Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Transport Assessment

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Barn Elms

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 6: Barn Elms

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6 Barn Elms

6.1 Introduction

6.1.1 This site-specific *Transport Assessment* (*TA*) presents the findings of the assessment of the transport issues of the Thames Tideway Tunnel project at the Barn Elms site located within the London Borough (LB) of Richmond upon Thames.

6.1.2 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.

6.1.3 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.

6.1.4 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 this report.

6.1.5 The *TA* structure is as follows:

a. Section 2 includes a description of the proposed development, detailing construction phasing, vehicle and person trip generation and construction traffic routing and details of the operational phase.

b. Section 3 outlines the assessment methodology used for the *TA* for the construction and operational phases.

c. Section 4 details the baseline conditions on the transport network surrounding the site, including survey data analysis and accident analysis.

d. Section 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 6 provides the assessment of the operational phase of the project.

f. Section 7 summarises the *TA* findings.

6.2 Proposed development

6.2.1 The proposed development is located within the Barn Elms Schools Sports Centre which is in the LB of Richmond upon Thames. The site adjoins the LB of Wandsworth along its southern boundary. The site location is shown in Figure 6.2.1 in the Barn Elms site *TA* figures.

6.2.2 The Barn Elms Schools Sports Centre and its associated playing fields are bounded to the north by Queen Elizabeth Walk and the London Wetland Centre, to the west by Barn Elms Playing Fields and Rocks Lane (A306), to the south by Beverley Brook and to the east by the River Thames. The surrounding area is predominantly residential in character and the nearest residents to the site are situated on Rocks Lane (A306) and on Horne Way situated to the south of the Beverley Brook.

6.2.3 The development at Barn Elms would intercept flows from the West Putney storm relief sewer via a CSO drop shaft and connection tunnel and convey these to the main tunnel.

Construction

6.2.4 The Barn Elms site is located in the southern section of the Barn Elms Schools Sports Centre and associated playing fields area. It would be accessed using Queen Elizabeth Walk from its junction with Rocks Lane (A306). Vehicles would route along Queen Elizabeth Walk before passing through a narrow section of private road which currently serves the Barn Elms Schools Sports Centre and adjacent residential properties. A new access road would be constructed across the northern and eastern regions of the Barn Elms Schools Sports Centre and playing fields to serve the construction site. This access would begin around 20m from the end of the private road within the Barn Elms Schools Sports Centre car park and would be segregated from pedestrians, cyclists and other vehicles by a fence along each of its sides. The highway layout during construction vehicle swept path analysis (phases 1-2) plans are provided in the Barn Elms site *TA* figures.

6.2.5 During construction it is anticipated that all materials would be transported to and from the site by road.

6.2.6 Construction at the Barn Elms site is anticipated to last for approximately 26 months. There would be two phases of construction covering; phase one – site set up, shaft construction and tunnelling. In addition to this, a changing room and some track and field facilities would also be relocated. 30 sport centre car parking places would be removed to make way for the access road. Phase two would cover the construction of other structures.

6.2.7 The access plan and highway layout during construction (phases 1-2) plans are provided in the Barn Elms site *TA* figures. 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 Appendix E.

6.2.8 During construction it is anticipated that transport networks could be affected as a result of the additional construction traffic associated with Barn Elms site with its construction route along Queen Elizabeth Walk off Rocks Lane (A306).

6.2.9 The alignment of the proposed access road would pass through the existing location of one of the Barn Elms Schools Sports Centre changing rooms. The northern-most changing room would be demolished and re-provided within the Barn Elms Schools Sports Centre grounds during site

setup. The exact location of the replacement changing room facility is subject to agreement with the site owners, the LB of Richmond upon Thames.

6.2.10 The Thames Path which follows the route of the River Thames to the east of the site boundary would not be affected.

6.2.11 Parking for five essential maintenance vehicles would be provided on site and no worker parking would be provided.

6.2.12 Construction details for the site relevant to the construction are summarised in Table 6.2.1.

Table 6.2.1: Construction traffic details

Description	Assumption
Assumed peak period of construction lorry movements and duration	Site Year 1 of construction 1 month duration
Assumed average peak daily construction lorry vehicle movements	44 movements per day (22 vehicle trips)*
Typical types of lorry requiring access (comprising rigid-bodied, flatbed and articulated vehicles)	Excavation lorries Plant and equipment lorries Imported fill lorries Ready mix mixer lorries Office delivery lorries Steel reinforcement lorries Temporary construction material lorries including pipe/track/oils/ greases lorries Aggregate 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

6.2.13 The Barn Elms site is located within the Barn Elms Schools Sports Centre which is in the LB of Richmond upon Thames. The site adjoins the LB of Wandsworth.

6.2.14 The Barn Elms Schools Sports Centre and its associated playing fields are bounded to the north by Queen Elizabeth Walk and the London Wetland Centre, to the west by Barn Elms Playing Fields and Rocks Lane (A306), which is part of the Transport for London Strategic Road Network (SRN), to the south by the Beverley Brook and to the east by the River Thames.

6.2.15 Figure 4.2.2 in the Barn Elms site *TA* figures shows the primary construction traffic routes for the Barn Elms site. These have been

discussed with both Transport for London (TfL) and the Local Highway Authority.

6.2.16 Access to the site would be via Queen Elizabeth Walk before passing through a narrow section of private road which currently serves the Barn Elms Schools Sports Centre and the adjacent residential properties. A new access road would be constructed across the northern and eastern regions of the Barn Elms Schools Sports Centre to serve the site.

6.2.17 The main junctions in the vicinity of the site, along the construction traffic routes are:

a. Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road junction

b. Rocks Lane (A306) / Mill Hill Road (B349)

c. Rocks Lane (A306) / Upper Richmond Road (A205) / Roehampton Lane (A306) / Queen's Ride (B306)

6.2.18 The primary access route would require construction vehicles to travel across the Barnes Railway Bridge on Rocks Lane (A306). This bridge may be subject to weight restrictions in the future due to structural limitations and therefore this may limit the size of construction vehicles that can be used at this site. No weight limit is currently imposed upon the bridge. Discussion with Network Rail has indicated that bridge refurbishment works, to include strengthening, are scheduled in approximately 2014/2015. Rocks Lane (A306) is part of the London Lorry Control Scheme.

6.2.19 The alignment of the proposed access road would pass through the existing location of one of the Barn Elms Schools Sports Centre changing rooms. The northern-most changing room would be demolished and re-provided within the Barn Elms Schools Sports Centre grounds during site setup.

6.2.20 The exact routing depends on the material origins and destinations which are detailed in the *Project-wide TA* (contained in Section 3).

Proposed construction flows

Construction vehicles

6.2.21 The proposed working hours are set out in the *CoCP* and 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 for large concrete pours and later at night on agreement with the LB of Richmond upon Thames.

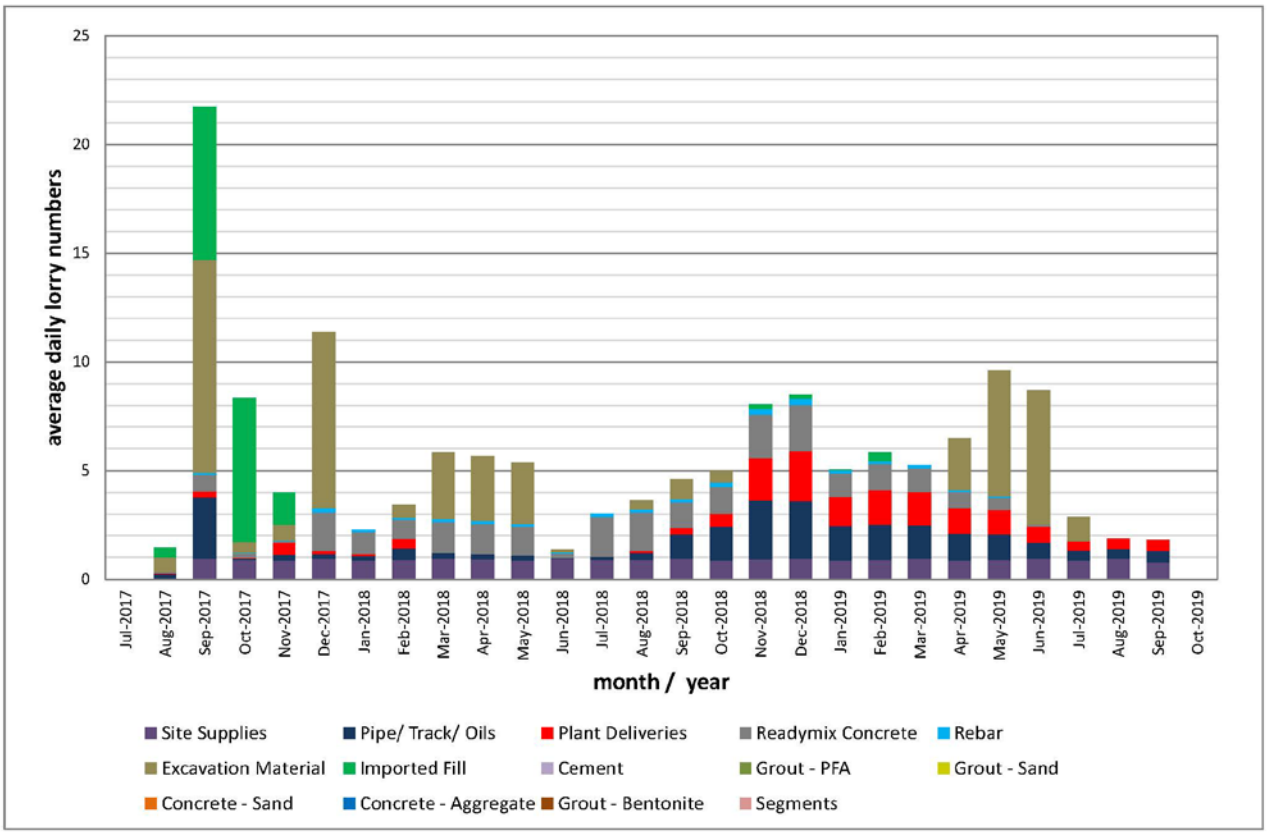
6.2.22 A limited number of extensions to working hours may be required to cover certain construction activities at the Barn Elms site such as major concrete pours. The site would also require continuous working hours when the tunnelling construction activities are taking place. These underground works would occur on a continuous 24 hour cycle seven days a week. It is anticipated that the continuous working would be for approximately six months. However, construction vehicle movements would be limited to the hours stated in para 6.2.21 other than in exceptional circumstances.

6.2.23 A site-specific peak construction assessment year has been identified. The histogram in Plate 6.2.1 shows that peak activity at the Barn Elms site would occur in Year 1 of construction. This peak is earlier than the overall project-wide construction peak activity year of 2019.

6.2.24 The assessment is based on 10% of the daily number of lorry journeys occurring in the peak hours, which has been discussed 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 *CoCP*.

6.2.25 The number of vehicular movements would vary throughout the construction period, and Plate 6.2.1 indicates the construction vehicle profile during construction.

Plate 6.2.1 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.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.*

6.2.26 The 07:00 - 09:00 and 17:00 - 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 16.4). 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.

6.2.27 Hourly construction vehicle trips during the inter-peak period are not expected to exceed the hourly trips generated between 08:00 - 09:00 and 17:00 - 18:00. The peak travel periods hours utilised for the modelling assessments in this report are therefore the weekday periods between 08:00 - 09:00 and 17:00 - 18:00.

6.2.28 As indicated in Plate 6.2.1, the number of vehicular movements varies throughout the construction period with only one month containing more than 20 HGV movements a day during the 26 month construction programme.

6.2.29 Other construction vehicle movements associated with site operations and contractor activities would be cars and light goods vehicles (LGVs). The construction vehicle movements expected to be generated by the Barn Elms site are shown in Table 6.2.4

Construction workers

6.2.30 The construction site is expected to require a maximum workforce of approximately 40 workers at any one time. The number and type of workers is shown in Table 6.2.2.

Table 6.2.2 Maximum estimated construction worker numbers

Contractor		Client
Staff*	**Labour****	**Staff*****
08:00-18:00	**08:00-18:00**	**08:00-18:00**
15	20	5

**Staff – contract staff brought in to 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.*

6.2.31 The 2001 Census[i] journey to work data, for the Barn Elms area shows that the predominant mode of travel is by car. However, it is considered unlikely that any workers would travel to or from the site by car as 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 a site-specific Travel Plan.

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

6.2.32 On this basis, it is anticipated that the predominant mode of travel for journeys to work in this area is public transport. It is assumed that the directions to and from the site would be from the nearest National Rail station on Rocks Lane (A306) and the bus stops on Rocks Lane (A306) and Church Road (A3003).

6.2.33 The Census mode shares have therefore been adjusted to reflect increased levels of non-car use by workers at this site. The mode split outlined in Table 6.2.3 and indicates that the predominant mode of travel for journeys to work in this area would be by bus. The mode split outlined in Table 6.2.3 has therefore been used to assess the impacts of worker journeys on the highway and public transport networks.

6.2.34 The method of distribution of worker trips on the transport networks, including the public transport services, has been agreed with the Local Highway Authority and TfL.

Table 6.2.3 Transport mode split

Mode	Percentage of trips to site	Equivalent number of worker trips (based on 40 worker trips)	
		AM peak hour	PM peak hour
Bus	26%	10	10
National Rail	18%	7	7
Underground	18%	7	7
Car driver	<1%*	0	0
Car passenger	<1%*	0	0
Cycle	5%	2	2
Walk	26%	11	11
River	1%	1	1
Other (taxi/motorcycle)	5%	2	2
Total	**100%**	**40**	**40**

*Note: * assuming to be zero for the purpose of this assessment. The peak travel time for construction workers is anticipated to occur between 07:00 – 08:00 and between 18:00 – 19:00, and the PM peak hour trips will be lower than the AM peak hour trips as shift changes occur at 15:00.*

6.2.35 Information regarding the travel arrangements of these workers would be included in the *Construction Management Plan* and *Workplace Travel Plan* documents for the Barn Elms site.

6.2.36 The exact directions of travel to and from the site which workers would use have not been determined. Staff could potentially be based in the local area or in the wider Greater London area and are unlikely to have the same trip attraction to primary A roads as construction lorries.

Vehicle movements summary

6.2.37 Other construction vehicle movements associated with site operations and contractor activities would be cars and light goods vehicles. The construction worker vehicle movements expected to be generated by the Barn Elms site is shown in Table 6.2.4.

6.2.38 The total anticipated number of construction-related vehicle movements in the peak month of activity at the Barn Elms site is set out in Table 6.2.4.

Table 6.2.4 Construction works 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%*	44	0	5	5	0
Other construction vehicle movements	36	4	4	4	4
Worker vehicle movements**	nominal	0	0	0	0
Total	**80**	**4**	**9**	**9**	**4**

** The assessment is 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.*

6.2.39 All materials would be transported by road to the Barn Elms site. To ensure the assessment of the highway network is robust, it has been based on a combination of the peak hour of movements for construction and worker vehicle movements between 07:00–09:00 and 17:00-19:00. These have been combined and applied to the peak hour to take into account the highest number of movements generated by the site.

6.2.40 Assuming that all construction material is transported by road at this site, an average peak flow of 80 vehicle movements a day is expected during the month of greatest activity during Site Year 1 of construction. At other times in the construction period vehicle flows would be lower than this average peak figure.

6.2.41 Table 6.2.4 shows that over both the AM peak period (07:00 – 0900) and the PM peak period (17:00 – 19:00) there will be 13 vehicular movements in each peak period.

Code of Construction Practice

6.2.42 Measures incorporated into the *CoCP 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

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.

6.2.43 In addition to the general transport measures within the *CoCP Part A*, the *CoCP Part B* (Section 5) relating to the Barn Elms site includes the following measures:

a. the site access/egress would be from Upper Richmond Road (A205), travelling along Rocks Lane (A306) and turning right into Queen Elizabeth Walk. Vehicles would access the site via the Barn Elms Schools Sports Centre car park. A new access roadwould route along the northern boundary of the Sports Centre to the River Thames and then along the eastern boundary parallel to the river.

b. the access route would be a single lane width with passing places

c. access and construction activities would be minimised at times of heavy recreational use of the playing fields

d. access to the existing car park and sport facilities would be maintained throughout the works

e. emergency access to the Ashlone Wharf tidal barrier by the Environment Agency would be maintained

f. Unless otherwise agreed in writing with the local planning authority, no heavy goods vehicles would enter or leave the construction site during the hours of 08:00 to 09:00 Monday to Friday excluding bank holidays, and 08:00 to 13:00 Saturday to avoid local congestion

g. Works during standard hours on a Saturday would consider avoiding periods of high recreational activity

h. access to the boathouse to be maintained for vehicles and pedestrians, unless otherwise agreed

i. parking changes within the Sports Centre car park required to facilitate the construction site access road would include temporary relocation/reprovision of car parking spaces for the duration of the works (note: land may be available from LB of Richmond upon Thames for the reprovision)

j. Rocks Lane (A306) is part of the London Lorry Control Scheme (http://www.londonlorrycontrol.com) and HGV movements along this road between 21:00 and 07:00 Monday to Friday, 13:00 and 00:00

Saturday and all day Sunday would be agreed with the LB of Richmond Upon Thames

k. at locations along Queen Elizabeth Walk and at the Sports Centre car park access where carriageway width may not permit two-way vehicle flow for HGVs traffic marshals would be required.

6.2.44 Based on current travel planning guidance including TfL's 'Travel Planning for new development in London[1]', this development lies within the threshold for producing a Strategic Framework Travel Plan. A *Project Framework Travel Plan* has been prepared based on the TfL ATTrBuTE guidance[ii]. The *Project Framework Travel Plan* addresses project-wide travel planning measures including the need for a Travel Plan Manager, initial travel surveys during construction and a monitoring framework. It also contains requirements and guidelines for the development of site-specific plans. The site-specific travel planning measures of relevance to the *Project Framework Travel Plan* are as follows:

a. information on existing transport networks and travel initiatives for the Barn Elms site

b. a mode split established for the Barn Elms site construction workers to establish and monitor travel patterns

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

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

Operation

6.2.45 During operation the transport networks around the Barn Elms site would be returned to the existing layout. The operational access area around the permanent infrastructure would not be fenced and could be accessed by private users of the Barn Elms Schools Sports Centre playing fields. Temporary fencing would be erected during periods of maintenance to provide a safe working area.

6.2.46 During operation it is anticipated that there would be no significant issues for 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 elements considered are those affecting highway layout and operation

6.2.47 The potential for operational impacts on highway layout and operation is due to the short-term effects of 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

[ii] 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, http://www.attrbute.org.uk/.

not required. The scope of this analysis has been agreed with LB of Richmond upon Thames, the LB of Wandsworth and TfL. Access would be required for light commercial vehicles on a three to six monthly maintenance schedule.

6.2.48 Additionally there would be more significant maintenance visits approximately every ten years which would require access to enable two mobile cranes and support vehicles to be brought to the site. During ten yearly inspections, space to locate two large mobile cranes and associated support vehicles within the site area would be required. The cranes would facilitate lowering and recovery of tunnel inspection vehicles and to provide duty/standby access for personnel.

6.2.49 During operation, the site would be accessed from Queen Elizabeth Walk and the narrow section of private road which currently serves the Barn Elms Schools Sports Centre and the adjacent residential properties. Operational vehicles would travel across the car park which serves the Barn Elms Schools Sports Centre. A new permanent access road would be constructed, predominantly on the same alignment as the construction access route along the northern and eastern perimeters of the Barn Elms Schools Sports Centre. The highway layout during operation plans (phases 1 and 2) are provided in the Barn Elms *TA* figures and indicate the operational layout at the site.

6.3 Assessment methodology

Scoping and Engagement

6.3.1 An extensive scoping and technical engagement process has been undertaken. All consultee comments relevant to this site are presented in Volume 6 of the *Environmental Statement*.

6.3.2 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

6.3.3 Throughout the scoping and technical engagement process, the key stakeholders with regards to transport, primarily TfL and the relevant local borough for each site, have been consulted. For Barn Elms, the LB of Richmond upon Thames and the LB of Wandsworth has been consulted and the comments which have arisen relating directly to the site have been recorded and responded to accordingly.

6.3.4 The key issues arising from the stakeholder engagement are:

a. Suggested pedestrian surveys be undertaken on Queen Elizabeth Walk if this is an access option

b. If parking bays are to be suspended, utilisation of the bays must be determined and alternative locations found if required.

c. A weight limit might be enforced on Rocks Lane (A306) at the bridge over the rail line. An alternative route might need to be found. Suggested alternative routes from the Rocks Lane (A306) /Upper Richmond Road (A205) / Roehampton Lane / Queen's Ride junction are:
d. East along Upper Richmond Road (A205) to Sheen Lane, then east along Mortlake High Street and The Terrace to Barnes High Street then Church Road (A3003) to Rocks Lane (A306); or
e. East along Upper Richmond Road (A205) to White Hart Lane, then east along The Terrace to Barnes High Street then Church Road (A3003) to Rocks Lane (A306).
f. Would prefer access via Queen Elizabeth Walk rather than a new access road from Rocks Lane (A306) along the side of Beverley Brook now the site is CSO rather than a main drive site.
g. The relocation of the bus stops on Rocks Lane (A306) opposite the proposed site access must be discussed with Transport for London.

6.3.5 The key technical issues raised have been addressed as far as is practicable at this stage within this *TA*, *Project-wide TA* and the *Environmental Statement*, in consultation with both TfL and the LB of Richmond upon Thames and LB of Wandsworth.

Construction

6.3.6 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.

Construction assessment area

6.3.7 The assessment area for the Barn Elms site includes the site access directly from Queen Elizabeth Walk. The junction of Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road has also been assessed.

6.3.8 These roads and junctions have been assessed for highway, cycle and pedestrian impacts. 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). Effects on local bus services and rail services of the Barn Elms site have also been assessed.

6.3.9 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.

6.3.10 The assessment for each site takes account of construction vehicle movements associated with Barn Elms, together with construction traffic from other Thames Tideway Tunnel sites that would use the highway network in the vicinity of this site in Site Year 1 of construction at Barn Elms.

Construction assessment year

6.3.11 2019 has been used as the peak construction assessment year for the assessment of project-wide effects. This has been agreed with TfL and is reported in the *Environmental Statement*.

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

6.3.13 The site-specific peak construction traffic year at Barn Elms is Site Year 1 of construction.

6.3.14 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

6.3.15 The assessment for each site takes account of construction vehicle movements associated with Barn Elms, 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 1 of construction.

6.3.16 The base case in Site Year 1 of construction takes into account the developments proposed on the former Putney Hospital site.

6.3.17 The existing buildings on the former Putney Hospital site (270m southwest of site) will be demolished to create a new Primary Care Centre and residential units. This could result in residents, staff and visitors using the footways and local highway network in the vicinity of the site experiencing impacts from the development. On this basis, they have been taken into consideration as a receptor in the TA.

6.3.18 The *Project-wide TA* indicates that 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 the Thames Tideway Tunnel project sites and this approach has been agreed with TfL. The HAMs have by developed by TfL using GLA employment and population forecasts, which are based on the employment and housing projections set out in the London Plan. As a result, the assessment inherently takes into account a level of future growth and development across London.

6.3.19 For future year assessments for the Barn Elms site, the TfL WeLHAM model has been used to test the strategic highway network impacts associated with the site. Construction traffic associated with other

Thames Tideway Tunnel project sites using routes in this area has been included in the WeLHAM scenario.

6.3.20 The model provides factors for the increase in vehicle-kilometres in the borough between the construction base year and 2021. The relevant growth factor for the site was applied to the traffic survey flows collected in 2011 to produce 2021 flows for existing traffic.

6.3.21 Office and operational trips associated with the site were assigned to the TfL WeLHAM model using the EIA scenario and the project peak month. The assigned flows were added to the 2021 existing flows and the construction flows to provide the turning movements for local modelling.

6.3.22 This provides a robust assessment case as the background traffic is forecast to 2021 rather than 2019 and no allowance has been made for existing traffic diverting away from the routes which run past the site as a consequence of the use of these roads by the additional project related traffic.

Operation

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

6.3.24 Given the level of transport activity associated with the Thames Tideway Tunnel during the operational phase, only the localised transport issues around the Barn Elms site are assessed. Other Thames Tideway Tunnel sites would not affect the area around Barn Elms in the operational phase and therefore are not considered in the assessment.

6.3.25 With regard to other developments in the vicinity of the site (as detailed in Vol 6 Appendix N of the *Environmental Statement*) both the developments (Barn Elms Sports Trust / Playing Fields and the former Putney Hospital development) would be complete and operational by Year 1 of operation. As a result, these developments have been included within the operational base case which takes into consideration the effects on highway layout and operation. There are no operational cumulative effects requiring assessment.

Operational assessment area

6.3.26 The assessment area for the operational assessment remains the same as for the construction assessment as set out in paras 6.3.7 and 6.3.8.

Operational assessment year

6.3.27 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 would become operational. As transport activity associated with the operational phase is very low, there is no requirement to assess any other year beyond that date.

6.4 Baseline

6.4.1 This section sets out the baseline conditions on the local transport network in the vicinity of the Barn Elms site in 2012, with the exception of the traffic survey data which was collected in 2011.

Policy Review

6.4.2 The Barn Elms site is located within the LB of Richmond upon Thames. The relevant national, regional and local policy documents have been reviewed and included within Appendix A.

Existing land use

6.4.3 The site is located within the Barn Elms Schools Sports Centre site and the site location is shown in Figure 6.2.1 in the Barn Elms site *TA* figures. Barn Elms Schools Sports Centre is a multi-sports area with grass sports pitches, tennis courts, and gym. A boat house and sailing club facility are accessible via the schools sport centre grounds.

Existing access

6.4.4 Access to the playing fields and the London Wetland Centre is provided by Queen Elizabeth Walk. This road links the site to the wider road network via a signalised junction, connecting Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road.

Pedestrian network and facilities

6.4.5 The existing pedestrian network and facilities in the vicinity of the site are described below and shown in Figure 6.4.1 in the Barn Elms site *TA* figures.

6.4.6 The key pedestrian network routes to and from the site are directly related to local public transport services including bus stops and National Rail stations. The key pedestrian network routes related to the Barn Elms site are:

a. The Thames Path

b. Queen Elizabeth Walk and the Queen Elizabeth Walk footpath

c. Rocks Lane / Castelnau (A306).

Thames Path

6.4.7 The Thames Path (a Public Right of Way) follows the route of the River Thames to the east of the site boundary. There is no access to the Thames Path from the Barn Elms site. A fence along the eastern side of the playing fields separates the site from the Thames Path and River Thames. The proposed routing of the construction and operational vehicles will not impact on the Thames Path and a line of vegetation screens one from the other, this is shown in Plate 6.4.1.

Plate 6.4.1 The Thames Path adjacent to Barn Elms playing fields looking south

Queen Elizabeth Walk

6.4.8 Queen Elizabeth Walk provides current access to the Barn Elms Schools Sport Centre, residential properties, the London Wetlands Centre, the Thames Path (via Queen Elizabeth Walk footpath) and other recreational facilities. It connects into Rocks Lane (A306), Castlenau (A306), Church Road (A3003) and Elm Grove Road via a signalised junction.

6.4.9 There are footpaths in place on both sides of Queen Elizabeth Walk which are approximately 2.2m wide on the southern side and 2.0m wide on the northern side.

6.4.10 The footpath continues to the schools playing field, where it then routes around the outside of the playing field site to connect into the Thames Path. This section of footpath is separated from the playing fields by a fence.

6.4.11 A signalised pedestrian crossing is provided on all arms of the junction formed by Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road. This crossing includes dropped kerbs and tactile paving on each arm.

6.4.12 Plate 6.4.2 shows the current access available for Queen Elizabeth Walk.

Plate 6.4.2 Queen Elizabeth Walk looking east

Rocks Lane (A306)

6.4.13 Rocks Lane (A306) bounds the western side of the site and, along with Castlenau (A306), provides a north-south connection between Upper Richmond Road (A205), Hammersmith Bridge and the Hammersmith gyratory on the northern bank of the River Thames.

6.4.14 The footpath on the eastern side of Rocks Lane (A306) is around 2.4m in width. There is also a gravel footpath located on the eastern side of Rocks Lane (A306) which runs parallel to the footpath and is separated from the footpath by a grass verge. This gravel path is approximately 2.6m wide. This is shown in Plate 6.4.3.

6.4.15 A signalised pedestrian crossing is also provided on Rocks Lane (A306) to the south of the priority junction formed by Rocks Lane (A306) and Ranelagh Avenue. This crossing comprises a pedestrian refuge, dropped kerbs and tactile paving.

Plate 6.4.3 Eastern side of Rocks Lane looking south from the junction with Queen Elizabeth Walk

Plate 6.4.4 Eastern side of Rocks Lane looking north along the gravel path

Barn Elms Schools Sports Centre and Barn Elms Playing Field

6.4.16 The area known as Barn Elms playing fields comprises of two separate (but currently jointly managed) recreational sites.

6.4.17 The southern section (The Barn Elms Playing Field) is nominally managed by LB of Richmond and is bounded by Rocks Lane (A306) to the east, Queen Elizabeth Walk to the north, the northern bank of the Beverly Brook to the south and the Barn Elms Sport Centre east.

6.4.18 The northern section (the Barn Elms Schools Sport Centre) is managed by the LB Wandsworth and is bounded by The Thames Path to the east, The London Wetland Centre to the north, the northern bank of the Beverly Brook to the south and Barn Elms Playing Field to the east. The Barn Elms Schools Sports Centre includes a gym, tennis courts and AstroTurf playing surfaces.

6.4.19 The main pedestrian and vehicular accesses to this site are from Queen Elizabeth Walk. The Barn Elms Playing Fields can also be accessed by pedestrians via a gateway on Rocks Lane (A306). This access is primarily for maintenance vehicles and is generally kept locked. Within the playing fields, a pedestrian route is located from the southern boundary northwards to the tennis courts in the centre of the fields. A fence runs along the northern bank of Beverley Brook along the southern boundary of the site preventing pedestrians from traversing the brook between Barn Elms Playing Fields and Lower Putney Common.

6.4.20 The Barn Elms Schools Sport Centre can be accessed from Queen Elizabeth Walk.

6.4.21 A fence runs along the northern, eastern and southern side of the playing fields, separating and enclosing the site, although private access to the boat house is provided for the Rowing Club.

6.4.22 A pedestrian route is also located within Barn Elms playing fields from the southern boundary northwards to the tennis courts in the centre of the fields

Cycle network and facilities

6.4.23 The existing cycle network and facilities in the vicinity of the site are described below and is shown in Figure 6.4.1 in the Barn Elms site *TA* figures.

National Cycle Routes

6.4.24 The main cycle route within the area is National Cycle Network (NCN) Route 4 which routes along Rocks Lane (A306) and Queen Elizabeth Walk around the edge of the school playing fields, until it reaches the Thames Path where it routes north and south along the river bank. There are advanced cycle stop lines on Elm Grove and Queen Elizabeth Walk as shown in Plate 6.4.5. The cycle route on Rocks Lane (A306) routes west once it reaches Ranelagh Avenue.

Plate 6.4.5 Advanced cycle stop line on Queen Elizabeth Walk

Barclays Cycle Superhighways

6.4.25 There are currently no Cycle Superhighway (CS) routes within the vicinity of the site.

Barclays Cycle Hire Scheme

6.4.26 There are currently no Barclays Cycle Hire docking stations within the vicinity of the site.

Cycle Parking

6.4.27 The closest cycle parking facilities to the site are located at the Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road junction where three cycle stands are located.

Public transport

Public Transport Accessibility Level

6.4.28 The Public Transport Accessibility Level (PTAL) of the site has been calculated using TfL's approved PTAL methodology (TfL, 2010)[2] (analysis is included in Appendix B). TfL's approved PTAL methodology gives a PTAL rating of 1 to 2, which indicates that public transport provision in the vicinity is poor (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.

6.4.29 The following sections detail the public transport services in the vicinity of the site which are shown on Figure 6.4.2 in the Barn Elms site *TA* figures.

Bus services

6.4.30 A total of six day time and two night time bus routes operate within 640m of the site serving the local destinations. Table 6.4.1 provides a summary of the bus services and their frequencies during the weekday peaks.

Table 6.4.1 Existing day time local bus services and frequency (number of buses per hour)*

Bus No.	Peak hours		Nearest bus stop to the site	Approx distance from the site (m)	Origin - destination
	AM Peak Mon-Fri (07:00-10:00)	PM Peak Mon-Fri (16:00-19:00)			
33	6-10	6-10	Barnes / Red Lion	700m	Fulwell – Hammersmith Bus Station
33	8-10	8-10	Church Road / Red Lion	750m	Hammersmith Bus Station - Fulwell
72	5-12	8-12	Church Road / Red Lion	750m	Brunel Road – Roehampton/ Bessborough Road
72	8-12	6-10	Barnes / Red Lion	700m	Roehampton/Bessborough Road - Brunel Road
209	10-20	10-20	Church Road / Red Lion	750m	Mortlake Bus Station – Hammersmith Bus Station
209	8-20	10-20	Church Road / Red Lion	750m	Hammersmith Bus Station - Mortlake Bus Station
283	0-4	1-8	Barnes / Wetland Centre	400m	Brunel Road / Barnes Wetland Centre
283	0-2	2-8	Barnes / Wetland Centre	400m	Barnes Wetland Centre / East Acton Industrial Estate
485	2	2	Barnes / Red Lion	700m	Ram St. – Hammersmith Bus Station
485	2	2	Barnes / Red Lion	700m	Hammersmith Bus Station - Ram St

*Note: *Transport for London (TfL) (2012) Timetables. Available at: http://journeyplanner.tfl.gov.uk/user/XSLT_SEL_STT_REQUEST?sessionID=0&language=en&mode=line&linePreSel=tfl:25:*&linePreSel=tfl:63:* (Accessed: 4th September 2012)*

6.4.31 On average there are 86 bus services per hour in the AM peak in total and 88 bus services per hour in the PM peak (two-way direction) close to the site.

6.4.32 There are approximately 12 night-time bus services per hour Monday – Friday between 00:00 – 06:00 and 14 bus services per hour on Saturdays between 00:00 – 06:00 (two-way direction) close to the site.

London Underground

6.4.33 There are no London Underground stations within 960m walking distance of the site.

6.4.34 The closest underground station is Hammersmith station which is approximately 2.5km to the north east of the site and serves the District, Piccadilly, Circle and Hammersmith and City lines.

6.4.35 All of the bus routes within 640m of the site provide a link between the site and Hammersmith station.

National Rail

6.4.36 As shown in Figure 6.4.2 in the *TA* figures, the closest National Rail station to the site is Barnes station which provides South West Trains services from Waterloo to Weybridge and Hounslow (loop service via Richmond). It is located approximately 1.8km to the south of the site and is beyond the 960m threshold used in the PTAL calculations but represents approximately a 23 minute walk.

6.4.37 In the AM and PM peak hours, there are a total of 20 services departing from Barnes station in the AM and PM peak hours. In the weekday peak periods trains to Waterloo operate at a frequency of approximately seven minutes, to Richmond at a frequency of approximately 15 minutes, to Weybridge at a frequency of approximately 30 minutes and to Hounslow at a frequency of approximately ten minutes.

6.4.38 Table 6.4.2 provides a summary of the National Rail services and their frequencies during the weekday peaks.

Table 6.4.2 Existing national rail services and frequency (number of services per hour)

Nearest station to the site	peak hours			Approx distance from the site (m)	Destination
	AM Peak Mon-Fri (08:00-09:00)	PM Peak Mon-Fri (17:00-18:00)	Saturday (13:00-14:00)		
Barnes	8	8	6	800	London Waterloo: Putney, Wandsworth Town, Clapham Junction, Queenstown Road, Vauxhall, London Waterloo
Barnes	4	4	-	800	Richmond, Mortlake, North Sheen
Barnes	6	6	4	800	Hounslow: Mortlake, North Sheen, Richmond, St Margarets, Twickenham, Whitton, Hounslow, Isleworth, Syon Lane, Brentford, Kew Bridge, Chiswick, Barnes Bridge, Barnes, Putney, Wandsworth Town, Clapham Junction, Queenstown Road, Vauxhall, London Waterloo
Barnes	2	2	2	800	Weybridge: Barnes Bridge, Chiswick, Kew Bridge, Brentford, Syon Lane, Isleworth, Hounslow, Fletham, Ashford, Egham, Virginia Water, Chertsey, Addlestone, Weybridge

Note: National Rail Enquiries (2011) Live departure boards. Available at: http://www.nationalrail.co.uk/times_fares/ldb/ (Accessed: 24 October 2011)

Taxis

6.4.39 There are no taxi ranks in the vicinity of the site.

River services

6.4.40 There are no wharfage / jetty facilities in the immediate vicinity of the Barn Elms site. The nearest pier to the site is at Putney Bridge, approximately 1.6 km to the east of the site.

Highway network and operation

6.4.41 The site is located on Queen Elizabeth Walk. Queen Elizabeth Walk is a narrow road ranging in width from approximately 6m to 4.3m in places which primarily serves the London Wetland Centre and the Barn Elms Schools Sports Centre and playing fields. Queen Elizabeth Walk joins the SRN at Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road signalised junction. Queen Elizabeth Walk connects the site to the SRN at Rocks Lane (A306).

6.4.42 Rocks Lane (A306) forms part of the SRN and is a single carriageway road. A 30mph speed limit applies and the road is suitable for HGV's and long vehicles. The road links to Hammersmith Bridge however have a 7.5 tonne weight restriction which prohibits this road being a north-south route across the river for HGV's. Rocks Lane (A306) is also part of the London Lorry Control Scheme.

6.4.43 All construction vehicles would approach the site via Queen Elizabeth Walk which is accessed from the Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road signalised junction.

6.4.44 The modelling outputs for the baseline situation of the Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road junction are shown in Table 6.4.8. The overall junction performance shows that the junction is operating within capacity in the weekday AM peak hour and close to capacity in the PM peak hour.

6.4.45 The modelling outputs for the baseline situation for these junctions are shown in Table 6.4.9. The results indicate that both junctions operate within capacity in both weekday peak hours.

Parking

6.4.46 Figure 6.4.3 in the Barn Elms site *TA* figures shows the locations of the existing car and coach parking within the vicinity of the site.

Existing on-street car parking

6.4.47 There is on-street parking located on the western side of Rocks Lane (A306) which is subject to a controlled parking zone (CPZ).

6.4.48 There is a small section of short stay (maximum two hours) pay and display parking available at the eastern end of Church Road (A3003) of approximately 20 spaces some 650m west of the Barn Elms site entrance.

6.4.49 Table 6.4.3 summarises the parking restrictions and the number of bays on the roads in the vicinity of the site.

Table 6.4.3 Existing on-street car parking

Road name	Type of parking restrictions and number of bays				
	Pay and display	Resident	Blue badge	Unrestricted	Short-term (max. 20 mins)
Cardigan Road	0	42	0	0	0
Rectory Lane	0	66	1	0	0
Bellevue Road	0	35	0	0	0
Ranelagh Avenue	0	79	0	0	0
Glebe Road	0	29	0	0	0
Rocks Lane	4	53	0	0	0
Elm Grove Road	4	134	1	0	0
Tennis Court access	0	0	0	15	0

Existing off-street/private car parking

6.4.50 There is off-street parking available at the London Wetland Centre which is located on Queen Elizabeth Walk, which is intended for the use of customers only.

6.4.51 There is also a private car park associated with the Barn Elms Schools Sports Centre which is located at the eastern end of Queen Elizabeth Walk. This car park is free for the use of patrons of the Barn Elms Schools Sports Centre and is locked at night time.

Coach parking

6.4.52 There are nine coach parking bays available on a pre-booked basis at the London Wetland Centre located on Queen Elizabeth Walk. These bays are illustrated on Figure 6.4.3.

Car clubs

6.4.53 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.

6.4.54 The closest car club parking space to the site is operated by Zipcar and is approximately 700m walking distance away from the Barn Elms site entrance on Byfield Gardens where one car space is provided.

6.4.55 The next closest car club parking space to the site is operated by City Car Club which is approximately 910m walking distance away from the Barn Elms site entrance on Kitson Road.

Servicing and deliveries

6.4.56 There are no on-street loading bays in the vicinity of the site.

Baseline survey data

Description of data

6.4.57 Automatic Traffic Count (ATC) data was obtained from TfL for Rocks Lane and Queen Elizabeth Walk.

6.4.58 Five year accident data on the roads within the vicinity of Barn Elms was also obtained from TfL.

6.4.59 Baseline survey has been collected for four phases in May, July, and August 2011, as well as June 2012 to establish the existing transport movements in the area. Figure 6.4.4 in the Barn Elms site *TA* figures shows the survey locations in the vicinity of the site. Appendix A of Section 3 of the *Project-wide TA* includes a baseline report which further details the data collection.

6.4.60 The scope of the surveys in terms of location and time periods was considered to ensure that the data required for assessment was collected. Junction turning count data was collected at junctions that TfL had advised required assessment. In some cases ATC data was collected on links to validate the junction count data and provide information for noise and air quality assessments. Pedestrian and cycle count data was collected at locations where flows could be affected either through diversions or the generation of additional trips or where conflicts could occur with construction vehicles. Parking survey data was collected where it was possible that parking suspensions would be necessary or where additional parking demand might be generated by the proposed development.

6.4.61 As part of surveys in May and July 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.

6.4.62 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 are surveyed, the busiest survey was used.

6.4.63 The surveys undertaken and their locations are summarised in Table 6.4.4.

Table 6.4.4 Survey types and locations

Survey type and location	Date
Junction survey (including pedestrian and cycle movements)	
Rocks Lane (A306), Church Road (A3003), Queen Elizabeth Walk and Castlenau	17/05/2011 and 21/05/2011
Rocks Lane (A306), Mill Hill Road, and Common Road	
Rocks Lane (A306), Queen's Ride, A205 Upper Richmond Road and Roehampton Lane	
Automatic Traffic Count (ATC)	
Rocks Lane (A306), north of Pavilion access	20/05/2011 – 12/06/2011
Rocks Lane (A306), south of Station Rd junction	
Queen Elizabeth Walk	04/07/2011 – 19/07/2011
Pedestrian and cycle surveys	
Thames Path, near the Boat House	17/05/2011 and 21/05/2011
Foot path in the (Wandsworth) Barn Elms Playing Fields from southern boundary to tennis courts	12/07/2011 and 09/07/2011
Queen Elizabeth Walk	07/07/2011 and 09/07/2011
Parking surveys	
Cardigan Road	13/09/2011 and 10/09/2011
Rectory Road	
Bellevue Road	
Ranelagh Avenue	
Glebe Road (from Ranelagh Avenue to Laurel Road)	
Mill Hill Road (from Mill Hill to Common Road)	
Rocks Lane (A306) (from Church Lane to Mill Hill Road)	
Elm Grove Road	
Tennis Court Access Road (off Rocks Lane (A306))	

6.4.64 Pedestrian and cyclist flow data from the pedestrian and cyclist surveys provided the baseline pedestrian traffic data sets which are set out in Table 6.4.5 and Table 6.4.6.

6.4.65 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.

6.4.66 The following ATC and junction surveys are on construction traffic routes to and from the Barn Elms site.

a. ATC on Rocks Lane (A306), north of Pavilion access
b. ATC on Rocks Lane (A306), south of Station Rd junction
c. ATC on Queen Elizabeth Walk

Results of the surveys

6.4.67 The surveys inform the analysis of the baseline situation in the area surrounding the Barn Elms site. The findings are summarised in the following paragraphs.

Pedestrians

6.4.68 Pedestrian surveys were undertaken at four locations around the site as indicated in Figure 6.4.4 in the Barn Elms site *TA* figures during the AM and PM peak hours.

6.4.69 Table 6.4.5 indicates the pedestrian flows surrounding the site during the AM, PM and weekend peak hours.

6.4.70 Pedestrian surveys around the site during the weekday AM and PM peak hours indicate that there is a relatively low level of pedestrian activity on Rocks Lane (A306) during peak periods with levels often being under 25 people per hour.

6.4.71 The western end of Queen Elizabeth Walk shows higher levels of use in the PM peak hour with 164 people routing eastbound and 205 people routing -westbound. These findings are supported by pedestrian and cycle data from the junction counts undertaken. These levels are also significantly higher than the AM north-eastbound and south-westbound figures (26 p/h and 21 p/h) suggesting that footfall is generally higher in the evenings with possible reasons being less urgency in travelling or nicer weather conditions.

6.4.72 Thames Path recorded medium levels of footfall in both directions during the AM and PM peaks (72 northbound AM, 37 southbound AM, 64 northbound PM and 64 southbound PM) with lower levels during the inter peak survey (52 northbound and 24 southbound). Levels during the weekend however were much higher with 143 northbound trips and 115 southbound trips along the Thames Path suggesting that whilst the route is used by commuters, it also has a strong footfall for recreational users.

6.4.73 The surveys show that there is low usage on the footpath through Barn Elms fields with respective northbound and southbound footfall reaching 6 people per hour and 10 people per hour in the AM peak and 18 people per hour and 29 people per hour in the PM peak.

6.4.74 The junction crossing results show that Church Road is the most frequently crossed road. The most likely reason for this is people from the surrounding residential areas crossing to use the Church Road bus stops.

This is shown in the morning peak where 88 pedestrians make a northbound crossing of the road, which could be to use the Church Road bus stop where services run towards the Hammersmith gyratory.

6.4.75 The results also show a medium to high level of usage is sustained over the weekend. This is likely due to local residents crossing the road to use the local shops and services available on Rocks Lane, Church Road and Castlenau arms of the junction.

Table 6.4.5 Existing pedestrian 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)
Thames Path – near boathouse	Westbound	72	52	64	143
Thames Path – near boathouse	Eastbound	37	24	64	115
Beverley Brook Footpath	Northwestbound	6	0	18	5
Beverley Brook Footpath	Southeastbound	10	1	29	6
Queen Elizabeth Walk – western end	Eastbound	26	24	164	100
Queen Elizabeth Walk – western end	Westbound	21	35	205	68
Rocks Lane west pavement – adjacent to playing fields	Northbound	7	7	17	4
Rocks Lane west pavement – adjacent to playing fields	Southbound	10	8	9	4
Rocks Lane east pavement – adjacent to playing fields	Northbound	5	12	24	19
Rocks Lane east pavement – adjacent to playing fields	Southbound	17	13	14	23
Rocks Lane / Church Road junction Pedestrian Crossings					
Castelnau (North Arm)	Eastbound	16	34	33	61
Castelnau (North Arm)	Westbound	21	27	31	69

Queen Elizabeth Walk (East Arm)	Southbound	10	23	22	26
Queen Elizabeth Walk (East Arm)	Northbound	13	7	13	16
Rocks Lane (Southeast Arm)	Southwestbound	6	12	17	16
Rocks Lane (Southeast Arm)	Northeastbound	12	14	24	37
Elm Grove Road (Southwest Arm)	Northwestbound	35	41	38	45
Elm Grove Road (Southwest Arm)	Southeastbound	20	37	42	46
Church Road (West Arm)	Northbound	88	57	55	61
Church Road (West Arm)	Southbound	46	78	57	58

Cyclists

6.4.76 Cyclist surveys were undertaken at the same locations as the pedestrian surveys during the AM and PM peak hours.

6.4.77 Table 6.4.6 indicates the flows of cyclists along the main routes surrounding the site.

6.4.78 The cycle travel patterns largely reflect the pedestrian movements with higher levels of usage along the western end of Queen Elizabeth Walk in the evening peak but relatively low levels of usage on the road network elsewhere around the Barn Elms site.

6.4.79 The Thames Path shows a consistent am/pm tidal movement for cyclists, northbound, southbound respectively during the am/pm peak and even usage on a Saturday. This tidal flow was also observed from the pedestrian study.

6.4.80 There is also a strong tidal flow along the carriageway of Rocks Lane with 106 cyclists travelling northbound on the west carriageway in the AM peak and 74 cyclists returning southbound in the PM peak on the east carriageway. This is reinforced by the junction results of Rocks Lane as both the Rocks Lane / Church Road junction and the Rocks Lane / Mill Hill Road junction both show a strong tidal flow northbound in the AM peak and southbound in the PM peak.

6.4.81 The tidal flow described above also continues along Castelnau, suggesting that Hammersmith is an employment hub for the local area.

Table 6.4.6 Existing cycle traffic

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)
Thames Path – near boathouse	Northbound	71	11	26	54
	Southbound	38	12	62	53
Beverley Brook Footpath	Northwestbound	0	0	4	0
	Southeastbound	0	0	0	1
Queen Elizabeth Walk – western end	Eastbound	10	1	63	17
	Westbound	3	3	39	17
Rocks Lane west carriageway – adjacent to playing fields	Northbound	106	12	13	20
Rocks Lane east carriageway – adjacent to playing fields	Southbound	21	9	74	13
Rocks Lane / Church Road junction					
Cyclists on carriageway					
Castelnau (North Arm)	Northbound	137	19	16	33
Castelnau (North Arm)	Southbound	24	11	83	13
Queen Elizabeth Walk (East Arm)	Eastbound	8	0	1	3
Queen Elizabeth Walk (East Arm)	Westbound	17	3	5	2
Rocks Lane (Southeast Arm)	Southeastbound	21	9	74	13

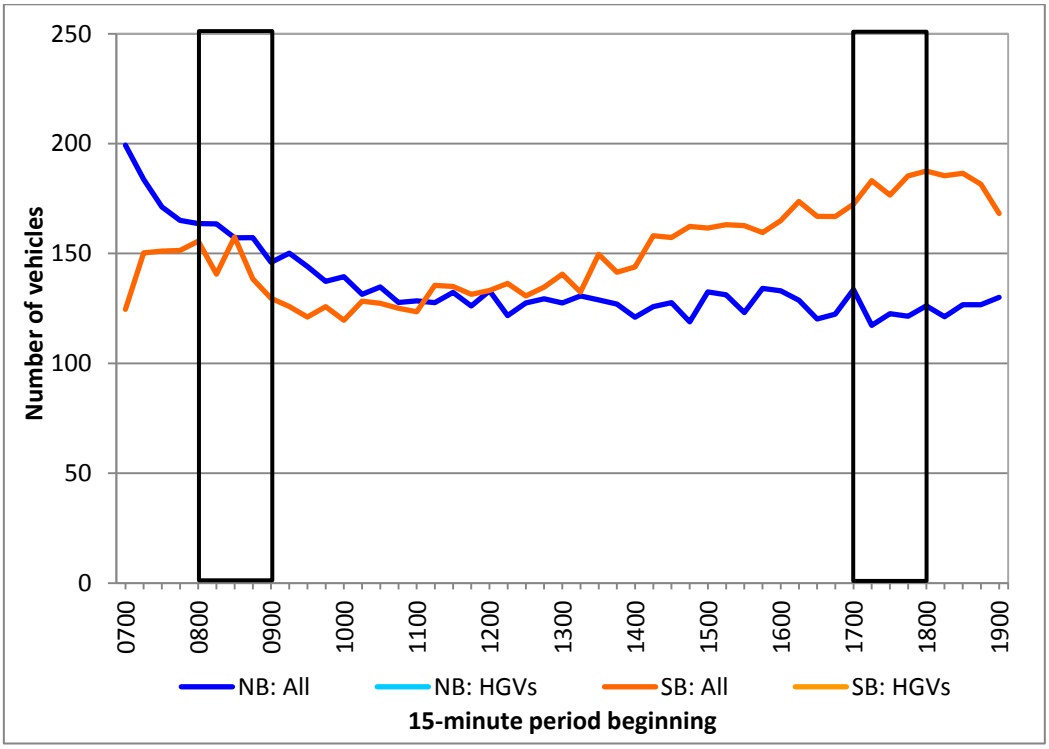
Road/route	Direction	Weekday			Weekend
		AM peak (08:00-09:00)	Inter-peak (12:00-13:00)	PM peak (17:00-18:00)	(13:00-14:00)
Rocks Lane (Southeast Arm)	Northwestbound	106	12	13	20
Elm Grove Road (Southwest Arm)	Southwestbound	0	0	4	1
Elm Grove Road (Southwest Arm)	Northeastbound	4	2	1	0
Church Road (West Arm)	Westbound	6	4	10	1
Church Road (West Arm)	Eastbound	21	4	3	16
Rocks Lane / Mill Hill Road junction					
Cyclists on carriageway					
Rocks Lane (North Arm)	Northbound	120	10	14	29
Rocks Lane (North Arm)	Southbound	23	7	68	15
Mill Hill Road (East Arm)	Eastbound	51	9	13	9
Mill Hill Road (East Arm)	Westbound	42	7	33	15
Common Road (South Arm)	Southbound	4	1	7	2
Common Road (South Arm)	Northbound	7	0	0	4
Rocks Lane (Southwest Arm)	Southwestbound	19	3	59	13
Rocks Lane (Southwest Arm)	Northeastbound	107	7	15	21
Mill Hill Road (East Arm)	Westbound	33	3	33	18
Mill Hill Road (East Arm)	Eastbound	48	5	10	16

Traffic flows

6.4.82 The ATC data has been analysed to identify the existing traffic flows along Rocks Lane (A306) north of the pavilion access and south of the junction with Station Road, and along Queen Elizabeth Walk.

6.4.83 The weekday, Saturday, and Sunday vehicle and HGV flows for a 12-hour period (07:00-19:00) along Rocks Lane (A306) north of the pavilion access are shown in Plate 6.4.1, Plate 6.4.2 and Plate 6.4.3 respectively.

Plate 6.4.1 Weekday two-way traffic flow along Rocks Lane (A306) north of Beverley Brook (weekday ATC survey)



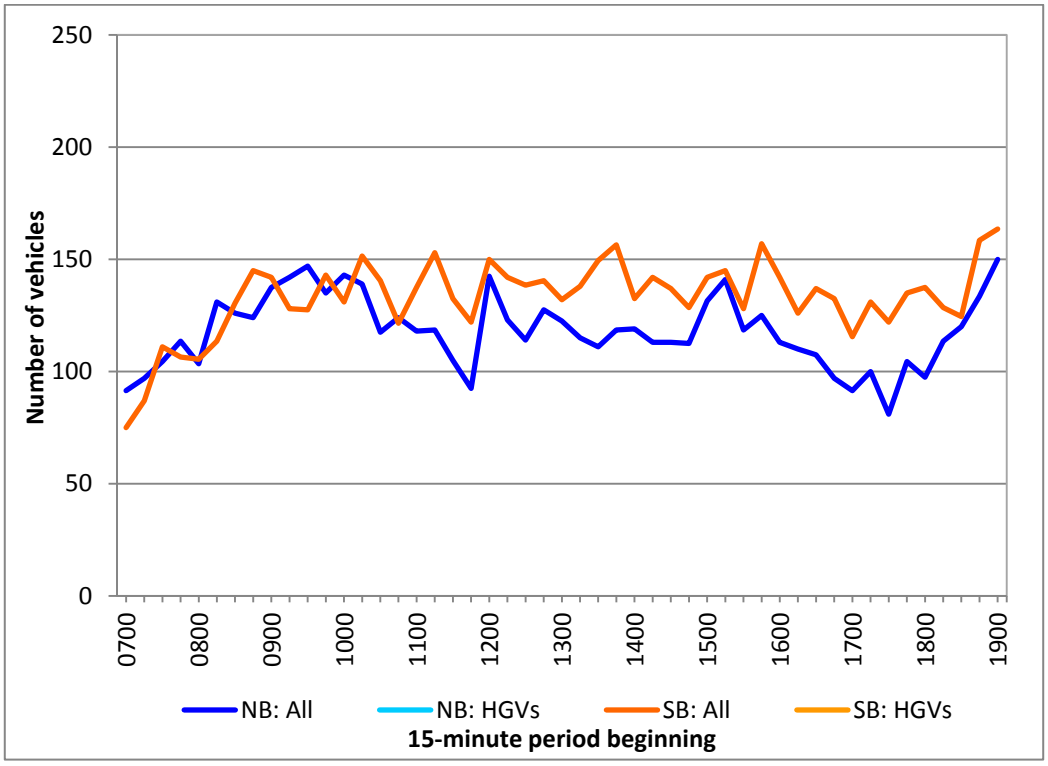
NB – NorthBound, SB – SouthBound. The black box represents the peak hour traffic flows used for the traffic assessment

6.4.84 Plate 6.4.2 shows a slightly peaked profile along Rocks Lane to the north of the Beverley Brook. There is a northbound traffic peak in the AM peak which is mirrored by a southbound peak in the PM peak suggesting that there is a net tidal flow to the north of the site.

6.4.85 The weekday ATC Rocks Lane shows that between 08:00 – 09:00 there are approximately 1,234 two-way vehicle movements. The busiest 15 minute peak period in this period occurred after 08:30 with approximately 157 northbound vehicles and approximately 158 southbound vehicles.

6.4.86 For the period between 17:00 – 18:00 there are approximately 1,212 two-way vehicle movements. The busiest 15 minute peak period in this period occurred after 17:45 with approximately 121 northbound vehicles and approximately 185 southbound vehicles.

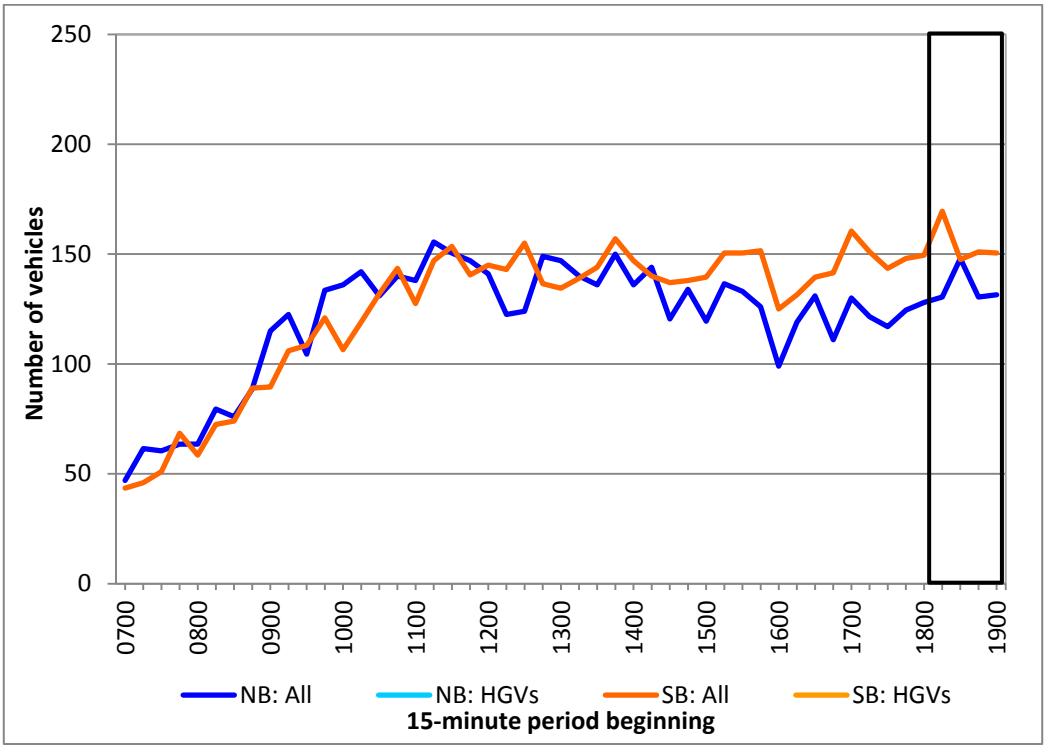
Plate 6.4.2 Saturday two-way traffic flow along Rocks Lane (A306) north of Beverley Brook (Saturday ATC survey)



NB – NorthBound, SB – SouthBound. The black box represents the peak hour traffic flows used for the traffic assessment

6.4.87 Analysis of the data showed that the Saturday peak travel period occurred between 18:30 – 19:30 with 1,173 two-way vehicle movements recorded. This is less than the AM and PM weekday two-way traffic flows and the period falls outside of the normal weekend construction works vehicle movements period of between 08:00 – 13:00.

Plate 6.4.3 Sunday two-way traffic flow along Rocks Lane (A306) north of Beverley Brook (Sunday ATC survey)

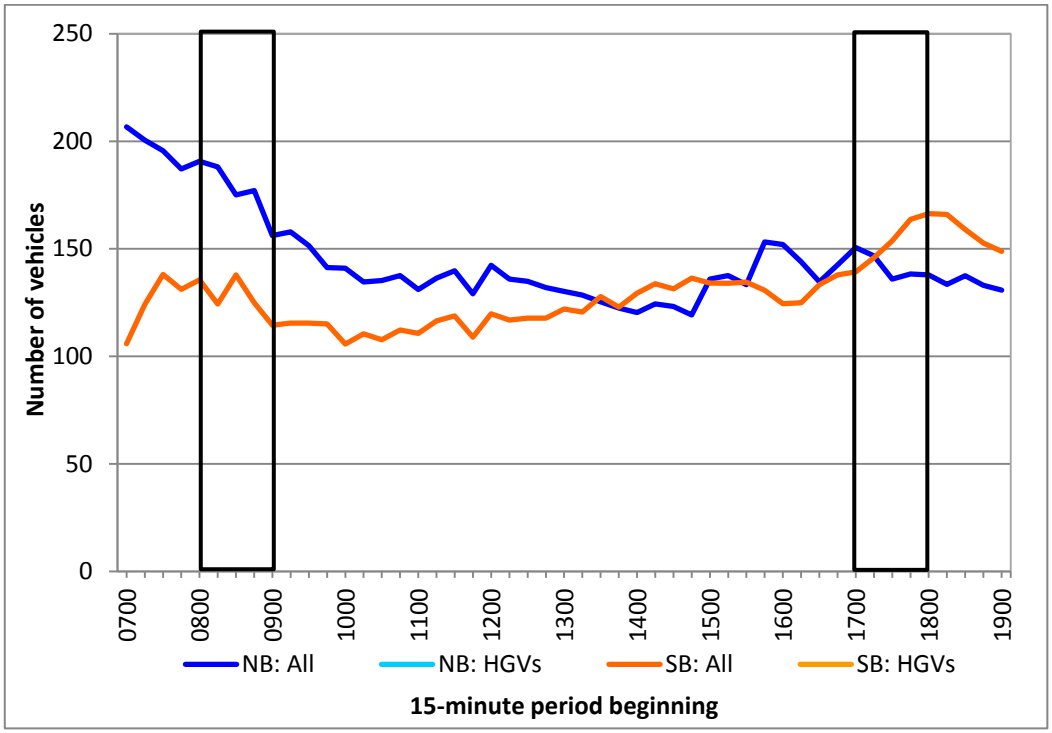


NB – NorthBound, SB – SouthBound. The black box represents the peak hour traffic flows used for the traffic assessment

6.4.88 Analysis of the data showed that the Sunday peak travel period occurred between 18:00 – 19:00 with 1,159 two-way vehicle movements recorded. This is less than the AM and PM weekday two-way traffic flows and the period falls outside of the normal weekend construction works vehicle movements period of between 08:00 – 13:00.

6.4.89 The weekday, Saturday, and Sunday vehicle and HGV flows for a 12-hour period (07:00-19:00) along Rocks Lane (A306) south the junction with Station Road are shown in Plate 6.4.4, Plate 6.4.5 and Plate 6.4.6 respectively.

Plate 6.4.4 Weekday two-way traffic flow along Rocks Lane (A306) south of Station Road (weekday ATC survey)

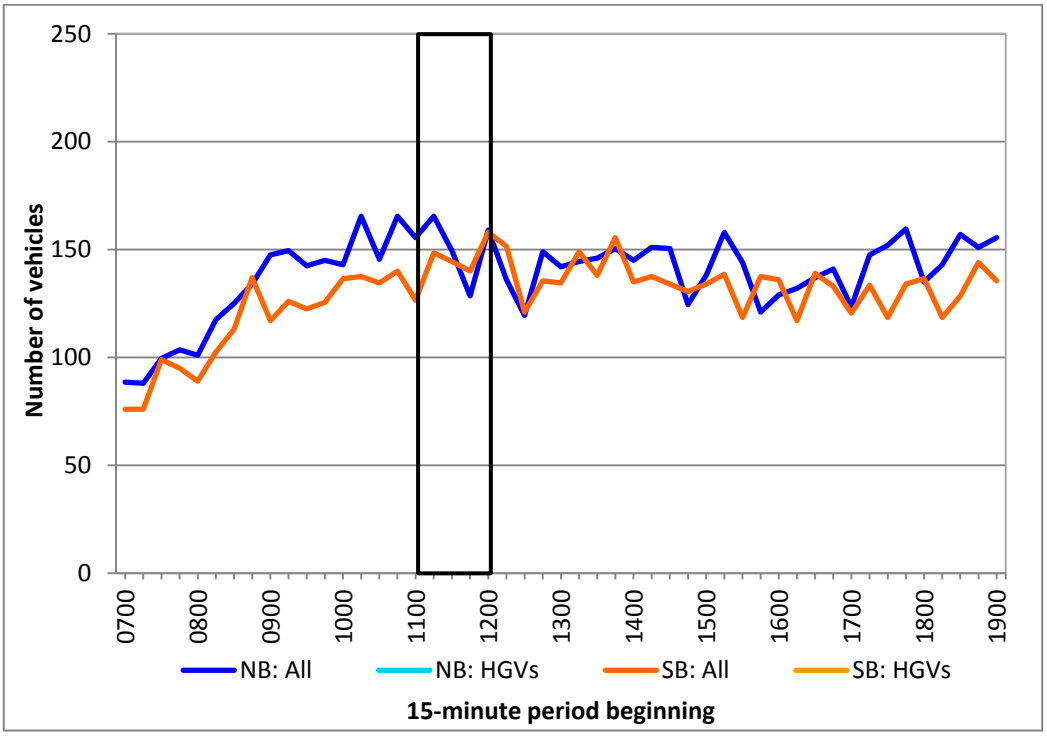


NB – NorthBound, SB – SouthBound. The black box represents the peak hour traffic flows used for the traffic assessment

6.4.90 The weekday ATC Rocks Lane south of Station Road data shows that between 08:00 – 09:00 there are approximately 1,254 two-way vehicle movements. The busiest 15 minute peak period in this period occurred after 08:00 with approximately 101 northbound vehicles and approximately 136 southbound vehicles.

6.4.91 For the period between 17:00 – 18:00 there are approximately 1,186 two-way vehicle movements. The busiest 15 minute peak period in this period occurred after 18:00 with approximately 138 northbound vehicles and approximately 166 southbound vehicles.

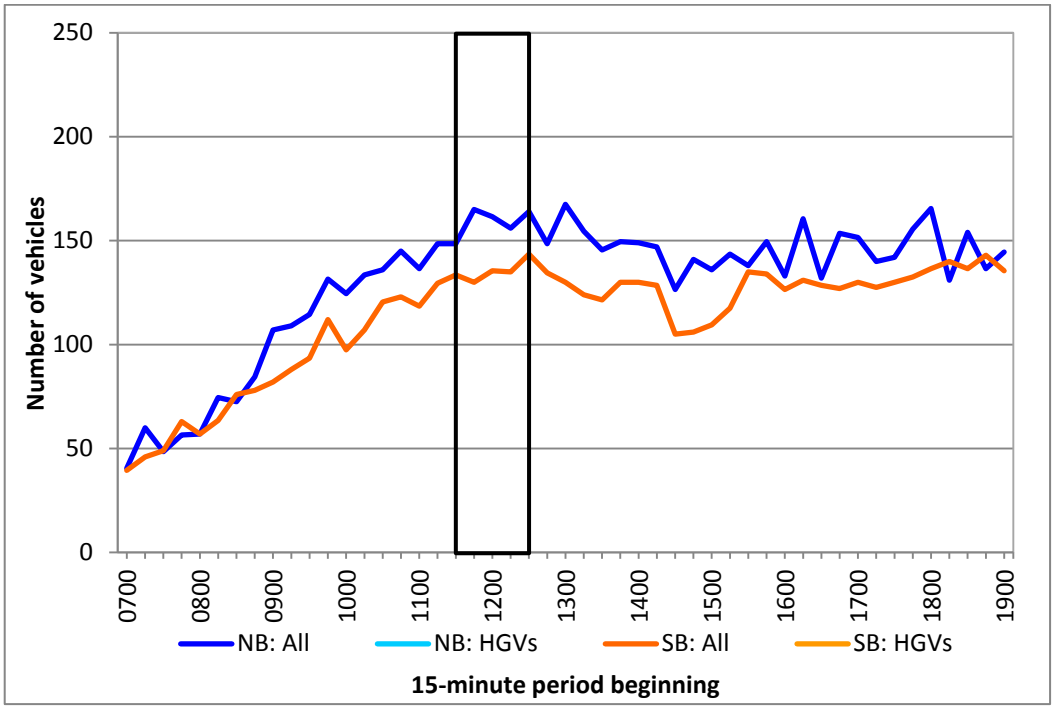
Plate 6.4.5 Saturday two-way traffic flow along Rocks Lane (A306) south of Station Road (Saturday ATC survey)



NB – NorthBound, SB – SouthBound. The black box represents the peak hour traffic flows used for the traffic assessment

6.4.92 Analysis of the data showed that the Saturday peak travel period occurred between 11:00 – 12:00 with 1,194 two-way vehicle movements recorded. This is less than the AM and PM weekday two-way traffic flows and the period falls within the normal weekend construction works vehicle movements period of between 08:00 – 13:00.

Plate 6.4.6 Sunday two-way traffic flow along Rocks Lane (A306) south of Station Road (Sunday ATC survey)

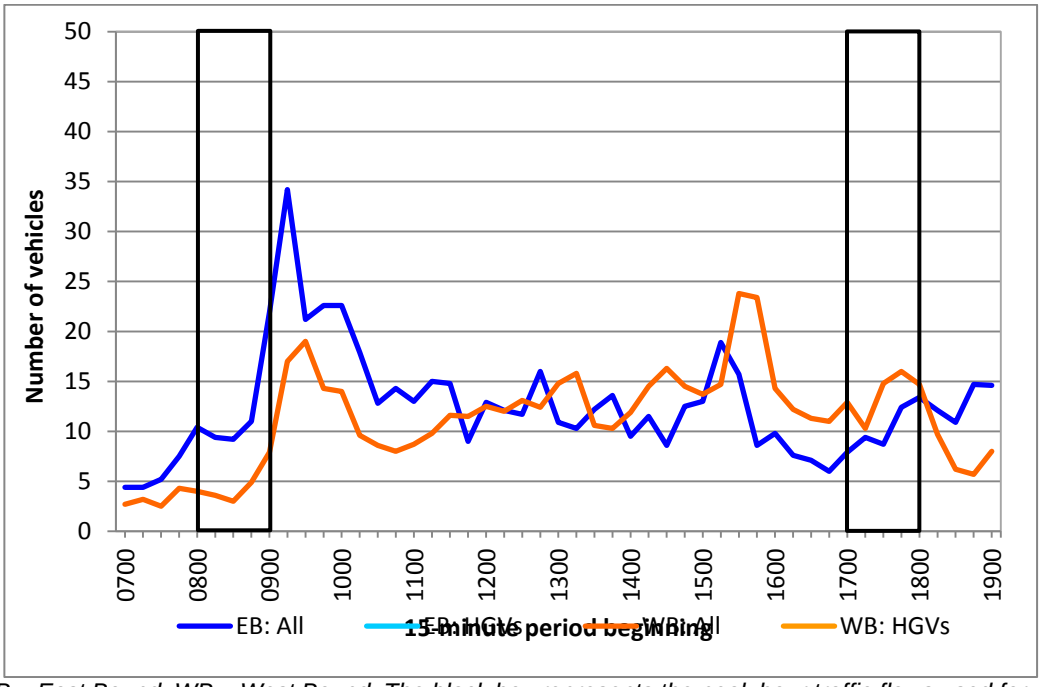


NB – NorthBound, SB – SouthBound. The black box represents the peak hour traffic flows used for the traffic assessment

6.4.93 Analysis of the data showed that the Sunday peak travel period occurred between 11:30 – 12:30 with 1,191 two-way vehicle movements recorded. This is less than the AM and PM weekday two-way traffic flows and the period falls within the normal weekend construction works vehicle movements period of between 08:00 – 13:00.

6.4.94 The weekday, Saturday, and Sunday vehicle and HGV flows for a 12-hour period (07:00-19:00) along Queen Elizabeth Walk are shown in Plate 6.4.7, Plate 6.4.8 and Plate 6.4.9 respectively.

Plate 6.4.7 Weekday two-way traffic flow Queen Elizabeth Walk (weekday ATC survey)

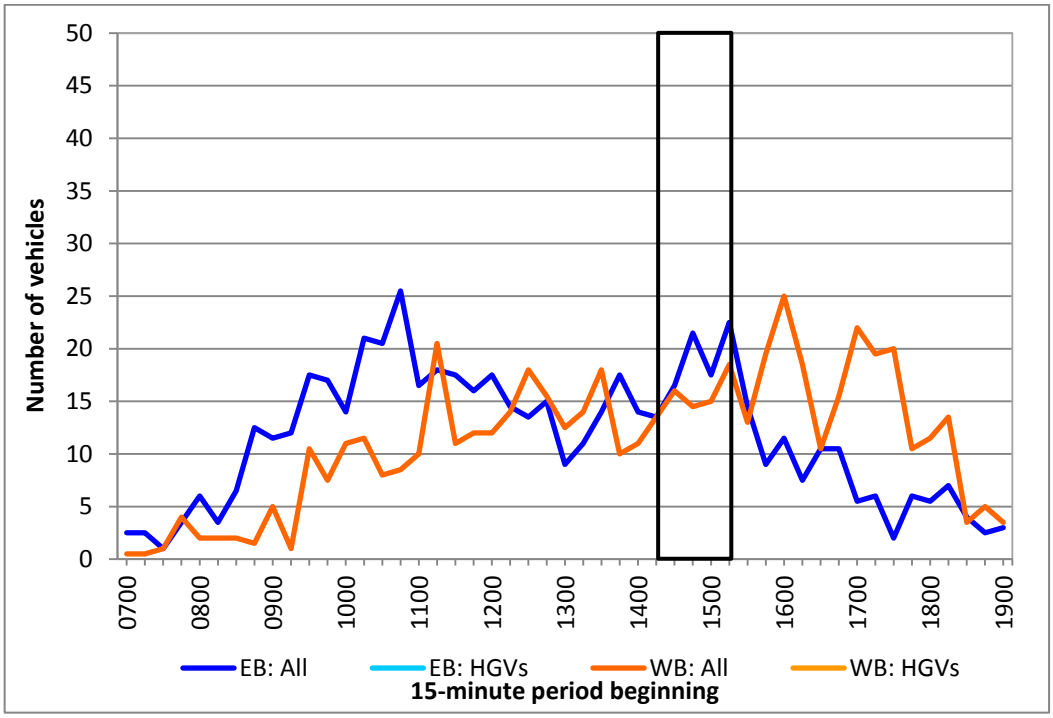


EB – East Bound, WB – West Bound. The black box represents the peak hour traffic flows used for the traffic assessment

6.4.95 The weekday ATC Queen Elizabeth Walk data shows that between 08:00 – 09:00 there are approximately 56 two-way vehicle movements. The busiest 15 minute peak period in this period occurred after 08:00 with approximately 10 northbound vehicles and approximately four southbound vehicles.

6.4.96 For the period between 17:00 – 18:00 there are approximately 92 two-way vehicle movements. The busiest 15 minute peak period in this period occurred after 17:45 with approximately 12 northbound vehicles and approximately 16 southbound vehicles.

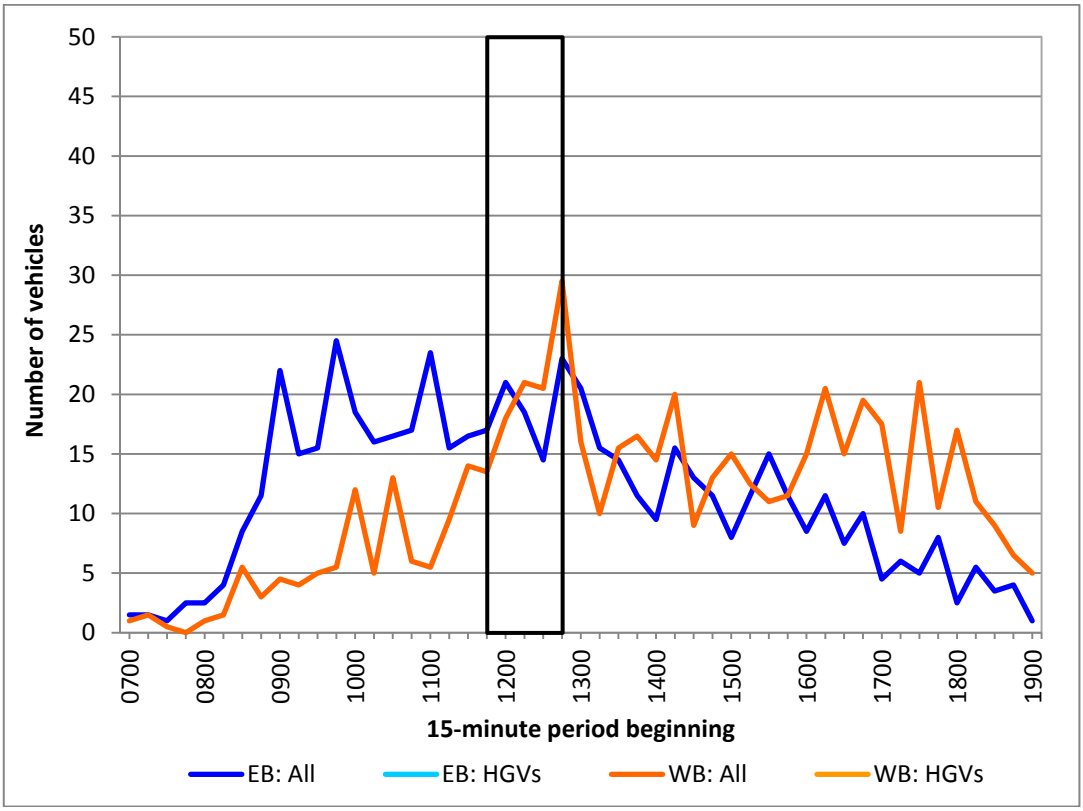
Plate 6.4.8 Saturday two-way traffic flow Queen Elizabeth Walk (Saturday ATC survey)



EB – East Bound, WB – West Bound. The black box represents the peak hour traffic flows used for the traffic assessment

6.4.97 Analysis of the data showed that the Saturday peak travel period occurred between 14:15 – 15:15 with 142 two-way vehicle movements recorded. This is higher than the AM and PM weekday two-way traffic flows but the period falls outside of the normal weekend construction works vehicle movements period of between 08:00 – 13:00. Between 08:00 – 13:00, the peak two-way vehicle movements occurred between was 128 (between 10:15 - 11:15), which is slightly more than that recorded in the PM weekday two-way traffic flows.

Plate 6.4.9 Sunday two-way traffic flow Queen Elizabeth Walk (Sunday ATC survey)



EB – East Bound, WB – West Bound. The black box represents the peak hour traffic flows used for the traffic assessment

6.4.98 Analysis of the data showed that the Sunday peak travel period occurred between 11:45 – 12:45 with 166 two-way vehicle movements recorded. This is higher than the AM and PM weekday two-way traffic flows and the period falls within the normal weekend construction works vehicle movements period of between 08:00 – 13:00.

Parking

6.4.99 Surveys were undertaken to establish the availability of parking stock in the vicinity of the site to understand the existing occupancy and capacity

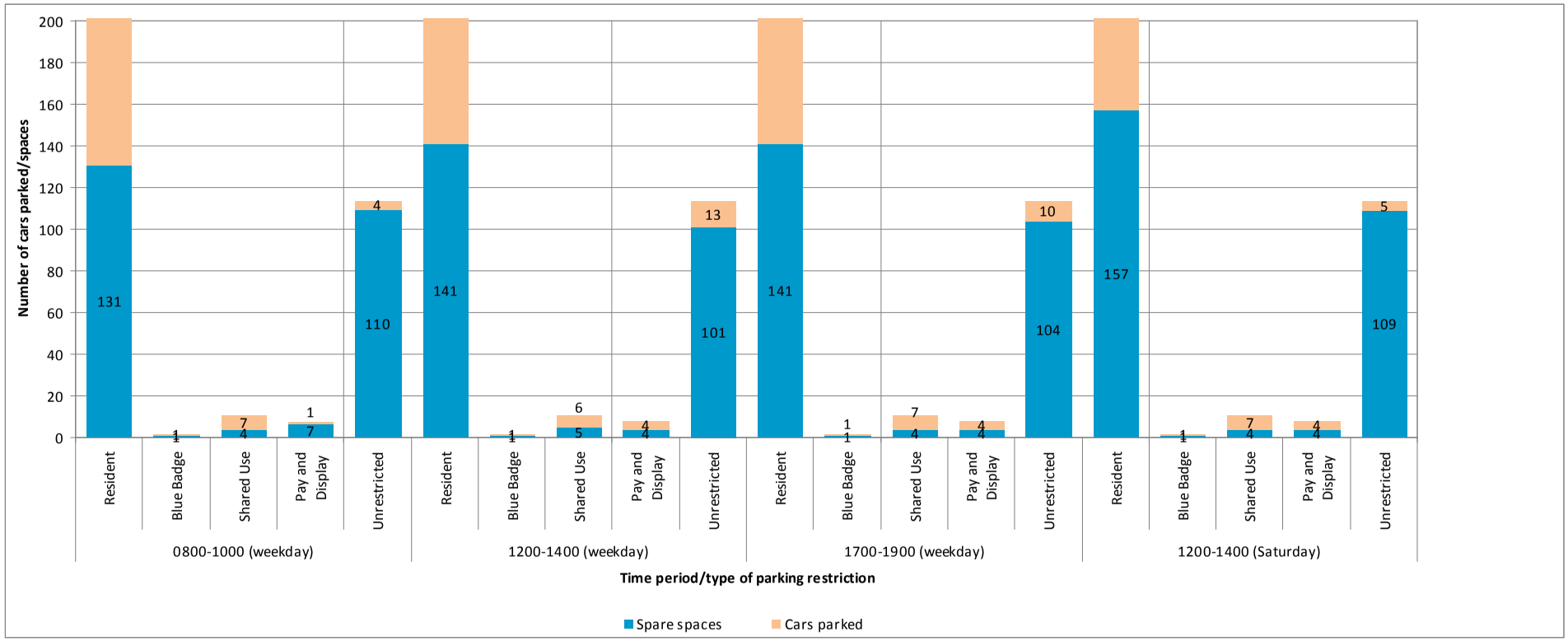
6.4.100 Table 6.4.7 shows the parking capacity available throughout a weekday. Plate 6.4.10 indicates a histogram of the car parking in the area surrounding Barn Elms during the AM, inter-peak, PM peaks and the weekend peak periods.

Table 6.4.7 Parking bay usage*

Location	No. and Type of parking	No. of spaces available - weekday			No. of spaces available Saturday 12:00-14:00
		08:00-10:00	12:00-14:00	17:00-19:00	
Cardigan Road	42	20	20	20	22
Rectory Road	66	17	15	14	20
Bellevue Road	35	13	12	9	13
Ranelagh Road	79	40	45	43	45
Glebe Road	29	13	12	14	12
Rocks Lane	53	8	14	13	17
Elm Grove Road	134	20	23	28	28
Leggatt Road	75	19	21	24	23
	Blue Badge				
Rectory Road	1	1	1	1	0
Elm Grove Road	1	0	0	0	0
	Shared Use				
Ranelagh Road	11	4	5	4	4
	Pay & Display				
Rocks Lane	4	3	4	2	2
Elm Grove Road	4	4	0	2	2
	Unrestricted				
Mill Hill Road	27	27	27	27	27
Rocks Lane	72	72	72	72	72
Tennis Court Access Road	15	11	2	5	10

**Motorcycle spaces available based on an assumed width of 1m per motorcycle*

Plate 6.4.10 Existing on-street car parking



6.4.101 The results shown in Table 6.4.7 and Plate 6.4.10 indicate there is spare capacity across the varying parking types within all time parameters surveyed.

Local highway modelling

6.4.102 To establish the existing capacity on the local highway network, a scope was agreed with TfL and LB of Richmond upon Thames to assess the junction of Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road using LINSIG.

6.4.103 Traffic models for this junction have been developed for this assessment. The models have been constructed using on-site measurements of classified vehicle volumes and queue lengths. The signal timings used in the assessment have been obtained from the TfL Signal Timing Sheet for this junction.

6.4.104 The TfL modelling guidelines and Modelling Audit Process (MAP) 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. 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.

6.4.105 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.

6.4.106 The baseline model therefore accounts for the current traffic and transport conditions within the vicinity of the site.

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

6.4.108 Figures 6.4.5 and 6.4.6 in the Barn Elms site *TA* figures indicate the traffic flows which were used for the baseline AM and PM peak hour assessments which take into account the observed flows. Model outputs are included in Appendix C which indicates the lane structure used for the assessment of the junction.

6.4.109 Below summarises the baseline performance of the Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road junction.

Table 6.4.8 Baseline LINSIG model outputs*

Approach	Movement	Weekday							
		AM peak				PM peak			
		(08:00-09:00)				(17:00-18:00)			
		Flow (PCUs)	DoS	MMQ (PCUs)	Delay (seconds per PCU)	Flow (PCUs)	DoS	MMQ (PCUs)	Delay (seconds per PCU)
Castelnau (A306)	Left / ahead	531	78%	18	40	626	91%	26	57
	Ahead / right	74	12%	2	23	59	9%	1	23
Queen Elizabeth Walk	All	9	7%	0	64	57	46%	2	77
Rocks Lane (A306)	Left / ahead	282	39%	7	27	265	36%	7	26
	Ahead / right	283	38%	7	27	265	35%	7	26
Elm Grove Road	All	16	13%	1	65	16	14%	1	66
Church Road (A3003)	All	197	68%	5	67	190	81%	6	87
		Practical Reserve Capacity (PRC)		Total Delay (PCU hours)		Practical Reserve Capacity (PRC)		Total Delay (PCU hours)	
Overall junction performance		16%		15		-1.5%		20	

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. 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

6.4.110 The LINSIG junction model output shows that total junction delay is 15 PCU hours in the AM peak period assessed and 20 PCU hours in the PM peak period assessed. These equate to approximately 38 seconds in AM peak and 49 seconds in the PM peak periods assessed.

6.4.111 The overall junction performance shows that the junction is currently operating within capacity in the weekday AM peak hour and close to capacity in the PM peak hour.

Accident analysis

6.4.112 Accident data within the vicinity of the site has been obtained from TfL and analysed to determine if there are any specific road safety issues, trends or patterns evident on the surrounding highway network.

6.4.113 Data has been obtained for a five year period to the 31st March 2011. Figure 6.4.7 in the Barn Elms site *TA* figures indicates the accidents that have occurred within the vicinity of the site. The following roads and junctions have been analysed:

a. Rocks Lane/ Mill Hill Road Junction

b. Rocks Lane/ Ranelagh Avenue Junction

c. Rocks Lane/ Queen Elizabeth Walk Junction

d. Rocks Lane/ Station Road Junction

e. Rocks Lane/ Upper Richmond Road Junction

f. Rocks Lane/ Castlenau Junction.

6.4.114 Table 6.4.10 provides a summary of the accident locations, total number of accidents and the associated level of accident severity. Appendix D provides a full analysis of the accidents.

Table 6.4.9 Accident severity

Location (Road / Junction)	Slight	Serious	Fatal	Total
Rocks Lane	6	2	0	8
Rocks Lane/ Mill Hill Road Junction	6	0	0	6
Rocks Lane/ Ranelagh Avenue Junction	7	0	1	8
Rocks Lane/ Queen Elizabeth Walk Junction	2	0	0	2
Rocks Lane/ Station Road Junction	4	1	0	5
Castlenau/ Ferry Road Junction	2	0	0	2
Mill Hill Road/ Common Road Junction	2	1	0	3
Total	**29**	**4**	**1**	**34**

6.4.115 During the five year period, a total of 34 accidents occurred within the study area analysed. Of these accidents, 29 were categorised as slight, four were serious and one was fatal with the majority of accidents occurring on the junctions of Rocks Lane/ Mill Hill Road and Rocks Lane/ Ranelagh Avenue

6.4.116 Of the serious accidents, three occurred on Rocks Lane with one at its junction with Station Road, whilst one occurred at the junction between Mill Hill Road and Common Road Junction. The cause of these accident were attributed to factors such as a failure to look properly, vehicle door opening or closed, careless/reckless driving and poor turning/ manoeuvring.

6.4.117 The one fatal accident that occurred along the A306 Rocks Lane in the five year period analysed, occurred at the Ranelagh Avenue junction to the west of the site. The accident involved a one vehicle that travelled off the carriageway and struck a tree. The accident was believed to be caused by the vehicle driver being inexperienced or a learner, travelling too fast for conditions and careless driving.

6.4.118 Figure 6.4.8 in the Barn Elms site *TA* figures shows the pedestrian and cyclist accidents by severity.

6.4.119 The records show that there were 12 accidents involving pedestrians and cyclists. Eight of the accidents occurred on the roads to be taken by construction vehicles within the study area. Inspection of the data showed that seven of these occurred at junctions with signalised control facilities, with the remaining accidents occurring at locations without signal control.

6.4.120 In the context of the temporary HGV movements associated with the Barn Elms site, the accident risk to these modes of travel will be managed by providing pedestrian and cyclist awareness training for commercial drivers associated with the construction works as set out in the Construction Management Plan. For sections of road affected by roadworks, the risk to all road-users will 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[iii].

6.5 Construction assessment

6.5.1 The *TA*, including both qualitative and quantitative assessment, 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 each site and knowledge of the construction programme, duration and levels of construction activity.

6.5.2 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 under

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

construction. The construction base case does not include any traffic related to the Thames Tideway Tunnel project, whether from the Barn Elms site or from other sites.

Construction base case

6.5.3 As described in Section 6.3 (Assessment Methodology), the construction assessment year for transport issues in relation to this site is Site Year 1 of construction.

Pedestrians and cyclists

6.5.4 There are no proposals to change the cycle or pedestrian network by Site Year 1 of construction and the network will operate as indicated in the baseline situation.

Public transport

6.5.5 At the time of the assessment there were no confirmed plans to amend National Rail or bus services within the area.

6.5.6 In terms of the public transport network, the London Underground Upgrade Plan produced by TfL[3] envisages there will be a capacity increase of approximately 24% on the District Line by Site Year 1 of construction. The Upgrade Plan envisages a combined increase in capacity on the Circle and Hammersmith and City Lines of 65% although it is clear that a significant proportion of this increase is attributed to the revised service patterns implemented in 2009, which are already reflected in the baseline data. It is envisaged that London Underground, bus and National Rail patronage will also increase by Site Year 1 of construction.

6.5.7 All other planned line upgrades included in the TfL London Underground Upgrade Plan, such as capacity improvements on Jubilee, Victoria, Northern, Hammersmith and City, Circle, Metropolitan and District lines, are also planned to be in place by the construction base case.

6.5.8 Due to traffic growth in the construction base case compared to the baseline situation during the morning peak hour, bus journey times along Rocks Lane (A306), Castelnau (A306) and Church Road (A3003) as well as within the wider area will be affected. The effect on journey times is detailed under the highway operation and network assessment and the results show that there would be a maximum increase in delay for bus users of 3 seconds in the morning peak over the baseline base. However, the results show that there would be a reduction in delay of up to 4 seconds in the evening peak, which is associated with negative growth in background traffic.

6.5.9 It is anticipated that patronage on public transport services may change between the baseline situation and Site Year 1 of construction. Future patronage changes on bus and rail networks will be driven by a range of complex factors and there are inherent uncertainties in setting a patronage level for a future year.

6.5.10 In order to ensure that the busiest case scenario is addressed in the assessment, the capacity for London Underground and National Rail

services in the base case has been assumed to remain the same as in the baseline situation. This ensures a robust assessment.

Highway network and operation

6.5.11 Baseline traffic flows (from the junction surveys) have been used and forecasting carried out to understand the capacity on the highway network in the vicinity of the Barn Elms site in Site Year 1 of construction without the Thames Tideway Tunnel project. The scope of this analysis has been agreed with the LB of Richmond upon Thames and TfL.

6.5.12 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. 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 modelling methodology note in the *Project-wide TA*.

6.5.13 For the Barn Elms site, the TfL WeLHAM model has been used. The model provides factors for the increase in vehicle kilometres in the LB of Richmond upon Thames between the base year and 2021. The relevant growth factors are described in paragraph 6.5.18 which was applied to the survey flows undertaken in 2011 to produce flows for 2021.

6.5.14 It should be noted that these represent growth over the period to 2021, which is beyond Site Year 1 of construction at Barn Elms and therefore ensures that the construction base case for the highway network is robust

Committed developments

6.5.15 The base case in Site Year 1 of construction takes into account the developments proposed on the former Putney Hospital site.

6.5.16 The existing buildings on the former Putney Hospital site (270m southwest of site) will be demolished to create a new Primary Care Centre and residential units. This could result in residents, staff and visitors using the footways and local highway network in the vicinity of the site experiencing impacts from the development. On this basis, they have been taken into consideration as a receptor in the *TA*.

6.5.17 The Barn Elms Schools Sports Centre has also been identified in the Development Schedule. However, as this development represents the refurbishment or replacement of an existing facility the receptor is expected to remain the same.

Local highway modelling

6.5.18 The growth factors for LB of Richmond upon Thames based on the WeLHAM model have been agreed with TfL and LB of Richmond upon Thames and applied to the baseline traffic flows. The growth factors are:

a. Weekday AM Peak growth factor: 1.5%

b. Weekday PM Peak growth factor: -1.5%

6.5.19 Baseline traffic flows (from the ATC and junction surveys) have been used and forecasting carried out to understand the local highway network conditions in the vicinity of the Barn Elms site in Site Year 1 of construction without the Thames Tideway Tunnel project. No overall traffic growth is expected for the LB of Richmond upon Thames, therefore the base case traffic flows will remain similar to the baseline conditions. However, the AM peak traffic flow will increase by 1.5% whilst the PM peak traffic flow will decrease by 1.5%.

6.5.20 Para 6.3.7 to 6.3.10 explains the definition of the assessment area for local highway network modelling. At this site, the assessment examines the Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road junction.

6.5.21 Table 6.5.1 shows the construction base case LINSIG model outputs.

Table 6.5.1 Construction base case LINSIG model outputs

Approach	Movement	Weekday							
		AM peak				PM peak			
		(08:00-09:00)				(17:00-18:00)			
		Flow (PCUs)	DoS	MMQ (PCUs)	Delay (seconds per PCU)	Flow (PCUs)	DoS	MMQ (PCUs)	Delay (seconds per PCU)
Castelnau (A306)	Left / ahead	540	79%	19	41	617	90%	25	54
	Ahead / right	76	12%	2	23	58	9%	1	23
Queen Elizabeth Walk	All	10	8%	0	64	58	47%	2	77
Rocks Lane (A306)	Left / ahead	288	39%	7	27	262	35%	7	26
	Ahead / right	288	39%	7	27	261	35%	7	26
Elm Grove Road	All	16	13%	1	65	17	14%	1	66
Church Road (A3003)	All	201	69%	5	68	188	80%	6	86
		Practical Reserve Capacity (PRC)		Total Delay (PCU hours)		Practical Reserve Capacity (PRC)		Total Delay (PCU hours)	
Overall junction performance		14%		15		-0%		19	

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. 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

6.5.22 The resulting construction base case LINSIG model output for the junction of Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road indicates that the Degree of Saturation on the majority of the approaches will increase by just 1% from the baseline situation during the morning peak hour, with the exception of Castelnau (A306) left ahead movement which reduces by one PCU, the Mean Maximum Queue length is unchanged. With regard to the evening peak, there is a reduction in the Degree of Saturation on the majority of the approaches of 1% from the baseline situation, with the exception of Castelnau (A306) left ahead movement which reduces by one PCU, the Mean Maximum Queue length is unchanged.

6.5.23 The LINSIG junction model output shows that total junction delay is 14 PCU hours in the AM and 19 PCU Hours in the PM peak periods assessed. These equate to 38 seconds per PCU in the AM and 48 seconds per PCU in the PM peak periods assessed.

Construction development case

6.5.24 This section summarises the findings of the assessment undertaken for the peak year of construction at the Barn Elms site (Site Year 1 of construction).

Pedestrian routes

6.5.25 There are existing pedestrian accesses to Barn Elms site entrance along Queen Elizabeth Way and Rocks Lane. There is also access for certain routes across the Barn Elms playing fields.

6.5.26 As the Barn Elms Schools Sports Centre changing rooms would need to be relocated, pedestrian routes to the changing rooms would change, depending on where they are relocated.

6.5.27 The new access road would be segregated from pedestrians, cyclists and other vehicles by a fence along each side of the road. Although the new access road crosses the pedestrian footpath leading between the Barn Elms Schools Sports Centre car park and the boathouse, pedestrians would be able to cross the access road at a gated crossing point supervised by a traffic marshal.

6.5.28 The Thames Path which follows the route of the River Thames to the east of the site boundary would not be physically affected.

6.5.29 The access plan and highway layout during construction (phases 1-2) plan is provided in the Barn Elms site *TA* figures and show the effect on the pedestrian footways during construction.

6.5.30 To assess a busiest case scenario, it has been anticipated that all worker trips would finish their journey by foot. This would equate to 40 construction workers in the AM and PM peak hours along Queen Elizabeth Walk and the surrounding crossing points and junctions to be added to the construction base case.

6.5.31 The footways which would most likely be affected by the worker trips would be the footways that link the site entrance to the bus stops. A

forecast distribution of worker pedestrian trips can be determined by considering the mode split shown in Table 6.2.3.

6.5.32 It is anticipated that there would not be an increase in pedestrian journey time as a result of the Barn Elms site construction works.

6.5.33 Given this small increase in pedestrian numbers against baseline usage, an extension to the length of the pedestrian phase at the junction of Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road is not required. In addition, as the assessment assumes that all construction workers would travel in the peak hours, the increase in pedestrian numbers against baseline usage during the peak hours due to construction workers walking is considered to be a conservative estimate because, due to the site working start and finish times, many workers will be travelling outside of peak network hours.

6.5.34 With regards to accidents, safety and pedestrian environment, there would be a peak of 44 HGV movements a day lasting one month. As peak hourly flows would therefore be between two and three vehicles per hour and the site access is not directly on to a strategic road, there would be a negligible effect on pedestrians.

6.5.35 Consideration has also been given to the potential effects on pedestrians using the recreational facilities at weekends, as this is when greater recreational activity might be expected. Construction vehicles and particularly lorries would only be travelling to/from the site during Saturday mornings (08:00 to 13:00) and would be minimised where possible, as set out in the *CoCP*. A average peak of nine construction vehicle movements an hour are expected in these hours, of which five would be lorries and four would be smaller vehicles. There would be no construction traffic at other times.

6.5.36 As described in Section 6.4, well-defined pedestrian routes already exist along Queen Elizabeth Walk which provide safe routes for people walking to and from the Barn Elms Schools Sports Centre and using the developments along Queen Elizabeth Walk that offer other leisure facilities. Construction traffic would be segregated from pedestrians and other traffic within the Barn Elms Schools Sports Centre car park and across the playing field. Measures would be taken as set out in the *CoCP Parts A* and *B* to ensure the safety of pedestrians on walking routes including the provision of appropriate signage and other related measures.

6.5.37 Taking all these issues into consideration, including the fact that construction vehicle movements would not occur on Saturday afternoons or on Sundays, the impact on pedestrians at weekends would be low. Therefore the effect on pedestrians would be same as for weekdays taking account of the measures proposed within the design.

Cycle routes

6.5.38 There would be an increase in construction vehicles on Rocks Lane (A306), part of which forms the National Cycle Network (route number 4) and on Queen Elizabeth Walk which is a connecting route to the Thames Path. This would increase the potential for cyclists and vehicle conflicts,

however as indicated in 6.5.33, this number is minimal and will have a negligible impact

6.5.39 The highway layout and operation assessment using the model indicates that any additional delays at the Rocks Lane (A306) / Queen Elizabeth Walk / Castlenau (A306) / Church Road (A3003) / Elm Grove Road junction would be very small, with a maximum four second delay in the PM peak hour from Queen Elizabeth Walk. As there would be no diversions of cycle routes, additional delays would be small and therefore the impact on cycle delay would be negligible.

6.5.40 Measures set out in the *CoCP* include 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 Barn Elms 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. This would include compliance with TfL guidance (Cyclists at Roadworks - Guidance[4]) to ensure safe passage for cyclists.

6.5.41 During the construction period, the operation and layout of the road network will not change other than to construct a site access crossover point. 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 LB of Richmond upon Thames prior to execution of any works.

6.5.42 As for pedestrians, consideration has also been given to the potential effects on cyclists using the recreational facilities at weekends. Taking into consideration all the issues and measures described in paragraphs 6.5.35 to 6.5.37, which are also relevant to cyclists, the impact on cyclists at weekends would be same as for weekdays taking account of the measures proposed within the design.

Bus routes and patronage

6.5.43 No bus services run immediately past the site. However, a total of six daytime bus routes serving the local area operate within walking distance of the Barn Elms site. The additional construction vehicles travelling along Rocks Lane (A306), Queen Elizabeth Walk and Church Road (A3003) may affect bus journey times on this route. The effect on journey times is detailed under the highway network assessment (see para 6.5.59 to 6.5.67), and shows that the result would be an increase of a maximum of some four seconds for those buses exiting Queen Elizabeth Walk in the PM peak hour, over that in the construction base case. The effect of this delay is considered insignificant.

6.5.44 It is anticipated that there would be a proportion of labourers and staff using buses to access the site during construction. It is expected that approximately ten additional two-way worker trips would be made by bus during the AM and PM peak hours, which would result in just over one worker trip per bus (based on a service of 86 buses during the AM peak hour and 88 buses during the PM peak hour within walking distance).

6.5.45 If all workers using National Rail and Underground services were to complete their journeys by bus, this would increase the number of workers travelling by bus to a total of 24 journeys in the AM and PM peak hours. However, this would still represent less than one additional journey per bus in each peak hour.

6.5.46 On this basis the additional worker trips made by bus in peak hours would be capable of being accommodated on the base case bus services and would typically be within the normal daily variation in bus patronage on these routes.

London Underground and National Rail patronage

6.5.47 No underground or rail stations are directly adjacent to the site and therefore none would be directly affected. It is anticipated that approximately 14 construction workers and labourers would use London Underground or National Rail services to access the site which would result in less than one additional trip per train given the number of National Rail and Underground services within the locality.

6.5.48 Based on the assessment of patronage and the fact that there is no direct impact as a result of the construction work and the impact on National Rail and London Underground services would be negligible.

River services and patronage

6.5.49 Given that there are no river passenger piers closer than 1.6km from the site, it is considered unlikely that river transport would be used by construction personnel. There would therefore be no change to river service patronage or operation.

Parking

6.5.50 During construction there would be no changes to on-street parking in the vicinity of the Barn Elms site.

6.5.51 Measures would also be taken for this site to discourage workers from travelling by car, instead promoting the use of public transport, walking or cycling.

6.5.52 A total of 30 parking spaces within the Barn Elms Schools Sports Centre car park would need to be suspended throughout the construction period. However, there is likely to be scope to rearrange the existing parking layout to relocate at least some of the suspended spaces.

6.5.53 There would be no construction worker parking in the area as parking on surrounding streets is restricted and measures to reduce car use would be incorporated into site-specific Travel Plan requirements. The loading change criterion is not relevant at this site as there are no loading bays in the vicinity of the site.

6.5.54 Based on the temporary removal of existing parking spaces during construction and due to the fact that most or all parking would be re-provided the effect on parking is considered insignificant.

Highway assessment

6.5.55 The access plan and highway layout during construction (phases 1-2) plans are provided in the Barn Elms site *TA* figures.

6.5.56 The highway layout during construction vehicle swept path analysis (phases 1-2) plan is provided in the Barn Elms site *TA* figures and show that the construction vehicles would be able to safely enter and leave the site.

6.5.57 During construction, a new site access would be required extending on from Queen Elizabeth Walk. Vehicles would access the site along Queen Elizabeth Walk before passing through a narrow section of private road which currently serves the Barn Elms Schools Sports Centre and adjacent residential properties. The access would then cross the northern and eastern regions of the Barn Elms Schools Sports Centre on a new vehicle access road to the site. This would remain in place for the duration of the construction period.

6.5.58 The northbound stop line on Rocks Lane (A306) will be relocated 500mm to the south at the Rocks Lane (A306) / Queen Elizabeth Walk / Castlelnau (A306) / Church Road (A3003) / Elm Grove Road junction.

Highway network

6.5.59 Table 6.2.4 in Section 6.2 shows the vehicle movement assumptions for the local peak traffic periods based on the peak months of construction activity at this site. The table also shows the construction worker vehicle movements expected to be generated by the site.

6.5.60 There are no construction vehicle movements associated with other Thames Tideway Tunnel sites that would pass through the area around the Barn Elms site in Site Year 1 of construction.

6.5.61 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.

6.5.62 The assignment of construction lorry trips has been undertaken using OmniTrans[iv] 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 Barn Elms site, or with other Thames Tideway Tunnel project sites, that would use routes in the vicinity of the Barn Elms site. Figure 6.5.1 in the Barn Elms site *TA* figures shows the OmniTrans plot for the local road network around the Barn Elms site.

6.5.63 Construction lorry movements would be limited to the day shift only (08:00 to 18:00) except in exceptional circumstances when HGV and abnormal

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

load movements could occur up to 22:00 for large concrete pours and later at night by agreement with the LB of Richmond upon Thames.

6.5.64 Changes to the highway network during construction and 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.

6.5.65 The local model has been used to apply the construction traffic demands and local geometrical changes to the construction base case to determine the changes in the highway network operation due to the project (i.e. Comparison of base and development cases). The development case traffic flows (providing input to the model) are shown in Figure 6.4.5 and Figure 6.4.6 in the Barn Elms site *TA* figures.

6.5.66 The construction base and development case models include the optimisation of traffic signal timings in order to maximise capacity and minimise overall delay at the Putney High Street (A219) / Lower Richmond Road/ Putney Bridge Street (A219) junction.

6.5.67 A summary of the construction assessment results for the weekday AM and PM peak hours is presented in Table 6.5.2 and Table 6.5.3.

Table 6.5.2 Construction LinSig model outputs (AM peak hour)

Approach	Arm	Flow (PCU)	Weekday								
			AM peak hour (08:00-09:00)								
			DoS			MMQ (vehicles)			Delay per PCU (seconds)		
			Base case	Devt case	Change	Base case	Devt case	Change	Base case	Devt case	Change
Castelnau (A306)	Left / ahead	541	79%	79%	0%	19	19	0	41	41	0
	Ahead / right	76	12%	12%	0%	2	2	0	23	23	0
Queen Elizabeth Walk	All	16	8%	13%	+5%	0	1	+1	64	65	+1
Rocks Lane (A306)	Left / ahead	290	39%	40%	+1%	7	8	+1	27	27	0
	Ahead / right	290	39%	39%	0%	7	8	+1	27	27	0
Elm Grove Road	All	16	13%	13%	0%	1	1	0	65	65	0
Church Road (A3003)	All	203	69%	70%	+1%	5	5	0	68	68	0
			PRC						Total delay (PCU hours)		
Overall junction performance			13.6%	13.3%	-0.3%				15	15	0

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. 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

Table 6.5.3 Construction LinSig model outputs (PM peak hour)

Approach	Arm	Flow (PCU)	Weekday								
			PM peak hour (17:00-18:00)								
			DoS			MMQ (vehicles)			Delay per PCU (seconds)		
			Base case	Devt t case	Change	Base case	Devt case	Change	Base case	Devt case	Change
Castelnau (A306)	Left / ahead	617	90%	90%	0%	25	25	0	54	54	0
	Ahead / right	58	9%	9%	0%	1	1	0	23	23	0
Queen Elizabeth Walk	All	66	47%	54%	+7%	2	3	+1	77	81	+4
Rocks Lane (A306)	Left / ahead	264	35%	36%	+1%	7	7	0	26	26	0
	Ahead / right	263	35%	35%	0%	7	7	0	26	26	0
Elm Grove Road	All	17	14%	14%	0%	1	1	0	66	66	0
Church Road (A3003)	All	190	80%	82%	+2%	6	7	+1	86	88	+2
			PRC						Total delay (PCU hours)		
Overall junction performance			-0.0%	-0.0%	0%				20	20	0

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. 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

6.5.68 The construction development case LINSIG model outputs indicate that the local highway will be operating within capacity in the AM peak hour and close to capacity in the PM peak hour.

6.5.69 The LINSIG model results suggest that the junction would continue to operate within capacity with Castelnau (A306) reaching 79% in the AM peak and 90% in the PM peak. The increase in the Mean Maximum Queue length for this movement would be one additional PCU. This suggests that the changes caused as a result of construction traffic on road network delay at this junction would be negligible for both peak periods.

6.5.70 The LINSIG junction model output shows that total junction delay is 15 PCU hours in the AM peak period assessed and 20 PCU hours in the PM peak period assessed. These equate to 39 seconds per PCU in the AM peak period assessed and 48 seconds per PCU in the PM peak period assessed.

6.5.71 With regards to highway network impact at weekends; traffic flows through this junction are slightly greater than on weekdays as more traffic routes through the Queen Elizabeth Walk arm of the junction to/from the Barn Elms Schools Sports Centre, playing fields and other leisure activities along Queen Elizabeth Walk. However, the traffic flow along Queen Elizabeth Walk would still be relatively low (around 200 vehicles per hour in total (combined eastbound and westbound traffic)) in terms of the capacity of the road network and the additional construction traffic at weekends would not lead to any different effects from those already identified for the weekday peak hours.

Construction mitigation

6.5.72 The project has been designed to limit the issues arising on transport networks as far as possible and many measures have been embedded directly in the design of the project. These are summarised in Table 6.5.4.

Table 6.5.4 Barn Elms design measures

Phase	Issues	Design measures
Construction	Creating access point	• Creation of gated accesses for the movement for construction traffic • Traffic management in and out of the site
	Creation of a new access road	• Create a new access road with hoardings and safety notice boards to provide safety to employees • Maintain a safe right of way to allow boat house access • Maintain emergency access facility for the Environment Agency to the Ashlone Wharf Tidal Barrier.
	Move Rocks Lane stop line	• Move location of stop line on Rocks Lane 500m back to allow safe manoeuvres of HGV in and out of Queen Elizabeth Walk
Operation	Creating access point	• Creation of a permanent access point for maintenance and operational personnel to access the site
	Creation of a new access road	• Creation of a permanent access road for maintenance and operational personnel to access the site

6.5.73 These embedded measures, discussed in Section 6.2, have been taken into account in the assessment. 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 measures are required for the construction phase.

6.6 Operational assessment

6.6.1 This section summarises the findings of the assessment undertaken for the Year 1 of operation at the Barn Elms site.

6.6.2 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 6.2. This has been discussed with the LB of Richmond upon Thames and TfL.

Operational base case

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

6.6.4 As stated in para 6.2.45 in Section 6.2, the elements of the transport network that would be affected during operation are highway layout and operation. For the purposes of the operational base case, it is anticipated that the highway layout and parking will be as indicated in the construction base case.

Operational development case

6.6.5 The operational assessment has taken into consideration those elements that would be affected, which comprise the short-term impacts on the highway layout and operation when maintenance visits are made to the site.

6.6.6 The assessment of the operational phase is therefore limited to the physical issues associated with accessing the site from the highway network as outlined in Section 6.2. This has been discussed with the LB of Richmond and TfL.

6.6.7 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 mobile cranes with associated support vehicles will be required for access to the shaft and tunnel approximately every ten years.

6.6.8 During the operational phase, the site would be accessed via a new permanent access road predominantly on the same alignment as the construction access route along the northern and eastern perimeters of the Barn Elms Schools Sports Centre. Vehicles would access along Queen Elizabeth Walk before passing through a narrow section of private road which currently serves the Barn Elms Schools Sports Centre.

6.6.9 The permanent highway layout plan is provided in the Barn Elms site *TA* figures and indicates the operational phase permanent works.

Parking

6.6.10 No change is expected to on-street car parking in the vicinity of the site, compared to the base case, as a result of the operational phase arrangements at Barn Elms.

6.6.11 The northernmost section of parking in the Barn Elms Schools Sports Centre car park that currently abuts the fence adjacent to the Queen Elizabeth Walk footpath would be permanently displaced by the permanent access road that would route along the northern and eastern boundaries of the Barn Elms Schools Sports Centre area and playing fields. Depending on the location of the relocated changing rooms, it is likely to be possible to re-provide this displaced parking within the existing Barn Elms Schools Sports Centre car park.

Highway layout and operation

6.6.12 During the operational phase, the area around the Barn Elms site and the parking in the Barn Elms Schools Sports Centre car park, with the exception of the northernmost section of parking as described above, would be reinstated to the current layout, or as agreed with LB Wandsworth, as stated in Section 6.2.

6.6.13 An assessment has been undertaken to ensure that the highway layout provided is adequate for the large vehicles required to access the site during the operational phase.

6.6.14 For routine three or six monthly inspections vehicular access would be required for light commercial vehicles, typically a transit van. On occasion there may be a consequent need for small flatbed vehicles to access the site.

6.6.15 During ten yearly inspections, space to locate two large mobile cranes and associated support vehicles within the site area would be required. The cranes would facilitate lowering and recovery of tunnel inspection vehicles and to provide duty/standby access for personnel. To assess the effect of these on the highway layout, swept paths have been undertaken for the largest vehicles to be required to access the site; a 11.36m mobile crane, 10m rigid articulated vehicle and 10.7m articulated vehicle.

6.6.16 The permanent highway layout vehicle swept path analysis plan is provided in the Barn Elms site *TA* figures and show safe access/ egress at the site for the operational phase.

6.6.17 When larger vehicles are required to service the site, there may be some temporary, short-term delay to other road users while manoeuvres are made. However 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.

6.6.18 Due to the infrequent nature of maintenance trips there is anticipated to be no significant disruption to the surrounding highway network during the operational phase at Barn Elms.

Operational mitigation

6.6.19 Due to there being no significant changes to transport during the operational phase, no mitigation is required.

Summary of site specific Transport Assessment

6.6.20 The outcomes of this *TA* demonstrate the key findings summarised in Table 6.6.1.

Table 6.6.1 Barn Elms Transport Assessment results

Phase	Mode of transport	Key Findings
Construction	Pedestrians	Insignificant change or effects
	Cyclists	Possible maximum delay of four seconds in the PM peak, from Queen Elizabeth Walk.
	Bus patronage and operators	Approximately 24 worker trips would be made by bus in each peak hour and could be accommodated on base case bus networks (including those finishing their trips from other modes). Possible maximum delay of four seconds in the PM peak, for bus route 243 exiting from Queen Elizabeth Walk.
	London Underground and National Rail patronage	Approximately 14 worker trips in each peak hour would be made by London Underground or National Rail and could be accommodated on base case services.
	Parking	30 spaces suspended within the Barn Elms car park.
	Highway network and operation	The northbound stop line on Rocks Lane (A306) will be relocated 500mm to te south at the Rocks Lane (A306) / Queen Elizabeth Walk / Castelnau (A306) / Church Road (A3003) / Elm Grove Road junction. Approximately 80 additional daily movements would be generated by the construction works at Barn Elms. The addition of the Thames Tideway Tunnel traffic (anticipated to be 9 two-way vehicle movements during the peak hours) could, in the PM peak hour, effect changes to capacity and increase the maximum delay to four seconds for traffic on Queen Elizabeth Walk. Average queue lengths would increase by only one vehicle on the Queen Elizabeth Walk approach. This is considered to be an insignificant effect on the local highway network.
Operation	Highway layout and operation	Possible short term delay due to crane movements once every 10 years.

References

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

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

[3] London Underground Upgrade Plan, http://www.tfl.gov.uk/assets/downloads/corporate/our-upgrade-plan-london-underground-february-2011.pdf

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Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Transport Assessment

Doc Ref: **7.10.03**

Barn Elms

Appendices

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

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Creating a cleaner, healthier River Thames

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Transport Assessment

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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 Barn Elms. 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 Borough of Richmond upon Thames.

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:

- *the opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;*
- *safe and suitable access to the site can be achieved for all people; and*
- *improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport*

grounds where the residual cumulative impacts of development are severe."

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 was published by the Department of Environment, Food and Rural Affairs in March 2012. This National Policy Statement (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 for Waste Water 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 for Waste Water 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:

- *"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;*
- *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*
- *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 moderate accessible transport hub and the proposed location has a Public Transport Accessibility Level (PTAL) rating of 3, rated as 'moderate'. 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. Information regarding the travel arrangements of the workers associated with the site will be included in the *Project Framework Travel Plan* and site-specific Travel Plan documents.

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 city that meets the challenges of economic and population growth;
- An internationally competitive and successful city;
- A city of diverse, strong, secure and accessible neighbourhoods;
- A city that delights the senses;
- A city that becomes a world leader in improving the environment; and
- A city where it is easy, safe and convenient for everyone to access jobs, opportunities and facilities.

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:

- Encouraging patterns and nodes of development that reduce the need to travel, especially by car;
- Seeking to improve the capacity and accessibility of public transport, walking and cycling, particularly in areas of greater demand;
- 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;
- Seeking to increase the use of the Blue Ribbon Network, especially the Thames, for passenger and freight use;
- Facilitating the efficient distribution of freight whilst minimising its impacts on the transport network;
- Supporting measures that encourage shifts to mode sustainable modes and appropriate demand management; and
- 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:

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

- **Policy 9** states that the Mayor *"will use the local and strategic development control processes";*
- **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";*
- **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*
- **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 London Borough of Richmond Upon Thames has a number of policies relevant to transport within the Local Development Framework (LDF) and the Unitary Development Plan (UDP).

Local Development Framework - Core Strategy (LB of Richmond upon Thames, April 2009)

A.4.2 The LDF aims to guide and manage development and regeneration in the borough until 2024. The adoption of the LDF's Core Strategy and the Development Management Plan (DMP) has now superseded the Borough's Unitary Development Plan, with the exception of the UDP's site specific proposals and policy on waste collection and disposal.

A.4.3 The Core Strategy was adopted in April 2009. Sustainable travel is a key focus of the transport policies within this document:

A.4.4 **Policy CP5 – Sustainable travel** promotes sustainable travel by:

- Encouraging safe and sustainable modes of travel;
- Prioritising pedestrian and cycle travel;
- Improving bus services;
- Reducing the impact of traffic;
- Implementing maximum car parking standards; and

- Requiring the submission of Green Travel Plans.

A.4.5 **Policy CP11 – River Thames Corridor** sets out how the River Thames and river related industries will be encouraged, enhanced and protected.

Local Development Framework - Development Management Plan (LB of Richmond upon Thames, November 2011)

A.4.6 The Development Management Plan (DMP) was adopted in 2011. Transport policies within this document build on the policies outlined in the Core Strategy, focusing on enhancing and improving sustainable travel and networks. A summary of the relevant policies are outlined below.

A.4.7 **Policy DM OS 11 – Thames policy area** outlines the borough's plans to protect the Thames Policy Area. Measures to enhance and protect the area include improving access to the River Thames, it's foreshore and the Thames Path and protecting the river's history, character and landscapes. The borough also state that land infill and development which encroaches into the river will be discouraged, unless required in exceptional circumstances.

A.4.8 **Policy DM OS 12 – Riverside uses** states that existing river dependent and river related uses will be protected by the requirement of *"an assessment of the effect of the proposed development on any existing river dependent uses*" and ensures that *"new development incorporates existing river features and takes into account the changing perspective with tides, flood risk, climate change, biodiversity and navigation."*

A.4.9 **Policy DM OS 13 – Moorings and floating structures** seeks to safeguard existing houseboats, moorings and other river structures.

A.4.10 **Policy DM TP 2 – Transport and new development** requires that all Major Developments are supported by a Transport Assessment, in line with DfT and TfL guidance.

A.4.11 **Policy DM TP 3 – Enhancing transport links** states that new developments should enhance accessibility by improving links, such as walking and cycling routes, with the local and wider transport network. It also states that a public riverside walk must be provided for developments adjoining the River Thames.

A.4.12 **Policy DM TP 6 – Walking and the pedestrian environment** aims to improve and maintain pedestrian networks and facilities within the borough. Requirements include improving existing infrastructure such as maintaining Rights of Way (where possible), enhancing pedestrian safety and security and ensuring that development does not create adverse impacts on the pedestrian environment.

A.4.13 **Policy DM TP 7 – Cycling** seeks to maintain and improve cycling conditions within the borough by providing safe and secure parking and access and by ensuring that development does not adversely impact on cycling conditions.

A.4.14 **Policy DM DC 5 – Neighbourliness, sunlighting and Daylighting** aims to protect adjoining developments from loss of privacy, visual intrusion, pollution, noise and disturbance.

Unitary Development Plan (LB of Richmond upon Thames, March 2005)

A.4.15 The UDP was adopted by the London Borough of Richmond Upon Thames in March 2005. However, this has recently been replaced by the borough's LDF. Relevant policies included:

A.4.16 **Policy ENV 16 – Bridleways** outlines the improvements to existing bridleways and encourages the construction of new bridleways.

A.4.17 **Policy ENV 26 – Thames Policy Area** outlines the borough's strategy to protect the Thames Policy Area.

A.4.18 **Policy ENV 27 – Access to the River Thames and the Thames Path National Trail** aims to improve access to the River Thames and put into place the Thames Path National Trail.

A.4.19 **Policy ENV 29 – Jetties and Pontoons** states that proposals for jetties, pontoons and similar structures on the river should not have a detrimental impact on river navigation, river regime and public enjoyment.

A.4.20 **Policy ENV 31 – Riverside uses** supports development that enhances the character, functionality and the public enjoyment of the River.

A.4.21 **Policy BLT 16 – Un-neighbourliness** seeks to project adjacent properties from adverse impacts such as loss of privacy, pollution, noise and visual intrusion.

A.4.22 **Policy TRN 2 – Transport and new developments** categorizes that new developments will need a transport assessment to assess any transport issues.

A.4.23 **Policy TRN 7 – Pedestrian safety** identifies the Council's requirements to maintain and improve pedestrian safety within the borough. Requirements include the provision of additional crossings, islands and refuges, widening pavements where appropriate and prioritising the needs of vulnerable users such as school children and the elderly.

A.4.24 **Policy TRN 8 – Pedestrian routes and security** requires new developments to prioritise pedestrian access, provide connections to existing pedestrian links, enhance accessibility and improve routes to key destinations including public transport, schools and town centres.

A.4.25 **Policy TRN 9 – Pedestrian environment** seeks to main and improve the pedestrian environment by introducing 20mph speed zones, implementing well designed streets, installing signage and ensuring that walking routes and facilities are accessible for all.

A.4.26 **Policy TRN 10 – Public rights of way** requires existing rights of way to be retained unless proposed alternative routes are safe, convenient and attractive.

A.4.27 **Policy TRN 11 – Cycling** aims to improve cycling facilities by, ensuring that emphasis is given to cyclists in the design of new development, providing links to the existing cycle network and providing safe and secure cycle parking facilities.

A.4.28 **Policy TRN 27 – Rail and waterborne freight** states that the borough will encourage rail and waterborne freight. The borough also states that the *"loss of existing wharves, railways sidings and related land will also be resisted where appropriate."*

A.4.29 **B5 – Barn Elms Sports Grounds** is a specific site identified in the Local Strategies and Plan Proposals chapter of the UDP. This policy outlines the borough's plans and policies to increase and enhance local sports facilities.

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Appendix B – PTAL analysis

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PTAI Study Report File Summary

PTAI Run Parameters

PTAI Run	20120410142019
Description	20120410142019
Run by user	PTAL web application
Date	04/10/2012

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:	523456, 176211

Mode	Stop	Route	Distance (metres)	Frequency (vph)	Weight	Walk time (mins)	SWT (mins)	TAT (mins)	EDF	AI
BUS	LWR RICHMOND R FESTING R	485	502.92	2	0.5	6.29	17	23.29	1.29	0.64
BUS	LWR RICHMOND R FESTING R	22	502.92	10	1	6.29	5	11.29	2.66	2.66
BUS	LWR RICHMOND R FESTING R	265	502.92	5	0.5	6.29	8	14.29	2.1	1.05

Total AI for this POI is 4.35.

PTAL Rating is 1b.

Appendix C – Local modelling outputs

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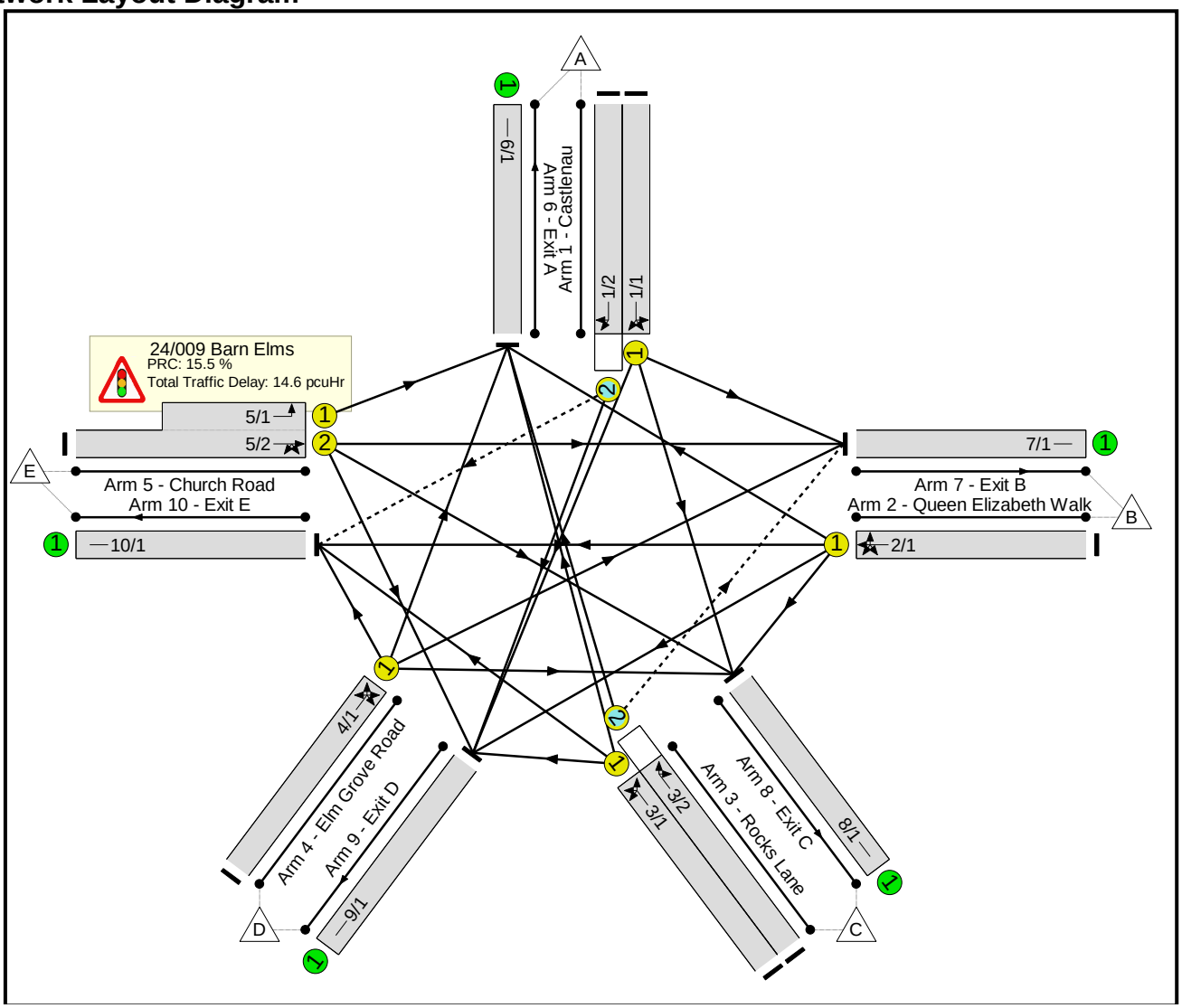
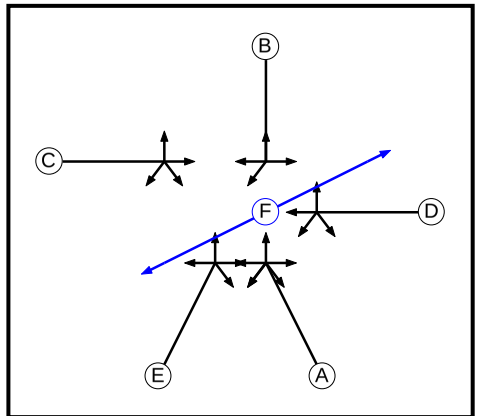
C.1 Baseline results, AM peak hour

Church Road/Castlenau/Queen Elizabeth Walk/Elm Grove Road/Rocks Lane junction signalised layout

Network Layout Diagram

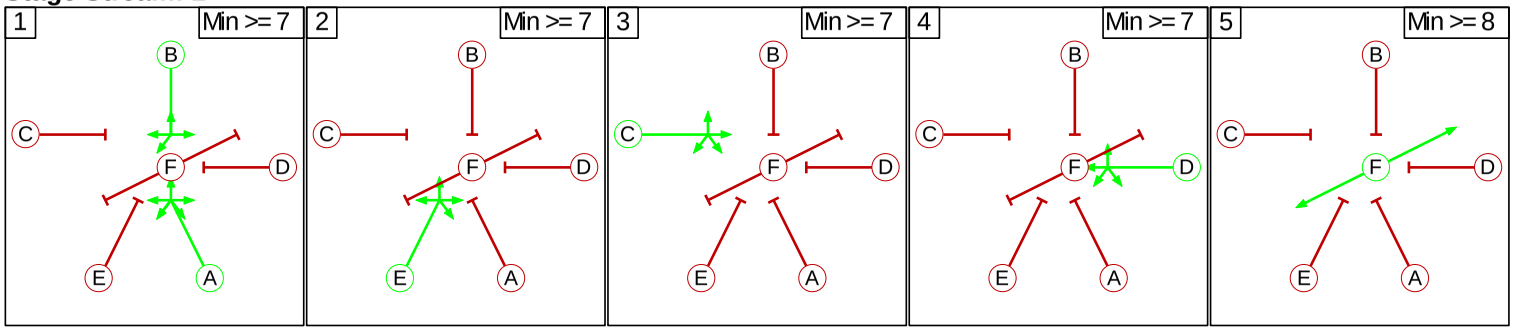


Phase Diagram



Stage Diagram

Stage Stream: 1



Phases in Stage

Stream	Stage No.	Phases in Stage
1	1	A B
1	2	E
1	3	C
1	4	D
1	5	F

Phase Intergreens Matrix

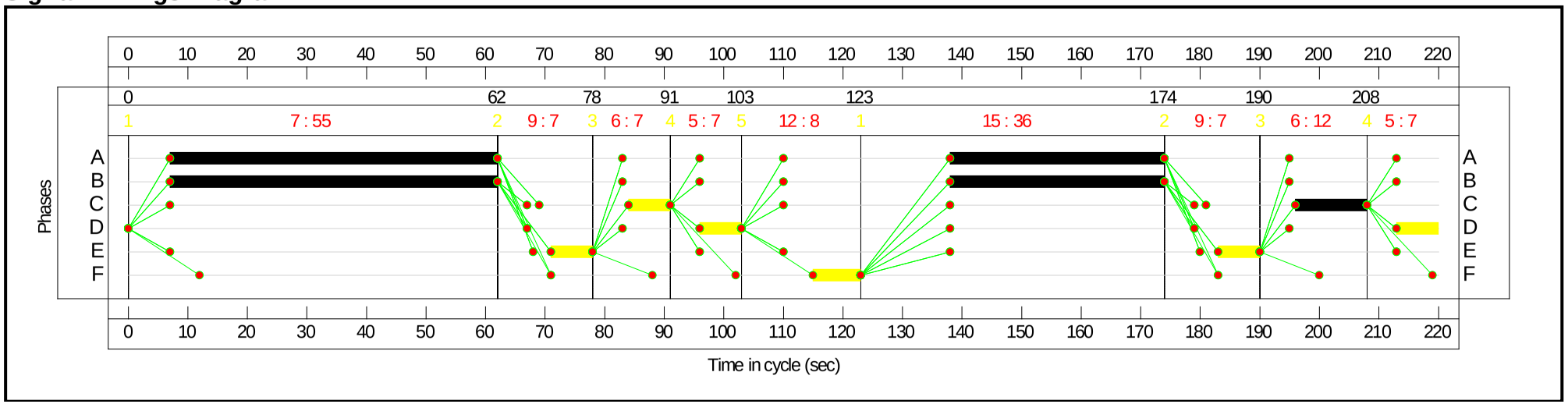
Terminating Phase	Starting Phase						
		A	B	C	D	E	F
	A		-	7	5	6	9
	B	-		5	5	9	9
	C	5	5		5	5	11
	D	7	7	7		7	12
	E	5	5	6	5		10
	F	15	15	15	15	15	

Traffic Flows, Desired

Desired Flow :

	Destination						
		A	B	C	D	E	Tot.
	A	0	3	528	5	69	605
	B	3	0	4	0	2	9
Origin	C	514	9	0	4	38	565
	D	8	0	3	0	5	16
	E	85	5	95	12	0	197
	Tot.	610	17	630	21	114	1392

Signal Timings Diagram



Network Results

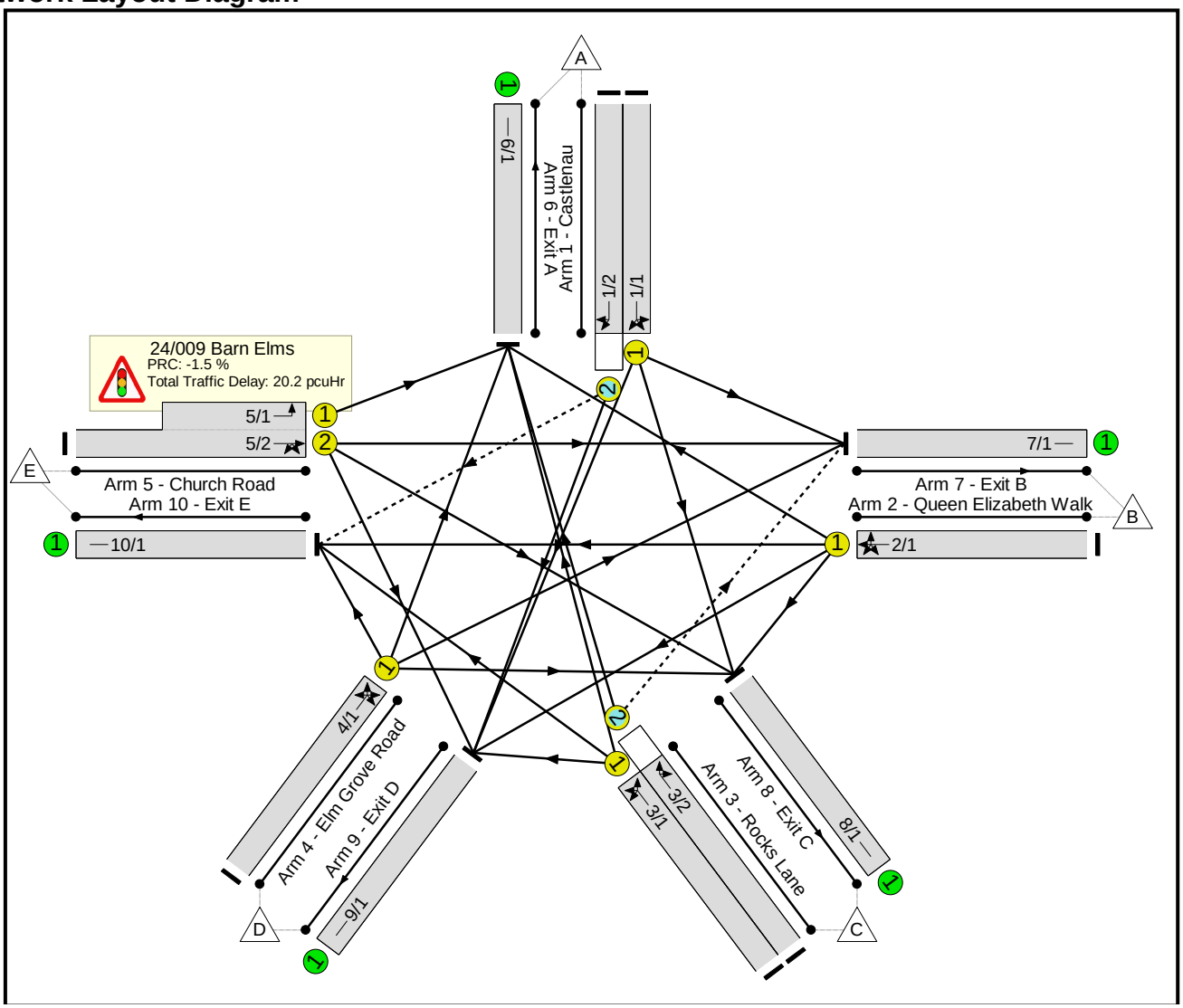
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**77.9%**	**77**	**0**	**1**	**14.6**	-	-
24/009 Barn Elms	-	-	-		-	-	-	-	-	-	**77.9%**	**77**	**0**	**1**	**14.6**	-	-
1/1	Castlenau Left Ahead Ahead2	U	A		2	91	-	531	1612	681	77.9%	-	-	-	5.9	39.9	18.1
1/2	Castlenau Ahead Right	O	B		2	91	-	74	1683	636	11.6%	68	0	1	0.5	23.2	1.7
2/1	Queen Elizabeth Walk Right Left Left2 Ahead	U	D		2	14	-	9	1671	122	7.4%	-	-	-	0.2	64.0	0.3
3/1	Rocks Lane Ahead Left Left2	U	A		2	91	-	282	1731	732	38.5%	-	-	-	2.1	26.6	7.3
3/2	Rocks Lane Ahead Right	O	B		2	91	-	283	1757	743	38.1%	9	0	0	2.1	26.5	7.3
4/1	Elm Grove Road Ahead Right Right2 Left	U	E		2	14	-	16	1682	122	13.1%	-	-	-	0.3	64.7	0.5
5/2+5/1	Church Road Left Ahead Right Right2	U	C		2	19	-	197	1731:1620	291	67.8%	-	-	-	3.7	66.8	4.5

C1 Stream: 1 PRC for Signalled Lanes (%): 15.5 Total Delay for Signalled Lanes (pcuHr): 14.63 Cycle Time (s): 220
PRC Over All Lanes (%): 15.5 Total Delay Over All Lanes(pcuHr): 14.63

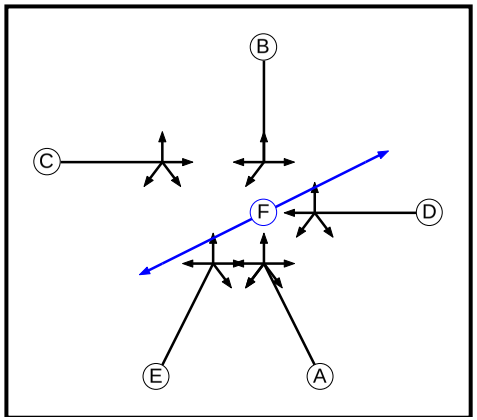
C.2 Baseline results, PM peak hour

Church Road/Castlenau/Queen Elizabeth Walk/Elm Grove Road/Rocks Lane junction signalised layout

Network Layout Diagram

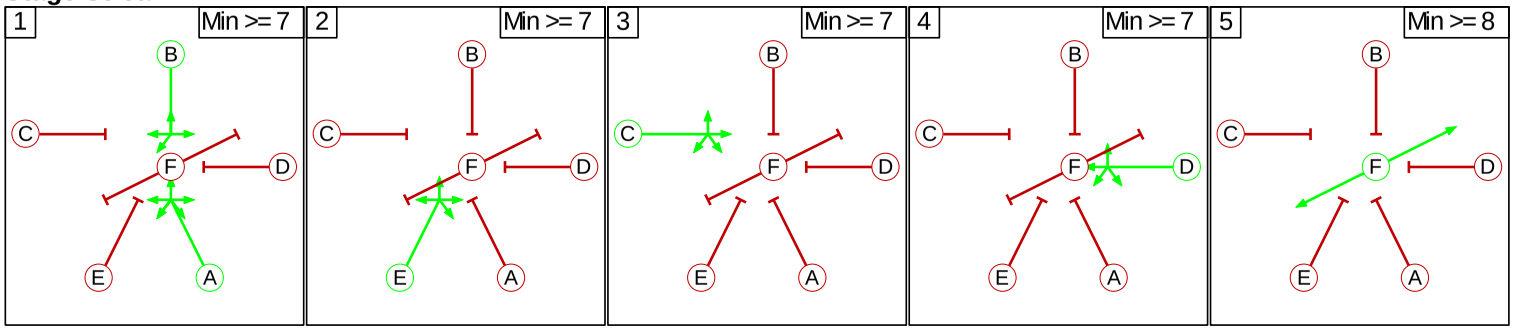


Phase Diagram



Stage Diagram

Stage Stream: 1



Phases in Stage

Stream	Stage No.	Phases in Stage
1	1	A B
1	2	E
1	3	C
1	4	D
1	5	F

Phase Intergreens Matrix

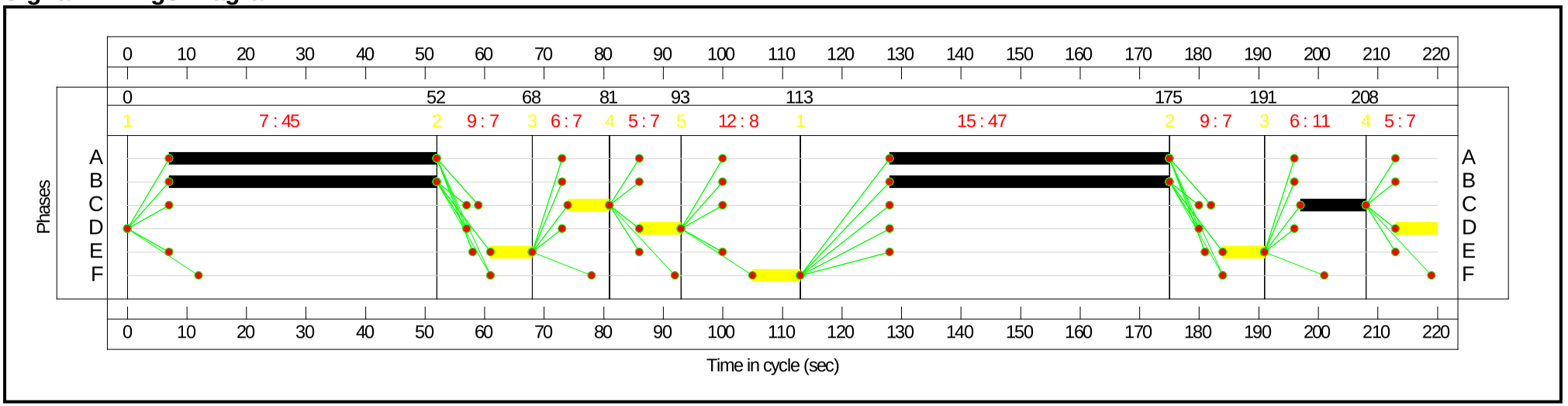
		Starting Phase					
		A	B	C	D	E	F
Terminating Phase	A		-	7	5	6	9
	B	-		5	5	9	9
	C	5	5		5	5	11
	D	7	7	7		7	12
	E	5	5	6	5		10
	F	15	15	15	15	15	

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	26	600	4	55	685
	B	31	0	10	0	16	57
	C	469	24	0	4	33	530
	D	3	0	4	0	9	16
	E	61	19	100	10	0	190
	Tot.	564	69	714	18	113	1478

Signal Timings Diagram



Network Results

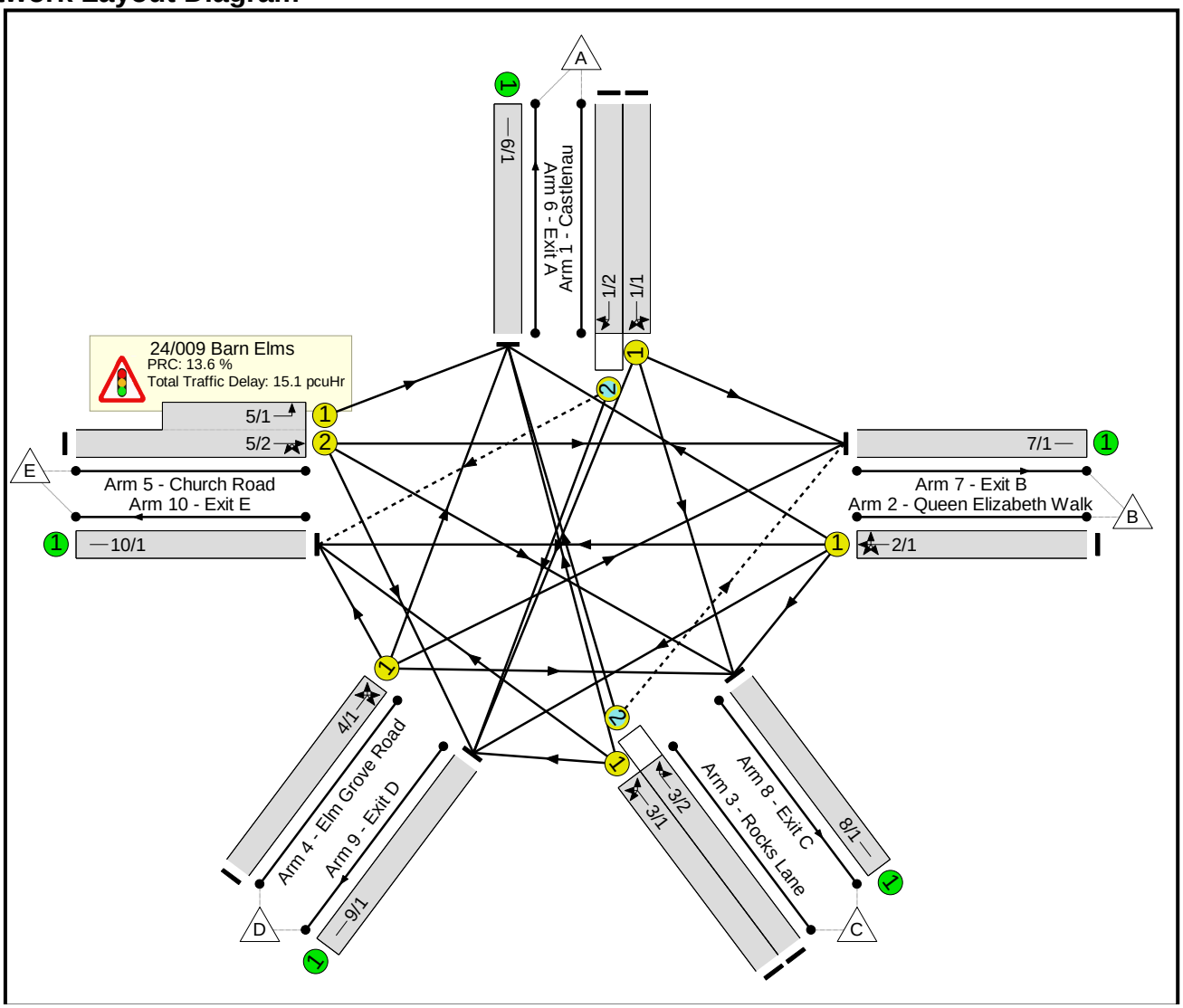
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**91.3%**	**78**	**0**	**1**	**20.2**	-	-
24/009 Barn Elms	-	-	-		-	-	-	-	-	-	**91.3%**	**78**	**0**	**1**	**20.2**	-	-
1/1	Castlenau Left Ahead Ahead2	U	A		2	92	-	626	1604	685	91.3%	-	-	-	9.9	56.9	26.0
1/2	Castlenau Ahead Right	O	B		2	92	-	59	1683	642	9.2%	54	0	1	0.4	22.6	1.3
2/1	Queen Elizabeth Walk Right Left Left2 Ahead	U	D		2	14	-	57	1693	123	46.3%	-	-	-	1.2	77.2	2.4
3/1	Rocks Lane Ahead Left Left2	U	A		2	92	-	265	1732	740	35.8%	-	-	-	1.9	25.9	6.8
3/2	Rocks Lane Ahead Right	O	B		2	92	-	265	1753	749	35.4%	24	0	0	1.9	25.8	6.8
4/1	Elm Grove Road Ahead Right Right2 Left	U	E		2	14	-	16	1629	118	13.5%	-	-	-	0.3	66.1	0.6
5/2+5/1	Church Road Left Ahead Right Right2	U	C		2	18	-	190	1753:1620	235	80.9%	-	-	-	4.6	86.6	6.4

C1 Stream: 1 PRC for Signalled Lanes (%): -1.5 Total Delay for Signalled Lanes (pcuHr): 20.16 Cycle Time (s): 220
PRC Over All Lanes (%): -1.5 Total Delay Over All Lanes(pcuHr): 20.16

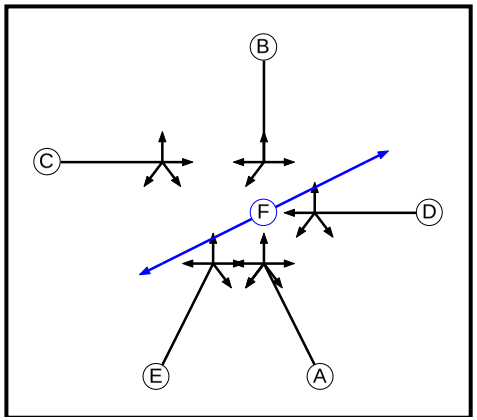
C.3 Construction base case results, AM peak hour

Church Road/Castlenau/Queen Elizabeth Walk/Elm Grove Road/Rocks Lane junction signalised layout

Network Layout Diagram

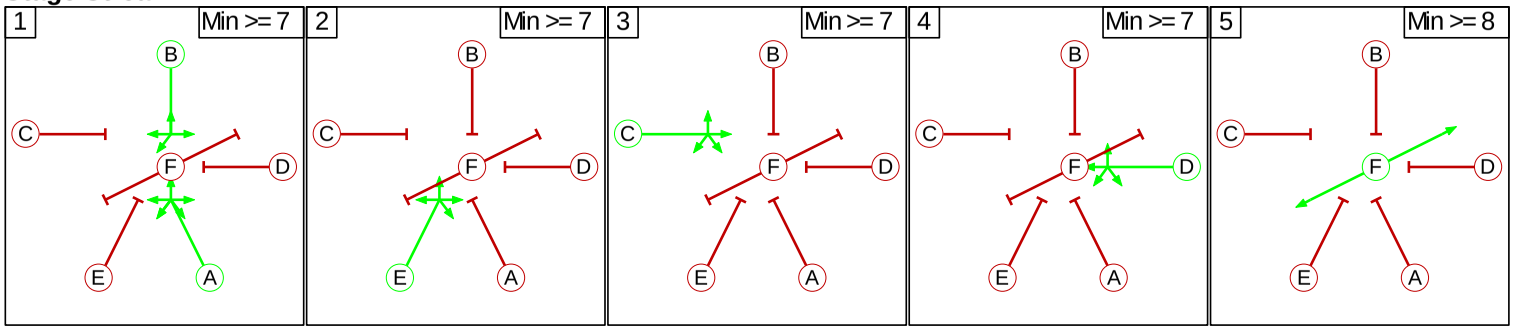


Phase Diagram



Stage Diagram

Stage Stream: 1



Phases in Stage

Stream	Stage No.	Phases in Stage
1	1	A B
1	2	E
1	3	C
1	4	D
1	5	F

Phase Intergreens Matrix

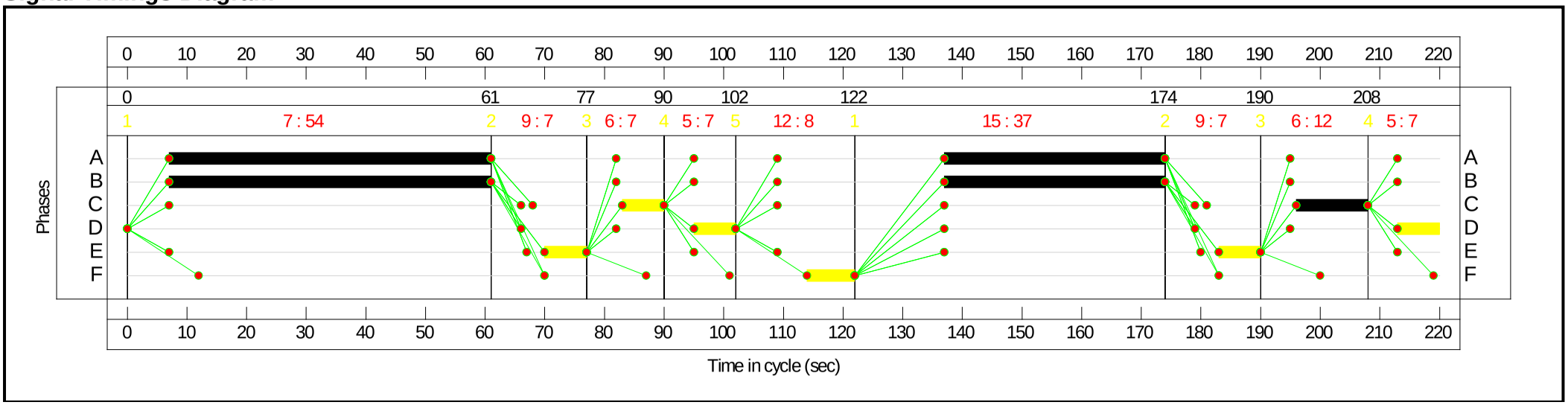
		Starting Phase					
		A	B	C	D	E	F
Terminating Phase	A		-	7	5	6	9
	B	-		5	5	9	9
	C	5	5		5	5	11
	D	7	7	7		7	12
	E	5	5	6	5		10
	F	15	15	15	15	15	

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	3	537	5	71	616
	B	3	0	5	0	2	10
	C	523	10	0	4	39	576
	D	8	0	3	0	5	16
	E	87	5	97	12	0	201
	Tot.	621	18	642	21	117	1419

Signal Timings Diagram



Network Results

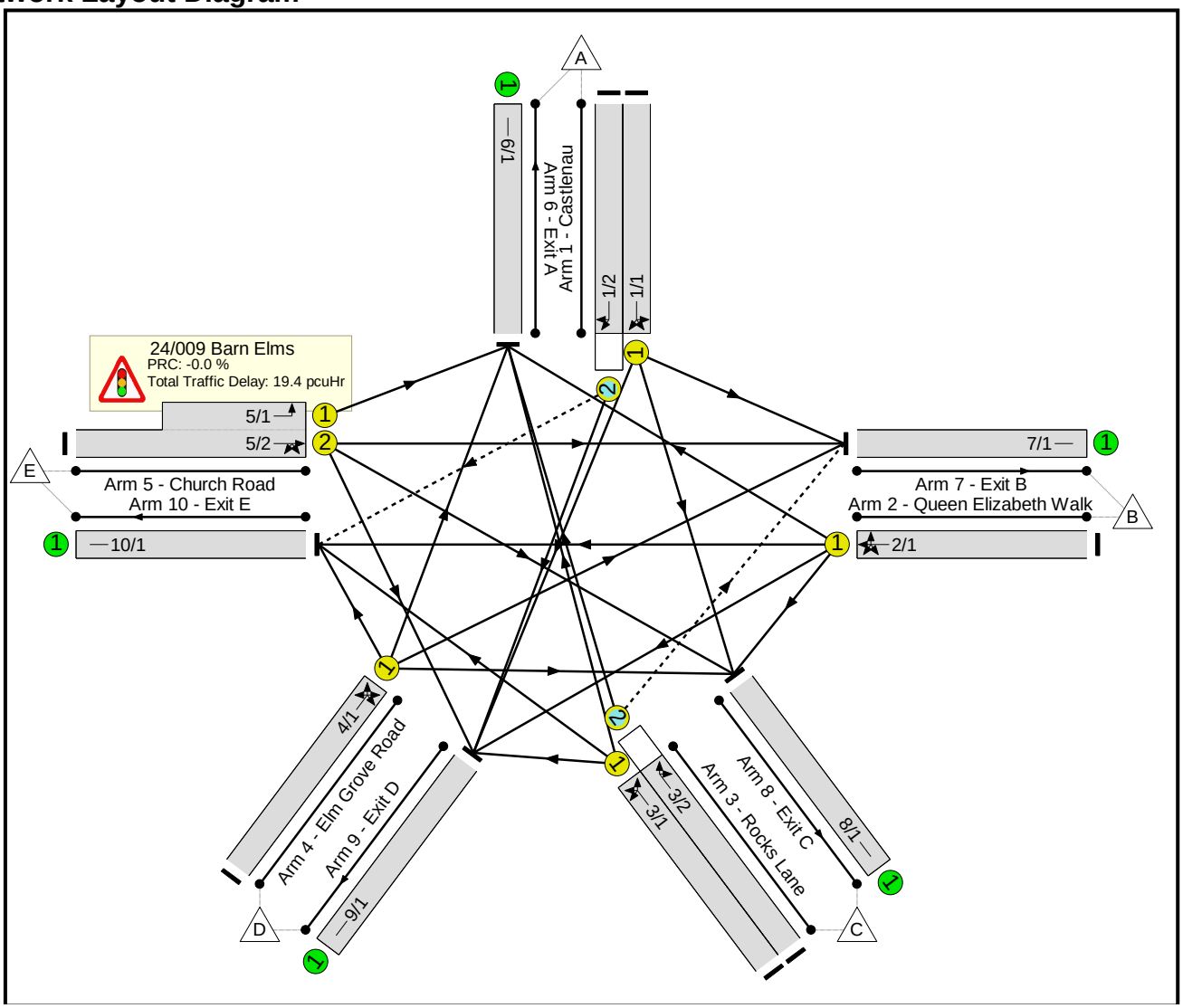
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**79.2%**	**80**	**0**	**1**	**15.1**	-	-
24/009 Barn Elms	-	-	-		-	-	-	-	-	-	**79.2%**	**80**	**0**	**1**	**15.1**	-	-
1/1	Castlenau Left Ahead Ahead2	U	A		2	91	-	540	1612	681	79.2%	-	-	-	6.1	40.9	18.7
1/2	Castlenau Ahead Right	O	B		2	91	-	76	1683	635	12.0%	70	0	1	0.5	23.3	1.7
2/1	Queen Elizabeth Walk Right Left Left2 Ahead	U	D		2	14	-	10	1665	121	8.3%	-	-	-	0.2	64.2	0.4
3/1	Rocks Lane Ahead Left Left2	U	A		2	91	-	288	1731	732	39.4%	-	-	-	2.1	26.8	7.4
3/2	Rocks Lane Ahead Right	O	B		2	91	-	288	1757	743	38.8%	10	0	0	2.1	26.6	7.4
4/1	Elm Grove Road Ahead Right Right2 Left	U	E		2	14	-	16	1682	122	13.1%	-	-	-	0.3	64.7	0.5
5/2+5/1	Church Road Left Ahead Right Right2	U	C		2	19	-	201	1731:1620	291	69.0%	-	-	-	3.8	67.5	4.6

C1 Stream: 1 PRC for Signalled Lanes (%): 13.6 Total Delay for Signalled Lanes (pcuHr): 15.13 Cycle Time (s): 220
PRC Over All Lanes (%): 13.6 Total Delay Over All Lanes(pcuHr): 15.13

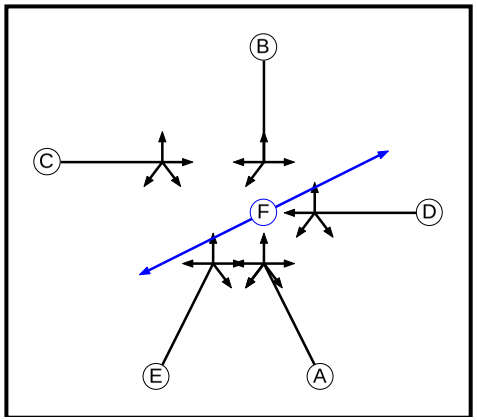
C.4 Construction base case results, PM peak hour

Church Road/Castlenau/Queen Elizabeth Walk/Elm Grove Road/Rocks Lane junction signalised layout

Network Layout Diagram

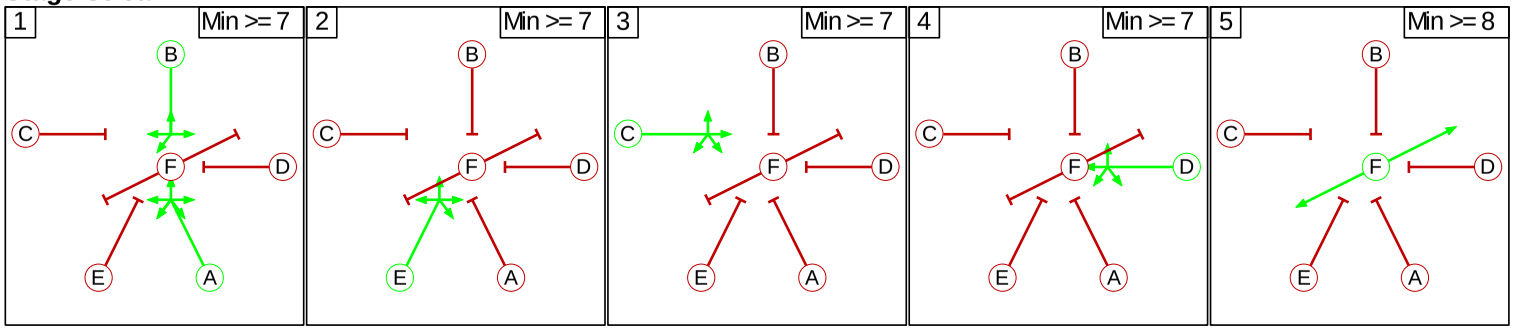


Phase Diagram



Stage Diagram

Stage Stream: 1



Phases in Stage

Stream	Stage No.	Phases in Stage
1	1	A B
1	2	E
1	3	C
1	4	D
1	5	F

Phase Intergreens Matrix

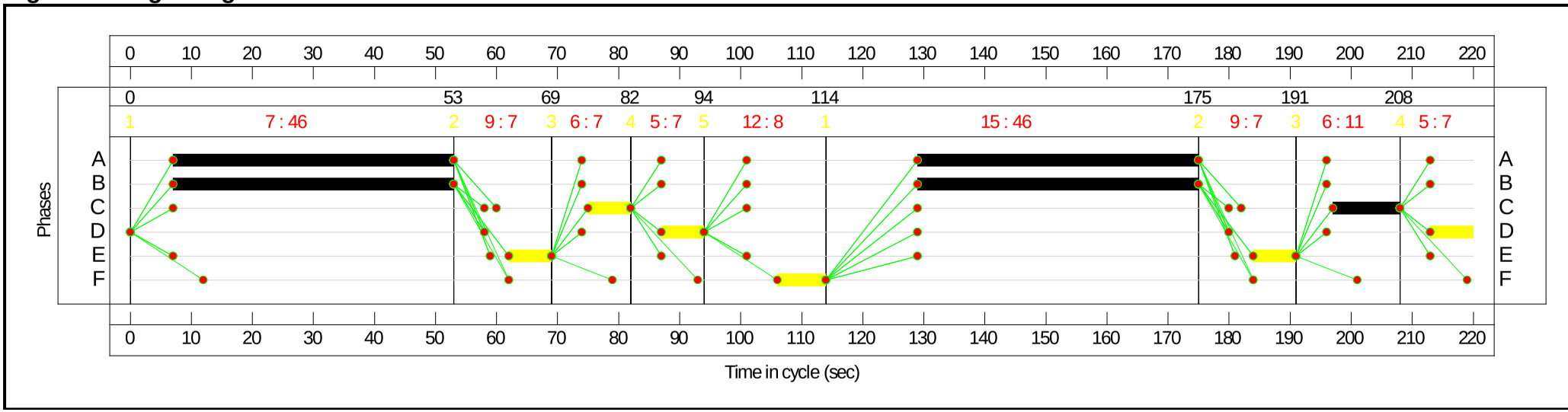
		Starting Phase					
		A	B	C	D	E	F
Terminating Phase	A		-	7	5	6	9
	B	-		5	5	9	9
	C	5	5		5	5	11
	D	7	7	7		7	12
	E	5	5	6	5		10
	F	15	15	15	15	15	

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	26	591	4	54	675
	B	31	0	10	0	17	58
	C	462	24	0	4	33	523
	D	3	0	4	0	10	17
	E	60	19	99	10	0	188
	Tot.	556	69	704	18	114	1461

Signal Timings Diagram



Network Results

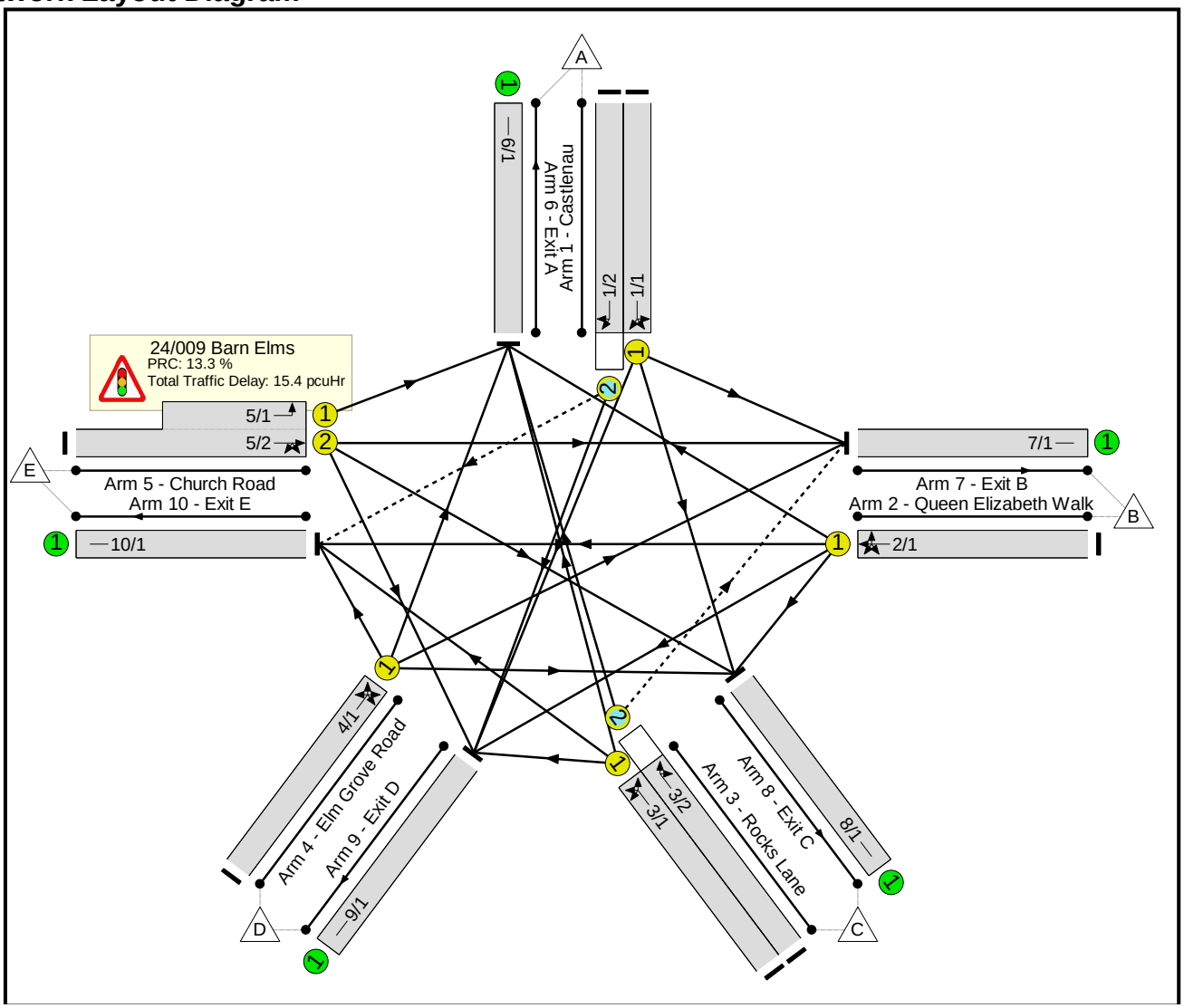
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**90.0%**	**77**	**0**	**1**	**19.4**	-	-
24/009 Barn Elms	-	-	-		-	-	-	-	-	-	**90.0%**	**77**	**0**	**1**	**19.4**	-	-
1/1	Castlenau Left Ahead Ahead2	U	A		2	92	-	617	1604	685	90.0%	-	-	-	9.2	53.9	24.8
1/2	Castlenau Ahead Right	O	B		2	92	-	58	1683	642	9.0%	53	0	1	0.4	22.6	1.3
2/1	Queen Elizabeth Walk Right Left Left2 Ahead	U	D		2	14	-	58	1695	123	47.1%	-	-	-	1.2	77.4	2.4
3/1	Rocks Lane Ahead Left Left2	U	A		2	92	-	262	1731	740	35.4%	-	-	-	1.9	25.8	6.7
3/2	Rocks Lane Ahead Right	O	B		2	92	-	261	1753	749	34.8%	24	0	0	1.9	25.7	6.6
4/1	Elm Grove Road Ahead Right Right2 Left	U	E		2	14	-	17	1626	118	14.4%	-	-	-	0.3	66.2	0.6
5/2+5/1	Church Road Left Ahead Right Right2	U	C		2	18	-	188	1753:1620	234	80.3%	-	-	-	4.5	85.5	6.2

C1 Stream: 1 PRC for Signalled Lanes (%): -0.0 Total Delay for Signalled Lanes (pcuHr): 19.37 Cycle Time (s): 220
PRC Over All Lanes (%): -0.0 Total Delay Over All Lanes(pcuHr): 19.37

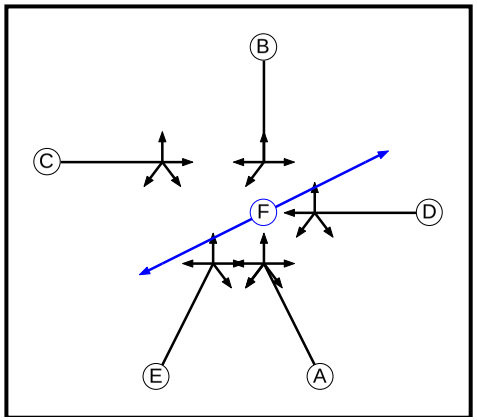
C.5 Construction development case results, AM peak hour

Church Road/Castlenau/Queen Elizabeth Walk/Elm Grove Road/Rocks Lane junction signalised layout

Network Layout Diagram

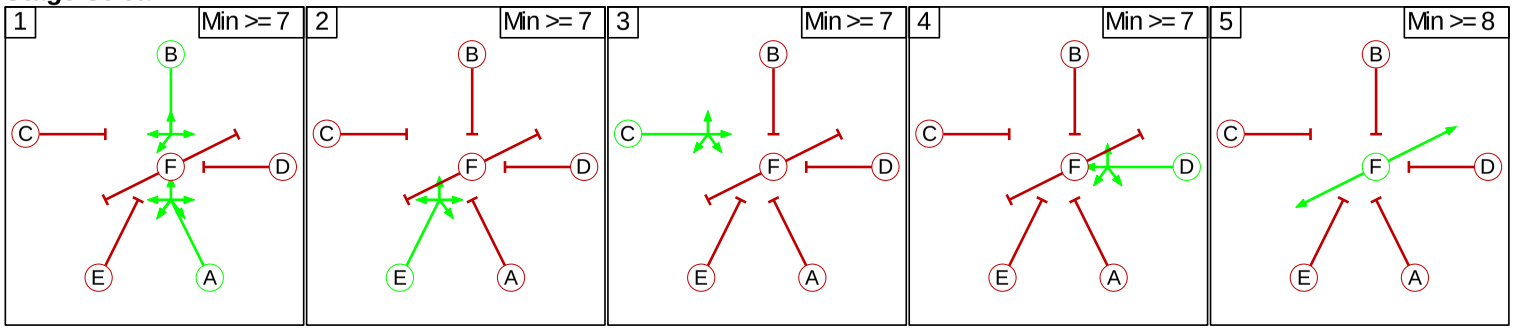


Phase Diagram



Stage Diagram

Stage Stream: 1



Phases in Stage

Stream	Stage No.	Phases in Stage
1	1	A B
1	2	E
1	3	C
1	4	D
1	5	F

Phase Intergreens Matrix

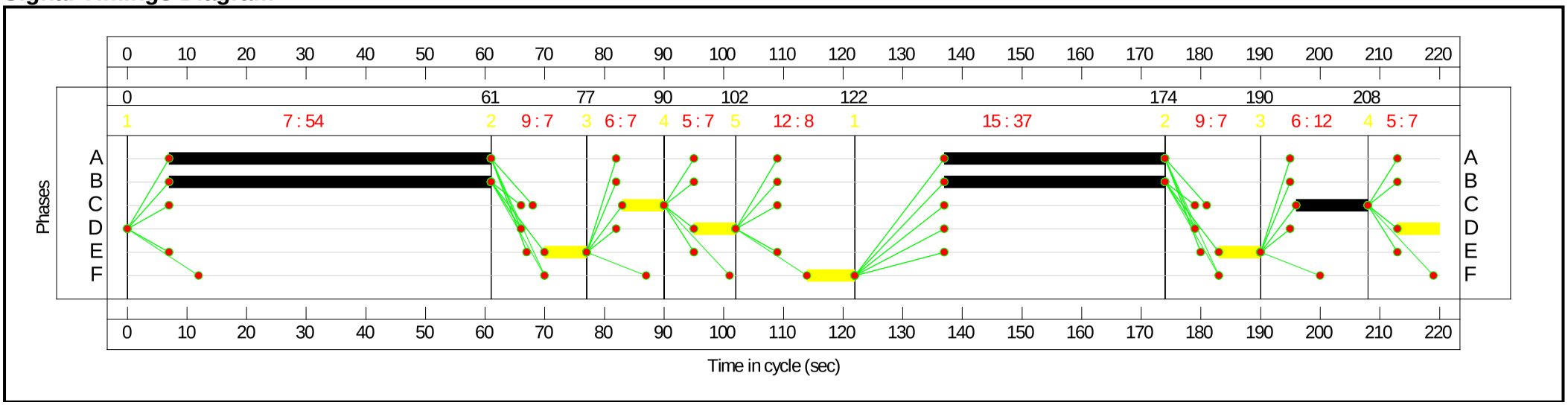
		Starting Phase					
		A	B	C	D	E	F
Terminating Phase	A		-	7	5	6	9
	B	-		5	5	9	9
	C	5	5		5	5	11
	D	7	7	7		7	12
	E	5	5	6	5		10
	F	15	15	15	15	15	

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	4	537	5	71	617
	B	3	0	9	0	4	16
	C	523	14	0	4	39	580
	D	8	0	3	0	5	16
	E	87	7	97	12	0	203
	Tot.	621	25	646	21	119	1432

Signal Timings Diagram



Network Results

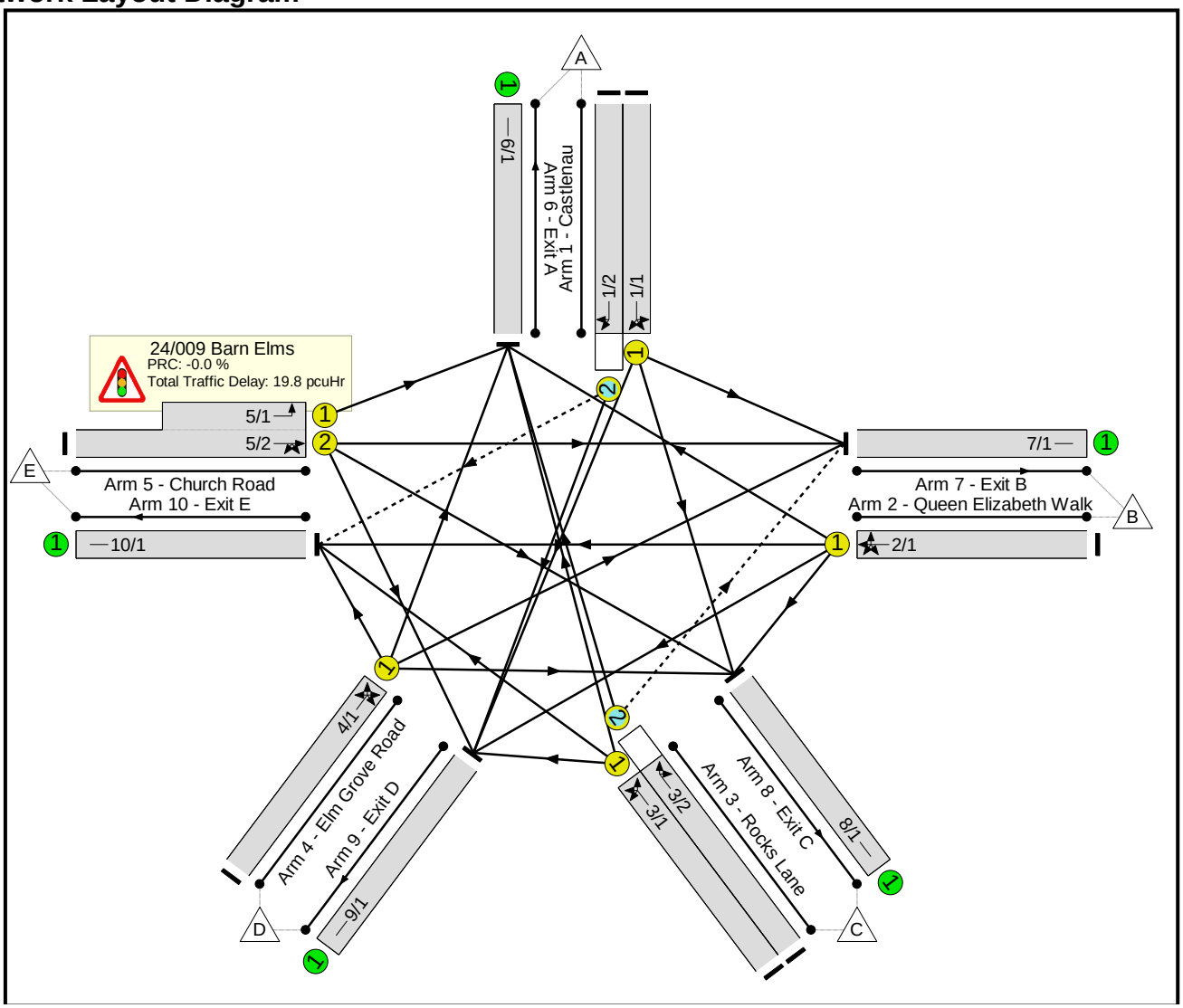
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**79.4%**	**83**	**0**	**2**	**15.4**	-	-
24/009 Barn Elms	-	-	-		-	-	-	-	-	-	**79.4%**	**83**	**0**	**2**	**15.4**	-	-
1/1	Castlenau Left Ahead Ahead2	U	A		2	91	-	541	1611	681	79.4%	-	-	-	6.2	41.0	18.7
1/2	Castlenau Ahead Right	O	B		2	91	-	76	1683	635	12.0%	70	0	1	0.5	23.3	1.7
2/1	Queen Elizabeth Walk Right Left Left2 Ahead	U	D		2	14	-	16	1671	122	13.2%	-	-	-	0.3	65.1	0.6
3/1	Rocks Lane Ahead Left Left2	U	A		2	91	-	290	1731	732	39.6%	-	-	-	2.2	26.8	7.6
3/2	Rocks Lane Ahead Right	O	B		2	91	-	290	1756	742	39.1%	14	0	0	2.1	26.7	7.5
4/1	Elm Grove Road Ahead Right Right2 Left	U	E		2	14	-	16	1682	122	13.1%	-	-	-	0.3	64.7	0.5
5/2+5/1	Church Road Left Ahead Right Right2	U	C		2	19	-	203	1734:1620	290	70.1%	-	-	-	3.9	68.3	4.8

C1 Stream: 1 PRC for Signalled Lanes (%): 13.3 Total Delay for Signalled Lanes (pcuHr): 15.39 Cycle Time (s): 220
PRC Over All Lanes (%): 13.3 Total Delay Over All Lanes(pcuHr): 15.39

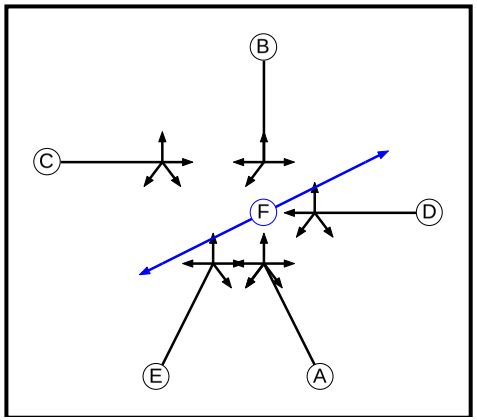
C.6 Construction development case results, PM peak hour

Church Road/Castlenau/Queen Elizabeth Walk/Elm Grove Road/Rocks Lane junction signalised layout

Network Layout Diagram

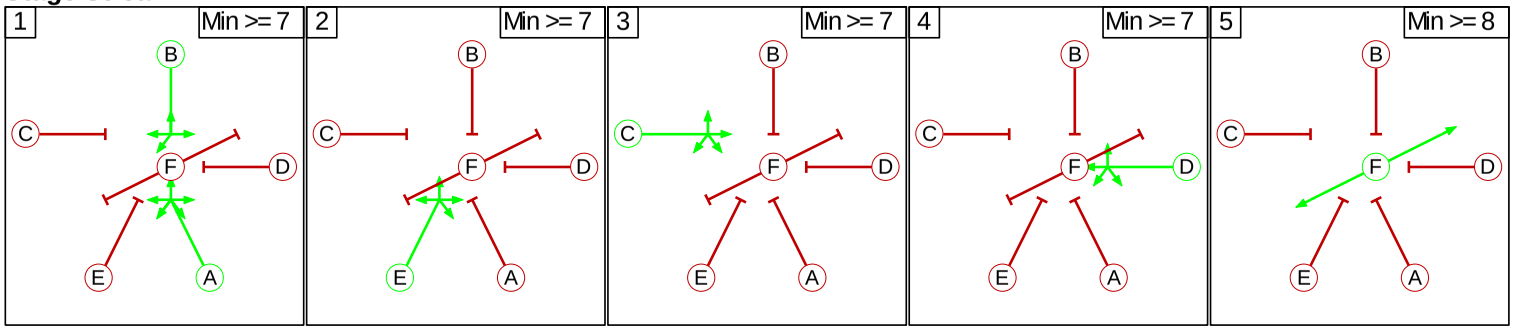


Phase Diagram



Stage Diagram

Stage Stream: 1



Phases in Stage

Stream	Stage No.	Phases in Stage
1	1	A B
1	2	E
1	3	C
1	4	D
1	5	F

Phase Intergreens Matrix

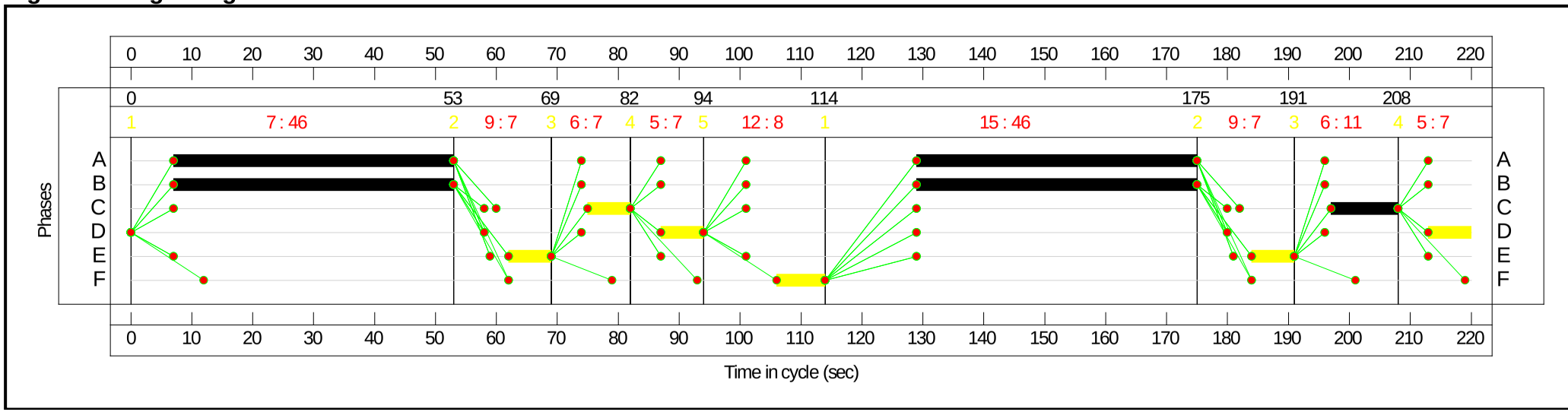
		Starting Phase					
		A	B	C	D	E	F
Terminating Phase	A		-	7	5	6	9
	B	-		5	5	9	9
	C	5	5		5	5	11
	D	7	7	7		7	12
	E	5	5	6	5		10
	F	15	15	15	15	15	

Traffic Flows, Desired

Desired Flow :

		Destination					
		A	B	C	D	E	Tot.
Origin	A	0	26	591	4	54	675
	B	32	0	15	0	19	66
	C	462	28	0	4	33	527
	D	3	0	4	0	10	17
	E	60	21	99	10	0	190
	Tot.	557	75	709	18	116	1475

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	-	-	-		-	-	-	-	-	-	**90.0%**	**81**	**0**	**1**	**19.8**	-	-
24/009 Barn Elms	-	-	-		-	-	-	-	-	-	**90.0%**	**81**	**0**	**1**	**19.8**	-	-
1/1	Castlenau Left Ahead Ahead2	U	A		2	92	-	617	1604	685	90.0%	-	-	-	9.2	53.9	24.8
1/2	Castlenau Ahead Right	O	B		2	92	-	58	1683	642	9.0%	53	0	1	0.4	22.6	1.3
2/1	Queen Elizabeth Walk Right Left Left2 Ahead	U	D		2	14	-	66	1692	123	53.6%	-	-	-	1.5	81.4	2.8
3/1	Rocks Lane Ahead Left Left2	U	A		2	92	-	264	1732	740	35.7%	-	-	-	1.9	25.8	6.7
3/2	Rocks Lane Ahead Right	O	B		2	92	-	263	1751	748	35.2%	27	0	1	1.9	25.7	6.7
4/1	Elm Grove Road Ahead Right Right2 Left	U	E		2	14	-	17	1626	118	14.4%	-	-	-	0.3	66.2	0.6
5/2+5/1	Church Road Left Ahead Right Right2	U	C		2	18	-	190	1755:1620	233	81.5%	-	-	-	4.6	87.6	6.5

C1 Stream: 1 PRC for Signalled Lanes (%): -0.0 Total Delay for Signalled Lanes (pcuHr): 19.81 Cycle Time (s): 220
PRC Over All Lanes (%): -0.0 Total Delay Over All Lanes(pcuHr): 19.81

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 5 years until the end of March 2011 has been analysed for the following junctions and surrounding roads:

- Rocks Lane;
- Castlenau/ Ferry Road Junction; and
- Mill Hill Road/ Common Road 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 are indicated in Table D.1 below. The study area is also graphically represented in Figure 1.1.

D.1.5 A total of 34 road traffic accidents have occurred in the area of interest during the five year period. These have been assessed in this section.

D.1.6 Of these accidents, 29 are classified as slight, 4 is classified as serious and 1 as fatal. Table D.1 below summarises where these accidents occurred, and their level of severity. Accident analysis for the individual junctions and roads sections is discussed below.

Table D.1 Accident severity 2006 to 2011

Location	Slight	Serious	Fatal	Total
Rocks Lane	6	2	0	8
Rocks Lane/ Mill Hill Road Junction	6	0	0	6
Rocks Lane/ Ranelagh Avenue Junction	7	0	1	8
Rocks Lane/ Queen Elizabeth Walk Junction	2	0	0	2
Rocks Lane/ Station Road Junction	4	1	0	5
Castlenau/ Ferry Road Junction	2	0	0	2
Mill Hill Road/ Common Road Junction	2	1	0	3
Total	29	4	1	34

A306 Rocks Lane

D.1.7 The A306 Rocks Lane section runs perpendicular to the Hammersmith Gyratory to the north and the A3 Kingston Road to the south. For the

stretch of the A306 within the study area, the highway is a single lane dual carriageway operating in a north-south direction. The junctions involved within this analysis are as follows:

- Rocks Lane/ Mill Hill Road Junction;
- Rocks Lane/ Ranelagh Avenue Junction;
- Rocks Lane/ Queen Elizabeth Walk Junction;
- Rocks Lane/ Station Road Junction;
- Rocks Lane/ Upper Richmond Road Junction; and
- Rocks Lane/ Castlenau Junction;

D.1.8 Of the total accidents, 3 were classified as serious. The accidents involved a car and/or another vehicle/ pedestrian. The major contributory factor to the serious accidents was failure to look properly, vehicle door opening or closed negligently and careless/reckless driving. There is a cluster of 2 accidents along Rocks Lane. Both of these accidents involved a car and another car and the key causes were recorded as a failure to look properly, vehicle door opening or closed negligently and careless/reckless driving. One of these accidents occurred 153m north-east of its junction with Upper Richmond Road, where a passenger of a car opens a door into another car. The vehicle door opened or closed negligently, failure to look properly and careless/ reckless driving were noted as the contributing factor to the cause of the accident.

D.1.9 Nearly all of the slight accidents that occurred along Rocks Lane involved cars and motorcyclists and the cause was often attributed to failing to look properly and undertaking a poor turn or manoeuvre.

D.1.10 The 1 fatal accident that occurred along the A306 Rocks Lane in the 5 year period analysed, occurred with the Ranelagh Avenue junction to the west of the site. The accident involved a one vehicle that travelled off the carriageway and struck a tree. The accident was caused by the vehicle driver being inexperienced or a learner, travelling too fast for conditions and careless driving.

D.1.11 Of the total accidents, only one accident involved a HGV. This accident was rated as slight in severity.

Castlenau/ Ferry Road

D.1.12 Castlenau/ Ferry Road junction runs to the north-west of the site and had 2 slight accidents occur on it during the 5 year period analysed. The cause of the accident was failure to look properly and failure to judge other person's path or speed.

D.1.13 There was no fatal or serious accidents on these roads during the 5 year period analysed.

Mill Hill Road/ Common Road

D.1.14 Mill Hill Road/ Common Road junction runs to the south-west of the site and had 2 slight accidents occur on it during the 5 year period analysed.

The cause of the accident was failure to look properly, poor turning/ manoeuvring and travelling too fast for conditions.

D.1.15 1 serious accident occurred on Mill Hill Road/ Common Road junction that involved two vehicles colliding. The cause of the accident was a failure to look properly and poor turning/ manoeuvring. This accident occurred at its junction with Mill Hill Road/ Common Road where a car reared-end in into another car which in turn reared-end into another car. Failure to look properly, careless/ reckless driving and travelling too fast for conditions were noted as the contributing factor to the cause of the accident.

D.1.16 There was no fatal accident on these roads during the 5 year period analysed.

D.2 Summary and conclusion

D.2.1 During the 5 year period, a total of 34 accidents occurred within the study area analysed. Of these accidents, 29 were categorised as slight, four were serious and one was fatal with the majority of accidents occurring on the junctions of Rocks Lane/ Mill Hill Road and Rocks Lane/ Ranelagh Avenue.

D.2.2 In general, the accidents largely involved cars and other cars/motorcylists. Only one of these accidents involved a HGV, which was rated as slight.

D.2.3 Of the serious accidents, 3 occurred each on Rocks Lane with one at its junction with Station Road, while one occurred at the junction between Mill Hill Road and Common Road Junction. The cause of these accident were attributed to factors such as a failure to look properly, vehicle door opening or closed, careless/reckless driving and poor turning/ manoeuvring. Thus, suggesting that these accidents have occurred as a result of human error rather than as a result of the highway geometry.

D.2.4 The 1 fatal accident that occurred along the A306 Rocks Lane in the 5 year period analysed, occurred with the Ranelagh Avenue junction to the west of the site. The accident involved a one vehicle that travelled off the carriageway and struck a tree. The accident was caused by the vehicle driver being inexperienced or a learner, travelling too fast for conditions and careless driving.

D.2.5 Furthermore, the majority of the slight accidents were also caused by factors associated with human error.

D.2.6 In summary, it is considered that the accidents within the vicinity of the site have been a result of human error rather than due to the geometry and / or infrastructure of the highway network. For this reason, accident mitigation is not considered necessary at this site location. In total 34 accidents have occurred within the study area analysed. In relation to the severity of these accidents, 29 were slight accidents, predominantly resulting from failure to look properly, poor manoeuvring and , careless/reckless driving.

D.2.7 Overall, the accidents occurred in the area of interest were mainly caused as a result of vehicles colliding or poor turning movements which resulted from not looking properly and travelling too fast for the conditions

indicating that the accidents are not due to highway geometry or poor infrastructure.

Appendix E – Road Safety Audit

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Your ref -
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Thames Tideway Tunnel
The Point (7th Floor)
37 North Wharf Road
Paddington
London W2 1AF
For the attention of Dermot Scanlon

12 February 2013

Dear Sirs

Thames Tideway Tunnel
Barn Elms – Stage 1 Road Safety Audit

Prior to the decision not to audit the Barn Elms scheme, the audit team had already visited the site and examined materials provided to them. This letter has been prepared for the project team in place of a formal Road Safety Audit report and highlights points relating to the proposals identified by the audit team. I would be grateful if you would bring these issues to the attention of the Designer and/or Maintainer as appropriate.

Comments

- Queen Elizabeth Walk forms part of National Cycle Network Route 4 and the Thames Cycle Route. Any traffic management proposed on these roads should take full account of cycles. Furthermore, delivery drivers should be made aware of the presence of the cycle routes and the likely increased risk of cycle / goods vehicle conflict.

IMG_8429.jpg

- The vehicular carriageway of Queen Elizabeth Walk is narrow and will not accommodate two large vehicles side by side. This is likely to result in vehicles over running the carriageway edge. At the western end of Queen Elizabeth Walk the footway is adjacent to the carriageway and vehicles mounting the kerb to pass are likely to place pedestrians at risk of collision. Inter-visible passing places should be provided along the narrow carriageway section.

- As demonstrated by some of the swept path analysis provided; the passing places provided on the access road to the Barn Elms site do not provide sufficient road width to accommodate two large vehicles passing each other.
- As demonstrated by the swept path analysis provided; the passing places provided on the access road to the Barn Elms site do not appear to be inter-visible increasing the risk of manoeuvring conflicts on the access road.
- An access gate is shown from the site access to allow the maintenance access for the Environment Agency to Ashlone Wharf. Both the access road and gateway are narrow and may not facilitate access for larger plant. Confirm likely plant requirements with the Environment Agency and design the gateway accordingly.

The agreed Audit Team of Mr C van Lottum MEng (Hons), MCIHT, MSoRSA and Mr T Corke BEng (Hons), MSc, CEng, MICE, MCIHT, MSoRSA visited the site together on Tuesday 4th December 2012. The examination of the site and materials provided for inspection was undertaken in accordance with the Terms of Reference set out in TfL Procedure 'Road Safety Audit SQA-0170 – Issue 4'; and the Audit Team members meet the training and experience requirements set out therein. Road Safety Audit is based upon a qualitative risk assessment process and there is no measure of the success achieved by any recommendations given herein. Road Safety Audit cannot guarantee the safe operation of the scheme under consideration as accidents are rare and random events and are largely caused by factors outside the Audit Team's influence.

If you have any further queries regarding this letter or the enclosed report, please do not hesitate to contact me

Yours faithfully

Chris van Lottum
Senior Engineer
Road Safety Audit Team Leader

Enc

cc Phillip Longman, Peter Brett Associates
Gavin Wicks, Arup

The following documents and drawings were supplied to the Audit Team by the Designer and have been examined in the course of conducting this audit.

Title	Reference	Revision
Transport - site location plan	1PL03-TT-50707	Jan 2013
Transport - construction traffic routes	1PL03-TT-50699	Jan 2013
Transport - accident locations	1PL03-TT-50763	Jan 2013
Construction phases - phase 1 - Site setup , shaft construction & tunnelling	DCO-PP-04X-BAREL-070018	Jan 2013
Highway layout during construction (Area 1)	DCO-PP-04X-BAREL-070025	Jan 2013
Permanent highway layout – Area 1 work	DCO-PP-04X-BAREL-070026	Jan 2013
Highway layout during construction – Vehicle swept path analysis (1 of 4)	DCO-PP-04X-BAREL-070027	Jan 2013
Permanent highway layout – Vehicle swept path analysis (1 of 5)	DCO-PP-04X-BAREL-070031	Jan 2013

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TECHNICAL NOTE

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T: +44 (0)20 7025 7100
E: london@peterbrett.com

Job Name	**Thames Tideway Tunnel – Barn Elms**	
Job No.	22104	
Note No.	001	
Date	15th February 2013	
Subject	Stage 1 Road Safety Audit – Designer's Response	
Prepared by	L Harney	**Reviewed:** B Kemp

1 Introduction

1.1 Arup was appointed by Thames Water to conduct a Stage 1 Road Safety Audit on proposals to create a construction access and egress for works associated with the Thames Tideway Tunnel at Barn Elms in the London Borough of Wandsworth.

1.2 A road safety audit was not undertaken for this site. However the audit team did visit the site and had the following comments this technical note provided the Designer's Response to the comments raised.

2 Safety review

2.1 Comment

Queen Elizabeth Walk forms part of National Cycle Network Route 4 and the Thames Cycle Route. Any traffic management proposed on these roads should take full account of cycles. Furthermore, delivery drivers should be made aware of the presence of the cycle routes and the likely increased risk of cycle / goods vehicle conflict.

Comment Response – The traffic management for the site will take account of the cycle routes in the area and all delivery drivers and site staff will be made aware of the presence of cyclists as part of the site induction. This will be included in the Code of Construction Practice at Stage 2 (Detailed Design).

2.2 Comment

The vehicular carriageway of Queen Elizabeth Walk is narrow and will not accommodate two large vehicles side by side. This is likely to result in vehicles over running the carriageway edge. At the western end of Queen Elizabeth Walk the footway is adjacent to the carriageway and vehicles mounting the kerb to pass are likely to place pedestrians at risk of collision. Intervisible passing places should be provided along the narrow carriageway section.

Comment Response – At present large vehicles including buses and coaches route along Queen Elizabeth Walk. There are locations along the road where informal passing points exist and these are intervisible. As the numbers of construction vehicles is expected to be relatively low at this site the informal passing points are should be adequate to accommodate the additional traffic.

2.3 Comment

As demonstrated by some of the swept path analysis provided: the passing places provided on the access road to Barn Elms site do not provide sufficient road width to accomadare two large vehicles passing each other.

Comment Response – It is intended that that contractor will manage vehicle movement to minimise vehicle to vehicle conflicts.

2.4 Comment

As demonstrated by the swept path analysis provided: the passing places provided on the access road to Barn Elms site do not appear to be inter-visible increasing the risk of manoeuvring conflicts on the access road.

Comment Response – It is intended that there will be fencing rather than hoarding provided along the route of the access road to increase visibility. Vehicles accessing and egressing the site will also be managed so as to minimise the potential for conflicts.

2.5 Comments

An access gate is shown from the site access to allow the maintenance access for the Environment Agency to Ashlone Wharf. Both the access road and gateway are narrow and may not facilitate access for larger plant. Confirm likely plant requirements with the Environment Agency and design the gateway accordingly.

Comment Response – There will be consultation with the Environment Agency regarding access to Ashlone Wharf at Stage 2 (Detailed Design).

Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Transport Assessment

Doc Ref: **7.10.03**

Barn Elms

Figures

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

Hard copy available in

Box **49** Folder **B**
January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

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Thames Tideway Tunnel

Transport Assessment

Section 6: Barn Elms figures

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Plans

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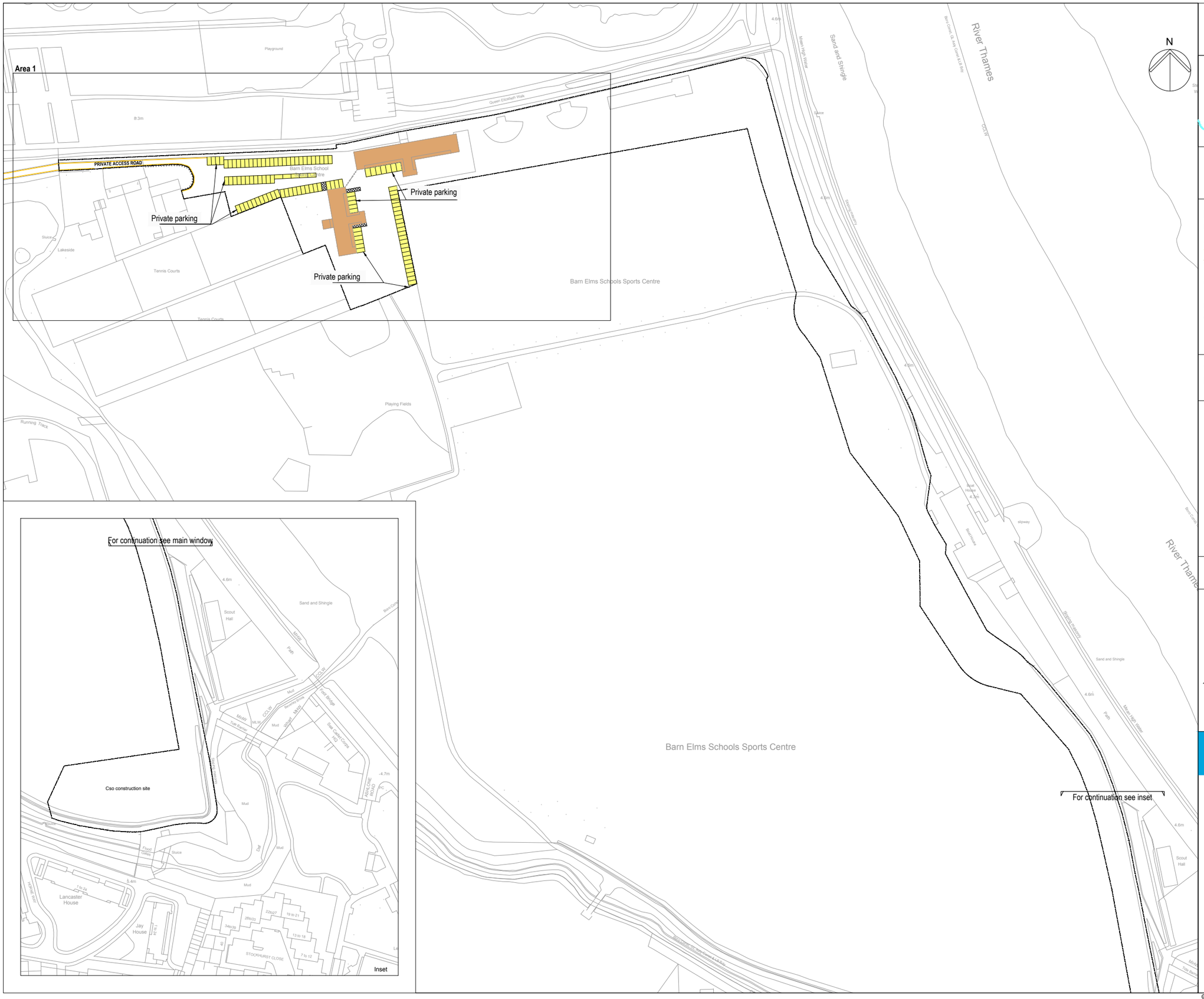
Barn Elms

THAMES TIDEWAY TUNNEL - SCHEDULE OF ASSOCIATED HIGHWAY WORKS

Drawing Number	Works Reference	Location	Item of Work	Date of Implementation
DCO-PP-04X-BAREL-077025	PRD2X_C01	Reference Not Used.	Reference Not Used.	TBC
	PRD2X_C02	Barn Elms Playing Fields Car Park	Provision of new site access gate at the start of the construction site access road within the sports centre car park.	TBC
	PRD2X_C03	Barn Elms Playing Fields Car Park	Provision of site security cabin adjacent to the site access gate within the sports centre car park.	TBC
	PRD2X_C04	Barn Elms Playing Fields Car Park	Suspension of approx. 30 car parking bays adjacent to the northern boundary of the sports centre car park in order to accommodate the new construction site access road.	TBC
	PRD2X_C05	Barn Elms Playing Fields Car Park	Demolition of a changing room facility in order to accommodate the new construction site access road.	TBC
	PRD2X_C06	Barn Elms Playing Fields Car Park	Removal or relocation of gates within the sports centre car park as adjacent changing room facilities are being demolished and to maintain access to the relocated parking bays.	TBC
	PRD2X_C07	Barn Elms Playing Fields Car Park	Removal of approx. 7 car parking bays adjacent to the changing facilities which are to be demolished.	TBC
	PRD2X_C08	Barn Elms Playing Fields Car Park	Provision of approximately 42 parking spaces within the sports centre car park in order to maintain the number of parking bays in the car park. This proposal increases the car park capacity by approximately 5 cars. Final parking bay layout to be agreed with LB Wandsworth.	TBC
DCO-PP-04X-BAREL-077026	PRD2X_P01	Reference Not Used.	Reference No Used.	TBC
	PRD2X_P02	Barn Elms Playing Fields Car Park	Removal of the access gate to the construction site and construction site access road between the entrance to the car park and the western end of the building to be demolished.	TBC
	PRD2X_P03	Barn Elms Playing Fields Car Park	Removal of the site security cabin which was located at the construction site access gate during the construction phase.	TBC
	PRD2X_P04	Barn Elms Playing Fields Car Park	Reinstatement of 30 parking bays adjacent to the northern boundary of the sports centre car park. These bays would be suspended during significant operational activities.	TBC
	PRD2X_P05	Barn Elms Playing Fields Car Park	Permanent replacement changing facilities to be provided. Details and location of this to be confirmed with LB Wandsworth.	TBC
	PRD2X_P06	Barn Elms Playing Fields Car Park	Provision of gate within the car park as is the existing arrangement. Exact location to be agreed with LB Wandsworth.	TBC
	PRD2X_P07	Barn Elms Playing Fields Car Park	Reinstatement or possible relocation of parking bays depending on the agreed layout of the car park with LB Wandsworth.	TBC
	PRD2X_P08	Barn Elms Playing Fields Car Park	Removal of temporary parking bays in this location which were in place during the construction phase.	TBC



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

- Parking restrictions
- Parking spaces
- Sports centre changing room facilities
- Bollard
- Gate

Revised

- Limit of land to be acquired or used (LLAU)

On street parking

Private parking - for Barn Elms sports centre

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 & construction base case

10m 0 100m

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

FOR INFORMATION

Location

Barn Elms
London Borough of Richmond Upon Thames

Document Information

Application for Development Consent

Existing & construction base case highway layout

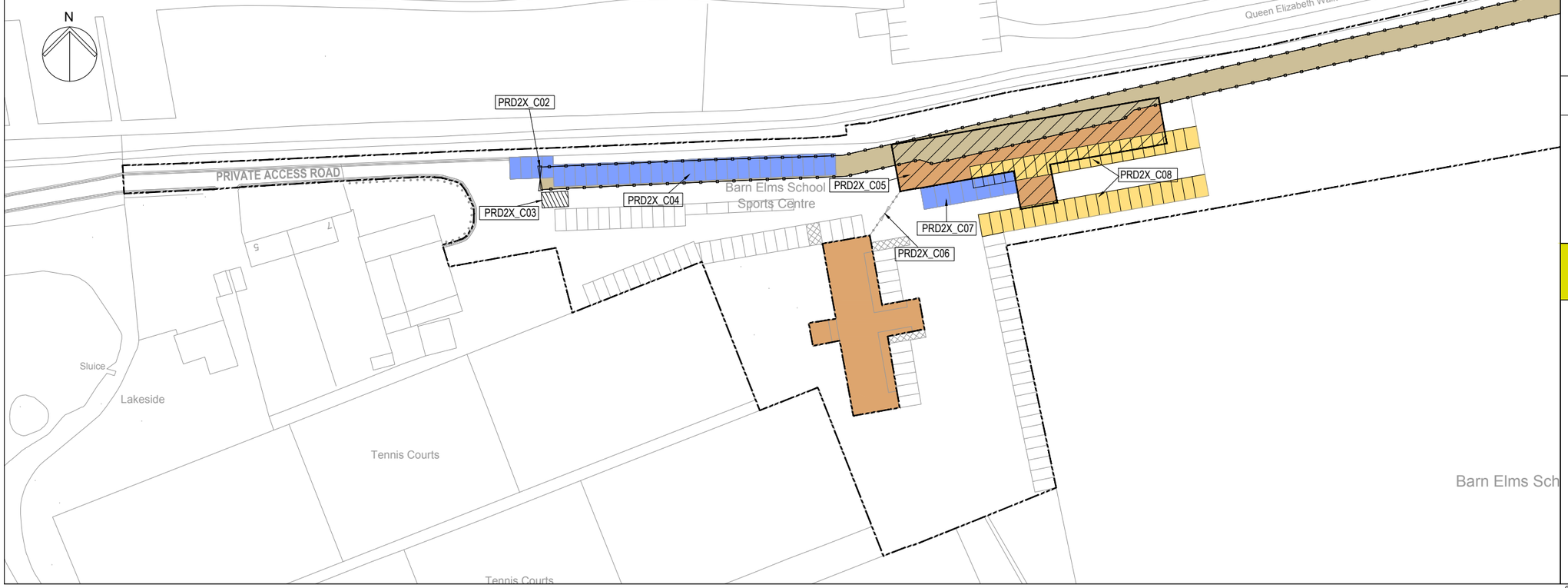
DCO-PP-04X-BAREL-070024
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Existing & construction base case highway layout

Highway layout during construction



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

- Parking restrictions
- Parking spaces
- Sports centre changing room facilities
- Gate
- Bollard

Revised

- Suspended parking spaces
- Temporary parking spaces
- Illustrative on-site manoeuvring zone
- Building to be demolished
- Site hut
- Site hoarding
- Access gate
- Limit of land to be acquired or used (LLAU)
- PRD2X_C00 See schedule of works

On street parking

Private parking - sports centre parking

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
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- 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

Phases 1 & 2

10m 0 40m

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

ILLUSTRATIVE

Location

Barn Elms

London Borough of Richmond Upon Thames

Document Information

Application for Development Consent

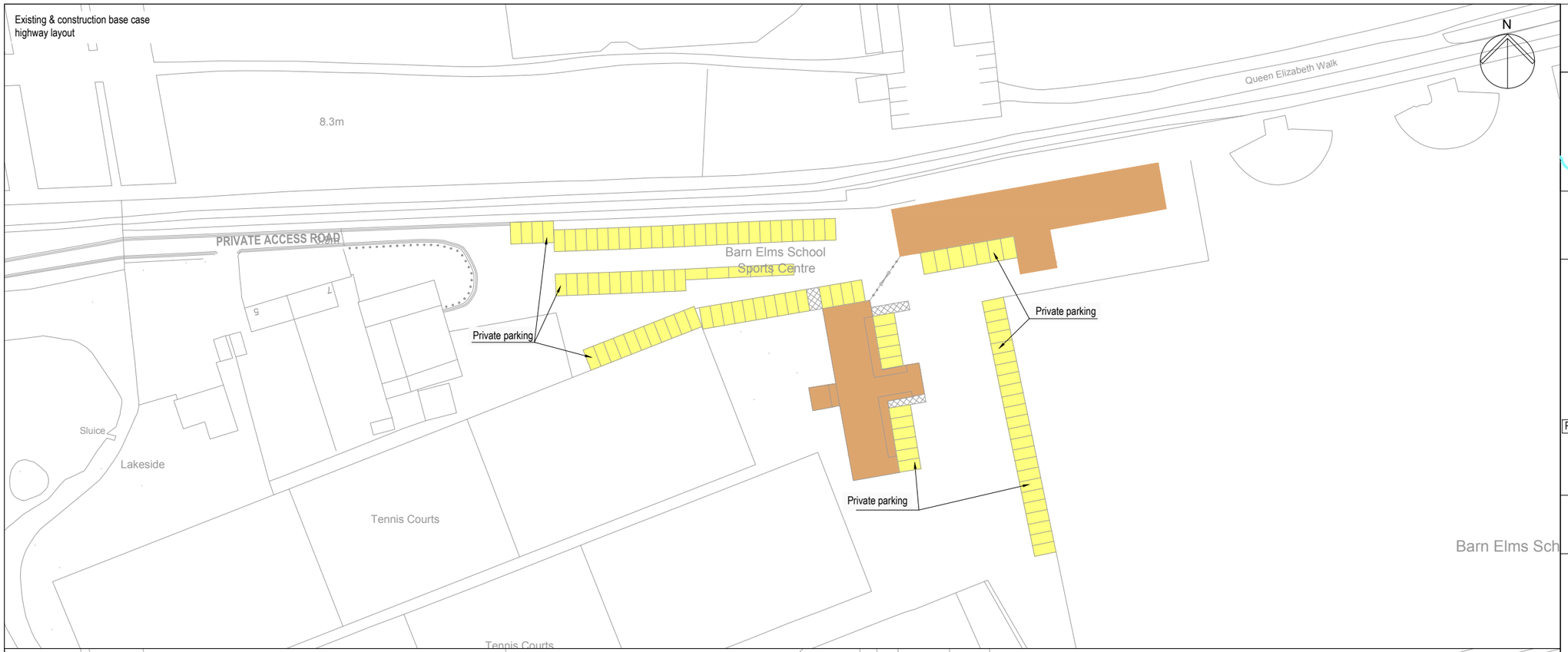
Highway layout during construction (Area 1)

DCO-PP-04X-BAREL-070025
January 2013

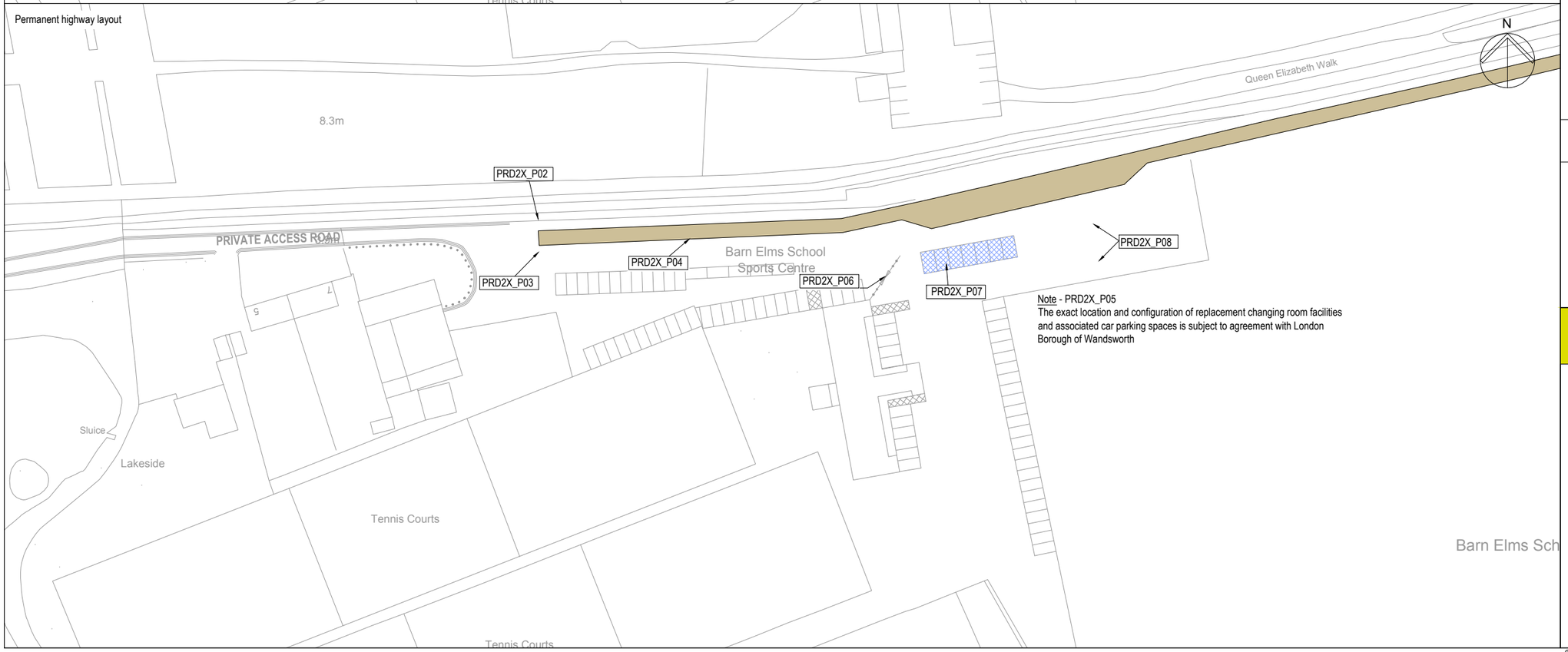
Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Existing & construction base case highway layout



Permanent highway layout



Note - PRD2X_P05
The exact location and configuration of replacement changing room facilities and associated car parking spaces is subject to agreement with London Borough of Wandsworth

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
- Parking restrictions
- Parking spaces
- Sport centre changing room facilities
- Gate
- Bollard

Revised
- Reinstated parking spaces
- Illustrative on-site manoeuvring zone
- PRD2X_P00 See schedule of works

On street parking

Private parking - sports centre parking

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 phase

10m 0 40m

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

ILLUSTRATIVE

Location
Barn Elms
London Borough of Richmond Upon Thames

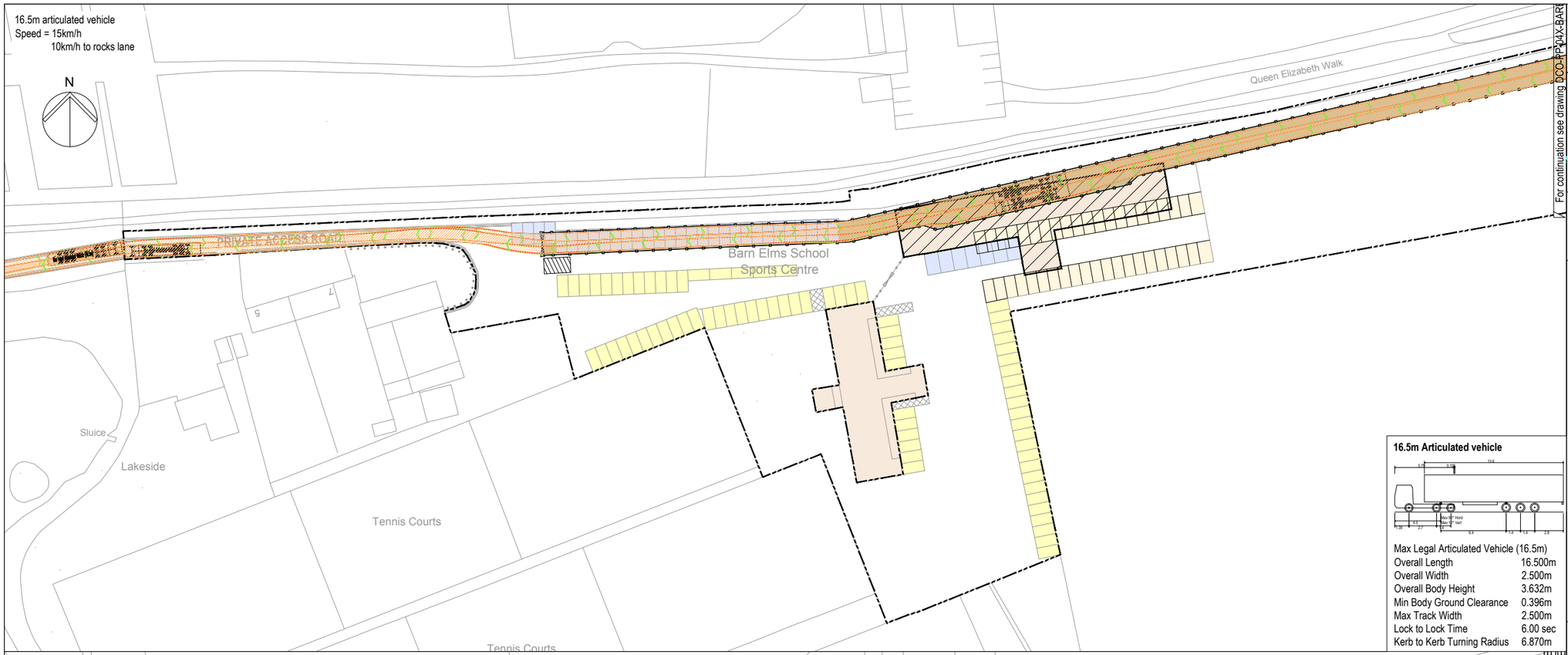
Document Information
Application for Development Consent
Permanent highway layout
Area 1 work

DCO-PP-04X-BAREL-070026
January 2013

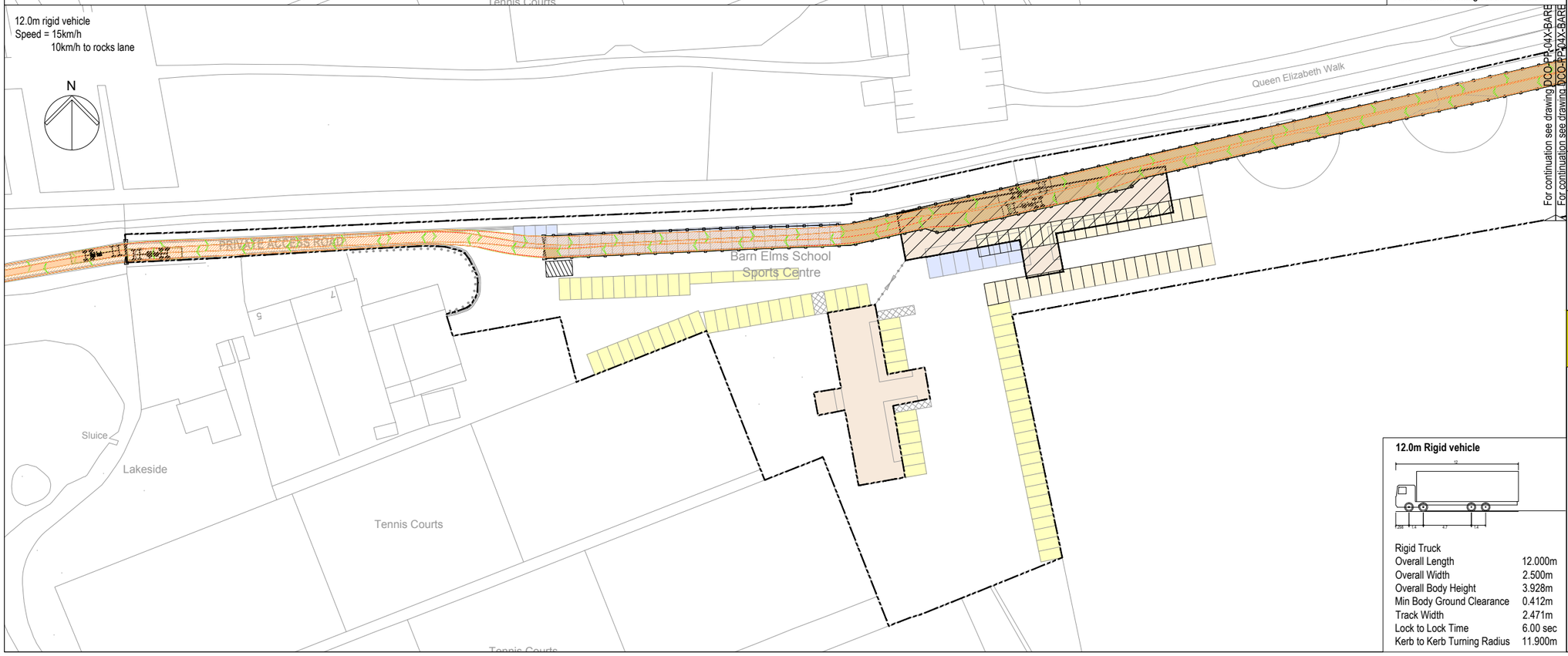
Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

16.5m articulated vehicle
Speed = 15km/h
10km/h to rocks lane



12.0m rigid vehicle
Speed = 15km/h
10km/h to rocks lane



16.5m Articulated vehicle

Max Legal Articulated Vehicle (16.5m)	
Overall Length	16.500m
Overall Width	2.500m
Overall Body Height	3.632m
Min Body Ground Clearance	0.396m
Max Track Width	2.500m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	6.870m

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	2.471m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	11.900m

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
- Parking restrictions
- Parking spaces
- Bollard

Revised
- Suspended parking spaces
- Temporary parking spaces
- Illustrative on-site manoeuvring zone
- Building to be demolished
- Site hut
- Site hoarding
- Access gate
- Limits of land to be acquired or used (LLAU)

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

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
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- 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
Phases 1 & 2

10m 0 40m

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

ILLUSTRATIVE

Location
Barn Elms
London Borough of Richmond Upon Thames

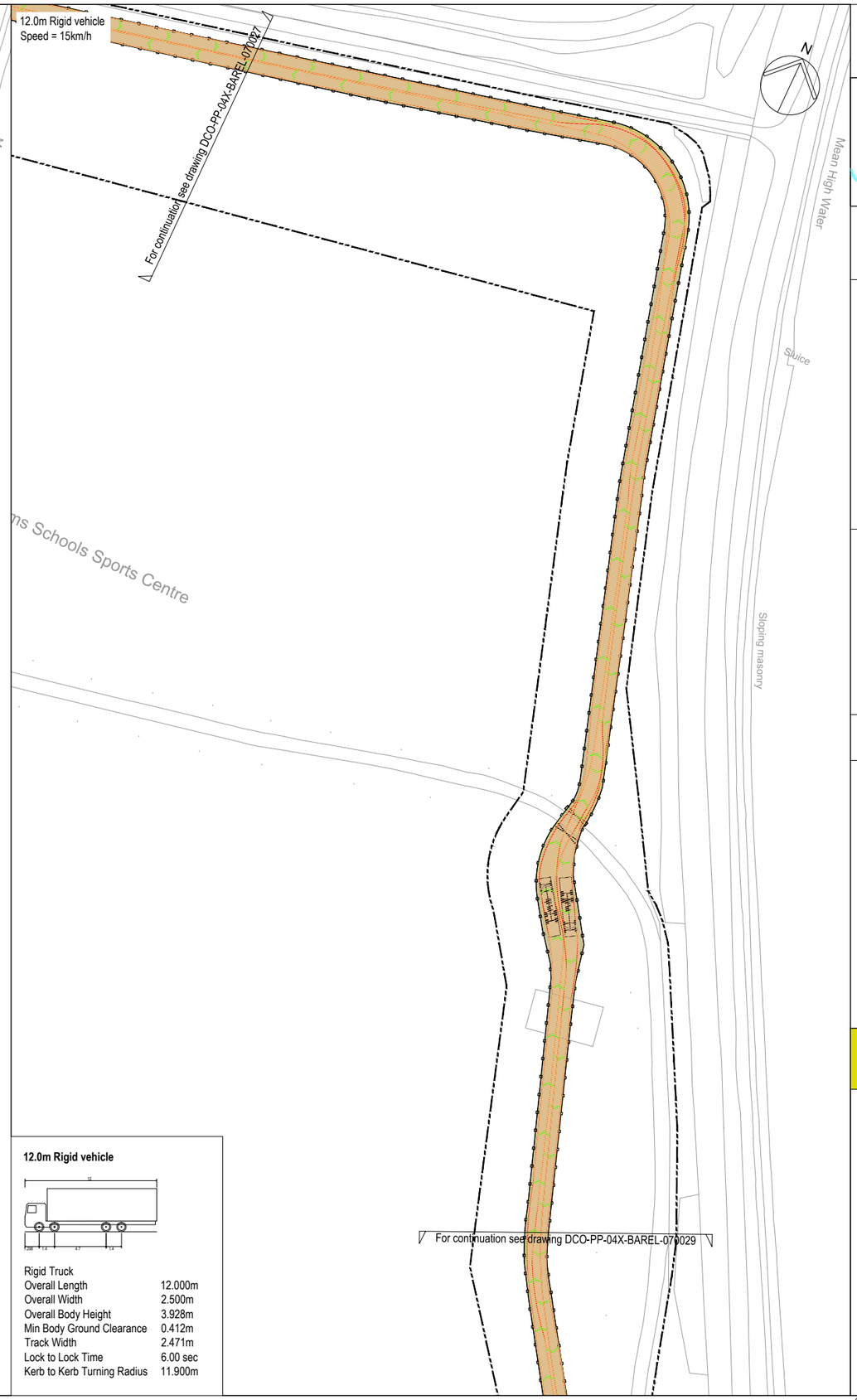
Document Information
Application for Development Consent

Highway layout during construction
Vehicle swept path analysis (sheet 1 of 4)

DCO-PP-04X-BAREL-070027
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



16.5m Articulated vehicle

Max Legal Articulated Vehicle (16.5m)	
Overall Length	16.500m
Overall Width	2.500m
Overall Body Height	3.632m
Min Body Ground Clearance	0.396m
Max Track Width	2.500m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	6.870m

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	2.471m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	11.900m

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

Revised

- Illustrative on-site manoeuvring zone
- Site hoarding
- Access gate
- Limit of land to be acquired or used (LLAU)

Vehicle swept path analysis

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

Standards

- Design Manual For Roads And Bridges, Dft, 1992
- Traffic Signs Regulations & General Directions, Tso, 2002
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- 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

Phases 1 & 2

10m 0 40m

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

ILLUSTRATIVE

Location

Barn Elms
London Borough of Richmond Upon Thames

Document Information

Application for Development Consent

Highway layout during construction
Vehicle swept path analysis (sheet 2 of 4)

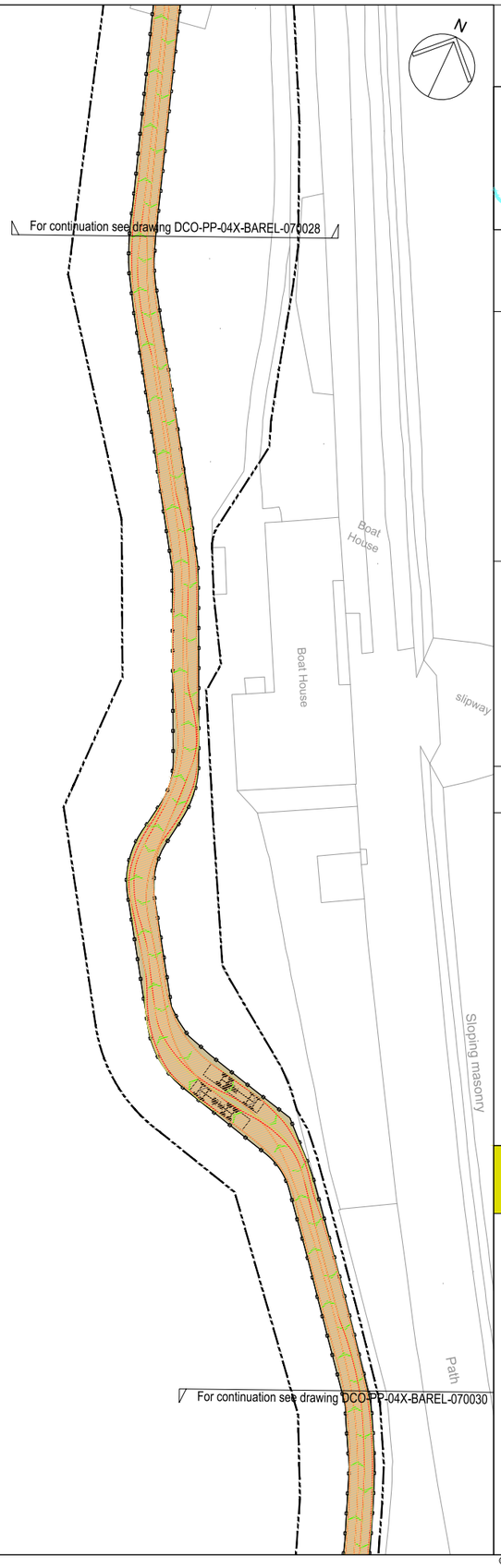
DCO-PP-04X-BAREL-070028
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

16.5m Articulated vehicle
Speed = 15km/h

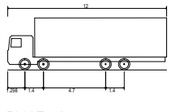
12.0m Rigid vehicle
Speed = 15km/h



16.5m Articulated vehicle

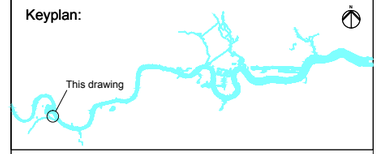
Max Legal Articulated Vehicle (16.5m)	
Overall Length	16.500m
Overall Width	2.500m
Overall Body Height	3.632m
Min Body Ground Clearance	0.396m
Max Track Width	2.500m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	6.870m

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	2.471m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	11.900m

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

Revised
- Illustrative on-site manoeuvring zone
- Site hoarding
- Limit of land to be acquired or used (LLAU)

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

Standards

- Design Manual For Roads And Bridges, Dft, 1992
- Traffic Signs Regulations & General Directions, Tso, 2002
- Traffic Signs Manual, Dft, 2006
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- 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
Phases 1 & 2

10m 0 40m

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

ILLUSTRATIVE

Location
Barn Elms
London Borough of Richmond Upon Thames

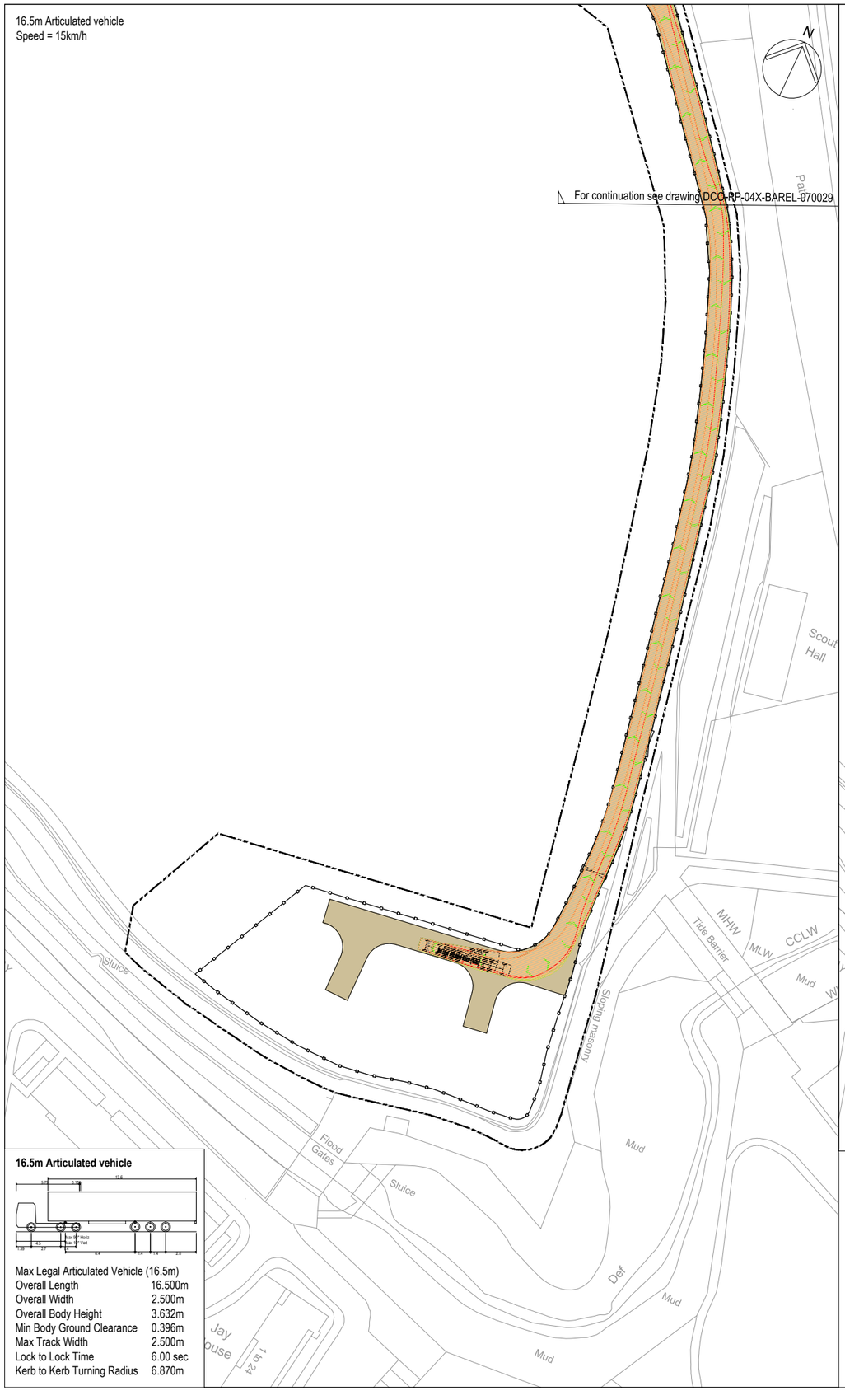
Document Information
Application for Development Consent
Highway layout during construction
Vehicle swept path analysis (sheet 3 of 4)

DCO-PP-04X-BAREL-070029
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

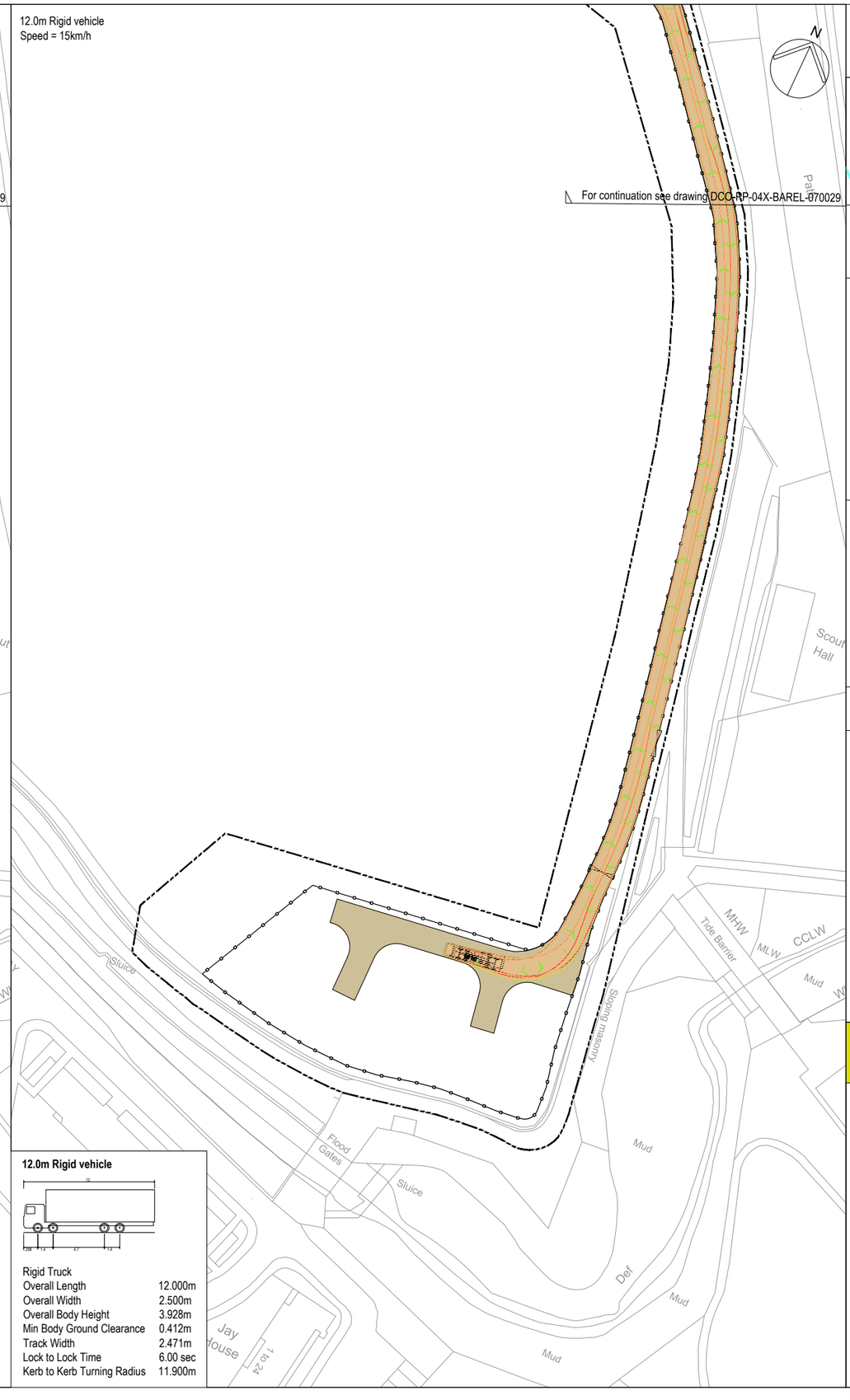
16.5m Articulated vehicle
Speed = 15km/h



16.5m Articulated vehicle

Max Legal Articulated Vehicle (16.5m)	
Overall Length	16.500m
Overall Width	2.500m
Overall Body Height	3.632m
Min Body Ground Clearance	0.396m
Max Track Width	2.500m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	6.870m

12.0m Rigid vehicle
Speed = 15km/h



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	2.471m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	11.900m

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

Revised
- Illustrative on-site manoeuvring zone
- Site hoarding
- Access gate
- Limit of land to be acquired or used (LLAU)

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

Standards

- Design Manual For Roads And Bridges, Dft, 1992
- Traffic Signs Regulations & General Directions, Tso, 2002
- Traffic Signs Manual, Dft, 2006
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- 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
Phases 1 & 2

10m 0 40m

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

ILLUSTRATIVE

Location
Barn Elms
London Borough of Richmond Upon Thames

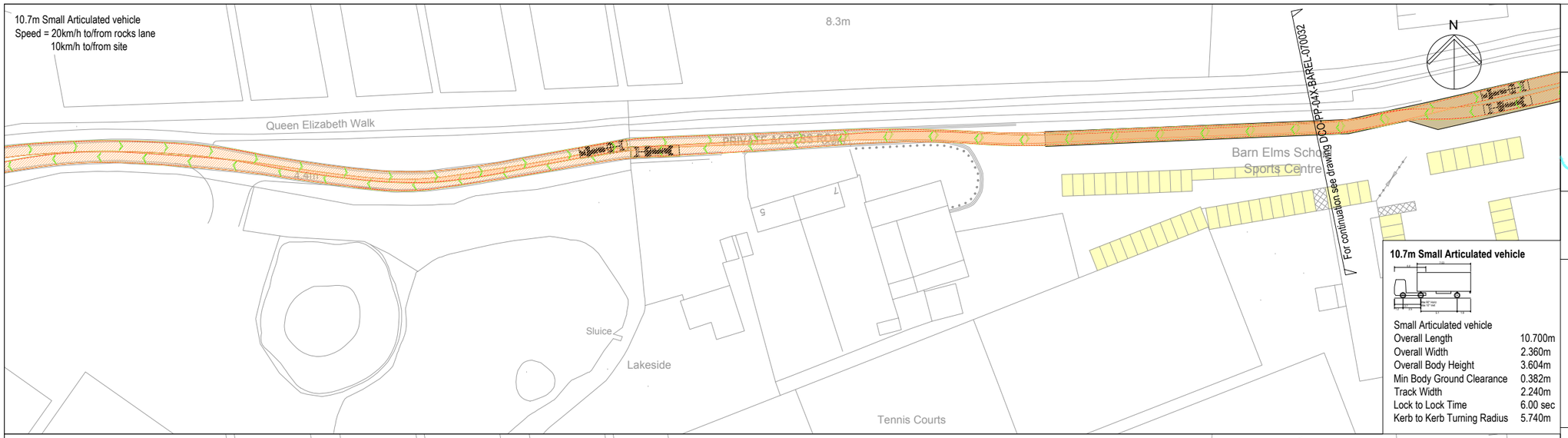
Document Information
Application for Development Consent
Highway layout during construction
Vehicle swept path analysis (sheet 4 of 4)

DCO-PP-04X-BAREL-070030
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

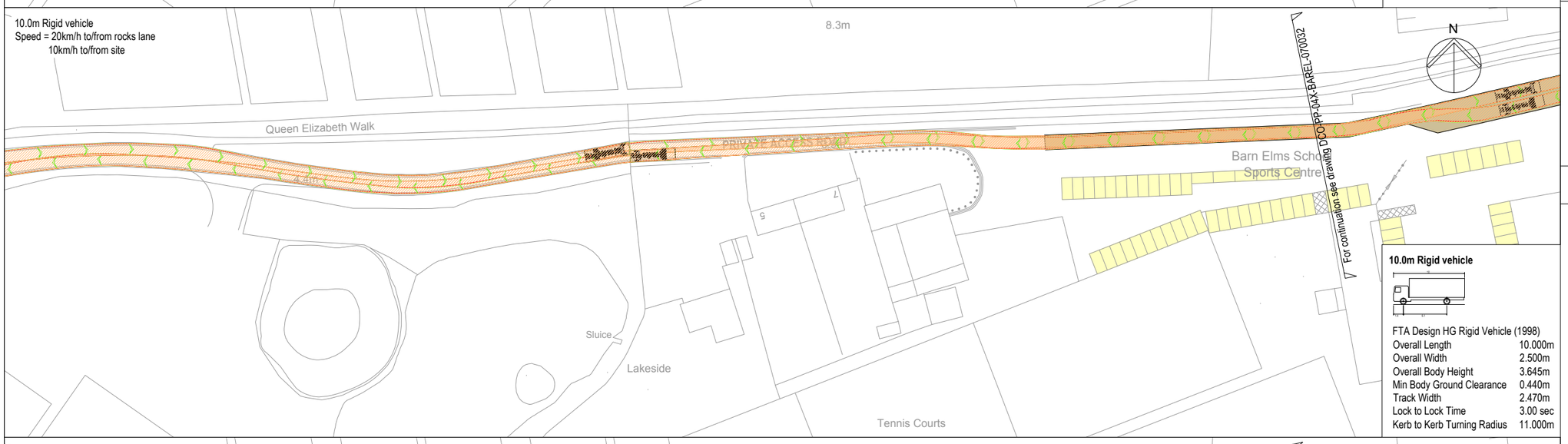
10.7m Small Articulated vehicle
Speed = 20km/h to/from rocks lane
10km/h to/from site



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	2.240m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	5.740m

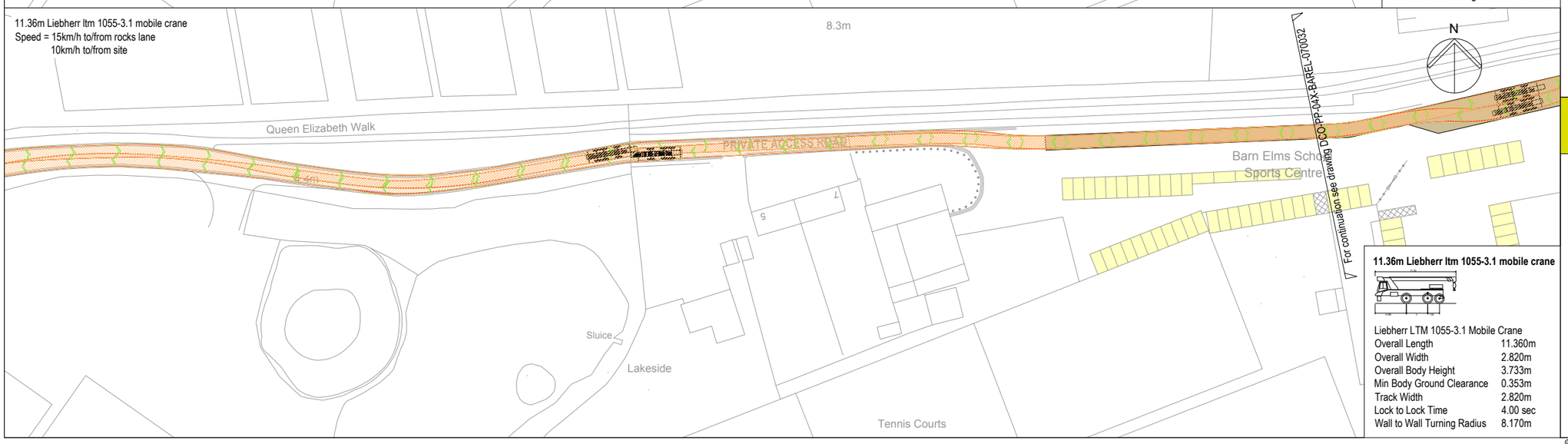
10.0m Rigid vehicle
Speed = 20km/h to/from rocks lane
10km/h to/from site



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	3.00 sec
Kerb to Kerb Turning Radius	11.000m

11.36m Liebherr ltm 1055-3.1 mobile crane
Speed = 15km/h to/from rocks lane
10km/h to/from site



11.36m Liebherr ltm 1055-3.1 mobile crane

Liebherr LTM 1055-3.1 Mobile Crane	
Overall Length	11.360m
Overall Width	2.820m
Overall Body Height	3.733m
Min Body Ground Clearance	0.353m
Track Width	2.820m
Lock to Lock Time	4.00 sec
Wall to Wall Turning Radius	8.170m

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
- Parking restrictions
- Parking spaces
- Gate
- Bollard

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

Revised
- Illustrative on-site manoeuvring zone

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 phase

10m 0 40m

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

ILLUSTRATIVE

Location
Barn Elms
London Borough of Richmond Upon Thames

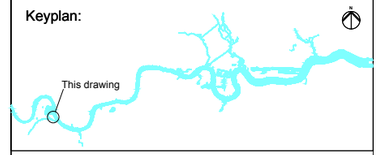
Document Information
Application for Development Consent
Permanent highway layout
Vehicle swept path analysis (sheet 1 of 5)

DCO-PP-04X-BAREL-070031
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

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
- Parking spaces
- Gate
- Bollard

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

Revised
- Illustrative on-site manoeuvring zone

Standards

- Design Manual For Roads And Bridges, Dft, 1992
- Traffic Signs Regulations & General Directions, Tso, 2002
- Traffic Signs Manual, Dft, 2006
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- Guidance For The Use Of Tactile Paving, Dft, 1998
- Accessible Bus Stop Design Guidance, Tfl, 2006

Stage
Permanent phase

10m 0 40m

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

ILLUSTRATIVE

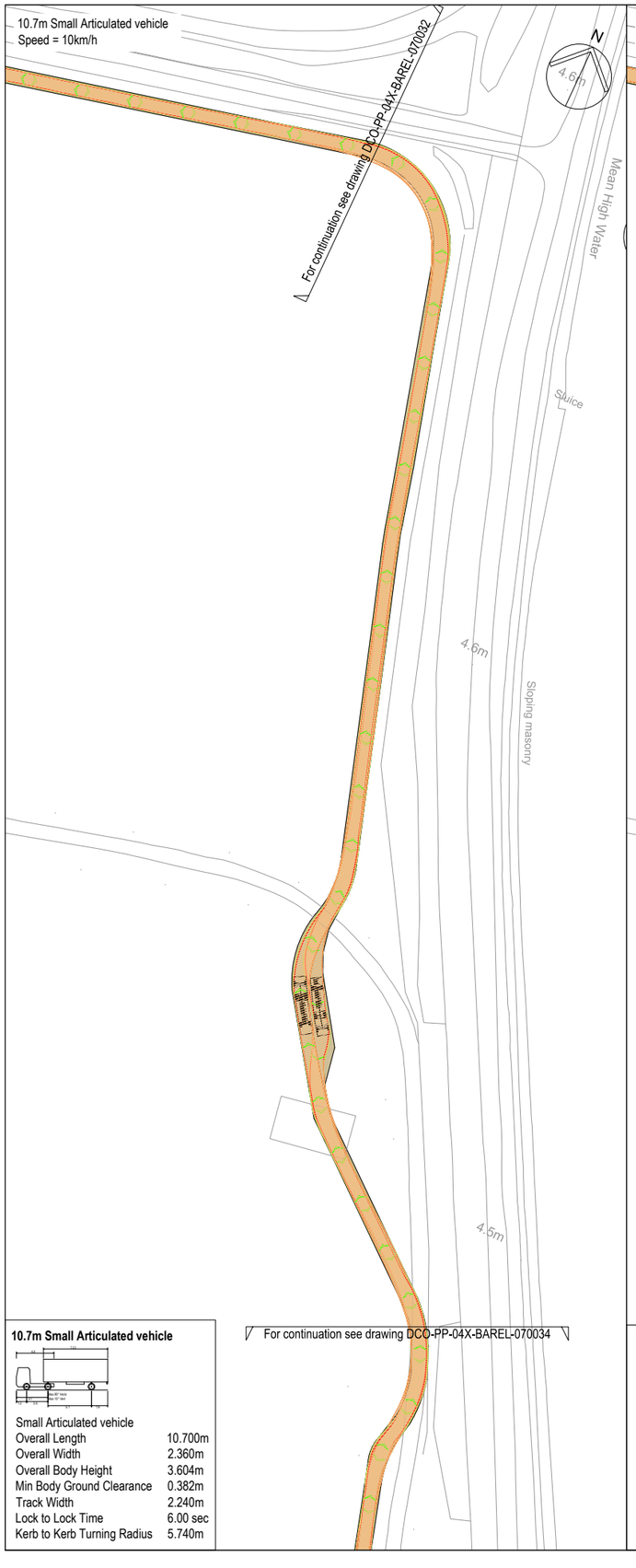
Location
Barn Elms
London Borough of Richmond Upon Thames

Document Information
Application for Development Consent
Permanent highway layout
Vehicle swept path analysis (sheet 2 of 5)

DCO-PP-04X-BAREL-070032
January 2013

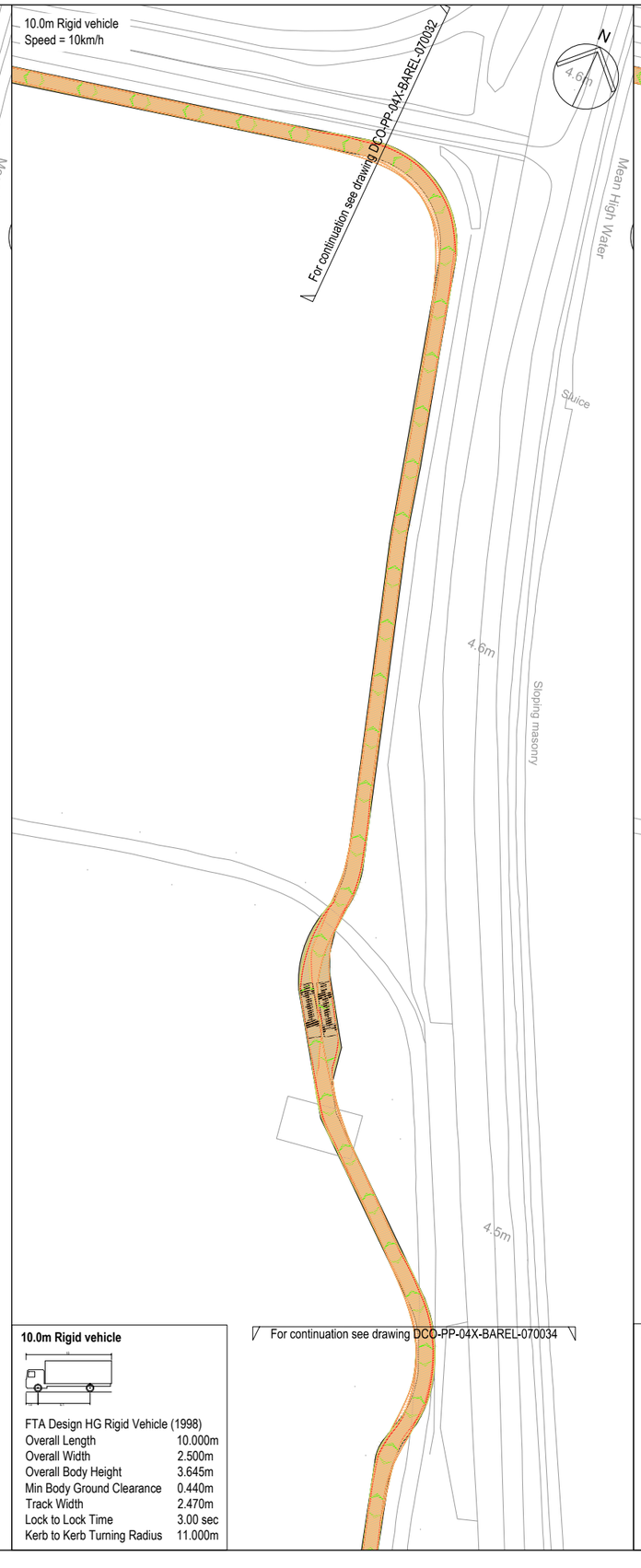
Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



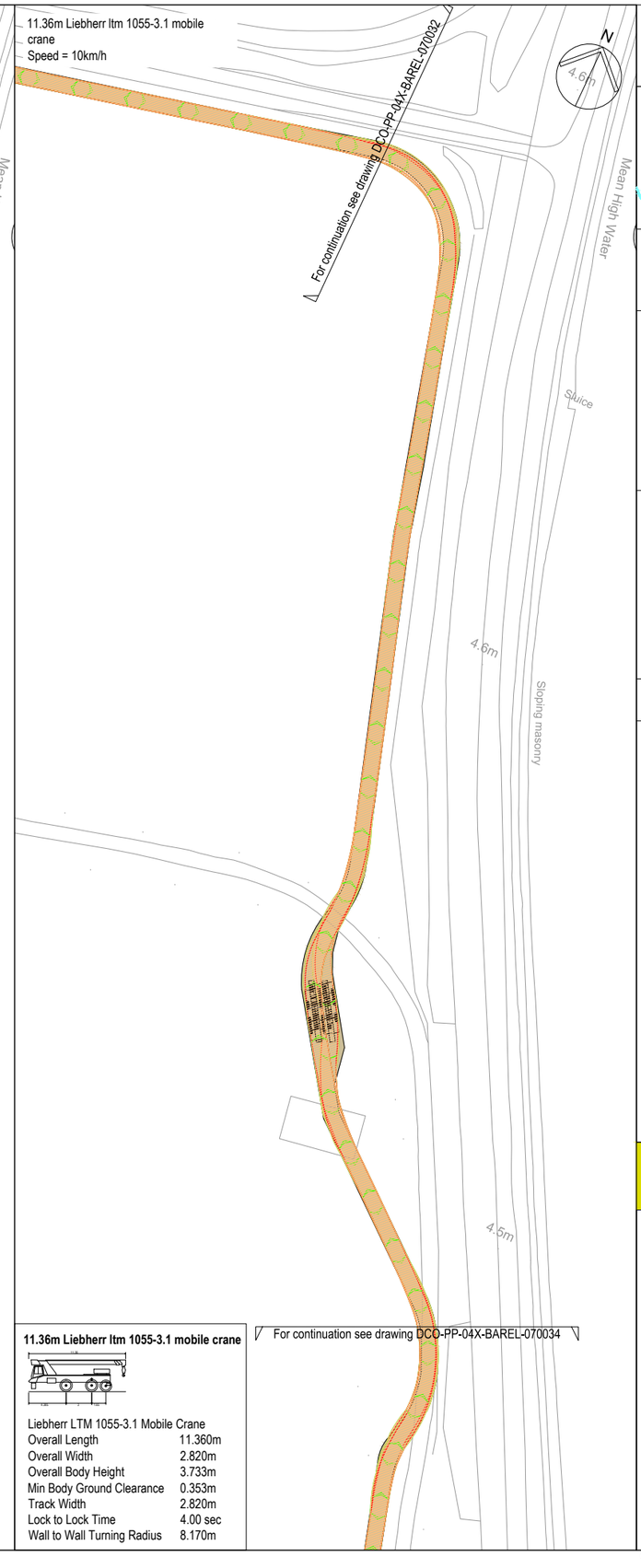
10.7m Small Articulated vehicle

Small Articulated vehicle	
Overall Length	10.700m
Overall Width	2.360m
Overall Body Height	3.604m
Min Body Ground Clearance	0.382m
Track Width	2.240m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	5.740m



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	3.00 sec
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	2.820m
Overall Body Height	3.733m
Min Body Ground Clearance	0.353m
Track Width	2.820m
Lock to Lock Time	4.00 sec
Wall to Wall Turning Radius	8.170m

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

Revised

Illustrative on-site manoeuvring zone

Vehicle swept path analysis

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

Standards

- Design Manual For Roads And Bridges, Dft, 1992
- Traffic Signs Regulations & General Directions, Tso, 2002
- Traffic Signs Manual, Dft, 2006
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- 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 phase

10m 0 40m

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

ILLUSTRATIVE

Location

Barn Elms
London Borough of Richmond Upon Thames

Document Information

Application for Development Consent

Permanent highway layout
Vehicle swept path analysis (sheet 3 of 5)

DCO-PP-04X-BAREL-070033
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

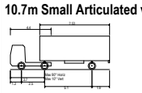
Thames Water

10.7m Small Articulated vehicle
Speed = 10km/h

10.0m Rigid vehicle
Speed = 10km/h

11.36m Liebherr ltm 1055-3.1 mobile crane
Speed = 10km/h

10.7m Small Articulated vehicle



Small Articulated vehicle	
Overall Length	10.700m
Overall Width	2.360m
Overall Body Height	3.604m
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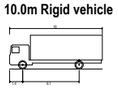
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	5.740m

10.0m Rigid vehicle



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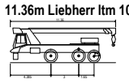
11.36m Liebherr ltm 1055-3.1 mobile crane



Liebherr LTM 1055-3.1 Mobile Crane	
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Overall Body Height	3.733m
Min Body Ground Clearance	0.353m
Track Width	2.820m
Lock to Lock Time	4.00 sec
Wall to Wall Turning Radius	8.170m

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

Revised

Illustrative on-site manoeuvring zone

Vehicle swept path analysis

Vehicle body outlines

Vehicle chassis outline

Vehicle swept path

Standards

- Design Manual For Roads And Bridges, Dft, 1992
- Traffic Signs Regulations & General Directions, Tso, 2002
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- Guidance For The Use Of Tactile Paving, Dft, 1998
- Accessible Bus Stop Design Guidance, Tfl, 2006

Stage
Permanent phase

10m 0 40m

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

ILLUSTRATIVE

Location

Barn Elms
London Borough of Richmond Upon Thames

Document Information

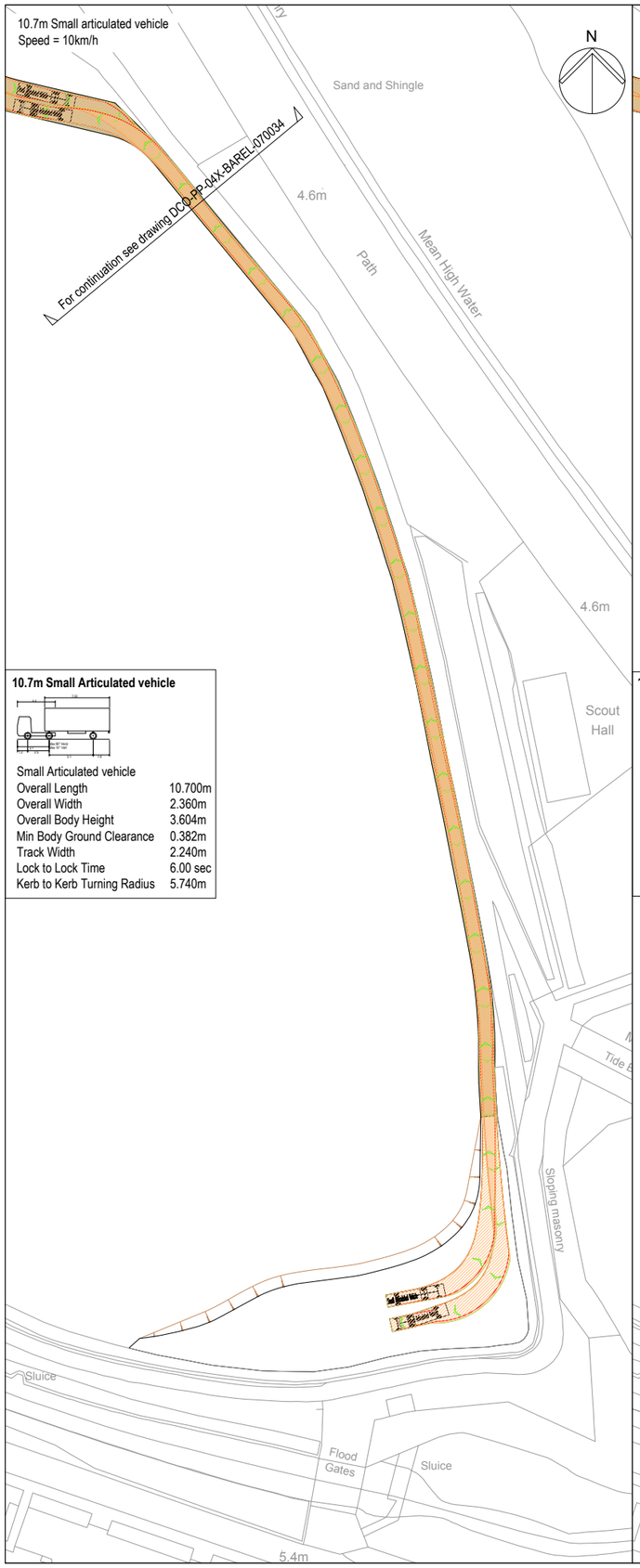
Application for Development Consent

Permanent highway layout
Vehicle swept path analysis (sheet 4 of 5)

DCO-PP-04X-BAREL-070034
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



10.7m Small Articulated vehicle

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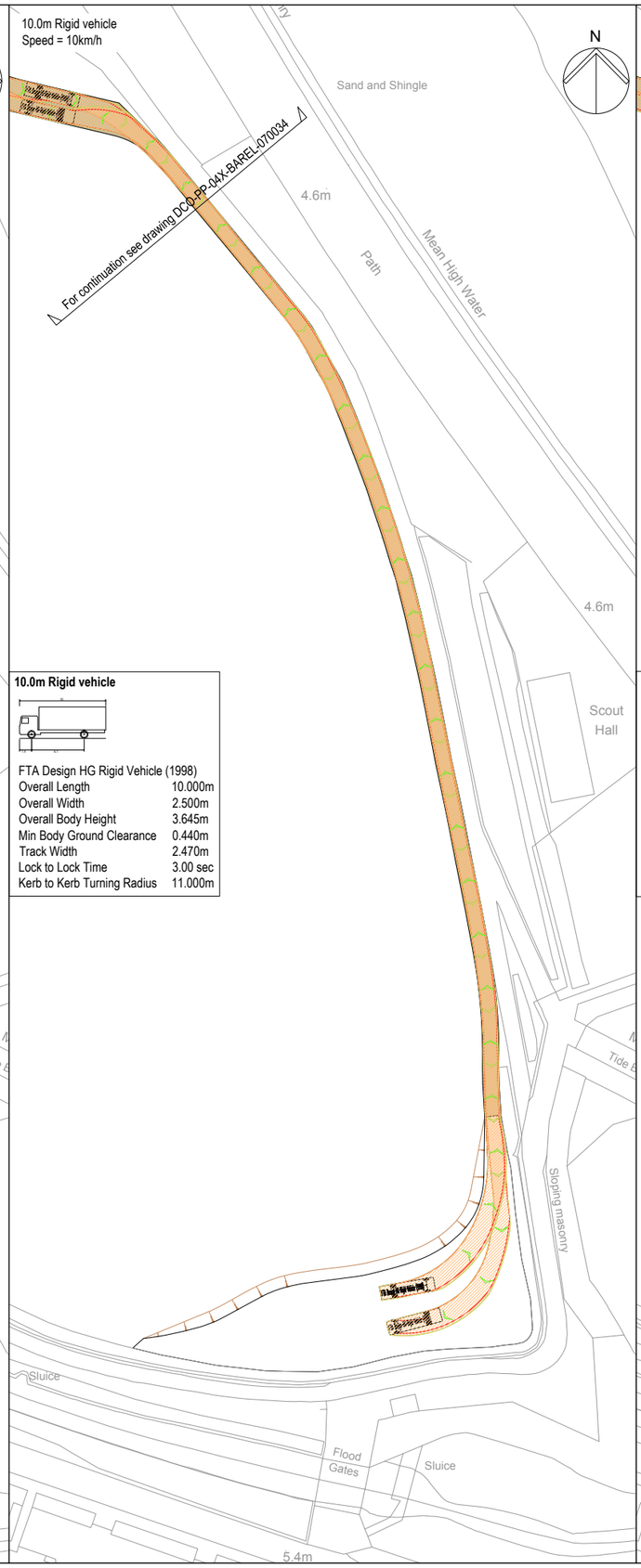

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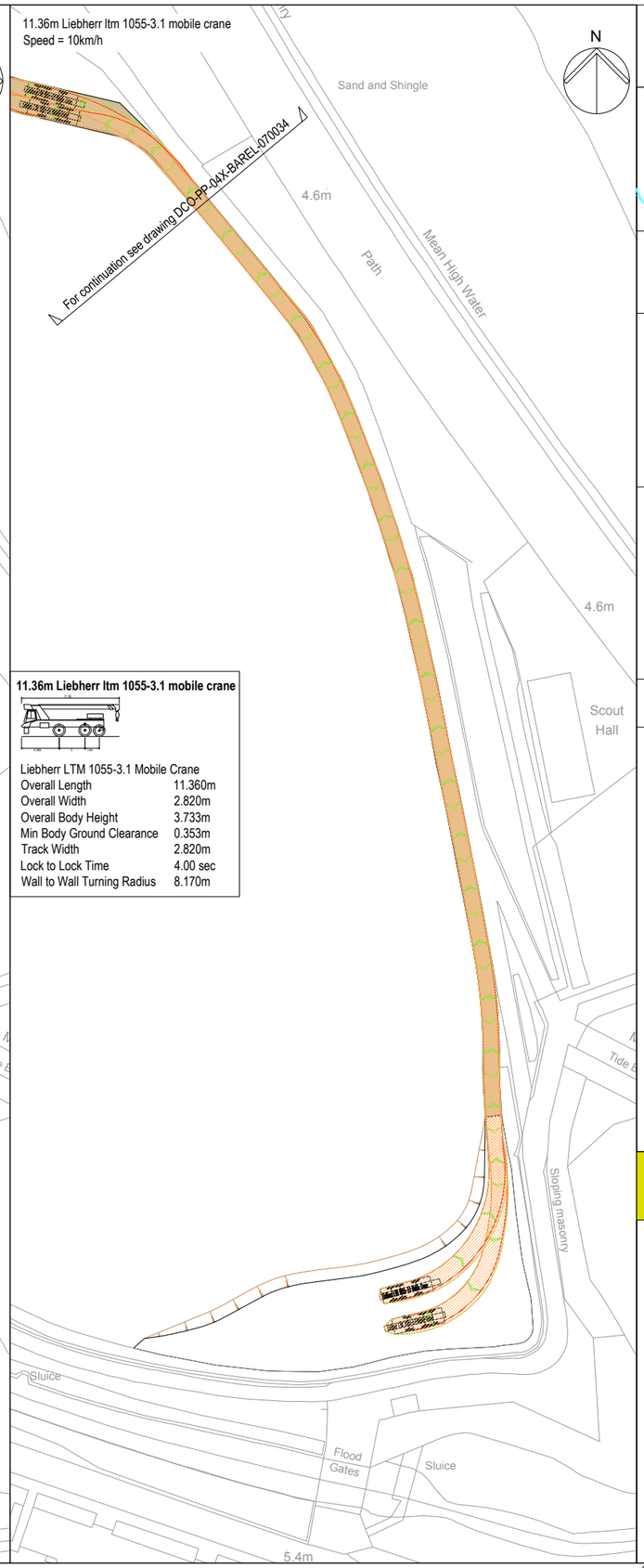

11.36m Liebherr ltm 1055-3.1 mobile crane

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Track Width	2.820m
Lock to Lock Time	4.00 sec
Wall to Wall Turning Radius	8.170m

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

Revised

- Illustrative on-site manoeuvring zone

Vehicle swept path analysis

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

Standards

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- Manual For Streets 2, Ciht, 2010
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- Guidance For The Use Of Tactile Paving, Dft, 1998
- Accessible Bus Stop Design Guidance, Tfl, 2006

Stage

Permanent phase

10m 0 40m

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

ILLUSTRATIVE

Location

Barn Elms
London Borough of Richmond Upon Thames

Document Information

Application for Development Consent

Permanent highway layout
Vehicle swept path analysis (sheet 5 of 5)

DCO-PP-04X-BAREL-070035
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

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Transport assessment figures

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Keyplan:

Key

- TFL road network
- Strategic road network
- Limits of Land to be Acquired or Used
- Local authority boundary

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Barn Elms
London Borough of Richmond

Document Information

Transport Assessment

Transport - site location plan

Figure 6.2.1

1PL03-TT-50707
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- 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
Barn Elms
London Borough of Richmond

Document Information
Transport Assessment
Transport - construction traffic routes

Figure 6.2.2
1PL03-TT-50699
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- Cycle parking
- National rail stations with cycle parking
- Pedestrian routes
- Thames path
- London strategic walk network
- 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

Barn Elms
London Borough of Richmond

Document Information

Transport Assessment

Transport - pedestrian and cycle network

Figure 6.4.1

1PL03-TT-50715
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- TFL bus stops
- Pier locations
- National rail stations
- TfL bus routes
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Barn Elms
London Borough of Richmond

Document Information

Transport Assessment

Transport - public transport

Figure 6.4.2

1PL03-TT-50723
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- City Car
- Zip Car
- Private car parking
- Coach parking
- Controlled Parking Zones and Hours of Operation
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Barn Elms

London Borough of Richmond

Document Information

Transport Assessment

Transport - parking

Figure 6.4.3

1PL03-TT-50731

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- Automatic traffic count surveys
- Pedestrian and cycle surveys
- Junction surveys
- Parking surveys
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Barn Elms

London Borough of Richmond

Document Information

Transport Assessment

Transport - survey locations

Figure 6.4.4

1PL03-TT-50739

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

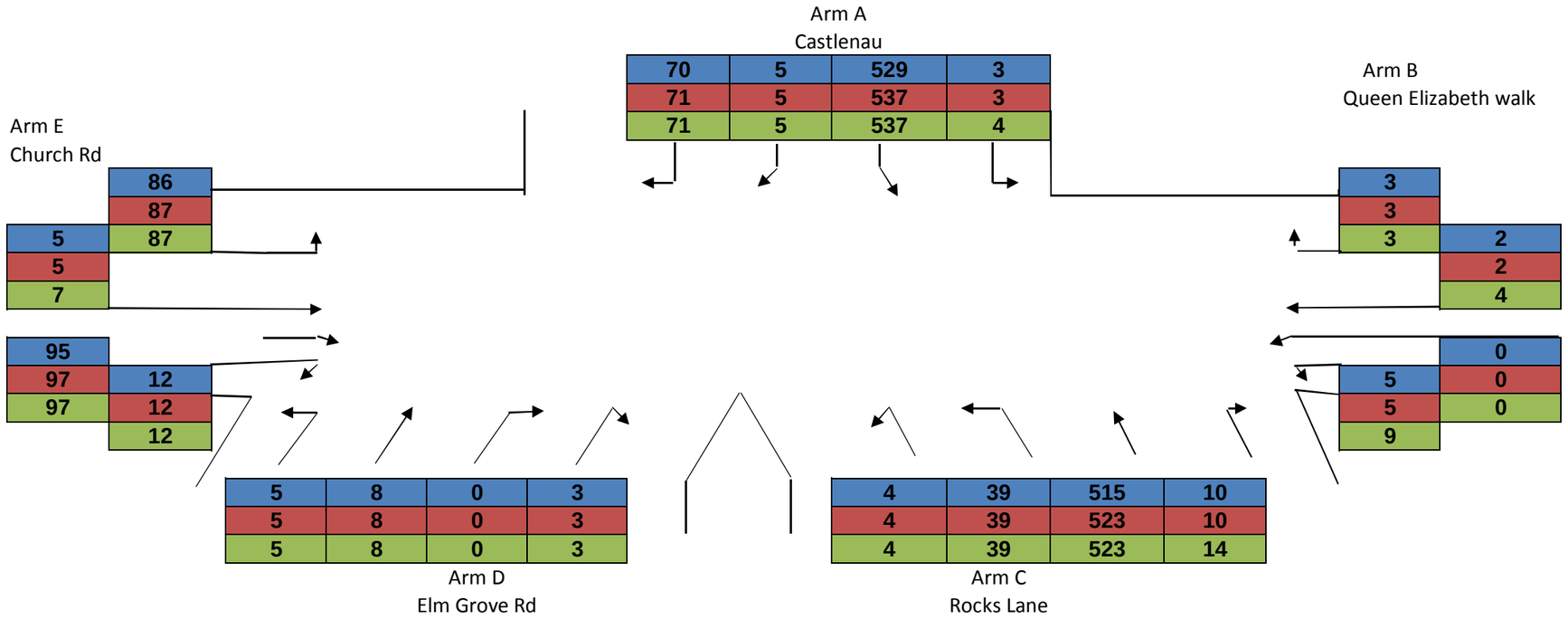
Thames Water

Site: Barn Elms
Borough: Richmond
Junction: St Church Rd/ Castlenau/ Rocks Ln
Junction no.: PBA 8

Data: Traffic Flow in PCUs - AM Peak Hour from Traffic Survey

Key

	Baseline
	Construction Base
	Development Case



FOR INFORMATION

Location
Barn Elms
London Borough of Richmond

Document Information
Transport Assessment

Baseline, Construction and Development case traffic flow (AM peak hour)

Figure 6.4.5
1PL03-TT-50918
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

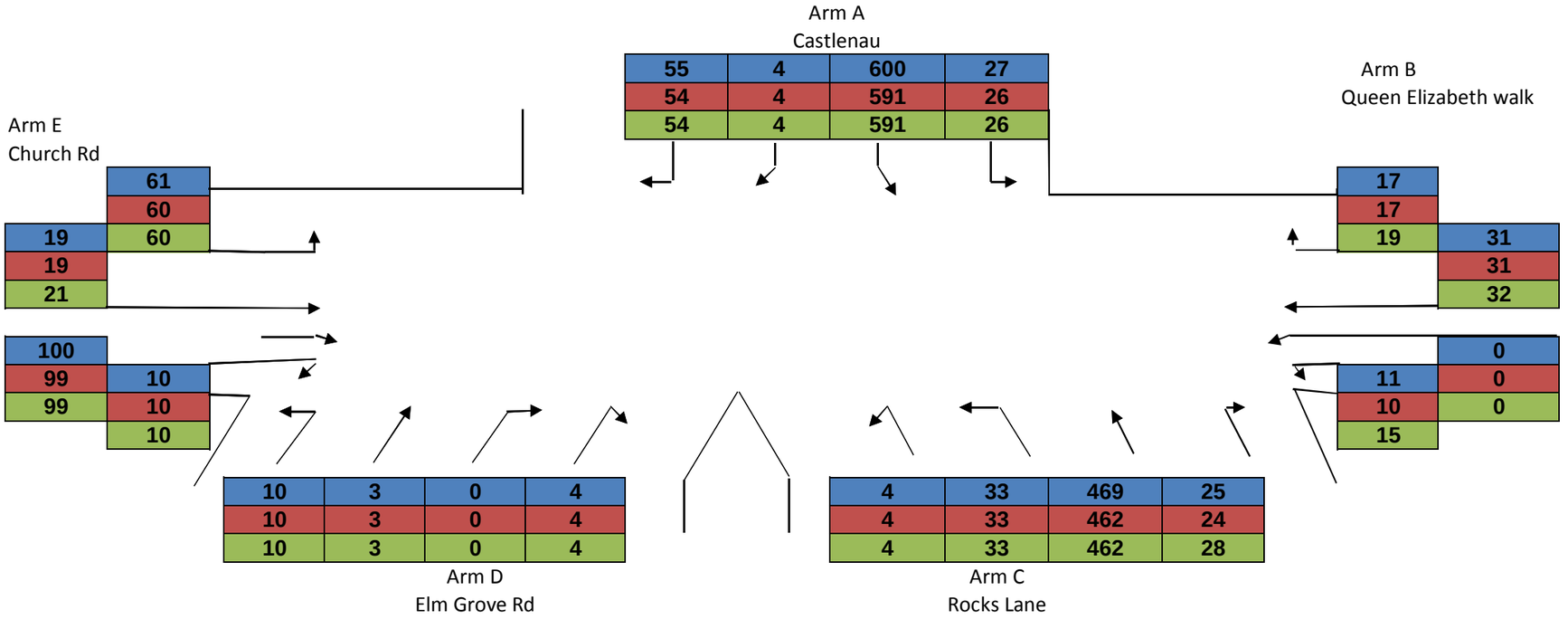
Thames Water

Site: Barn Elms
Borough: Richmond
Junction: St Church Rd/ Castlenau/ Rocks Ln
Junction no.: PBA 8

Data: Traffic Flow in PCUs - PM Peak Hour from Traffic Survey

Key

	Baseline
	Construction Base
	Development Case



FOR INFORMATION

Location
Barn Elms
London Borough of Richmond

Document Information
Transport Assessment

Baseline, Construction and Development case traffic flow (PM peak hour)

Figure 6.4.6
1PL03-TT-50942
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- Slight
- Serious
- Fatal
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

Barn Elms

London Borough of Richmond

Document Information

Transport Assessment

Transport - accident locations

Figure 6.4.7

1PL03-TT-50763

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

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

Barn Elms
London Borough of Richmond

Document Information

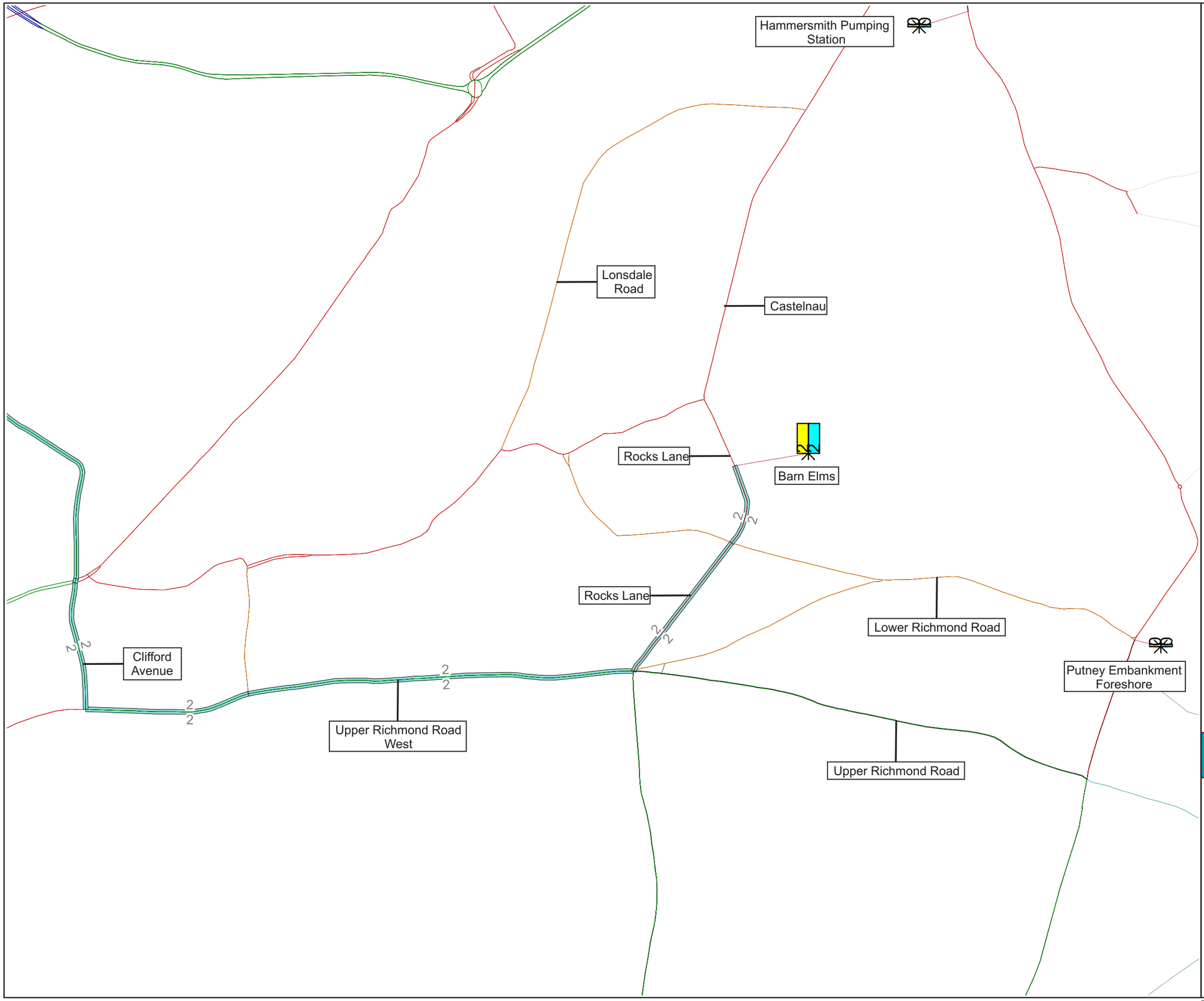
Transport Assessment

Transport - pedestrian and cyclist accidents by severity
Figure 6.4.8

1PL03-TT-50846
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 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- > 75

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

FOR INFORMATION

Location

Barn Elms
London Borough of Richmond

Document Information

Transport Assessment
Hourly Construction Lorry Movements - Site Year 1 of Construction

Figure 6.5.1

1PL03-TT-50875

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

DCO-DT-000-ZZZZZ-071003