**Thames Tideway Tunnel**
Thames Water Utilities Limited

# Application for Development Consent

Application Reference Number: WWO10001

# Transport Assessment

Doc Ref: **7.10.07**

## Carnwath Road Riverside

### Main Report

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

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January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

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# Thames Tideway Tunnel

# Transport Assessment

# Section 10: Carnwath Road Riverside

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# 10 Carnwath Road Riverside

## 10.1 Introduction

10.1.1 This site specific *Transport Assessment (TA)* presents the findings of the assessment of the transport issues of the Thames Tideway Tunnel project at the Carnwath Road Riverside site located within the London Borough (LB) of Hammersmith and Fulham.

10.1.2 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.

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

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

10.1.5 The *TA* structure is as follows:

a. Section 10.2 includes a description of the proposed development detailing construction phasing, vehicle and person trip generation, construction traffic routing and details of the operational phase.

b. Section 10.3 outlines the assessment methodology used for the *TA* for the construction and operational phases.

c. Section 10.4 details the baseline conditions on the transport network surrounding the Carnwath Road Riverside site including survey data analysis and accident analysis.

d. Section 10.5 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 highway network capacity.

e. Section 10.6 provides the assessment of the operational phase of the project.

f. Section 10.7 summarises the *TA* findings.

## 10.2 Proposed development

10.2.1 The proposed development site is located adjacent to the north bank of the River Thames and west of Wandsworth Bridge in LB of Hammersmith and Fulham as shown in Figure 10.2.1.

10.2.2 The site currently comprises light industrial warehouses and brownfield open land sites along a section of river frontage of the River Thames. The site incorporates Whiffin Wharf, Hurlingham Wharf and Carnwath Road Industrial Estate.

10.2.3 The development at Carnwath Road Riverside consists of a main tunnel driven from the Carnwath Road Riverside site to Acton Storm Tanks. It would also receive the main tunnel drive from Kirtling Street and the Frogmore connection tunnel from Dormay Street. Construction is anticipated to take approximately six years. Figure 10.2.1 indicates the Carnwath Road Riverside site location.

## Construction

10.2.4 The construction site would be located on land to the south of Carnwath Road and part of the foreshore of the River Thames. Vehicle access to and from the Carnwath Road Riverside site would take place from Carnwath Road via Wandsworth Bridge Road (A217).

10.2.5 During construction it is anticipated that transport networks could be affected as a result of the additional construction traffic associated with Carnwath Road Riverside and other construction sites with construction routes along Wandsworth Bridge Road (A217), pedestrian and cycle diversions along the Thames Path and changes to on-street parking.

10.2.6 There would be four phases of construction at the Carnwath Road Riverside site covering phase 1 - site set-up and shaft construction, phase 2 – tunnelling, phase 3 - secondary lining and other structures and phase 4 – site demobilisation. The access plan and highway layout during construction – area 1 and area 2 plan provided in the Carnwath Road Riverside *Transport Assessment* figures show the highway layout at the Carnwath Road Riverside site during construction.

10.2.7 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.

10.2.8 During phases 1 and 2, shaft and main tunnel construction, two site vehicle accesses would be in operation on Carnwath Road. The western access would only be used as an entry only for emergency access or specific deliveries and not for routine use and would be left-turn in only. All heavy goods vehicles (HGVs) entering the site would arrive and leave via Carnwath Road and the junction of Carnwath Road with Wandsworth Bridge Road (A217).

10.2.9 During phases 3 and 4, for the main tunnel secondary lining and site demobilisation, the western access would be closed due to crane activities and there would only be one site vehicle access (eastern) in operation.

### Parking

10.2.10 To accommodate Carnwath Road Riverside site access and larger vehicles travelling along Carnwath Road, it would be necessary to suspend sections of the shared use parking.

10.2.11 Three sections of parking would be suspended throughout the

construction period comprising a potential total of 12 parking spaces. Three of these parking spaces are on the north side of Carnwath Road located opposite the western site access while the remaining nine parking spaces are on the southern side of Carnwath Road to the west of Peterborough Road. Single yellow line parking restrictions would be added where these sections of parking are suspended and these restrictions would operate from 07:00 to 19:00, Monday to Saturday.

10.2.12 It would also be necessary to extend the hours of operation of the existing single yellow line parking restrictions and loading restrictions on Carnwath Road from the junction with the Wandsworth Bridge Road (A217) and Townmead Road to the western site boundary. This would be extended to no parking or loading 07:00 to 19:00, Monday to Saturday.

10.2.13 The access plan and highway layout during construction – area 1 and area 2 plan is, provided in the Carnwath Road Riverside *Transport Assessment* figures present the proposed suspension of parking bays and extended hours of restrictions for single yellow lines associated with the construction works at the Carnwath Road Riverside site.

10.2.14 Parking for essential maintenance vehicles would be provided on-site. With regard to construction worker parking, no worker parking would be provided on-site and measures would be taken to discourage workers travelling to the site by car, including promoting the use of public transport, walking and cycling. These measures are included in the *Draft Project Framework Travel Plan* and *CoCP* and would be reflected in the site-specific *Travel Plan* for this site.

### Thames Path

10.2.15 From the east, the Thames Path currently routes along the riverside, until it meets the west end of the Carnwath Road Industrial Park by the Howdens Joinery Co. building, where it moves inland onto Carnwath Road through the Carnwath Road Riverside site. It is then diverted back onto the riverside along the western boundary of the Carnwath Road Riverside site. The route through the development site at the joinery building would be closed during construction. An alternative diversionary route would be provided along Carnwath Road for an additional 110m before diverting back onto the riverside path along the back of the Retail Park. The overall distance of this section of the Thames Path would remain the same.

### Bus routes

10.2.16 Bus route 424 operates as a hail-and-ride service along Carnwath Road past the site and would therefore be affected by the construction works as buses would be unable to stop in the vicinity of the site. This would prevent passengers boarding and alighting on this section of Carnwath Road. The alternative would be for passengers to board / alight at the southern end of Peterborough Road 20m north of this location, or at bus stop TU approximately 260m walking distance east on Townmead Road.

10.2.17 This suspension could potentially increase walking distance for some passengers. The level of use of the hail-and-ride section for boarding and alighting is not captured in Transport for London (TfL) data sources but from discussions with TfL it is understood to be relatively low and therefore

the number of passengers affected by this change would be small. For those affected, it would represent an average delay of less than one minute, which is not considered significant for bus passengers boarding and alighting on this stretch of Carnwath Road.

### Construction traffic

10.2.18 At the junction of Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road, a potential restriction has been identified for 16.5m articulated vehicles and 12.0m rigid vehicles turning left into Carnwath Road from Wandsworth Bridge Road (A217). A junction improvement is therefore proposed as part of the design to realign the existing kerb to allow the construction vehicles to carry out this manoeuvre without overrunning the kerb. The highway layout during construction vehicle swept path analysis plans provided in the Carnwath Road Riverside *Transport Assessment* figures show the proposed junction improvements.

10.2.19 A summary of the construction lorry and barge movement details for the Carnwath Road Riverside site relevant to the construction *TA* are summarised in Table 10.2.1.

10.2.20 During construction, 90% of excavated material from the main tunnel and shaft would be transported out and 90% of main tunnel secondary lining aggregates would be transported in by barge. All other material would be transported by road.

**Table 10.2.1 Construction details**

| Description | Assumption |
|---|---|
| Assumed peak period of construction lorry movements | Site Year 2 of construction |
| Assumed average peak daily construction lorry vehicle movements | 90 movements per day (45 vehicle trips) |
| Assumed peak period of construction barge movements | Site Year 2 of construction |
| Assumed average peak daily construction barge movements | 4 movements per day (2 barge trips) |
| Typical types of lorry requiring access (comprising rigid-bodied, flatbed and articulated vehicles) | Imported fill lorries<br>Aggregate lorries<br>Cement tankers lorries<br>Ready mix mixer lorries<br>Steel reinforcement lorries<br>Tunnel precast concrete |

| Description | Assumption |
|---|---|
| | segment lorries<br>Office delivery lorries<br>Plant and equipment lorries<br>Temporary construction material lorries including Pipe/tracks/oils/greases lorries<br>Excavation 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

10.2.21 Figure 10.2.2 in the Carnwath Road Riverside *Transport Assessment* Figures shows the construction traffic routes for access to/from Carnwath Road Riverside. Construction routes have been discussed with TfL. The local highway authority, LB of Hammersmith and Fulham, has seen but not formally agreed this routing.

10.2.22 The Carnwath Road Riverside site is to the south of Carnwath Road and to the west of Wandsworth Bridge Road (A217). Wandsworth Bridge Road (A217) is part of the Transport for London Strategic Road Network (SRN) and provides a link to the Transport for London Road Network (TLRN) on the south side of Wandsworth Bridge.

10.2.23 The construction vehicle routes depend on the origins and destinations of the construction materials. Some construction vehicles would travel to access the Carnwath Road Riverside site from the wider area. The exact routing depends on the material origin and destinations which is detailed in the *Project-wide TA*.

### Proposed construction flows

10.2.24 Although the site would have 24-hour working, vehicle movements would only 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 Hammersmith and Fulham.

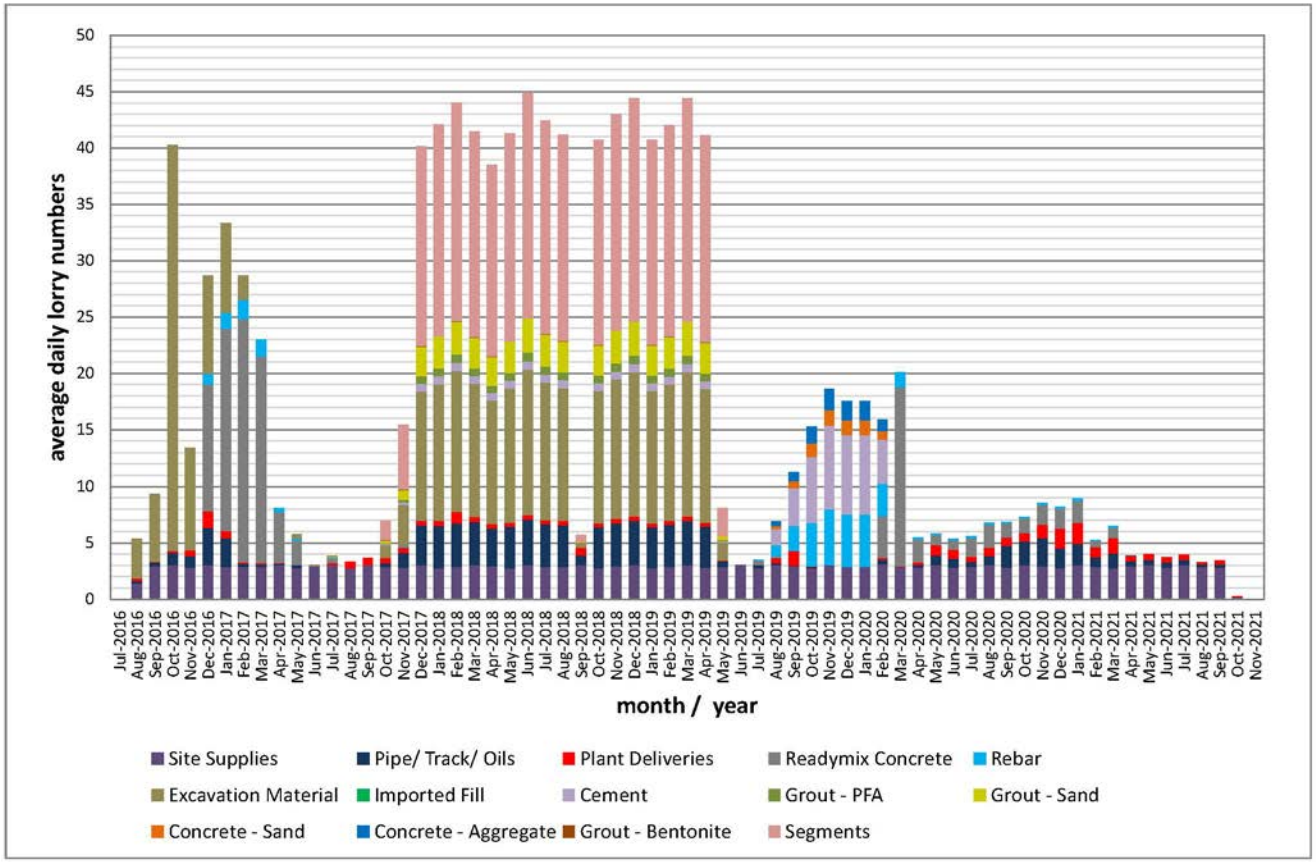
10.2.25 A site-specific peak construction assessment year has been identified. The histograms in Plate 10.2.1 and Plate 10.2.2 show that the peak site-specific activity at the Carnwath Road Riverside site would occur in Year 2 of construction. This site-specific peak is earlier than the overall project-wide construction peak activity year of 2019.

10.2.26 This *TA* assesses this site-specific peak construction year. As detailed in Table 10.2.1 there would be an estimated 90 average peak daily construction lorry vehicle movements and an estimated four peak daily

construction barge movements. Plate 10.2.1 and Plate 10.2.2 indicate the construction vehicle and construction barge profiles during construction.

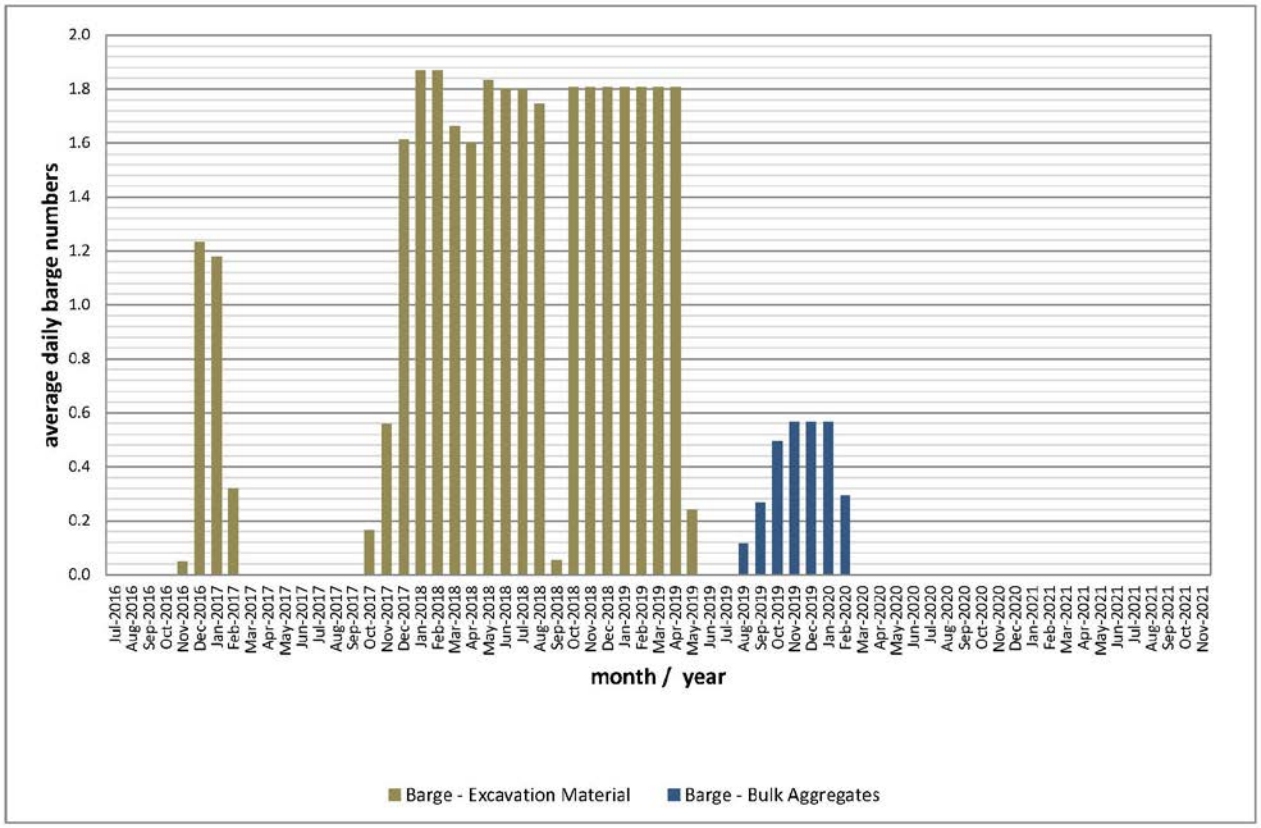
10.2.27 The assessment is based on 10% of the daily number of lorry journeys occurring in the peak hours, which has been agreed with TfL as a reasonable approach. It is recognised that it may be desirable to reduce the number of construction lorry movements in peak hours and the mechanisms for addressing this would form part of the *Traffic Management Plans* (TMP) which are required as part of the *CoCP*.

**Plate 10.2.1 Estimated construction lorry profile**




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

**Plate 10.2.2 Estimated construction barge profile**




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

10.2.28 The histograms show that the number of vehicular movements varies throughout the construction period with over 24 months with less than 40 HGV movements a day and 14 months with over 80 movements a day during the six year construction programme.

10.2.29 The peak month in Site Year 2 of construction has been used for the assessment and 10% of the daily HGV construction movements in the peak month have been assumed to take place during the peak hours to give a busiest case assessment.

10.2.30 As the *Project-wide Transport Assessment (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.

10.2.31 The 07:00 to 09:00 and 17:00 to 19:00 priods identified from the local traffic surveys are busier on the network in theweekday than those encountered at the weekends (this is discussed in Section 10.4). Whilst the AM and PM peak hours differ slightly from these network-wide peak hours, the assessment at this site has been based on a combination of the highest hourly number of movements for construction and worker vehicles in the periods between 07:00 to 09:00 and 17:00 to 19:00. These have been applied to the network-wide peak hours to take account of the highest number of movements that could be generated by the site in these periods.

10.2.32 Hourly construction vehicle trips during the inter-peak period are not expected to exceed the hourly trips assumed for the 08:00 to 09:00h and 17:00 to 18:00 periods used in this assessment and in practice, the peaks for each of these groups would not occur concurrently and therefore the assessment is considered to be reasonable. The peak travel periods used for the modelling in this assessment are therefore the weekday periods between 08:00 and 09:00 and 17:00 and 18:00

10.2.33 Other construction vehicle movements associated with the site operations and contractor activities would be cars and light goods vehicles. Although no worker parking will be provided on-site, an assessment of potential worker vehicle movements has been included representing an unconstrained case to produce a robust assessment. The *Draft Project Framework Travel Plan* and site specific *Travel Plan* would include measures to discourage workers from travelling by car or parking in surrounding streets the estimates of construction worker vehicles are shown in Table 10.5.3.

### Construction workers

10.2.34 The construction site is expected to require a maximum workforce of 165 workers on-site at any one time. The number and type of workers is shown in Table 10.2.2. It is noted that the table shows the maximum total number of workers required (289); however, as a result of shift patterns the maximum workforce on site would be 165 during the dayshift (08:00-18:00).

**Table 10.2.2 Maximum estimated construction worker numbers**

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

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

10.2.35 The anticipated worker mode split has been derived by taking the highest number of workers during the peak month and calculating the percentage of trips by mode using the 2001 Census[i] journey to work data for the area in the vicinity of Carnwath Road Riverside site.

10.2.36 As indicated in Table 10.2.3, whilst the most popular individual mode of transport is the private car (37.9%), a large proportion of people travel to work by sustainable modes (ie, bus, rail / tube, walk and cycle).

10.2.37 The Census data indicates that the predominant mode of travel for journeys to work in this area is public transport. There is no parking available on-site for workers and there would be no parking provided within the site boundary. Parking on surrounding streets has restricted availability and measures to reduce car use would be incorporated into a site-specific Travel Plan which means that workers would be unlikely to drive to the site. Therefore, the Census mode shares represent a robust assessment at the Carnwath Road Riverside site.

10.2.38 The mode split outlined in Table 10.2.3 has therefore been used to assess the impacts of worker journeys on the highway and public transport networks.

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

**Table 10.2.3 Transport mode split**

| Mode | Percentage of trips to site | Equivalent number of worker trips (based on 165 worker trips) | |
|---|---|---|---|
| | | AM peak hour (07:00-8:00) | PM peak hour (18:00-19:00) |
| Bus | 12.3% | 20 | 13 |
| National Rail | 9.6% | 16 | 10 |
| Underground | 15.6% | 26 | 16 |
| Car driver | 37.9% | 63 | 40 |
| Car passenger | 2.4% | 4 | 2 |
| Cycle | 5.5% | 9 | 6 |
| Walk | 11.9% | 20 | 12 |
| River | 0.8% | 1 | 1 |
| Other (taxi/motorcycle) | 4.1% | 7 | 4 |
| **Total** | **100%** | **165** | **105** |

*Note: PM Peak hour figure is lower than the AM peak hour as shift change is at 15:00 not 18:00. Census mode shares have been used in the assessment to provide a robust analysis; notwithstanding that site-specific Travel Plan measures would be likely to reduce worker car journeys to a minimum.*

10.2.39 Information regarding the travel arrangements of these workers would be included in the contractors' *Construction Management Plan* and *Workplace Travel Plan* documents for the Carnwath Road Riverside site.

10.2.40 It is difficult to predict with certainty the directions to and from which workers at the site would travel. 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.

10.2.41 However, it has been assumed that the origins of worker vehicle trips would be similar to the origins of trips to the zone in the TfL Highway Assignment Model (HAM) in which Carnwath Road Riverside is located. Therefore the distribution on the highway network has assumed the same distribution of the TfL Strategic Model to the borough level.

10.2.42 The methodology for assigning worker trips to the transport networks has been agreed with TfL and been consulted with the local highway authority.

10.2.43 At this site there would be no parking provided within the site boundary for workers and measures would be incorporated into site-specific *Travel Plan* requirements in order to minimise the number of workers travelling to and from the site by car. This accords with the overall objectives of the *Draft Project Framework Travel Plan.*

10.2.44 However, given that not all parking in the surrounding streets is subject to restrictions at all times and that spare capacity has been observed within the available on-street parking provision, this *TA* has considered the effects that could arise if workers were to travel by car and park in the surrounding streets. This is to ensure a robust assessment of the likely effects but should be viewed against the commitments made in the *Draft Project Framework Travel Plan* and the requirements for site-specific Travel Plans which in practice mean it is highly unlikely that any workers would travel by car.

### Vehicle movement summary

10.2.45 Other construction vehicle movements associated with site operations and contractor activities would be cars and light good vehicles. Other construction vehicle movements expected to be generated by the Carnwath Road Riverside site is shown in Table 10.2.4

10.2.46 Table 10.2.4 also shows the construction lorry movement assumptions for the local peak traffic periods. These are based on the peak months of construction activity at this site.

**Table 10.2.4 Construction works movements**

| Vehicle type | Vehicle movements per time period | | | | |
|---|---|---|---|---|---|
| | **Total Daily** | **07:00 to 08:00** | **08:00 to 09:00** | **17:00 to 18:00** | **18:00 to 19:00** |
| Construction lorry vehicle movements 10%* | 88 | 0 | 9 | 9 | 0 |
| Other construction vehicle movements** | 134 | 6 | 6 | 6 | 6 |
| Worker vehicle movements*** | 219 | 63 | 24 | 7 | 40 |
| **Total** | **441** | **69** | **39** | **22** | **46** |

** 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 based on 37.9% of workers driving, derived by taking the highest number of workers during the peak month and calculating the % of trips using the 2001 Census Journey to Work data. This represents an unconstrained case to produce a robust assessment, as there would be no parking on site for workers and the Draft Project Framework Travel Plan and site specific Travel Plan would include measures to discourage workers from driving or parking in surrounding streets*

10.2.47 Assuming that 90% of excavated material from the main tunnel is transported out and 90% of main tunnel secondary lining aggregates is transported in by barge with all other material by road, an average peak flow of 441 vehicle movements a day is expected during the months of greatest activity during Year 2 of construction at the Carnwath Road

Riverside site. At other times in the construction period vehicle flows would be lower than this average peak figure.

10.2.48 Table 10.2.4 shows that in the busiest AM peak hour the Carnwath Road Riverside site would generate approximately 69 vehicle movements and in the busiest PM peak hour period the Carnwath Road Riverside site would generate approximately 46 vehicle movements.

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

10.2.50 There would be one additional construction HGV movement per hour associated with other Thames Tideway Tunnel sites that would use Wandsworth Bridge Road (A217). This would produce a combined total of ten movements per hour when added to movements generated by the Carnwath Road Riverside site which is not considered significant.

### Code of Construction Practice

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

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

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

c. site specific *River Transport Management Plans (RTMP)* are to be produced for each relevant worksite. As with the *TMP*'s this would set out how river access to site would be managed so as to minimise impact on the river and communicate this with the PLA, local borough and other stakeholders.

10.2.52 In addition to the general transport measures within the *CoCP Part A,* the *CoCP Part B* (Section 5) relating to the Carnwath Road Riverside site includes the following measures:

a. the security barrier would be positioned to allow a standard vehicle to be wholly off the road whilst awaiting barrier operation

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

b. the western access would be only used for emergency access or specific deliveries and not routinely used due to proximity of adjacent properties

c. all vehicles would access/egress the site from the Wandsworth Bridge Road (A217) and Carnwath Road. The junction between Carnwath Road and Wandsworth Bridge Road would be altered at the start of the construction period to enable HGVs to perform a left turn off of Wandsworth Bridge Road onto Carnwath Road

   i the eastern access would be left turn in right turn out.

   ii the western access would be left turn in only

   iii the diversion of the Thames Path is to be adequately signed

   iv the new route on the eastern boundary is to have high quality directional lighting for security

d. three sections of parking to be suspended comprising a potential total of 12 parking spaces on Carnwath Road. Single yellow line parking restrictions would be added where these sections of parking are suspended, with these restrictions operating from 07:00 to 19:00, Monday to Friday.

e. an extension to the hours of operation of the existing single yellow line parking restrictions and loading restrictions on Carnwath Road. This would be extended to no parking or loading 08:00 to 18:00, Monday to Friday and 08:00 to 13:00 on Saturday.

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

a. information on existing transport networks and travel initiatives for the Carnwath Road Riverside site

b. a mode split established for the Carnwath Road Riverside site construction workers to establish and monitor travel patterns

[iii] 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 TfL's published guidance on travel planning for new development in London, http://www.attrbute.org.uk/.

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.

### Other measures during construction

10.2.54 Embedded design measures which are not outlined in the *CoCP* but are of relevance to the *TA* at the Carnwath Road Riverside site comprise:

a. the proposed junction improvement at the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction.

b. provision of a new crossover at the western site access on Carnwath Road

c. widening of the existing crossover on Carnwath Road at the eastern site access

10.2.55 These measures are detailed further within the construction assessment section.

## Operation

10.2.56 During operation it is anticipated that there would be no significant impacts on the transport infrastructure and operation within the local area because maintenance trips to Carnwath Road Riverside site will be infrequent and short term. On this basis, the only elements considered in the operational assessment are:

a. effects on car parking

b. effects on highway layout and operation.

10.2.57 The potential for operational impacts on these elements is due to the short-term effects of the physical aspects of access to the site for maintenance. These are only considered qualitatively because the minimal effect on the highway network means that a quantitative assessment is not required. The scope of this analysis has been discussed with LB of Hammersmith and Fulham and TfL.

10.2.58 During operation, maintenance vehicles would enter the site from Carnwath Road. Access would be required for a light commercial vehicle on a three to six monthly maintenance schedule.

10.2.59 Additionally there would be more significant maintenance visits for emergencies and approximately every ten years requiring access to enable two mobile cranes to be brought to the site, which may require temporary suspension of some on-street parking in the vicinity of the site.

10.2.60 The access arrangements for the operational phase are shown on the permanent highway layout plans provided in the Carnwath Road Riverside *Transport Assessment* figures.

## 10.3 Assessment methodology

### Engagement

10.3.1 An extensive scoping and technical engagement process has been undertaken. All consultee comments relevant to the Carnwath Road Riverside site are presented in Table 12.3.1 of Volume 10 of the *Environmental Statement* and are summarised in para. 10.3.4.

10.3.2 Whilst the effects associated with transport for the operational phase have been scoped out of the *Environmental Statement* and are not expected to be significant, the *TA* examines the operational phase in order to satisfy the relevant stakeholders that technical issues have been addressed.

#### Consultees

10.3.3 Throughout the scoping and technical engagement process the key stakeholders with regards to transport, primarily TfL and the relevant borough for each site, have been consulted. For Carnwath Road Riverside, LB of Hammersmith and Fulham has been consulted and the comments which have arisen relating directly to the Carnwath Road Riverside site have been recorded and responded to accordingly.

10.3.4 The key issues arising from stakeholder engagement are:

a. the need to manage the diversion of the Thames Path during construction

b. the operation of the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction, particularly with regard to the safety of pedestrians and cyclists

c. consideration to be given to the impact on the hail-and-ride bus service on Carnwath Road.

d. the impact of any loss of parking on Carnwath Road to be assessed and mitigated if necessary

e. the routing of construction vehicles to be considered to avoid sensitive or congested locations.

10.3.5 The key technical issues raised have been addressed as far as is practicable at this stage within this *TA*, *Project-wide Transport Assessment* and the *Environmental Statement*, in consultation with both TfL and the LB of Hammersmith and Fulham.

### Construction

10.3.6 The assessment methodology for the construction phases follows that described in the *Project-wide TA*. There are no site-specific variations for undertaking the construction assessment of the Carnwath Road Riverside site.

10.3.7 The effect of all other Thames Tideway Tunnel sites on the area surrounding Carnwath Road Riverside has been taken into account within the assessment of the peak year of construction at this site.

### Construction assessment area

10.3.8 The assessment area for the Carnwath Road Riverside site includes the site accesses on Carnwath Road, Carnwath Road itself and the junction of Wandsworth Bridge Road (A217) with Carnwath Road and Townmead Road.

10.3.9 The Thames Path was included within the assessment due to its proximity to the development site. Effects on local bus services within 640m of the site and rail services within 960m of the site have been assessed. 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).

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

### Construction assessment year

10.3.11 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 *Project-wide TA*.

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

10.3.13 The site-specific peak construction traffic year at Carnwath Road Riverside is Year 2 of construction. This site-specific peak is earlier than the overall project-wide construction peak activity year of 2019.

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

### Highway network modelling

10.3.15 The effect of all other Thames Tideway Tunnel sites on the area surrounding Carnwath Road Riverside has been taken into account within the assessment of the peak year of construction at this site.

10.3.16 As indicated in the Development Schedule (see Vol 10 Appendix N of the *Environmental Statement*), ten other developments identified within 1km of the Carnwath Road Riverside site would be complete and operational by Year 2 of construction and one (Wandsworth Riverside Quarter) would be partially complete and occupied. Of these, two developments, comprising

the redevelopment and re-provision of a concrete plant on Townmead Road and development at Imperial Wharf, lie on the north side of the River Thames (the same side as the Carnwath Road Riverside site).

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

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

10.3.19 For future year assessments the TfL West London HAM (WeLHAM) has been used for the Carnwath Road Riverside site. 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. Construction traffic associated with other Thames Tideway Tunnel project sites using routes in this area has been included in the WeLHAM scenarios.

10.3.20 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 flows and the construction flows to provide the turning movements for local modelling.

10.3.21 This provides a robust assessment case as the background traffic is growthed 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.

### Sensitivity testing

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

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

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

c. if lorry movements are required outside the typical hours of 08:00 to 18:00, this would be agreed in advance with TfL and the local highway authority.

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

a. variation in construction vehicle numbers around the average daily figure for the peak month

b. a lower level of river transport for construction materials (leading to an increased number of lorry movements)

c. changes in programme which might lead to construction activity peaking at different times and/or a greater coincidence of peaks at adjacent sites which could lead to higher construction lorry flows on the surrounding highway network.

10.3.24 As para 10.3.22 explains, if construction vehicle numbers were to exceed the average daily figure for the peak month, this would be an infrequent occurrence and should be seen in the context that the assessment is based on the peak month of construction activity at each site, rather than a lower 'typical' month.

10.3.25 It is expected that river transport would be used for certain construction materials and this forms part of the *Transport Strategy*. It is therefore not likely that all materials would be moved by road at all sites. However, there is the possibility that river transport might not be available at a particular site or sites for short periods of time and this might be the result of temporary navigational constraints, local issues temporarily preventing access to the river, or wider issues restricting river movements to a number of sites (such as the closure of the Thames Barrier).

10.3.26 In practice the potential for increased coincidence of construction peaks between sites is limited because of the sequential nature of the construction activities required. Whilst it is possible that individual site peaks might change slightly, it is very unlikely that all sites would experience peak activity in the same period.

10.3.27 Although these events, if they were to arise, would be limited and short-term, it has been agreed with TfL that sensitivity testing would be undertaken within the *TA* to identify the potential impacts associated with such occurrences. It has also been agreed that for consistency, the test would be based on the number of construction lorry movements that would be related to moving all construction materials by road. This has been assumed to act as a proxy for events of this nature and represents an upper bound on the level of construction traffic that could be expected

## Operation

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

10.3.29 Given the local impact of the transport activity associated with the Thames Tideway Tunnel during the operational phase, only the localised transport effects around the Carnwath Road Riverside site are assessed. Other Thames Tideway Tunnel sites would not affect the area around Carnwath Road Riverside in the operational phase and therefore they are not considered in the assessment.

10.3.30 With regard to other developments in the vicinity of the site, all the developments would be complete and operational by Year 1 of operation. As a result, they have been included within the operational base case which takes into consideration the effects on highway layout, operation and parking.

### Operational assessment area

10.3.31 The assessment area for the operational assessment remains the same as for the construction assessment as outlined in paragraphs 10.3.8and 10.3.9.

### Operational assessment year

10.3.32 The operational assessment year has been taken as Year 1 of operation. As transport activity associated with the operational phase is very low there is no requirement to assess any other year beyond that date.

## 10.4 Baseline

10.4.1 This section sets out the baseline conditions for transport in and around the site in 2012 with the exception of the traffic survey data which was collected in 2011.

### Policy review

10.4.2 The Carnwath Road Riverside site is located within the LB of Hammersmith and Fulham; the relevant national, regional and local policy documents have been reviewed and included within Appendix A.

### Existing land use

10.4.3 The Carnwath Road Riverside site comprises Whiffin Wharf to the west, Hurlingham Wharf in the centre and the Carnwath Road Industrial Estate to the east. The Carnwath Road Riverside site is bordered to the north by Carnwath Road, the Piper Building (residential properties) and commercial properties. To the east, the Carnwath Road Riverside site is bordered by two retail facilities and beyond these, Wandsworth Bridge Road. To the west there are residential properties and beyond these lies Hurlingham Park.

### Existing access

10.4.4 The Carnwath Road Riverside site is currently accessed from Carnwath Road. The Thames Path routes along part of the riverside frontage of the Carnwath Road Riverside site, as well as along part of the boundary at the Carnwath Road Riverside site on Carnwath Road.

## Pedestrian network and facilities

10.4.5 The key pedestrian network to and from the site are directly related to local public transport services including bus stops and National Rail stations. The key pedestrian network related to the Carnwath Road Riverside site are:

a. Wandsworth Bridge Road (A217) to Wandsworth Town National Rail Station

b. Carnwath Road / Wandsworth Bridge Road (A217) / Townmead Road to bus stops on Wandsworth Bridge Road and Townmead Road.

c. The Thames Path.

d. The existing pedestrian network and facilities in the vicinity of the Carnwath Road Riverside site are described below and shown on Figure 10.4.1.

### Thames Path

10.4.6 The Thames Path routes along the bank of the River Thames adjacent to the Carnwath Road Riverside site. The Thames Path passes to the north of Whiffin Wharf and Hurlingham Wharf along Carnwath Road for approximately 240m before returning back to, and continuing along, the river bank. The route has signs to direct pedestrians and cyclists. Plate 10.4.1 shows the Thames Path at the Carnwath Road Riverside site.

**Plate 10.4.1 Thames Path at the Carnwath Road Riverside site**

### Carnwath Road

10.4.7 Carnwath Road provides an east-west link near to the bank of the River Thames between Wandsworth Bridge and Hurlingham Park.

10.4.8 The footways along either side of Carnwath Road are between 2.3m and 2.5m wide.

10.4.9 Dropped kerbs with tactile paving and central refuges are provided on all arms of the junction of Carnwath Road, Wandsworth Bridge Road (A217) and Townmead Road. However, the pedestrian crossings at the junction are not signal controlled as the phasing of the junction signals does not include a pedestrian phase. Carnwath Road is shown in Plate 10.4.2.

**Plate 10.4.2 Carnwath Road at Carnwath Road Riverside**


### Wandsworth Bridge Road (A217)

10.4.10 There are footways on both sides of Wandsworth Bridge Road (A217) to the east and Broomhouse Lane to the west of the Carnwath Road Riverside site. These footways are approximately 2m wide along the bridge. The footway and cycle lane at Wandsworth Bridge are shown in Plate 10.4.3.

## Cycle network and facilities

10.4.11 The existing cycle network and facilities in the vicinity of Carnwath Road Riverside site are described below and shown in Figure 10.4.1 in the Carnwath Road Riverside *Transport Assessment* figures.

10.4.12 The main cycle route within the area is National Cycle Network (NCN) Route 4 which follows the line of the River Thames through London. Near to Carnwath Road Riverside site it routes across Putney Bridge, around

the northern side of Hurlingham Park and along Broomhouse Lane, Sulivan Road, Hugon Road and Stephendale Road. The route is predominantly on-road near to the Carnwath Road Riverside site; however the contraflow section of cycleway along Hugon Road between Peterborough Road and Dymock Road is segregated from vehicular traffic by a kerb.

10.4.13 An off-carriageway cycle lane is provided in both directions across Wandsworth Bridge. North of Wandsworth Bridge on-road cycle markings are provided both northbound and southbound along Wandsworth Bridge Road (A217). In the northbound direction an advisory cycle lane is provided between Wandsworth Bridge and Hugon Road. In the southbound direction, there is a bus lane between Stephendale Road and Townmead Road. Cyclists are permitted to use the bus lane.

**Plate 10.4.3 Cycle lane along Wandsworth Bridge Road (A217)**

10.4.14 Advanced cycle stop lines are provided for cyclists on all four arms of the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction.

### Barclays Cycle Superhighways

10.4.15 The closest CS to the Carnwath Road Riverside site is CS8 which routes between Westminster and Wandsworth. At its closest, CS8 is south of Wandsworth Bridge, approximately 600m to the south of the Carnwath Road Riverside site.

### Barclays Cycle Hire scheme

10.4.16 There are no Barclays Cycle Hire docking stations in the vicinity of the Carnwath Road Riverside site. The nearest docking station is located on King's Road (A3217) approximately 3.3km from the Carnwath Road Riverside site.

### Cycle parking

10.4.17 One Sheffield Cycle Stand capable of accommodating up to two cycles is provided on the northern footway adjacent the controlled crossing on the Townsmead Road arm of the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction.

10.4.18 Two Sheffield Stands, capable of accommodating up to four cycles, are located on the eastern footway of Wandsworth Bridge Road (A217), just north of the Townmead Road junction.

10.4.19 Five Sheffield Stands are located on the eastern footway of Wandsworth Bridge Road (A217), approximately 70m north of the Carnwath Road junction. These are capable of accommodating up to ten cycles.

## Public transport

### Public Transport Accessibility Level

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

10.4.21 Using this methodology the Carnwath Road Riverside site has a PTAL rating of 2, rated as 'poor' (with 1 being the lowest accessibility and 6b being the highest accessibility).

10.4.22 The following sections detail the public transport services in the vicinity of Carnwath Road Riverside site which are shown on Figure 10.4.2 of the Carnwath Road Riverside *Transport Assessment* figures.

### Bus services

10.4.23 A total of five daytime bus routes and two night bus routes operate within a 640m walking distance of the Carnwath Road Riverside site. Route 424 operates as a hail-and-ride service along Carnwath Road. Table 10.4.1 provides a summary of the bus services and their frequencies during the weekday peaks.

**Table 10.4.1 Existing daytime weekday peak hour local bus services and frequencies (number of buses per hour)**

| Bus number | Origin - destination | Nearest bus stop to Carnwath Road Riverside site | Approximate walking distance from Carnwath Road Riverside site (m) | Weekday peak hour two-way frequencies | |
|---|---|---|---|---|---|
| | | | | AM peak hour (08:00-09:00) | PM peak hour (17:00-18:00) |
| C3 | Falcon Road / Grant Road – Warwick Road Tesco | Wandsworth Bridge | 250 | 18 | 14 |
| 28 | Station Terrace – Mapleton Crescent | Townmead Road | 350 | 17 | 17 |
| 295 | Ladbroke Grove Sainsbury's – Clapham Junction Station / Falcon Road | Townmead Road | 350 | 15 | 15 |
| 391 | William Morris Way / Sainsbury's – Richmond Bus Station | William Morris Way / Sainsbury's | 550 | 8 | 6 |
| 424 | Putney Heath / Green Man – Stevenage Road / Fulham Football Club | Hail-and-ride adjacent site; nearest bus stop on Townmead Road | 205 | 4 | 4 |

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

10.4.24 The bus routes operate from the following bus stops:

a. Townmead Road bus stop on Wandsworth Bridge Road (A217) – northbound and southbound;

b. Wandsworth Bridge bus stop on Townmead Road – eastbound and westbound

c. William Morris Way / Sainsbury's bus stop on Townmead Road – eastbound and westbound

d. Carnwath Road hail-and-ride service – eastbound and westbound

10.4.25 On average there are approximately 60 daytime bus services in total per hour in the AM peak and 55 bus services in total per hour in the PM peak accessible within 640m walking distance of the Carnwath Road Riverside site.

### London Underground

10.4.26 As shown on Figure 10.4.2 of the Carnwath Road Riverside *Transport Assessment* figures the closest London Underground station is Putney Bridge station which is located approximately 1.1km or 14 minutes walk to the west of the site and is served by the District Line. Trains from this station travel east to Tower Hill and Upminster or north to Edgware Road via Earls Court and south to Wimbledon.

10.4.27 In the AM and PM peak hours the frequency of northbound and southbound trains at Putney Bridge is approximately one every four minutes, providing an average of 15 services in each direction per hour.

10.4.28 Table 10.4.2 provides a summary of both London Underground and London Overground services and their frequencies during the weekday peaks.

### London Overground

10.4.29 Imperial Wharf station is located approximately 1.3km or 17 minutes walk to the east and is served by London Overground. Imperial Wharf Overground station has a frequency of four trains per hour towards Clapham Junction and four trains per hour towards Stratford in the peak hours.

10.4.30 Both stations are outside the 960m walking threshold which is treated as the maximum walkable distance in the PTAL calculations.

**Table 10.4.2 Existing London Underground and London Overground weekday peak hour services and frequencies (number of services per hour)**

| Line | Origin - destination | Approximate walking distance from Carnwath Road Riverside site (m) | Weekday peak hour two-way frequencies | |
|---|---|---|---|---|
| | | | AM peak hour (08:00-09:00) | PM peak hour (17:00-18:00) |
| District Line | Wimbledon – Tower Hill / Upminster & Edgeware Road and reverse | 1,100 | 30 | 30 |
| London Overground | Clapham Junction – Stratford via Willesden Junction and reverse | 1,300 | 4 | 4 |

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

### National Rail

10.4.31 There are no National Rail Stations within 960m of the Carnwath Road Riverside site. The closest station to the site is Wandsworth Town, which is approximately 1.1km to the south of the Carnwath Road Riverside site and services Waterloo station to the northeast and Staines to the west.

10.4.32 In each of the AM and PM peak hours, nine trains service Waterloo from Wandsworth Town rail station. Five trains and six trains service westbound routes towards Staines in the AM and PM peak hours respectively.

10.4.33 Imperial Wharf station is located approximately 1.3km or 17 minutes walk to the east and is served by Southern Rail. Imperial Wharf station has a frequency of one train per hour towards Milton Keynes central and one train per hour towards East Croydon in the peak hours.

10.4.34 Table 10.4.3 summarises the National Rail services (excluding Imperial Wharf Station) and frequencies during the weekday peaks.

**Table 10.4.3 Existing National Rail weekday peak hour services and frequencies (number of services per hour)**

| National Rail station | Origin – destination | Approximate walking distance from Carnwath Road Riverside site (m) | Weekday peak hour two-way frequency | |
|---|---|---|---|---|
| | | | AM peak hour (08:00-09:00) | PM peak hour (17:00-18:00) |
| Wandsworth Town | Wandsworth Town – London Waterloo – Wandsworth Town (Stations on the Hounslow Loop) | 1,100 | 9 | 9 |
| Wandsworth Town | London Waterloo – Staines – Weybridge | 1,100 | 5 | 6 |

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

### River services

10.4.35 The Carnwath Road Riverside site has no river passenger piers in the immediate vicinity, with the nearest pier being Wandsworth Riverside Quarter Pier which is located 2km walking distance from the site, upstream on the opposite side of the river.

### River navigation

10.4.36 The Carnwath Road Riverside site lies opposite the Western Riverside Waste Transfer Station (WTS) on the south bank of the river. Barges are used to transport waste away from the facility. Barges arrive and depart on most tides. The time at which such activity takes place is typically around the high tide period.

10.4.37 Other river traffic, including commercial freight and passenger traffic, and private leisure traffic, pass the Carnwath Road Riverside site. An analysis has been made of the typical volume of river vessel traffic passing the Carnwath Road Riverside site, based on published river passenger timetables and estimates of freight traffic based on discussions with operators. It is estimated that the peak hour for river vessel traffic passing the site is between 17:00 and 18:00, Monday to Friday. During this hour around ten vessels are estimated to pass the Carnwath Road Riverside site, depending on the season. This figure however, is not constant as freight vessel transit patterns, which are included in the traffic, are influenced by the rising and falling tide. Therefore, such a peak will only occur every 10 to 12 days when the tide is at its highest. These figures include vessels arriving and departing the WTS.

10.4.38 Table 10.4.4 shows the estimated typical passing river traffic rate.

**Table 10.4.4 Aggregated typical river movement frequencies (number of passing craft per hour)**

| | Time of day | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0600 - 0700 | 0700 - 0800 | 0800 - 0900 | 0900 - 1000 | 1000 - 1100 | 1100 - 1200 | 1200 - 1300 | 1300 - 1400 | 1400 - 1500 | 1500 - 1600 | 1600 - 1700 | 1700 - 1800 | 1800 – 1900 | 1900 – 2000 | 2000 - 2100 | 2100 - 2200 | 2200 - 2300 | 2300 - 0000 |
| Carnwath Road Riverside | 1 | 1 | 1 | 0 | 0 | 3 | 3 | 5 | 1 | 0 | 0 | 10 | 1 | 3 | 0 | 0 | 0 | 0 |

*Source:* http://www.tfl.gov.uk/modalpages/2648.aspx *and consultation with aggregates companies, West London Waste Authority, barge operators, Port of London Authority*

### Taxis

10.4.39 There are no taxi ranks within 650m walking distance of the site.

## Highway network and operation

10.4.40 The Carnwath Road Riverside site is located on Carnwath Road, a 30mph single carriageway east-west link between Wandsworth Bridge Road (A217) and Broomhouse Lane, as shown on Figure 10.2.1 in the Carnwath Road Riverside *Transport Assessment* figures. The road has intermittent on-street parking and loading bays on both sides of the road. There are also four sets of traffic calming speed cushions located approximately every 90-100m. The speed cushions are approximately 1.8m in width and are located in strings of two or three across the road. Chicanes, characterised by trees and bollards, are positioned in between sets of on-street parking bays on the northern edge of the road. One further chicane is positioned on the southern edge immediately in front of where the Thames Path joins Carnwath Road.

10.4.41 All HGVs would approach the site via the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road signalised junction. Wandsworth Bridge Road (A217) forms part of the SRN and provides a north-south link between Wandsworth Common in the south and Fulham and Chelsea to the north.

10.4.42 Wandsworth Bridge Road (A217) connects with the Wandsworth Gyratory in the south, which forms part of the TLRN.

10.4.43 Near to the construction site, Wandsworth Bridge Road (A217) is a single carriageway road with a southbound bus lane. North of Carnwath Road there is one lane of traffic in each direction. Where the road passes across Wandsworth Bridge there are two lanes northbound and one lane southbound.

10.4.44 The modelling outputs for the baseline situation for the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road signalised junction are shown in Table 10.4.10. The overall junction performance shows that the junction is operating above capacity in the weekday AM peak period and within capacity in the PM peak period.

## Parking

10.4.45 Figure 10.4.3 in the Carnwath Road Riverside *Transport Assessment* figures shows the locations of the existing car parking within the vicinity of the Carnwath Road Riverside site.

### Existing on-street car parking

10.4.46 On-street parking is permitted along Carnwath Road. Carnwath Road is within the Controlled Parking Zone (CPZ) ‘Q’. A total of 46 dedicated shared use parking bays are located along either side of Carnwath Road in a staggered arrangement. In this area, parking is restricted from Monday to Saturday between 09:00 and 17:00 unless a permit or a parking ticket is displayed when using the dedicated bays. There is an eight hour limit for pay and display parking.

10.4.47 There are no blue badge or motorcycle parking spaces located along Carnwath Road.

10.4.48 On Carnwath Road, to the east of the Piper Centre there are single yellow line restrictions which prohibit waiting from Monday to Saturday between 08:00 and 18:30 and prohibit loading from Monday to Saturday between 08:00 and 09:30 and between 16:30 and 18:30.

10.4.49 To the west of the Piper Centre there are single yellow line restrictions which prohibit waiting from Monday to Saturday between 07:00 and 19:00 and prohibit loading from Monday to Saturday between 07:00 and 10:00 and between 16:00 and 19:00.

10.4.50 Table 10.4.5 summarises the parking restrictions and the number of bays on the roads in the vicinity of the Carnwath Road Riverside site. As set out in Table 10.4.5, it is anticipated that approximately 400 cars can be accommodated within the on-street parking bays in the vicinity of the site.

10.4.51 The availability and usage of parking capacity on a weekday and a Saturday on the roads in the vicinity of the site is summarised in Plate 10.4.6 and Plate 10.4.10.

**Table 10.4.5 Existing on-street car parking in the vicinity of the Carnwath Road Riverside site**

| Road name | Type of parking and number of bays |
|---|---|
| | Shared Use |
| Carnwath Road | 46 |
| Broomhouse Lane between Carnwath Road and Sullivan Road | 35 |
| Peterborough Road between Sulivan Road and Carnwath Road | 35 |
| Dymock Street | 66 |
| Breer Street | 63 |
| Hugon Road | 81 |
| Sulivan Road | 75 |

10.4.52 There is no on-street parking along Wandsworth Bridge Road (A217) as it forms part of the SRN.

### Existing off-street / private car parking

10.4.53 A retailcar park is located on Wandsworth Bridge Road (A217) approximately 250m walking distance east of the Carnwath Road Riverside site which is open from 09:00 to 20:00 Monday to Friday, 09:00 to 18:00 Saturday and 11:00 to 17:00 Sunday and is intended for the use of PC World customers only.

10.4.54 There is a supermarket car park at 51 Townmead Road, approximately 400m walking distance east of the Carnwath Road Riverside site which is

open from 08:00 to 22:00 Monday to Friday, 07:00 to 22:00 Saturday and 10:00 to 16:00 Sunday and is intended for the use of customers only.

10.4.55 Riverside West car park is located in Smugglers Way, approximately 1km to the south of the Carnwath Road Riverside site (across Wandsworth Bridge). This car park is open 24 hours Monday to Sunday.

10.4.56 A DIY retail outlet car park is also located in Smugglers Way which is also intended for customers' use only.

### Coach parking

10.4.57 The nearest coach parking is Earls Court coach park 3.5km north of the Carnwath Road Riverside site.

### Car clubs

10.4.58 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.

10.4.59 The closest car club parking space to the Carnwath Road Riverside site is operated by ZipCar and is approximately 400m walking distance to the west of the Carnwath Road Riverside site on Carnwath Road where one space is provided.

10.4.60 The second closest bay is also operated by ZipCar and is located approximately 540m walking distance east of the site in Townmead Road.

## Servicing and deliveries

10.4.61 There are two loading bays located along Carnwath Road. Both of these bays are located on the northern side of the road outside units 74 to 84 and 92 to 100 Carnwath Road, approximately 18m and 70m respectively to the west of the Carnwath Road Riverside site. The loading bays are restricted to stays of 20 minutes only, with no return within one hour.

10.4.62 Observations of vehicle activity along Carnwath Road have concluded that loading and unloading activity also occurs at other locations on Carnwath Road.

## Baseline survey data

### Description of data

10.4.63 Automatic traffic count (ATC) data was obtained from TfL for the following locations in the vicinity of the site as shown on Figure 10.4.1:

a. Wandsworth Bridge Road (A217) – 20m north of Beltran Road;

b. Wandsworth Bridge Road (A217) – 100m south of Carnwath Road;

c. New King's Road (A308) – 50m west of Peterborough Road; and

10.4.64 This data was analysed to understand the traffic flows along these routes from May to June 2011. These flows are discussed in paragraphs 10.4.85 to 10.4.95.

10.4.65 Five year accident data on roads in the vicinity of the Carnwath Road Riverside site was also obtained from TfL. This data is discussed in paragraphs 10.4.114to 10.4.126

10.4.66 Baseline survey data were collected in May, June and July 2011 to establish the existing transport movements in the area. Figure 10.4.4 in the Carnwath Road Riverside *Transport Assessment* figures shows the survey locations in the vicinity of the Carnwath Road Riverside site. Appendix A of Section 3 of the Project-wide *TA* includes, a *Baseline Data Report* which provides full detail of the surveys undertaken and the data collected.

10.4.67 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 and traffic signal timings. Parking surveys were undertaken to establish the usage of on-street parking in Carnwath Road.

10.4.68 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 turning count data and provide information for noise and air quality assessments.

10.4.69 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 parking suspensions would be necessary or where additional parking demand could be generated.

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

10.4.71 The *Baseline Data Report* presents the method for field survey data collection and data collected through other sources. Base case traffic flows for local junction models have been derived from the baseline data. These baseline flows have then been factored to reflect traffic growth between the baseline and base case periods.

10.4.72 The surveys undertaken and their locations are summarised in Table 10.4.6 and shown on Figure 10.4.4 in the Carnwath Road Riverside *Transport Assessment* figures.

**Table 10.4.6 Survey types and locations**

| Survey type and location | Dates |
|---|---|
| **Junction turning movement survey (including pedestrian and cycle movements)** | |
| Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction | 12th and 14th May 2011 |
| **Automatic Traffic Count (ATC)** | |

| Survey type and location | Dates |
|---|---|
| Wandsworth Bridge Road (A217) approximately 20m north of Beltran Road | 21st May to 12th June 2011 |
| Wandsworth Bridge Road (A217) approximately 100m south of Carnwath Road | 21st May to 12th June 2011 |
| **Pedestrian and cycle surveys** | |
| Thames Path west of Wandsworth Bridge (north side) | 12th and 14th May 2011 |
| Carnwath Road 50m south-west of Dymock Street junction | 7th and 9th July 2011 |
| Along Hugon Road near Dymock Street junction | 7th and 9th July 2011 |
| **Parking surveys** | |
| Carnwath Road, Broomhouse Lane (between Carnwath Road and Sullivan Road), Sullivan Road, Peterborough Road (between Sullivan Road and Carnwath Road), Hurlingham Square, Hugon Road, Breer Street. | 9th and 11th June 2011 |

10.4.73 Both ATCs listed in Table 10.4.6 were located on construction traffic routes to and from the Carnwath Road Riverside site as was the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction turning count.

### Results of the surveys

10.4.74 The surveys inform the analysis of the baseline situation in the area surrounding the Carnwath Road Riverside site. The following section provides a summary of the findings.

#### Pedestrians

10.4.75 Table 10.4.7 shows the pedestrian flows surrounding the Carnwath Road Riverside site during the AM, PM and weekend peak hours.

**Table 10.4.7 Existing pedestrian flows**

| Road/route | Direction | Weekday | | | Weekend |
|---|---|---|---|---|---|
| | | AM peak hour (08:00-09:00) | Inter-peak hour (12:00-13:00) | PM peak hour (17:00-18:00) | Saturday peak hour (13:00-14:00) |
| **Specific Surveys:** | | | | | |
| Thames Path west of Wandsworth Bridge (north side) | Westbound | 5 | 2 | 6 | 9 |
| Thames Path west of Wandsworth Bridge (north side) | Eastbound | 2 | 3 | 9 | 9 |
| Carnwath Road section near to Dymock Road | Westbound | 133 | 0 | 27 | 39 |
| Carnwath Road section near to Dymock Road | Eastbound | 27 | 0 | 115 | 33 |
| Hugon Road section near to Dymock Road | Westbound | 222 | 0 | 44 | 30 |
| Hugon Road section near to Dymock Road | Eastbound | 28 | 0 | 70 | 20 |
| **Junction Counts: Pedestrian Crossings:** | | | | | |
| Wandsworth Bridge Road (north side) | Eastbound | 30 | 39 | 55 | 40 |
| Wandsworth Bridge Road (north side) | Westbound | 67 | 43 | 53 | 58 |
| Townmead Road (east side) | Southbound | 37 | 13 | 25 | 30 |
| Townmead Road (east side) | Northbound | 25 | 7 | 36 | 23 |
| Wandsworth Bridge Road (south side) | Westbound | 14 | 19 | 22 | 28 |
| Wandsworth Bridge Road (south side) | Eastbound | 12 | 15 | 12 | 31 |
| Carnwath Road (west side) | Northbound | 55 | 33 | 31 | 47 |
| Carnwath Road (west side) | Southbound | 41 | 53 | 53 | 49 |

10.4.76 Pedestrian surveys were undertaken at three locations around the Carnwath Road Riverside site during the AM and PM peaks. Pedestrian flows on the Thames Path west of Wandsworth Bridge were very low with approximately seven movements in the AM peak hour, 15 in the PM peak hour and 18 in the Saturday peak hour.

10.4.77 There were significantly higher pedestrian flows on Carnwath Road and Hugon Road with the survey data suggesting a trend in movements of higher flows westbound in the AM peak hour and higher flows eastbound in the PM peak hour occurs.

10.4.78 The pedestrian survey on Carnwath Road by Dymock Street recorded 133 pedestrians travelling in the westbound direction and 27 eastbound in the AM peak hour. In the PM peak hour, there were 27 pedestrians travelling westbound and 115 eastbound.

10.4.79 The pedestrian survey on Hugon Road by Dymock Street recorded 222 pedestrians travelling in the westbound direction and 28 eastbound in the AM peak hour. While in the PM peak hour, there were 44 travelling westbound and 70 eastbound.

10.4.80 On Wandsworth Bridge Road 67 pedestrians were observed travelling westbound in the AM peak hour and 55 pedestrians travelling eastbound in the PM peak hour.

### Cyclists

10.4.81 Table 10.4.8 summarises the flows of bicycles along the main routes surrounding the Carnwath Road Riverside site.

**Table 10.4.8 Existing cycle flows**

| Road/route | Direction | Weekday | | | Weekend |
|---|---|---|---|---|---|
| | | AM peak (08:00-09:00) | Inter-peak (12:00-13:00) | PM peak (17:00-18:00) | Saturday peak hour (13:00-14:00) |
| **Specific Surveys:** | | | | | |
| Thames Path (west of Wandsworth Bridge) | Westbound | 2 | 1 | 4 | 0 |
| Thames Path (west of Wandsworth Bridge) | Eastbound | 2 | 0 | 6 | 0 |
| Carnwath Road section near to Dymock Rd | Westbound | 2 | -* | 2 | 0 |
| Carnwath Road section near to Dymock Rd | Eastbound | 1 | - | 4 | 0 |
| Hugon Road section near to Dymock Rd | Westbound | 2 | - | 2 | 3 |
| Hugon Road section near to Dymock Rd | Eastbound | 0 | - | 1 | 1 |
| **Junction Counts: Pedestrian Crossings:** | | | | | |
| Wandsworth Bridge Road (north side) | Eastbound | 1 | 0 | 0 | 3 |
| Wandsworth Bridge Road (north side) | Westbound | 1 | 0 | 2 | 3 |
| Townmead Road (east side) | Southbound | 8 | 2 | 8 | 0 |
| Townmead Road (east side) | Northbound | 3 | 0 | 0 | 6 |
| Wandsworth Bridge Road (south side) | Westbound | 3 | 4 | 5 | 3 |
| Wandsworth Bridge Road (south side) | Eastbound | 16 | 6 | 5 | 3 |
| Carnwath Road (west side) | Northbound | 2 | 0 | 3 | 5 |
| Carnwath Road (west side) | Southbound | 5 | 0 | 14 | 2 |

| Road/route | Direction | Weekday | | | Weekend |
|---|---|---|---|---|---|
| | | AM peak (08:00-09:00) | Inter-peak (12:00-13:00) | PM peak (17:00-18:00) | Saturday peak hour (13:00-14:00) |
| **Junction Counts: On Carriageway** | | | | | |
| Wandsworth Bridge Road (north side) | Southbound | 25 | 6 | 107 | 20 |
| Wandsworth Bridge Road (north side) | Northbound | 113 | 22 | 29 | 15 |
| Townmead Road (east side) | Westbound | 17 | 10 | 63 | 15 |
| Townmead Road (east side) | Eastbound | 66 | 8 | 3 | 12 |
| Wandsworth Bridge Road (south side) | Northbound | 217 | 29 | 32 | 25 |
| Wandsworth Bridge Road (south side) | Southbound | 48 | 19 | 171 | 31 |
| Carnwath Road (west side) | Eastbound | 26 | 9 | 19 | 6 |
| Carnwath Road (west side) | Westbound | 58 | 5 | 18 | 8 |

**no data recorded.*

10.4.82 The cycle surveys indicate that demands are not high in the area. There was a maximum of six cyclists recorded on the Thames Path travelling eastbound in the PM peak hour, with four travelling westbound.

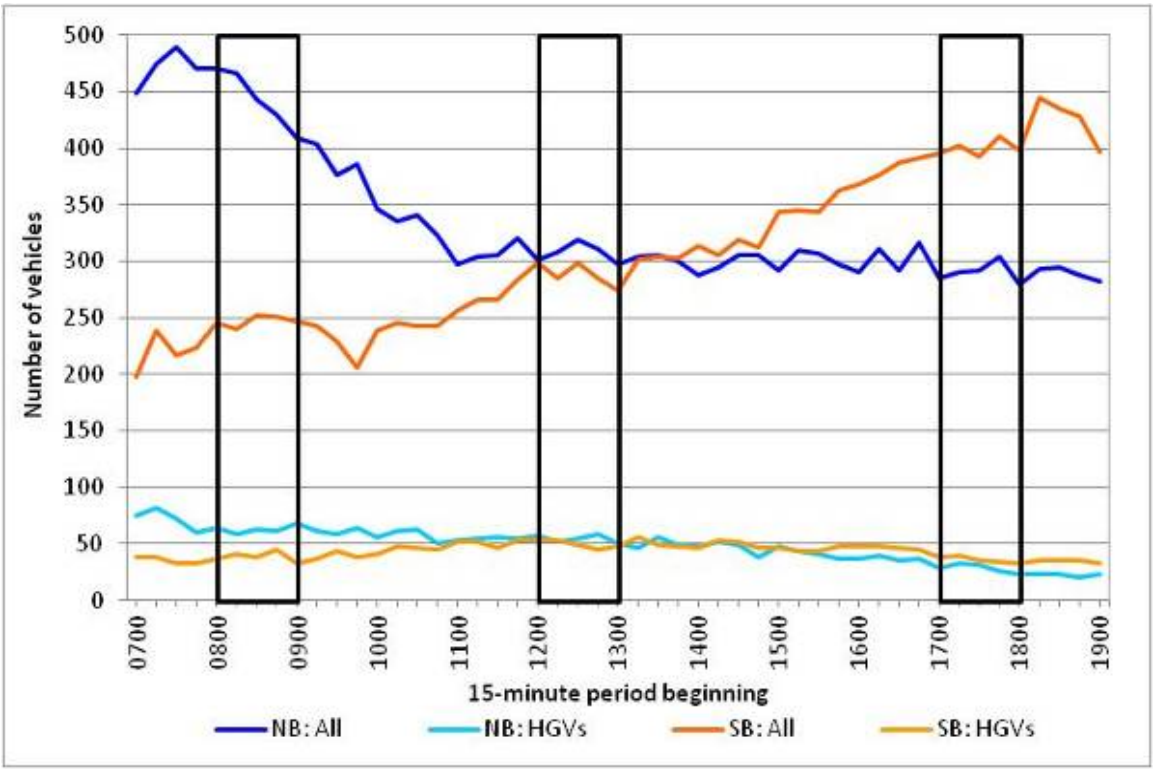
10.4.83 The junction counts suggest greater cycle usage along Carnwath Road than on the Thames Path with 58 cyclists travelling in the westbound direction and 26 eastbound in the AM peak hour. While in the PM peak hour there were 18 travelling westbound and 19 eastbound.

10.4.84 In addition, there is significant cycle movement along Wandsworth Bridge Road (A217) and through the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction, with 217 cyclists travelling (to the south side of the junction) in the northbound direction and 48 southbound in the AM peak hour. In the PM peak hour, there were 32 travelling northbound and 171 southbound. Concurrently the numbers to the north of the junction were 113 cyclists travelling in the northbound direction and 25 southbound in the AM peak hour, while in the PM peak hour there were 29 travelling northbound and 107 southbound.

### Traffic flows

10.4.85 The ATC data has been analysed to identify the existing traffic flows along Wandsworth Bridge Road (A217). The weekday vehicle and HGV flows for a 12-hour period (07:00-19:00) are shown in Plate 10.4.4 and Plate 10.4.7. Weekday flows are used as this is when the greatest impacts from the project are likely to be experienced.

**Plate 10.4.4 Existing 15-minute traffic flows along Wandsworth Bridge Road (A217) – 100m south of Carnwath Road (weekday ATC survey)**

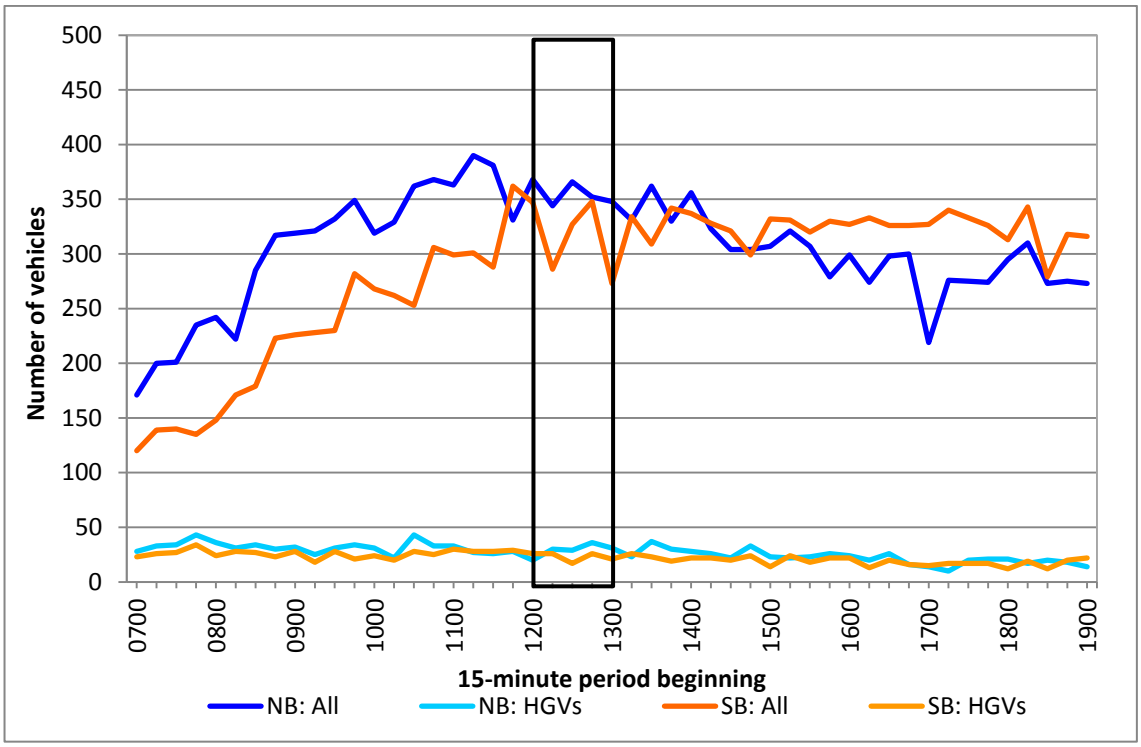



*EB – East Bound, WB – West Bound. The black box represents the peak hour traffic flows used for the traffic assessment.*

10.4.86 Plate 10.4.4 shows that the AM peak hour for Wandsworth Bridge Road (A217) 100m south of Carnwath Road is the busiest hour with a maximum two-way flow of approximately 2,798 vehicles. The busiest 15 minute peak period in the peak hour occurred between 0800 – 0815 with approximately 471 northbound vehicles and approximately 246 southbound vehicles.

10.4.87 For the PM peak hour, there was a maximum two-way flow of approximately 2,773 vehicles. The busiest 15 minute peak period in the peak hour occurred between 17:15 – 17:30 with approximately 291 northbound vehicles and approximately 403 southbound vehicles.

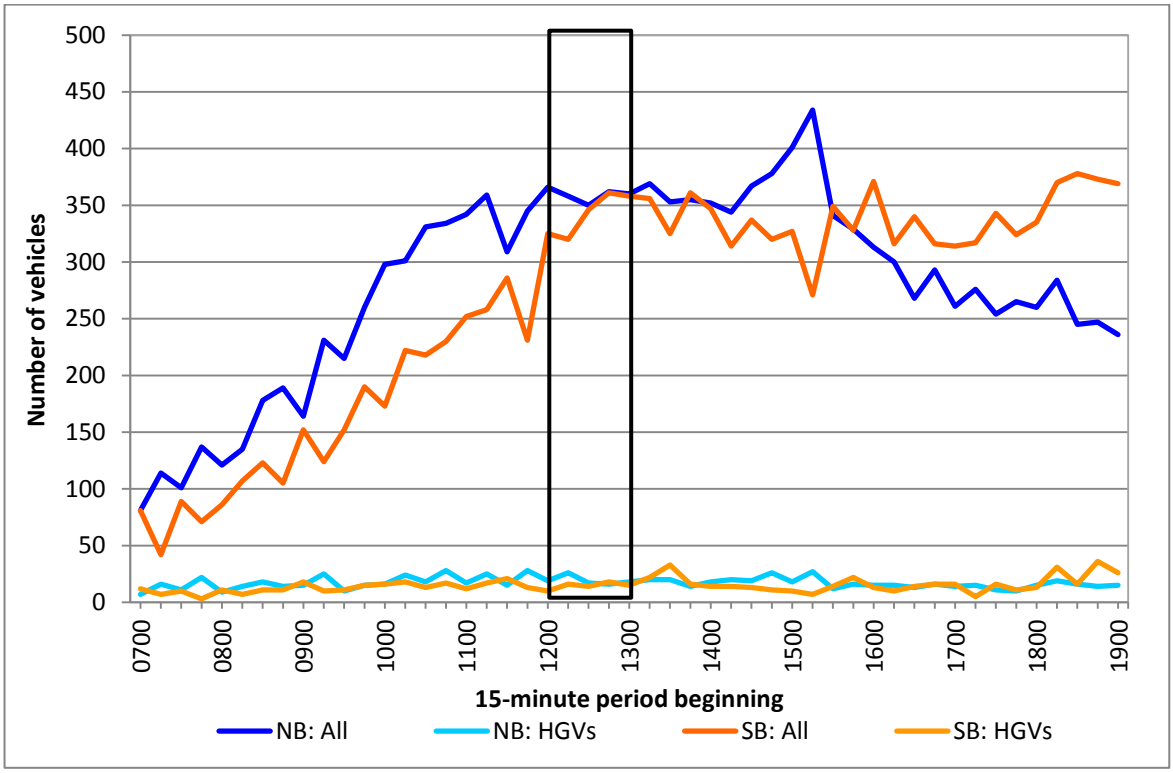
**Plate 10.4.5 Existing 15-minute traffic flows along Wandsworth Bridge Road (A217) – 100m south of Carnwath Road (Saturday ATC survey)**




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

10.4.88 Analysis of the data showed that the Saturday peak travel period occurred between 11:00 and 12:00 with 2,492 two-way vehicle movements recorded. This is slightly less than the AM and or PM weekday two-way traffic flows and the period falls outside of the expected weekend construction works vehicle movements period of between 08:00 and 13:00 on a Saturday.

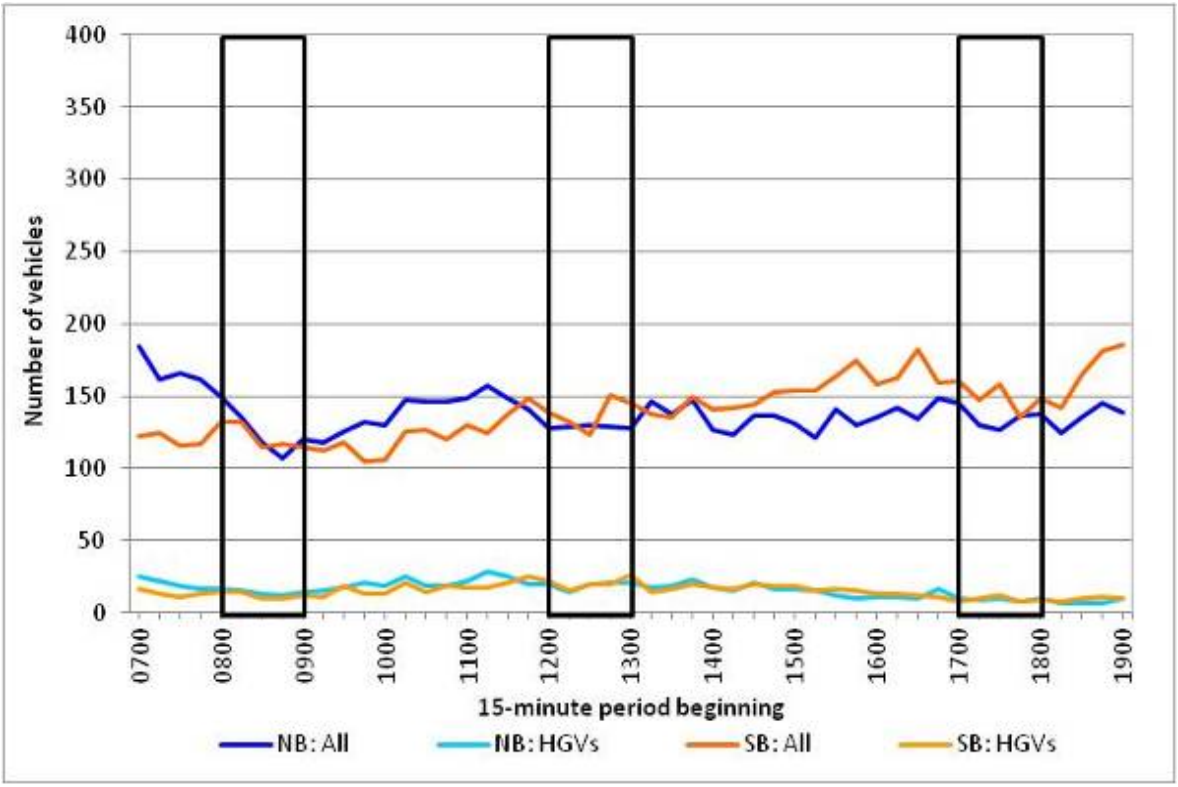
**Plate 10.4.6 Existing 15-minute traffic flows along Wandsworth Bridge Road (A217) – 100m south of Carnwath Road (Sunday ATC survey)**




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

10.4.89 Analysis of the data showed that the Sunday peak travel period occurred between 12:00 and 13:00 with 2,788 two-way vehicle movements recorded. This is slightly less than the AM and or PM weekday two-way traffic flows. However, construction vehicle movements are not expected to take place on a Sunday.

**Plate 10.4.7 Existing 15-minute traffic flows along Wandsworth Bridge Road (A217) 20m north of Beltran Road (weekday ATC survey)**

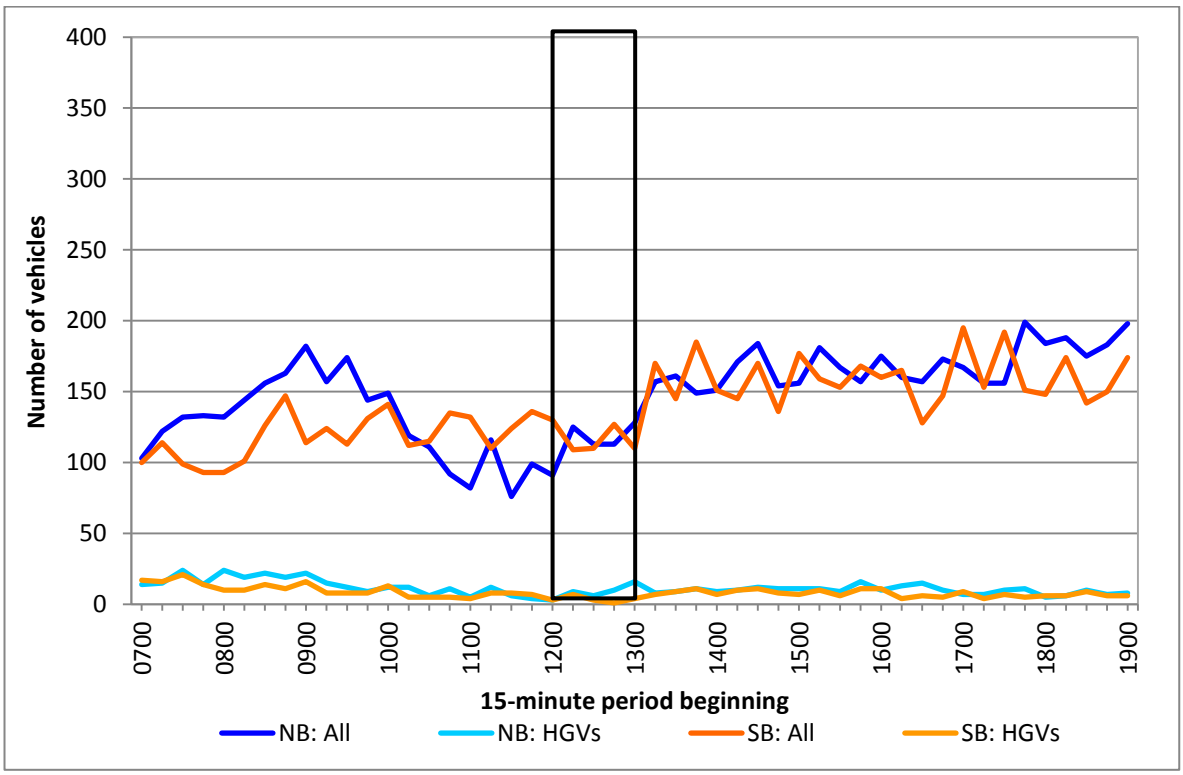



*EB – East Bound, WB – West Bound. The black box represents the peak hour traffic flows used for the traffic assessment.*

10.4.90 Plate 10.4.7 shows that the PM hour peak for Wandsworth Bridge Road (A217) 20m north of Beltran Road is the busiest with a maximum two-way flow of approximately 1,140 vehicles. The busiest 15 minute peak period in the peak hour occurred between 17:00 – 17:15 with approximately 145 northbound vehicles and approximately 160 southbound vehicles.

10.4.91 For the AM peak hour, a maximum two-way flow of approximately 989 vehicles. The busiest 15 minute peak period in the peak hour occurred between 08:45 – 09:00 with approximately 121 northbound vehicles and approximately 118 southbound vehicles.

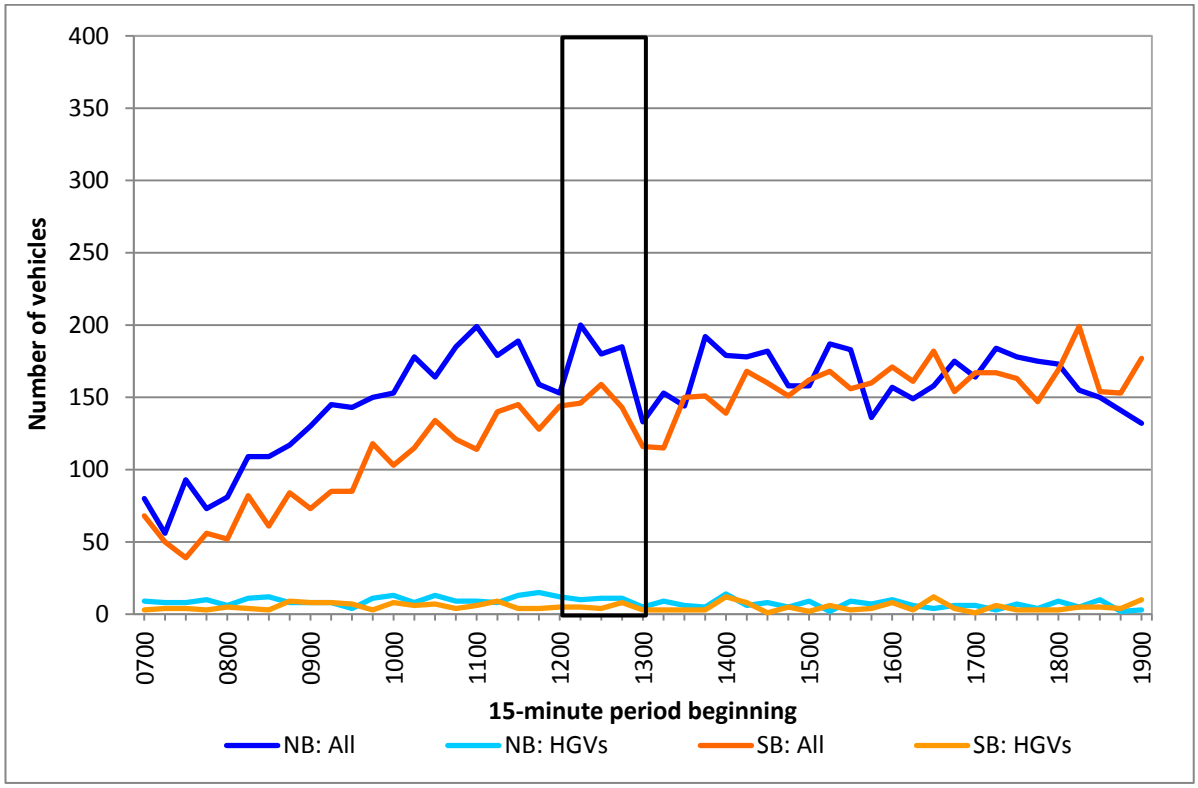
**Plate 10.4.8 Existing 15-minute traffic flows along Wandsworth Bridge Road (A217) 20m north of Beltran Road (Saturday ATC survey)**




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

10.4.92 Analysis of the data showed that the Saturday peak travel period occurred between 17:00 and 18:00 with 1,369 two-way vehicle movements recorded. This is slightly higher than the AM and PM weekday two-way traffic flows and the period falls within/outside of the expected weekend construction works vehicle movements period of between 08:00 and 13:00 on a Saturday.

**Plate 10.4.9 Existing 15-minute traffic flows Wandsworth Bridge Road (A217) 20m north of Beltran Road (Sunday ATC survey)**




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

10.4.93 Analysis of the data showed that the Sunday peak travel period occurred between 12:00 and 13:00 with 1,310 two-way vehicle movements recorded. This is slightly less/higher than the AM and or PM weekday two-way traffic flows. However, construction vehicle movements are not expected to take place on a Sunday.

10.4.94 A direct junction comparison is not available for this site, although using TfL data from Wandsworth Bridge roundabout (which was collected at a different time period), a comparison of flow data along Wandsworth Bridge Road to which Carnwath Road joins, can be made. Traffic surveys indicate that there is a total traffic flow of 3,248 and 3,058 vehicles in the AM and PM peak hours respectively using the Wandsworth Bridge (A217) Road past the Carnwath Road junction.

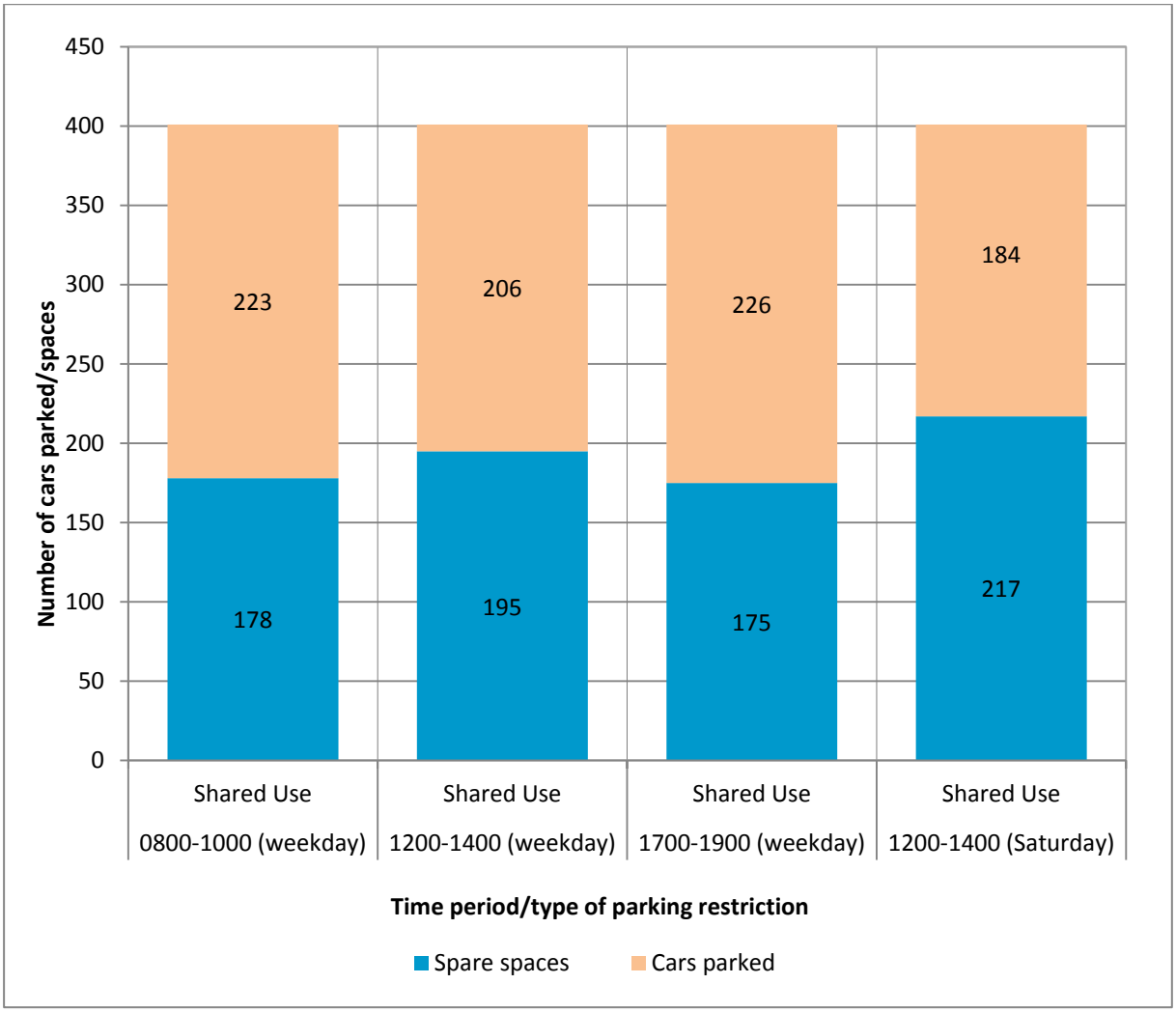
10.4.95 The TfL data for the Wandsworth Bridge Road (A217) indicates that there is a total traffic flow of 2,724 and 3,058 vehicles using the road in the AM and PM peak hours respectively.

10.4.96 Comparison of the junction survey data against the TfL junction survey data used in the TRANSYT modelling shows that the TfL vehicle flow is slightly higher but of similar magnitude in the PM peak. In the AM peak hour though, the TfL survey is lower. However, given that the ATC data provides the higher flow figure and this has been used for the model, this is considered to be a worst case scenario for the site.

### Parking

10.4.97 Plate 10.4.10 shows a histogram of the car parking availability and usage in the area surrounding Carnwath Road during the AM, inter-peak and PM peaks on a weekday and during the weekend peak periods.

**Plate 10.4.10 Existing on-street car parking availability and usage**



10.4.98 Table 10.4.9 shows parking availability and usage on Carnwath Road only on a weekday and Saturday.

**Table 10.4.9 Parking bay availability and usage**

| Location | Number and Type of Bays | | No. of spaces available | | | |
|---|---|---|---|---|---|---|
| | | | Weekday | | | Saturday |
| | | | 08:00-10:00 | 12:00-14:00 | 17:00-19:00 | 12:00-14:00 |
| Carnwath Road | Shared use bays | 46 | 31 | 23 | 20 | 31 |

10.4.99 The results of the parking surveys indicate that usage of the on-street parking is moderate. It was estimated that approximately 400 cars can be accommodated within the on-street parking bays in the vicinity of the Carnwath Road Riverside site.

10.4.100 The parking survey suggested that about 50% of all available spaces were used throughout the day. The utilisation is slightly higher in the Saturday and weekday inter-peak when compared to the AM and PM weekday peak periods.

## Local highway modelling

10.4.101 For the assessment of the local highway network, a scope was discussed with TfL and LB of Hammersmith and Fulham to assess the Carnwath Road site accesses using a PICADY model and the junction of Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road using a LinSig model.

10.4.102 Traffic models for the junction of Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road have been developed for this assessment and where possible suitable models from TfL have been used. The models have been constructed using on-site measurements of classified vehicle volumes and queue lengths.

10.4.103 The signal timings input to the LinSig model for this junction provided by TfL have been used in this assessment.

10.4.104 As part of the scope the local modelling is required for the adjacent junctions to the sites. The TfL model has been used as a base for the junction of Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction. As the Strategic modelling has not identified any major issues at other junctions in the vicinity of the site, no local modelling is required for other junctions.

10.4.105 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. Where TfL models have been used, saturation flows have been retained where no change is proposed to junctions; where changes are proposed, saturation flows have been calculated and compared with site observations to determine suitable values. Validation of the models has been based on observed data including signal timings, vehicle volumes and queue lengths to provide the key criteria for comparison with modelled queue lengths.

10.4.106 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.

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

10.4.108 A baseline model for the new site accesses was not created as these locations are not currently in use as accesses.

**Table 10.4.10 Baseline LinSig model outputs**

| Approach | Movement | Weekday | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | AM peak hour (08:00-09:00) | | | | PM peak hour (17:00-18:00) | | | |
| | | Flow (PCU) | DoS | MMQ (PCU) | Delay (seconds per PCU) | Flow (PCU) | DoS | MMQ (PCU) | Delay (seconds per PCU) |
| Wandsworth Bridge Road (A217) | Left / Ahead | 151 | 26% | 3 | 29 | 305 | 36% | 6 | 20 |
| | Ahead / Right | 365 | 62% | 9 | 37 | 688 | 80% | 17 | 32 |
| Townmead Road | Left | 304 | 34% | 5 | 14 | 522 | 78% | 14 | 36 |
| | Right / Ahead | 104 | 29% | 3 | 40 | 56 | 17% | 1 | 40 |
| Wandsworth Bridge | Left / Ahead | 1340 | 89% | 21 | 19 | 988 | 60% | 7 | 9 |
| | Right | 673 | 81% | 17 | 34 | 315 | 59% | 8 | 38 |
| Carnwath Road | Left / Ahead | 119 | 34% | 3 | 41 | 76 | 23% | 2 | 40 |
| | Right | 233 | 88% | 9 | 89 | 199 | 67% | 6 | 57 |
| | | Practical Reserve Capacity (PRC) | | Total Delay (PCU Hours) | | Practical Reserve Capacity (PRC) | | Total Delay (PCU hours) | |
| Overall junction performance | | 0.9% | | 28 | | 12.9% | | 23 | |

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

10.4.109 The weekday AM and PM baseline model queues for the junction of Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road were compared against observed queue lengths for the peak periods to validate the LinSig model and ensure reasonable representation of existing conditions.

10.4.110 Figures 10.4.5 and 10.4.6 in the Carnwath Road Riverside *Transport Assessment* figures show the traffic flows which were used for the baseline AM and PM peak hour assessments which take into account the observed flows.

10.4.111 Table 10.4.10 summarises the baseline performance of the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction. The overall junction performance shows that the junction is currently operating at capacity in the weekday AM peak hour and within capacity in the PM peak hour. The maximum delay per vehicle is 89 seconds in the AM peak and 57 seconds in the PM peak. The delay to vehicles is most significant during the AM peak hour for vehicles turning right from Carnwath Road eastbound into Wandsworth Bridge Road (A217) southbound.

10.4.112 The LinSig junction model output shows that total junction delay is 28 PCU hours in the AM peak and 23 PM peak period assessed. These equate to 32 seconds per PCU in the AM peak period and 26 seconds per PCU in the PM peak periods assessed.

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

### Accident analysis

10.4.114 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.

10.4.115 Data has been obtained for a five year period to the 31st March 2011. Figure 10.4.7 in the Carnwath Road Riverside *Transport Assessment* figures indicates the accidents that have occurred within the vicinity of the site. The following junctions and surrounding roads have been analysed:

a. Carnwath Road
b. Carnwath Road/ Wandsworth Bridge Road
c. Wandsworth Bridge Road
d. Wandsworth Bridge Road/ Townmead Road
e. Hugon Road
f. Peterborough Road.

10.4.116 Table 10.4.11 indicates the accidents that have occurred within the vicinity of Carnwath Road Riverside site. Appendix D provides a full analysis of accidents within the local area surrounding the Carnwath Road Riverside site.

**Table 10.4.11 Accident severity from 2006 to 2011**

| Location | Slight | Serious | Fatal | Total |
|---|---|---|---|---|
| Carnwath Road | 11 | 1 | 0 | 12 |
| Carnwath Road/ Breer Street Junction | 4 | 0 | 0 | 4 |
| Carnwath Road/ Peterborough Road Junction | 2 | 0 | 0 | 2 |
| Carnwath Road/ Wandsworth Bridge Road Junction | 7 | 1 | 0 | 8 |
| Carnwath Road/ Dymock Street Junction | 0 | 1 | 0 | 1 |
| Wandsworth Bridge Road | 9 | 1 | 0 | 10 |
| Wandsworth Bridge Road/ Townmead Road Junction | 3 | 2 | 0 | 5 |
| Wandsworth Bridge Road/ Stephendale Road Junction | 4 | 2 | 0 | 6 |
| Wandsworth Bridge Road/ Hugon Road Junction | 5 | 0 | 0 | 5 |
| Wandsworth Bridge Road/ Rosebury Road Junction | 4 | 1 | 0 | 5 |
| Hugon Road/ Breer Road Junction | 0 | 1 | 0 | 1 |
| Peterborough Road/ Sulivan Road Junction | 0 | 1 | 0 | 1 |
| Broomhouse Lane/ Carnwath Road intersection | 1 | 0 | 0 | 1 |
| Broomhouse Lane/ Daisy Lane Junction | 0 | 0 | 1 | 1 |
| Total | 51 | 10 | 1 | 62 |

10.4.117 A total of 62 accidents were recorded in the assessment area over the five years of accident data analysed. In relation to the severity of these accidents, ten were serious and 51 were slight, predominantly resulting from failure to look properly, poor manoeuvres by drivers and failure to judge another person's path or speed. Figure 10.2.1 in the Carnwath Road Riverside *Transport Assessment* figures shows the study area.

10.4.118 In total, 31 accidents were recorded along Wandsworth Bridge Road (A217) and the junctions associated with this stretch of highway. 25 of these accidents were classified as slight, predominantly resulting from failure to look properly, poor manoeuvres and failure to judge another person's path or speed.

10.4.119 Of the total accidents, six were classified as serious. The major contributory factors to the serious accidents were poor turning or

manoeuvring, failure to look properly and failure to judge another person's path or speed.

10.4.120 No fatal accidents were recorded along the same section of Wandsworth Bridge Road (A217) in the five year period analysed.

10.4.121 The largest number of serious accidents was recorded at the Wandsworth Bridge Road (A217) junctions with Townmead Road and Stephendale Road, with two such accidents at each location.

10.4.122 The largest number of accidents occurred along Wandsworth Bridge Road (A217) and at its junction with Carnwath Road / Townmead Road. The only significant cluster of accidents in the vicinity of the Carnwath Road Riverside site was recorded at the Wandsworth Bridge Road (A217) junction with Townmead Road and Carnwath Road. There were ten slight and three serious accidents recorded in this location over the five year period.

10.4.123 One fatal accident was recorded at the Broomhouse Lane / Daisy Lane junction to the northwest of the Carnwath Road Riverside site.

10.4.124 Of the accidents across the whole study area, two involved medium goods vehicles (MGVs) and one a HGV. In regard to the MGVs their severity was a slight and serious, whilst for the HGV the severity was serious.

10.4.125 As shown in Figure 10.4.48 of the Carnwath Road site *Transport Assessment* figures, there were 40 accidents involving pedestrians and cyclists. 32 occurred on the roads to be taken by construction vehicles within the study area, of which seven were classed as serious. Inspection of the data showed that eight of these occurred at junctions with signalised control facilities, with the remaining accidents occurring at locations without signal control. The pedestrian fatality is described above in paragraph 10.4.123 which is not on a construction route.

10.4.126 In the context of the temporary HGV movements associated with the Carnwath Road Riverside 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[2].

## 10.5 Construction assessment

10.5.1 The assessment, including both qualitative and quantitative assessment, has been undertaken drawing on discussions with TfL and the local highway authority 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.

10.5.2 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

construction. The construction base case does not include any traffic related to the Thames Tideway Tunnel, whether from the Carnwath Road Riverside site or from other sites.

## Construction base case

10.5.3 As described in Section 10.3, the construction assessment year for transport effects in relation to the Carnwath Road Riverside site is Year 2 of construction.

### Pedestrians and cyclists

10.5.4 There are no proposals to change the cycle or pedestrian network by Year 2 of construction and the network will operate as indicated in the baseline description in Section 10.4.

### Public transport

10.5.5 In terms of the public transport network, it is expected that as a result of the TfL London Underground Upgrade Plan[3], capacity will increase on the District Line by approximately 24% compared to the current baseline capacity.

10.5.6 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.

10.5.7 Due to traffic growth in the construction base case compared to the baseline situation, bus journey times along Wandsworth Bridge Road (A217), Carnwath Road and within the wider area will be affected. This will result in an additional road network delay of a maximum of approximately five seconds in the AM peak and four seconds in the PM peak at the junction of Wandworth Bridge Road (A217), Carnwath Road and Townmead Road.

10.5.8 It is anticipated that patronage on public transport services may change between the baseline situation and Year 2 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. There are further capacity improvements anticipated on the Bakerloo, Piccadilly and Central lines however the best way of delivering these improvements, including the timescales, are currently being investigated by TfL. At this stage, we are unable to estimate how much of these upgrades will have been completed by the construction base case or how much will be remaining.

10.5.9 In order to ensure that the busiest case scenario is addressed in the assessment, the capacity for London Overground, London Underground and public transport services in the construction base case has been assumed to remain the same as capacity in the baseline situation. This ensures a robust assessment.

### River navigation

10.5.10 There are no proposals to alter any river navigation patterns from the current baseline conditions and therefore the construction base case remains to the same as the baseline position.

### Highway network operation

10.5.11 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 Carnwath Road Riverside site in Year 2 of construction without the Thames Tideway Tunnel project. The scope of this analysis has been discussed with LB of Hammersmith and Fulham and TfL.

10.5.12 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 HAM, as described in the Strategic *Modelling Methodology Report,* in Appendix B to Section 3 (*Project-wide) TA.*

10.5.13 As explained in Section 10.3 Assessment methodology of this *TA*, the traffic flows for the base and development cases have been calculated by considering the net change in traffic resulting from the committed developments in the area to ensure that the construction base case for the highway network is robust.

10.5.14 The LB of Hammersmith and Fulham are developing a junction improvement scheme at the Carnwath Road / Wandsworth Bridge Road (A217) junction (as part of the South Fulham Riverside initiative) which would involve changes to the junction layout, the widening of traffic lanes and the amendment of traffic signal controls. It is understood that contributions to this scheme are being sought from developers in the surrounding area; however at the time of writing there is no committed programme for implementation of the scheme. The assessment has been therefore been undertaken on the basis of the existing junction arrangement in the baseline situation.

### Committed developments

10.5.15 The only committed development in the immediate vicinity of Carnwath Road Riverside site which could result in changes to the transport networks in the area is the redevelopment and replacement of a concrete plant, aggregate storage facility, transfer building and conveyors at Townmead Road. The base case in Year 2 of construction takes account of this development. Further details can be found within Volume 10 of the *Environmental Statement* Section 12.4.

### Local highway modelling

10.5.16 The growth factors for the LB of Hammersmith and Fulham based on the WeLHAM model have been agreed with TfL and the LB of Hammersmith and Fulham and applied to all the baseline traffic flows. The growth factors are:

a. Weekday AM Peak growth factor: +4.7%

b. Weekday PM Peak growth factor: +5.0%

10.5.17 Paragraph 10.3.8 to 10.3.9 explains the definition of the assessment area for local highway network modelling. At this site, the assessment examines the site accesses on Carnwath Road, Carnwath Road itself and the junction of Wandsworth Bridge Road (A217) with Carnwath Road and Townmead Road.

10.5.18 The construction development case includes the optimisation of traffic signal timings in order to minimise journey time increases within the local area. Table 10.5.1 shows the construction base case model outputs

**Table 10.5.1 Construction base case LinSig model outputs**

| Approach | Movement | Weekday | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | AM peak hour (08:00-09:00) | | | | PM peak hour (17:00-18:00) | | | |
| | | Flow (PCU) | DoS | MMQ (PCU) | Delay (seconds per PCU) | Flow (PCU) | DoS | MMQ (PCU) | Delay (seconds per PCU) |
| Wandsworth Bridge Road (A217) | Left / Ahead | 152 | 27% | 3 | 29 | 306 | 35% | 6 | 19 |
| | Ahead / Right | 388 | 66% | 10 | 38 | 736 | 83% | 19 | 34 |
| Townmead Road | Left | 318 | 36% | 5 | 14 | 548 | 84% | 16 | 42 |
| | Right / Ahead | 109 | 29 % | 3 | 39 | 59 | 18% | 1 | 40 |
| Wandsworth Bridge | Left / Ahead | 1404 | 95% | 31 | 29 | 1037 | 63% | 7 | 9 |
| | Right | 705 | 88% | 20 | 43 | 331 | 66% | 9 | 43 |
| Carnwath Road | Left / Ahead | 124 | 34% | 3 | 40 | 81 | 24% | 2 | 40 |
| | Right | 244 | 92% | 11 | 102 | 209 | 71.0% | 6 | 60 |
| | | Practical Reserve Capacity (PRC) | | Total Delay (PCU Hours) | | Practical Reserve Capacity (PRC) | | Total Delay (PCU Hours) | |
| Overall junction performance | | -5.1% | | 36 | | 7.0% | | 27 | |

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

10.5.19 The resulting construction base case LinSig model for the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road shows that the junction continues to operate at capacity in the weekday AM peak hour and within capacity in the PM peak hour. The maximum delay per vehicle is 102 seconds in the AM peak and 60 seconds in the PM peak an increase of 13 seconds and three seconds respectively. The delay to vehicles is most significant during the AM peak hour for vehicles turning right from Carnwath Road eastbound into Wandsworth Bridge Road (A217) southbound.

10.5.20 The LinSig junction model output shows that total junction delay is 36 PCU hours in the AM peak and 27 PM peak period assessed. These equate to 38 seconds per PCU in the AM peak period and 29 seconds per PCU in the PM peak periods assessed, an increase of six and three seconds respectively.

10.5.21 Overall the results indicate that in the construction base case the local network will operate above capacity in the AM peak and within capacity in the PM peak when taking into account the construction base case traffic flows and signal optimisation.

## Construction development case

10.5.22 This section summarises the findings of the assessment undertaken for the peak year of construction at the Carnwath Road Riverside site (Year 2 of construction).

### Pedestrian routes

10.5.23 As discussed in Section 10.2, the Thames Path routes through the site and would therefore need to be diverted during construction at Carnwath Road although the overall walking distance for those using the Thames Path would not change. The diversion would continue the Thames Path along Carnwath Road for an additional 110m before connecting back to the riverside along the back of the Retail Park. The construction phase layout – phase 1, phase 2, phase 3 and phase 4 plans, provided in the Carnwath Road Riverside *Transport Assessment* figures show the highway layout at the Carnwath Road Riverside site during construction, including the effect on the pedestrian footways during construction.

10.5.24 To assess a busiest case scenario it has been anticipated that all workers would finish their journeys to the site and start their journeys from the site on foot. As a result, the 165 worker trips generated in the AM peak hour and 105 worker trips generated in the PM peak hour have been added to the construction base case pedestrian flows to determine the development case pedestrian flows in the AM and PM peak hours.

10.5.25 The footways which would most likely to be affected by the worker trips would be Carnwath Road, the Thames Path and the junction of Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road. A forecast distribution of worker pedestrian trips can be determined by considering the mode split shown in Table 10.2.3 and the location of the nearest rail/tube stations and bus stops. Based on this, it is assumed that approximately 55% would be travelling along Carnwath Road or along the

Thames Path to the west of the Carnwath Road Riverside site, and approximately 45% would be travelling along Carnwath Road and the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road to the east of the Carnwath Road Riverside site.

10.5.26 This would equate to a maximum of 91 construction workers in the AM peak hour along Carnwath Road or the Thames Path to the west of the Carnwath Road Riverside site, and 58 in the PM peak hour.

10.5.27 Along Carnwath Road to the east of the Carnwath Road Riverside site and the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction, there would be a maximum of 74 workers in the AM peak hour and 47 in the PM peak hour.

10.5.28 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. An extension to the length of the pedestrian phase at the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction of is therefore not required.

10.5.29 Taking into consideration the pedestrian diversions and increase in worker trips the greatest effect would be on the southern footway along Carnwath Road, to which pedestrians would be diverted from the Thames Path.

10.5.30 The proposed Thames Path diversion around the Carnwath Road Riverside site would not create any additional pedestrian delay as the overall journey distance would remain the same.

10.5.31 The introduction of new site accesses along the southern side of Carnwath Road would result in pedestrians having to cross both site accesses. When construction vehicles are entering or leaving the Carnwath Road Riverside site, this could introduce occasional delays to pedestrian journeys which are expected to be a maximum of 30 seconds in each case. The maximum overall delay that might be experienced would therefore be one minute; however, it is unlikely that pedestrians would encounter vehicle movements at both accesses and therefore the average delay to the few pedestrians who would be affected whilst waiting for a vehicle to access the Carnwath Road Riverside site is likely to be in the order of 30 seconds.

10.5.32 The additional construction vehicle movements to and from the Carnwath Road Riverside site accesses would present a minor increase in the risk of accidents to pedestrians, although appropriate signage and management measures would be put in place to ensure pedestrian safety at each access point.

10.5.33 During all construction work and on any section of road subject to temporary diversions or restrictions imposed by roadworks associated with the Carnwath Road Riverside 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 will include compliance with the Equality Act

2010[4] to ensure safe passage for mobility and vision impaired pedestrians.

### Cycle routes

10.5.34 Cyclists using the highway may experience some delay to journey times as a result of the additional traffic generated by the construction works at the Carnwath Road Riverside site. The effect on journey times is identified in the LinSig modelling which is outlined in the highway assessment section and Table 10.5.2 and would be an increase of a maximum of some 13 seconds over that in the construction base case.

10.5.35 With regard to accidents and safety, while cyclists would not be required to make any additional road crossing, although they would cross the two new site entrances, there would be an increase in construction traffic flows. This would lead to a minor increase in the risk of accidents to cyclists although there would be an increase in construction traffic of between four and 20 two-way HGV movements per hour at the Carnwath Road Riverside site which is not considered significant and appropriate signage would be provided to warn cyclists of the presence of large vehicles.

10.5.36 Cyclists using the Thames Path would be diverted, as discussed in paragraph 10.5.23. However, this would alter cycle journey times as the distance using the diversion is equivalent to that in the base case. There would be no significant increase to cycle journey times on the Thames Path.

10.5.37 Measures set out in the *CoCP* described in para. 10.2.52 include that the security barrier would be positioned to allow a standard vehicle to be wholly off the road whilst awaiting barrier operation. During all construction work and on any section of road subject to temporary diversions or restrictions imposed by roadworks associated with the Carnwath Road Riverside 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[5]) to ensure safe passage for cyclists.

10.5.38 During the construction period, 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 Hammersmith and Fulham prior to execution of any works.

### Bus routes and patronage

10.5.39 No bus services run immediately past the site entrances. However, the additional construction vehicles travelling along Wandsworth Bridge Road (A217) and Carnwath Road may affect bus journey times. The changes are set out in Table 10.5.2.

10.5.40 The maximum delay for Routes 28 and 295 is from right turning traffic from Wandsworth Bridge Road (A217) southbound into Carnwath Road westbound. On this basis, it is expected that routes 28 and 295 would

experience an additional seven seconds delay from the Wandsworth Bridge Road (A217) left and ahead lane.

**Table 10.5.2 Estimated maximum delay for bus services**

| Bus Route Number | Maximum Delay per Vehicle |
|---|---|
| 28 | 7 seconds |
| 295 | 7 seconds |
| 424 | -2 seconds |
| C3 | 5 seconds |

10.5.41 In the context of overall bus journey times for these routes the delay to bus services is not considered to be significant.

10.5.42 It is expected that approximately 20 additional two-way worker trips would be made by bus during the AM peak hour and 13 in the PM peak hour. Based on a service of 60 and 55 buses within a 640m walking distance during the AM and PM peak hours respectively, this equates to less than one additional passenger per bus. 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 well within the normal daily variation in bus patronage on these routes.

10.5.43 As London Underground, London Overground and National Rail stations are all more than 960m from the Carnwath Road Riverside site it is possible that workers using these services as their main mode of transport would complete their journeys by bus or on foot.

10.5.44 If the additional 42 workers in the AM peak and 26 in the PM peak expected to travel by rail and underground were to complete their journeys by bus, this would increase the additional demand on bus services to approximately 62 journeys in the AM peak hour and 39 in the PM peak hour. This would still equate to approximately one additional journey per bus and therefore would not have a significant effect on bus patronage.

### London Underground patronage

10.5.45 No underground or rail stations are directly adjacent to the Carnwath Road Riverside site and therefore none would be directly affected by the construction works.

10.5.46 It is anticipated that approximately 26 workers would use London Underground services to access the Carnwath Road Riverside site in the AM peak and 16 in the PM peak. This equates to approximately one additional passenger per train, based on the 30 services per hour available at Putney Bridge station in the AM and PM peaks. This additional patronage could be accommodated on base case London Underground services.

### London Overground and National Rail patronage

10.5.47 It is expected that there would be approximately 16 worker journeys made using London Overground or National Rail services in the AM peak and 10 in the PM peak.

10.5.48 On National Rail (and London Overground), this equates to approximately one additional passenger per train, based on a frequency of 18-19 services in the AM and PM peak hours respectively which is not a significant increase and could be accommodated on base case rail services.

### River navigation

10.5.49 During construction it is anticipated that 90% of excavated material from the main tunnel and shaft would be transported out and 90% of main tunnel secondary lining aggregates would be transported in by barge. The peak number of barge movements would occur within Site Year 2 of construction with an average of four barge movements a day.

10.5.50 Barges would be hauled by tugs which typically haul two barges at a time where possible. This means that there would be one tug movement in each direction (two in total) per day at this site.

10.5.51 There would be no changes to existing mooring arrangements at other locations in the vicinity of the site, nor to the provision of river access for leisure users of the river.

10.5.52 Due to the low number of barges arriving at the site, it is anticipated that the impact on river navigation in the vicinity of the site as a result of barges arriving at Carnwath Road Riverside would not be significant.

10.5.53 It is noted that a separate navigational risk assessment has been undertaken for the temporary construction works and barges to be used at Carnwath Road Riverside. This is reported separately outside of the *TA*.

### Parking

10.5.54 As noted in Section 10.2 it would be necessary to suspend sections of car parking on Carnwath Road which would reduce the available capacity by approximately 12 vehicle spaces.

10.5.55 Baseline surveys suggest that there is spare parking capacity in the area. The parking surveys show that for weekdays across the day the average spare capacity is 44% or 183 spaces. During weekend between midday and 2pm spare capacity is higher at approximately 54% or 217 spaces; consequently there would be sufficient capacity to accommodate the additional car parking associated with worker car use along Carnwath Road and the displacement of parking associated with the suspension of car parking bays in the vicinity of the site accesses. It would not therefore be necessary to re-provide the suspended parking spaces.

10.5.56 Table 10.2.3 indicates that based on mode shares from the 2001 Census 103 workers would be drive to the Carnwath Road Riverside site over the course of the working day. This would comprise 63 cars arriving during the busiest hour in the morning between 07:00 and 08:00 and 40 cars

departing during the busiest hour in the afternoon between 18:00 and 19:00.

10.5.57 There is an eight hour maximum pay-and-display limit for those without a valid permit for CPZ 'Q' on Carnwath Road. As restrictions apply between 09:00 and 17:00 Monday to Saturday, this limit of stay would typically be sufficient to discourage day shift workers from parking in the immediate area, although those who are working night shifts would not be subject to any parking restrictions or charges.

10.5.58 There are other off-street parking options available further away from the Carnwath Road Riverside site, which are subject to parking charges or restricted use. Charges may be sufficient to discourage use of these facilities by workers on a regular basis.

10.5.59 Active 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. These measures are firmly anchored within the Travel Plan Guidelines and *CoCP*.

10.5.60 The highway layout during construction – area 1 and area 2 plans provided in the Carnwath Road Riverside *Transport Assessment* figures summarise the proposed suspension of parking bays and extended hours of restrictions for single yellow lines associated with the construction works at the Carnwath Road Riverside site.

## Highway assessment

### Highway layout

10.5.61 The highway layout during construction – area 1 and area 2 plans provided in the Carnwath Road Riverside *Transport Assessment* figures show the highway layout during Phases 1, 2, 3 and 4 of the construction works at the Carnwath Road Riverside site.

10.5.62 The site is on the southern side of Carnwath Road and would be accessed from the westbound lane. A new crossover would be required at the western site access, while the existing crossover at the eastern access would require widening. The highway layout during construction vehicle swept path analysis plans provided in the Carnwath Road Riverside *Transport Assessment* figures shows this movement show the swept path movements of construction vehicles and show that these vehicles would be able to enter and leave the Carnwath Road Riverside site safely.

10.5.63 At the junction of Carnwath Road / Wandsworth Bridge Road (A217) / Townmead Road, a potential conflict has been identified for 16.5m articulated vehicles and 12.0m rigid vehicles turning left into Carnwath Road from Wandsworth Bridge Road (A217). A junction improvement is therefore proposed to realign the existing kerb to allow the construction vehicles to carry out this manoeuvre without overrunning the kerb. The highway layout during construction vehicle swept path analysis plans provided in the Carnwath Road Riverside *Transport Assessment* figures shows this movement.

### Highway network

10.5.64 Table 10.2.2 shows the vehicle movement assumptions for the local peak traffic periods based on the peak months of construction activity at this site.

10.5.65 Table 10.2.2 shows an average peak flow of 441 vehicle movements a day is expected during the months of greatest activity during Site Year 2 of construction at the Carnwath Road Riverside site. At other times in the construction period, vehicle flows would be lower than this average peak figure.

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

10.5.67 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.

10.5.68 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 Carnwath Road Riverside site, or with other Thames Tideway Tunnel project sites, that would use routes in the vicinity of the Carnwath Road Riverside site. Figure 10.5.1 in the Carnwath Road Riverside *Transport Assessment* figures shows the OmniTrans plot for the local road network around the Carnwath Road Riverside site. 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.

10.5.69 The local PICADY and LinSig models have 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 (ie, comparison of base and development cases)

10.5.70 The construction development case model includes the optimisation of traffic signal timings in order to maximise capacity and minimise overall

[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

delay at the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction.

10.5.71 A summary of the construction assessment results for the LinSig model for the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction in the weekday AM and PM peak hours is presented in Table 10.5.4 and Table 10.5.5. The construction base case model indicates that the local highway will be operating over capacity in the AM peak and within capacity in the PM peak without the Thames Tideway Tunnel proposals.

10.5.72 With inclusion of the construction traffic generated the construction development case, this indicates that the local highway will remain over capacity in the AM peak and within capacity in the PM peak.

10.5.73 In the AM peak there is a slight increase in demand resulting from the construction traffic. This would increase the degree of saturation by 10% on the Wandsworth Bridge Road (A217) southbound approach in the AM peak hour, with an additional queue of one vehicle length and additional delay of seven seconds per vehicle. The queue on the Wandsworth Bridge northbound approach would increase by three vehicle lengths with an additional delay of five seconds. The majority of vehicles undertaking this movement would be associated with the construction traffic.

10.5.74 In the PM peak hour there would be no impact on junction performance. These changes in capacity, queue length and delay are not considered significant.

10.5.75 The junctions between the two new site accesses and Carnwath Road is represented by a single new site access in the PICADY model. This model also uses the peak traffic flow and hence provides the worst case impact on any one of the Carnwath Road / new site access junction.

10.5.76 The results of the PICADY modelling are shown in Table 10.5.6. The results indicate that the accesses would operate well within capacity during construction. No comparison with a base case has been made as these accesses would be introduced specifically for the works at the Carnwath Road Riverside site.

**Table 10.5.3 Construction development case LinSig model outputs (AM peak hour)**

| Approach | Arm | Flow (PCU) | Weekday | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AM peak hour (08:00-09:00) | | | | | | | | |
| | | | DoS | | | MMQ (PCUs) | | | Delay (seconds per PCU) | | |
| | | | Base case | Devt case | Change | Base case | Devt case | Change | Base case | Devt case | Change |
| Wandsworth Bridge Road (A217) | Left / Ahead | 269 | 55% | 56% | +1% | 7 | 7 | +1 | 39 | 39 | - |
| | Ahead / Right | 273 | 56% | 56% | - | 7 | 7 | +1 | 40 | 41 | +1 |
| Townmead | Left | 318 | 33% | 33% | - | 4 | 4 | - 1 | 11 | 11 | - |
| | Right / Ahead | 111 | 28% | 28% | - | 3 | 3 | - | 38 | 38 | - |
| Wandsworth Bridge | Left / Ahead | 1409 | 93% | 96% | +3% | 25 | 35 | +12 | 24 | 35 | +11 |
| | Right | 705 | 81% | 81% | - | 18 | 18 | - | 33 | 33 | - |
| Carnwath Road | Left / Ahead | 128 | 32% | 33% | + 1% | 3 | 3 | - | 38 | 39 | +1 |
| | Right | 257 | 86% | 91% | +5% | 9 | 11 | - | 82 | 96 | +14 |
| | | | Practical Reserve Capacity (PRC) | | | | | | Total Delay (PCU Hours) | | |
| Overall junction performance | | | -5.6% | -7.0% | -1.4% | | | | 34 | 36 | +2 |

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

*2. Assessment has assumed that traffic signal optimisation has been undertaken as detailed in Volume 2 of ES.*

**Table 10.5.4 Construction development case LinSig model outputs (PM peak hour)**

| Approach | Arm | Flow (PCU) | Weekday | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PM peak hour (17:00-18:00) | | | | | | | | |
| | | | DoS | | | MMQ (PCUs) | | | Delay (seconds per PCU) | | |
| | | | Base case | Devt t case | Change | Base case | Devt case | Change | Base case | Devt case | Change |
| Wandsworth Bridge Road (A217) | Left / Ahead | 307 | 35% | 35% | - | 6 | 6 | - | 19 | 19 | - |
| | Ahead / Right | 739 | 83% | 84% | + 1% | 19 | 20 | +1 | 34 | 35 | +1 |
| Townmead Road | Left | 548 | 84% | 84% | - | 16 | 16 | - | 42 | 42 | - |
| | Right / Ahead | 60 | 18% | 18% | - | 1 | 1 | - | 40 | 40 | - |
| Wandsworth Bridge | Left / Ahead | 1042 | 63% | 64% | + 1% | 7 | 7 | - | 9 | 10 | +1 |
| | Right | 331 | 66% | 69% | + 3% | 9 | 9 | - | 43 | 45 | +2 |
| Carnwath Road | Left / Ahead | 83 | 24% | 24% | - | 2 | 2 | - | 40 | 39 | - 1 |
| | Right | 225 | 71% | 73% | + 2% | 6 | 7 | +1 | 60 | 60 | - |
| | | | Practical Reserve Capacity (PRC) | | | | | | Total Delay (PCU Hours) | | |
| Overall junction performance | | | 7.0% | 7.0% | - | | | | 27 | 27 | - |

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

*2. Assessment has assumed that traffic signal optimisation has been undertaken as detailed in Volume 2 of ES.*

**Table 10.5.5 Construction development case PICADY model outputs (AM and PM peak hours)**

| Approach | Movement | Weekday | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | AM peak hour (08:00-09:00) | | | | PM peak hour (17:00-18:00) | | | |
| | | Flow (vehs) | RFC | MMQ (PCU) | Delay (seconds) | Flow (vehs) | RFC | MMQ (PCU) | Delay (seconds) |
| Site Access | Right | 8 | 5% | 0 | 24 | 8 | 3% | 0 | 15 |
| Carnwath Rd (westbound) | Right | 9 | 1% | 0 | 5 | 5 | 1% | 0 | 5 |

*Notes: RFC represents Ratio of Flow to Capacity. Queue represents number of vehicles in queue. Delay represents the mean delay per vehicle.*

## Construction mitigation

10.5.77 The project has been designed to limit the effects 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 10.5.6.

**Table 10.5.6 Carnwath Road Riverside design measures**

| Phase | Issues | Design measures |
|---|---|---|
| Construction | Creating access points | • Creation of gated accesses for the left-turn in / right turn-out movement for construction traffic |
| | Diversion of the Thames Path | • Diversion of pedestrians from the Thames Path to southern footway of Carnwath Road<br>• Diversion of the Thames Path would be adequately signed |
| | Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction | • Junction alterations to facilitate improved vehicle turning space and safer pedestrian environment at Wandsworth Bridge Road (northbound/Carnwath Road. |
| | Suspension of parking on Carnwath Road | • To suspend approximately 12 vehicle spaces.<br>• Average spare parking capacity is 44% or 183 spaces |
| | Movement of construction traffic flows on the local highway network | • Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction |
| Operation | Creating access point | • Provision of new dropped kerb access point<br>• To accommodate ten yearly maintenance vehicles. |

10.5.78 These embedded measures, discussed in Section 10.2, 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.

### Sensitivity testing

10.5.79 The assessment outcomes reported earlier are based on the *Transport Strategy* for this site as outlined in Section 3.

10.5.80 A sensitivity test has been undertaken to examine the implications of variation in the number of construction vehicles in the peak month of

activity at this site, including the possibility that river transport were not available for short periods of time which could temporarily increase vehicle numbers. In this sensitivity test, the number of construction vehicles would be be a maximum of 32 per hour in the AM and PM peak hour.

10.5.81 The results of the local junction modelling using these figures are presented in Table 10.5.7 and Table 10.5.8 for Wandsworth Bridge (A217) / Carnwath Road / Townmead Road junction, and in Table 10.5.9 and Table 10.5.10 for the Carnwath Road / New Access junction.

10.5.82 The results suggest that under this scenario, the Wandsworth Bridge (A217) / Carnwath Road / Townmead Road junction would operate without additional delay in the AM and PM peaks. The largest change is a 7% increase in degree of saturation from 33% to 40% on the left turn / ahead movement on Carnwath Road in the AM peak. This is not significant.

10.5.83 At the Carnwath Road / New Access junction, the results in Table 10.5.9 and Table 10.5.10 show that the junction would continue to operate within capacity. The maximum increase in delay experienced for any movement at the junction is ten seconds in the AM peak and six seconds in the PM peak for vehicles turning right into the site access.

10.5.84 The results of this sensitivity test indicate that even assuming all materials arrive and depart the site by road, the impact on the operation of the Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction and the site access junction would not be significant.

**Table 10.5.7 Construction development case LinSig model outputs (AM peak hour), sensitivity test**

| Approach | Arm | Flow (PCU) | Weekday | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AM peak hour (08:00-09:00) | | | | | | | | |
| | | | DoS | | | MMQ (PCUs) | | | Delay (seconds per PCU) | | |
| | | | Base case | Devt case | Sensitivity Test | Base case | Devt case | Sensitivity Test | Base case | Devt case | Sensitivity Test |
| Wandsworth Bridge Road (A217) | Left / Ahead | 283 | 46% | 56% | 56% | 6 | 7 | 7 | 32 | 39 | 38 |
| | Ahead / Right | 283 | 47% | 56% | 56% | 6 | 7 | 7 | 34 | 41 | 45 |
| Townmead Road | Left | 318 | 36% | 33% | 33% | 5 | 4 | 4 | 14 | 11 | 12 |
| | Right / Ahead | 111 | 29% | 28% | 28% | 3 | 3 | 3 | 39 | 38 | 38 |
| Wandsworth Bridge | Left / Ahead | 1409 | 91% | 96% | 96% | 23 | 35 | 35 | 21 | 35 | 35 |
| | Right | 705 | 83% | 81% | 83% | 18 | 18 | 18 | 35 | 33 | 35 |
| Carnwath Road | Left / Ahead | 151 | 34% | 33% | 40% | 3 | 3 | 4 | 40 | 39 | 40 |
| | Right | 257 | 92% | 91% | 91% | 11 | 11 | 11 | 102 | 96 | 96 |
| | | | Practical Reserve Capacity (PRC) | | | | | | Total Delay (PCU Hours) | | |
| Overall junction performance | | | -5.6% | -7.0% | -7.0% | | | | 34 | 38 | 38 |

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

*2. Assessment has assumed that traffic signal optimisation has been undertaken as detailed in Volume 2 of ES.*

**Table 10.5.8 Construction development case LinSig model outputs (PM peak hour), sensitivity test**

| Approach | Arm | Flow (PCU) | Weekday | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PM peak hour (17:00-18:00) | | | | | | | | |
| | | | DoS | | | MMQ (PCUs) | | | Delay (seconds per PCU) | | |
| | | | Base case | Devt case | Sensitivity Test | Base case | Devt case | Sensitivity Test | Base case | Devt case | Sensitivity Test |
| Wandsworth Bridge Road (A217) | Left Ahead | 307 | 35% | 35% | 35% | 6 | 6 | 5 | 19 | 19 | 19 |
| | Ahead Right | 762 | 83% | 84% | 85% | 19 | 20 | 21 | 34 | 35 | 35 |
| Townmead Road | Left | 548 | 84% | 84% | 86% | 16 | 16 | 16 | 42 | 42 | 45 |
| | Right Ahead | 60 | 18% | 18% | 19% | 1 | 1 | 1 | 40 | 40 | 40 |
| Wandsworth Bridge | Left Ahead | 1042 | 63% | 64% | 64% | 7 | 7 | 7 | 9 | 10 | 10 |
| | Right | 331 | 66% | 69% | 72% | 9 | 9 | 9 | 43 | 45 | 48 |
| Carnwath Road | Left Ahead | 107 | 24% | 24% | 32% | 2 | 2 | 3 | 40 | 39 | 41 |
| | Right | 225 | 71% | 73% | 73% | 6 | 7 | 7 | 60 | 60 | 60 |
| | | | Practical Reserve Capacity (PRC) | | | | | | Total Delay (PCU hours) | | |
| Overall junction performance | | | 7.0% | 7.0% | 4.3% | | | | 27 | 27 | 29 |

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

*2. Assessment has assumed that traffic signal optimisation has been undertaken as detailed in Volume 2 of ES.*

**Table 10.5.9 Construction development case PICADY model outputs (AM peak hour), sensitivity test**

| Approach | Arm | Flow (vehs) | Weekday | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AM peak hour (08:00-09:00) | | | | | | | | |
| | | | DoS | | | MMQ (vehicles) | | | Delay (seconds) | | |
| | | | Devt case | Sensitivity Test | Change | Devt case | Sensitivity Test | Change | Devt case | Sensitivity Test | Change |
| Site Access | Right | 19 | 4% | 15% | +11% | 0 | 0 | 0 | 22 | 32 | +10 |
| Carnwath Rd (w) | Right | 9 | 1% | 1% | 0 | 0 | 0 | 0 | 6 | 6 | - |

*Notes: RFC represents Ratio of Flow to Capacity. Queue represents number of vehicles in queue. Delay represents the mean delay per vehicle.*

**Table 10.5.10 Construction sensitivity development case PICADY model outputs (PM peak hour), sensitivity test**

| Approach | Arm | Flow (vehs) | Weekday | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PM peak hour (17:00-18:00) | | | | | | | | |
| | | | DoS | | | MMQ (vehicles) | | | Delay (seconds) | | |
| | | | Devt case | Sensitivity Test | Change | Devt case | Sensitivity Test | Change | Devt case | Sensitivity Test | Change |
| Site Access | Right | 20 | 3% | 10% | +7% | 0 | 0 | 0 | 14 | 20 | +6 |
| Carnwath Rd (w) | Right | 5 | 1% | 1% | 0 | 0 | 0 | 0 | 6 | 6 | - |

*Notes: RFC represents Ratio of Flow to Capacity. Queue represents number of vehicles in queue. Delay represents the mean delay per vehicle.*

### Operational assessment

10.5.85 This section summarises the findings of the assessment undertaken for Year 1 of operation at the Carnwath Road Riverside site.

10.5.86 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 2. This has been discussed with TfL and the LB of Hammersmith and Fulham.

## Operational base case

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

10.5.88 As explained in paragraph 10.2.56 the elements of the transport network that would be affected during operation are highway layout and operation and parking. For the purposes of the operational base case it is anticipated that the highway layout and parking will be as described in the construction base case.

10.5.89 The operational base case also takes into account the developments described in the Development Schedule contained in Volume 10 Appendix N of the *Environmental Statement*. All three of the developments within 250m of the site (Wandsworth Riverside Quarter, Townmead Road concrete plant and Western Riverside Transfer Station) would be complete by Year 1 of operation.

## Operational development case

10.5.90 The operational development case for the Carnwath Road Riverside site includes any permanent changes in the vicinity of the Carnwath Road Riverside site as a result of the Thames Tideway Tunnel project and takes into consideration the occasional maintenance activities required at the Carnwath Road Riverside site.

10.5.91 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 required for access to the shaft and tunnel every ten years.

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

10.5.93 The permanent highway layout plans- area 1 and area 2 are provided in the Carnwath Road Riverside site *Transport Assessment* figures and indicates the operational phase permanent works.

### Parking

10.5.94 No change is expected to car parking in the vicinity of the Carnwath Road Riverside site compared to the base case as a result of the operational phase of the proposed development at the Carnwath Road Riverside site.

10.5.95 When large vehicles are required to service the Carnwath Road Riverside site, the suspension of a small number of parking bays maybe required depending on the size of vehicle. This temporary suspension would be on

an infrequent basis and would occur approximately once every six months at most.

10.5.96 Taking into consideration the infrequent and temporary nature of the arrival of vehicles at Carnwath Road Riverside which would require parking suspension it is anticipated that parking activity in the area would not be significantly affected.

### Highway layout and operation

10.5.97 During the operational phase, the site would be accessed via Carnwath Road from the westbound lane. The permanent highway layout plan is provided in the Carnwath Road Riverside site *Transport Assessment* figures and shows the access arrangements for the operational phase.

10.5.98 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 Carnwath Road Riverside site.

10.5.99 During ten-yearly inspections, an area to locate two large cranes and support vehicles within the Carnwath Road Riverside site area would be required. The cranes would facilitate lowering and recovery of tunnel inspection vehicles, and to provide duty / standby access for personnel.

10.5.100 To assess the effect of these on the highway layout, swept path analyses have been undertaken for the largest vehicles expected to access the site; an 11.36m mobile crane, a 10m articulated vehicle, a 10.7m articulated vehicle and a 13.63m mobile crane. The permanent highway layout vehicle swept path analysis plan is provided in the Carnwath Road Riverside site *Transport Assessment* figures indicate the swept path movements during operation and shows that the operational vehicles would be able to safely enter and leave the site.

10.5.101 As identified above, when large vehicles are required to service the site, it may be necessary to suspend a small number of parking bays for a short time. When these larger vehicles are required to service the Carnwath Road Riverside site there may be some temporary, short-term delay to other road users while manoeuvres are made. However it is anticipated that the arrival of large vehicles would normally be scheduled to take place outside of the peak hours to minimise the effect on the local highway network.

10.5.102 Due to the infrequent nature of maintenance trips there is anticipated to be no significant change to the surrounding highway network.

### Operational mitigation

10.5.103 The project has been designed to limit the effects on transport networks as far as possible and many measures have been embedded directly into the design of the project, including the *CoCP*.

10.5.104 Due to there being no significant changes to the transport networks during the operational phase, no mitigation is required other than the minor measures set out in Table 10.5.6.

## 10.6 Summary of site-specific Transport Assessment

10.6.1 The outcomes of this *TA* demonstrate the key findings indicated in Table 10.6.1.

**Table 10.6.1 Carnwath Road Riverside *Transport Assessment* results**

| Phase | Mode of transport | Key Findings |
|---|---|---|
| Construction | Pedestrians | The average increase in pedestrian journey time would be a maximum of 60 seconds due to the need to cross both site accesses on Carnwath Road; however, it is unlikely that pedestrians would encounter vehicle movements at both accesses therefore the average delay to the few pedestrians crossing the Carnwath Road Riverside site entrance at the same time as vehicle access/ egress is likely to be in the order of 30 seconds.<br>With the exception of the delays mentioned immediately above, no change to pedestrian journey times as a result of the diversion of the Thames Path |
| | Cyclists | No change to cycle journey times as a result of the diversion of the Thames Path. There would be a maximum change in cycle journey time of seven seconds for cyclists turning right from Wandsworth Bridge Road (A217) southbound into Carnwath Road westbound. |
| | Bus patronage and operators | Approximately 20 worker trips would be made by bus in the AM peak and 13 in the PM peak. Rail users completing journeys by bus would increase demand to approximately 62 journeys in the AM peak and 39 in the PM peak. These could be accommodated on base case services.<br>The boarding / alighting points for the hail-and-ride section of route 424 on Carnwath Road would be suspended adjacent to the Carnwath Road Riverside site. This would affect only a small number of passengers; the route itself would continue to operate.<br>The delay for services 295 and 28 is expected to be a maximum of 7 seconds, service 424 a maximum delay of 5 seconds and service C3 experiences a reduction in delay resulting from the construction traffic accessing the Carnwath Road Riverside site. |
| | London Underground, London Overground and National Rail patronage | Approximately 42 worker trips would be made by London Undergound, London Overground or National Rail in the AM peak and 26 in the PM peak which could be accommodated on base case services |
| | River navigation | Approximately four barge movements per day presenting no significant change to river |

| Phase | Mode of transport | Key Findings |
|---|---|---|
| | | navigation conditions. |
| | Parking | Three sections of on-street car parking along Carnwath Road totalling approximately 12 vehicle spaces would be suspended. Waiting and loading restriction times would be extended to 07:00 – 19:00 in the vicinity of the Carnwath Road Riverside site access. |
| | Highway network and operation | Approximately 441 additional daily movements would be produced by the construction works at Carnwath Road Riverside. It should be noted that close to a half of these movements are attributed to worker vehicle movements which are very unlikely to materialise.<br>The Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road junction in the construction base case would be operating over capacity during the AM peak hour and within capacity during the PM peak hour. The addition of the Thames Tideway Tunnel traffic (anticipated to be 45 construction vehicle trips (90 movements) during the peak hours) results in an overall increase in delay of two seconds per vehicle in the PM peak hour. On any one arm the maximum delay is fourteen seconds per vehicle in the AM peak hour. |
| Operation | Parking | Minor temporary parking bay suspension may be required when large cranes require access to the Carnwath Road Riverside site approximately every ten years. |
| | Highway layout and operation | Some network delay may be experienced by other road users when large vehicles are accessing the Carnwath Road Riverside site, however this will be infrequent and temporary. |

# References

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

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

[3] TfL. London Undergr*ound Upgrade Plan,* 2011. Available at: *http://www.tfl.gov.uk/assets/downloads/corporate/our-upgrade-plan-london-underground-february-2011.pdf*

[4] HM Government, Equality Act 2010 – Guidance, 2010

[5] Traffic Advisory Leaflet 15/99 (December 1999) *Cyclists at Roadworks – Guidance* was produced by TfL and provides recommended lane widths at roadworks.

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**Thames Tideway Tunnel**
Thames Water Utilities Limited

# Application for Development Consent

Application Reference Number: WWO10001

# Transport Assessment

Doc Ref: **7.10.07**

## Carnwath Road Riverside

### Appendices

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

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# Thames Tideway Tunnel

# Transport Assessment

# Section 10 Appendices: Carnwath Road Riverside

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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 Carnwath Road Riverside. 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 Hammersmith and Fulham.

## 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 *Draft Project Framework Travel Plan* which accompanies this application.

## 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 Hammersmith and Fulham have a number of policies relevant to transport within the Unitary Development Plan (UDP), Local Development Framework (LDF) and Supplementary Planning Guidance (SPG) for the Thames Strategy.

### Unitary Development Plan (LB of Hammersmith and Fulham, 2003)

A.4.2 The UDP was adopted by the London Borough of Hammersmith and Fulham in August 2003 with certain policies 'saved' from September 2007 and will remain until adopted policies in Development Plan Documents (DPDs) and Supplementary Planning Documents (SPDs) within the LDF replace them. It is a technical town planning document that acts as a land use strategy document and also sets out policies that planning applications will be considered against.

A.4.3 The transport related policies set out the integration of land use and transport , major improvements to both the public transport and road networks as well as all other modes of transport.

A.4.4 **Policy G0 – Sustainable development** with regards to transport wishes to:

- Seek a co-ordinated transportation structure based on the main structural land use elements of the borough; and

- Encourage the use of public transport and energy-efficient transport modes.

A.4.5 **Policy G3 – Environment** aims to conserve, protect and enhance the quality, character and identity of the borough's built and open environment through:

- Making the environment safer and more accessible for all; and
- Reduction of pollution such as from road traffic and other forms of transport.

A.4.6 **Policy G4 – Transportation and accessibility**

- Development will be guided to locations that minimise the need to travel, and will be required to incorporate access arrangements that encourage the use of sustainable modes of travel and transport;
- Promotion of traffic restraint and reduction with the aim of reducing congestion and air pollution, and avoiding the need for increasing the road capacity;
- Land use provision for improvements to the road network only when necessary to maintain a safe, free flow traffic network;
- The siting, design and layout of development will require providing easy access for disabled people, as well as a safe, secure and direct access for pedestrians, as well as the provision of facilities to encourage sustainable modes of transport; and
- Measures will be sought to promote rail and water for freight transport.

## Local Development Framework – Core Strategy (LB of Hammersmith and Fulham, 2010)

A.4.7 The LDF was adopted in October 2011, replacing the Unitary Development Plan. The document "sets out the Borough Partnership's long term vision,...to create a borough of opportunity for all."

A.4.8 With regards to transport, improvements to public transport, as well as the highway, pedestrian and cycle networks where required particularly as a results of regeneration initiatives will be carefully considered.

A.4.9 **Strategic policy SFR – South Fulham** riverside seeks to encourage river related use as well as linkages to the riverside. All developments must be acceptable in terms of its transport impact, and where necessary, contributions to improvements to affected networks should be made.

A.4.10 **Borough wide strategic policy - RTC1 – River Thames and Grand Union Canal** aims to enhance and increase access and use of the waterways in the Borough, namely the River Thames and the Grand Union Canal by several means, including:

- Ensuring the provision, or improvement and greening of the Thames Path National Trail (the Riverside Walk) in all riverside developments and the canalside tow path; and

- Improvement to the linkages to the river and riverside walk and the canal where appropriate.

A.4.11 **London wide strategic policy - CC3 – Waste management** seeks where possible to provide movement of waste and recyclable materials by sustainable means of transport, including the use of the Grand Union Canal.

A.4.12 **Borough wide strategic policy - T1** – Transport seeks to improve transportation provision and accessibility by:

- Promote major improvements with new stations and passenger services on the West London Line;
- Supporting Crossrail and the national High Speed 2 (HS2) Heathrow rail link proposal;
- Seeking a new station on the Central Line at Du Cane Road;
- Seeking increased capacity and reliability on Piccadilly and District Lines;
- Seeking a routeing of the Chelsea-Hackney line (Crossrail 2) via Chelsea Harbour/Sands End;
- Seeking increased use of the Thames for passenger services and the Grand Union Canal for passenger and freight use;
- Increasing the opportunities for walking, i.e. extending the Thames Path National Trail, and for cycling, i.e. completing the Cycle Super Highways;
- Seeking localised improvements to the highway network to reduce congestion on north-south routes in the borough;
- Securing access improvements for all, particularly people with disabilities, as part of planning permissions for new developments in the borough;
- Ensuring appropriate parking is provided to meet the essential needs of the development without impacting on the quality of the urban environment; and
- To relate the intensity of development to public transport accessibility and highway capacity.

## Supplementary Planning Guidance – Thames Strategy (Kew-Chelsea) (WS Atkins plc, 2002).

A.4.13 This document provides the following guidance with regards to transport:

- Consideration to improvements in areas such as installation of bus lanes where accessibility to rail and underground are particularly poor. In addition there are accessibility issues regarding the links of local areas of interest particularly concerning the route for tourists;

- Improving the interchange between public transport modes in the vicinity of the River, providing easier access to the riverside for pedestrians and cyclists;
- Provision for new or improved river crossings;
- Design of new sections of the riverside path should incorporate full accessibility, including full access for disabled people, way marking and other sign posting and street furniture to indicate links to other walking routes, stations and bus stops;
- Locations to car parking facilities for disabled users close to the river should be as close as possible to the site;
- Consideration for the provision of an Eco-bus route along both sides of the River to facilitate improved accessibility to the riverside;
- Options for extending the use of the Thames for regular and frequent passenger travel should be explored; and
- Consideration for the use of the river for freight movement.

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# Appendix B – PTAL analysis

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# PTAI Study Report File Summary

## PTAI Run Parameters

| | |
|---|---|
| PTAI Run | 20121409180129 |
| Description | 20121409180129 |
| Run by user | PTAL web application |
| Date | 26/09/2012 |

## 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: | 525507, 175579 |

| Mode | Stop | Route | Distance (metres) | Frequency (vph) | Weight | Walk time (mins) | SWT (mins) | TAT (mins) | EDF | AI |
|---|---|---|---|---|---|---|---|---|---|---|
| BUS | PETERBORO' R CARNWATH RD | 424 | 174.34 | 2 | 0.5 | 2.18 | 17 | 19.18 | 1.56 | 0.78 |
| BUS | WANDSWORTH BRIDGE TAVERN | 28 | 398.49 | 8 | 1 | 4.98 | 5.75 | 10.73 | 2.8 | 2.8 |
| BUS | WANDSWORTH BRIDGE TAVERN | 295 | 398.49 | 7.5 | 0.5 | 4.98 | 6 | 10.98 | 2.73 | 1.37 |
| BUS | WANDSWORTH BRIDGE TAVERN | C3 | 398.49 | 8 | 0.5 | 4.98 | 5.75 | 10.73 | 2.8 | 1.4 |

Total AI for this POI is 6.35.

PTAL Rating is 2.

# Appendix C – Local modelling outputs

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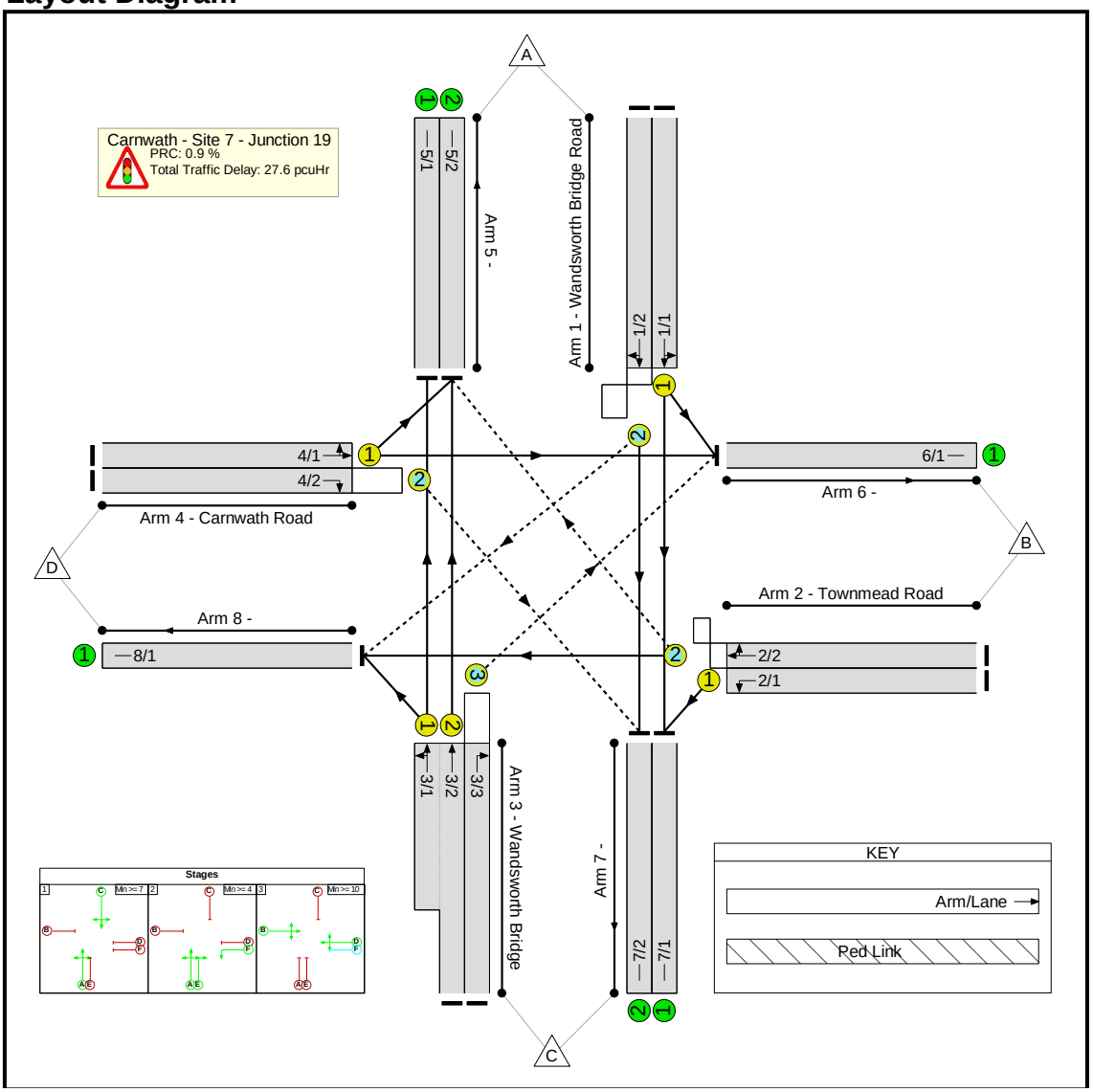
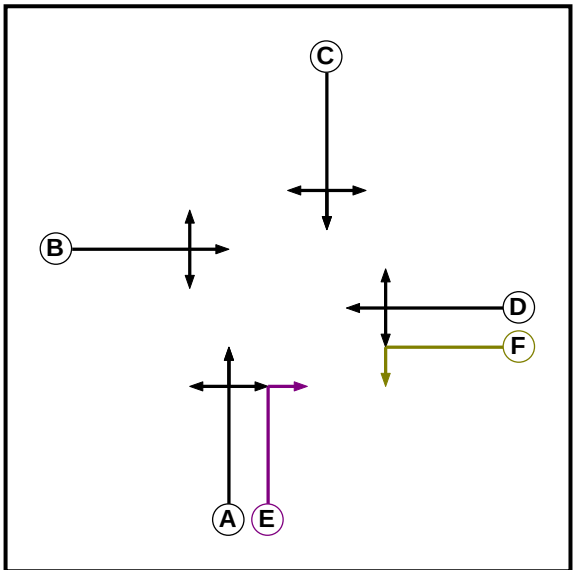
# C.1 Baseline results, AM peak hour

## Carnwath Road / Wandsworth Bridge Road / Townmead Road junction, existing signalised layout

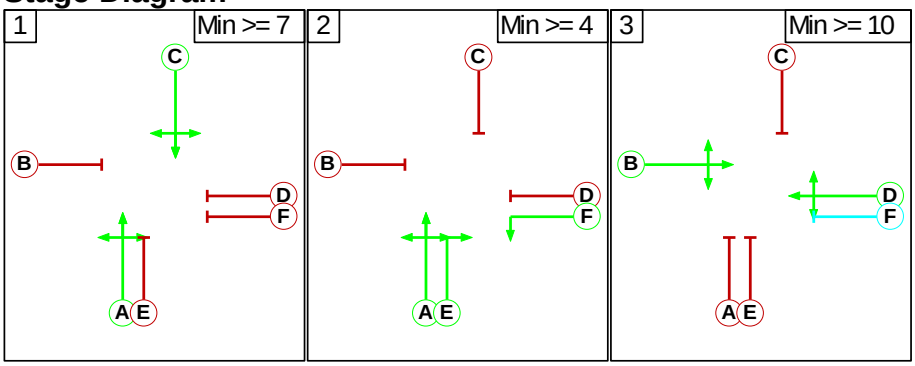
### Network Layout Diagram



## Phase Diagram




## Stage Diagram




## Phases in Stage

| Stage No. | Phases in Stage |
|---|---|
| 1 | A C |
| 2 | A E F |
| 3 | B D |

## Phase Intergreens Matrix

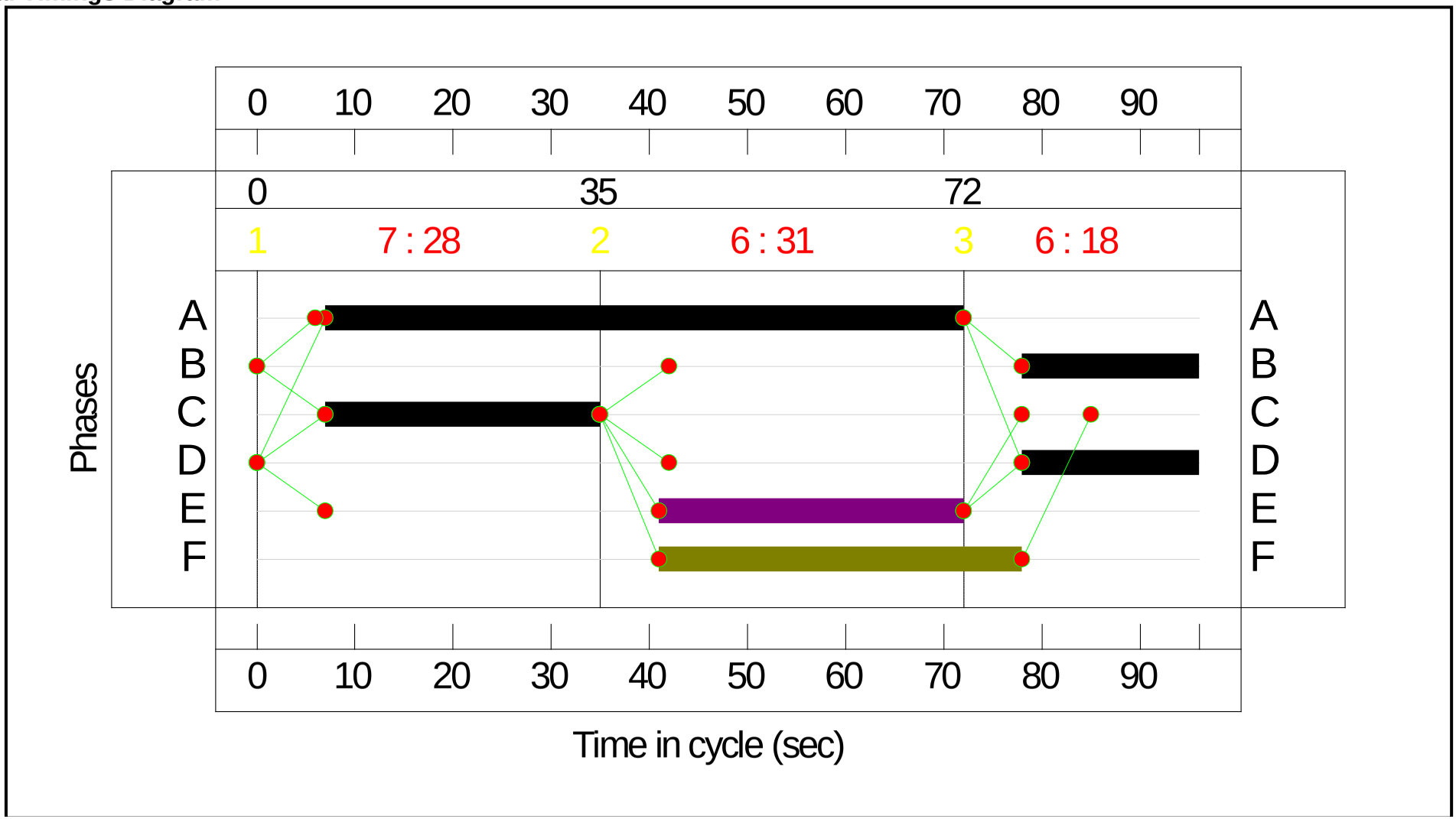
| | | Starting Phase | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F |
| Terminating Phase | A | | 6 | - | 6 | - | - |
| | B | 6 | | 7 | - | - | - |
| | C | - | 7 | | 7 | 6 | 6 |
| | D | 7 | - | 7 | | 7 | - |
| | E | - | - | 6 | 6 | | - |
| | F | - | - | 7 | - | - | |

## Traffic Flows, Desired

**Desired Flow :**

| | | Destination | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | Tot. |
| Origin | A | 0 | 17 | 492 | 5 | 514 |
| | B | 12 | 0 | 304 | 91 | 407 |
| | C | 612 | 673 | 0 | 728 | 2013 |
| | D | 18 | 100 | 232 | 0 | 350 |
| | Tot. | 642 | 790 | 1028 | 824 | 3284 |

**Signal Timings Diagram**



## Network Results

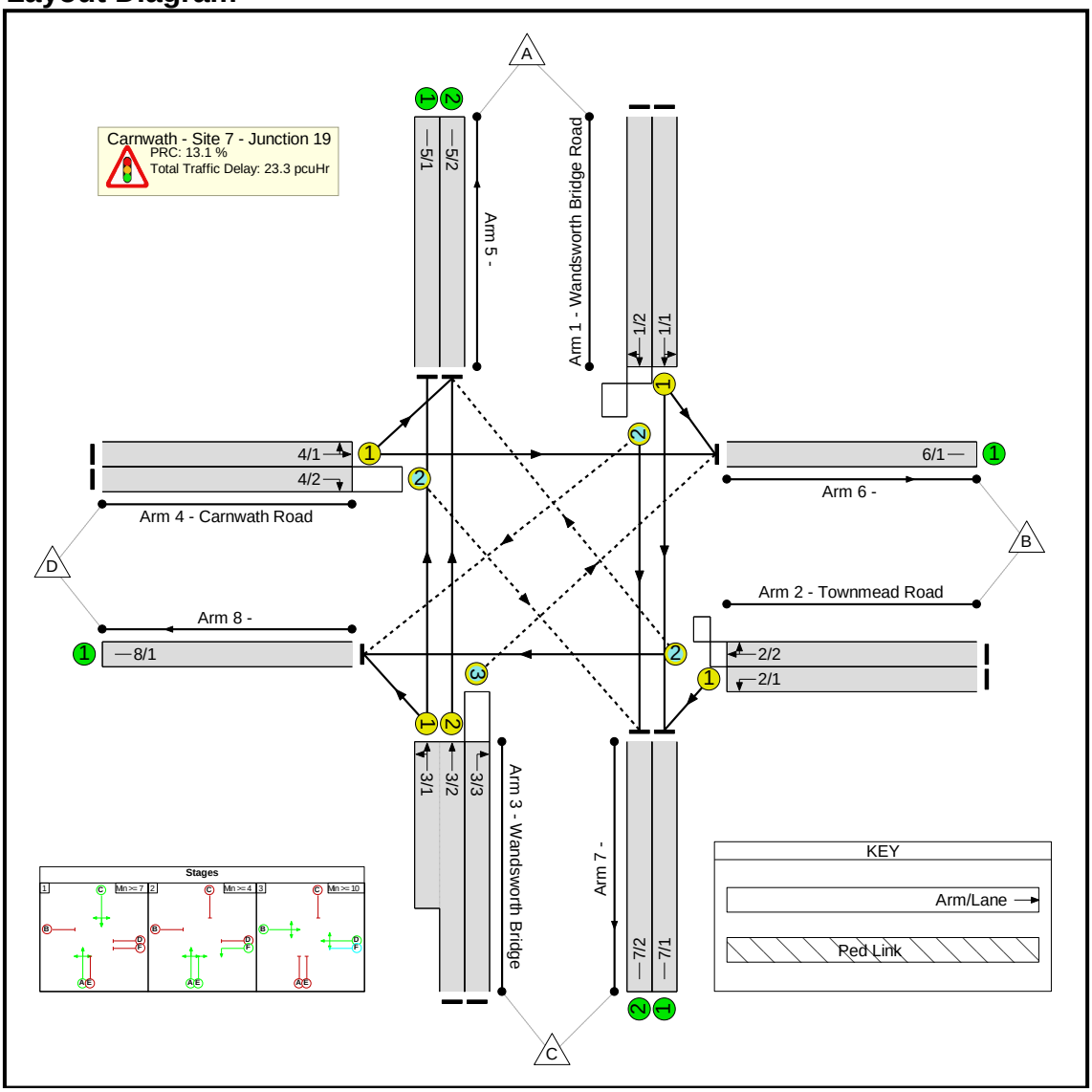
| Item | Lane Description | Full Phase | Demand Flow (pcu) | Deg Sat (%) | Av. Delay Per PCU (s/pcu) | Mean Max Queue (pcu) |
|---|---|---|---|---|---|---|
| 1/1 | Wandsworth Bridge Road Left Ahead | C | 150 | 27.0% | 29.9 | 3.2 |
| 1/2 | Wandsworth Bridge Road Ahead Right | C | 364 | 64.0% | 38.5 | 9.3 |
| 2/1 | Townmead Road Left | D | 304 | 33.3% | 13.3 | 4.4 |
| 2/2 | Townmead Road Right Ahead | D | 103 | 28.9% | 40.2 | 2.5 |
| 3/2+3/1 | Wandsworth Bridge Ahead Left | A | 1340 | 89.2% | 18.7 | 21.4 |
| 3/3 | Wandsworth Bridge Right | A | 673 | 80.0% | 33.1 | 16.9 |
| 4/1 | Carnwath Road Left Ahead | B | 118 | 33.6% | 40.8 | 2.9 |
| 4/2 | Carnwath Road Right | B | 232 | 87.4% | 87.9 | 8.9 |

C1 PRC for Signalled Lanes (%): 0.9 Total Delay for Signalled Lanes (pcuHr): 27.55 Cycle Time (s): 96
PRC Over All Lanes (%): 0.9 Total Delay Over All Lanes(pcuHr): 27.55

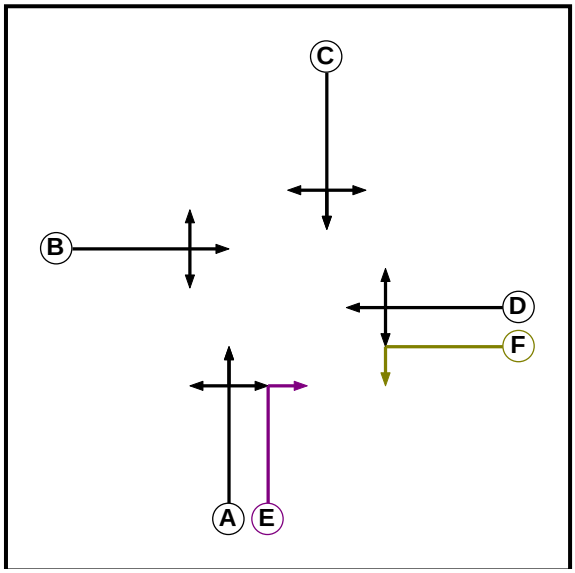
# C.2 Baseline results, PM peak hour

## Carnwath Road / Wandsworth Bridge Road / Townmead Road junction, existing signalised layout

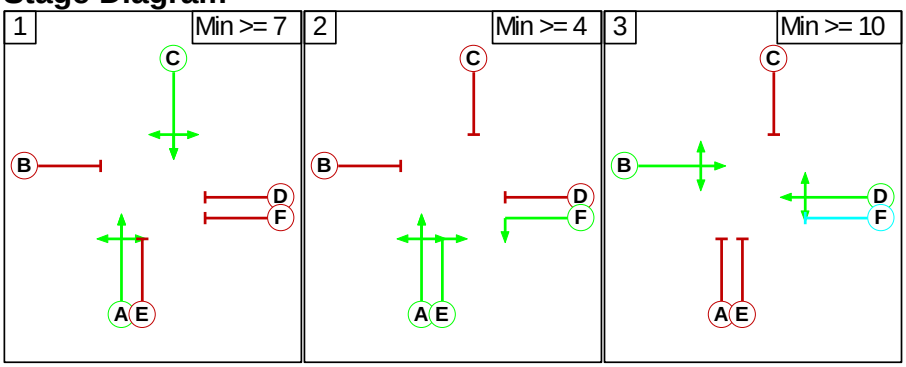
### Network Layout Diagram



## Phase Diagram




## Stage Diagram




## Phases in Stage

| Stage No. | Phases in Stage |
|---|---|
| 1 | A C |
| 2 | A E F |
| 3 | B D |

## Phase Intergreens Matrix

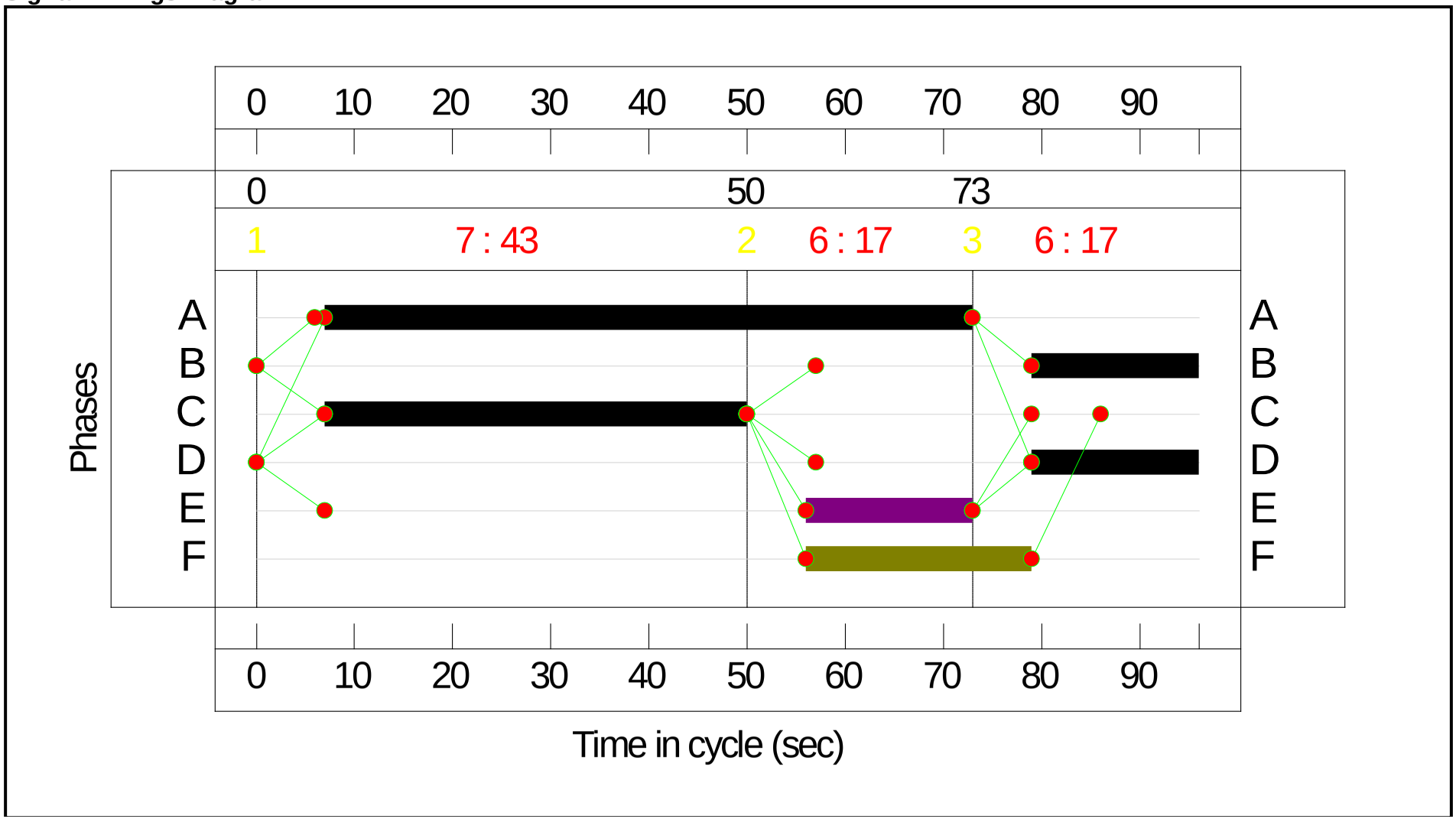
| | | Starting Phase | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F |
| Terminating Phase | A | | 6 | - | 6 | - | - |
| | B | 6 | | 7 | - | - | - |
| | C | - | 7 | | 7 | 6 | 6 |
| | D | 7 | - | 7 | | 7 | - |
| | E | - | - | 6 | 6 | | - |
| | F | - | - | 7 | - | - | |

## Traffic Flows, Desired

**Desired Flow :**

| | | Destination | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | Tot. |
| Origin | A | 0 | 19 | 966 | 6 | 991 |
| | B | 17 | 0 | 521 | 38 | 576 |
| | C | 593 | 315 | 0 | 394 | 1302 |
| | D | 11 | 65 | 198 | 0 | 274 |
| | Tot. | 621 | 399 | 1685 | 438 | 3143 |

**Signal Timings Diagram**



## Network Results

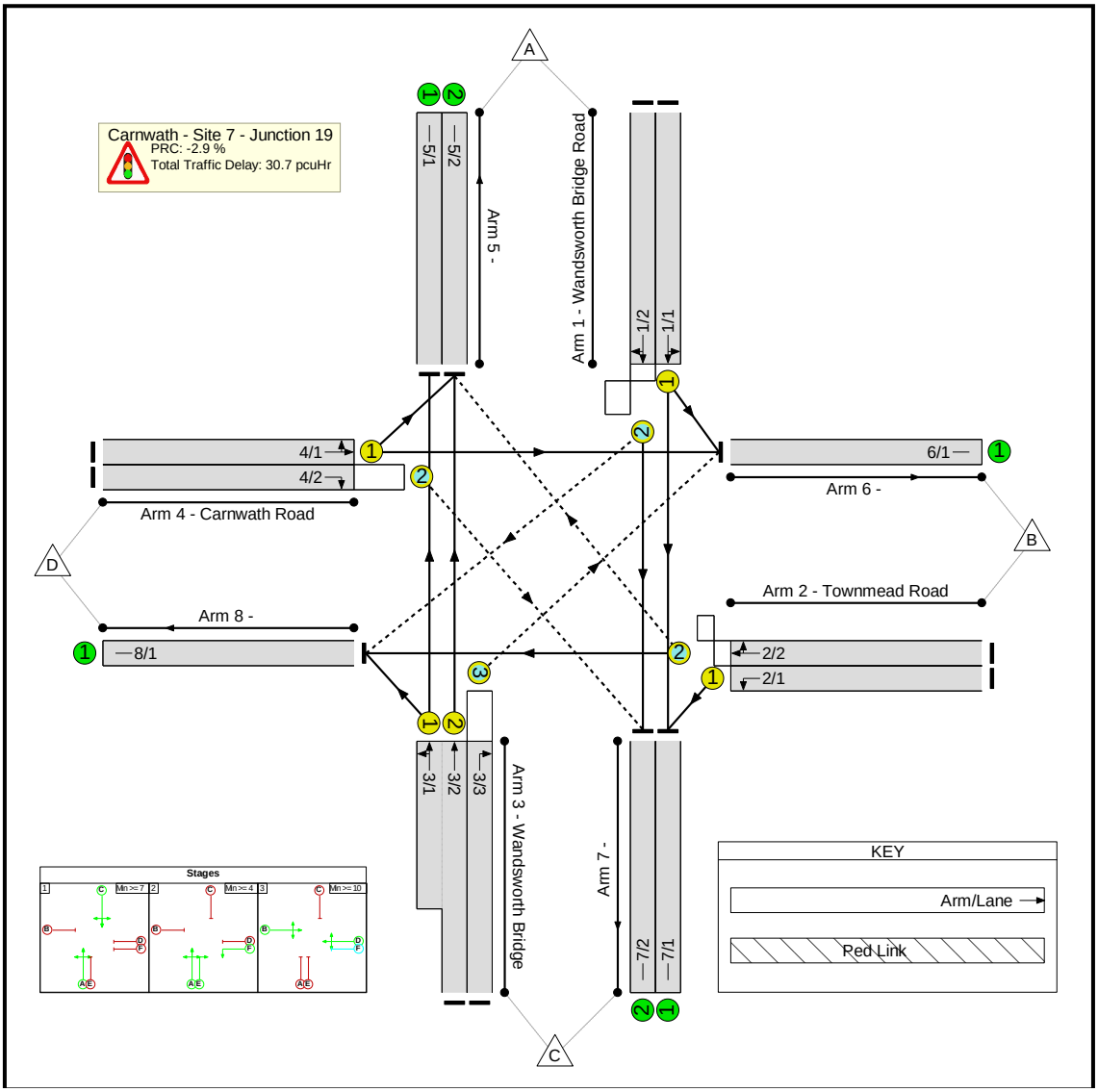
| Item | Lane Description | Full Phase | Demand Flow (pcu) | Deg Sat (%) | Av. Delay Per PCU (s/pcu) | Mean Max Queue (pcu) |
|---|---|---|---|---|---|---|
| 1/1 | Wandsworth Bridge Road Left Ahead | C | 304 | 35.7% | 20.1 | 5.5 |
| 1/2 | Wandsworth Bridge Road Ahead Right | C | 687 | 79.6% | 32.2 | 17.4 |
| 2/1 | Townmead Road Left | D | 521 | 78.0% | 35.6 | 13.6 |
| 2/2 | Townmead Road Right Ahead | D | 55 | 16.7% | 40.1 | 1.3 |
| 3/2+3/1 | Wandsworth Bridge Ahead Left | A | 987 | 59.8% | 8.6 | 6.6 |
| 3/3 | Wandsworth Bridge Right | A | 315 | 59.4% | 38.4 | 7.8 |
| 4/1 | Carnwath Road Left Ahead | B | 76 | 22.8% | 40.1 | 1.9 |
| 4/2 | Carnwath Road Right | B | 198 | 66.6% | 56.9 | 5.8 |

C1 PRC for Signalled Lanes (%): 13.1 Total Delay for Signalled Lanes (pcuHr): 23.31 Cycle Time (s): 96
PRC Over All Lanes (%): 13.1 Total Delay Over All Lanes(pcuHr): 23.31

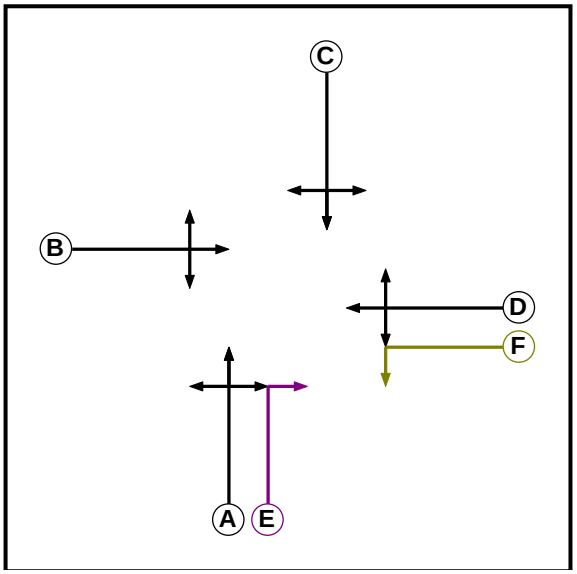
# C.3 Construction base case results, AM peak hour

## Carnwath Road / Wandsworth Bridge Road / Townmead Road junction, existing signalised layout

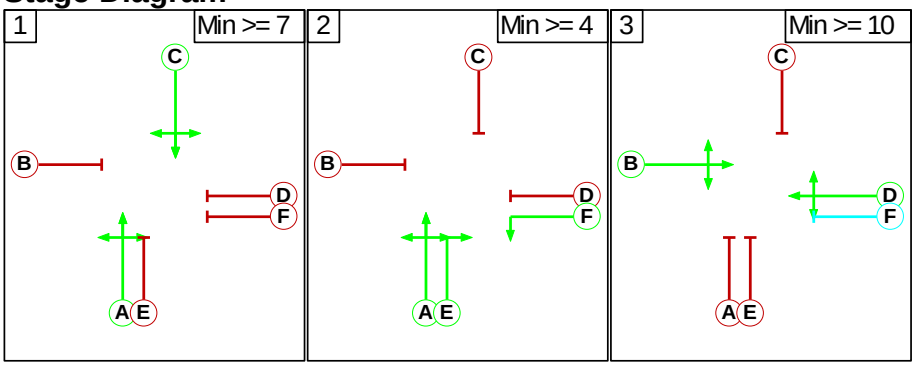
### Network Layout Diagram



## Phase Diagram




## Stage Diagram




## Phases in Stage

| Stage No. | Phases in Stage |
|---|---|
| 1 | A C |
| 2 | A E F |
| 3 | B D |

## Phase Intergreens Matrix

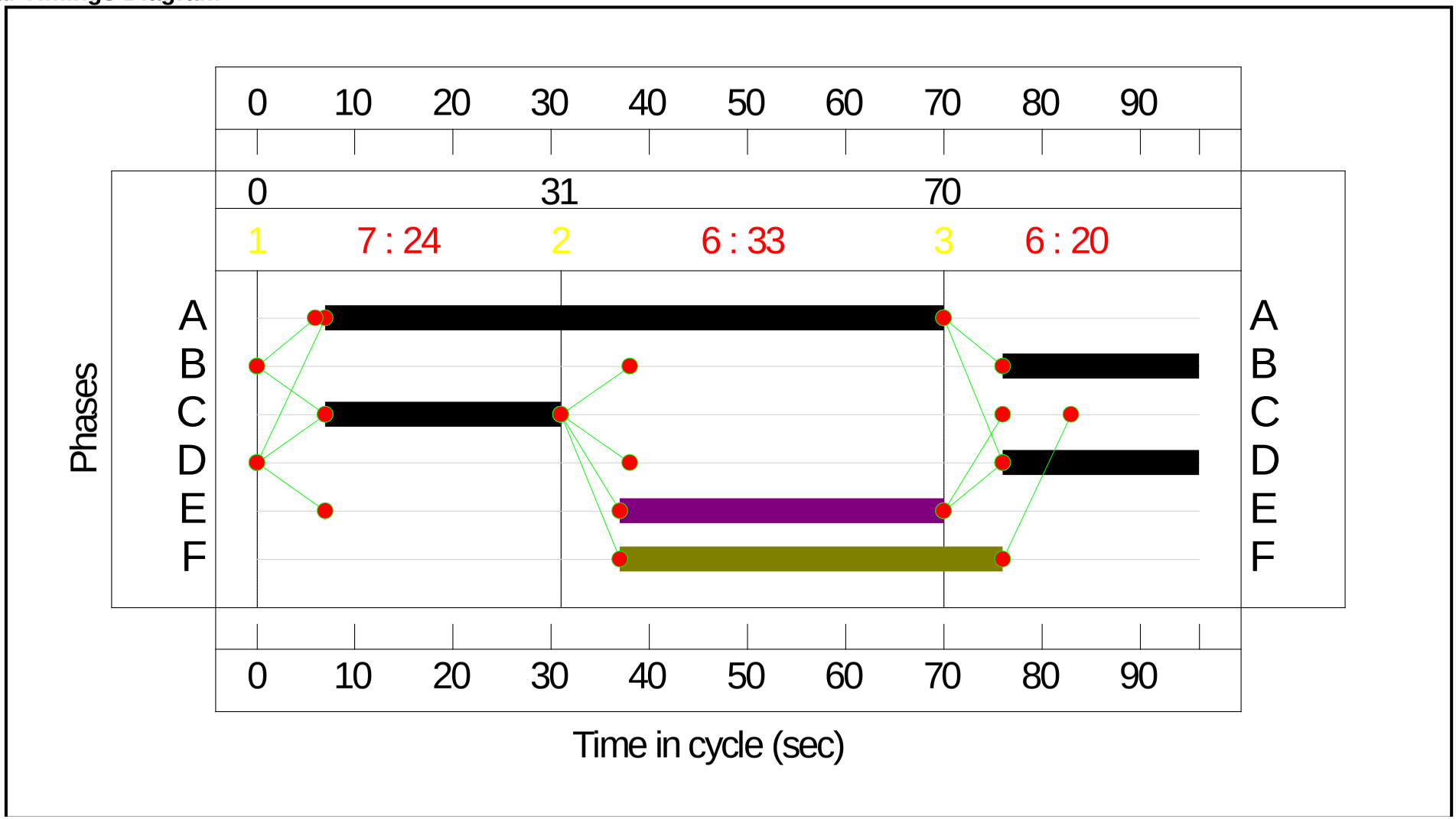
| | | Starting Phase | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F |
| Terminating Phase | A | | 6 | - | 6 | - | - |
| | B | 6 | | 7 | - | - | - |
| | C | - | 7 | | 7 | 6 | 6 |
| | D | 7 | - | 7 | | 7 | - |
| | E | - | - | 6 | 6 | | - |
| | F | - | - | 7 | - | - | |

## Traffic Flows, Desired

**Desired Flow :**

| | | Destination | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | Tot. |
| Origin | A | 0 | 19 | 515 | 6 | 540 |
| | B | 13 | 0 | 318 | 96 | 427 |
| | C | 641 | 705 | 0 | 763 | 2109 |
| | D | 19 | 105 | 244 | 0 | 368 |
| | Tot. | 673 | 829 | 1077 | 865 | 3444 |

**Signal Timings Diagram**



## Network Results

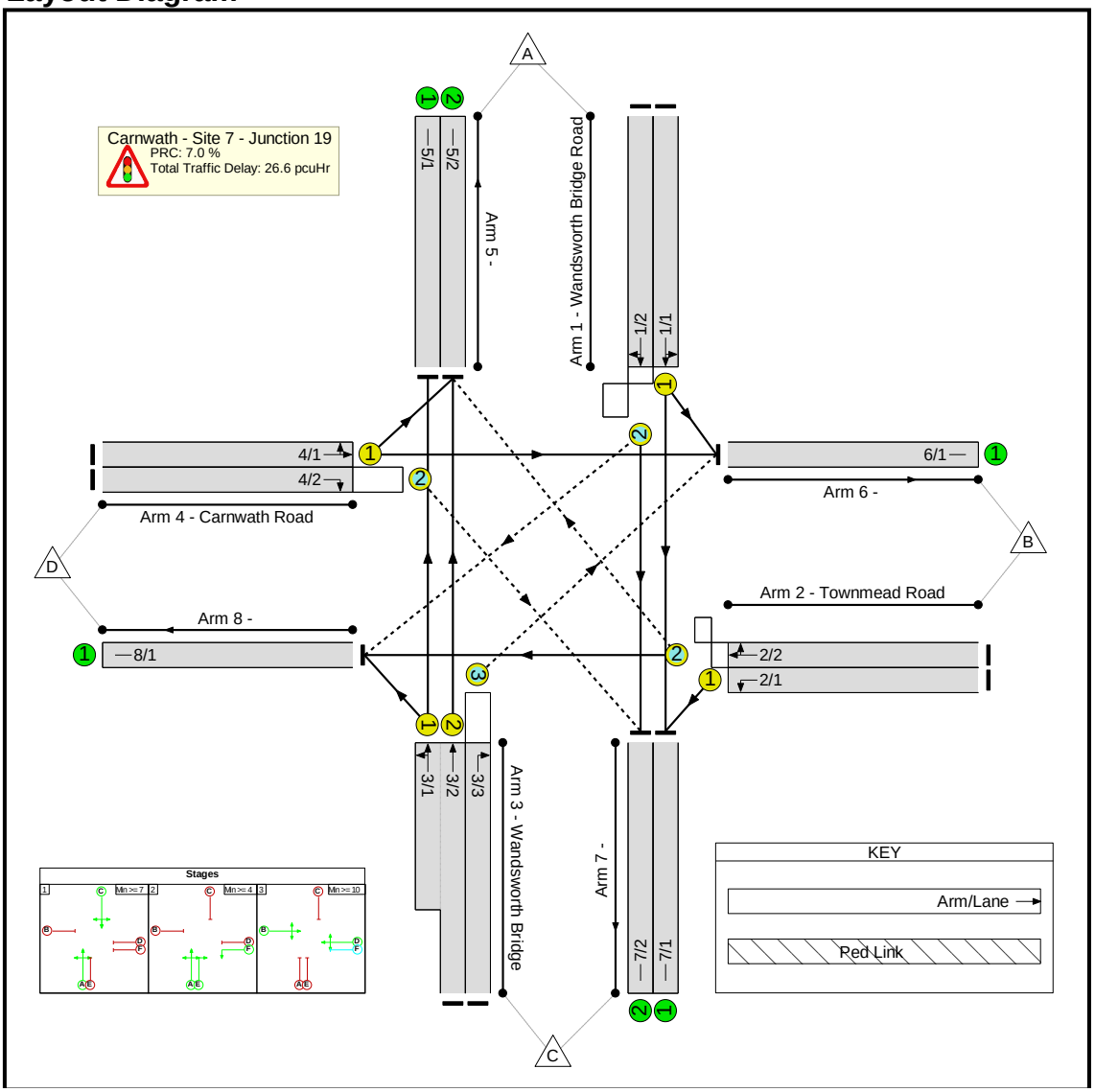
| Item | Lane Description | Full Phase | Demand Flow (pcu) | Deg Sat (%) | Av. Delay Per PCU (s/pcu) | Mean Max Queue (pcu) |
|---|---|---|---|---|---|---|
| 1/1 | Wandsworth Bridge Road Left Ahead | C | 267 | 55.2% | 38.9 | 6.7 |
| 1/2 | Wandsworth Bridge Road Ahead Right | C | 273 | 55.8% | 40.2 | 6.9 |
| 2/1 | Townmead Road Left | D | 318 | 32.5% | 11.2 | 4.2 |
| 2/2 | Townmead Road Right Ahead | D | 109 | 27.7% | 37.9 | 2.6 |
| 3/2+3/1 | Wandsworth Bridge Ahead Left | A | 1404 | 92.6% | 23.9 | 25.4 |
| 3/3 | Wandsworth Bridge Right | A | 705 | 81.3% | 33.1 | 17.8 |
| 4/1 | Carnwath Road Left Ahead | B | 124 | 31.9% | 38.3 | 3.0 |
| 4/2 | Carnwath Road Right | B | 244 | 86.4% | 81.7 | 9.1 |

C1 PRC for Signalled Lanes (%): -2.9 Total Delay for Signalled Lanes (pcuHr): 30.73 Cycle Time (s): 96
PRC Over All Lanes (%): -2.9 Total Delay Over All Lanes(pcuHr): 30.73

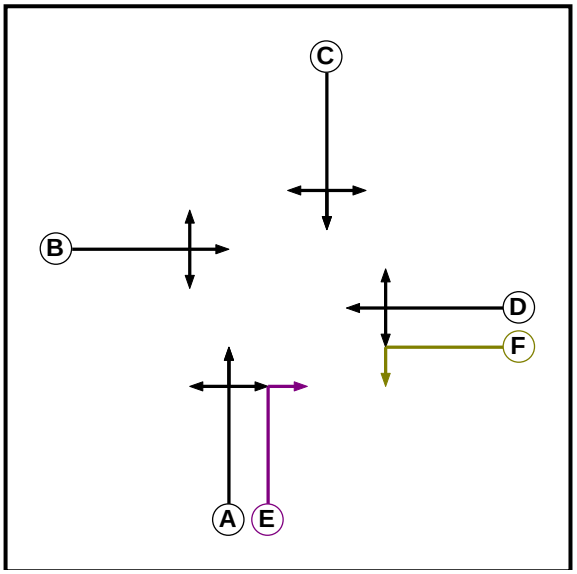
# C.4 Construction base case results, PM peak hour

## Carnwath Road / Wandsworth Bridge Road / Townmead Road junction, existing signalised layout

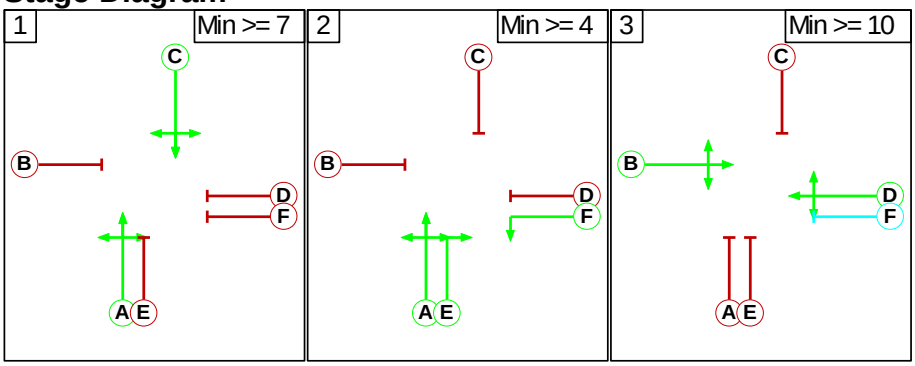
### Network Layout Diagram



## Phase Diagram




## Stage Diagram




## Phases in Stage

| Stage No. | Phases in Stage |
|---|---|
| 1 | A C |
| 2 | A E F |
| 3 | B D |

## Phase Intergreens Matrix

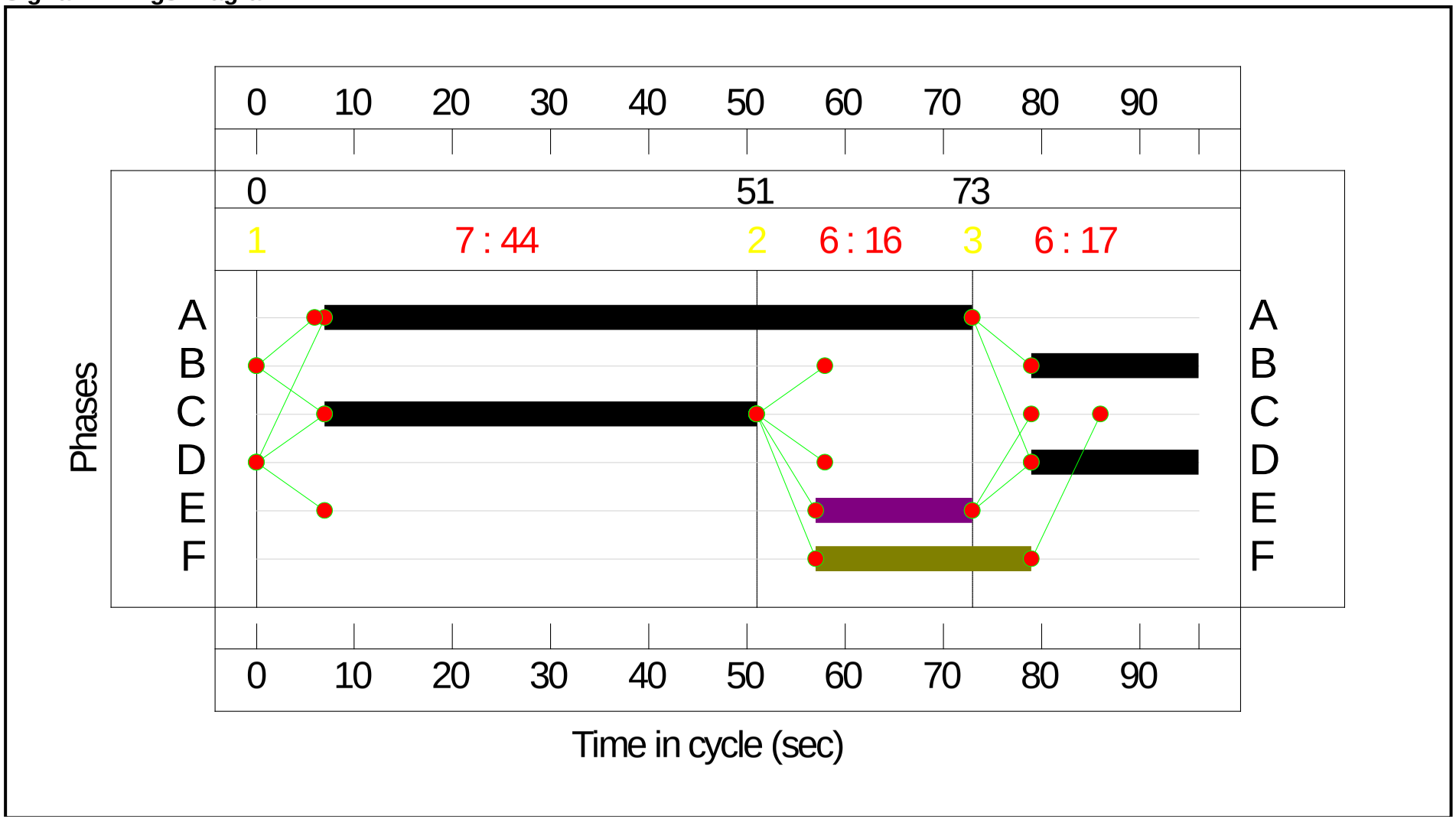
| | | Starting Phase | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F |
| Terminating Phase | A | | 6 | - | 6 | - | - |
| | B | 6 | | 7 | - | - | - |
| | C | - | 7 | | 7 | 6 | 6 |
| | D | 7 | - | 7 | | 7 | - |
| | E | - | - | 6 | 6 | | - |
| | F | - | - | 7 | - | - | |

## Traffic Flows, Desired

**Desired Flow :**

| | | Destination | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | Tot. |
| Origin | A | 0 | 21 | 1014 | 7 | 1042 |
| | B | 18 | 0 | 548 | 41 | 607 |
| | C | 623 | 331 | 0 | 414 | 1368 |
| | D | 12 | 69 | 209 | 0 | 290 |
| | Tot. | 653 | 421 | 1771 | 462 | 3307 |

**Signal Timings Diagram**



## Network Results

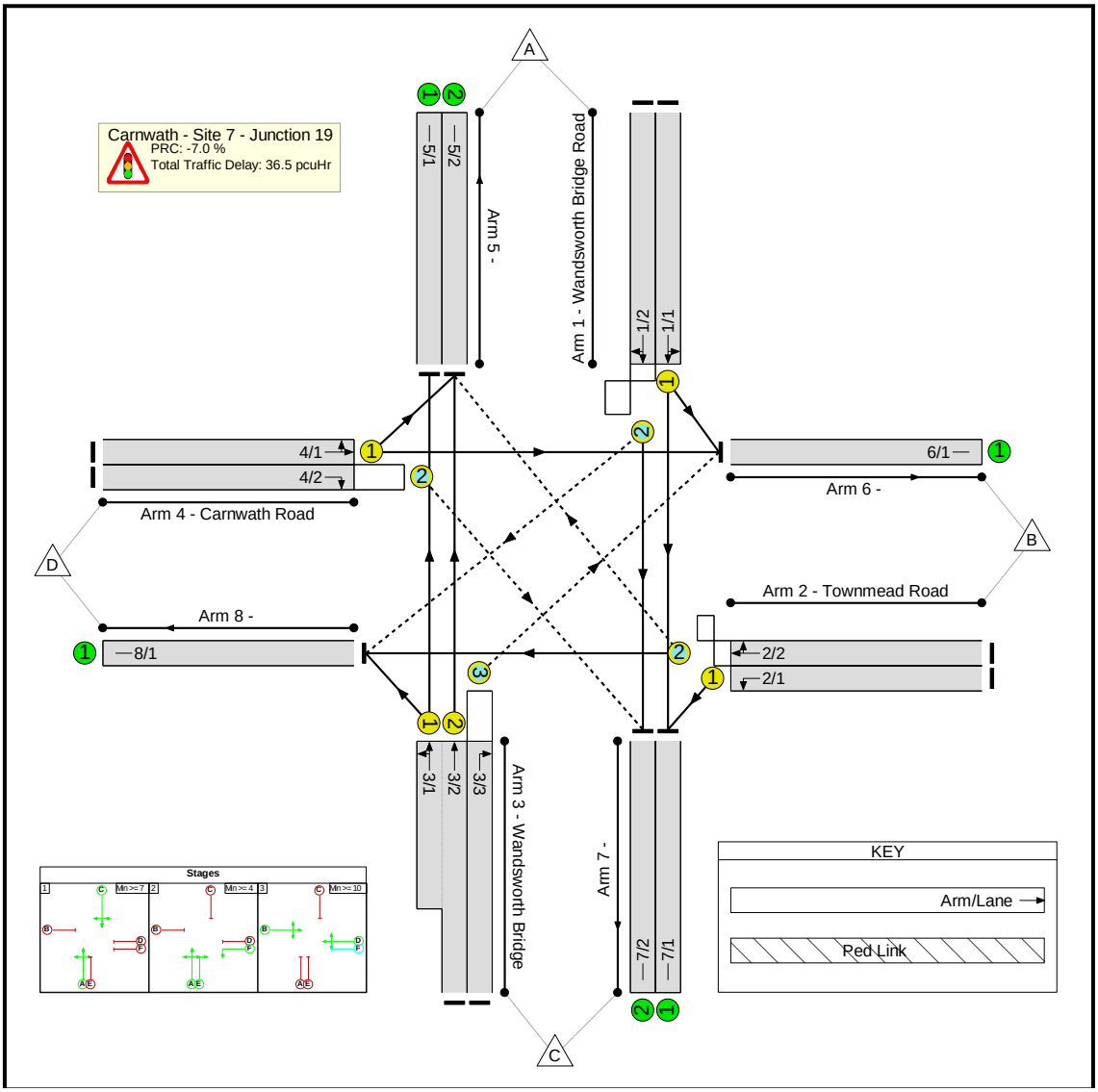
| Item | Lane Description | Full Phase | Demand Flow (pcu) | Deg Sat (%) | Av. Delay Per PCU (s/pcu) | Mean Max Queue (pcu) |
|---|---|---|---|---|---|---|
| 1/1 | Wandsworth Bridge Road Left Ahead | C | 306 | 35.1% | 19.4 | 5.5 |
| 1/2 | Wandsworth Bridge Road Ahead Right | C | 736 | 83.4% | 34.1 | 19.4 |
| 2/1 | Townmead Road Left | D | 548 | 84.1% | 41.7 | 15.6 |
| 2/2 | Townmead Road Right Ahead | D | 59 | 17.9% | 40.3 | 1.4 |
| 3/2+3/1 | Wandsworth Bridge Ahead Left | A | 1037 | 63.0% | 9.0 | 7.2 |
| 3/3 | Wandsworth Bridge Right | A | 331 | 66.3% | 42.9 | 8.7 |
| 4/1 | Carnwath Road Left Ahead | B | 81 | 24.3% | 40.3 | 2.0 |
| 4/2 | Carnwath Road Right | B | 209 | 71.0% | 60.2 | 6.4 |

C1 PRC for Signalled Lanes (%): 7.0 Total Delay for Signalled Lanes (pcuHr): 26.58 Cycle Time (s): 96
PRC Over All Lanes (%): 7.0 Total Delay Over All Lanes(pcuHr): 26.58

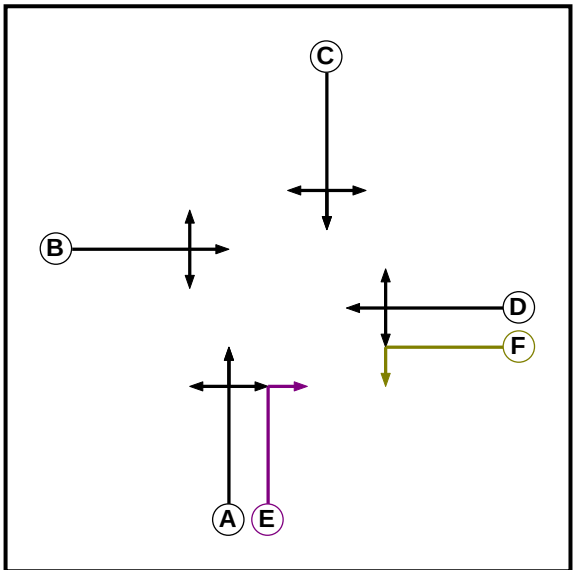
# C.5 Construction development case results, AM peak hour

## Carnwath Road / Wandsworth Bridge Road / Townmead Road junction, existing signalised layout

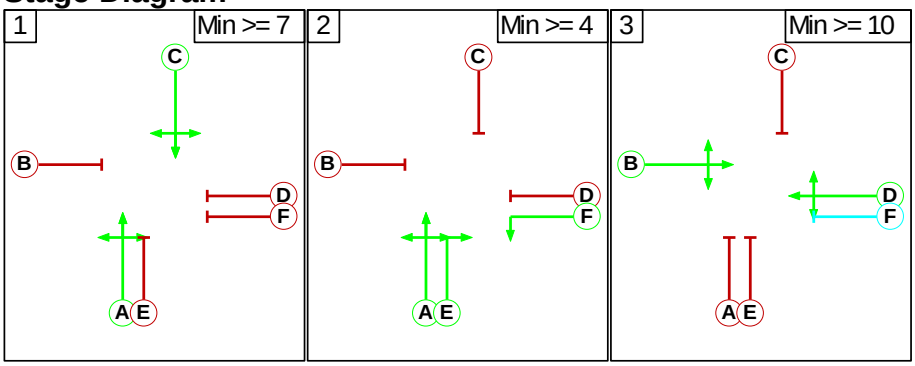
### Network Layout Diagram



## Phase Diagram




## Stage Diagram




## Phases in Stage

| Stage No. | Phases in Stage |
|---|---|
| 1 | A C |
| 2 | A E F |
| 3 | B D |

## Phase Intergreens Matrix

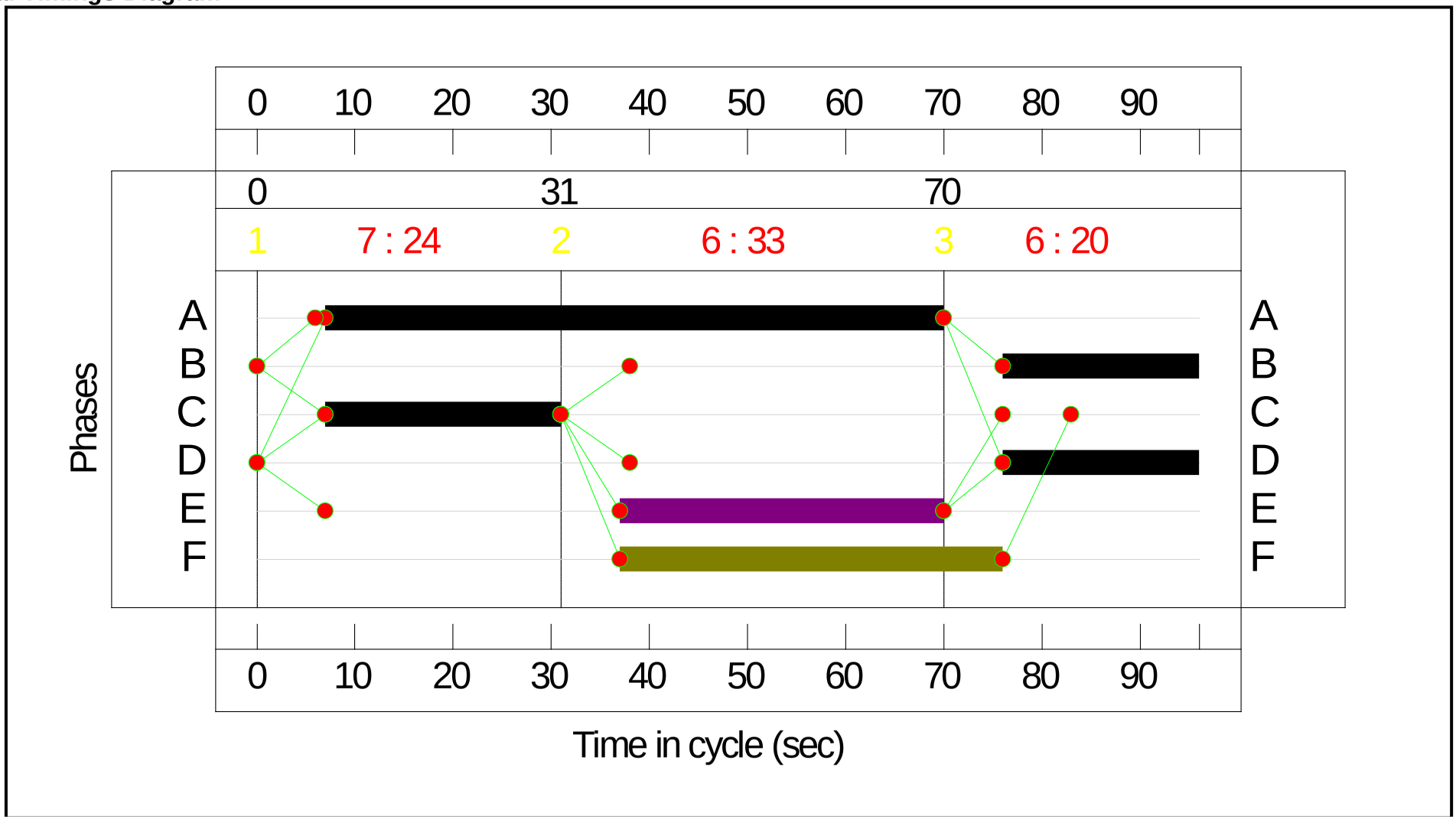
| | | Starting Phase | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F |
| Terminating Phase | A | | 6 | - | 6 | - | - |
| | B | 6 | | 7 | - | - | - |
| | C | - | 7 | | 7 | 6 | 6 |
| | D | 7 | - | 7 | | 7 | - |
| | E | - | - | 6 | 6 | | - |
| | F | - | - | 7 | - | - | |

## Traffic Flows, Desired

**Desired Flow :**

| | | Destination | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | Tot. |
| Origin | A | 0 | 19 | 515 | 8 | 542 |
| | B | 14 | 0 | 318 | 97 | 429 |
| | C | 641 | 705 | 0 | 768 | 2114 |
| | D | 22 | 106 | 257 | 0 | 385 |
| | Tot. | 677 | 830 | 1090 | 873 | 3470 |

**Signal Timings Diagram**



## Network Results

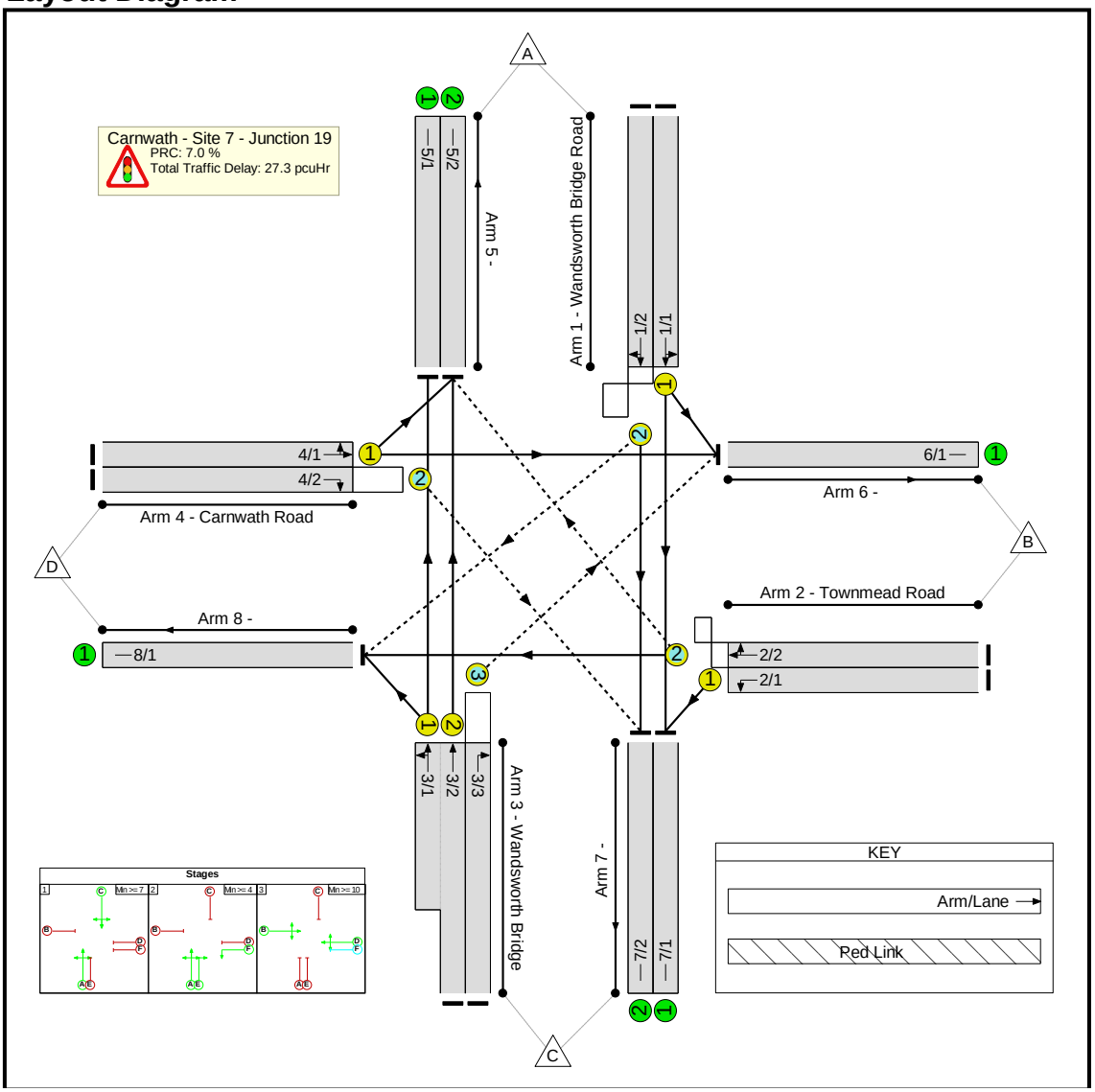
| Item | Lane Description | Full Phase | Demand Flow (pcu) | Deg Sat (%) | Av. Delay Per PCU (s/pcu) | Mean Max Queue (pcu) |
|---|---|---|---|---|---|---|
| 1/1 | Wandsworth Bridge Road Left Ahead | C | 269 | 55.6% | 39.0 | 6.8 |
| 1/2 | Wandsworth Bridge Road Ahead Right | C | 273 | 55.8% | 40.6 | 6.9 |
| 2/1 | Townmead Road Left | D | 318 | 32.5% | 11.2 | 4.2 |
| 2/2 | Townmead Road Right Ahead | D | 111 | 28.2% | 38.0 | 2.6 |
| 3/2+3/1 | Wandsworth Bridge Ahead Left | A | 1409 | 96.3% | 34.9 | 35.2 |
| 3/3 | Wandsworth Bridge Right | A | 705 | 81.3% | 33.1 | 17.8 |
| 4/1 | Carnwath Road Left Ahead | B | 128 | 33.1% | 38.5 | 3.1 |
| 4/2 | Carnwath Road Right | B | 257 | 91.0% | 95.5 | 10.6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| C1 | PRC for Signalled Lanes (%): | -7.0 | Total Delay for Signalled Lanes (pcuHr): | 36.51 | Cycle Time (s): | 96 |
| | PRC Over All Lanes (%): | -7.0 | Total Delay Over All Lanes(pcuHr): | 36.51 | | |

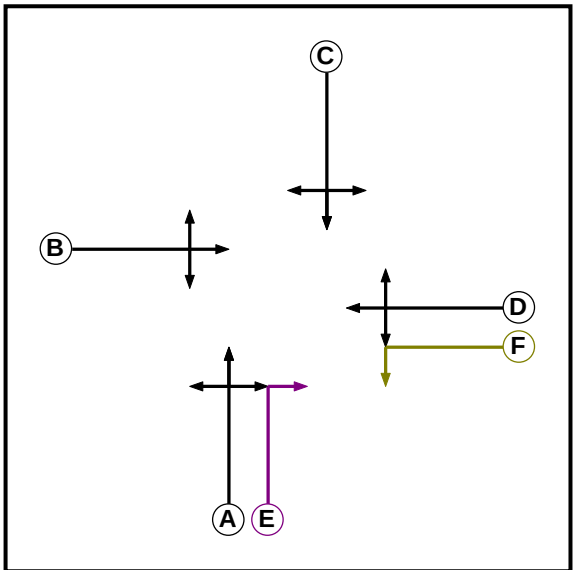
# C.6 Construction development case results, PM peak hour

## Carnwath Road / Wandsworth Bridge Road / Townmead Road junction, existing signalised layout

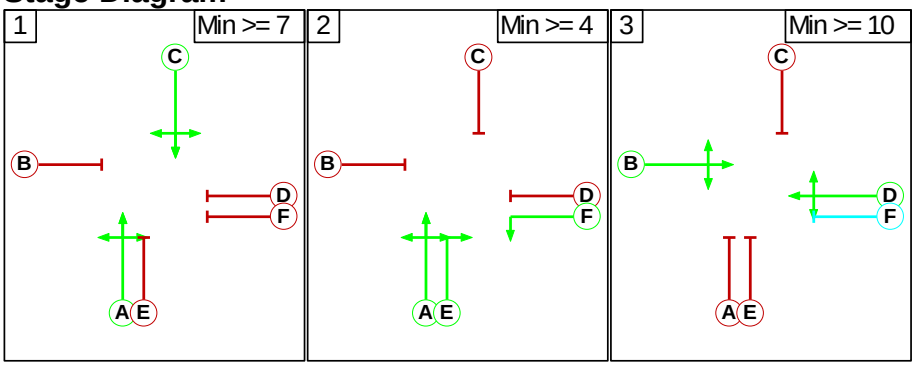
### Network Layout Diagram



## Phase Diagram




## Stage Diagram




## Phases in Stage

| Stage No. | Phases in Stage |
|---|---|
| 1 | A C |
| 2 | A E F |
| 3 | B D |

## Phase Intergreens Matrix

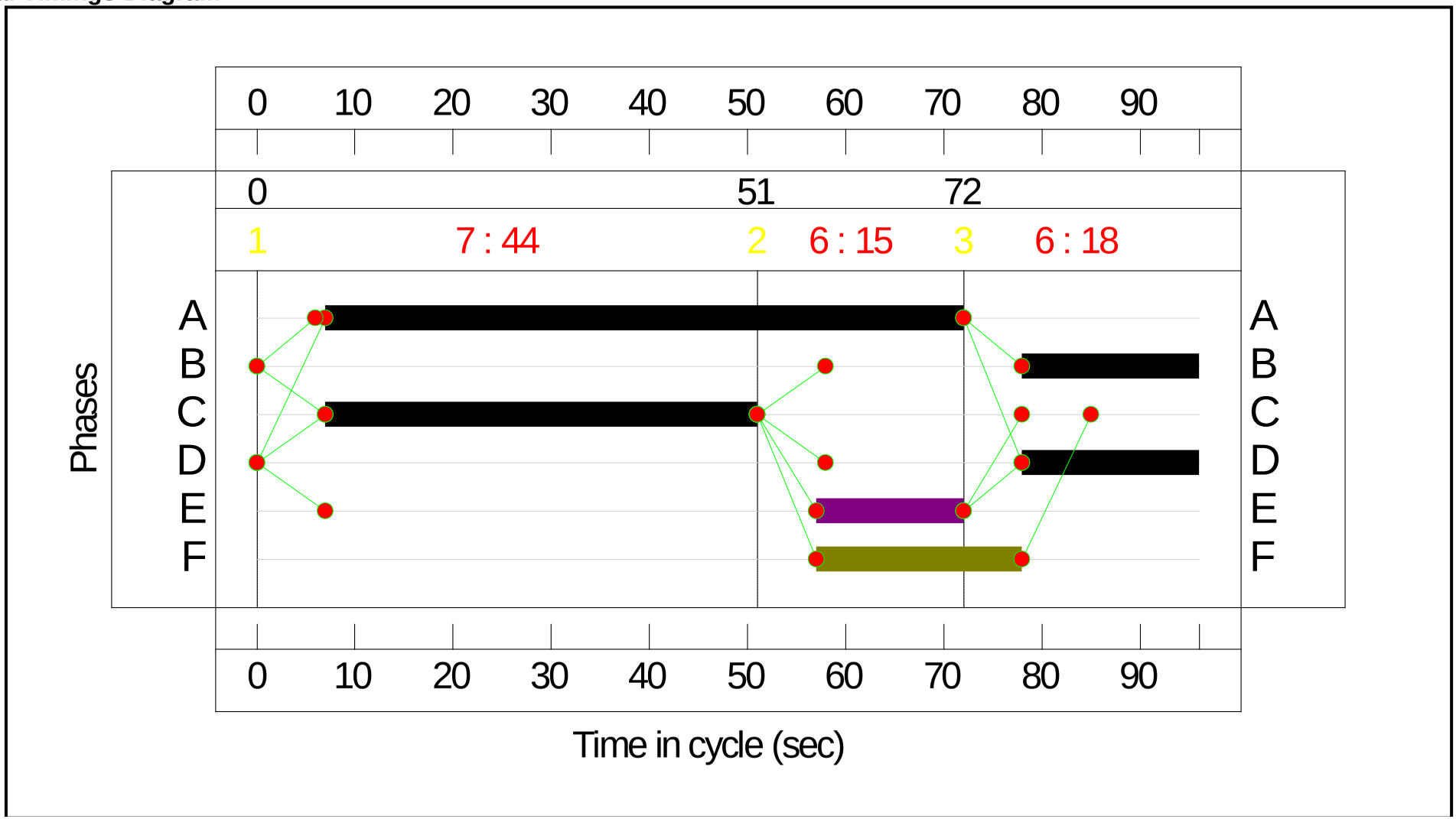
| | | Starting Phase | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F |
| Terminating Phase | A | | 6 | - | 6 | - | - |
| | B | 6 | | 7 | - | - | - |
| | C | - | 7 | | 7 | 6 | 6 |
| | D | 7 | - | 7 | | 7 | - |
| | E | - | - | 6 | 6 | | - |
| | F | - | - | 7 | - | - | |

## Traffic Flows, Desired

**Desired Flow :**

| | | Destination | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | Tot. |
| Origin | A | 0 | 22 | 1014 | 10 | 1046 |
| | B | 19 | 0 | 548 | 41 | 608 |
| | C | 623 | 331 | 0 | 419 | 1373 |
| | D | 14 | 69 | 225 | 0 | 308 |
| | Tot. | 656 | 422 | 1787 | 470 | 3335 |

**Signal Timings Diagram**



## Network Results

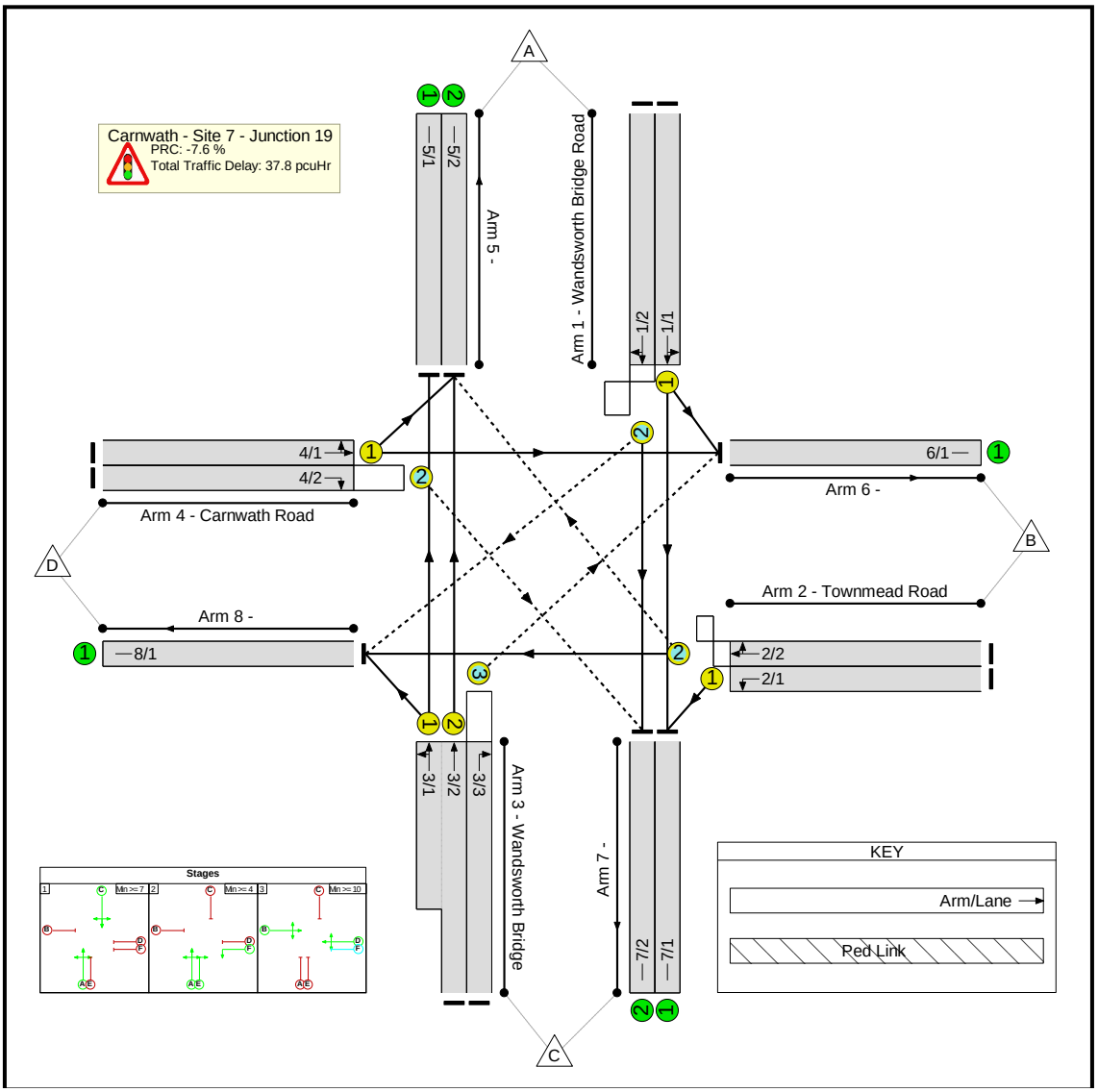
| Item | Lane Description | Full Phase | Demand Flow (pcu) | Deg Sat (%) | Av. Delay Per PCU (s/pcu) | Mean Max Queue (pcu) |
|---|---|---|---|---|---|---|
| 1/1 | Wandsworth Bridge Road Left Ahead | C | 307 | 35.3% | 19.4 | 5.5 |
| 1/2 | Wandsworth Bridge Road Ahead Right | C | 739 | 83.8% | 34.5 | 19.5 |
| 2/1 | Townmead Road Left | D | 548 | 84.1% | 41.7 | 15.6 |
| 2/2 | Townmead Road Right Ahead | D | 60 | 18.3% | 39.6 | 1.4 |
| 3/2+3/1 | Wandsworth Bridge Ahead Left | A | 1042 | 63.9% | 9.5 | 7.4 |
| 3/3 | Wandsworth Bridge Right | A | 331 | 68.8% | 45.1 | 8.9 |
| 4/1 | Carnwath Road Left Ahead | B | 83 | 23.7% | 39.1 | 2.0 |
| 4/2 | Carnwath Road Right | B | 225 | 72.8% | 59.9 | 6.9 |

| | | | | | |
|---|---|---|---|---|---|
| C1 | PRC for Signalled Lanes (%): | 7.0 | Total Delay for Signalled Lanes (pcuHr): | 27.30 | Cycle Time (s): 96 |
| | PRC Over All Lanes (%): | 7.0 | Total Delay Over All Lanes(pcuHr): | 27.30 | |

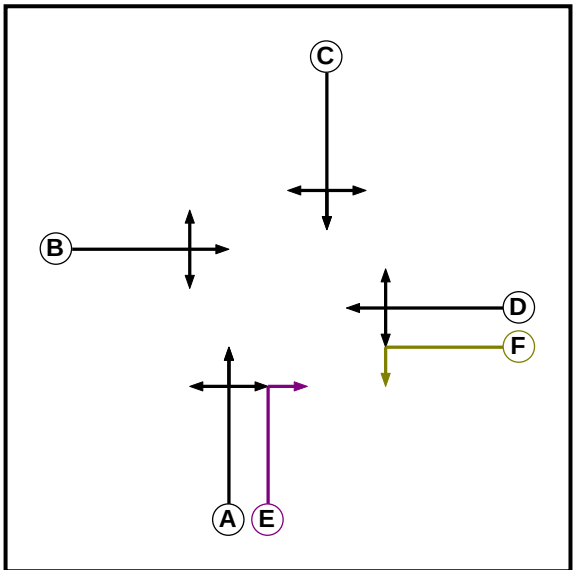
# C.7 Construction development case results, 'all by road' sensitivity test, AM peak hour

## Carnwath Road / Wandsworth Bridge Road / Townmead Road junction, existing signalised layout

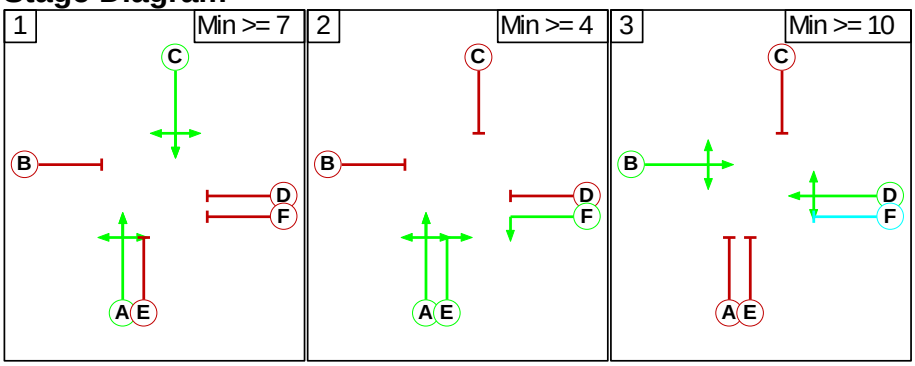
### Network Layout Diagram



## Phase Diagram




## Stage Diagram




## Phases in Stage

| Stage No. | Phases in Stage |
|---|---|
| 1 | A C |
| 2 | A E F |
| 3 | B D |

## Phase Intergreens Matrix

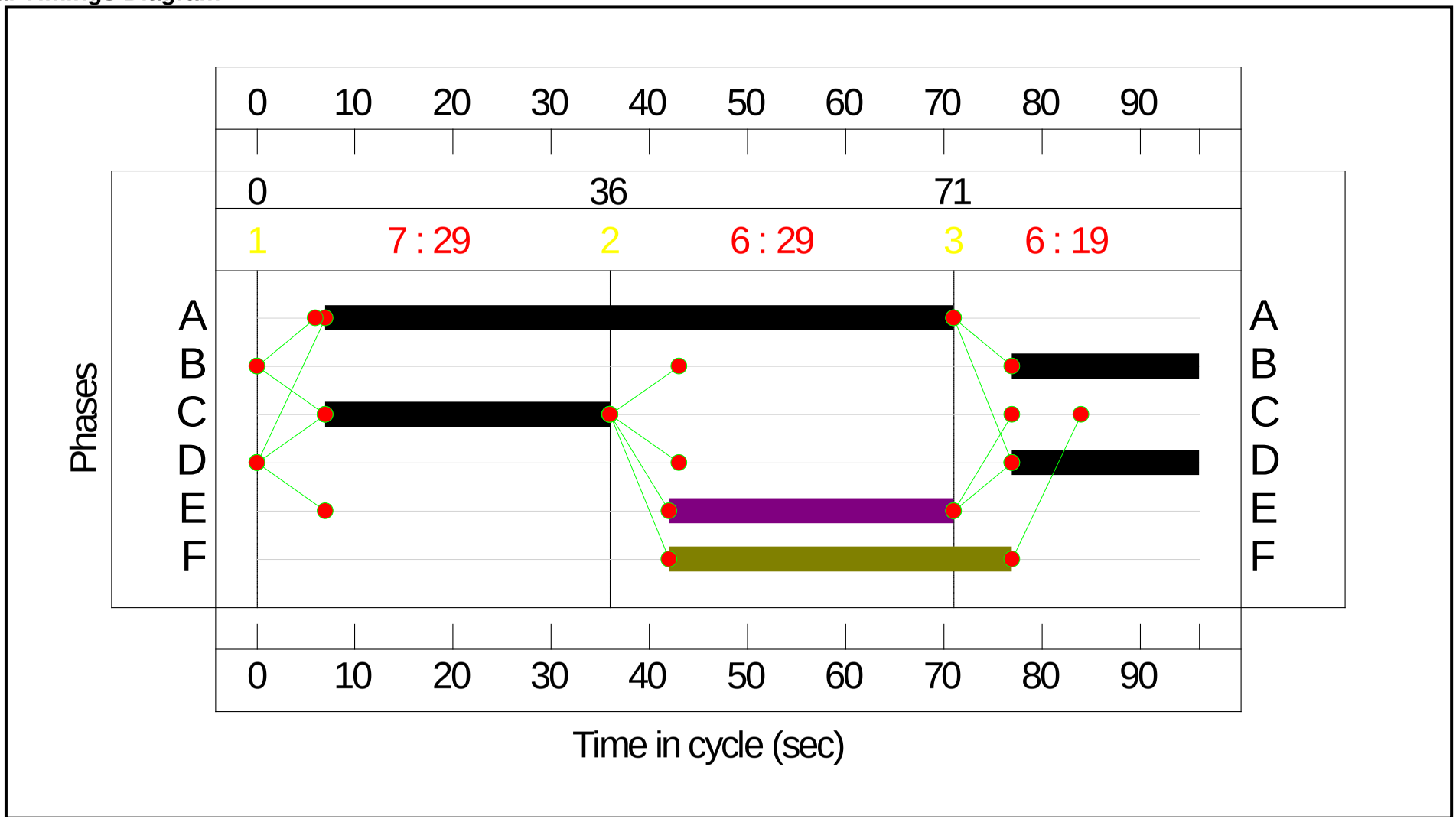
| | | Starting Phase | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F |
| Terminating Phase | A | | 6 | - | 6 | - | - |
| | B | 6 | | 7 | - | - | - |
| | C | - | 7 | | 7 | 6 | 6 |
| | D | 7 | - | 7 | | 7 | - |
| | E | - | - | 6 | 6 | | - |
| | F | - | - | 7 | - | - | |

## Traffic Flows, Desired

**Desired Flow :**

| | | Destination | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | Tot. |
| Origin | A | 0 | 19 | 515 | 32 | 566 |
| | B | 14 | 0 | 318 | 97 | 429 |
| | C | 641 | 705 | 0 | 768 | 2114 |
| | D | 45 | 106 | 257 | 0 | 408 |
| | Tot. | 700 | 830 | 1090 | 897 | 3517 |

**Signal Timings Diagram**



## Network Results

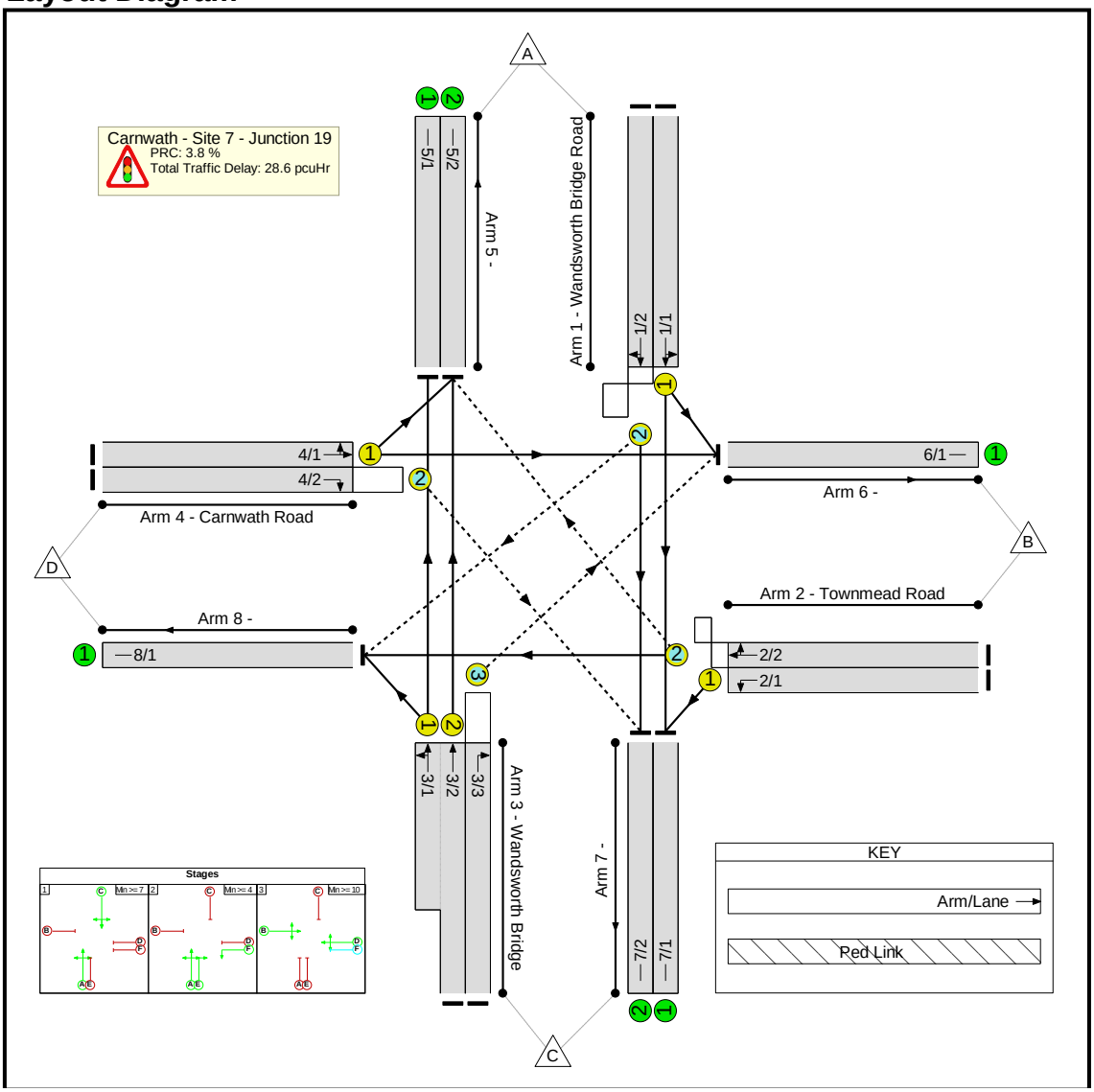
| Item | Lane Description | Full Phase | Demand Flow (pcu) | Deg Sat (%) | Av. Delay Per PCU (s/pcu) | Mean Max Queue (pcu) |
|---|---|---|---|---|---|---|
| 1/1 | Wandsworth Bridge Road Left Ahead | C | 283 | 48.7% | 32.8 | 6.5 |
| 1/2 | Wandsworth Bridge Road Ahead Right | C | 283 | 48.8% | 39.2 | 6.5 |
| 2/1 | Townmead Road Left | D | 318 | 35.5% | 14.1 | 4.8 |
| 2/2 | Townmead Road Right Ahead | D | 111 | 29.6% | 39.5 | 2.7 |
| 3/2+3/1 | Wandsworth Bridge Ahead Left | A | 1409 | 95.0% | 29.8 | 31.9 |
| 3/3 | Wandsworth Bridge Right | A | 705 | 83.9% | 36.0 | 18.6 |
| 4/1 | Carnwath Road Left Ahead | B | 151 | 42.0% | 41.6 | 3.8 |
| 4/2 | Carnwath Road Right | B | 257 | 96.8% | 128.9 | 13.0 |

C1 PRC for Signalled Lanes (%): -7.6 Total Delay for Signalled Lanes (pcuHr): 37.77 Cycle Time (s): 96
PRC Over All Lanes (%): -7.6 Total Delay Over All Lanes(pcuHr): 37.77

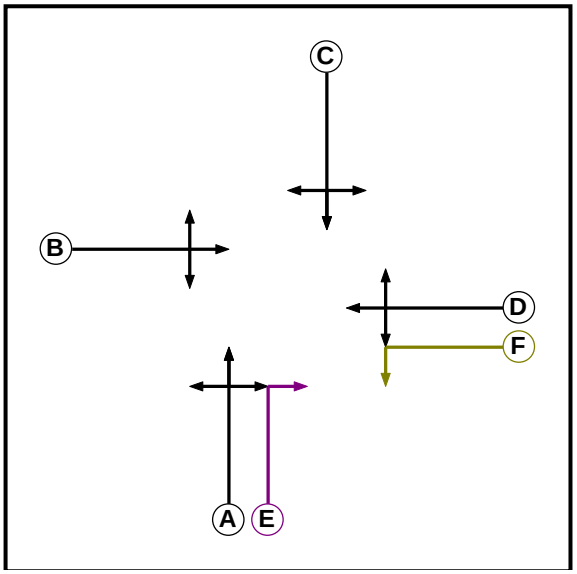
# C.8 Construction development case results, 'all by road' sensitivity test, PM peak hour

## Carnwath Road / Wandsworth Bridge Road / Townmead Road junction, existing signalised layout

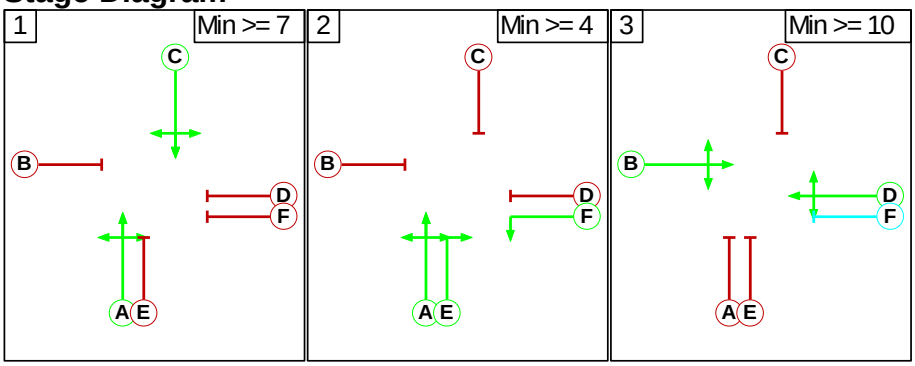
### Network Layout Diagram



## Phase Diagram




## Stage Diagram




## Phases in Stage

| Stage No. | Phases in Stage |
|---|---|
| 1 | A C |
| 2 | A E F |
| 3 | B D |

## Phase Intergreens Matrix

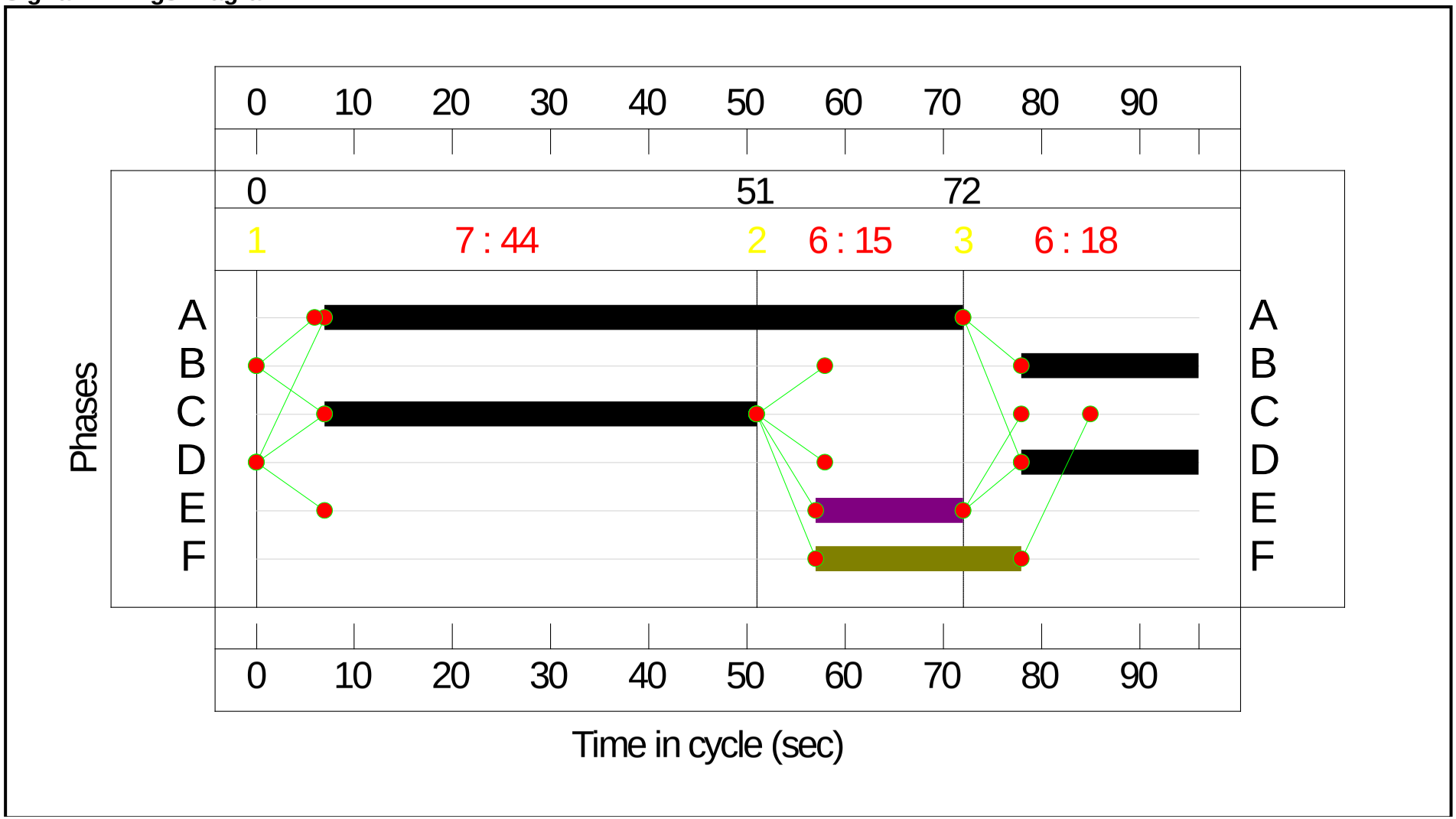
| | | Starting Phase | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F |
| Terminating Phase | A | | 6 | - | 6 | - | - |
| | B | 6 | | 7 | - | - | - |
| | C | - | 7 | | 7 | 6 | 6 |
| | D | 7 | - | 7 | | 7 | - |
| | E | - | - | 6 | 6 | | - |
| | F | - | - | 7 | - | - | |

## Traffic Flows, Desired

**Desired Flow :**

| | | Destination | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | Tot. |
| Origin | A | 0 | 22 | 1014 | 33 | 1069 |
| | B | 19 | 0 | 548 | 41 | 608 |
| | C | 623 | 331 | 0 | 419 | 1373 |
| | D | 38 | 69 | 225 | 0 | 332 |
| | Tot. | 680 | 422 | 1787 | 493 | 3382 |

**Signal Timings Diagram**



## Network Results

| Item | Lane Description | Full Phase | Demand Flow (pcu) | Deg Sat (%) | Av. Delay Per PCU (s/pcu) | Mean Max Queue (pcu) |
|---|---|---|---|---|---|---|
| 1/1 | Wandsworth Bridge Road Left Ahead | C | 307 | 35.3% | 19.4 | 5.5 |
| 1/2 | Wandsworth Bridge Road Ahead Right | C | 762 | 86.7% | 37.6 | 21.1 |
| 2/1 | Townmead Road Left | D | 548 | 84.1% | 41.7 | 15.6 |
| 2/2 | Townmead Road Right Ahead | D | 60 | 18.7% | 40.1 | 1.4 |
| 3/2+3/1 | Wandsworth Bridge Ahead Left | A | 1042 | 63.9% | 9.5 | 7.4 |
| 3/3 | Wandsworth Bridge Right | A | 331 | 69.6% | 46.1 | 8.9 |
| 4/1 | Carnwath Road Left Ahead | B | 107 | 31.7% | 40.8 | 2.7 |
| 4/2 | Carnwath Road Right | B | 225 | 72.8% | 59.9 | 6.9 |

C1 PRC for Signalled Lanes (%): 3.8 Total Delay for Signalled Lanes (pcuHr): 28.57 Cycle Time (s): 96
PRC Over All Lanes (%): 3.8 Total Delay Over All Lanes(pcuHr): 28.57

## C.9 Construction development case results, AM peak hour

### Carnwath Road / Site Access, proposed priority layout

#### Data Errors and Warnings

*No errors or warnings*

#### Analysis Set Details

| Name | Roundabout Capacity Model | Description | Include In Report | Use Specific Demand Set(s) | Specific Demand Set(s) | Locked | Network Flow Scaling Factor (%) | Network Capacity Scaling Factor (%) | Reason For Scaling Factors |
|---|---|---|---|---|---|---|---|---|---|
| (Default Analysis Set) | ARCADY | | ✓ | | | | 100.000 | 100.000 | |

#### Demand Set Details

| Name | Scenario Name | Time Period Name | Description | Traffic Profile Type | Model Start Time (HH:mm) | Model Finish Time (HH:mm) | Model Time Period Length (min) | Time Segment Length (min) | Results For Central Hour Only | Single Time Segment Only | Locked | Run Automatically | Use Relationship | Relationship |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dev Case Core, AM | Dev Case Core | AM | TT EIA Jun19 - AM | Varies by Arm | 08:00 | 09:00 | 60 | 15 | | | | ✓ | | |

# Junction Network

#### Junctions

| Name | Junction Type | Major Road Direction | Arm Order | Do Geometric Delay | Junction Delay (s) | Junction LOS |
|---|---|---|---|---|---|---|
| untitled | T-Junction | Two-way | A,B,C | | 15.15 | C |

#### Junction Network Options

| Driving Side | Lighting | Road Surface |
|---|---|---|
| Left | Normal/unknown | (Mini-roundabouts only) |

# Arms

## Arms

| Arm | Name | Description | Arm Type |
|---|---|---|---|
| A | Carnwath Road (E) | | Major |
| B | Site Access | | Minor |
| C | Carnwath Road (W) | | Major |

## Major Arm Geometry

| Arm | Width of carriageway (m) | Has kerbed central reserve | Width of kerbed central reserve (m) | Has right turn bay | Width For Right Turn (m) | Visibility For Right Turn (m) | Blocks? | Blocking Queue (PCU) |
|---|---|---|---|---|---|---|---|---|
| C | 6.00 | | 0.00 | | 2.20 | 55.00 | ✓ | 0.00 |

*Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.*

## Minor Arm Geometry

| Arm | Minor Arm Type | Lane Width (m) | Lane Width (Left) (m) | Lane Width (Right) (m) | Width at give-way (m) | Width at 5m (m) | Width at 10m (m) | Width at 15m (m) | Width at 20m (m) | Estimate Flare Length | Flare Length (PCU) | Visibility To Left (m) | Visibility To Right (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B | One lane | 3.50 | | | | | | | | | | 20 | 20 |

## Pedestrian Crossings

| Arm | Crossing Type |
|---|---|
| A | None |
| B | None |

| C | None |
|---|---|

### Slope / Intercept / Capacity

#### Priority Intersection Slopes and Intercepts

| Junction | Stream | Intercept (Veh/hr) | Slope for A-B | Slope for A-C | Slope for C-A | Slope for C-B |
|---|---|---|---|---|---|---|
| **1** | B-A | 518.648 | 0.094 | 0.239 | 0.150 | 0.341 |
| **1** | B-C | 668.391 | 0.102 | 0.259 | - | - |
| **1** | C-B | 605.814 | 0.235 | 0.235 | - | - |

*The slopes and intercepts shown above do NOT include any corrections or adjustments.*
*Streams may be combined, in which case capacity will be adjusted.*
*Values are shown for the first time segment only; they may differ for subsequent time segments.*

# Traffic Flows

### Demand Set Data Options

| Default Vehicle Mix | Vehicle Mix Varies Over Time | Vehicle Mix Varies Over Turn | Vehicle Mix Varies Over Entry | Vehicle Mix Source | PCU Factor for a HV (PCU) | Default Turning Proportions | Estimate from entry/exit counts | Turning Proportions Vary Over Time | Turning Proportions Vary Over Turn | Turning Proportions Vary Over Entry |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ✓ | ✓ | HV Percentages | 2.00 | | | | ✓ | ✓ |

# Entry Flows

### General Flows Data

| Arm | Profile Type | Use Turning Counts | Average Demand Flow (Veh/hr) | Flow Scaling Factor (%) |
|---|---|---|---|---|
| **A** | DIRECT | ✓ | N/A | 100.000 |
| **B** | DIRECT | ✓ | N/A | 100.000 |
| **C** | DIRECT | ✓ | N/A | 100.000 |

# Turning Proportions

**Turning Counts or Proportions (Veh/hr) - Junction 1 (for whole period)**

| | | To | | |
|---|---|---|---|---|
| | | **A** | **B** | **C** |
| **From** | **A** | 0.000 | 4.000 | 922.000 |
| | **B** | 4.000 | 0.000 | 3.000 |
| | **C** | 398.000 | 4.000 | 0.000 |

**Turning Proportions (Veh) - Junction 1 (for whole period)**

| | | To | | |
|---|---|---|---|---|
| | | **A** | **B** | **C** |
| **From** | **A** | 0.00 | 0.00 | 1.00 |
| | **B** | 0.57 | 0.00 | 0.43 |
| | **C** | 0.99 | 0.01 | 0.00 |

# Vehicle Mix

### Average PCU Per Vehicle - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | A | B | C |
| From | A | 1.000 | 2.000 | 1.052 |
| | B | 2.000 | 1.000 | 1.000 |
| | C | 1.040 | 1.000 | 1.000 |

### Heavy Vehicle Percentages - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | A | B | C |
| From | A | 0.000 | 100.000 | 5.220 |
| | B | 100.000 | 0.000 | 0.000 |
| | C | 3.950 | 0.000 | 0.000 |

# Results

## Results Summary for whole modelled period

| Stream | Max RFC | Max Delay (s) | Max Queue (Veh) | Max LOS | Average Demand (Veh/hr) | Total Junction Arrivals (Veh) | Total Queueing Delay (Veh-min) | Average Queueing Delay (s) | Rate Of Queueing Delay (Veh-min/min) | Inclusive Total Queueing Delay (Veh-min) | Inclusive Average Queueing Delay (s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B-AC | 0.04 | 23.18 | 0.04 | C | 7.00 | 7.00 | 2.61 | 22.38 | 0.04 | 2.61 | 22.39 |
| C-AB | 0.01 | 5.40 | 0.01 | A | 8.86 | 8.86 | 0.89 | 6.02 | 0.01 | 0.89 | 6.02 |
| C-A | - | - | - | - | 393.14 | 393.14 | - | - | - | - | - |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **A-B** | - | - | - | - | 4.00 | 4.00 | - | - | - | - | - |
| **A-C** | - | - | - | - | 922.00 | 922.00 | - | - | - | - | - |

## C.10 Construction development case results, PM peak hour

### Carnwath Road / Site Access, proposed priority layout

#### Data Errors and Warnings

*No errors or warnings*

#### Analysis Set Details

| Name | Roundabout Capacity Model | Description | Include In Report | Use Specific Demand Set(s) | Specific Demand Set(s) | Locked | Network Flow Scaling Factor (%) | Network Capacity Scaling Factor (%) | Reason For Scaling Factors |
|---|---|---|---|---|---|---|---|---|---|
| (Default Analysis Set) | ARCADY | | ✓ | | | | 100.000 | 100.000 | |

#### Demand Set Details

| Name | Scenario Name | Time Period Name | Description | Traffic Profile Type | Model Start Time (HH:mm) | Model Finish Time (HH:mm) | Model Time Period Length (min) | Time Segment Length (min) | Results For Central Hour Only | Single Time Segment Only | Locked | Run Automatically | Use Relationship | Relationship |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dev Case Core, PM | Dev Case Core | PM | TT EIA Jun19 - PM | Varies by Arm | 17:00 | 18:00 | 60 | 15 | | | | ✓ | | |

# Junction Network

#### Junctions

| Name | Junction Type | Major Road Direction | Arm Order | Do Geometric Delay | Junction Delay (s) | Junction LOS |
|---|---|---|---|---|---|---|
| untitled | T-Junction | Two-way | A,B,C | | 11.73 | B |

### Junction Network Options

| Driving Side | Lighting | Road Surface |
|---|---|---|
| Left | Normal/unknown | (Mini-roundabouts only) |

# Arms

### Arms

| Arm | Name | Description | Arm Type |
|---|---|---|---|
| **A** | Carnwath Road (E) | | Major |
| **B** | Site Access | | Minor |
| **C** | Carnwath Road (W) | | Major |

### Major Arm Geometry

| Arm | Width of carriageway (m) | Has kerbed central reserve | Width of kerbed central reserve (m) | Has right turn bay | Width For Right Turn (m) | Visibility For Right Turn (m) | Blocks? | Blocking Queue (PCU) |
|---|---|---|---|---|---|---|---|---|
| **C** | 6.00 | | 0.00 | | 2.20 | 55.00 | ✓ | 0.00 |

*Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.*

### Minor Arm Geometry

| Arm | Minor Arm Type | Lane Width (m) | Lane Width (Left) (m) | Lane Width (Right) (m) | Width at give-way (m) | Width at 5m (m) | Width at 10m (m) | Width at 15m (m) | Width at 20m (m) | Estimate Flare Length | Flare Length (PCU) | Visibility To Left (m) | Visibility To Right (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **B** | One lane | 3.50 | | | | | | | | | | 20 | 20 |

### Pedestrian Crossings

| Arm | Crossing Type |
|---|---|
| **A** | None |

| | |
|---|---|
| **B** | None |
| **C** | None |

### Slope / Intercept / Capacity

#### Priority Intersection Slopes and Intercepts

| Junction | Stream | Intercept (Veh/hr) | Slope for A-B | Slope for A-C | Slope for C-A | Slope for C-B |
|---|---|---|---|---|---|---|
| **1** | B-A | 518.648 | 0.094 | 0.239 | 0.150 | 0.341 |
| **1** | B-C | 668.391 | 0.102 | 0.259 | - | - |
| **1** | C-B | 605.814 | 0.235 | 0.235 | - | - |

*The slopes and intercepts shown above do NOT include any corrections or adjustments.*
*Streams may be combined, in which case capacity will be adjusted.*
*Values are shown for the first time segment only; they may differ for subsequent time segments.*

# Traffic Flows

### Demand Set Data Options

| Default Vehicle Mix | Vehicle Mix Varies Over Time | Vehicle Mix Varies Over Turn | Vehicle Mix Varies Over Entry | Vehicle Mix Source | PCU Factor for a HV (PCU) | Default Turning Proportions | Estimate from entry/exit counts | Turning Proportions Vary Over Time | Turning Proportions Vary Over Turn | Turning Proportions Vary Over Entry |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ✓ | ✓ | HV Percentages | 2.00 | | | | ✓ | ✓ |

# Entry Flows

### General Flows Data

| Arm | Profile Type | Use Turning Counts | Average Demand Flow (Veh/hr) | Flow Scaling Factor (%) |
|---|---|---|---|---|
| **A** | DIRECT | ✓ | N/A | 100.000 |
| **B** | DIRECT | ✓ | N/A | 100.000 |
| **C** | DIRECT | ✓ | N/A | 100.000 |

# Turning Proportions

### Turning Counts or Proportions (Veh/hr) - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | **A** | **B** | **C** |
| **From** | **A** | 0.000 | 4.000 | 488.000 |
| | **B** | 5.000 | 0.000 | 3.000 |
| | **C** | 336.000 | 3.000 | 0.000 |

### Turning Proportions (Veh) - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | **A** | **B** | **C** |
| **From** | **A** | 0.00 | 0.01 | 0.99 |
| | **B** | 0.63 | 0.00 | 0.38 |
| | **C** | 0.99 | 0.01 | 0.00 |

# Vehicle Mix

### Average PCU Per Vehicle - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | A | B | C |
| From | A | 1.000 | 2.000 | 1.024 |
| | B | 1.807 | 1.000 | 1.000 |
| | C | 1.019 | 1.000 | 1.000 |

### Heavy Vehicle Percentages - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | A | B | C |
| From | A | 0.000 | 100.000 | 2.370 |
| | B | 80.730 | 0.000 | 0.000 |
| | C | 1.880 | 0.000 | 0.000 |

# Results

### Results Summary for whole modelled period

| Stream | Max RFC | Max Delay (s) | Max Queue (Veh) | Max LOS | Average Demand (Veh/hr) | Total Junction Arrivals (Veh) | Total Queueing Delay (Veh-min) | Average Queueing Delay (s) | Rate Of Queueing Delay (Veh-min/min) | Inclusive Total Queueing Delay (Veh-min) | Inclusive Average Queueing Delay (s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B-AC | 0.03 | 14.72 | 0.03 | B | 8.00 | 8.00 | 1.92 | 14.37 | 0.03 | 1.92 | 14.37 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **C-AB** | 0.01 | 5.02 | 0.01 | A | 5.32 | 5.32 | 0.47 | 5.33 | 0.01 | 0.47 | 5.33 |
| **C-A** | - | - | - | - | 333.68 | 333.68 | - | - | - | - | - |
| **A-B** | - | - | - | - | 4.00 | 4.00 | - | - | - | - | - |
| **A-C** | - | - | - | - | 488.00 | 488.00 | - | - | - | - | - |

## C.11 Construction development case results, 'all by road' sensitivity test, AM peak hour

### Carnwath Road / Site Access, proposed priority layout

#### Data Errors and Warnings

*No errors or warnings*

#### Analysis Set Details

| Name | Roundabout Capacity Model | Description | Include In Report | Use Specific Demand Set(s) | Specific Demand Set(s) | Locked | Network Flow Scaling Factor (%) | Network Capacity Scaling Factor (%) | Reason For Scaling Factors |
|---|---|---|---|---|---|---|---|---|---|
| (Default Analysis Set) | ARCADY | | ✓ | | | | 100.000 | 100.000 | |

#### Demand Set Details

| Name | Scenario Name | Time Period Name | Description | Traffic Profile Type | Model Start Time (HH:mm) | Model Finish Time (HH:mm) | Model Time Period Length (min) | Time Segment Length (min) | Results For Central Hour Only | Single Time Segment Only | Locked | Run Automatically | Use Relationship | Relationship |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dev Case Sen, AM | Dev Case Sen | AM | TT ABR Jun19 - AM | Varies by Arm | 08:00 | 09:00 | 60 | 15 | | | | ✓ | | |

# Junction Network

#### Junctions

| Name | Junction Type | Major Road Direction | Arm Order | Do Geometric Delay | Junction Delay (s) | Junction LOS |
|---|---|---|---|---|---|---|
| untitled | T-Junction | Two-way | A,B,C | | 28.14 | D |

### Junction Network Options

| Driving Side | Lighting | Road Surface |
|---|---|---|
| Left | Normal/unknown | (Mini-roundabouts only) |

# Arms

### Arms

| Arm | Name | Description | Arm Type |
|---|---|---|---|
| **A** | Carnwath Road (E) | | Major |
| **B** | Site Access | | Minor |
| **C** | Carnwath Road (W) | | Major |

### Major Arm Geometry

| Arm | Width of carriageway (m) | Has kerbed central reserve | Width of kerbed central reserve (m) | Has right turn bay | Width For Right Turn (m) | Visibility For Right Turn (m) | Blocks? | Blocking Queue (PCU) |
|---|---|---|---|---|---|---|---|---|
| **C** | 6.00 | | 0.00 | | 2.20 | 55.00 | ✓ | 0.00 |

*Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.*

### Minor Arm Geometry

| Arm | Minor Arm Type | Lane Width (m) | Lane Width (Left) (m) | Lane Width (Right) (m) | Width at give-way (m) | Width at 5m (m) | Width at 10m (m) | Width at 15m (m) | Width at 20m (m) | Estimate Flare Length | Flare Length (PCU) | Visibility To Left (m) | Visibility To Right (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **B** | One lane | 3.50 | | | | | | | | | | 20 | 20 |

### Pedestrian Crossings

| Arm | Crossing Type |
|---|---|
| **A** | None |

| | |
|---|---|
| **B** | None |
| **C** | None |

### Slope / Intercept / Capacity

#### Priority Intersection Slopes and Intercepts

| Junction | Stream | Intercept (Veh/hr) | Slope for A-B | Slope for A-C | Slope for C-A | Slope for C-B |
|---|---|---|---|---|---|---|
| **1** | B-A | 518.648 | 0.094 | 0.239 | 0.150 | 0.341 |
| **1** | B-C | 668.391 | 0.102 | 0.259 | - | - |
| **1** | C-B | 605.814 | 0.235 | 0.235 | - | - |

*The slopes and intercepts shown above do NOT include any corrections or adjustments.*
*Streams may be combined, in which case capacity will be adjusted.*
*Values are shown for the first time segment only; they may differ for subsequent time segments.*

# Traffic Flows

### Demand Set Data Options

| Default Vehicle Mix | Vehicle Mix Varies Over Time | Vehicle Mix Varies Over Turn | Vehicle Mix Varies Over Entry | Vehicle Mix Source | PCU Factor for a HV (PCU) | Default Turning Proportions | Estimate from entry/exit counts | Turning Proportions Vary Over Time | Turning Proportions Vary Over Turn | Turning Proportions Vary Over Entry |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ✓ | ✓ | HV Percentages | 2.00 | | | | ✓ | ✓ |

# Entry Flows

### General Flows Data

| Arm | Profile Type | Use Turning Counts | Average Demand Flow (Veh/hr) | Flow Scaling Factor (%) |
|---|---|---|---|---|
| **A** | DIRECT | ✓ | N/A | 100.000 |
| **B** | DIRECT | ✓ | N/A | 100.000 |
| **C** | DIRECT | ✓ | N/A | 100.000 |

# Turning Proportions

### Turning Counts or Proportions (Veh/hr) - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | **A** | **B** | **C** |
| **From** | **A** | 0.000 | 16.000 | 922.000 |
| | **B** | 16.000 | 0.000 | 3.000 |
| | **C** | 398.000 | 4.000 | 0.000 |

### Turning Proportions (Veh) - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | **A** | **B** | **C** |
| **From** | **A** | 0.00 | 0.02 | 0.98 |
| | **B** | 0.84 | 0.00 | 0.16 |
| | **C** | 0.99 | 0.01 | 0.00 |

# Vehicle Mix

### Average PCU Per Vehicle - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | A | B | C |
| From | A | 1.000 | 2.000 | 1.052 |
| | B | 2.000 | 1.000 | 1.000 |
| | C | 1.040 | 1.000 | 1.000 |

### Heavy Vehicle Percentages - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | A | B | C |
| From | A | 0.000 | 100.000 | 5.220 |
| | B | 100.000 | 0.000 | 0.000 |
| | C | 3.950 | 0.000 | 0.000 |

# Results

### Results Summary for whole modelled period

| Stream | Max RFC | Max Delay (s) | Max Queue (Veh) | Max LOS | Average Demand (Veh/hr) | Total Junction Arrivals (Veh) | Total Queueing Delay (Veh-min) | Average Queueing Delay (s) | Rate Of Queueing Delay (Veh-min/min) | Inclusive Total Queueing Delay (Veh-min) | Inclusive Average Queueing Delay (s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B-AC | 0.15 | 34.06 | 0.18 | D | 19.00 | 19.00 | 10.25 | 32.38 | 0.17 | 10.26 | 32.40 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **C-AB** | 0.01 | 5.44 | 0.02 | A | 8.93 | 8.93 | 0.90 | 6.07 | 0.02 | 0.90 | 6.07 |
| **C-A** | - | - | - | - | 393.07 | 393.07 | - | - | - | - | - |
| **A-B** | - | - | - | - | 16.00 | 16.00 | - | - | - | - | - |
| **A-C** | - | - | - | - | 922.00 | 922.00 | - | - | - | - | - |

## C.12 Construction development case results, 'all by road' sensitivity test, PM peak hour

### Carnwath Road / Site Access, proposed priority layout

#### Data Errors and Warnings

*No errors or warnings*

#### Analysis Set Details

| Name | Roundabout Capacity Model | Description | Include In Report | Use Specific Demand Set(s) | Specific Demand Set(s) | Locked | Network Flow Scaling Factor (%) | Network Capacity Scaling Factor (%) | Reason For Scaling Factors |
|---|---|---|---|---|---|---|---|---|---|
| (Default Analysis Set) | ARCADY | | ✓ | | | | 100.000 | 100.000 | |

#### Demand Set Details

| Name | Scenario Name | Time Period Name | Description | Traffic Profile Type | Model Start Time (HH:mm) | Model Finish Time (HH:mm) | Model Time Period Length (min) | Time Segment Length (min) | Results For Central Hour Only | Single Time Segment Only | Locked | Run Automatically | Use Relationship | Relationship |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dev Case Sen, PM | Dev Case Sen | PM | TT ABR Jun19 - PM | Varies by Arm | 17:00 | 18:00 | 60 | 15 | | | | ✓ | | |

# Junction Network

#### Junctions

| Name | Junction Type | Major Road Direction | Arm Order | Do Geometric Delay | Junction Delay (s) | Junction LOS |
|---|---|---|---|---|---|---|
| untitled | T-Junction | Two-way | A,B,C | | 18.35 | C |

### Junction Network Options

| Driving Side | Lighting | Road Surface |
|---|---|---|
| Left | Normal/unknown | (Mini-roundabouts only) |

# Arms

### Arms

| Arm | Name | Description | Arm Type |
|---|---|---|---|
| **A** | Carnwath Road (E) | | Major |
| **B** | Site Access | | Minor |
| **C** | Carnwath Road (W) | | Major |

### Major Arm Geometry

| Arm | Width of carriageway (m) | Has kerbed central reserve | Width of kerbed central reserve (m) | Has right turn bay | Width For Right Turn (m) | Visibility For Right Turn (m) | Blocks? | Blocking Queue (PCU) |
|---|---|---|---|---|---|---|---|---|
| **C** | 6.00 | | 0.00 | | 2.20 | 55.00 | ✓ | 0.00 |

*Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.*

### Minor Arm Geometry

| Arm | Minor Arm Type | Lane Width (m) | Lane Width (Left) (m) | Lane Width (Right) (m) | Width at give-way (m) | Width at 5m (m) | Width at 10m (m) | Width at 15m (m) | Width at 20m (m) | Estimate Flare Length | Flare Length (PCU) | Visibility To Left (m) | Visibility To Right (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **B** | One lane | 3.50 | | | | | | | | | | 20 | 20 |

### Pedestrian Crossings

| Arm | Crossing Type |
|---|---|
| **A** | None |

| | |
|---|---|
| **B** | None |
| **C** | None |

### Slope / Intercept / Capacity

#### Priority Intersection Slopes and Intercepts

| Junction | Stream | Intercept (Veh/hr) | Slope for A-B | Slope for A-C | Slope for C-A | Slope for C-B |
|---|---|---|---|---|---|---|
| **1** | B-A | 518.648 | 0.094 | 0.239 | 0.150 | 0.341 |
| **1** | B-C | 668.391 | 0.102 | 0.259 | - | - |
| **1** | C-B | 605.814 | 0.235 | 0.235 | - | - |

*The slopes and intercepts shown above do NOT include any corrections or adjustments.*
*Streams may be combined, in which case capacity will be adjusted.*
*Values are shown for the first time segment only; they may differ for subsequent time segments.*

# Traffic Flows

### Demand Set Data Options

| Default Vehicle Mix | Vehicle Mix Varies Over Time | Vehicle Mix Varies Over Turn | Vehicle Mix Varies Over Entry | Vehicle Mix Source | PCU Factor for a HV (PCU) | Default Turning Proportions | Estimate from entry/exit counts | Turning Proportions Vary Over Time | Turning Proportions Vary Over Turn | Turning Proportions Vary Over Entry |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ✓ | ✓ | HV Percentages | 2.00 | | | | ✓ | ✓ |

# Entry Flows

### General Flows Data

| Arm | Profile Type | Use Turning Counts | Average Demand Flow (Veh/hr) | Flow Scaling Factor (%) |
|---|---|---|---|---|
| **A** | DIRECT | ✓ | N/A | 100.000 |
| **B** | DIRECT | ✓ | N/A | 100.000 |
| **C** | DIRECT | ✓ | N/A | 100.000 |

# Turning Proportions

### Turning Counts or Proportions (Veh/hr) - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | **A** | **B** | **C** |
| **From** | **A** | 0.000 | 16.000 | 488.000 |
| | **B** | 17.000 | 0.000 | 3.000 |
| | **C** | 336.000 | 3.000 | 0.000 |

### Turning Proportions (Veh) - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | **A** | **B** | **C** |
| **From** | **A** | 0.00 | 0.03 | 0.97 |
| | **B** | 0.85 | 0.00 | 0.15 |
| | **C** | 0.99 | 0.01 | 0.00 |

# Vehicle Mix

### Average PCU Per Vehicle - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | A | B | C |
| From | A | 1.000 | 2.000 | 1.024 |
| | B | 1.940 | 1.000 | 1.000 |
| | C | 1.019 | 1.000 | 1.000 |

### Heavy Vehicle Percentages - Junction 1 (for whole period)

| | | To | | |
|---|---|---|---|---|
| | | A | B | C |
| From | A | 0.000 | 100.000 | 2.370 |
| | B | 94.040 | 0.000 | 0.000 |
| | C | 1.880 | 0.000 | 0.000 |

# Results

### Results Summary for whole modelled period

| Stream | Max RFC | Max Delay (s) | Max Queue (Veh) | Max LOS | Average Demand (Veh/hr) | Total Junction Arrivals (Veh) | Total Queueing Delay (Veh-min) | Average Queueing Delay (s) | Rate Of Queueing Delay (Veh-min/min) | Inclusive Total Queueing Delay (Veh-min) | Inclusive Average Queueing Delay (s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B-AC | 0.10 | 20.34 | 0.11 | C | 20.00 | 20.00 | 6.56 | 19.69 | 0.11 | 6.57 | 19.70 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **C-AB** | 0.01 | 5.05 | 0.01 | A | 5.34 | 5.34 | 0.48 | 5.37 | 0.01 | 0.48 | 5.37 |
| **C-A** | - | - | - | - | 333.66 | 333.66 | - | - | - | - | - |
| **A-B** | - | - | - | - | 16.00 | 16.00 | - | - | - | - | - |
| **A-C** | - | - | - | - | 488.00 | 488.00 | - | - | - | - | - |

# Appendix D – Accident Data

## D.1 Existing Highway Safety Analysis

D.1.1 Details of road traffic accidents within the vicinity of the site have been obtained from Transport for London (TfL) and have been reviewed to determine whether there are particular issues 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:

- Carnwath Road;
- Carnwath Road/ Wandsworth Bridge Road;
- Wandsworth Bridge Road;
- Wandsworth Bridge Road/ Townmead Road;
- Hugon Road;
- Peterborough Road;

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 62 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, 51 are classified as slight, 10 are 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.

**Vol 4 Table D.1 Accident severity 2006 to 2011**

| Location | Slight | Serious | Fatal | Total |
|---|---|---|---|---|
| Carnwath Road | 11 | 1 | 0 | 12 |
| Carnwath Road/ Breer Street Junction | 4 | 0 | 0 | 4 |
| Carnwath Road/ Peterborough Road Junction | 2 | 0 | 0 | 2 |
| Carnwath Road/ Wandsworth Bridge Road Junction | 7 | 1 | 0 | 8 |

| | | | | |
|---|---|---|---|---|
| Carnwath Road/ Dymock Street Junction | 0 | 1 | 0 | 1 |
| Wandsworth Bridge Road | 9 | 1 | 0 | 10 |
| Wandsworth Bridge Road/ Townmead Road Junction | 3 | 2 | 0 | 5 |
| Wandsworth Bridge Road/ Stephendale Road Junction | 4 | 2 | 0 | 6 |
| Wandsworth Bridge Road/ Hugon Road Junction | 5 | 0 | 0 | 5 |
| Wandsworth Bridge Road/ Rosebury Road Junction | 4 | 1 | 0 | 5 |
| Hugon Road/ Breer Road Junction | 0 | 1 | 0 | 1 |
| Peterborough Road/ Sulivan Road Junction | 0 | 1 | 0 | 1 |
| Broomhouse Lane/ Carnwath Road Junction | 1 | 0 | 0 | 1 |
| Broomhouse Lane/ Daisy Lane Junction | 0 | 0 | 1 | 1 |
| **Total** | **51** | **10** | **1** | **62** |

### Carnwath Road

D.1.7 Carnwath Road runs perpendicular to the A217 Wandsworth Bridge Road in an eastern direction towards the northern boundary of the site area. For the stretch of Carnwath Road within the study area, the highway is a single two-way carriageway and a parking lane heading in the east-west direction. Carnwath Road extends east as far as the A217 Wandsworth Bridge Road and west as far as Broomhouse Lane. The junctions involved within this analysis are as follows:

- Carnwath Road/ Breer Street Junction;
- Carnwath Road/ Peterborough Road Junction;
- Carnwath Road/ Wandsworth Bridge Road Junction; and
- Carnwath Road/ Dymock Street Junction.

D.1.8 In total 27 accidents have occurred along Carnwath Road and the junctions associated with this stretch of highway. In relation to the severity of these accidents, 24 were slight accidents, predominantly resulting from failure to look properly and poor manoeuvring.

D.1.9 Of the total accidents, 3 were classified as serious. The majority of the accidents involved cars, motor vehicles and pedestrians. The major contributory factor to the serious accidents was failure to look properly and poor turning/ manoeuvring.

D.1.10 Of the accidents within this study area, one involved a MGV and none involved HGVs. The one MGV accident was rated as slight in severity.

D.1.11 No fatal accident occurred along Carnwath Road in the 5 year period analysed.

### A217 Wandsworth Bridge Road

D.1.12 The A217 Wandsworth Bridge Road runs perpendicular between the A308 New Kings Road in the north and the A3205 York Road in the south. For the stretch of the A217 within the study area, the highway is a three lane carriageway heading in the north-south direction. The junctions involved within this analysis are as follows:

- Wandsworth Bridge Road/ Townmead Road Junction;
- Wandsworth Bridge Road/ Stephendale Road Junction;
- Wandsworth Bridge Road/ Hugon Road Junction; and
- Wandsworth Bridge Road/ Rosebury Road Junction.

D.1.13 In total 31 accidents have occurred along Wandsworth Bridge Road and the junction associated with this stretch of highway. In relation to the severity of these accidents, 25 were slight accidents, predominantly resulting from failure to look properly, poor manoeuvres and failure to judge other person's path or speed.

D.1.14 Of the total accidents, 6 were classified as serious. The accidents involved cars , motor vehicles and pedestrians. The major contributory factor to the serious accidents was poor turning/ manoeuvring, failure to look properly and failure to judge other person's path or speed. One of these serious accidents involved a HGV stopping at a bus stop and collecting a passenger 50m along Wandsworth Bridge Road at its junction with Stephendale Road, when the HGV took off the passenger fell onto the carriageway. The cause of this accident was as a result of careless/reckless driving and a junction restart.

D.1.15 Of the accidents within this study area, one involved a HGV and none involved MGVs/LGVs. The one HGV accident was rated as serious in severity.

D.1.16 No fatal accident occurred along Wandsworth Bridge Road in the 5 year period analysed.

### Hugon Road

D.1.17 Hugon Road is a two-way single carriageway with parking lanes on either side of the road. The road runs parallel to the north of Carnwath Road and joins up with Wandsworth Bridge Road further north of the site.

D.1.18 One serious accident occurred on Hugon Road during the 5 year period analysed and involved a car and a pedestrian at its junction with Breer Road. The cause of it was careless driving and failure to look properly.

### Peterborough Road

D.1.19 Peterborough Road is a two-way single carriageway with a parking lane on one side of the road. The road runs perpendicular to Carnwath Road in the south and the A308 New Kings Road in the north.

D.1.20 One serious accident occurred on Peterborough Road junction with Sullivan Road during the 5 year period analysed and involved a MGV and a car. A MGV was trying to evade a police car by swerving and hitting a

bollard. The cause of it was exceeding the speed limit, sudden braking and loss of control.

### Broomhouse Lane

D.1.21 Broomhouse Lane is a two-way single carriageway that runs perpendicular to Carnwath Road in the south and Hurlingham Road in the north.

D.1.22 The 1 fatal accident that occurred along Broomhouse Lane in the 5 year period analysed occurred at Daisy Lane junction. The accident involved two motorcycles and was caused by travelling on the wrong side of the carriageway, exceeding the speed limit and careless driving.

## D.2 Summary and Conclusion

D.2.1 The largest number of road traffic accidents has occurred at the A217 Wandsworth Bridge Road and its location at Townmead Road/ Carnwath Road junction; which have been classified as 10 slight and 3 serious accidents. The largest number of serious accidents has occurred at the Wandsworth Bridge Road with its junctions at Townmead Road and Stephendale Road.

D.2.2 The only significant clustering of accidents in the locations discussed is again Wandsworth Bridge Road and its location with Townmead Road/ Carnwath Road junction, where vehicle paths cross. In this case vehicle accidents are relatively evenly spread around the junction indicating that accidents are not due to highway geometry.

D.2.3 The one fatality that occurred within this study area is attributed to careless driving, speed and a failure to look properly and is not considered to be due to road geometry or failure of infrastructure.

D.2.4 Of the accidents involved 2 were MGVs and one was a HGV, where for the MGVs their severity were slight and serious, while for the HGV the severity was serious.

D.2.5 Overall, the accidents occurred in the area of interest were mainly caused as a result of vehicle/ pedestrian paths crossing or poor turning movements which resulted from not looking properly and careless/ reckless driving indicating that the accidents are not due to highway geometry or poor infrastructure.

# Appendix E – Road Safety Audit

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Your ref -
Our ref 211146-00/cvl

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Thames Tideway Tunnel
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For the attention of Dermot Scanlon

13 February 2013

Dear Sirs

Thames Tideway Tunnel
Carnwath Road Riverside – Stage 1 Road Safety Audit

I have the pleasure of enclosing our Carnwath Road Riverside – Stage 1 Road Safety Audit report. In addition to the enclosed report, the Audit Team noted the following points outwith the remit of the audit. I would be grateful if you would bring these issues to the attention of the Highway Authority, Designer and/or Maintainer as appropriate.

***Additional Comments***

- Carnwath Road, past the site, is a signed cycle route; as is Wandsworth Bridge Road. Any traffic management proposed on these roads should take full account of cycles. Delivery drivers should be made aware of the presence of the cycle routes and the likely increased risk of cycle / goods vehicle conflict.

IMG_8496.jpg

- The proposals show the removal of around 13 on-street parking bays from Carnwath Road during the construction phase at Carnwath Road Riverside. This is likely to result in congestion and frustration for drivers who cannot find somewhere to park. Replacement facilities should be provided during the duration of the construction works.

Thames Tideway Tunnel

# Thames Tideway Tunnel - Carnwath Road Riverside

## Stage 1 Road Safety Audit

RSA1.1a

Rev A | 13 February 2013



Job number 211146-03

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# Document Verification

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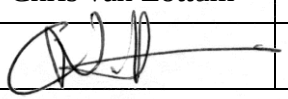
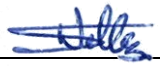
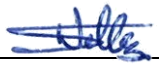
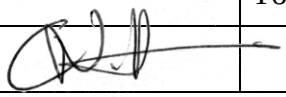
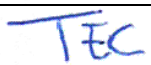
| | | Signature |  |  |  |
| Rev A | 13 Feb 2013 | **Filename** | RP CVL TTT 07 Carnwath RSA1.1 130213 Rev A.docx | | |
| | | **Description** | Revised information received | | |
| | | | Prepared by | Checked by | Approved by |
| | | Name | Chris van Lottum | Tom Corke | Steve Wells |
| | | Signature |  |  |  |
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| | | **Description** | | | |
| | | | Prepared by | Checked by | Approved by |
| | | Name | | | |
| | | Signature | | | |
| | | | | **Issue Document Verification with Document** | ✓ |

# Contents



## Figures



## Appendices

# 1 Introduction

Arup was appointed by Thames Tideway Tunnel 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 Carnwath Road Riverside, London Borough of Hammersmith and Fulham.

The agreed Audit Team consisted of:

- Mr C van Lottum MEng (Hons), MCIHT, MSoRSA
- Mr T Corke BEng (Hons), MSc, CEng, MICE, MCIHT, MSoRSA

The Audit Team visited the site together on Tuesday 4th December 2012; weather conditions at the time of the site visit were bright and cold and the road surface was damp.

A list of information provided to the Audit Team has been included as Appendix A to this Report.

The following information was **not** made available to the Audit Team and as such any specific influence of these details on road user safety has not been considered by this audit:

- Departures from Standard
- Road profiles
- Cross sections
- Drainage
- Landscape
- Public utilities
- Traffic signals
- Traffic signs
- Street lighting
- Road markings
- Road restraint systems

It is understood that no previous road safety audits have been conducted on this scheme.

This audit has been 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. The Audit Team has examined and reported only on the road safety implications of the scheme as presented and has not examined or verified the compliance of the design to any other criteria. However, to clearly explain a problem or recommendation, the Audit Team may occasionally refer to design standards without engaging in technical audit.

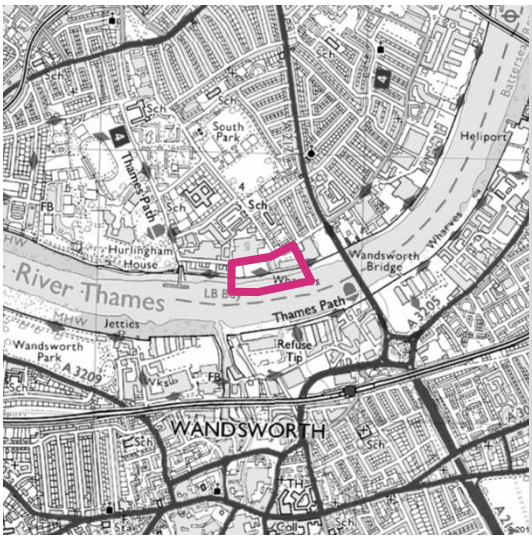
All problems and recommendations identified by this audit are referenced to the design drawings and the locations have been indicated on the attached plan.

Other issues, including safety issues identified during the Audit but excluded from this report by the Terms of Reference, which the Audit Team wishes to draw to the attention of the Audit Project Sponsor, are set out in separate correspondence.

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 in this report as accidents are rare and random events and are largely caused by factors outside the Audit Team's influence, such as driving behaviour and, to a lesser extent, vehicle condition.

## 1.1 Site Description




**Scheme Location**

Carnwath Road is situated on the north bank of the river Thames; at its eastern end it joins the A217 Wandsworth Bridge Road which runs between Wandsworth and Fulham in west London.

## 1.2 Scheme Description

During phases 1 and 2 of construction (shaft and main tunnel construction) two site vehicle accesses would be in operation on Carnwath Road. The western access would only be used as an entry only for emergency access or specific deliveries and not for routine use and would be left-turn in only.

To accommodate Carnwath Road Riverside site access and larger vehicles travelling along Carnwath Road, it would be necessary to suspend sections of the shared use parking (restrictions would operate from 07:00 to 19:00, Monday to Saturday).

During phase 3, for the main tunnel secondary lining, the western access would be closed due to crane activities and there would only be one site vehicle access (eastern) in operation.

A junction improvement is therefore proposed at the junction of Wandsworth Bridge Road (A217) / Carnwath Road / Townmead Road, for the duration of the works.

# 2 Stage 1 Road Safety Audit

The Recommendations below are numbered as follows:

STAGE . AUDIT NUMBER . RECOMMENDATION NUMBER

## 2.1 Construction Layout

| | | |
|---|---|---|
| | **Location:** | Junction of Carnwath Road with Wandsworth Bridge Road |
| | **Summary:** | Existing accident record for delivery route could be exacerbated by construction traffic. |
| | **Description:** | There is an existing accident risk relating to vehicles turning at the junction of Carnwath Road with Wandsworth Bridge Road<br><br>The construction necessitates large numbers of HGV turning movements at this junction which may exacerbate the existing problems. |
| **S1.1.1** | **Recommendation:** | It may be necessary to adjust the signal timing at the junction in order to accommodate the increased movement of slower moving HGVs at the junction. Delivery drivers and site staff should be made aware of the likely increased risk of turning conflicts, particularly with vulnerable road users through inclusion in the site induction process and construction method statements. |

| | | |
|---|---|---|
| | **Location:** | Carnwath Road access to Whiffin Wharf |
| | **Summary:** | Swept path shows HGV conflict with site hoarding |
| | **Description:** | The swept path analysis for a 16.5m articulated and 12m rigid HGV entering the site from Carnwath Road conflicts with the hoarding on the eastern side of the access. |

Notwithstanding the damage to a vehicle caused by a collision with the gate and hoarding; If the movement cannot be completed without conflict it will be necessary for HGV drivers to reverse back to complete their manoeuvre thereby placing other road users at risk from a collision as a result of reduced rearward visibility.

**S1.1.2** **Recommendation:** Widen the site entrance to accommodate the movement allowing HGVs to enter the site in a forward gear.

---

**Location:** Carnwath Road opposite Whiffin Wharf

**Summary:** Parking bays used to stack delivery vehicles would block site access resulting in collisions.

**Description:** Builders merchant Hitchcock King is situated immediately north-west of the Whiffin Wharf site access. Their loading bay is located on the highway at the eastern end of their site. As a result their drivers queue in the parking bays along the front of the Piper Centre.

IMG_8508.jpg

These queuing vehicles will block access for vehicles entering the Tunnel site. If the movement cannot be completed without conflict it will be necessary for HGV drivers to reverse back to complete their manoeuvre placing other road users at risk from a collision as a result of reduced rearward visibility.

**S1.1.3** **Recommendation:** Suspend additional parking bays on Carnwath Road so as to ensure unobstructed egress.

## 2.2 Permanent Layout

No items have been raised with respect to the Permanent Layout as a result of this audit

**End of list of problems identified and recommendations offered in this Stage 1 Road Safety Audit.**

# 3 Road Safety Audit Statement

I certify that this audit has been carried out in accordance with HD19/03.

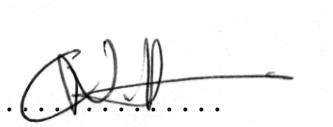
## Audit Team Leader

Mr C van Lottum MEng (Hons), MCIHT, MSoRSA

Senior Engineer

Arup

Central Square, Forth Street,
Newcastle upon Tyne, NE1 3PL



13 February 2013

## Audit Team Member

Mr T Corke BEng (Hons), MSc, CEng, MICE, MCIHT, MSoRSA

Senior Engineer

Arup

The Arup Campus, Blythe Gate, Blythe Valley Park,
Solihull, B90 8AE

# Figures

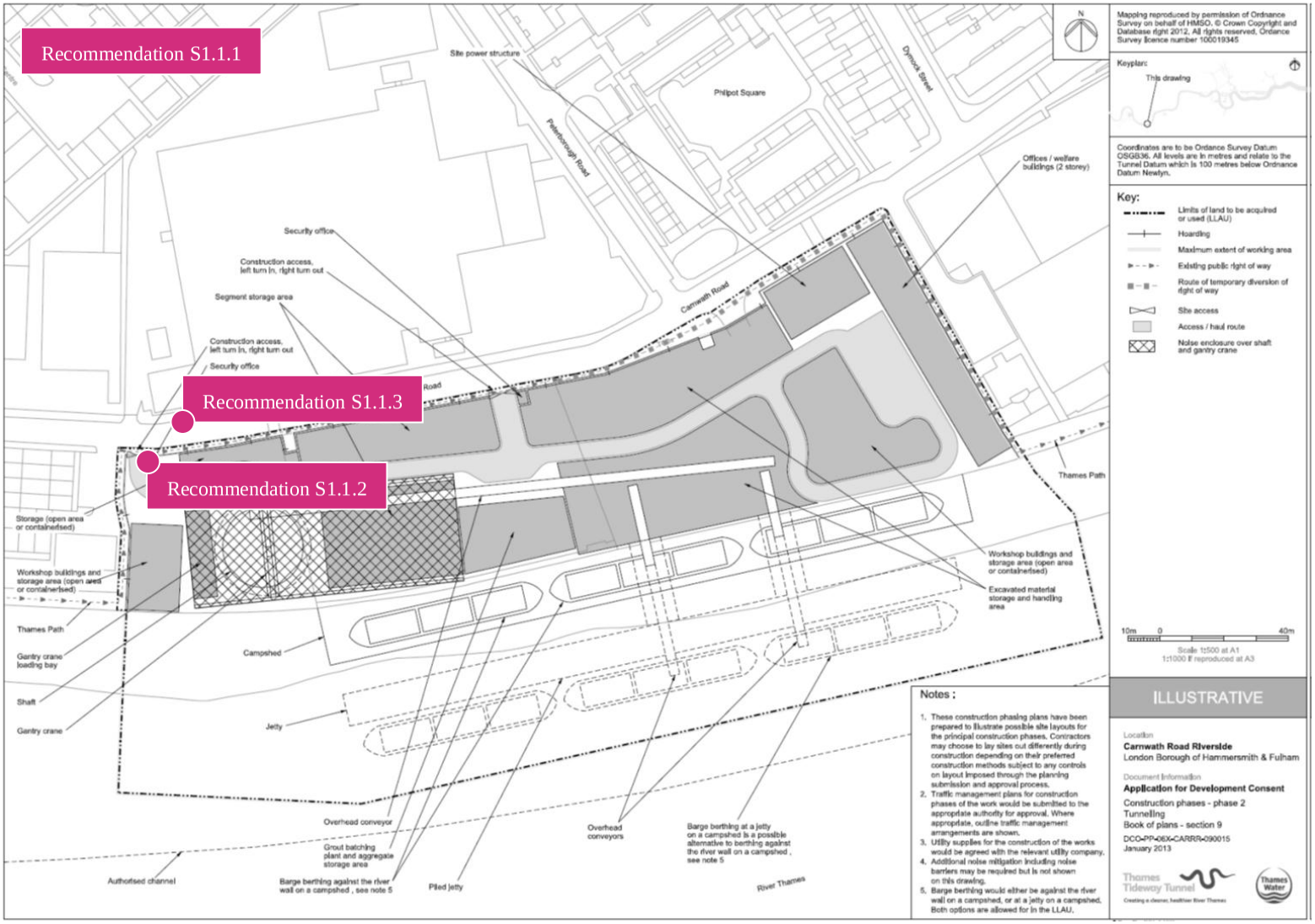



Figure 1 Location of Recommendations

# Appendix A

Documents and Drawings

# A1 Documents and Drawings

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.

## A1.1 Documents

| Title | Reference | Revision |
|---|---|---|
| Road Safety Audit Brief | - | 16/12/2012 |
| Road Accident Data | - | - |

## A1.2 Drawings

| Title | Reference | Revision |
|---|---|---|
| Transport - site location plan | 1PL03-TT-50608 | Jan 2013 |
| Transport - construction traffic routes | 1PL03-TT-50600 | Jan 2013 |
| Transport - accident locations | 1PL03-TT-50744 | Jan 2013 |
| Construction phases - phase 2 - Tunnelling | DCO-PP-06X-CARRR-090015 | Jan 2013 |
| Highway layout during construction – Area 1 work | DCO-PP-06X-CARRR-090021 | Jan 2013 |
| Highway layout during construction – Area 2 work | DCO-PP-06X-CARRR-090022 | Jan 2013 |
| Permanent highway layout – Area 1 work | DCO-PP-06X-CARRR-090023 | Jan 2013 |
| Permanent highway layout – Area 2 work | DCO-PP-06X-CARRR-090024 | Jan 2013 |
| Highway layout during construction (Area 1) – Vehicle swept path analysis | DCO-PP-06X-CARRR-090025 | Jan 2013 |
| Highway layout during construction (Area 2) – Vehicle swept path analysis | DCO-PP-06X-CARRR-090026 | Jan 2013 |
| Permanent highway layout (Area 1) – Vehicle swept path analysis (HGVs) | DCO-PP-06X-CARRR-090027 | Jan 2013 |
| Permanent highway layout (Area 2) – Vehicle swept path analysis (HGVs) | DCO-PP-06X-CARRR-090028 | Jan 2013 |
| Permanent highway layout (Area 1) – Vehicle swept path analysis (cranes) | DCO-PP-06X-CARRR-090029 | Jan 2013 |
| Permanent highway layout (Area 2) – Vehicle swept path analysis (cranes) | DCO-PP-06X-CARRR-090030 | Jan 2013 |

- Site observations noted traffic having significant difficulties in making the right turn out of Carnwath Road on to Wandsworth Bridge Road. High levels of conflict were noted an a number of near misses observed over a 15 minute period, particularly between northbound traffic on Wandsworth Bridge Road and southbound traffic from Carnwath Road; and between Westbound traffic from Townmead Road and southbound traffic from Carnwath Road.

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 Phil Longman, Peter Brett Associates
Gavin Wicks, Arup

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# TECHNICAL NOTE

**Peter Brett Associates LLP**
16 Brewhouse Yard, Clerkenwell,
London, EC1V 4LJ
**T:** +44 (0)20 7025 7100
**E:** london@peterbrett.com

| | | |
|---|---|---|
| **Job Name** | **Thames Tideway Tunnel – Carnwath Road** | |
| **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 Carnwath Road in the London Borough of Hammersmith and Fulham.

**1.2** This technical note provides the Designer's Response to the Stage 1 Audit for this site.

## 2 Stage 1 Road Safety Audit

**2.1** Location: Junction of Carnwath Road with Wandsworth Bridge Road

Summary: Existing accident record for delivery route could be exacerbated by construction traffic.

Description: There is an existing accident risk relating to vehicles turning at the junction of Carnwath Road with Wandsworth Bridge Road.

The construction necessitates large numbers of HGV turning movements at this junction which may exacerbate the existing problems.

S1.1.1 Recommendation: It may be necessary to adjust the signal timing at the junction in order to accommodate the increased movement of slower moving HGVs at the junction. Delivery drivers and site staff should be made aware of the likely increased risk of turning conflicts, particularly with vulnerable road users through inclusion in the site induction process and construction method statement.

Recommendation Accepted – Local junction modelling was undertaken on this junction for the future year with and without construction traffic and had been assessed as part of the Transport Assessment. The requirement to adjust the signal timings will be examined at Stage 2 (Detailed Design). Delivery drivers and site staff will be made aware of the presence of vulnerable road users at this junction as part of the site induction. This will be included in the Code of Construction Practice at Stage 2 (Detailed Design)

**2.2** Location: Carnwath Road access to Whiffin Wharf

Summary: Swept path shows HGV conflict with the site hoarding.

Description: The swept path analysis for a 16.5m articulated and 12m rigid HGV entering the site from Carnwath Road conflicts with the hoarding on the eastern side of the access.

Notwithstanding the damage to a vehicle caused by a collision with the gate and hoarding; if the movement cannot be completed without conflict it will be necessary for HGV drivers to reverse back to complete their manoeuvre thereby placing other road users at risk from a collision as a result of reduced rearward visibility.

S1.1.2 Recommendation: Widen the site entrance to accommodate the movement allowing HGVs to enter the site in a forward gear.

Recommendation Accepted – The site access will be of a sufficient width to accommodate HGVs entering the site. The exactly alignment of the hoarding will be determined at Stage 2 (Detailed Design).

**2.3** Location: Carnwath Road opposite Whiffin Wharf

Summary: Parking bays used to stack delivery vehicles would block site access resulting in collisions.

Description: Builders merchants Hitchcock King is situated immediately north-west of the Whiffin Wharf site access. Their loading bay is located on the highway at the eastern end of their site. As a result their drivers queue in the parking bays along the front of the Piper Centre.

These queuing vehicles will block access for vehicles entering the Tunnel site. If the movement cannot be completed without conflict it will be necessary for HGV drivers to reverse back to complete their manoeuvre placing other road users at risk from a collision as a result of reduced rearward visibility.

S1.1.3 Recommendation: Suspend additional parking bays on Carnwath Road so as to ensure unobstructed egress.

Recommendation Rejected –The parking and loading suspensions will be extended to cover the hours of operation of the construction access. Also the access will be managed so conflicts with other vehicles on the public highway would be minimised.

## 3 Response to Comments provided in addition to the Stage 1 Road Safety Audit

**3.1** Additional Comments

Carnwath Road, past the site, is a signed cycle route; as is Wandsworth Bridge Road. Any traffic management proposed on these roads should take full account of cycles. 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 – Delivery drivers and site staff will be made aware of the presence of cyclists on Carnwath Road and Wandsworth Bridge Road as part of the site induction. This will be included in the Code of Construction Practice at Stage 2 (Detailed Design).

**3.2** Additional Comments

The proposals show removal of around 13 on street parking bays from Carnwath Road during the construction phase at Carnwath Road Riverside. This is likely to result in congestion and frustration for drivers who cannot find somewhaere top park. Replacement facilities should be provided during the duration of the construction works.

Comment Response – The restrictions will apply during the working day and will not impact peak parking demand.

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**Thames Tideway Tunnel**
Thames Water Utilities Limited

# Application for Development Consent

Application Reference Number: WWO10001

# Transport Assessment

Doc Ref: **7.10.07**

## Carnwath Road Riverside

### Figures

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

Hard copy available in

Box **50** Folder **B**
January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

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# Thames Tideway Tunnel

# Transport Assessment

# Section 10: Carnwath Road Riverside figures

**List of contents**

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# Plans

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# Carnwath Road Riverside

THAMES TIDEWAY TUNNEL - SCHEDULE OF ASSOCIATED HIGHWAY WORKS

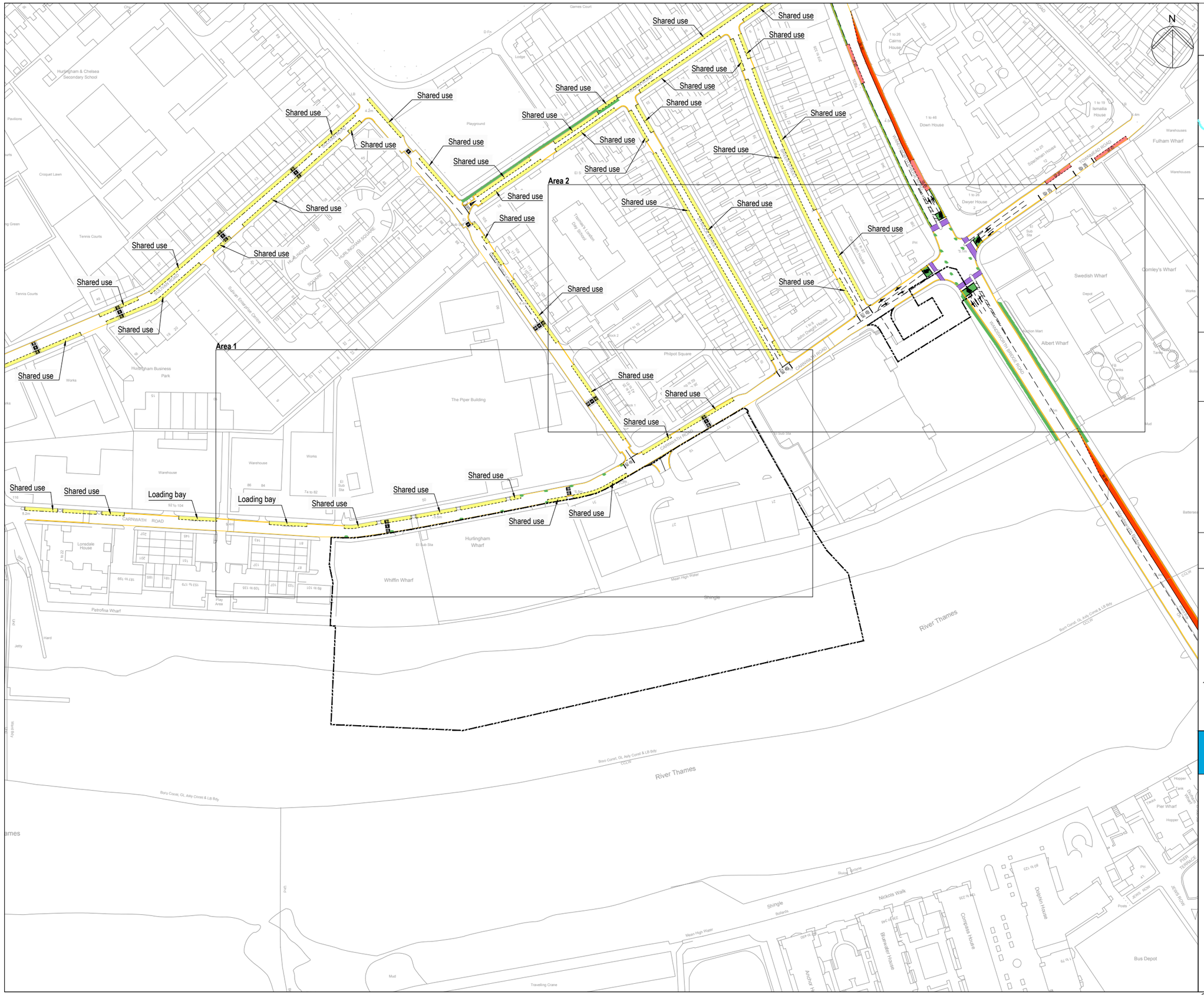
| Drawing Number | Works Reference | Location | Item of Work | Date of Implementation |
|---|---|---|---|---|
| DCO-PP-06X-CARRR-090021, DCO-PP-06X-CARRR-090022 | PHF3X_C01 | Carnwath Road - West of Peterborough Road | Provision of gated site access including removal of footpath and provision of dropped kerbs at site access. | TBC |
| | PHF3X_C02 | Carnwath Road - West of Peterborough Road | Suspension of approximately 19m of shared use on-street parking on northern side of Carnwath Road | TBC |
| | PHF3X_C03 | Carnwath Road - West of Peterborough Road | Closure of existing access to site. Possible continuation of public footway adjacent to closed access depending upon feedback from LB Hammersmith and Fulham | TBC |
| | PHF3X_C04 | Carnwath Road - West of Peterborough Road | Closure of existing access to site. Possible continuation of public footway adjacent to closed access depending upon feedback from LB Hammersmith and Fulham | TBC |
| | PHF3X_C05 | Carnwath Road - West of Peterborough Road to Wandsworth Bridge Road | Extension of single yellow line parking restriction hours of operation to Monday to Saturday 7am to 7pm. | TBC |
| | PHF3X_C06 | Carnwath Road - West of Peterborough Road | Provision of gated construction site access. | TBC |
| | PHF3X_C07 | Carnwath Road - West of Peterborough Road | Realignment of small section of kerb on the eastern side of the construction site access. | TBC |
| | PHF3X_C08 | Carnwath Road - West of Peterborough Road | Suspension of 11m of shared use on-street parking | TBC |
| | PHF3X_C09 | Carnwath Road - West of Peterborough Road | Suspension of 34m of shared use on-street parking | TBC |
| | PHF3X_C10 | Carnwath Road - East of Peterborough Road | Closure of existing access to site. Possible continuation of public footway adjacent to closed access depending upon feedback from LB Hammersmith and Fulham | TBC |
| | PHF3X_C11 | Carnwath Road / Wandsworth Bridge Road Junction | Realignment of kerb on the south-western side of the junction to accommodate turning movements of larger vehicles. Widening of footway and relocation of tactile paving. This would require third party land acquisition. | TBC |
| DCO-PP-06X-CARRR-090023, DCO-PP-06X-CARRR-090024 | PHF3X_P01 | Carnwath Road - West of Peterborough Road | Closure of construction site access and reinstatement of footway. | TBC |
| | PHF3X_P02 | Carnwath Road - West of Peterborough Road | Reinstatement of 19m of existing on-street parking which was suspended during the construction phase as per PHF3X_C02 | TBC |
| | PHF3X_P03 | Carnwath Road - West of Peterborough Road | Provision of access for maintenance vehicles for the permanent phase includes the removal of a section of footpath and provision of dropped kerbs. | TBC |
| | PHF3X_P04 | Carnwath Road - West of Peterborough Road | Reinstatement of existing access which was closed during the construction phase as per PHF3X_C03 | TBC |
| | PHF3X_P05 | Carnwath Road - West of Peterborough Road to Wandsworth Bridge Road | Reinstatement of existing hours of operation of the single yellow line parking restriction | TBC |
| | PHF3X_P06 | Carnwath Road - West of Peterborough Road | Reinstatement of existing gated access which was modified during the construction phase as per PHF3X_C06 | TBC |
| | PHF3X_P07 | Carnwath Road - West of Peterborough Road | Reinstatement of existing kerb on the eastern side of the access which was removed during the construction phase as per PHF3X_C07 | TBC |
| | PHF3X_P08 | Carnwath Road - West of Peterborough Road | Reinstatement of approximately 11m of on-street parking which was suspended during the construction phase as per PHF3X_C08 | TBC |
| | PHF3X_P09 | Carnwath Road - West of Peterborough Road | Reinstatement of approximately 34m of on-street parking which was suspended during the construction phase as per PHF3X_C09 | TBC |
| | PHF3X_P10 | Carnwath Road - East of Peterborough Road | Reinstatement of existing access which was closed during the construction phase as per PHF3X_C10 | TBC |

# Carnwath Road Riverside

THAMES TIDEWAY TUNNEL - SCHEDULE OF ASSOCIATED HIGHWAY WORKS

| Drawing Number | Works Reference | Location | Item of Work | Date of Implementation |
|---|---|---|---|---|
| | PHF3X_P11 | Carnwath Road / Wandsworth Bridge Road Junction | Possible reinstatement of the south-western kerb to current alignment at the junction. Alignment of back of footway returned to current alignment. Subject to agreement with LB Hammersmith and Fulham | TBC |

Date of issue: January 2013



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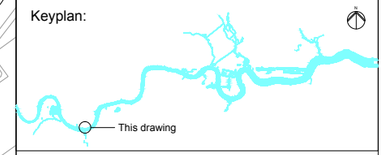



Coordinates are to be Ordnance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

**Key**

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

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

**On Street Parking**

Shared use - Q permit holders or pay & display max stay 8hrs Mon - Sat 9:00am - 5:00pm

Loading bay - Goods vehicles loading only 20 mins no return within 1 hour

**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**
Phase 1 - 2

10m 0 100m

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

# FOR INFORMATION

Location

**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information

**Application for Development Consent**

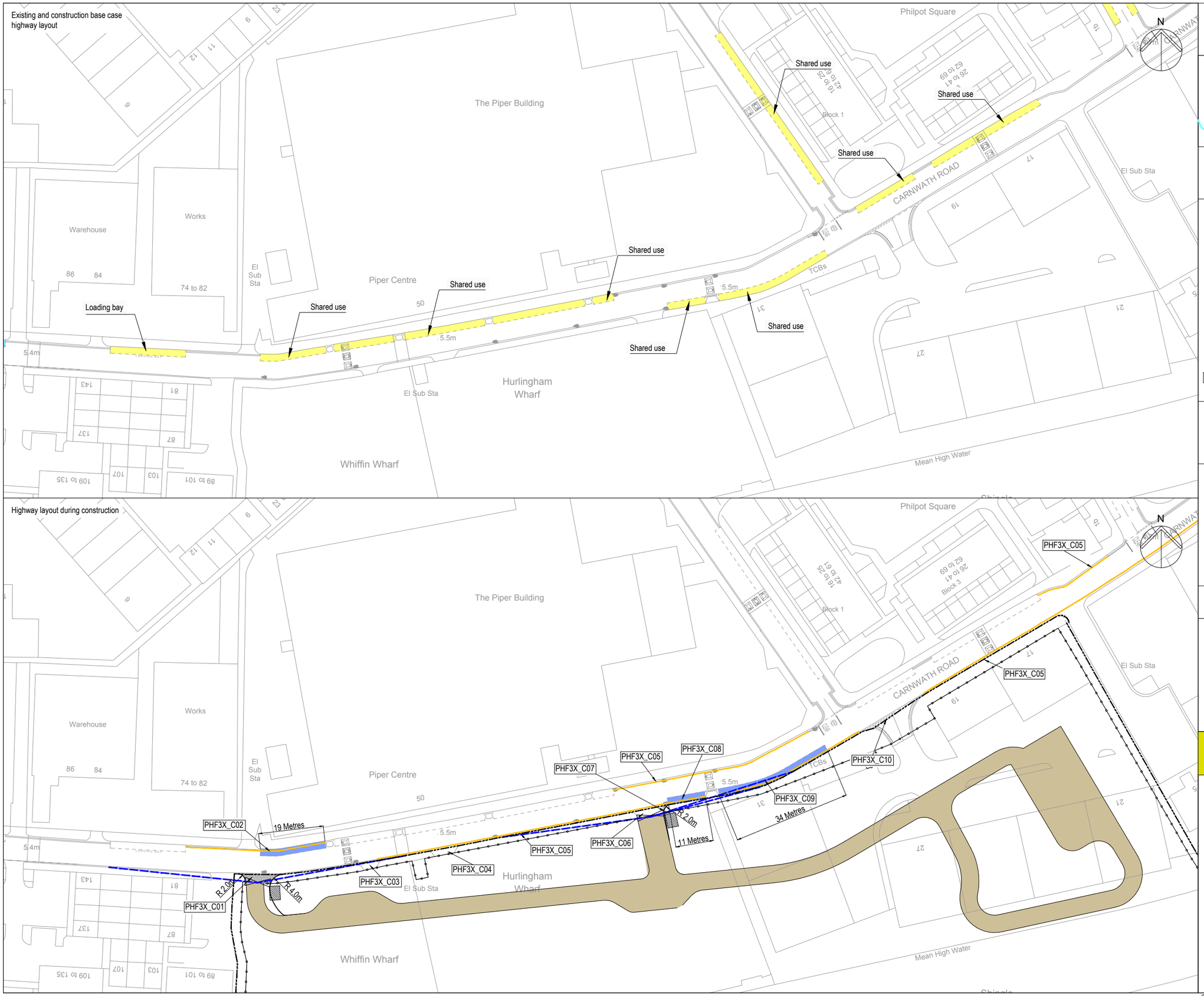
Existing highway layout

DCO-PP-06X-CARRR-090020
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Existing and 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
- On street parking

Revised
- Parking restrictions
- Removal of footway
- Suspended on street parking
- Illustrative on-site manoeuvring zone
- Site hut
- Site hoarding
- Access gate
- Visibility splay - 2.4m x 43m (SSD adjust for bonnet length)
- Limit of land to be acquired or used (LLAU)
- PHF1X_C00 See schedule of works

**On Street Parking**

Shared use - Q permit holders or pay & display max stay 8hrs Mon - Sat 9:00am - 5:00pm

Loading bay - Goods vehicles loading only 20 mins no return within 1 hour

**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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- Guidance For The Use Of Tactile Paving, Dft, 1998
- Accessible Bus Stop Design Guidance, Tfl, 2006

**Stage**
Phase 1 - 2

10m 0 40m

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

ILLUSTRATIVE

Location

**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information

**Application for Development Consent**

Highway layout during construction
Area 1 work

DCO-PP-06X-CARRR-090021
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

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

Revised
- Parking restrictions
- Removal of footway
- Extension of footway
- Tactile paving
- Limit of land to be acquired or used (LLAU)
- PWH1X_C00 See schedule of works

**On Street Parking**

Shared use - Q permit holders or pay & display max stay 8hrs Mon - Sat 9:00am - 5:00pm

**Standards**
- Design Manual For Roads And Bridges, Dft, 1992
- Traffic Signs Regulations & General Directions, Tso, 2002
- Traffic Signs Manual, Dft, 2006
- Manual For Streets, Dft, 2007
- Manual For Streets 2, Ciht, 2010
- Designing For Deliveries, Fta, 1998
- Cycle Infrastructure Design Ltn 2/08, Dft, 2008
- Design Of Pedestrian Crossings Ltn 2/95, Dft, 1995
- Guidance For The Use Of Tactile Paving, Dft, 1998
- Accessible Bus Stop Design Guidance, Tfl, 2006

**Stage**
Phase 1 - 2

10m 0 40m

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

ILLUSTRATIVE

Location
**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

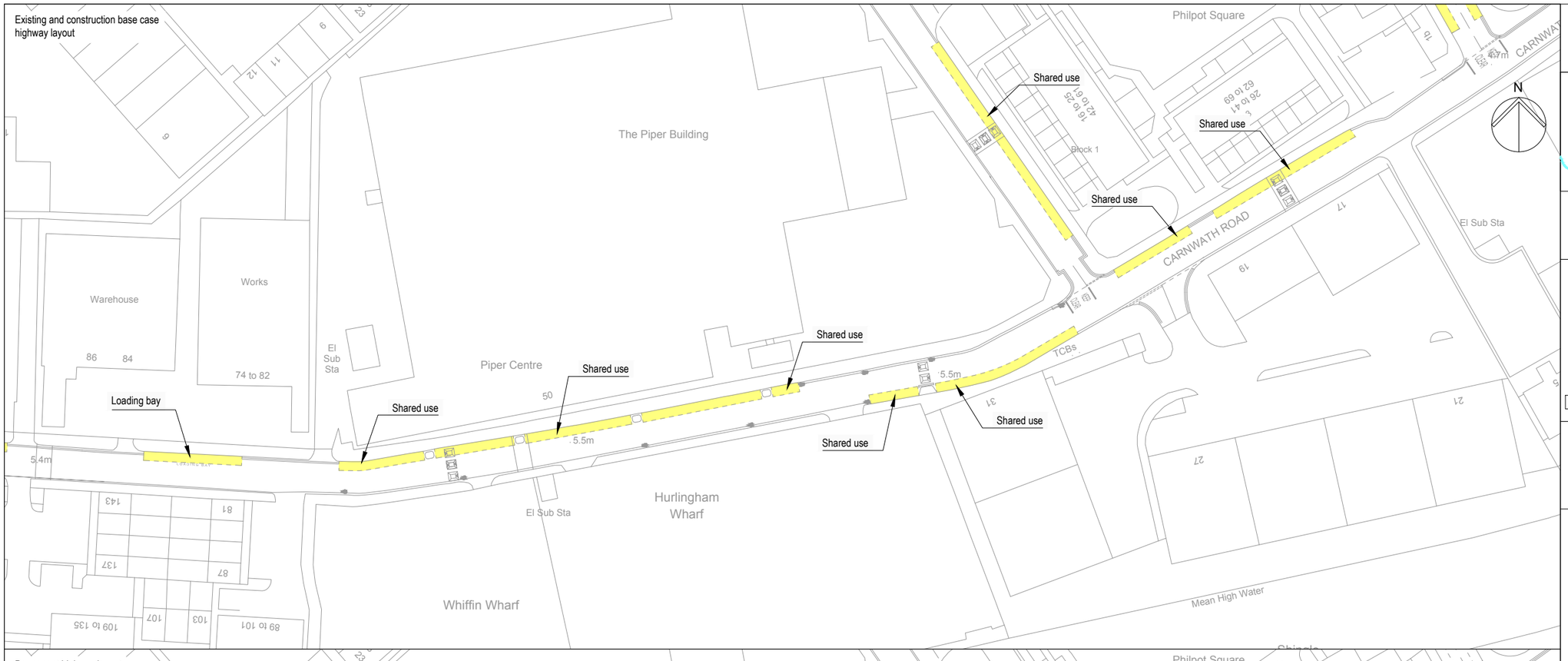
Document Information
**Application for Development Consent**
Highway layout during construction
Area 2 work

DCO-PP-06X-CARRR-090022
January 2013

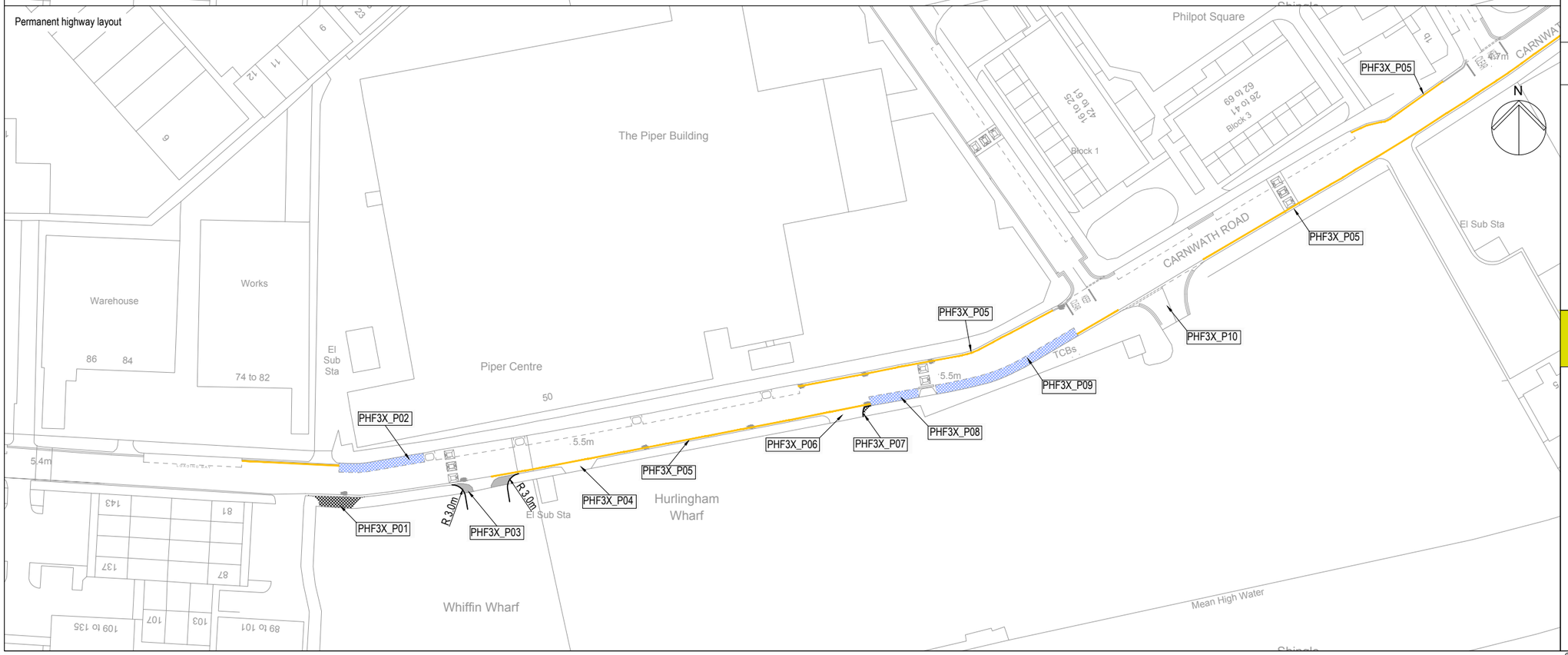
Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Existing and construction base case highway layout




Permanent highway layout






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
- On street parking

Revised
- Parking restrictions
- Removal of footway
- Reinstated footway
- Reinstated on street parking
- PHF1X_P00 See schedule of works

**On Street Parking**

Shared use - Q permit holders or pay & display max stay 8hrs Mon - Sat 9:00am - 5:00pm

Loading bay - Goods vehicles loading only 20 mins no return within 1 hour

**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
**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

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

DCO-PP-06X-CARRR-090023
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Existing and construction base case highway layout


Permanent highway layout






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

Revised
- Parking restrictions
- Removal of footway
- Reinstated footway
- PHF1X_P00 See schedule of works

**On Street Parking**

Shared use - Q permit holders or pay & display max stay 8hrs Mon - Sat 9:00am - 5:00pm

**Standards**
- Design Manual For Roads And Bridges, Dft, 1992
- Traffic Signs Regulations & General Directions, Tso, 2002
- Traffic Signs Manual, Dft, 2006
- Manual For Streets, Dft, 2007
- Manual For Streets 2, Ciht, 2010
- Designing For Deliveries, Fta, 1998
- Cycle Infrastructure Design Ltn 2/08, Dft, 2008
- Design Of Pedestrian Crossings Ltn 2/95, Dft, 1995
- Guidance For The Use Of Tactile Paving, Dft, 1998
- Accessible Bus Stop Design Guidance, Tfl, 2006

**Stage**
Permanent phase

10m 0 40m

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

ILLUSTRATIVE

Location
**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information
**Application for Development Consent**

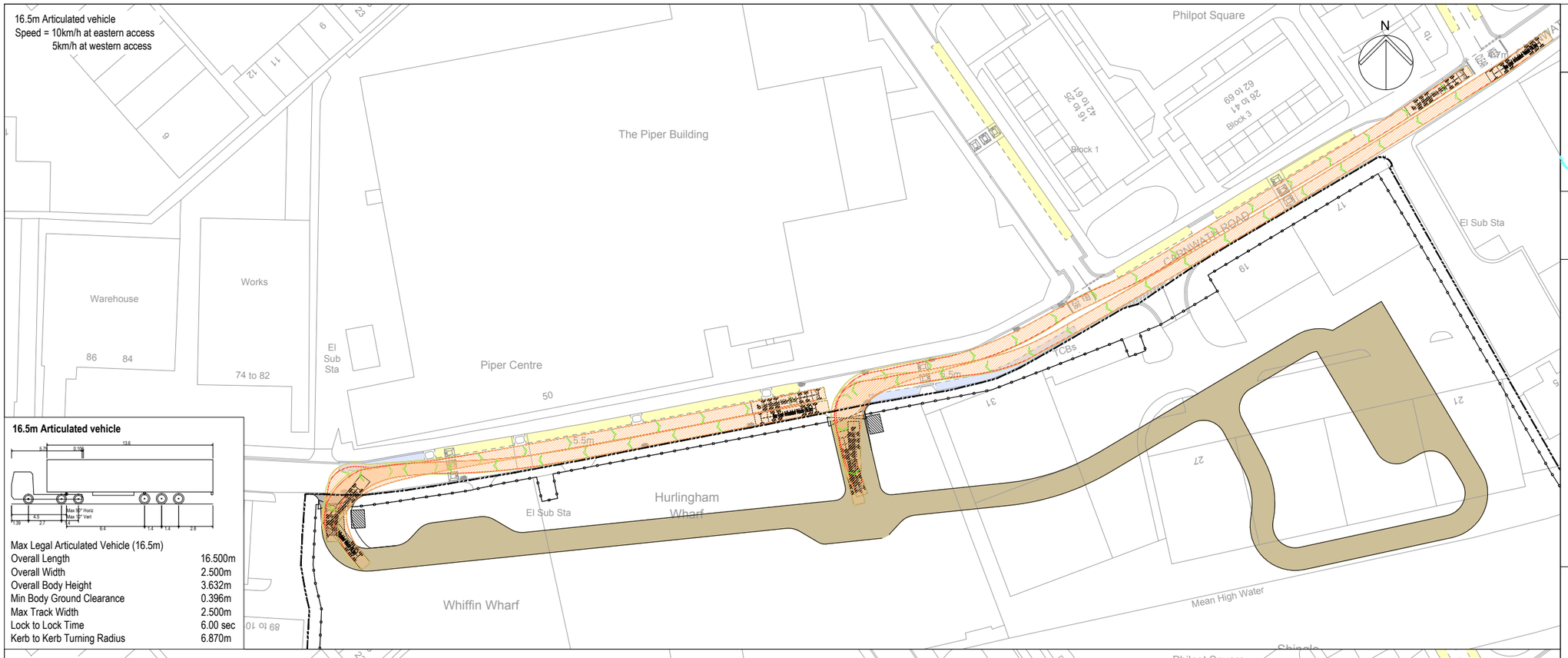
Permanent highway layout
Area 2 work

DCO-PP-06X-CARRR-090024
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

16.5m Articulated vehicle
Speed = 10km/h at eastern access
5km/h at western access

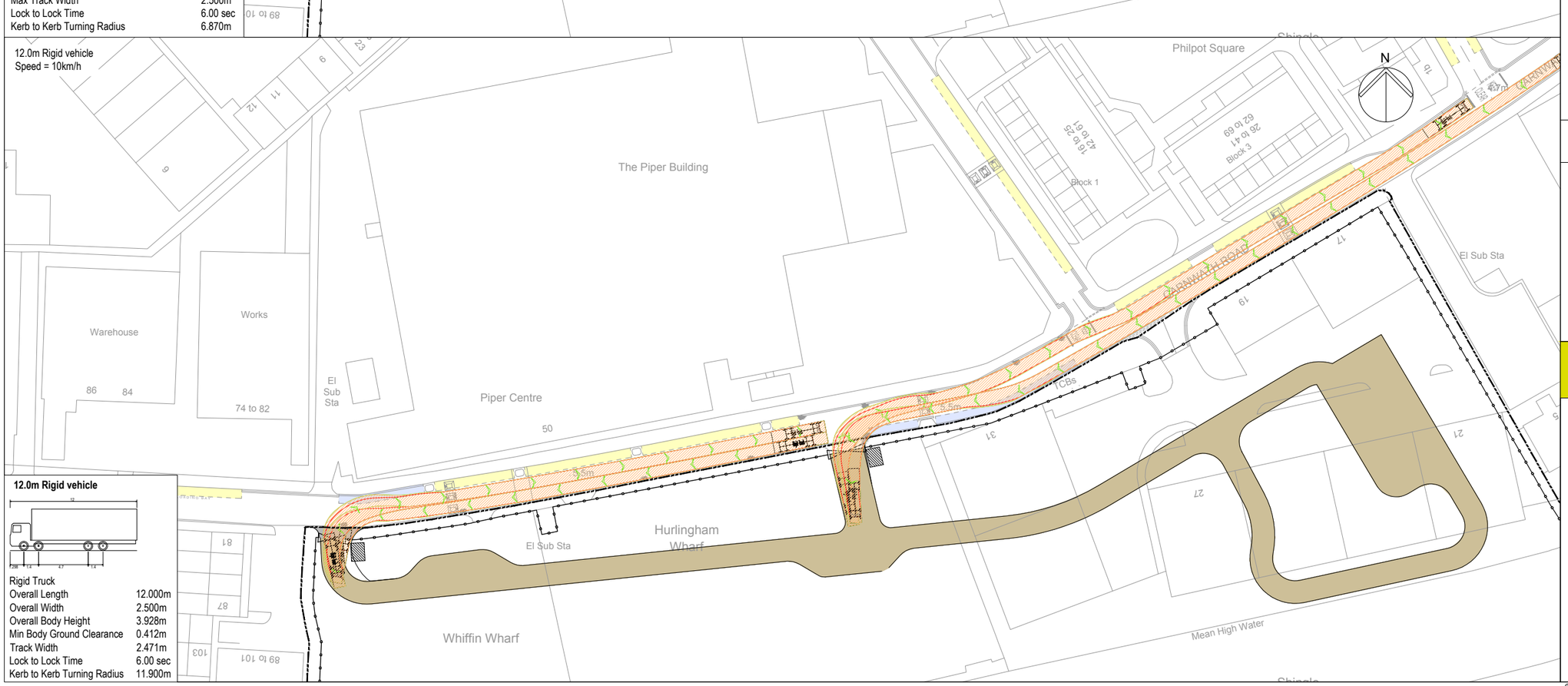



**16.5m Articulated vehicle**



| 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 = 10km/h



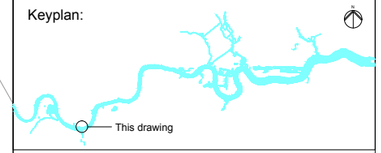

**12.0m Rigid vehicle**



| 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**

Existing
- Parking Restrictions
- On street parking

Revised
- Removal of footway
- Suspended on street parking
- Illustrative on -site manoeuvring zone
- Site hut
- 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
- 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**
Phase 1 - 2

10m 0 40m

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

ILLUSTRATIVE

Location
**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information
**Application for Development Consent**

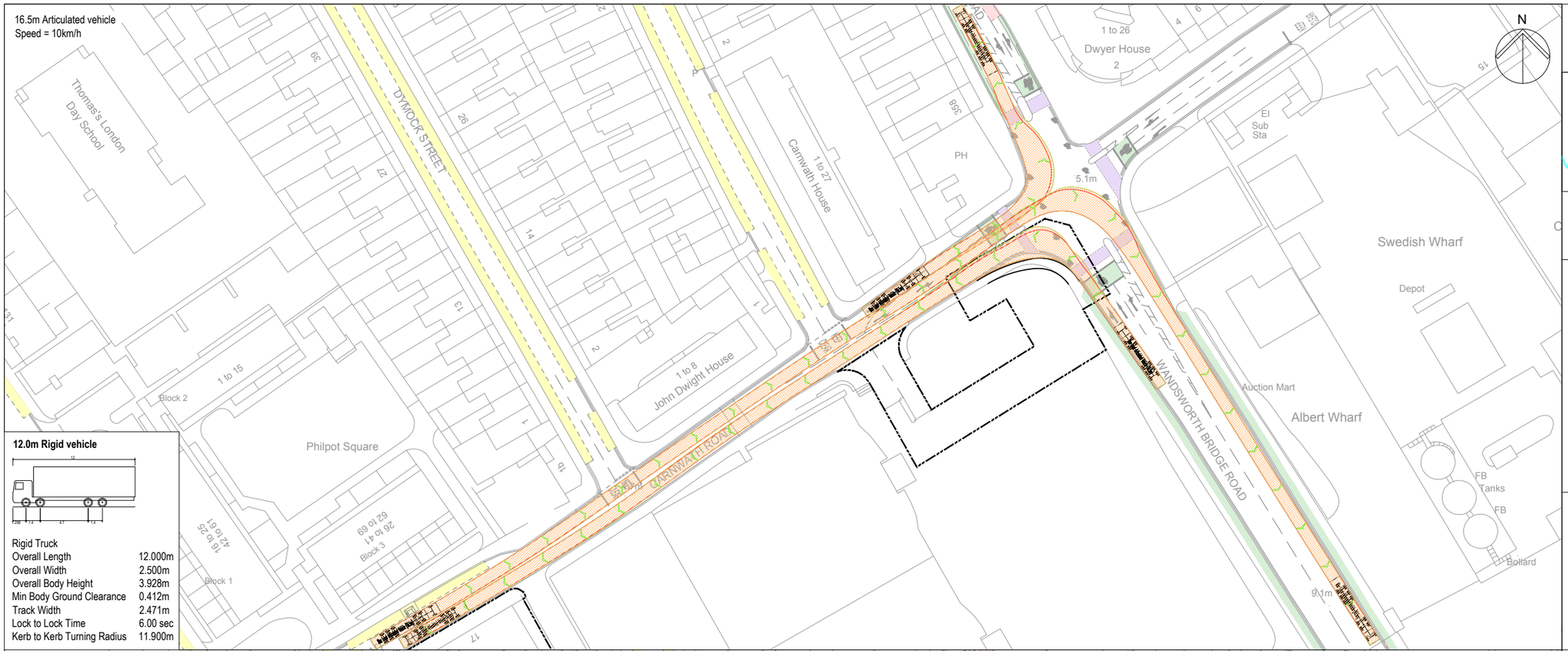
Highway layout during construction (Area 1)
Vehicle swept path analysis

DCO-PP-06X-CARRR-090025
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

16.5m Articulated vehicle
Speed = 10km/h

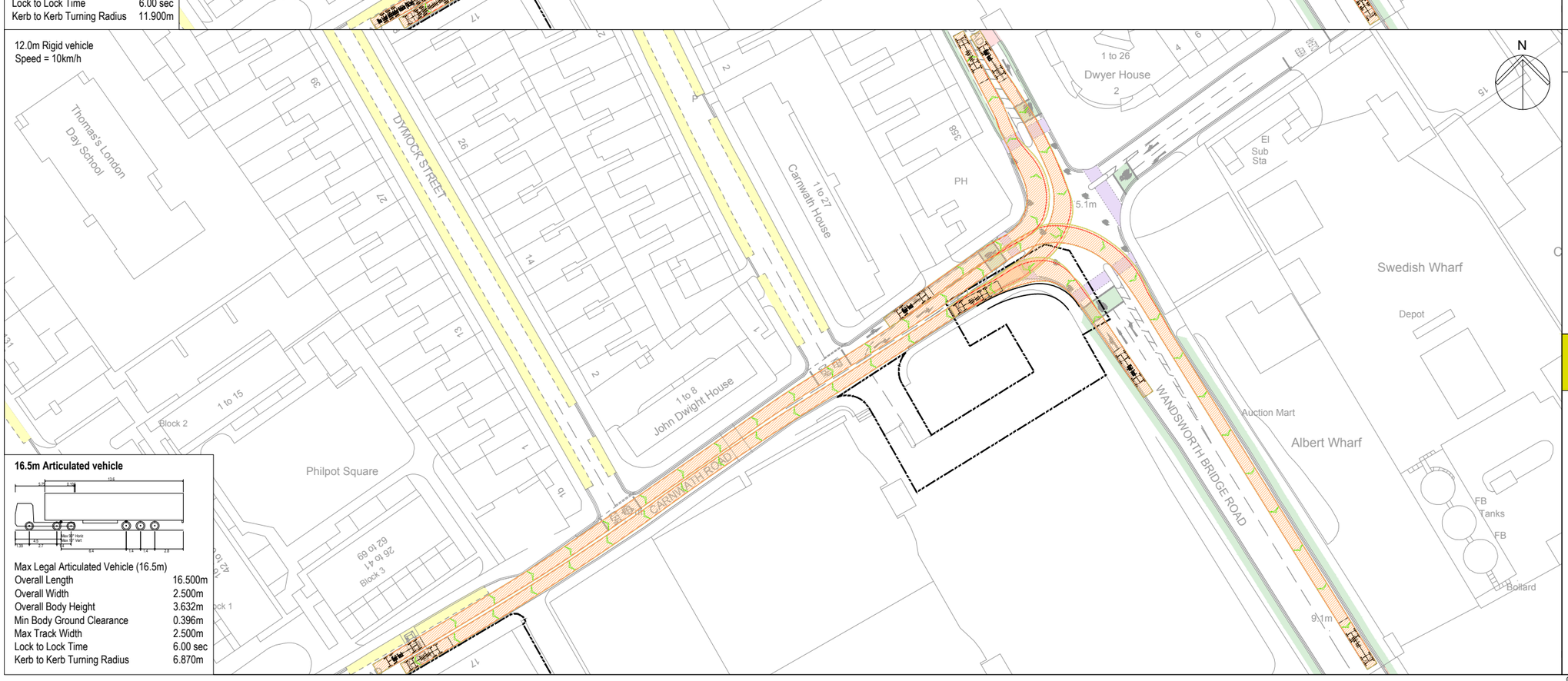



**12.0m Rigid vehicle**



| 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 |

12.0m Rigid vehicle
Speed = 10km/h



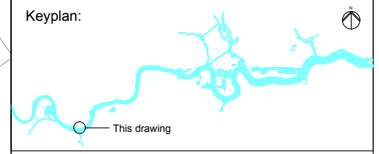

**16.5m Articulated vehicle**



| 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 |



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

Revised
- 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
- 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**
Phase 1 - 2

10m 0 40m

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

ILLUSTRATIVE

Location
**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information
**Application for Development Consent**

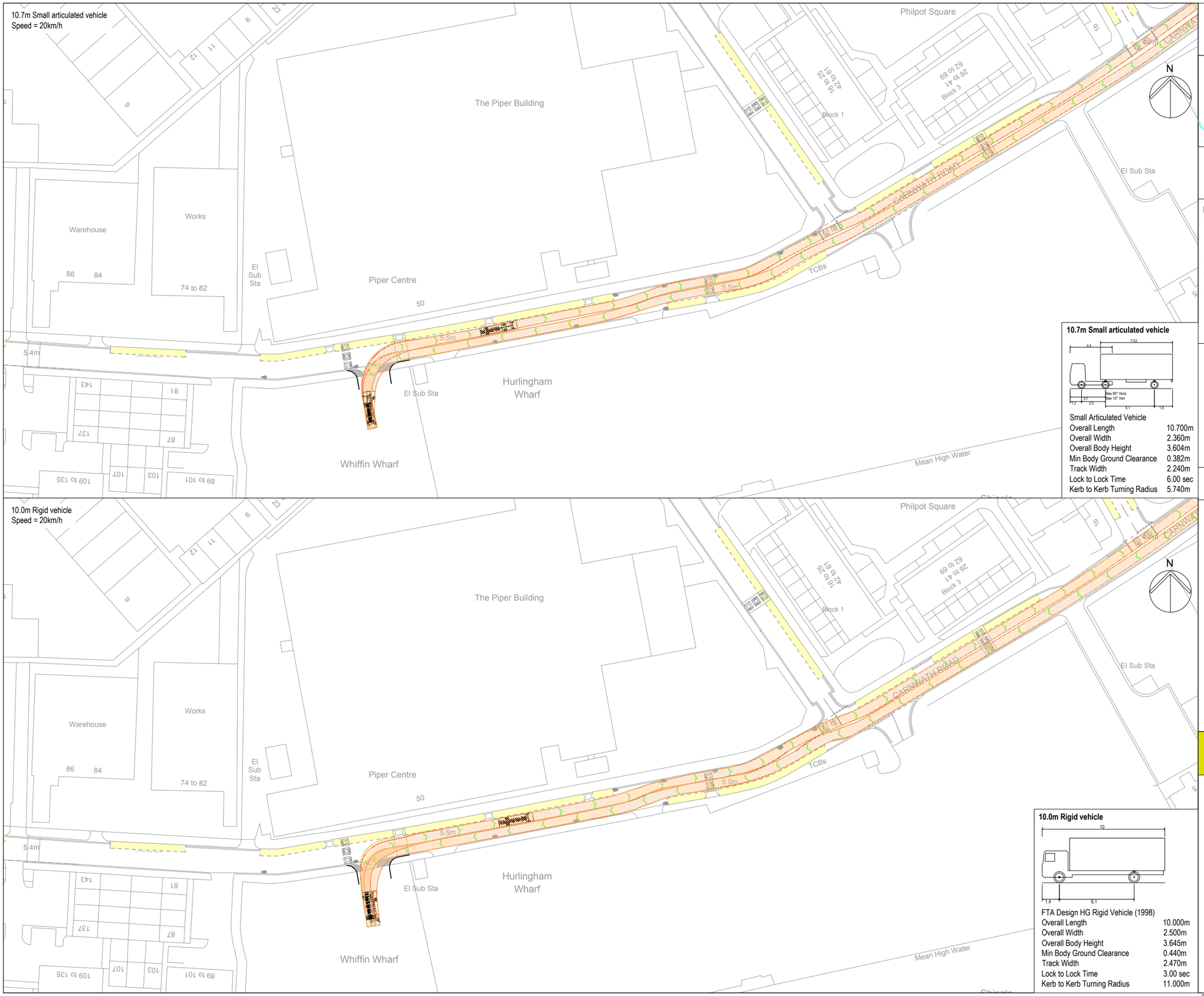
Highway layout during construction (Area 2)
Vehicle swept path analysis

DCO-PP-06X-CARRR-090026
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

10.7m Small articulated vehicle
Speed = 20km/h




**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 |



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
- On street parking

Revised
- Removal of footway

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
- 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
**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

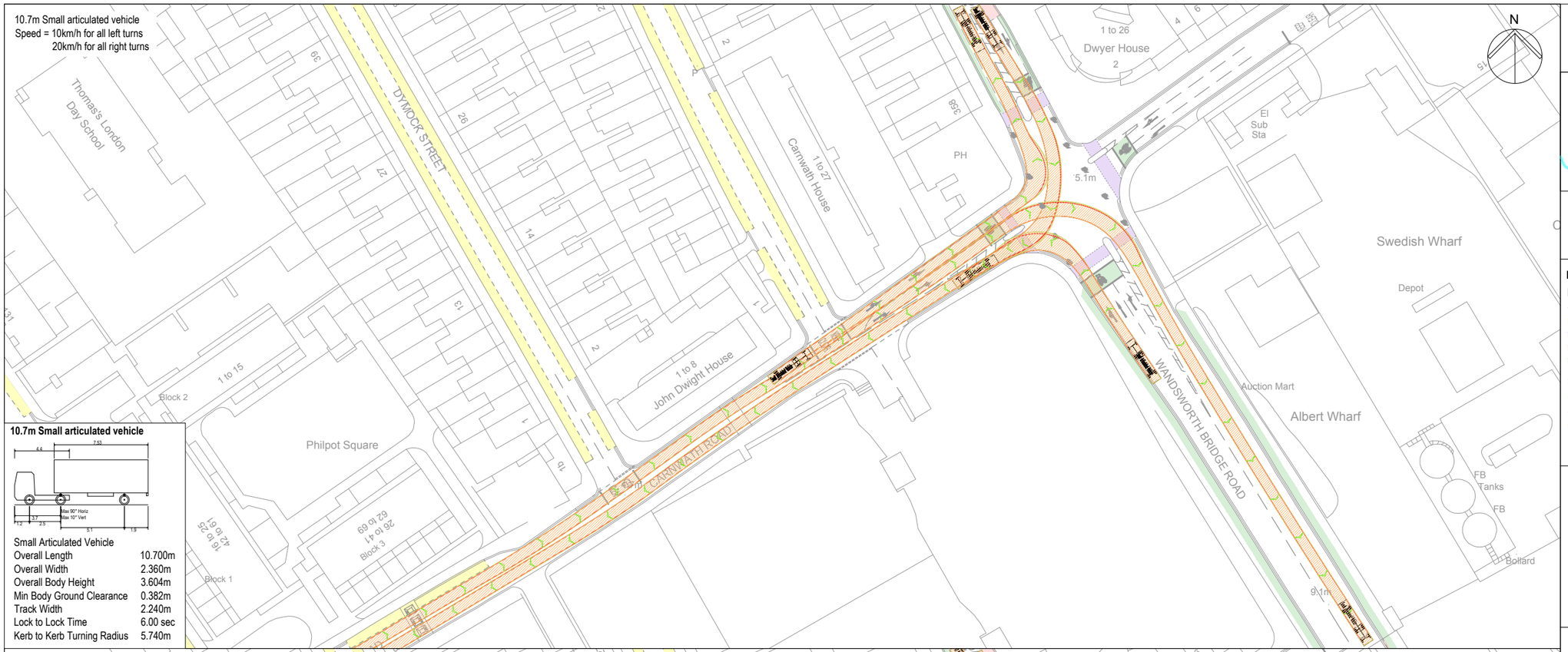
Document Information
**Application for Development Consent**
Permanent highway layout (Area 1)
Vehicle swept path analysis (HGVs)

DCO-PP-06X-CARRR-090027
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

10.7m Small articulated vehicle
Speed = 10km/h for all left turns
20km/h for all right turns

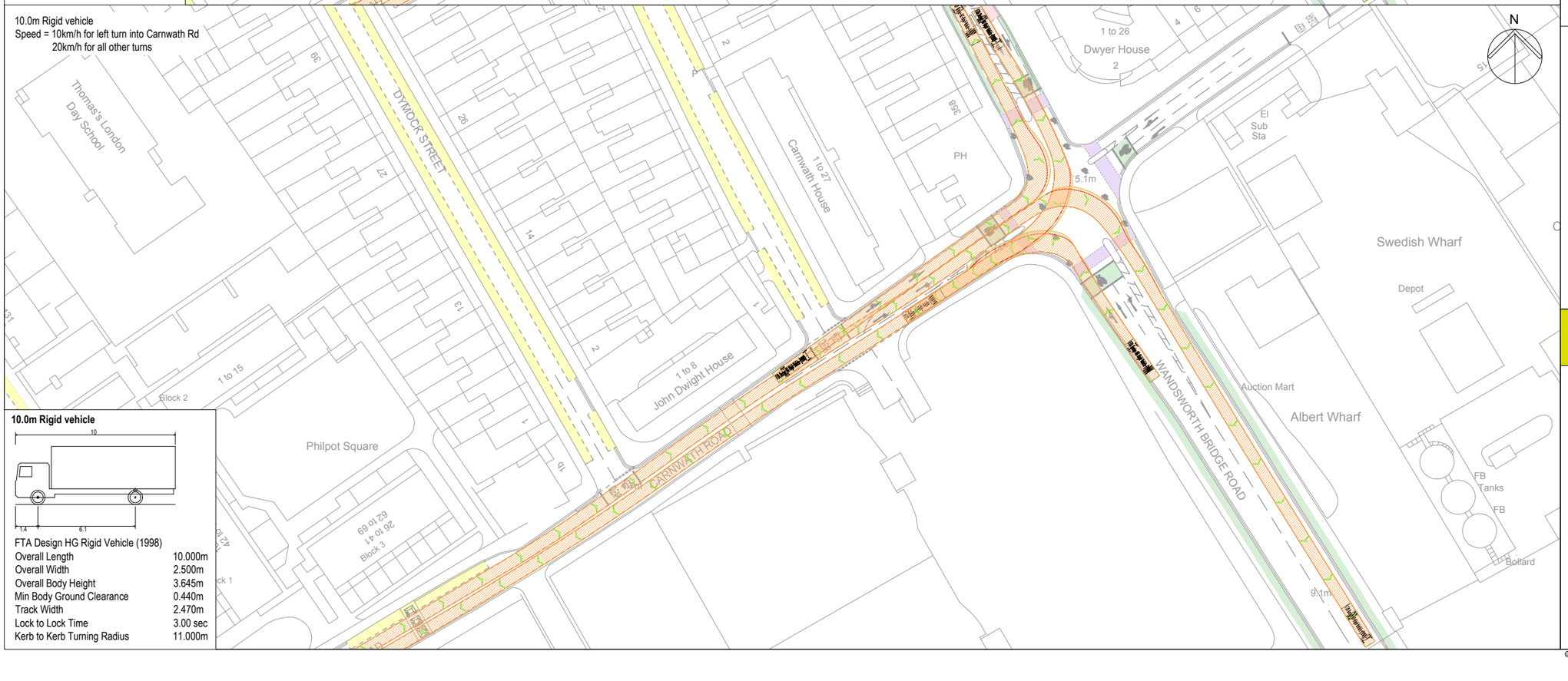



**10.7m Small articulated vehicle**




| 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 = 10km/h for left turn into Carnwath Rd
20km/h for all other turns



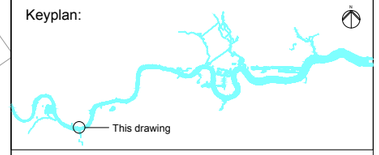

**10.0m Rigid vehicle**




| 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 |



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

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
- 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
**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information
**Application for Development Consent**

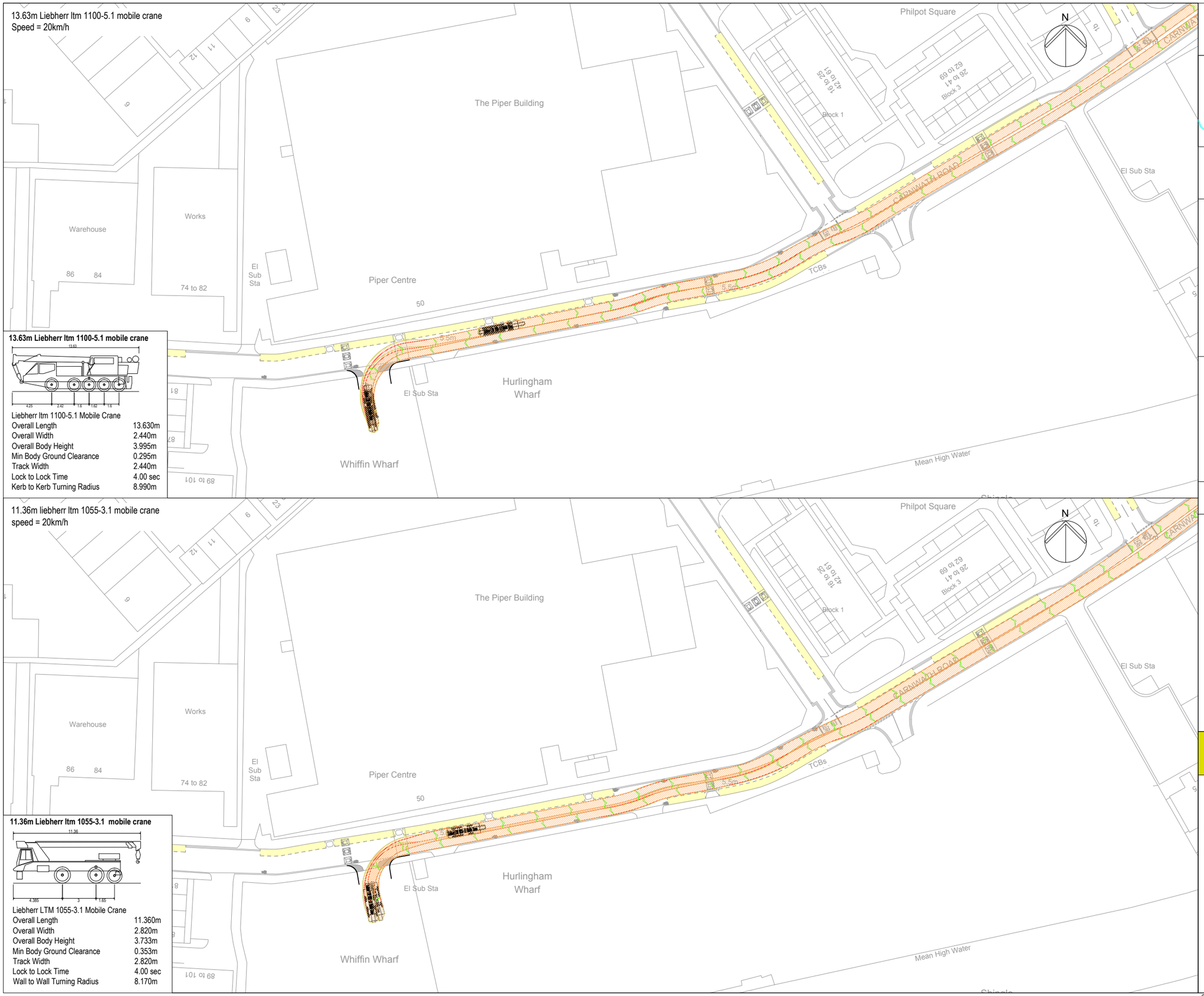
Permanent highway layout (Area 2)
Vehicle swept path analysis (HGVs)

DCO-PP-06X-CARRR-090028
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

13.63m Liebherr ltm 1100-5.1 mobile crane
Speed = 20km/h




**13.63m Liebherr ltm 1100-5.1 mobile crane**




| Liebherr ltm 1100-5.1 Mobile Crane | |
|---|---|
| Overall Length | 13.630m |
| Overall Width | 2.440m |
| Overall Body Height | 3.995m |
| Min Body Ground Clearance | 0.295m |
| Track Width | 2.440m |
| Lock to Lock Time | 4.00 sec |
| Kerb to Kerb Turning Radius | 8.990m |

11.36m liebherr ltm 1055-3.1 mobile crane
speed = 20km/h




**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
- On street parking

Revised
- Removal of footway

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
- 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
**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

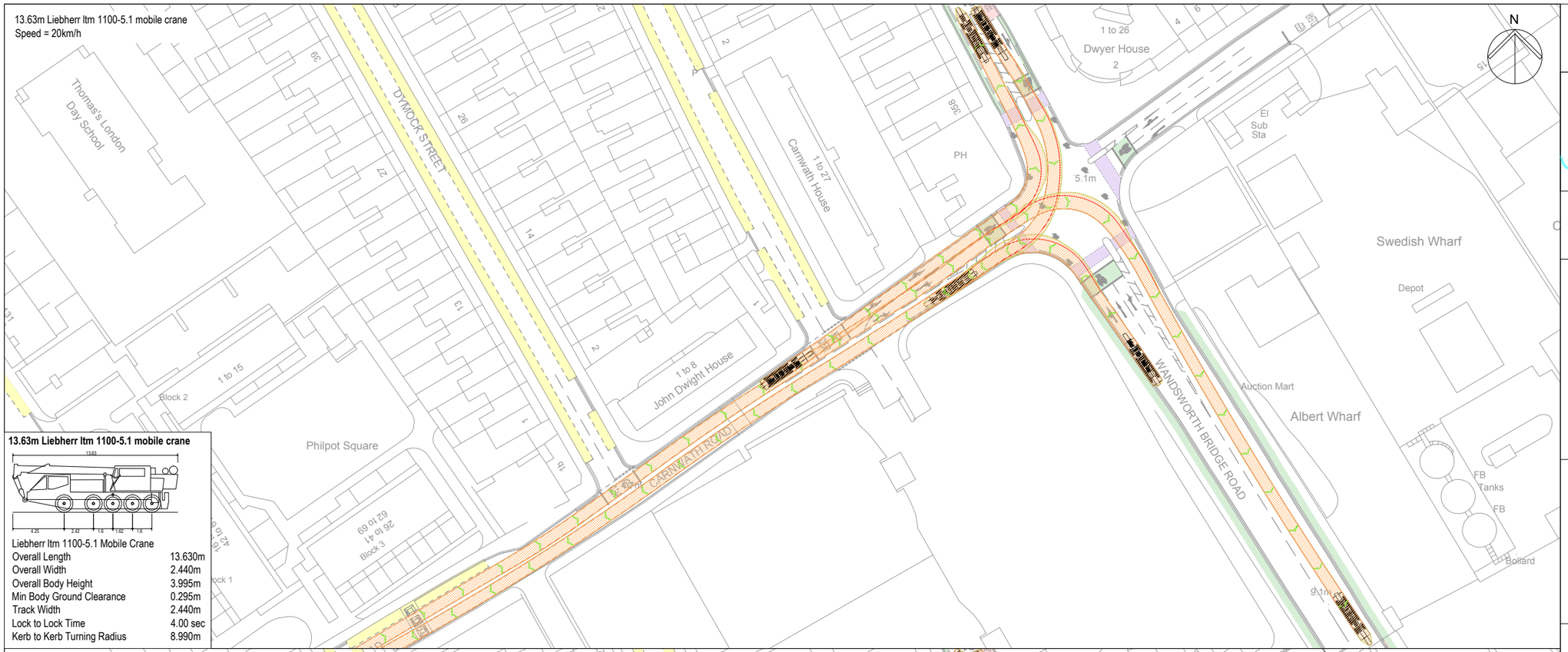
Document Information
**Application for Development Consent**
Permanent highway layout (Area 1)
Vehicle swept path analysis (cranes)

DCO-PP-06X-CARRR-090029
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

13.63m Liebherr ltm 1100-5.1 mobile crane
Speed = 20km/h

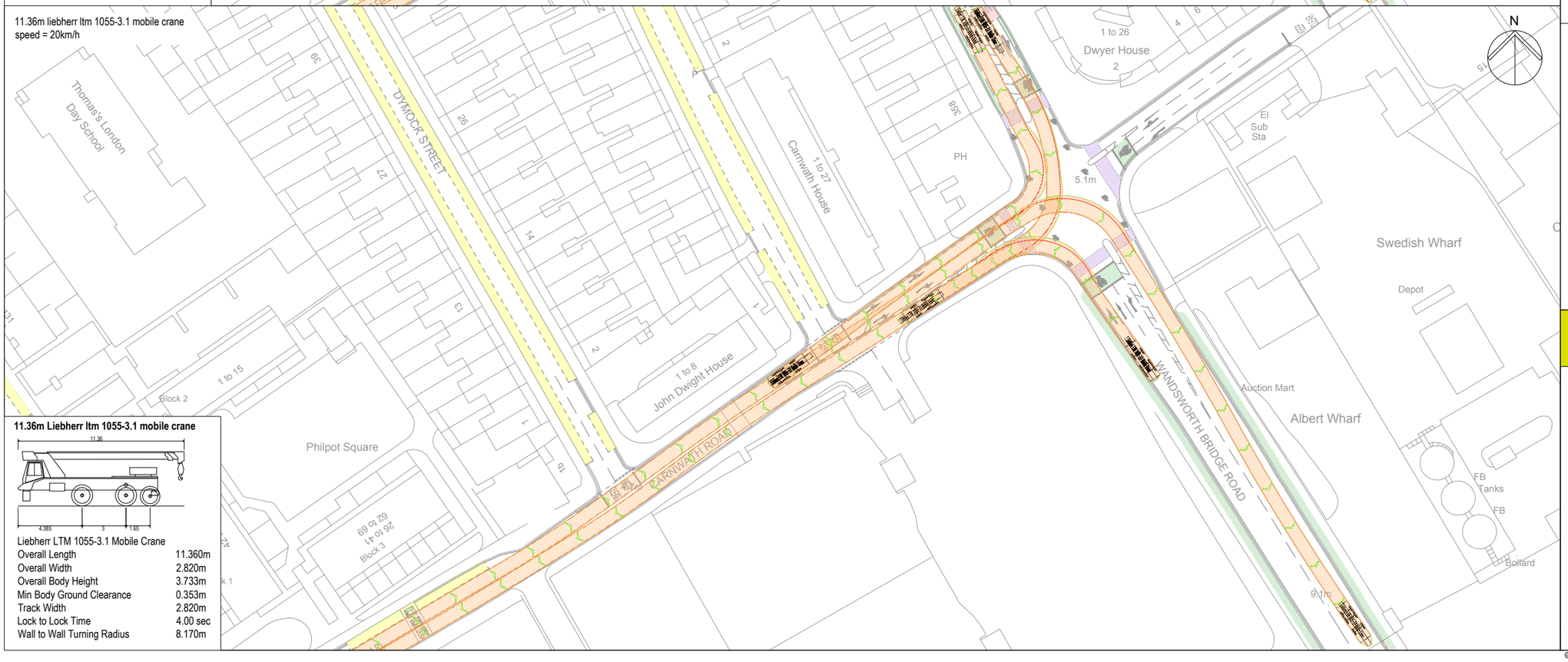



**13.63m Liebherr ltm 1100-5.1 mobile crane**



| Liebherr ltm 1100-5.1 Mobile Crane | |
|---|---|
| Overall Length | 13.630m |
| Overall Width | 2.440m |
| Overall Body Height | 3.995m |
| Min Body Ground Clearance | 0.295m |
| Track Width | 2.440m |
| Lock to Lock Time | 4.00 sec |
| Kerb to Kerb Turning Radius | 8.990m |

11.36m liebherr ltm 1055-3.1 mobile crane
speed = 20km/h



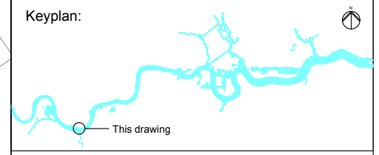

**11.36m Liebherr ltm 1055-3.1 mobile crane**



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

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
- 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
**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information
**Application for Development Consent**
Permanent highway layout (Area 2)
Vehicle swept path analysis (cranes)

DCO-PP-06X-CARRR-090030
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

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

Falconbrook Pumping Station

Townmead Road

Wandsworth Bridge Road

Carnwath Road

A217

Wandsworth Bridge Road

Swandon Way

A217

A214 Trinity Road

A3

Armoury Way

A3

HAMMERSMITH & FULHAM

WANDSWORTH

WANDSWORTH

Parsons Green

Sands End

Battersea Reach

Hurlingham Park

Hurlingham Club Grounds

Cricket Ground

Hurlingham House

Croquet Lawn

Broomhouse Dock

Wandsworth Park

Clapham Junction

Spencer Park

Wandsworth Common

Superstore

Heliport

Brewery

Govt Offs

Works

Academy

Mean High Water

MHW

0 55 110 m

Scale 1 : 7,500 at A3

## FOR INFORMATION

Location

**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information

**Transport Assessment**

Transport - site location plan

Figure 10.2.1

1PL03-TT-50608
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- Site access
- TFL road network
- Strategic road network
- Primary construction route
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

**FOR INFORMATION**

Location

**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information

**Transport Assessment**

Transport - construction traffic routes

Figure 10.2.2

1PL03-TT-50600
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- National Rail stations with cycle parking
- Underground stations with cycle parking
- Cycle superhighway (open)
- London strategic walk network
- Thames path
- London cycle routes

National cycle network

Route Type

- Open Traffic Free
- Open on-road
- Limits of Land to be Acquired or Used
- Local authority boundary

110 55 0 110 m

Scale 1 : 7,500 at A3

## FOR INFORMATION

Location

**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information

**Transport Assessment**

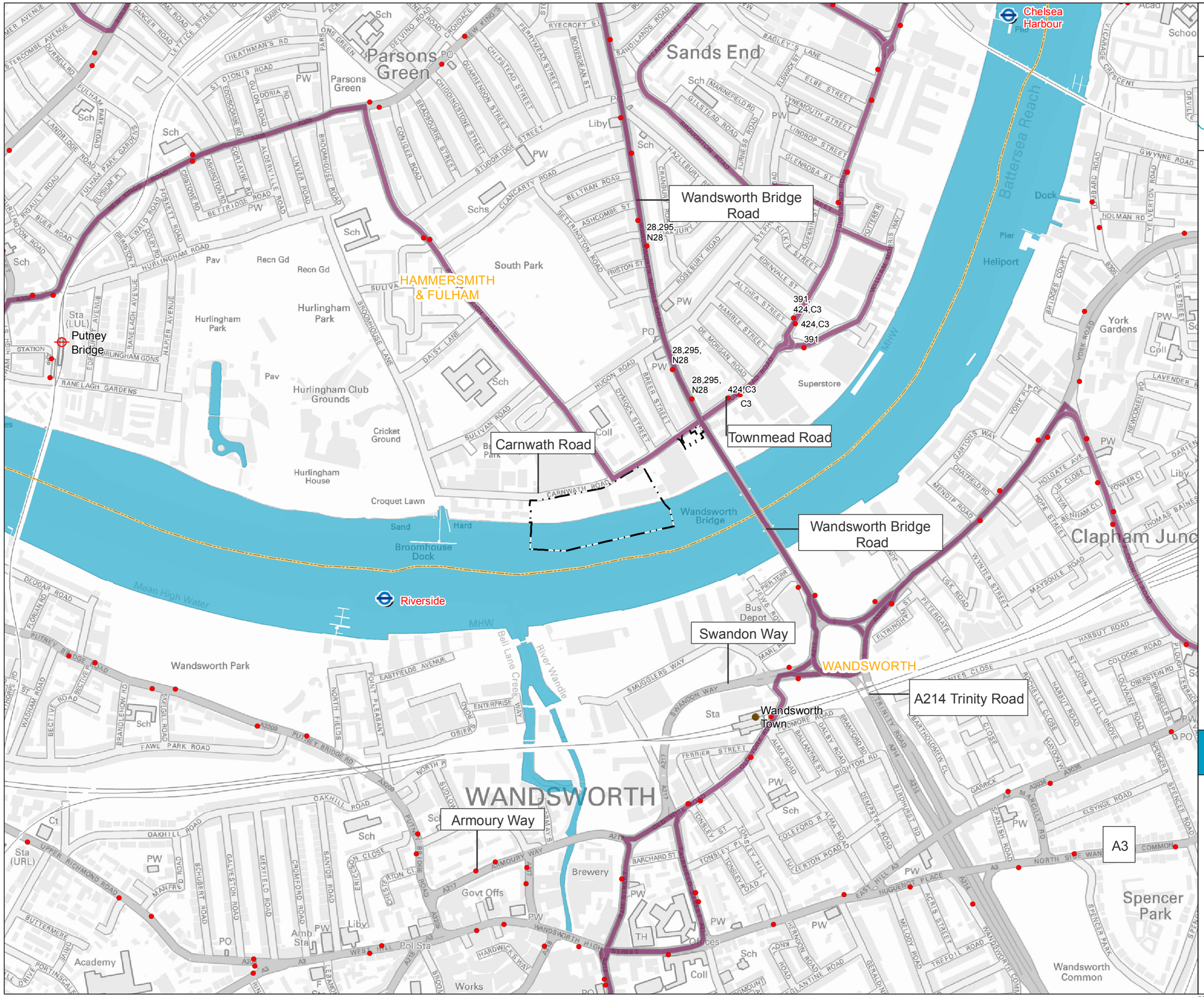
Transport - pedestrian and cycle network

Figure 10.4.1

1PL03-TT-50616
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

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Keyplan:

Key

- TFL bus stops
- National rail stations
- London underground stations
- Pier locations
- 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

**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information

**Transport Assessment**

Transport - public transport

Figure 10.4.2

1PL03-TT-50624
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

- Private car parking
- City Car
- Green Wheels
- Hertz on Demand
- Zip Car
- 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

**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information

**Transport Assessment**

Transport - parking

Figure 10.4.3

1PL03-TT-50632
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

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

80 40 0 80 m

Scale 1 : 5,000 at A3

**FOR INFORMATION**

Location

**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information

**Transport Assessment**

Transport - survey locations

Figure 10.4.4

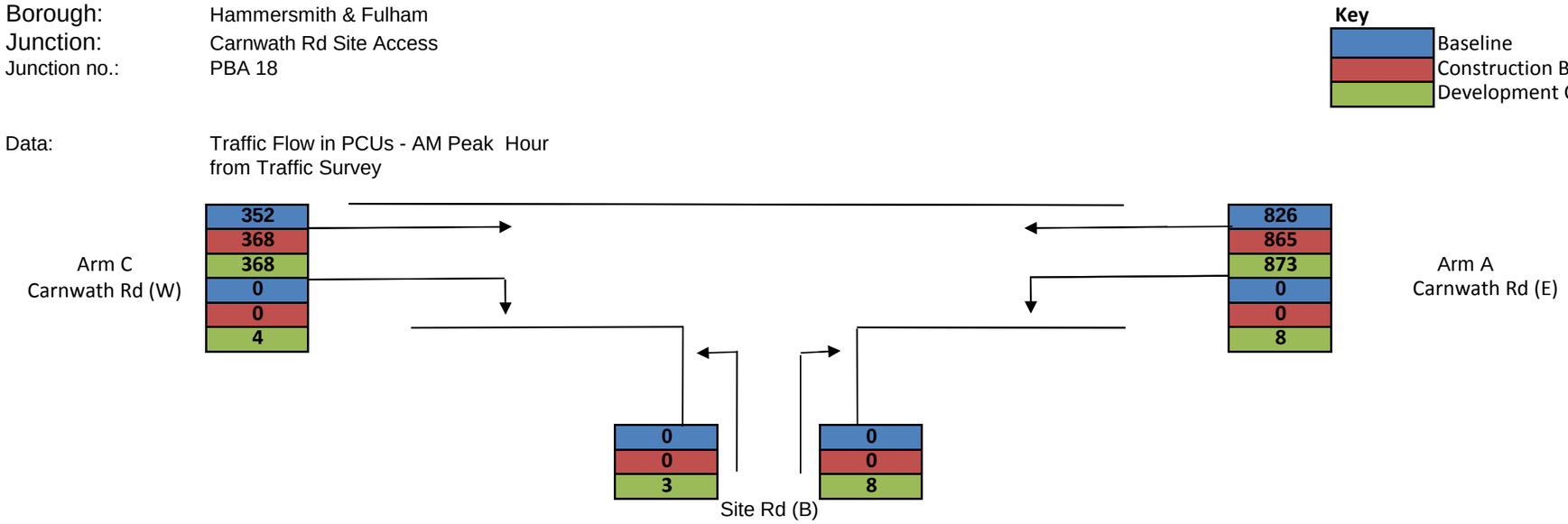
1PL03-TT-50640
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

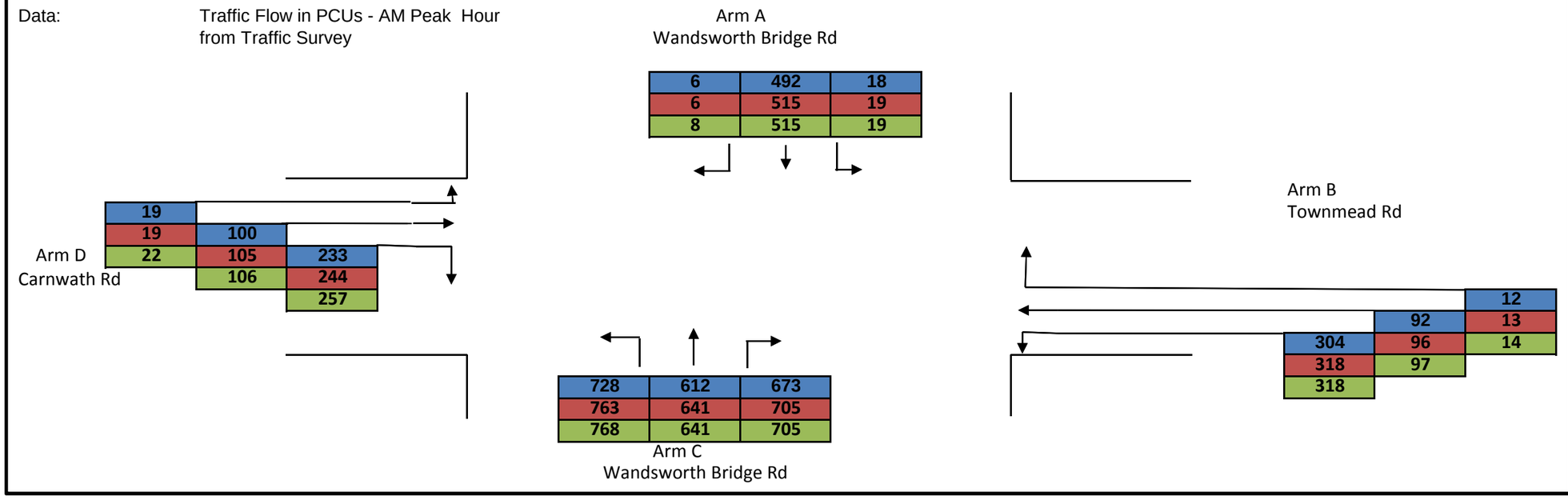
Site: Carnwath Rd
Borough: Hammersmith & Fulham
Junction: Carnwath Rd Site Access
Junction no.: PBA 18

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




Site: Carnwath Rd
Borough: Hammersmith & Fulham
Junction: Wandsworth Bridge Rd/ Carnwath Rd/ Townmead Rd
Junction no.: PBA 19

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




FOR INFORMATION

Location
**Carnwath Road**
LB of Hammersmith & Fulham

Document Information
**Transport Assessment**

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

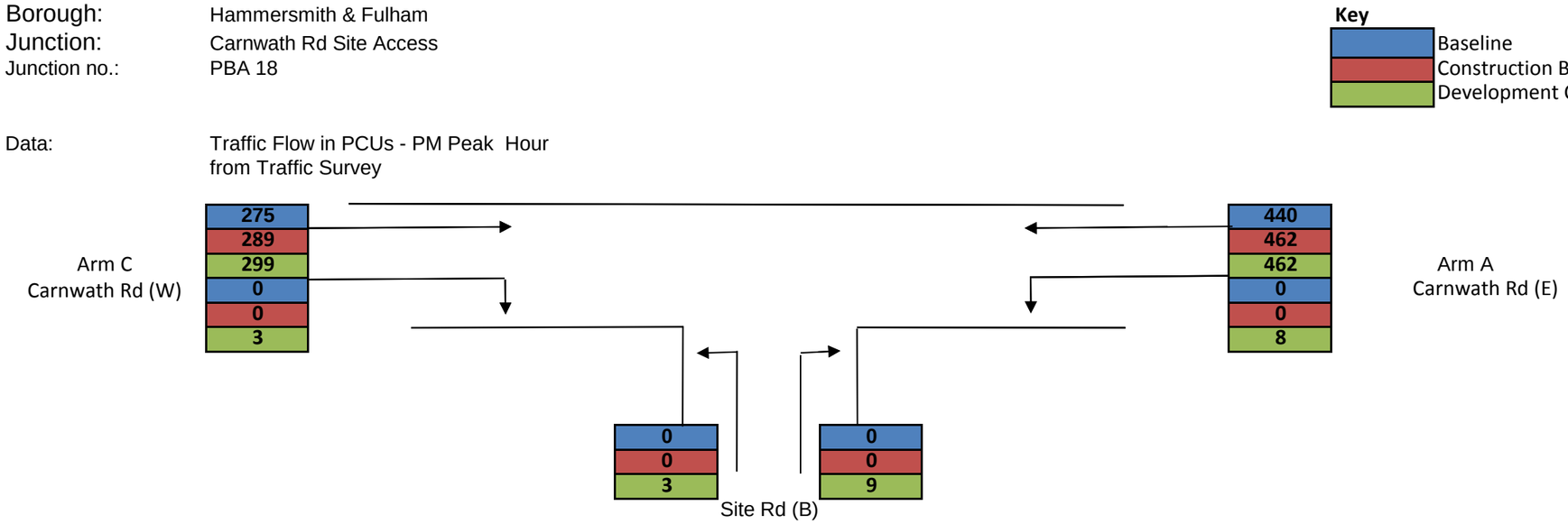
Figure 10.4.5
1PL03-TT-50899
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

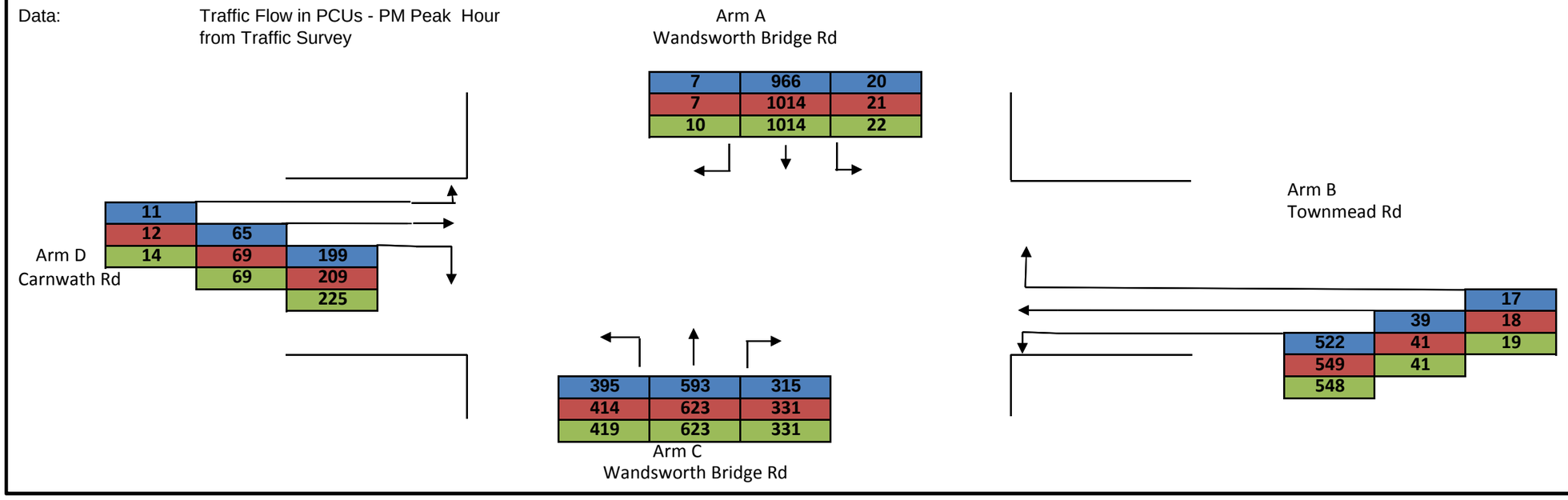
Site: Carnwath Rd
Borough: Hammersmith & Fulham
Junction: Carnwath Rd Site Access
Junction no.: PBA 18

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




Site: Carnwath Rd
Borough: Hammersmith & Fulham
Junction: Wandsworth Bridge Rd/ Carnwath Rd/ Townmead Rd
Junction no.: PBA 19

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




FOR INFORMATION

Location
**Carnwath Road**
LB of Hammersmith & Fulham

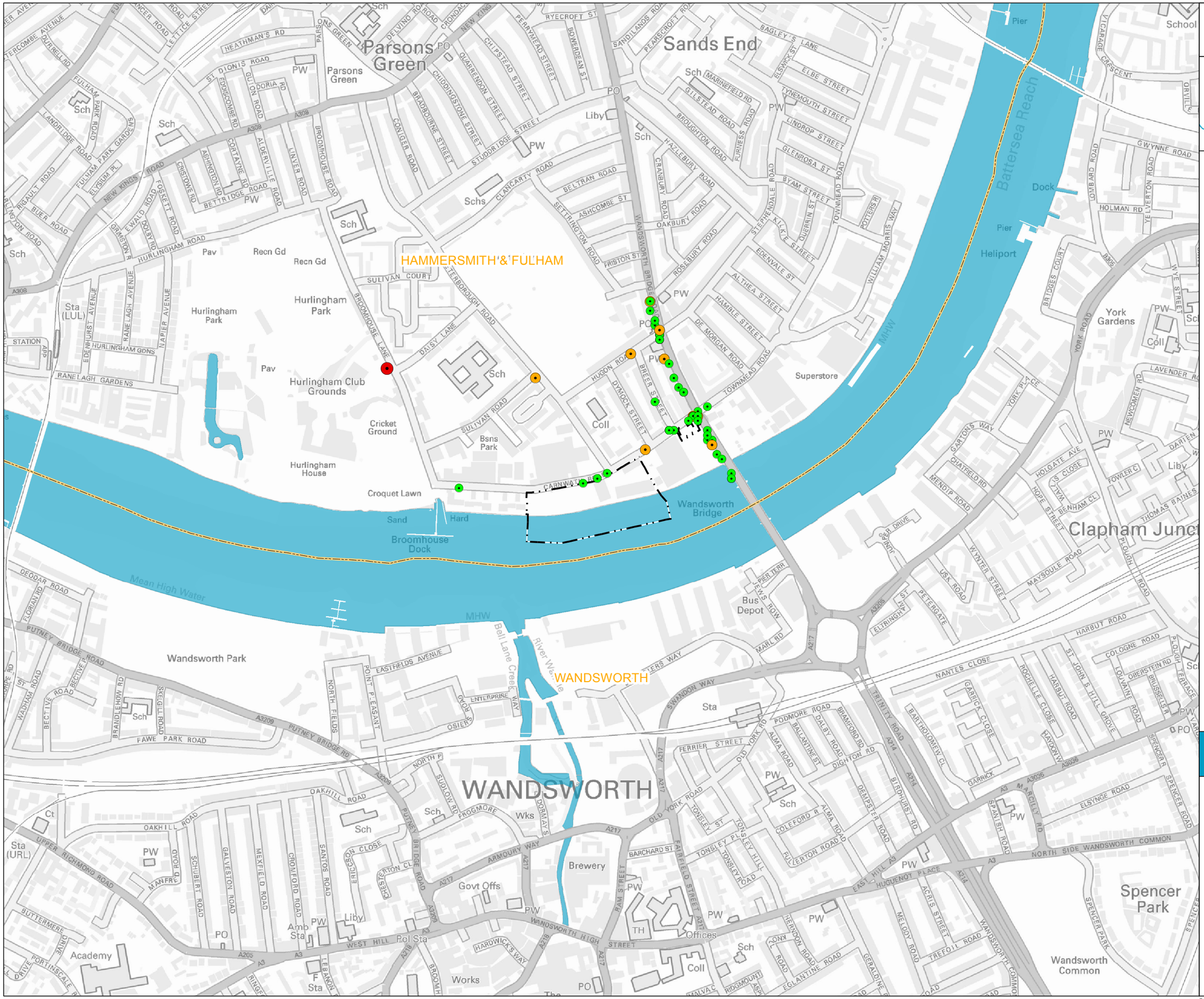
Document Information
**Transport Assessment**

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

Figure 10.4.6
1PL03-TT-50923
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

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Keyplan:

Key

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

110 55 0 110 m

Scale 1 : 7,500 at A3

FOR INFORMATION

Location

**Carnwah Road Riverside**
London Borough of Hammersmith & Fulham

Document Information

**Transport Assessment**

Transport - accident locations

Figure 10.4.7

1PL03-TT-50744
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Keyplan:

Key

## 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

**Carnwah Road Riverside**
London Borough of Hammersmith & Fulham

Document Information

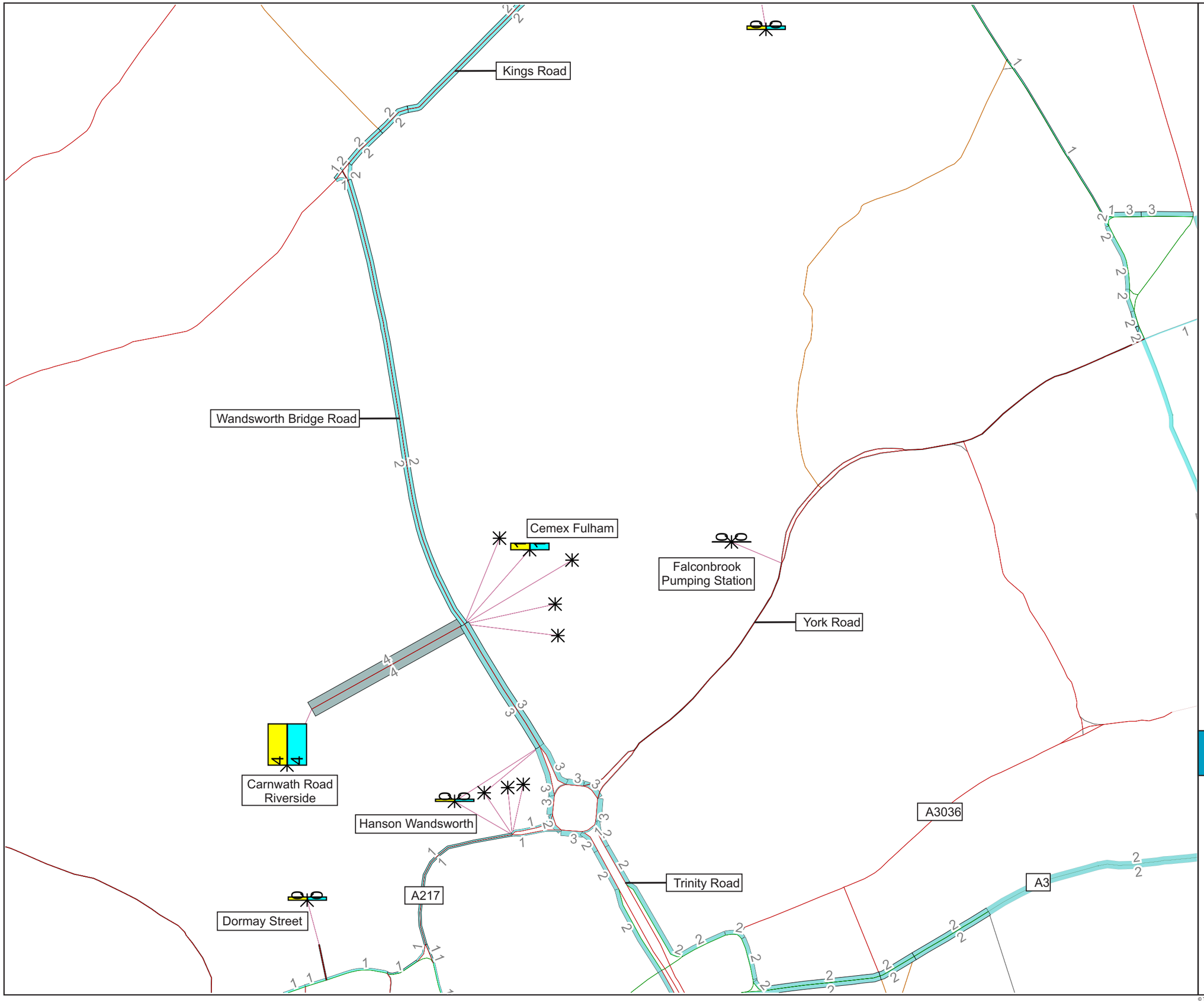
**Transport Assessment**

Transport - pedestrian and cyclist accidents by severity
Figure 10.4.8

1PL03-TT-50828
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water




**Hourly construction lorries arrivals and departures**

- Arrivals
- Departures

**Hourly construction lorries movements**

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

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

FOR INFORMATION

Location

**Carnwath Road Riverside**
London Borough of Hammersmith & Fulham

Document Information

**Transport Assessment**
Hourly Construction Lorry Movements - Site Year 3 of Construction

Figure 10.5.1

1PL03-TT-50892

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

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



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