restrict Manoeuvring Vehicles

Further to 2.4 above, there are parking bays opposite the permanent maintenance access which will affect the swept path for vehicles using the access resulting in rear axles passing over the vehicular crossing at an acute angle and necessitating a wider vehicular crossing. This is likely to increase the risk of pedestrians using the footway being struck by a vehicle. However, it is noted that the proposed maintenance access will be used infrequently and also that the proposed maintenance vehicles are smaller than the construction traffic. Therefore, the overall risk arising from this situation may be considered to be lower. The Design Team in conjunction with the Highway Authority will have to decide whether or not the risk is acceptable.

However, if the access be used more frequently and by larger vehicles than envisaged, the Audit Team consider would reiterate the problem as stated in 2.5 above.

Recommendation

If the access be used more frequently and by larger vehicles than envisaged, the Audit Team recommend that in order to provide more space for manoeuvring vehicles and to minimise the conflict with pedestrians on the footway, parking bays opposite Norman Road Access 2 should be suspended.

Otherwise, assuming that the access is used infrequently and by smaller maintenance vehicles as currently envisaged, the Design Team in conjunction with the Highway Authority should assess whether or not the risk is acceptable.

2.9 Problem

Location - Norman Road Access 2

Summary - Vegetation Restricts Visibility

Further to 2.6 above, there is existing vegetation to the south of the access which could restrict visibility of approaching traffic especially for a driver in a high cab.

Recommendation

Existing vegetation should be cut back to ensure adequate visibility is achieved and maintained.

3 Audit Team Statement

We certify that we have examined the drawings and documents listed in Appendix A to this Road Safety Audit Report. The Road Safety Audit has been carried out within the sole purpose of identifying any feature that could be removed or modified in order to improve the safety of the scheme. The problems identified have been noted in this report together with associated suggestions for safety improvements that we recommend should be studied for implementation.

No one on the Audit Team has been involved with the design of the measures.

Audit Team Leader:

Name: Philip Edwards Signed:

Position: Principal Engineer Date: 13th February 2013

Organisation: Peter Brett Associates

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Audit Team Members:

Name: James Horne Signed:

Position: Senior Engineer Date: 13th February 2013

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Appendix A

Appendix A

Information Utilised in this Stage 1 Road Safety Audit:-

- Figure 24.2.1 – Site Location Plan;
- Figure 24.2.2 – Construction Traffic Routes;
- Figure 24.4.7 – Accident Locations;
- DCO-PP-23X-GREPS-240003– Access Plan;
- DCO-PP-23X-GREPS-240009– Permanent Works Layout;
- DCO-PP-23X-GREPS-240027– Construction Phases – Phase 1 Site Setup & Shaft Construction;
- DCO-PP-23X-GREPS-240028– Construction Phases – Phase 2 Tunnelling;
- DCO-PP-23X-GREPS-240029– Construction Phases – Phase 3 Other Structures;
- DCO-PP-23X-GREPS-240032- Existing Highway Layout.
- DCO-PP-23X-GREPS-240033– Highway Layout During Construction;
- DCO-PP-23X-GREPS-240034– Permanent Highway Layout;
- DCO-PP-23X-GREPS-240035– Highway Layout During Construction Vehicle Swept Path Analysis;
- DCO-PP-23X-GREPS-240036– Permanent Highway Layout Vehicle Swept Path Analysis;
- 213601-01 – Greenwich Pumping Station, Facility and Amenity Map;
- Highway Mitigation Plans;
- Technical Note – Information for Greenwich Pumping Station Stage 1 RSA;
- Technical Memorandum – Greenwich Pumping Station – Accident Analysis;

NB Some of the above drawings indicate a note that states ‘See Schedule of Works’. The Audit Team have not been provided with this Schedule.

Appendix B

Appendix B

Site Reference Plan – Figure 1

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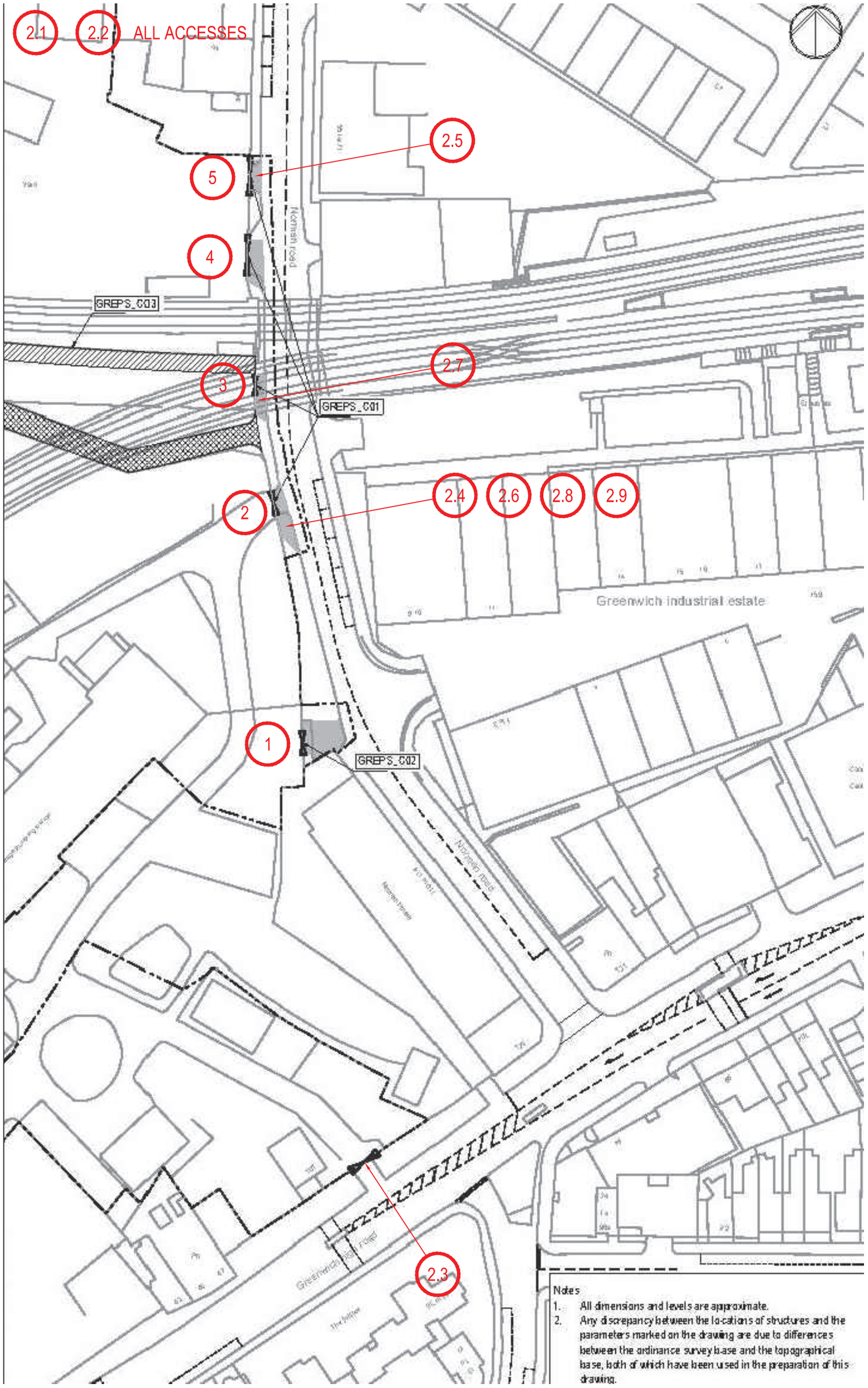

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Client

THAMES WATER UTILITIES

SCALING NOTE: Do not scale from this drawing. If in doubt, ask.
UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake his own investigation where the presence of any existing sewers, services, plant or apparatus may affect his operations.

THAMES TIDEWAY TUNNEL
GREENWICH PUMPING STATION

SITE REFERENCE PLAN

Mark	Revision	Drawn	Date	Chkd

Drawing Status: STAGE 1 ROAD SAFETY AUDIT

Date of 1st Issue	15/02/13
A3 Scale	N.T.S.
Drawn by	MA
Checked by	PE

Drawing Number: FIGURE 1
J:\Safety Audits\27016 Thames Tunnel\Acad\dwg\27016_SIRSA_005 - FIGURE 1.dwg

Revision: -

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Technical Note

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Project title	Thames Tideway Tunnel	Job number	211146-04
cc		File reference	211146
Prepared by	F Jahanshahi	Date	15 February 2013
Subject	RSA Stage 1 - Designers response for Greenwich Pumping Station		

1 Introduction

This report is the Designer's Response to the Stage 1 Road Safety Audit Report for Greenwich Pumping Station completed in February 2013.

2 Responses to the items arising from the Stage 1 Road Safety Audit

2.1 Problem –

Location: *All accessed*

Summary: *Vehicle Swept Paths Not Fully Tested*

Description: The swept path drawing provided illustrates turning manoeuvres for vehicles arriving and departing via Norman Road south to Greenwich High Road, but not to the north towards A200 Creek Road (Norman Road Access 5 is also illustrated with vehicles departing to the north). Therefore, it is not clear that all manoeuvres can be achieved without vehicles conflicting with opposing traffic or overrunning footways. Furthermore, the speed of the Design Vehicles used for the swept path analysis is not stated.

Recommendation: Further swept path analysis should be undertaken to check that all anticipated manoeuvres of construction traffic associated with the site can be achieved without conflicting with opposing traffic or overrunning footways. These should be completed at realistic speeds for the respective manoeuvres.

Designer's response

Recommendation noted. Detail design (stage 2) will review the swept path analysis further to ensure that the manoeuvres of the construction traffic can be achieved without conflicting the opposing traffic or overrunning footways.

During all phases of construction, construction vehicles would use Blackheath Road (A2). They would approach the site northeast bound along Greenwich High Road (A206) and northbound along Norman Road (B208), using a left turn in / left turn out basis to enter and exit the site. Vehicles leaving the site would travel southbound along Norman Road (B208) and southwest along Greenwich High Road (A206) to Blackheath Road (A2).

The speed of the design vehicles manoeuvring has been carried at in 5km/h. This is shown in the construction vehicle swept path analysis plan in the Greenwich Pumping Station *Transport Assessment* figures.

2.2 Problem –

Location: *All accesses*

Summary: *Site boundary Walls and Fences Restrict Visibility*

Description: The existing boundary walls and fences around the perimeter of the site adjacent to all proposed access are high. Intervisibility between drivers emerging from the site and pedestrians on the footway will be severely restricted when vehicles are exiting from the site.

Recommendation: The detailed design should ensure that there will be adequate intervisibility at the back of footway.

Designer's response

Recommendation noted. Detail design (stage 2) will review construction vehicle access arrangements to ensure access / egress points have adequate forward visibility, including detailing of barrier type and additional road markings that may be required.

2.3 Problem –

Location: *Access on Greenwich High Road*

Summary: *Existing Access Unsuitable for use by Large Vehicles*

Description: The proposed access point in Greenwich High Road is an existing access to the pumping station. No details of swept path movements have been provided for this particular access. It is noted that this access is designated for "light vehicles" on the various Construction Phase drawings. However, it is not clear what will define "light vehicles. By inspection on site, it would appear that the access is narrow and even "Transit" sized vehicles are likely to overrun the footway. Pedestrians will be at risk from vehicles turning. Also, the footway may be damaged by turning vehicles resulting to an uneven surface and trip hazards. The existing access comprises cobbles with evidence of reinstatements leaving an uneven surface which may deteriorate further with heavy use.

Recommendation: The suitability of the access for use by “light vehicles” vehicles should be reviewed. If it is to be used it is recommended that the access is reconstructed to provide a heavy duty vehicular crossing with amended geometry suitable to accommodate intended vehicles turning in and out of the access.

Designer’s response

Recommendation noted. Detail design (stage 2) will review construction vehicle access arrangements to / from Greenwich High Road (A206) to ensure access / egress points have adequate space for construction vehicles to enter and exit the site.

2.4 Problem –

Location: *Norman Road Access 2*

Summary: *Parking Bays Restrict Manoeuvring Vehicles*

Description: There are parking bays opposite Norman Road Access 2. These affect the swept path for vehicles exiting at this location resulting in rear axles passing over the vehicular crossing at an acute angle and necessitating a wider vehicular crossing. This is likely to increase the risk to pedestrians using the footway being struck by a vehicle.

Recommendation: In order to provide more space for manoeuvring vehicles and to minimise the conflict with pedestrians on the footway, parking bays opposite Norman Road Access 2 should be suspended.

See also 2.8 below.

Designer’s response

Recommendation noted. The construction vehicle swept path analysis plan will be amended to ensure all manoeuvres can be completed without conflicting with pedestrians on the footway at detail design (stage 2).

2.5 Problem –

Location: *Norman Road Access 5*

Summary: *Visibility Restricted by Parked Vehicles*

Description: Visibility from Norman Road Access 5 will be restricted to the north by vehicles in the on-street parking bays.

Recommendation: Parking bays north of Norman Road Access 5 should be suspended in order to safeguard adequate visibility for drivers exiting from the site.

Designer's response

Recommendation noted. Currently there is no proposal for the suspension of any car parking along Norman Road (B208) as part of the construction works at the Greenwich Pumping Station site. However, at detail design (stage 2) the visibility of the construction vehicles egressing the access points on Norman Road (B208) will be reviewed and car parking bays would be restricted if required.

2.6 Problem –

Location: *Norman Road Access 2*

Summary: *Vegetation Restricts Visibility*

Description: The information provided implies this will be used for egress from part of the site. There is existing vegetation to the south of the access which could restrict visibility of approaching traffic especially for a driver in a high cab.

Recommendation: Existing vegetation should be cut back to ensure adequate visibility is achieved. Vegetation should be maintained clear of visibility splays through the period the access is in use.

See also 2.9 below.

Designer's response

Recommendation noted. Detail design (stage 2) will review construction vehicle access arrangements to ensure access / egress points have adequate forward visibility.

2.7 Problem –

Location: *Pedestrian / Cycle Link Diversion*

Summary: *Boundary Walls Restrict Visibility*

Description: It is proposed to realign the pedestrian cycle link form Norman Road towards Creek Side. The path will be bounded by existing walls which will restrict intervisibility between pedestrians on the footway and pedestrians and cyclists approaching Norman Road on the pedestrian / cycle link. Also, drivers on Norman Road would have restricted visibility to any pedestrian or, more likely, cyclists emerging from the link onto the carriageway without giving way.

Recommendation: Ideally, the pedestrian / cycle link should be retained on its existing alignment. (By inspection, it appears that that Norman Road Access 3 may not be essential). Should this not be possible, visibility at the end of the pedestrian / cycle link should be improved. Recognising that to the north this will be impractical due to the proximity of the existing bridge abutment, measures should also be provided to deflect people approaching Norman Road on the link from the adjacent walls, and encourage them to approach slowly and be prepared to stop.

Designer's response

Recommendation noted. Detail design (stage 2) will review to ensure there would be adequate visibility at the end of the pedestrian / cycle link and that measures would be provided if required.

Operational Phase (Post Construction)

2.8 Problem –

Location: *Norman Road Access 2*

Summary: *Parking Bays Restrict Manoeuvring Vehicles*

Description: Further to 2.4 above, there are parking bays opposite the permanent maintenance access which will affect the swept path for vehicles using the access resulting in rear axles passing over the vehicular crossing at an acute angle and necessitating a wider vehicular crossing. This is likely to increase the risk of pedestrians using the footway being struck by a vehicle. However, it is noted that the proposed maintenance access will be used infrequently and also that the proposed maintenance vehicles are smaller than the construction traffic. Therefore, the overall risk arising from this situation may be considered to be lower. The Design Team in conjunction with the Highway Authority will have to decide whether or not the risk is acceptable.

However, if the access be used more frequently and by larger vehicles than envisaged, the Audit Team consider would reiterate the problem as stated in 2.5 above.

Recommendation: If the access be used more frequently and by larger vehicles than envisaged, the Audit Team recommend that in order to provide more space for manoeuvring vehicles and to minimise the conflict with pedestrians on the footway, parking bays opposite Norman Road Access 2 should be suspended.

Otherwise, assuming that the access is used infrequently and by smaller maintenance vehicles as currently envisaged, the Design Team in conjunction with the Highway Authority should assess whether or not the risk is acceptable.

Designer's response

Recommendation noted. The vehicle swept path analysis plan for the operation phase will be reviewed and will be amended if required to ensure all manoeuvres can be completed without conflicting with pedestrians on the footway at detail design (stage 2).

2.9 Problem –

Location: *Norman Road Access 2*

Summary: *Vegetation Restricts Visibility*

Description: Further to 2.6 above, there is existing vegetation to the south of the access which could restrict visibility of approaching traffic especially for a driver in a high cab.

Technical Note

211146-04 15 February 2013

Recommendation: Existing vegetation should be cut back to ensure adequate visibility is achieved and maintained.

Designer's response

Recommendation noted. Detail design (stage 2) will review construction vehicle access arrangements to ensure access / egress points have adequate forward visibility.

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name	F Jahanshahi	G Wicks	S Jenkins
Signature			

Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Transport Assessment

Doc Ref: **7.10.21**

Greenwich Pumping Station

Figures

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

Hard copy available in

Box **53** Folder **B**
January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

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Thames Tideway Tunnel

Transport Assessment

Section 24: Greenwich Pumping Station figures

List of contents

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Plans

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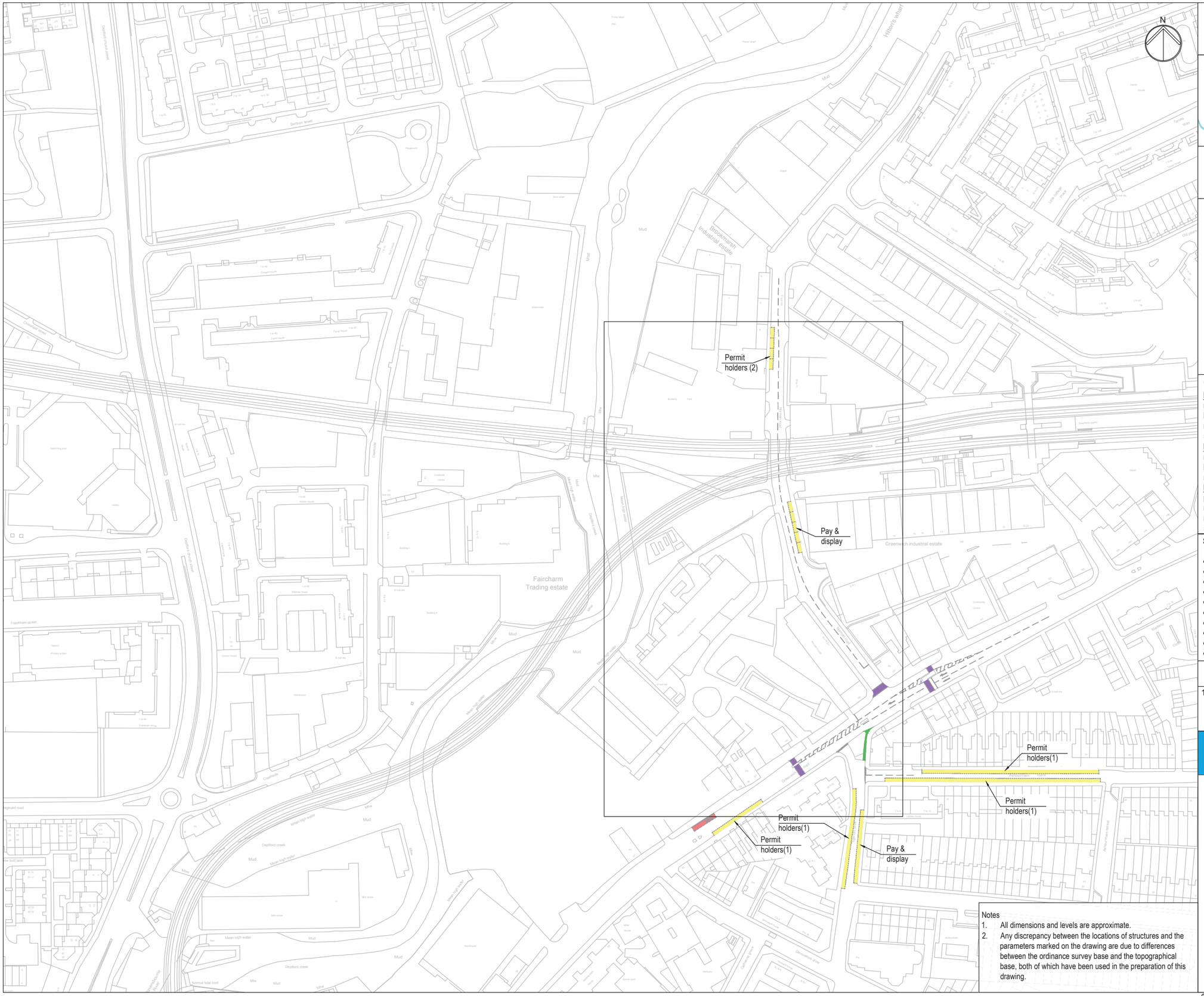
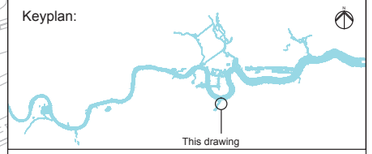
Greenwich Pumping Station

THAMES TIDEWAY TUNNEL - SCHEDULE OF ASSOCIATED HIGHWAY WORKS

Drawing Number	Works Reference	Location	Item of Work	Date of Implementation
DCO-PP-23X-GREPS-240033	GREPS_C01	Norman Road	Creation of enlarged access points. Including vehicle crossover area	TBC
	GREPS_C02	Norman Road	Creation of access point. Including vehicle crossover area	TBC
	GREPS_C03	Norman Road	Removal of existing footpath and provision of a new footpath adjacent to Deptford Creek. Approx length 90m	TBC
DCO-PP-23X-GREPS-240034	GREPS_P01	Norman Road	Reinstatement of footway/crossovers.	TBC
	GREPS_P02	Footpath from Norman Rd	Temporary footpath removed and permanent footpath reinstated.	TBC



Keyplan:



Coordinates are to be Ordance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

Key

- On street parking
- Bus stop / stand
- Pedestrian crossing
- Cycle lane / advance stop line

On street parking

Permit holders (1)
resident & business permit holders only
mon - sat 9.00am - 5.00pm
sun 9.00am - 6.00pm

Permit holders (2)
resident & business permit holders only
mon - fri 9.00am - 10.00pm

Pay & display
pay & display parking
maximum 4 hours
mon - sat 9:00am - 5:00pm
sun 9:00am - 6:00pm

Standards

- Design manual for roads and bridges, Dft, 1992
- Traffic signs regulations & general directions, TSO, 2002
- Traffic signs manual, Dft, 2006
- Manual for streets, Dft, 2007
- Manual for streets 2, CIHT, 2010
- Designing for deliveries, Fta, 1998
- Cycle infrastructure design Ltn 2/08, Dft, 2008
- Design of pedestrian crossings Ltn 2/95, Dft, 1995
- Guidance for the use of tactile paving, Dft, 1998
- Accessible bus stop design guidance, TfL, 2006

Stage
Existing

10m 0 100m

Scale 1:1000 at A1
1:2000 if reproduced at A3

FOR INFORMATION

Location
Greenwich pumping station
Royal Borough of Greenwich

Document Information
Application for Development Consent
Existing highway layout

DCO-PP-23X-GREPS-240032
January 2013

Notes
1. All dimensions and levels are approximate.
2. Any discrepancy between the locations of structures and the parameters marked on the drawing are due to differences between the ordinance survey base and the topographical base, both of which have been used in the preparation of this drawing.

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Existing highway layout

Highway layout during construction

GREPS_C03

GREPS_C01

GREPS_C02

Norman road

Greenwich industrial estate

Greenwich High Road

Norman House

The Jubilee

Lamley house

Keyplan:

Coordinates are to be Ordance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

Key

Existing
- On street parking
- Bus stop / stand
- Pedestrian crossing
- Cycle lane / advance stop line

Revised
- L.L.A.U.
- Vehicle crossover area
- Temporary closure of footpath
- Temporary footpath
- GREPS_c00 See schedule of works
- Site access

On street parking

Pay & display
pay & display parking
maximum 4 hours
mon - sat 9:00am - 5:00pm
sun 9:00am - 6:00pm

Permit holders (1)
resident & business permit holders only
mon - sat 9.00am - 5.00pm
sun 9.00am - 6.00pm

Permit holders (2)
resident & business permit holders only
mon - fri 9.00am - 10.00pm

Standards

- Design manual for roads and bridges, Dft, 1992
- Traffic signs regulations & general directions, TSO, 2002
- Traffic signs manual, Dft, 2006
- Manual for streets, Dft, 2007
- Manual for streets 2, CIHT, 2010
- Designing for deliveries, Fta, 1998
- Cycle infrastructure design Ltn 2/08, Dft, 2008
- Design of pedestrian crossings Ltn 2/95, Dft, 1995
- Guidance for the use of tactile paving, Dft, 1998
- Accessible bus stop design guidance, TfL, 2006

Stage
Construction

10m 0 40m

Scale 1:500 at A1
1:1000 if reproduced at A3

ILLUSTRATIVE

Location
Greenwich pumping station
Royal Borough of Greenwich

Document Information
Application for Development Consent
Highway layout during construction

DCO-PP-23X-GREPS-240033
January 2013

Notes
1. All dimensions and levels are approximate.
2. Any discrepancy between the locations of structures and the parameters marked on the drawing are due to differences between the ordinance survey base and the topographical base, both of which have been used in the preparation of this drawing.

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

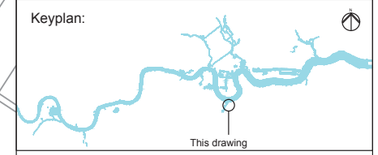
Thames Water

Existing highway layout

Permanent highway layout

N

Keyplan:



Coordinates are to be Ordnance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

Key

Existing
- On street parking
- Bus stop / stand
- Pedestrian crossing

Revised
- Reinstated footway / vehicle crossover
- Temporary footway removed
- Vehicle crossover. (Permanent access point)
- GREPS_P00 See schedule of works

On street parking

Permit holders (1)
resident & business permit holders only
mon - sat 9.00am - 5.00pm
sun 9.00am - 6.00pm

Permit holders (2)
resident & business permit holders only
mon - fri 9.00am - 10.00pm

Pay & display
pay & display parking
maximum 4 hours
mon - sat 9:00am - 5:00pm
sun 9:00am - 6:00pm

Standards

- Design manual for roads and bridges, Dft, 1992
- Traffic signs regulations & general directions, TSO, 2002
- Traffic signs manual, Dft, 2006
- Manual for streets, Dft, 2007
- Manual for streets 2, CIHT, 2010
- Designing for deliveries, Fta, 1998
- Cycle infrastructure design Ltn 2/08, Dft, 2008
- Design of pedestrian crossings Ltn 2/95, Dft, 1995
- Guidance for the use of tactile paving, Dft, 1998
- Accessible bus stop design guidance, TfL, 2006

Stage
Permanent

10m 0 40m

Scale 1:500 at A1
1:1000 if reproduced at A3

ILLUSTRATIVE

Location
Greenwich pumping station
Royal Borough of Greenwich

Document Information
Application for Development Consent
Permanent highway layout

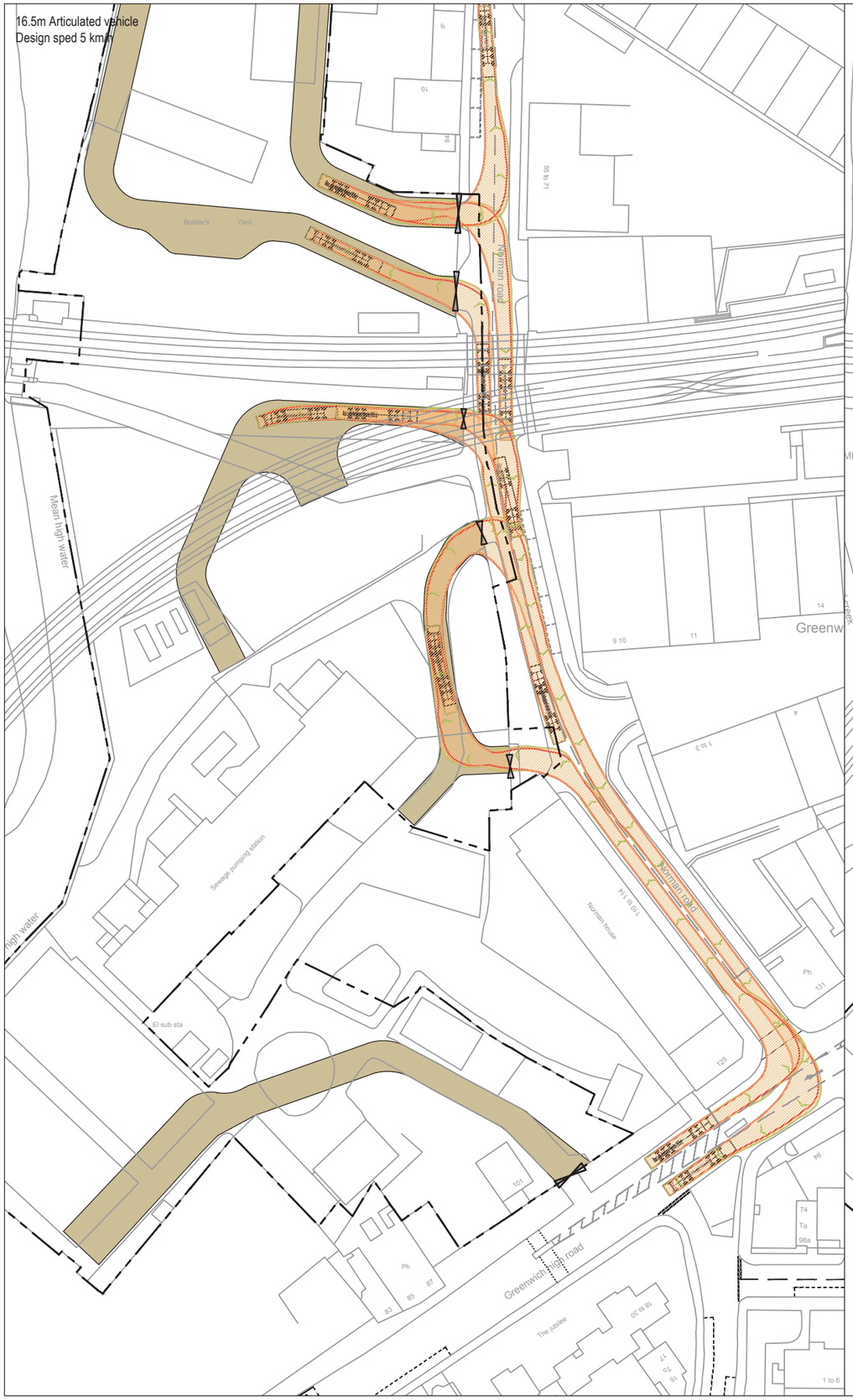
DCO-PP-23X-GREPS-240034
January 2013

Notes
1. All dimensions and levels are approximate.
2. Any discrepancy between the locations of structures and the parameters marked on the drawing are due to differences between the ordnance survey base and the topographical base, both of which have been used in the preparation of this drawing.

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

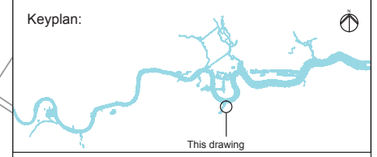
16.5m Articulated vehicle
Design sped 5 km/h



12.0m Rigid vehicle
Design sped 5 km/h

Notes
1. All dimensions and levels are approximate.
2. Any discrepancy between the locations of structures and the parameters marked on the drawing are due to differences between the ordinance survey base and the topographical base, both of which have been used in the preparation of this drawing.

Keyplan:



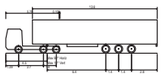
Coordinates are to be Ordance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

Key

Revised
- Illustrative on-site manoeuvring zone

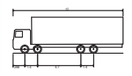
Vehicle swept path analysis
- Vehicle body outlines
- Vehicle chassis outline
- Vehicle swept path
- L.L.A.U
- Site access

16.5m Articulated vehicle



Max Legal Articulated Vehicle (16.5m)	
Overall Length	16.500m
Overall Width	2.500m
Overall Body Height	3.652m
Min Body Ground Clearance	0.396m
Max Track Width	2.500m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	8.870m

12.0m Rigid vehicle



Rigid Truck	
Overall Length	12.000m
Overall Width	2.500m
Overall Body Height	3.928m
Min Body Ground Clearance	0.412m
Track Width	2.47 m
Lock to Lock Time	4.00 sec
Kerb to Kerb Turning Radius	11.900m

Standards

- Design manual for roads and bridges, Dft, 1992
- Traffic signs regulations & general directions, TSO, 2002
- Traffic signs manual, Dft, 2006
- Manual for streets, Dft, 2007
- Manual for streets 2, CIHT, 2010
- Designing for deliveries, Fta, 1998
- Cycle infrastructure design Ltn 2/08, Dft, 2008
- Design of pedestrian crossings Ltn 2/95, Dft, 1995
- Guidance for the use of tactile paving, Dft, 1998
- Accessible bus stop design guidance, TfL, 2006

Stage
Construction

10m 0 40m

Scale 1:500 at A1
1:1000 if reproduced at A3

ILLUSTRATIVE

Location
Greenwich pumping station
Royal Borough of Greenwich

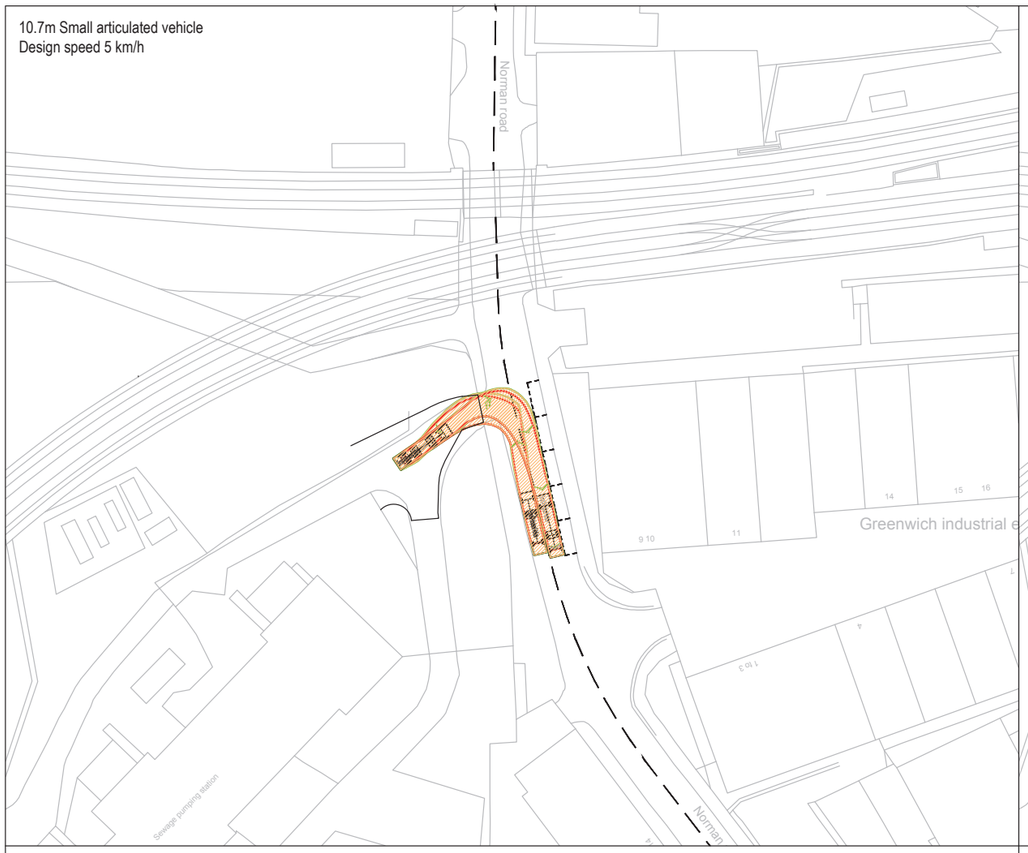
Document Information
Application for Development Consent
Highway layout during construction
Swept path analysis

DCO-PP-23X-GREPS-240035
January 2013

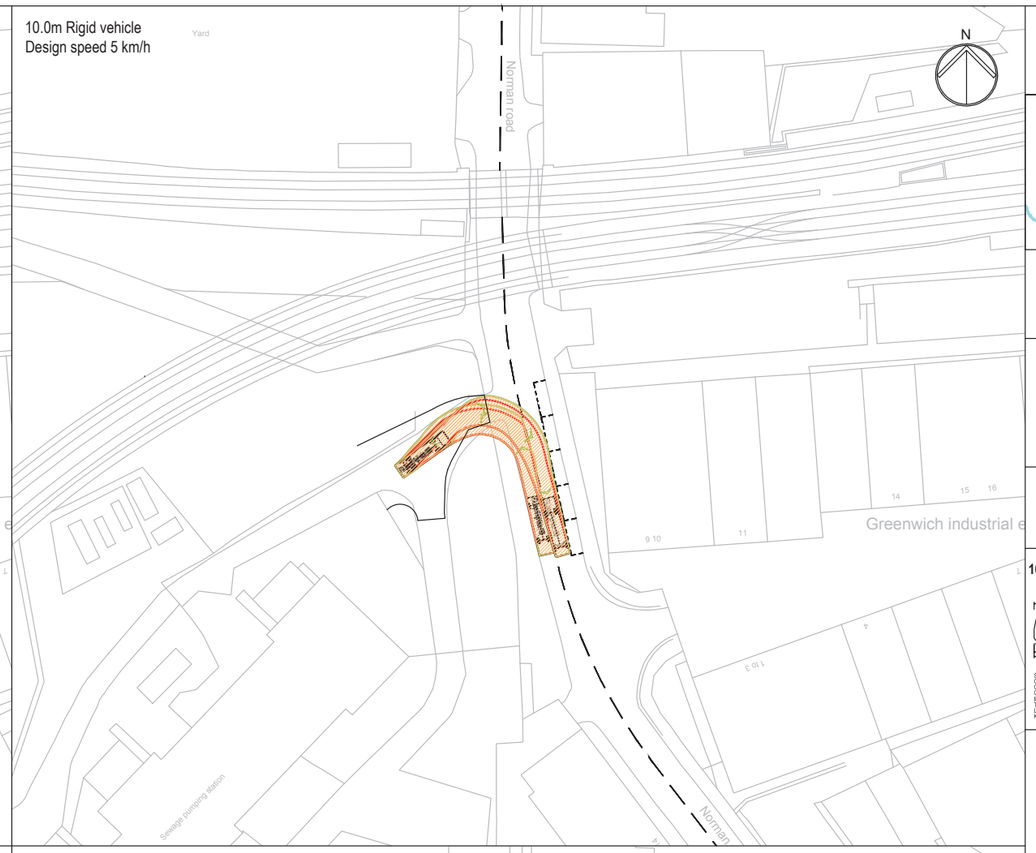
Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

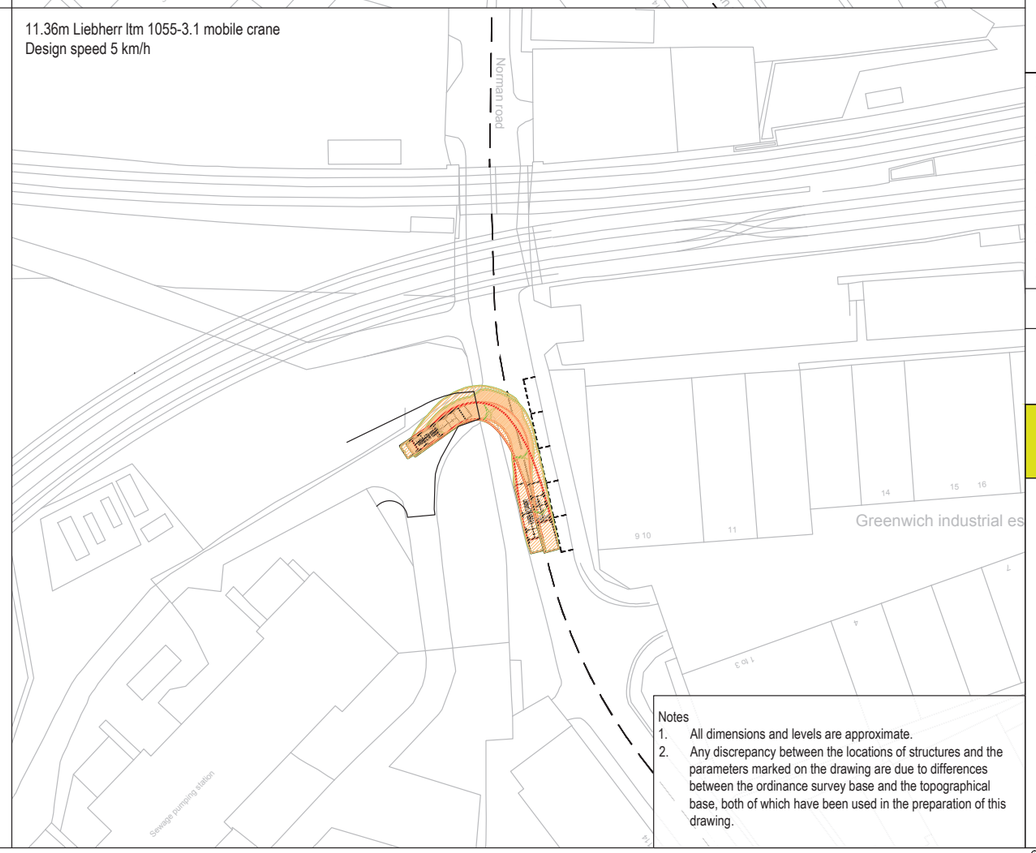
10.7m Small articulated vehicle
Design speed 5 km/h



10.0m Rigid vehicle
Design speed 5 km/h



11.36m Liebherr ltm 1055-3.1 mobile crane
Design speed 5 km/h



Notes
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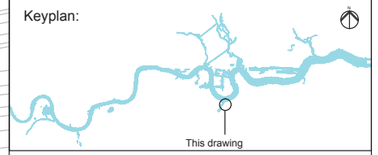
Keyplan:

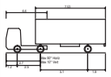


Coordinates are to be Ordance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

Key

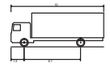
Vehicle swept path analysis
- Vehicle body outlines
- Vehicle chassis outline
- Vehicle swept path

10.7m Small articulated vehicle



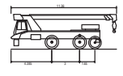
Small Articulated Vehicle	
Overall Length	10.700m
Overall Width	2.360m
Overall Body Height	3.604m
Min Body Ground Clearance	0.382m
Track Width	2.345m
Lock to Lock Time	4.00sec
Kerb to Kerb Turning Radius	9.740m

10.0m Rigid vehicle



FTA Design HG Rigid Vehicle (1998)	
Overall Length	10.000m
Overall Width	2.500m
Overall Body Height	3.645m
Min Body Ground Clearance	0.440m
Track Width	2.470m
Lock to Lock Time	4.00sec
Kerb to Kerb Turning Radius	11.000m

11.36m Liebherr ltm 1055-3.1 mobile crane



Liebherr LTM 1055-3.1 Mobile Crane	
Overall Length	11.360m
Overall Width	2.500m
Overall Body Height	3.733m
Min Body Ground Clearance	0.400m
Track Width	2.500m
Lock to Lock Time	4.00 sec
Wall to Wall Turning Radius	8.170m

Standards

- Design manual for roads and bridges, Dft, 1992
- Traffic signs regulations & general directions, TSO, 2002
- Traffic signs manual, Dft, 2006
- Manual for streets, Dft, 2007
- Manual for streets 2, CIHT, 2010
- Designing for deliveries, Fta, 1998
- Cycle infrastructure design Ltn 2/08, Dft, 2008
- Design of pedestrian crossings Ltn 2/95, Dft, 1995
- Guidance for the use of tactile paving, Dft, 1998
- Accessible bus stop design guidance, TfL, 2006

Stage
Permanent

10m 0 40m

Scale 1:500 at A1
1:1000 if reproduced at A3

ILLUSTRATIVE

Location
Greenwich pumping station
Royal Borough of Greenwich

Document Information
Application for Development Consent

Permanent highway layout
Swept path analysis

DCO-PP-23X-GREPS-240036
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Transport assessment figures

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Keyplan:

Key

- Pumping station
- TFL road network
- Strategic road network
- 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 - site location plan

Figure 24.2.1

1PL03-TT-50612
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- Site access
- TFL road network
- Strategic road network
- Primary construction route
- 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 - construction traffic routes

Figure 24.2.2

1PL03-TT-50604
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- National rail stations with cycle parking
- Underground stations with cycle parking
- DLR stations with cycle parking
- London strategic walk network
- Cycle superhighway (open 2013)
- Cycle superhighway (open 2015)
- Thames path
- London cycle routes

National cycle network

Route Type

- Open Traffic Free
- Open on-road
- 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

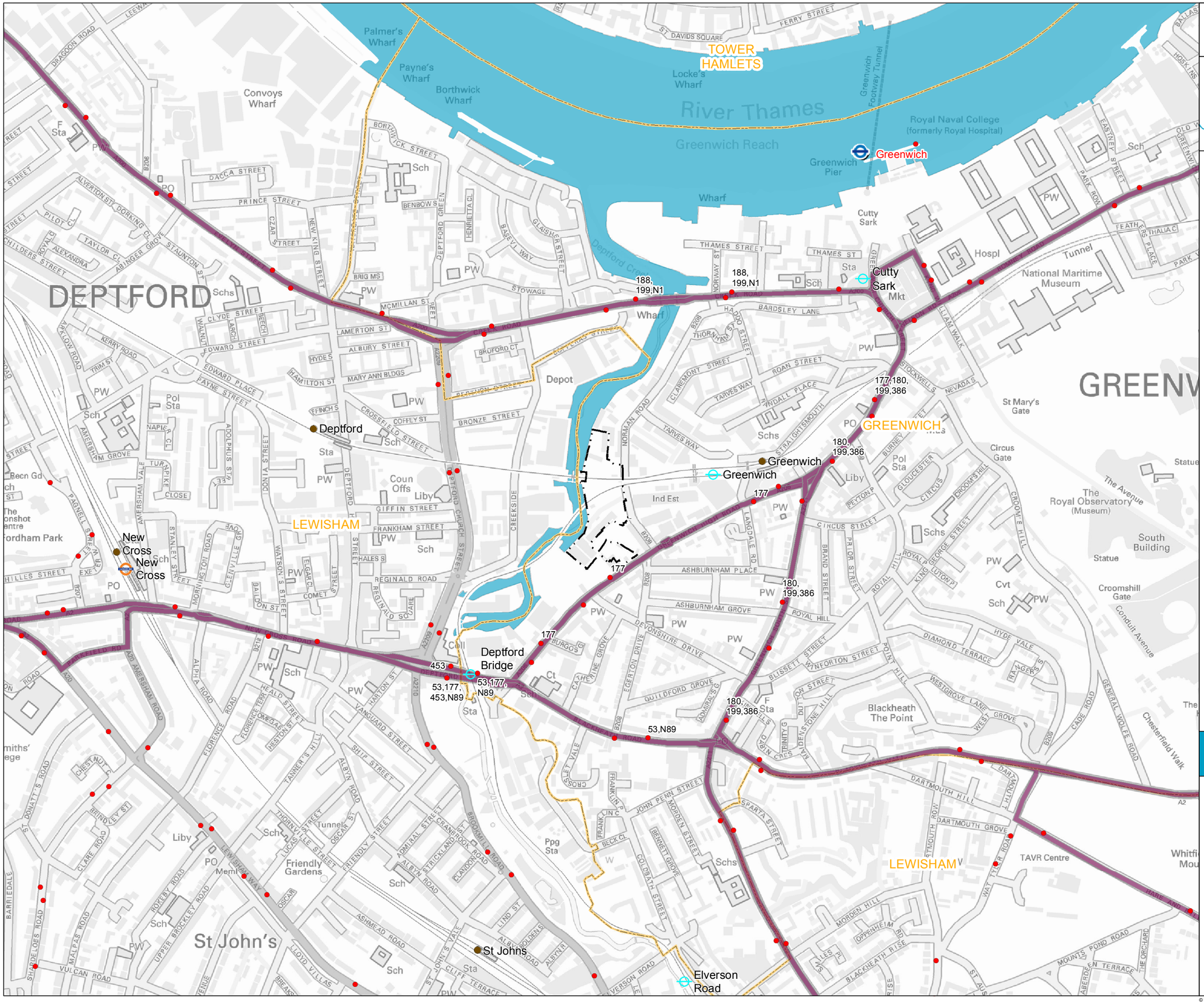
Transport - pedestrian and cycle network

Figure 24.4.1

1PL03-TT-50620
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Council parking
- Private car parking
- Coach Parking
- Zip Car
- 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 - parking

Figure 24.4.3
1PL03-TT-50636
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

Greenwich Pumping Station
Royal Borough of Greenwich

Document Information

Transport Assessment

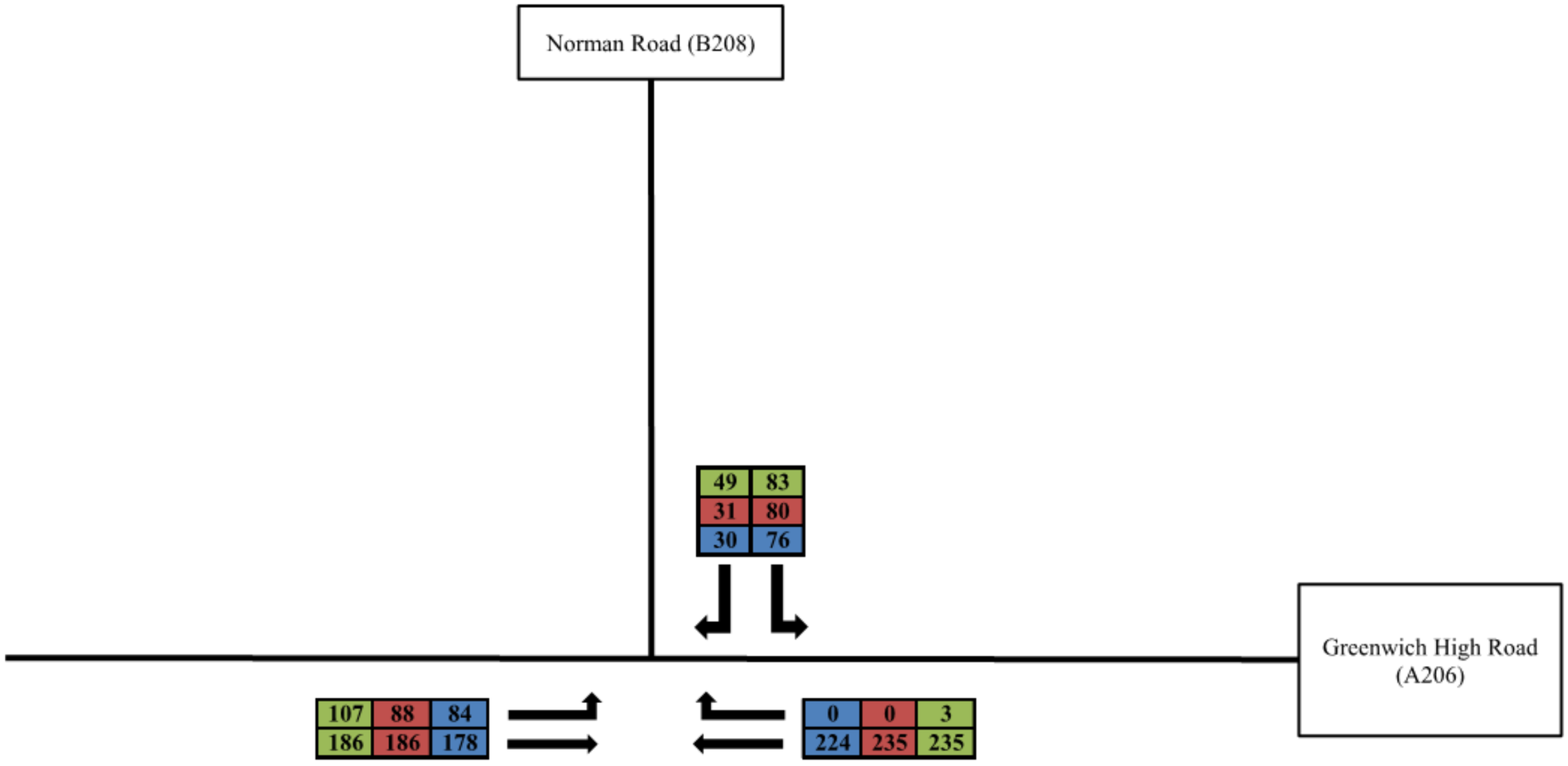
Transport - survey locations

Figure 24.4.4

1PL03-TT-50644
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Base Traffic Flow
- Construction Base
- Development Case

FOR INFORMATION

Location

Greenwich Pumping Station
Royal Borough of Greenwich

Document Information

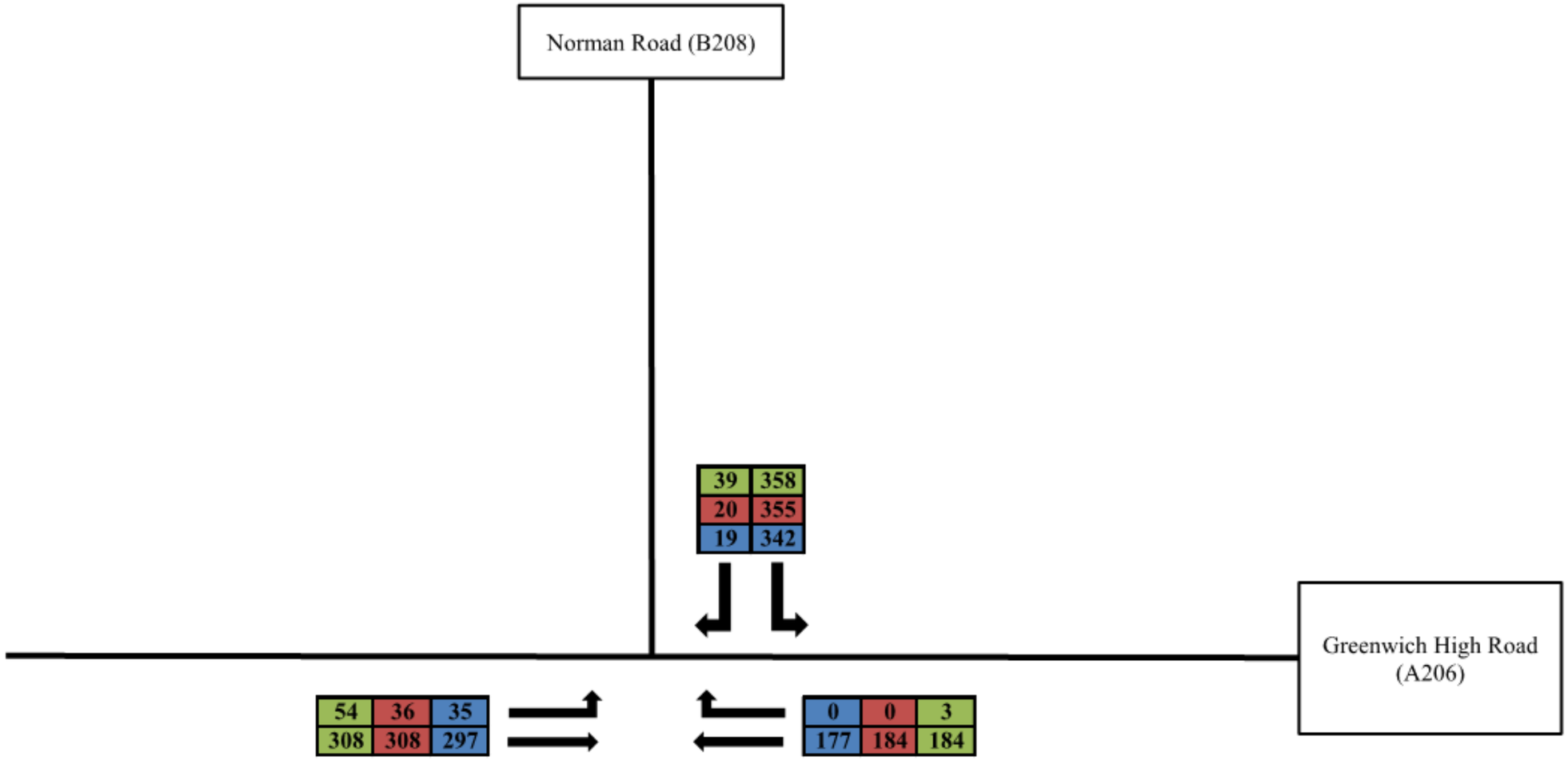
Transport Assessment

Transport - Baseline, Construction and Development case traffic flow (AM peak hour)
Figure 24.4.5

1PL03-TT-50903
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Base Traffic Flow
- Construction Base
- Development Case

FOR INFORMATION

Location

Greenwich Pumping Station
Royal Borough of Greenwich

Document Information

Environmental Statement

Transport - Baseline, Construction and Development case traffic flow (PM peak hour)
Figure 24.4.6

1PL03-TT-50927
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

Keyplan:

Key

Accidents

(Severity, Mode of travel)

- Slight, Pedestrian
- Slight, Pedal Cycle
- Serious, Pedestrian
- Serious, Pedal Cycle
- 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

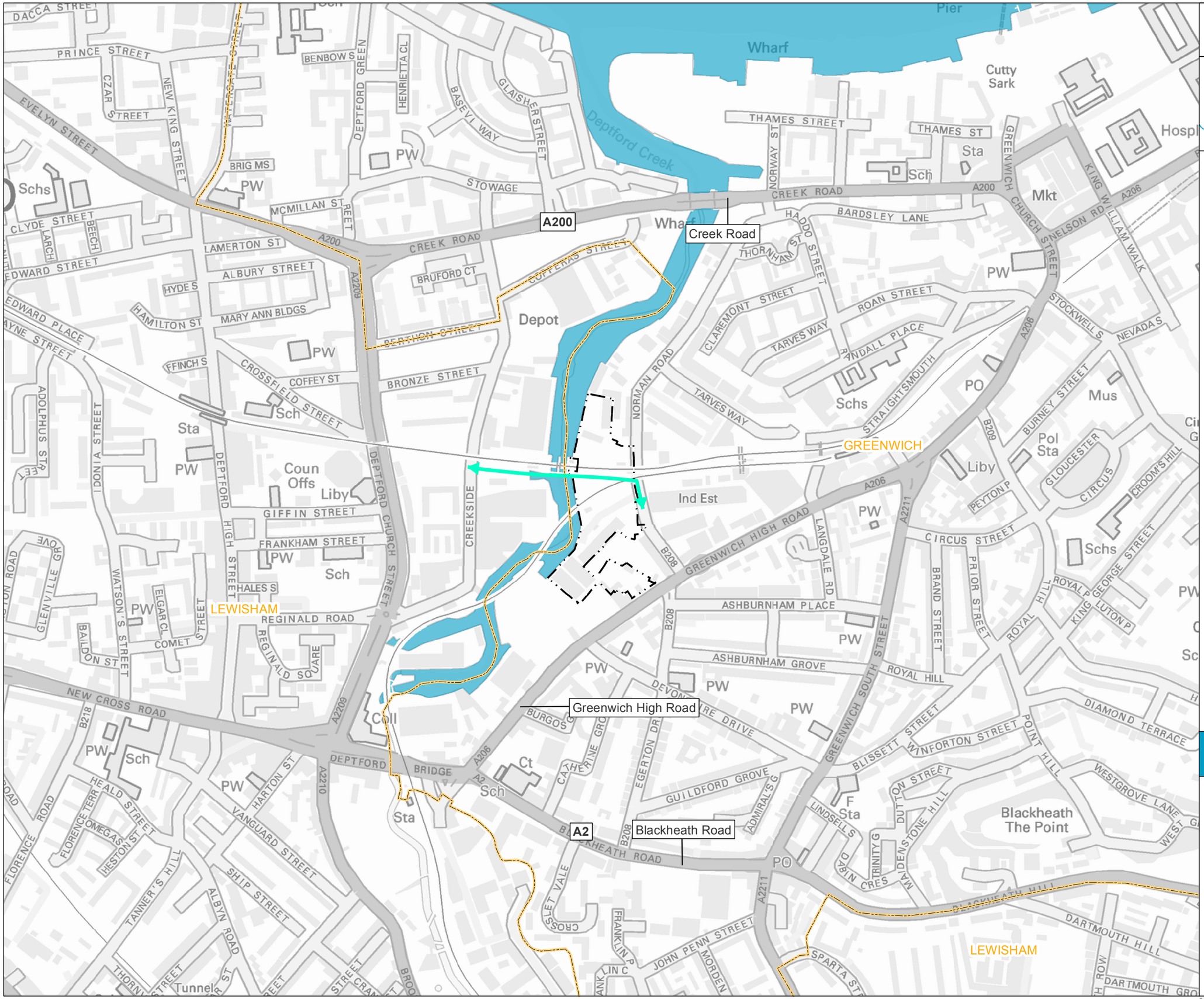
Transport Assessment

Transport - pedestrian and cyclist accidents by severity
Figure 24.4.8

1PL03-TT-50832
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Proposed cycle diversion
- 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

Greenwich Pumping Station
Royal Borough of Greenwich

Document Information

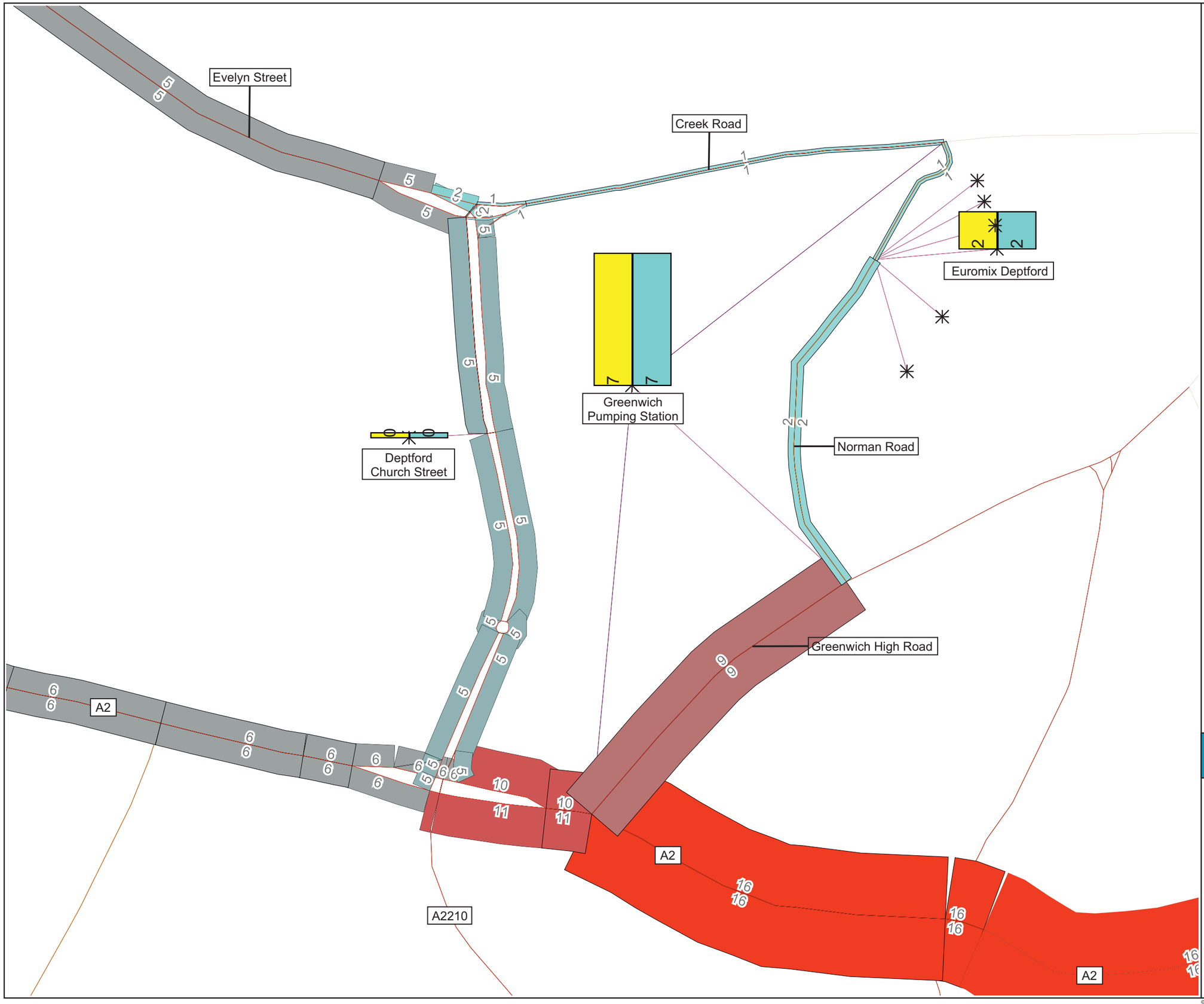
Transport Assessment

Transport - cycle diversion for Greenwich PS construction phases 1,2,3
Figure 24.5.1

1PL03-TT-50769
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Hourly construction lorries arrivals and departures

- Arrivals
- Departures

Hourly construction lorries movements

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- 8 - 9
- 9 - 10
- 10 - 11
- 11 - 12
- 12 - 13
- 13 - 14
- 14 - 15
- > 15

Note: Construction vehicle flows include all Thames Tideway Tunnel sites on this network during this period.

FOR INFORMATION

Location
Greenwich Pumping Station
Royal Borough of Greenwich

Document Information
Transport Assessment
Hourly Construction Lorry Movements - Site Year 3 of Construction

Figure 24.5.2
1PL03-TT-50896

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

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Thames Water Utilities Limited
Clearwater Court, Vastern Road, Reading RG1 8DB

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