

Transport and Works Act 1992

London Underground (Northern Line Extension) Order

Environmental statement

Volume IIb: Appendix C

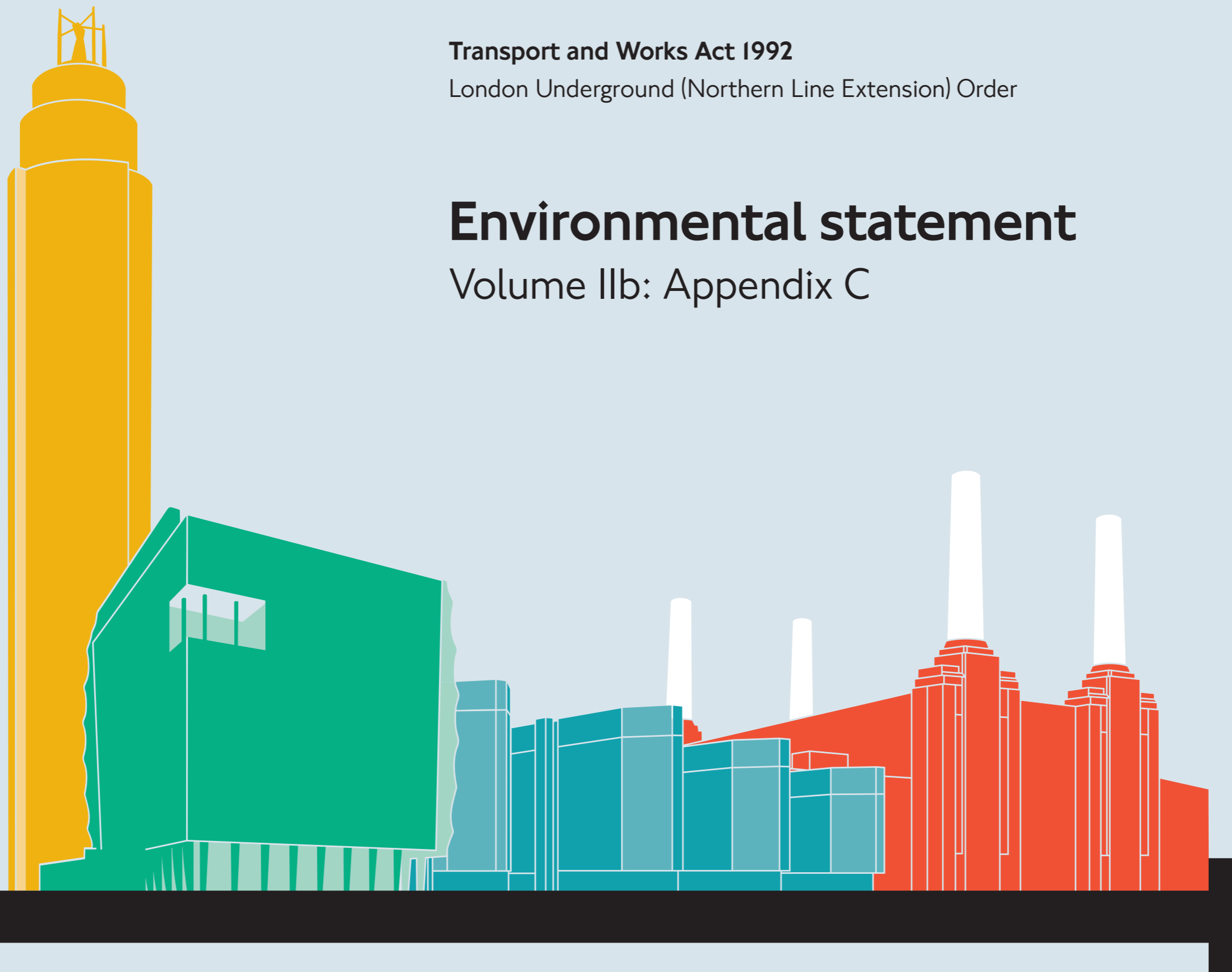


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Environmental Statement

Volume II

C1: Construction Traffic, Parking &
Pedestrian Impact Assessment

Environmental Statement

Volume II

Northern Line Extension

C1: Construction Traffic, Parking & Pedestrian Impact Assessment

Report

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1 Introduction

Construction Traffic, Parking and Pedestrian Impact Assessments - Overview

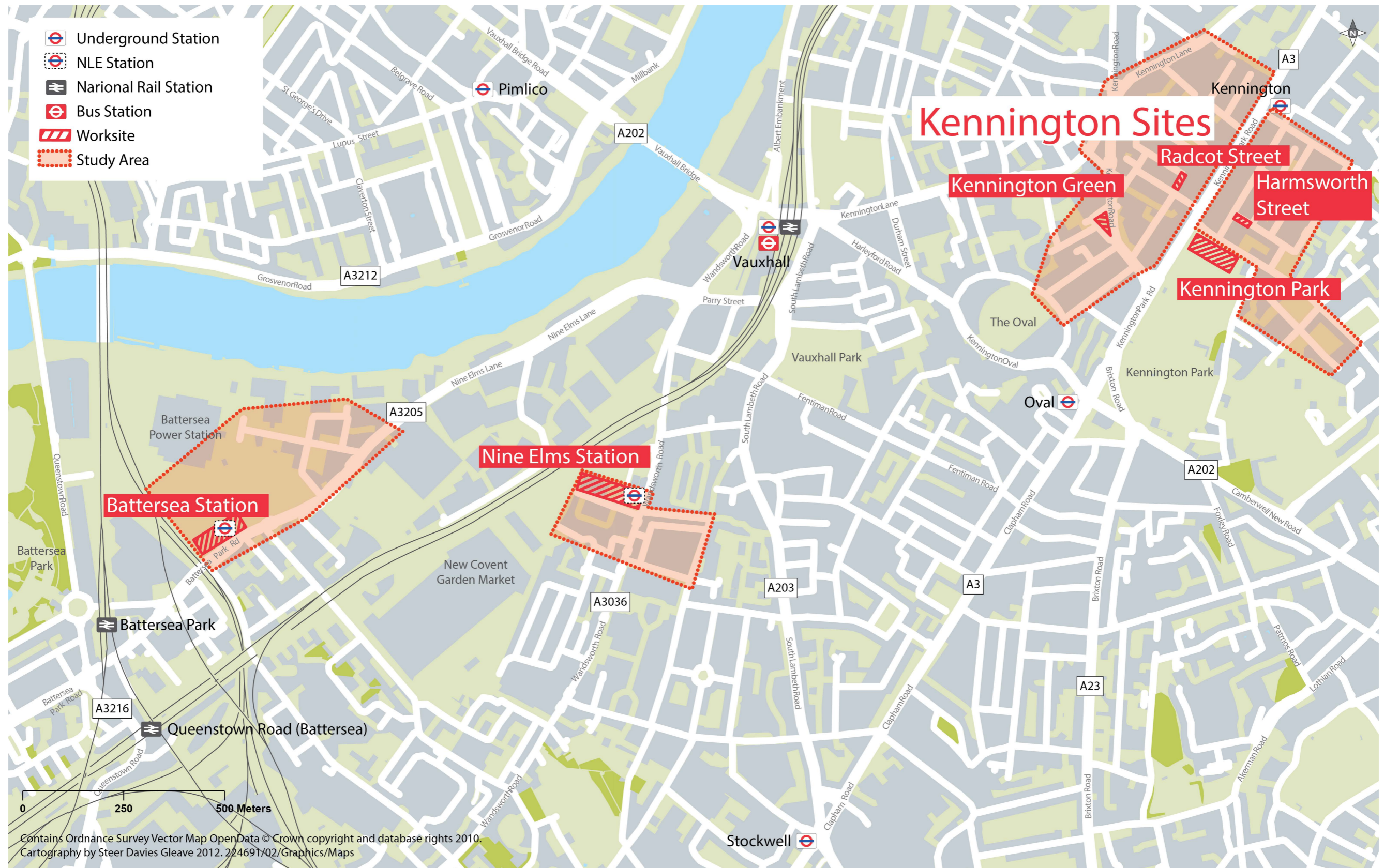
- 1.1 This Report presents the analysis undertaken by Steer Davies Gleave that considers the effect of the construction of the Northern Line Extension (NLE) on traffic, parking and pedestrians.
- 1.2 The Report incorporates the following:
 - Overview of construction proposals
 - Current conditions in the Study Area
 - Analysis of area wide and local junction traffic impacts
 - Analysis of parking impacts
 - Analysis of pedestrian impacts.
- 1.3 This assessment has been undertaken to ensure that the impacts of constructing the NLE on traffic, parking and pedestrians are understood and that mitigation measures are proposed where required.

2 Study Area, Worksites and Access

Construction overview

- 2.1 The NLE, which will take approximately four years to build, requires the construction of an underground railway to form an extension of the Northern line (Charing Cross branch) from Kennington to Battersea. It would diverge from the existing railway south of Kennington station from a section of track used by terminating trains (known as the Kennington loop).
- 2.2 Significant excavation activity will be required to build the tunnels and stations and, to minimise disruption to the road network, approximately two thirds of the excavated material will be transported by river and the remaining will be transported by road.
- 2.3 There will be up to six worksites, as set out in Figure 2.1.

FIGURE 2.1 NLE WORKSITES



C1: Construction

2.4 Table 2.1 provides further detail on the location of these worksites and the estimated length of construction activity at each site.

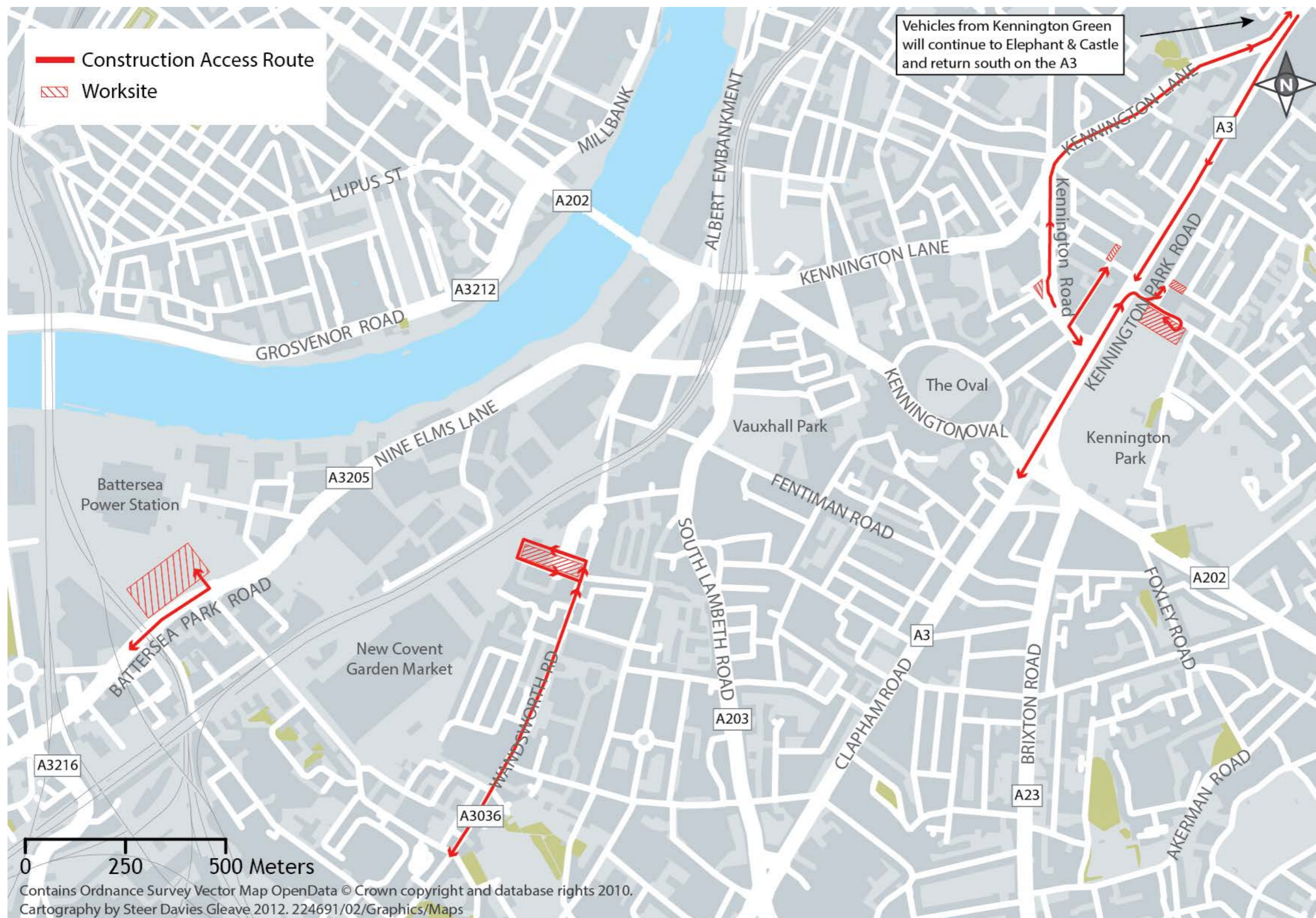
TABLE 2.1 NLE WORKSITES

Worksite	Borough	Nearest strategic road corridor	Duration	Purpose
Radcot Street	Lambeth	Kennington Park Road	2 years	Temporary shaft
Harmsworth Street	Southwark	Kennington Park Road	2 years	Temporary shaft
Kennington Green	Lambeth	Kennington Road	2.5 - 3 years	Permanent shaft
Kennington Park	Lambeth	Kennington Park Road	2.5 - 3 years	Permanent shaft
Nine Elms	Lambeth	Wandsworth Road	4 years	Underground station
Battersea	Wandsworth	Battersea Park Road	4 years	Underground station

2.5 All worksites will be surrounded by hoardings that will be well lit with ground-oriented lighting. All reversing construction vehicle movements will be assisted by a banksman.

2.6 The proposed construction routes would utilise the strategic road network, entering onto non-strategic roads only at the point of accessing worksites located within, or adjacent, to non-strategic roads. Access routes have been chosen taking account of potential impacts on cyclists, pedestrians and other road users and are set out in Figure 2.2.

FIGURE 2.2 PROPOSED ACCESS ROUTES TO WORKSITES



C1: Construction

- 2.7 These vehicles will all originate or be destined for south and west London meaning that central London, and particularly the bridges, will be avoided by most vehicles.
- 2.8 Local access to the proposed worksites was analysed in detail. This analysis included vehicle tracking for the following vehicles:
- 10m rigid
 - Large tipper
 - Low loader
 - Fire tender
- 2.9 This analysis shows that all vehicles analysed can access the worksites with some changes to parking arrangements at some locations (discussed further in Section 5). The vehicle types analysed are indicative and based on the requirements of other similar worksites. The proposed accesses will allow construction vehicles to enter and exit the worksites at Kennington Park, Kennington Green, Nine Elms and Battersea in a forward gear. Except in exceptional circumstances, all reversing will take place within the worksite at these locations. The accesses are subject to change depending on the final vehicle requirements of the specific sites. When a construction contractor is selected, site accesses and vehicle types will be agreed.
- 2.10 Site specific and vehicle tracking drawings can found in Appendix A.

Radcot Street

- 2.11 Radcot Street is predominantly residential with three and four storey Victorian terraced housing. Construction activity at Radcot Street is expected to last approximately two years, with peaks and troughs depending on the particular phase of activity.
- 2.12 Throughout the works, Radcot Street would be closed to traffic and the worksite would be screened by a protective hoarding. Pedestrian access would be retained (further detail in Section 6).
- 2.13 The worksite will require the suspension of parking on Radcot Street, and additional spaces will need to be suspended to facilitate the movement of construction vehicles. This is covered in more detail in Section 5.

Access

- 2.14 The Radcot Street worksite would be accessed from the Strategic Road Network (SRN) at Kennington Road via Stannary Street. This route avoids the narrow section of road along Ravensdon Street and also avoids construction vehicles crossing the Barclay's Cycle Superhighway (except at signalised junctions).
- 2.15 Vehicles approaching Stannary Street from the south (i.e. from Kennington Road) will be required to turn right into Stannary Street. This is an unsignalised junction and vehicles will be required to wait for an appropriate length gap before turning. Typically there will only be 1-2 construction vehicle movements per hour and this level of demand is not expected to affect existing bus or general traffic flows in this area. Buses will continue to use the bus lane located on the northbound carriageway of Kennington Road.
- 2.16 Large vehicles will be required to make a three-point turn to exit the site and this has been deemed feasible. This will allow them to also exit via Stannary Street to the strategic road network.

- 2.17 It should be noted that there is a builders' merchant towards the western end of Stannary Street which is already regularly accessed by large vehicles. If a large vehicle is parked on-street to use the builders' merchant then a large construction vehicle would not be able to pass unless further parking is suspended.

Alternative Access Options

- 2.18 An exit route from Radcot Street to the north has been considered and rejected because:
- It has a greater impact on parking than the route via Stannary Street
 - Although turning movements are possible they are tight and not suited to the residential road network
 - If more than one vehicle is waiting at the signals with Kennington Road then vehicles would not be able to pass the waiting vehicles to enter Milverton Street and the surrounding residential network
- 2.19 An entrance or exit route via Ravensdon Street was rejected because of its narrow width which makes it unsuitable for large vehicles (see Figure 2.3).

FIGURE 2.3 RAVENSDON STREET LOOKING TOWARDS KENNINGTON ROAD



Harmsworth Street

- 2.20 Harmsworth Street is located in a residential area. Construction activity at Harmsworth Street is expected to last approximately two years, with peaks and troughs depending on the particular phase of activity.
- 2.21 Throughout the works, Harmsworth Street would be closed to traffic and the worksite screened by a protective hoarding. Pedestrian access on the southern footway and emergency access to the nursery on the northern footway would be retained (further detail in Section 6).

2.22 The worksite will require the suspension of parking on part of Harmsworth Street, and additional parking spaces will need to be suspended to facilitate the movement of construction vehicles. This is covered in more detail in Section 5.

Access

2.23 Access to and from the major road network is proposed via Kennington Park Place. This routeing ensures that the Barclay's Cycle Superhighway is only crossed by construction vehicles at the signalised junction of Kennington Park Place and Kennington Road.

Alternative Access Options

2.24 An exit route to the north along De Laune Street and then with a left turn in Braganza Street has been considered and rejected because:

- Left turn from De Laune Street to Braganza Street is difficult and requires suspension of 1 parking space and turning vehicles would overrun the existing kerb line.
- Approximately 40 more houses would be affected by this alternate routing compared with an entrance and exit route via Kennington Park Place.

Kennington Green

2.25 The Kennington Green worksite is located on Kennington Road and surrounded on two sides by residential houses and the Beefeater Distillery. Construction activity at the Green is expected to last approximately two years, with peaks and troughs depending on the particular phase of activity.

2.26 Throughout the works, the Green will be closed to make way for the worksite, with part of the side road surrounding the Green to be shut for a period of approximately three months in order to construct the NLE headhouse.

2.27 The worksite will require the suspension of parking around the Green, and additional spaces will need to be suspended to facilitate the movement of construction vehicles. This is covered in more detail in Section 5.

Access

2.28 Vehicle access to the site would be from the south-east along Kennington Road. Vehicles would then pass through the site and exit to the north to re-join Kennington Road continuing in the same direction. For the purposes of this assessment, it has been assumed that the 80m of bus lane on Kennington Road is suspended for the duration of the works at Kennington Green.

2.29 Upon exiting the site to the north, vehicles will need to use a route that allows them to head south to their final destination. Potential routes have been examined and the following option is available: North along Kennington Road as far as Kennington Lane, turn right into Kennington Lane, travel along Kennington Lane as far as Newington Butts, turn left into Newington Butts (no right turn is possible), travel along Newington Butts as far as Elephant and Castle, loop around southern roundabout to return to A3 (Newington Butts).

Alternative Access Options

2.30 There are no alternative access options to this site which might shorten the distance to the main road network or ease turning movement arrangements.

Kennington Park

2.31 The Kennington Park worksite is located in the north-east corner of Kennington Park. Construction activity at Kennington Park is expected to last approximately two years, with peaks and troughs depending on the particular phase of activity.

2.32 Throughout the works, this section of the Park will be closed and the worksite would be screened by a protective hoarding. The footway adjacent to the Park on Kennington Park Place would need to be closed (further detail in Section 6).

2.33 The worksite will require the suspension of parking on part of Kennington Park Place. This is covered in more detail in Section 5.

Access

2.34 The Kennington Park worksite would be accessed from the strategic road network at Kennington Park Road via Kennington Park Place. This route ensures that construction vehicles would only cross the Barclay's Cycle Superhighway at the signalised junction of Kennington Park Place and Kennington Road.

2.35 Construction vehicles would turn into the worksite from Kennington Park Place. Vehicles turning This turning movement is accommodated can turn into the site taking advantage of the existing zig-zag parking restrictions on the northern side of Kennington Park Place. These restrictions enable construction vehicles to make the sweep of the turn required to enter the site.

Alternative Access Options

2.36 There are no alternative access options to this site which might shorten the distance to the main road network or ease turning movement arrangements.

Nine Elms

2.37 The Nine Elms station worksite is located on the corner of Wandsworth Road and Pascal Street. Construction activity at the site is expected to last approximately four years, with peaks and troughs depending on the particular phase of activity.

2.38 Throughout the works, the footways on Wandsworth Road and Pascal Street next to the worksites would need to be closed (further detail in Section 6).

2.39 The worksite will also require the suspension of parking on Pascal Street. This is covered in more detail in Section 5.

Access

2.40 Access to the site is from Wandsworth Road via a site entrance north of the Pascal Street junction. Vehicles leaving the site will join Pascal Street and turn right at the signalised junction onto Wandsworth Road.

Alternative Access Options

2.41 There are no alternative access options to this site which might shorten the distance to the main road network or ease turning movement arrangements.

C1: Construction

Battersea

2.42 The Battersea station worksite is located on part of the Battersea Power Station site. Construction activity at this site is expected to last approximately four years.

2.43 Throughout the works, there would be no road or footway closures or any suspension of parking.

Access

2.44 Access to the Battersea Station site will be provided via a new, temporary signalised junction at Battersea Park Road and Thessaly Road that incorporates the existing pedestrian crossing (to be provided as part of the construction works). Further detail can be found in Appendix A of this Report.

Alternative Access Options

2.45 There are no alternative access options to this site which might shorten the distance to the main road network or ease turning movement arrangements.

3 Existing Conditions

Introduction

3.1 Existing conditions relating to traffic, parking and pedestrians at or near the worksites have been examined using traffic counts, audits and pedestrian surveys.

Existing Traffic Conditions and Surveys

3.2 In order to identify the existing traffic conditions in the study area the following traffic surveys were commissioned by TfL for the junctions that would provide access to the worksites:

- Wandsworth Road / Pascal Street
- Kennington Green (north) / Kennington Road (north and south)
- Kennington Park Road / Stannary Street

3.3 These traffic count surveys were carried out on 12 July 2012 in three separate three hour time periods as follows:

- AM Peak 07:00-10:00;
- Inter Peak 11:30-14:30; and
- PM Peak 16:00-19:00.

3.4 The results of a 3 hour AM peak (07:00-1000) survey are shown in Table 3.1.

TABLE 3.1 SUMMARY OF TRAFFIC SURVEY DATA, 3 HOUR AM PEAK (07:00-10:00)

	Direction	Car/Light Goods Vehicles	Lorry /Heavy Goods Vehicle	Bus	Motor-cycle	Total
Kennington Park Road, north of Claylands Road	Northbound	1,550	80	60	510	2,200
	Southbound	1460	80	50	110	1,700
Kennington Road, north of Stannary Street	Northbound	1,620	50	110	440	2,220
	Southbound	770	30	100	30	930
Wandsworth Road, South of Pascal Street	Northbound	1,980	90	90	240	2,400
	Southbound	780	40	70	40	930
Battersea Park Road, North of Prince of Wales Drive	Eastbound	2,200	150	70	490	2,910
	Westbound	2,240	170	70	120	2,600

3.5 Other junctions that also form access to worksites, such as Kennington Park Road / Kennington Place, have not been surveyed as recent traffic flow data is available for them as part of other TfL projects.

3.6 The junctions where traffic survey data is currently available are summarised in Figure 3.1. The figure also includes the on-street parking areas surveyed.

Site Access Surveys: Beefeater Distillery

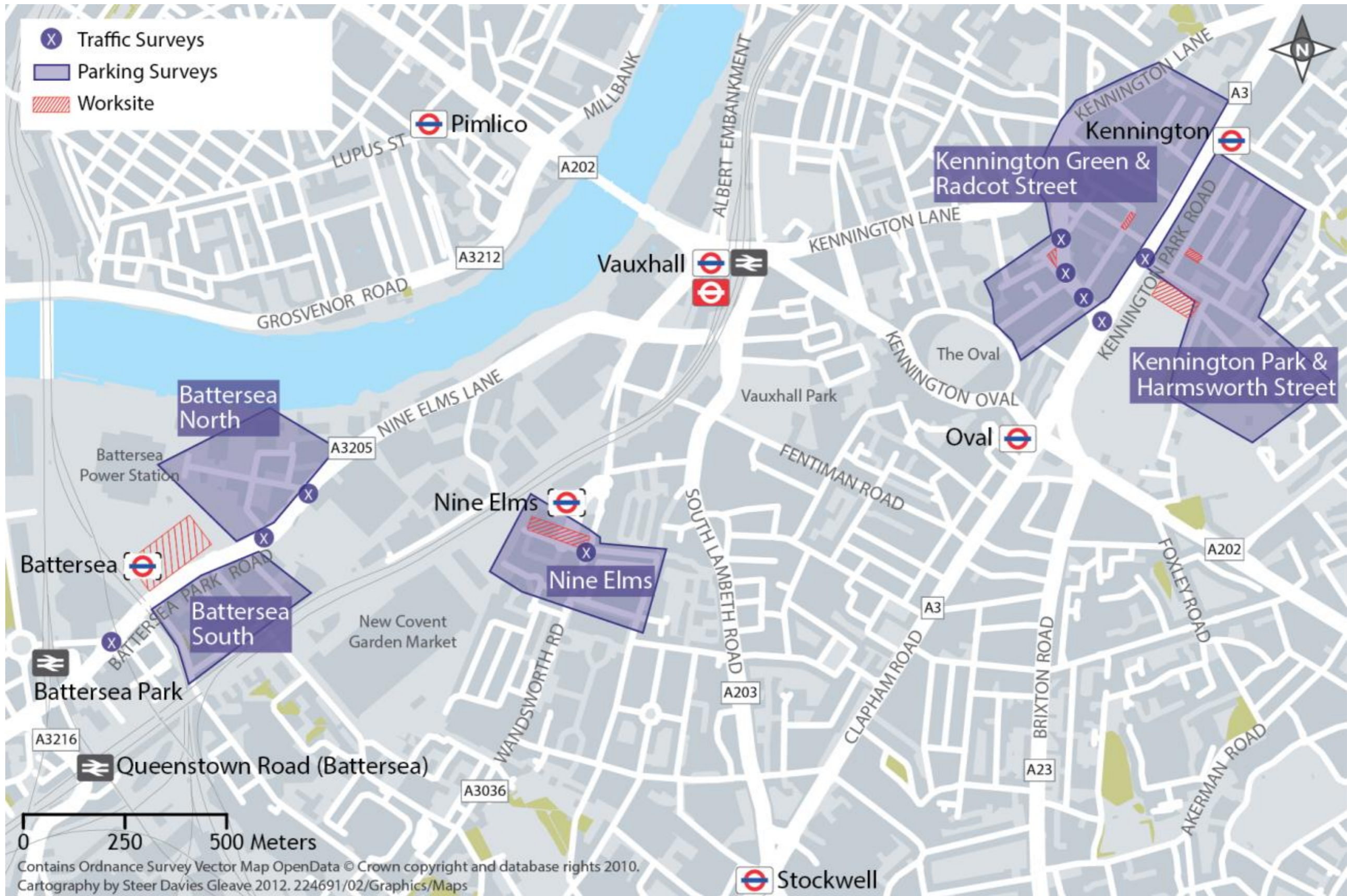
3.7 The Beefeater Distillery is located to the north-west of Kennington Green and its main delivery entrance is from Kennington Road via the north side of Kennington Green. The distillery will require access to their site through the entire NLE construction period. The following vehicles require access to the site:

- 37,000 Litre bulk tankers;
- 28,000 Litre ISO tankers;
- 27,000 Litre vacuum tankers;
- 7.5 Tonne lorries;
- Articulated lorries;
- Single and double height coaches;
- Vans;
- Cars; and
- Motorcycles.

3.8 A survey was conducted to determine the number and type of vehicles accessing the distillery site as well as pedestrians.

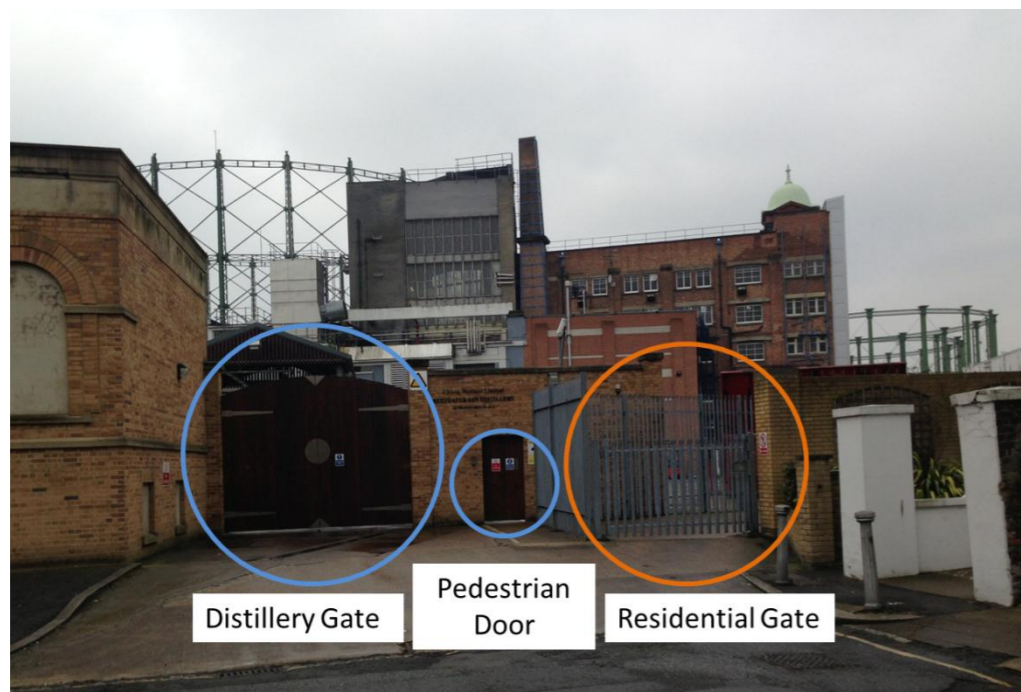
3.9 There were a total of four vehicle and pedestrian access points monitored during these surveys. Three of these are adjacent to each other and face Kennington Road on the north side of Kennington Green while one is on Montford Place.

FIGURE 3.1 JUNCTION TRAFFIC COUNTS AND PARKING SURVEY AREAS



3.11 Two of the three entrances off Kennington Road lead to the distillery, one is a gate for vehicles and the other is a door for pedestrians (Figure 3.2). The third entrance provides access to a parking area for the adjacent residential building.

FIGURE 3.2 DISTILLERY SITE ENTRANCES OFF KENNINGTON ROAD



12 hour Site Survey - 6 March 2013

3.12 All four gates were surveyed between 07:00-19:00 on 6 March 2013, a date that was agreed with the distillery as a day that would have typical vehicle and pedestrian flows. It was conducted using video cameras with the footage analysed upon completion of the survey.

The vehicular distillery gate was used throughout the day between 07:00-16:30. Table 3.2 shows the different vehicle types that accessed the site during the three peak periods. No buses, motorcycles, pedal cycles or taxis accessed the site.

TABLE 3.2 PEAK AND TOTAL FLOWS AT DISTILLERY (07:00-10:00)

Time	Cars/LGV		Rigid 2		HGV		Pedestrians		Total	
	In	Out	In	Out	In	Out	In	Out	In	Out
AM Peak (07:00-10:00)	5	-	1	1	3	3	1	-	10	4
Inter Peak (1200-1300)	3	3	-	-	1	-	-	-	4	3
PM Peak (1500-1900)	2	6	-	-	-	-	-	-	2	6
Daily Total	10	10	1	1	5	5	3	-	19	16

3.13 As seen in Table 3.2, the majority of vehicles using this gate were cars and LGVs. There were a total of 5 two way trips made by HGVs and three of them were during the AM peak.

3.14 The pedestrian door was used 15 times over the 12 hour period. The gate opening on to Montford Place was not used during the survey.

3.15 The residential gate was used 14 times, seven times for cars or LGVs, six times by pedestrians and once for a pedal cyclist.

3.16 Overall vehicle and pedestrian flows to/from the distillery and adjacent residential parking area during this survey were low. The vehicles accessing the sites are not expected to be delayed by NLE construction. Coordination between the NLE site manager and the distillery will reduce the likelihood of disruption to vehicles accessing the distillery.

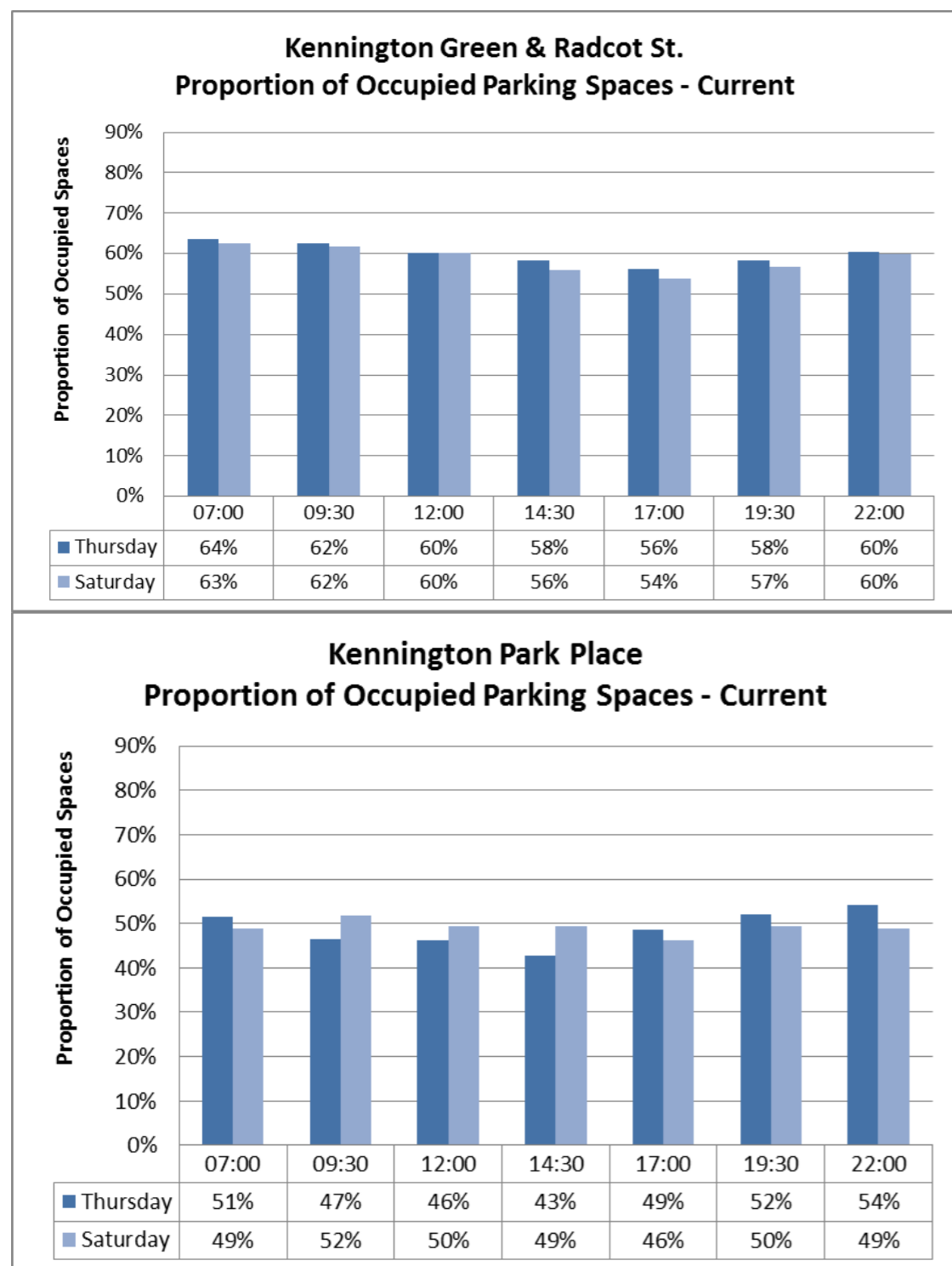
Existing Parking Conditions and Surveys

3.17 Construction of the temporary and permanent shafts will require some parking spaces to be temporarily suspended for the duration of the works. To understand the impact of this proposed change, the existing level of parking demand was surveyed using parking beat surveys on Thursday 13 September and Saturday 15 September 2012. During these surveys the number of vehicles parked on each street within the survey areas was recorded together with the type of space being used.

3.18 This information was collected at the following times during each survey: 07:00; 09:30; 12:00; 14:30; 17:00; 19:30 and 22:00.

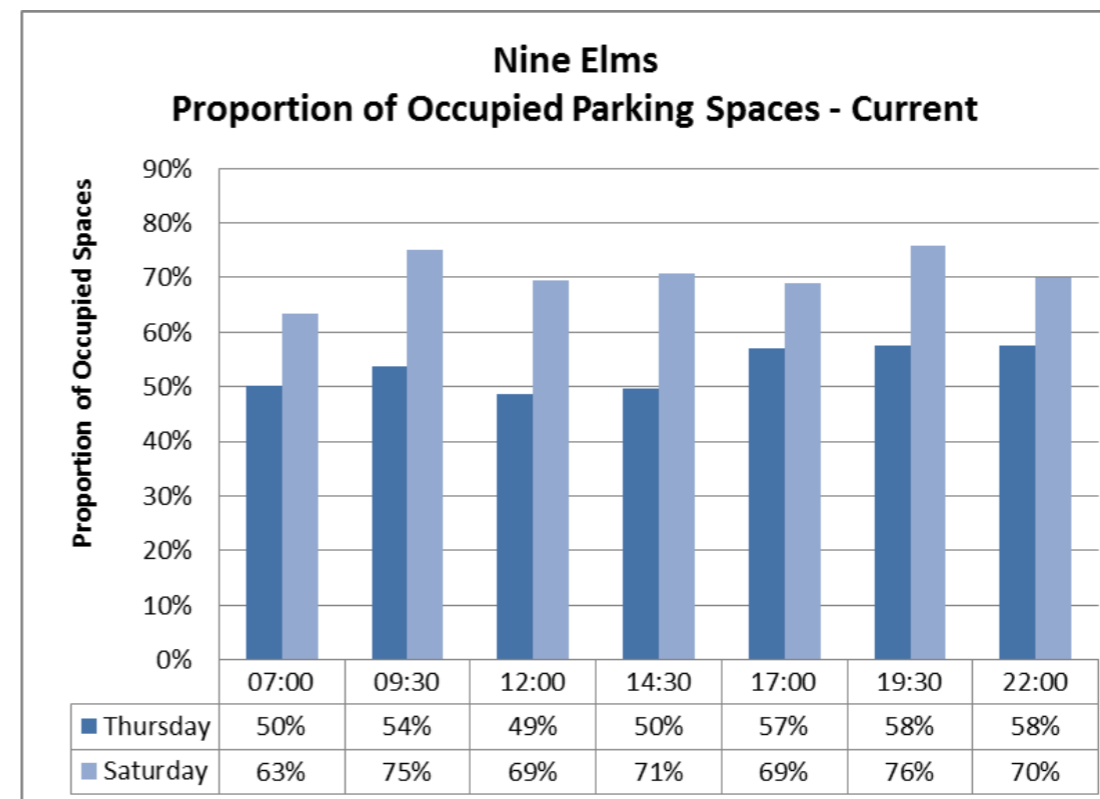
3.19 Summary results of these surveys are presented in Figure 3.3 to 3.5. The results in these graphs show the level of parking occupancy based on surveyed parking demand and the availability of parking spaces.

FIGURE 3.3 EXISTING PARKING DEMAND-KENNINGTON AREA SITES



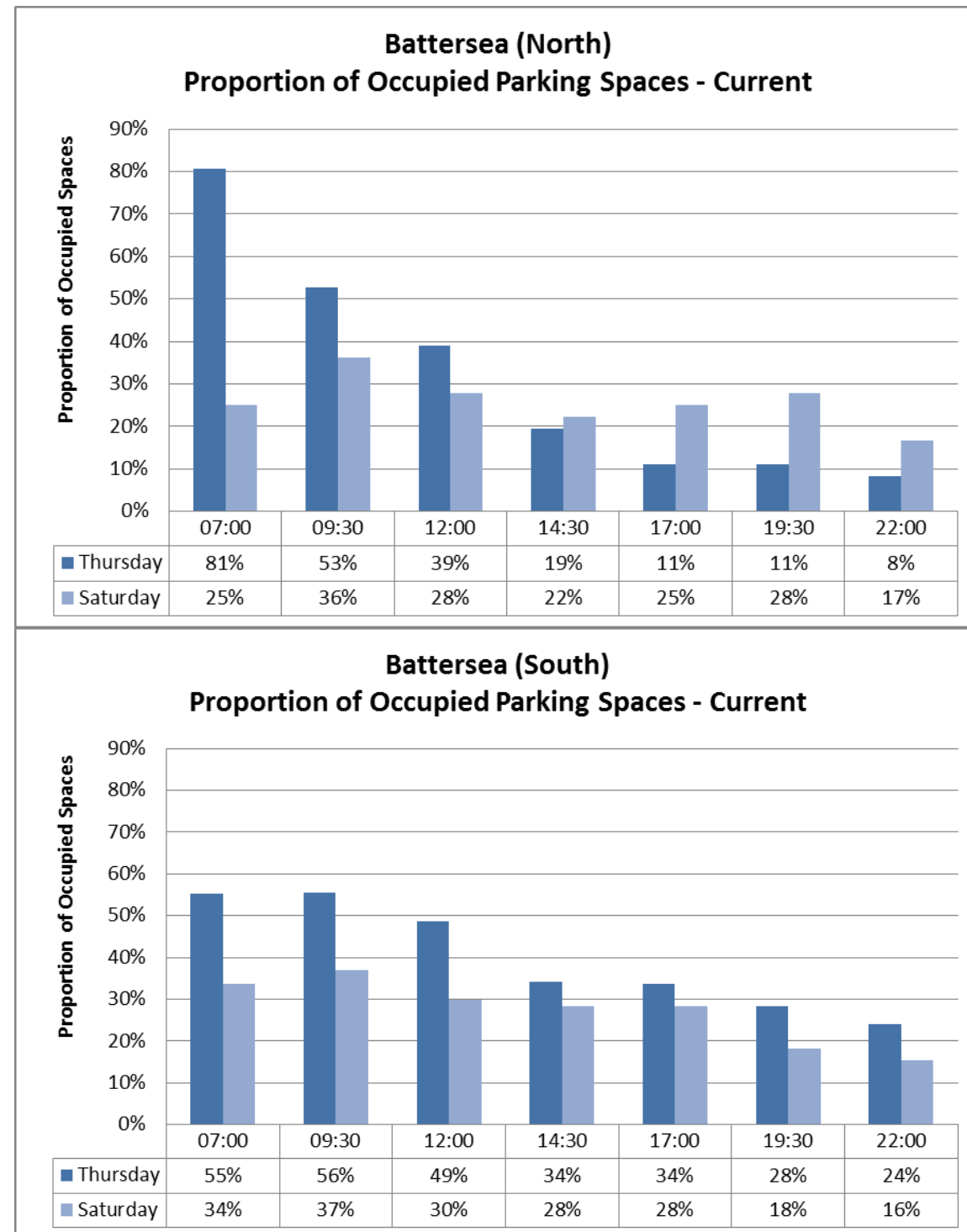
3.20 This analysis shows that there is spare parking capacity in both areas at all times when each area is considered as a whole. The profile of parking demand over the day reflects the residential nature of these areas with maximum demand typically overnight when people are at home.

FIGURE 3.4 EXISTING PARKING DEMAND -NINE ELMS LANE



3.21 This analysis shows that there is spare parking capacity in this area at all times when each area is considered as a whole. The profile of parking demand over the day reflects the commercial nature of this area with maximum demand during the 09:30 and 19:30 beat.

FIGURE 3.5 EXISTING PARKING DEMAND - BATTERSEA



3.22 Parking demand in these two locations is much lower than in the other surveyed areas because they are predominantly light industrial land uses rather than residential.

Pedestrian Conditions

Pedestrian Environmental Review System (PERS)

3.23 To assess the current pedestrian conditions, a Pedestrian Environmental Review System (PERS) audit was undertaken on 40 links and 11 crossings in the areas around the proposed NLE worksites. This audit was conducted on 13 December 2012 for the links and on 4 January 2013 for the crossings.

3.24 PERS uses a Red, Amber and Green (RAG) rating system, with Red being the worst pedestrian environment, Green being the best. The complete report is provided in Appendix C5 and provides further details on the pedestrian environment and pedestrian flows. A summary is provided below.

3.25 The results of this audit show that the pedestrian environments around the worksites are generally good but with six (15% of the total) very poor links that scored red.

Summary of PERS findings

Links

3.26 Three of the red links were part of the 34 links assessed near the Kennington Green, Kennington Park, Radcot Street, Harmsworth Street and Nine Elms sites. They are as follows:

- Near the Radcot Street site, the east side of Stannary Street between nos. 6-14 received a red rating due to the presence of large vehicles making deliveries, forklifts and trucks crossing the footway, obstacles placed in the footway and poor surface quality (see Figure 3.7);
- Near the Radcot Street site, the east end of Ravensdon Street where it meets Kennington Park Road also received a red rating due to its very narrow footways and poor environment; and
- Near the Kennington Green site, the north side of Kennington Road, across from Kennington Green, scored red due to its narrow width. This footway was further obstructed by vehicles parked in front of the adjacent buildings with their bumpers protruding, wheelie bins stored on the footway and vegetation growing into the footway.

3.27 The other three links that scored red were near Battersea Power Station. These links were on both sides of Cringle Street and on the west side of Kirtling Street. This area is the worst performing in this analysis with all of its links scoring yellow or red. This environment is generally inhospitable to pedestrians mainly due to the industrial land uses in the area and the large numbers of HGVs servicing these industries

FIGURE 3.6 PERS RED LINKS

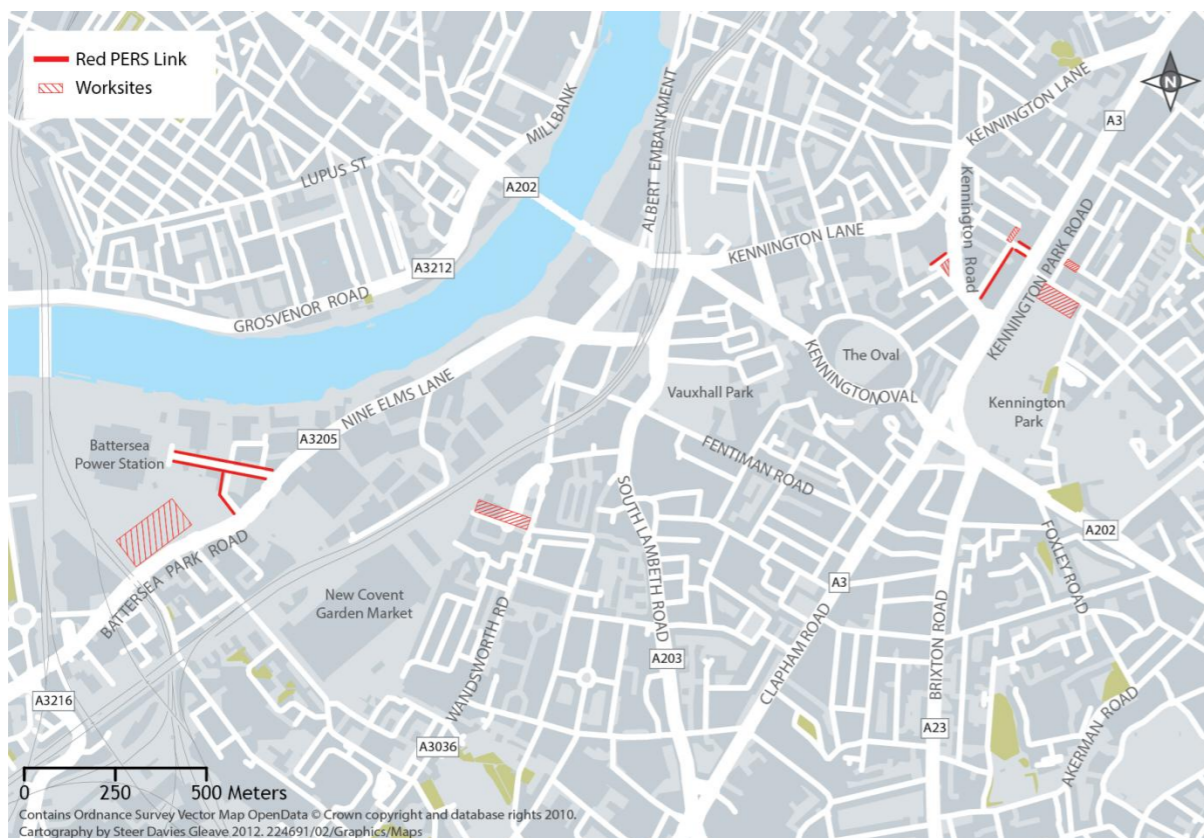
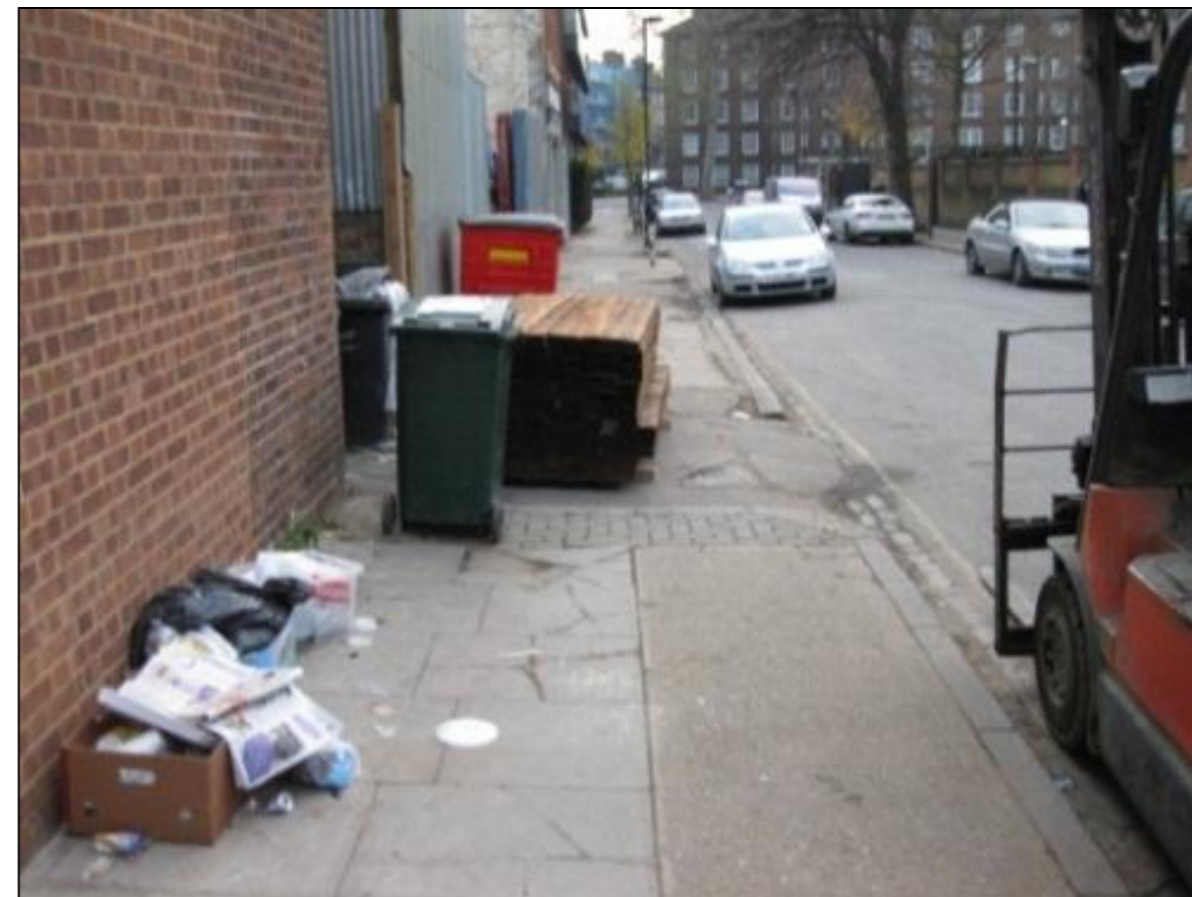


FIGURE 3.7 PHOTO OF PEDESTRIAN ENVIRONMENT - CRINGLE ST.



FIGURE 3.7 PHOTO OF PEDESTRIAN ENVIRONMENT - STANNARY ST



Crossings

3.28 All audited crossings at all sites scored a green rating.

Pedestrian surveys

3.29 Pedestrian surveys were undertaken at 19 locations near the proposed worksites. These surveys were undertaken from 13-15 January 2012 and the results are provided in Appendix C5.

3.30 The results of the survey show that all sites, except for Nine Elms, have relatively low pedestrian flows of between 30-80 Pedestrians Per Hour (PPH) i.e. approximately one pedestrian per minute. Due to its location near a large Sainsbury's supermarket, Nine Elms experiences pedestrian flows over 150 PPH.

4 Construction Traffic Assessment

Construction Options

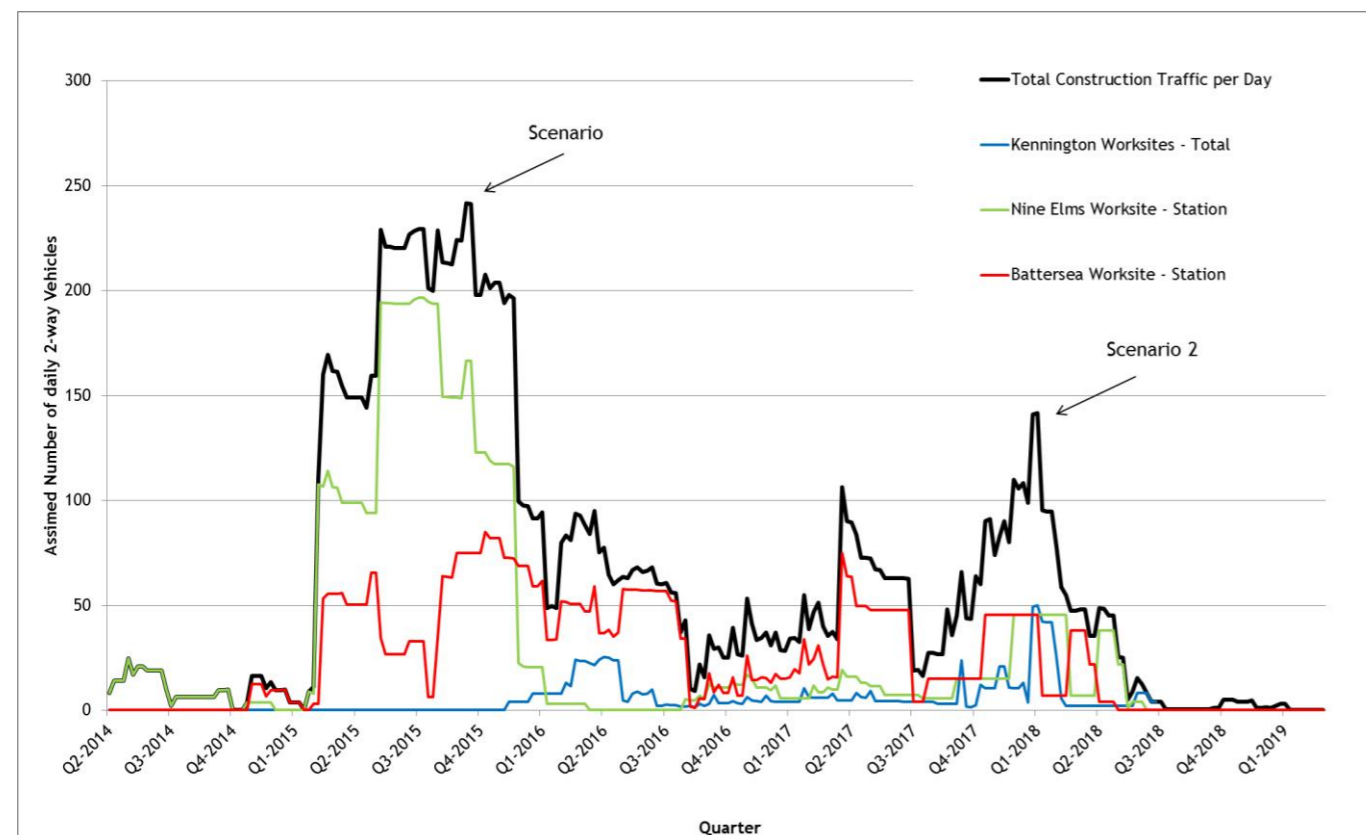
4.1 Construction traffic assumptions have been provided for two different construction options. The first follows a grouting method that requires two grouting shafts at Radcot Street and Harmsworth Street. This method is referred to as Construction Option A. Construction Option B - Sprayed Concrete Lining (SCL) - would not require the grouting shafts but would increase activity at the permanent shaft worksites. The construction for both methods is assumed to begin in Q2-Q3 2014.

Construction Option A - Grouting Method

4.2 Six construction sites are needed if Construction Option A is used. The distribution of traffic generated by all of the worksites using this method is shown in Figure 4.1. For reference, 1 two-way vehicle trips in this (and subsequent graphs) means 1 vehicle arriving at the site and then 1 vehicle departing the site.

4.3 There is a clear peak in construction trips beginning in Q2 2015 and ending Q1 2016. This peak is mainly due to the station box excavation works at the Nine Elms and Battersea sites. There is a second, less significant peak in Q1 2018 due to activity generated by the sites in the Kennington area.

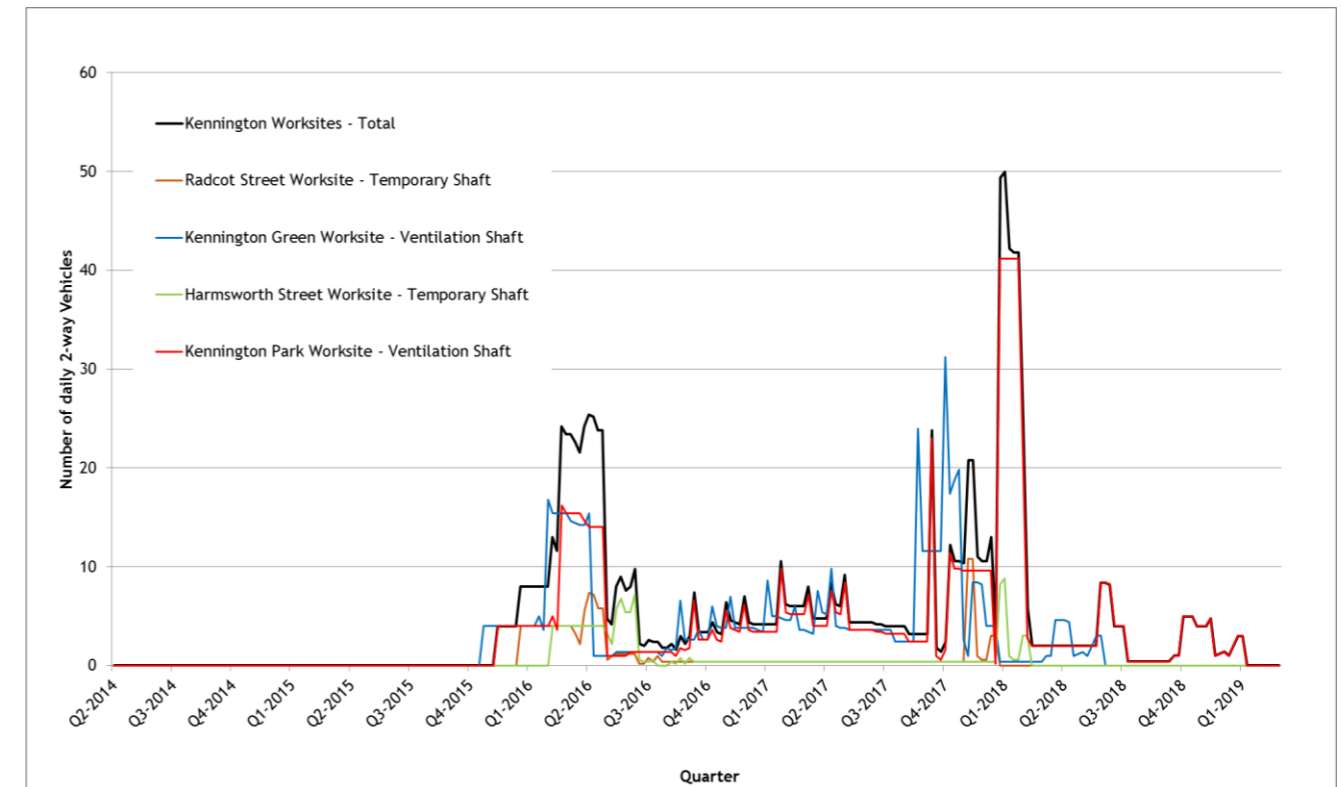
FIGURE 4.1 CONSTRUCTION OPTION A - DAILY CONSTRUCTION TRIPS BY ALL SITES



Source: TfL, 2013

4.4 Figure 4.2 below shows the traffic generated by each of the worksites in the Kennington area.

FIGURE 4.2 CONSTRUCTION OPTION A - DAILY CONSTRUCTION TRIPS KENNINGTON SITES



Source: TfL, 2013

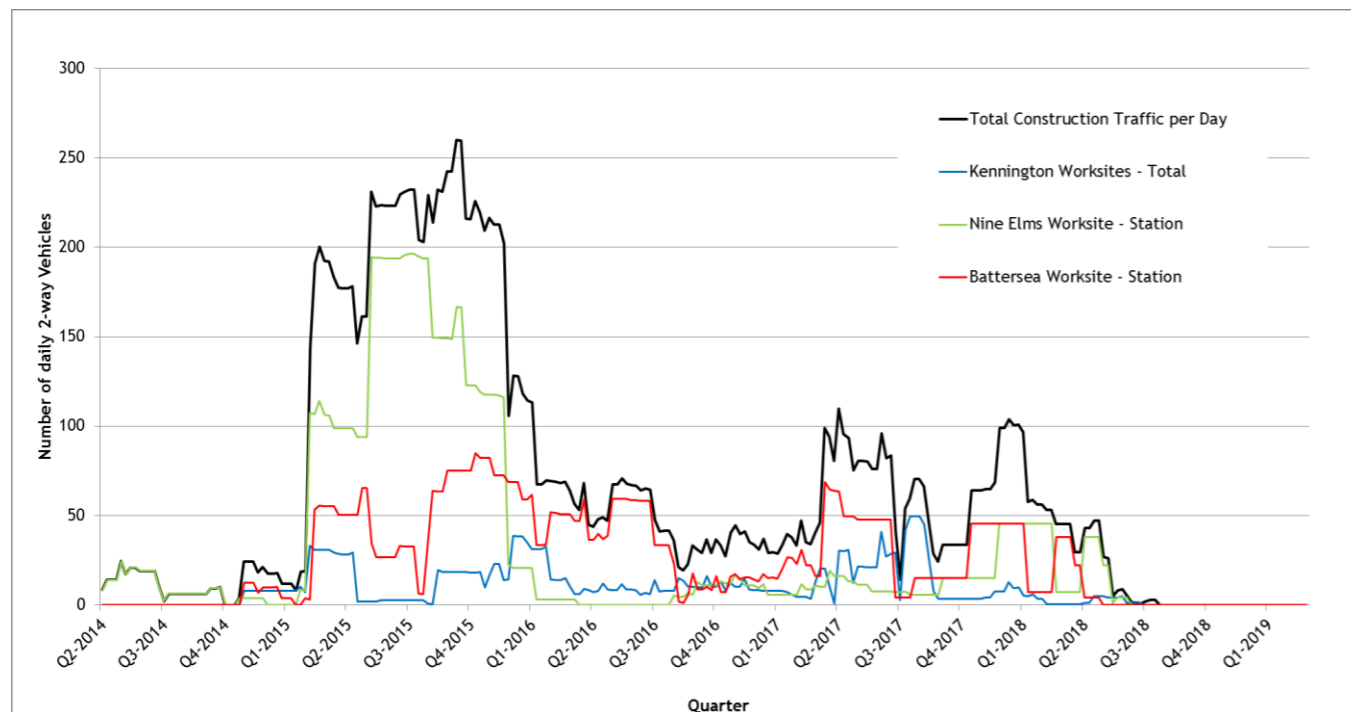
4.5 It should be noted that construction at the sites in the Kennington area would start in Q4 2016, one and a half years later than Battersea and Nine Elms Station sites. At the beginning of Q2 2016, there is a peak of approximately 25 two-way trips per day. This is due to the convergence of two smaller peaks at the Kennington Green and Kennington Park work sites. Shifting the construction schedule for either of these two sites by four weeks would reduce this peak and the potential for this would be considered by the construction contractor for the scheme. There is a second peak beginning Q1 2018 of 50 two-way trips per day. As over 40 of these trips are due to activity at Kennington Park, shifting the construction schedule would have little effect.

Construction Option B - Sprayed Concrete Lining (SCL)

4.6 Under Construction Option B, the two temporary shafts would not be required; however this methodology increases the activity and trips at the Kennington Green and Kennington Park sites. Overall the number of trips generated on the network increases by around 5% (as a result of the increased activity at the Kennington sites), with the number of trips at Nine Elms and Battersea remaining the same.

4.7 Figure 4.3 shows the total number of trips for all sites throughout the Construction Option B program. For this option, construction at Kennington Green and Kennington Park begins earlier than Construction Option A.

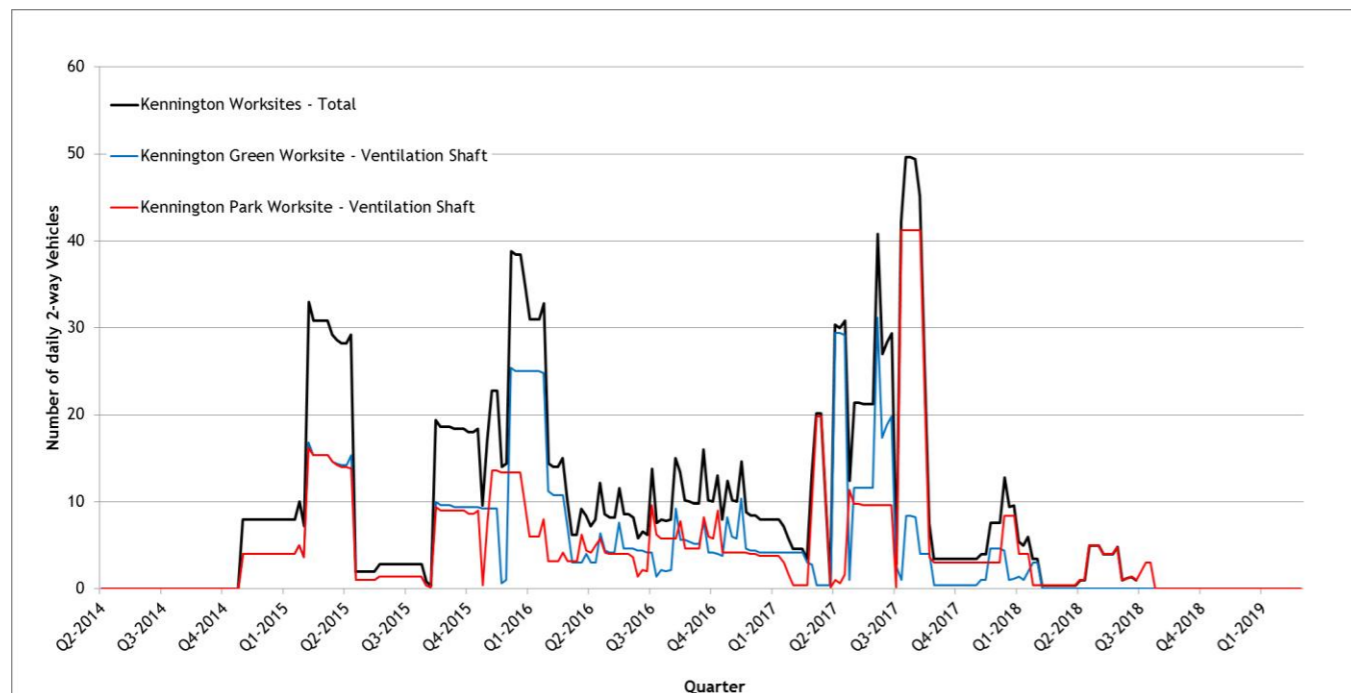
FIGURE 4.3 CONSTRUCTION OPTION B - DAILY CONSTRUCTION TRIPS ALL SITES



Source: TfL, 2013

4.8 Figure 4.4 breaks down the activity at the two Kennington sites (without the grout shafts, there is no construction activity at Radcot Street and Harmsworth Street).

FIGURE 4.4 CONSTRUCTION OPTION B - DAILY CONSTRUCTION TRIPS AT KENNINGTON SITES



Source: TfL, 2013

Comparison of Construction Option A and Construction Option B on Trip Generation

- 4.9 Construction Option B increases the total number of vehicle trips over the duration of construction programme by 785, from 16,637 to 17,422 - a 5% difference in the total number of trips generated by the NLE construction. The two profiles are shown in Figure 4.5.
- 4.10 While Construction Option B generates more trips than Construction Option A, the distribution of all trips remains similar in both construction schedules. Both methods experience a large peak during 2015 due to the excavation of the station box at Nine Elms.

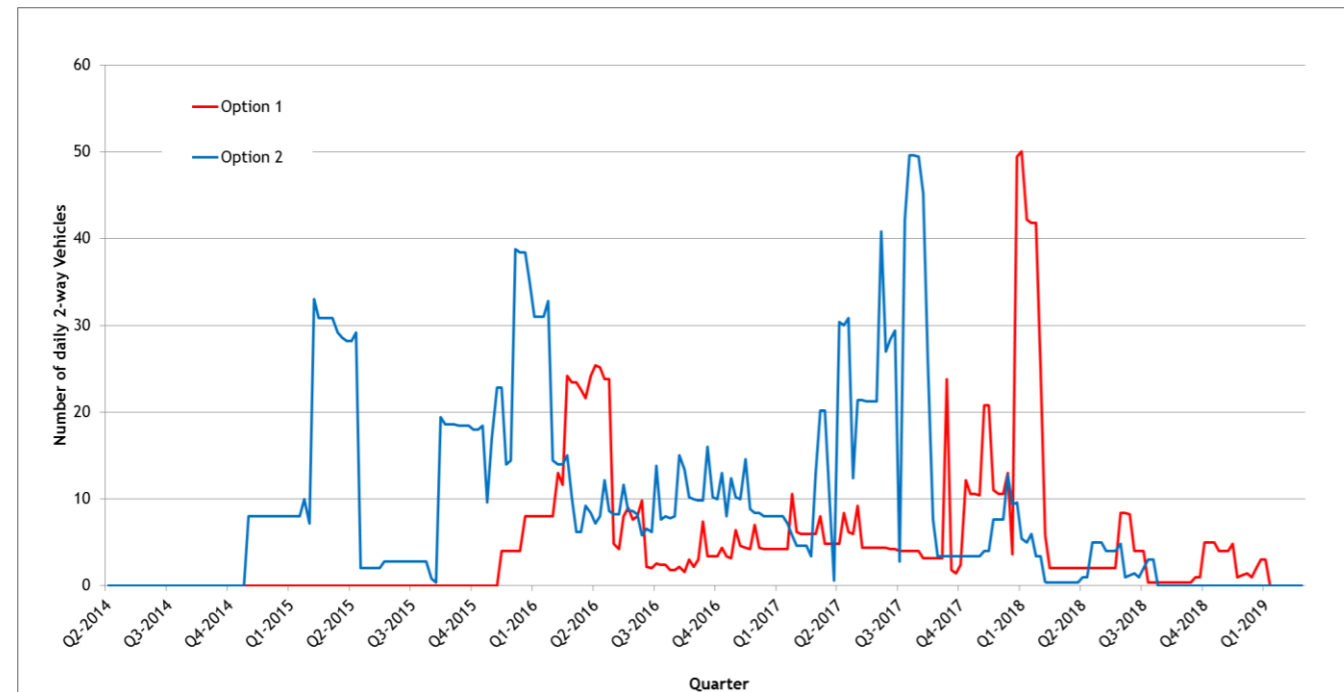
FIGURE 4.5 CONSTRUCTION OPTIONS A AND B - DAILY CONSTRUCTION TRIPS ALL SITES



Source: TfL, 2013

- 4.11 The difference between the two options is more apparent in the timing of the trips in the Kennington area. As shown in Figure 4.6, Construction Option B has the same trip peaks approximately 4 months earlier than Construction Option A.

FIGURE 4.6 CONSTRUCTION OPTIONS A AND B - TOTAL KENNINGTON CONSTRUCTION TRIPS



Source: TfL, 2013

4.12 The major difference in traffic terms between the two options is in the timing of the trips. In terms of assessing the impact on the road network, when examined at the peaks, there is a negligible difference between Construction Option A and Construction Option B as the scale of the number of trips generated is very similar.

Impact Assessment Assumptions

4.13 Both construction options produce similar trip volumes and patterns. Although Construction Option A generates 5% less trips overall, the distribution of vehicles around the Kennington sites under this option is expected to cause more local impacts due to the additional work sites at Radcot and Harmsworth Streets. Therefore, Construction Option A has been used in the trip distribution and modelling analysis.

4.14 Analysis of the trip generation data shows that the peak construction activity, in terms of traffic generation, will take place between Q2 2015 - Q1 2016. More than 200 two-way vehicle trips would be generated every day. Peak activity during this period is over 250 two-way trips per day. This peak will be mainly generated by construction activity at the Battersea and Nine Elms Station worksites, as show in Figure 4.1 previously.

4.15 A secondary period of peak construction activity is also shown in Figure 4.1. It is smaller in terms of total trip generation and in duration. This peak will occur during Q1 2018 with a total of 137 two-way trips per day.

4.16 These peak periods would have different impacts on the local road network around each construction site. Therefore, the following scenarios have been used to assess traffic impact:

- Scenario 1 - 2015 NLE Construction Traffic Peak: majority of trips generated at Nine Elms and Battersea (occurs during Q4 2015); and

- Scenario 2 - 2018 NLE Construction Traffic Peak: distribution of trips from many sites (occurs during Q1 2018).

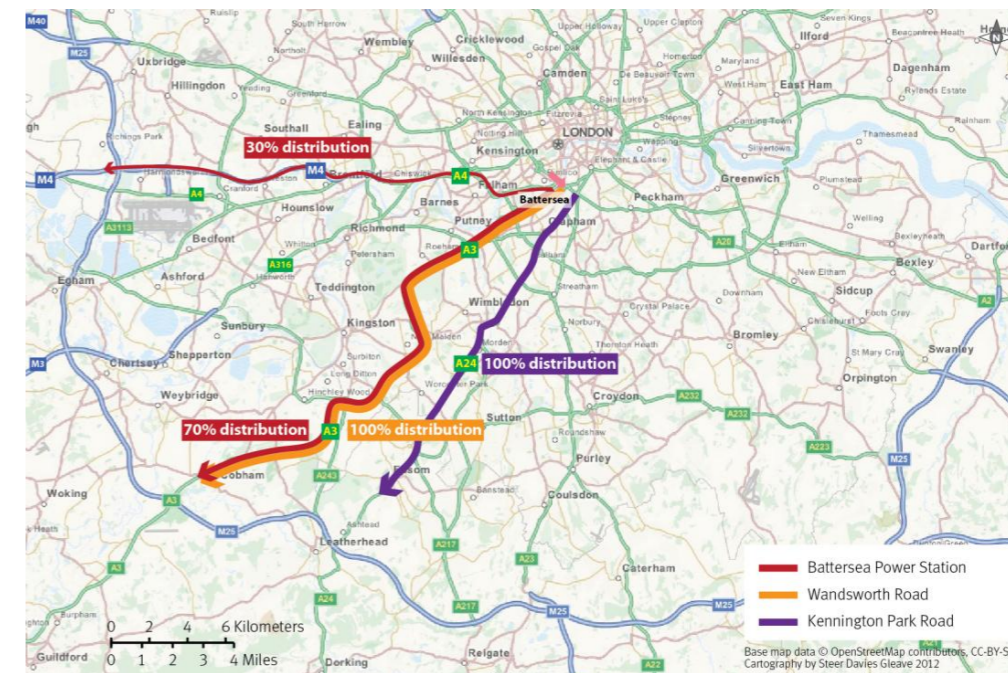
NLE Construction Traffic Distribution and Assignment

4.17 The following assumptions have been made in relation to the distribution of traffic to/from the worksites:

- Of the total outgoing and incoming traffic from/to Battersea Station 30% will have origin/destination in north-west London and 70% in south London;
- Due to large volumes of traffic and weight restrictions on the bridges in central London, all construction traffic to/from Nine Elms Station and all Kennington sites will have an origin/destination in south London; and
- All construction traffic will use the SRN until it reaches the M25 London Orbital Motorway.

4.18 Based on the above assumptions, Figure 4.7 shows the construction traffic distribution between the construction area and the London road network.

FIGURE 4.7 NLE CONSTRUCTION TRAFFIC DISTRIBUTION ASSUMPTIONS



4.19 Based on the traffic distribution assumptions above and the construction traffic generated by each site, two trip generation scenarios were examined. They are as follows:

- Scenario 1 - Base 2009 Flows + 2015 NLE Construction Peak Flows; and
- Scenario 2 - Base 2009 Flows + 2018 NLE Construction Peak Flows.

4.20 Figure 4.8 shows the construction traffic assignment across the road network for Scenario 1 and Figure 4.9 for Scenario 2.

4.21 When estimating the hourly peak period construction flows, the following assumptions have been made:

- A PCU conversion factor of 2 vehicles has been assumed for each construction vehicle;

- Construction activity will take place for 10 hours during the day (08:00-18:00) over a 5 day work week; and
 - 15% of construction traffic movements occur during the AM peak hour on the network.
- 4.22 Table 4.1 shows a comparison of the NLE Construction traffic for Scenario 1 and the hourly traffic flows derived from the Base 2009 CLoHAM model obtained from TfL. Table 4.2 shows the same information for Scenario 2.
- 4.23 The levels of activity at each site vary; hence the peak levels of overall construction activity may occur at times when there is no activity at some of the individual sites, as can be observed in Tables 4.1 and 4.2, which set out the peak activity scenarios. The intensity of activity at the Battersea and Nine Elms sites in Scenario 1 for example mean that despite the lack of any activity at some of the other sites, the overall level of activity is still at a peak.
- 4.24 While the traffic flow values for the main road links have been obtained from the CLoHAM models, traffic flows for the side roads providing access to the worksites have been obtained through the traffic surveys carried out on 12 July 2012.

FIGURE 4.8 HOURLY CONSTRUCTION TRAFFIC ASSIGNMENT ASSUMPTIONS: SCENARIO 1 (2015)

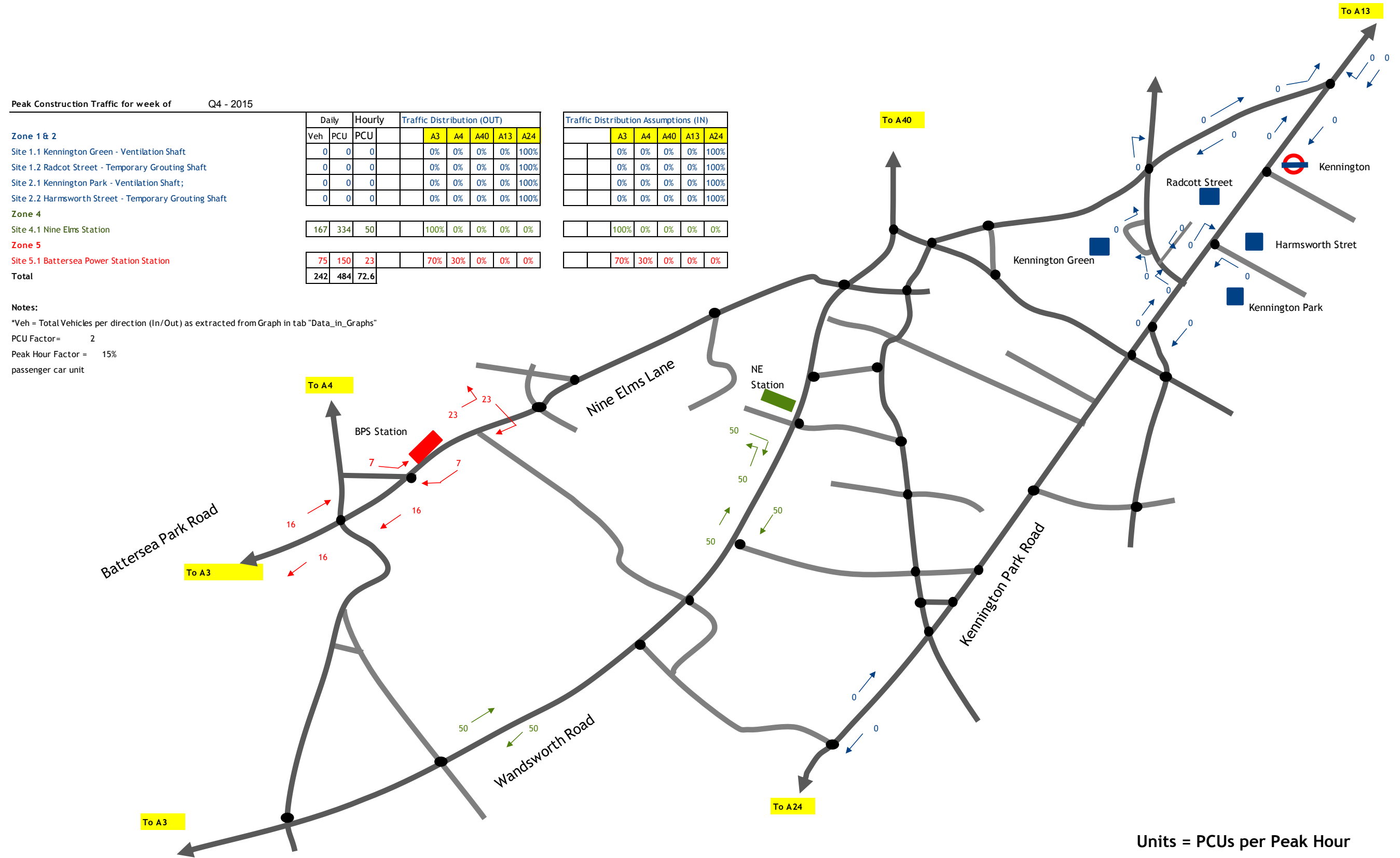


FIGURE 4.9 HOURLY CONSTRUCTION TRAFFIC ASSIGNMENT ASSUMPTIONS: SCENARIO 2 (2018)

Peak Construction Traffic for week of Q1 - 2018

Zone 1 & 2

- Site 1.1 Kennington Green - Ventilation Shaft
- Site 1.2 Radcot Street - Temporary Grouting Shaft
- Site 2.1 Kennington Park - Ventilation Shaft;
- Site 2.2 Harmsworth Street - Temporary Grouting Shaft

Zone 4

- Site 4.1 Nine Elms Station

Zone 5

- Site 5.1 Battersea Power Station Station

Total

Veh*	PCU	PCU	Traffic Distribution (OUT)				
			A3	A4	A40	A13	A24
1	2	<1	0%	0%	0%	0%	100%
0	0	0	0%	0%	0%	0%	100%
41	82	12	0%	0%	0%	0%	100%
9	18	3	0%	0%	0%	0%	100%
Zone 4							
46	92	14	100%	0%	0%	0%	0%
Zone 5							
46	92	14	70%	30%	0%	0%	0%
143	286	42.6					

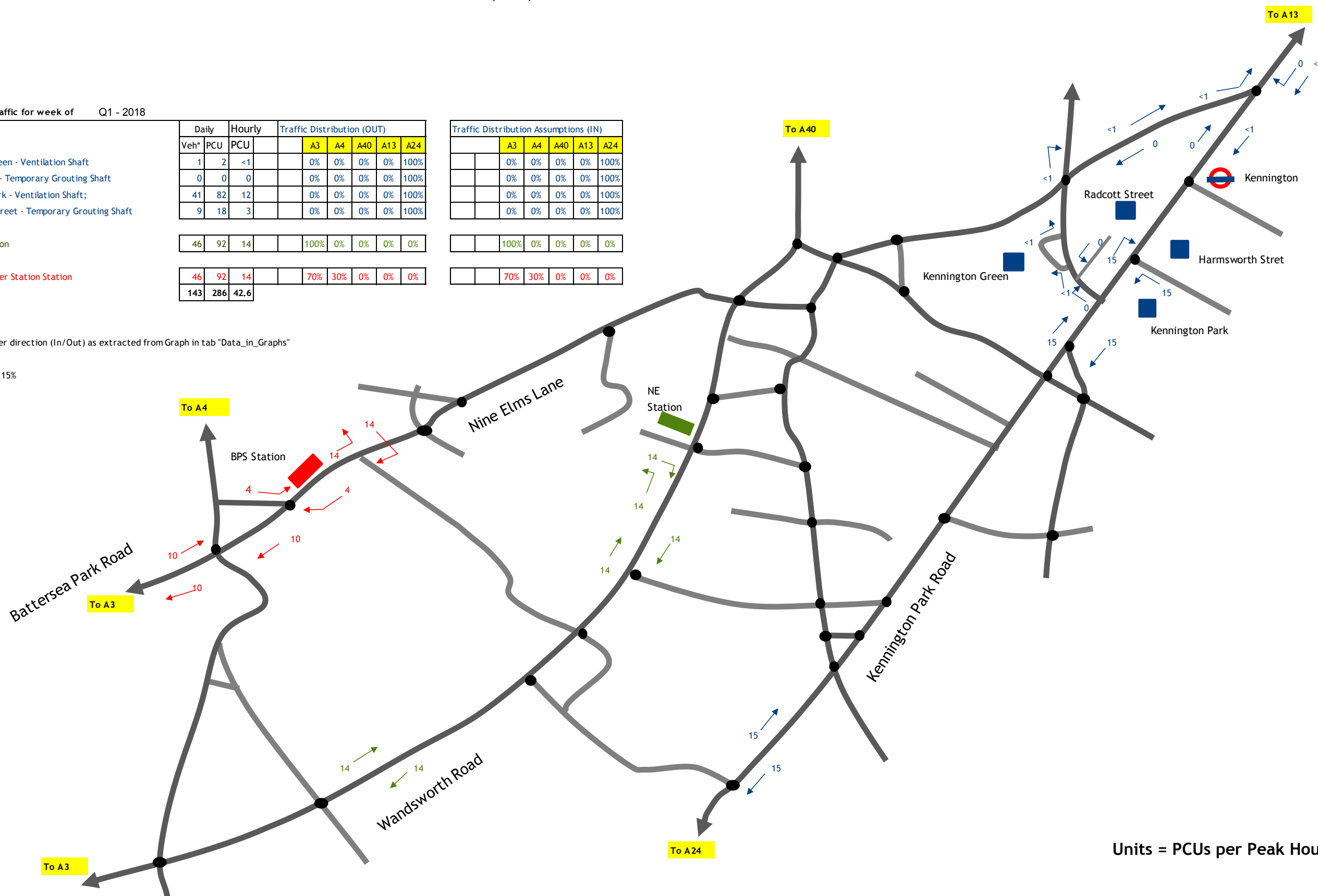
Traffic Distribution Assumptions (IN)					
A3	A4	A40	A13	A24	
0%	0%	0%	0%	100%	
0%	0%	0%	0%	100%	
0%	0%	0%	0%	100%	
0%	0%	0%	0%	100%	
100%	0%	0%	0%	0%	
70%	30%	0%	0%	0%	

Notes:

*Veh = Total Vehicles per direction (In/Out) as extracted from Graph in tab "Data_in_Graphs"

PCU Factor = 2

Peak Hour Factor = 15%



Units = PCUs per Peak Hour

C1: Construction

Criteria for analysis

- 4.25 It is envisaged that the NLE will have similar types of traffic and transport effects during construction to those identified for Crossrail and the Victoria Station Upgrade scheme. Therefore, the assessment criteria used for these projects has been used as the basis for defining a significant effect for the NLE.
- 4.26 In relation to construction traffic, the criteria is:
“A 30% net increase in traffic (lorries or all vehicles) over future baseline two-way flows (or one-way flows where either the link or the lorry route is one-way) for links affected for more than four weeks in any 12-month period, and where the total increase in traffic is more than 40 vehicles a day, subject to the increase leading to delay. Individual temporary increases of up to five days do not count towards the four-week period”
- 4.27 The report issued by TfL Surface Transport in March 2011 and titled: “Thames Tideway Tunnel, Traffic Modelling Expectations Technical Note” presents a detailed methodology for the traffic modelling to be carried out for Thames Tideway Tunnel. This methodology has been reviewed and considered during the development of the methodology for the NLE TIA. It states that if the impact at an area wide level is not significant, local junction modelling is not required.
- 4.28 As shown in the tables above, none of the main road links exceed a 30% increase in traffic flows. If a comparison is made against the future CLoHAM traffic flows the percentage becomes even smaller (see following Tables 4.3-4.4).
- 4.29 The side roads generally see a greater percentage increase due to the lower base flows. Junctions where construction traffic joins the main highway have been assessed using traffic modelling software to ensure sufficient turning capacity is provided. Details of both of these analyses are detailed later in this section.

Area Wide Traffic Assessment

Sub-regional SATURN model

- 4.30 The Central London Highway Assignment Model (CLoHAM) was used to assess the impact of the NLE construction at an area level. The model covers the NLE study area as shown in the following chapter.
- 4.31 The CLoHAM modelling was undertaken by TfL and covers the following peak periods.
- AM Peak: 08:00-09:00
 - PM Peak: 17:00-18:00
- 4.32 The base model for year 2009 has been recalibrated with the NLE study area in mind and as discussed previously, the following scenarios were assessed:
- Scenario 1 - Base 2009 Flows + 2015 NLE Construction Peak Flows
 - Scenario 2 - Base 2009 Flows + 2018 NLE Construction Peak Flows

CLoHAM Model Re-Calibration and Study Area Updates

- 4.33 TfL carried out a re-calibration of CLoHAM using the traffic survey data from across central London and the NLE study area.
- 4.34 The method of junction control (i.e. signalised, priority, roundabout etc.) was updated in line with recent changes across the road network.

4.35 Where required, network coding of geometric designs and traffic signal timings have been updated in order to reflect recent changes to the road network layout and to ensure that the CLoHAM model is representative of the existing traffic operations.

4.36 Additional minor roads have been added, especially within the NLE Study Area network in order to increase the resolution of the road network and potential route choices.

CLoHAM Model Results: Traffic Flows, Delays, Queues and Volume/Capacity

- 4.37 Comparisons between the Base 2009 and Scenarios 1 and 2 show marginal changes in the reassignment of traffic flows across the NLE study area network as a result of the additional NLE construction traffic.
- 4.38 A comparison between the Base 2009 and both scenarios is shown in 4.3 and 4.4.
- 4.39 The changes in delays, queues and volume/capacity created as a result of the additional NLE construction traffic and the reassignment are also marginal.

Area Wide Conclusions

- 4.40 Based on the results of the assessment carried out using the CLoHAM model, the effect of the NLE construction is expected to be ‘Capacity-Neutral’.

TABLE 4.1 HOURLY CONSTRUCTION TRAFFIC FLOWS FOR SCENARIO 1 (2015) PEAK AND CLOHAM BASE 2009 TRAFFIC FLOWS

Location No.	Main Road Links	Hourly Traffic (PCU)						Percentage of Hourly Construction Traffic			
		Construction Traffic		CLOHAM Base 2009 AM		CLOHAM Base 2009 PM		AM Peak		PM Peak	
		SW	NE	SW	NE	SW	NE	SW	NE	SW	NE
1	Kennington Park Road (Between Kennington Road and Camberwell New Road)	0	0	942	1148	734	690	0%	0%	0%	0%
2	Kennington Park Road (Between Camberwell New Road and Stockwell Road)	0	0	371	753	635	599	0%	0%	0%	0%
3	Kennington Park Road (Between Stockwell Road and Union Road)	0	0	347	649	861	605	0%	0%	0%	0%
4	Battersea Park Road (Between Kirtling Street and Prince of Wales Drive)	23	23	472	417	423	430	5%	5%	5%	5%
5	Battersea Park Road (Between Prince of Whales Drive and Queenstown Road)	16	16	538	571	591	392	3%	3%	3%	4%
6	Battersea Park Road (Between Queenstown Road and Latchmere Road)	16	16	380	649	533	657	4%	2%	3%	2%
7	Wandsworth Road (Between Nine Elms Lane and Lansdowne Way)	0	0	238	676	480	482	0%	0%	0%	0%
8	Wandsworth Road (Between Lansdowne Way and Union Road)	50	50	260	662	421	470	19%	8%	12%	11%
9	Wandsworth Road (Between Union Road and Silverthorne Road)	50	50	539	585	533	560	9%	9%	9%	9%
10	Vauxhall Gyratory (Wandsworth Road)	0		2658		2245		0%		0%	
11	Vauxhall Gyratory (Kennington Lane)	0		1652		2317		0%		0%	
12	Vauxhall Gyratory (Lambeth Road)	0		2098		1974		0%		0%	
13	Vauxhall Gyratory (Parry Street)	0		2395		1931		0%		0%	

Location No.	Side Road Links	Hourly Vehicles						Percentage of Hourly Construction Traffic			
		Construction Traffic		Surveys 2012 (AM Peak)		Surveys 2012 (PM Peak)		AM Peak		PM Peak	
		Out	In	Out	In	Out	In	Out	In	Out	In
1	Battersea Power Station Access	23	23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	Pascal Street	50	50	99	10	201	8	51%	501%	25%	626%
3	Kennington Green (North Arm)	0	0	2	5	18	5	0%	0%	0%	0%
4	Kennington Green (South Arm)	0	0	50	29	68	12	0%	0%	0%	0%
5	Kennington Park Place*	0	0	303	109	143	160	0%	0%	0%	0%
6	Stannary Street	0	0	19	21	17	6	0%	0%	0%	0%

Notes:

* Flows obtained from TRANSYT Model for Region R363 provided by TfL

AM Peak CloHAM = 08:00-09:00

AM Peak Surveys = 08:00-09:00

PM Peak CloHAM = 17:00-18:00

PM Peak Surveys = 17:00-18:00

C1: Construction

TABLE 4.2 HOURLY CONSTRUCTION TRAFFIC FLOWS FOR SCENARIO 2 (2018 PEAK) COMPARED WITH CLOHAM BASE 2009 TRAFFIC FLOWS

Location No.	Main Road Links	Hourly Traffic (PCU)						Percentage of Hourly Construction Traffic			
		Construction Traffic		CLOHAM Base 2009 AM		CLOHAM Base 2009 PM		AM Peak		PM Peak	
		SW	NE	SW	NE	SW	NE	SW	NE	SW	NE
1	Kennington Park Road (Between Kennington Road and Camberwell New Road)	15	15	942	1148	734	690	2%	1%	2%	2%
2	Kennington Park Road (Between Camberwell New Road and Stockwell Road)	0	0	371	753	635	599	0%	0%	0%	0%
3	Kennington Park Road (Between Stockwell Road and Union Road)	15	15	347	649	861	605	4%	2%	2%	3%
4	Battersea Park Road (Between Kirtling Street and Prince of Wales Drive)	14	14	472	417	423	430	3%	3%	3%	3%
5	Battersea Park Road (Between Prince of Whales Drive and Queenstown Road)	10	10	538	571	591	392	2%	2%	2%	2%
6	Battersea Park Road (Between Queenstown Road and Latchmere Road)	10	10	380	649	533	657	3%	1%	2%	1%
7	Wandsworth Road (Between Nine Elms Lane and Lansdowne Way)	0	0	238	676	480	482	0%	0%	0%	0%
8	Wandsworth Road (Between Lansdowne Way and Union Road)	14	14	260	662	421	470	5%	2%	3%	3%
9	Wandsworth Road (Between Union Road and Silverthorne Road)	14	14	539	585	533	560	3%	2%	3%	2%
10	Vauxhall Gyratory (Wandsworth Road)	0		2658		2245		0%		0%	
11	Vauxhall Gyratory (Kennington Lane)	0		1652		2317		0%		0%	
12	Vauxhall Gyratory (Lambeth Road)	0		2098		1974		0%		0%	
13	Vauxhall Gyratory (Parry Street)	0		2395		1931		0%		0%	

Location No.	Side Road Links	Hourly Vehicles						Percentage of Hourly Construction Traffic			
		Construction Traffic		Surveys 2012 (AM Peak)		Surveys 2012 (PM Peak)		AM Peak		PM Peak	
		Out	In	Out	In	Out	In	Out	In	Out	In
1	Battersea Power Station Access	14	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	Pascal Street	14	14	99	10	201	8	14%	138%	7%	173%
3	Kennington Green (North Arm)	0	0	2	5	18	5	15%	6%	2%	6%
4	Kennington Green (South Arm)	0	0	50	29	68	12	1%	1%	0%	3%
5	Kennington Park Place*	15	15	303	109	143	160	5%	14%	10%	9%
6	Stannary Street	0	0	19	21	17	6	0%	0%	0%	0%

Notes:

* Flows obtained from TRANSYT Model for Region R363 provided by TfL

AM Peak CloHAM = 08:00-09:00

AM Peak Surveys = 08:00-09:00

PM Peak CloHAM = 17:00-18:00

PM Peak Surveys = 17:00-18:00

TABLE 4.3 COMPARISON OF CLOHAM BASE (2009) AND SCENARIO 1 (2015 PEAK)

AM Peak Flows	Main Road Links	Hourly Traffic (PCU)							
		Construction Traffic		CLOHAM Base 2009 AM		CLOHAM + Construction -		Difference B-A	
		SW	NE	SW	NE	SW	NE	SW	NE
1	Kennington Park Road (Between Kennington Road and Camberwell New Road)	0	0	942	1148	952	1172	10	24
2	Kennington Park Road (Between Camberwell New Road and Stockwell Road)	0	0	371	753	384	778	13	24
3	Kennington Park Road (Between Stockwell Road and Union Road)	0	0	347	649	351	672	4	24
4	Battersea Park Road (Between Kirtling Street and Prince of Wales Drive)	0	0	472	417	468	437	-4	20
5	Battersea Park Road (Between Prince of Whales Drive and Queenstown Road)	18	18	538	571	566	586	28	15
6	Battersea Park Road (Between Queenstown Road and Latchmere Road)	18	18	380	649	425	659	45	10
7	Wandsworth Road (Between Nine Elms Lane and Lansdowne Way)	52	0	238	676	256	651	18	-25
8	Wandsworth Road (Between Lansdowne Way and Union Road)	52	52	260	662	284	692	24	30
9	Wandsworth Road (Between Union Road and Silverthorne Road)	52	52	539	585	568	607	29	22
10	Vauxhall Gyratory (Wandsworth Road)	52		2658		2727		69	
11	Vauxhall Gyratory (Kennington Lane)	52		1652		1712		60	
12	Vauxhall Gyratory (Lambeth Road)	52		2098		2133		35	
13	Vauxhall Gyratory (Parry Street)	52		2395		2472		77	

PM Peak Flows	Main Road Links	Hourly Traffic (PCU)							
		Construction Traffic		CLOHAM Base 2009 PM		CLOHAM + Construction -		Difference B-A	
		SW	NE	SW	NE	SW	NE	SW	NE
1	Kennington Park Road (Between Kennington Road and Camberwell New Road)	0	0	734	690	744	694	25	0
2	Kennington Park Road (Between Camberwell New Road and Stockwell Road)	0	0	635	599	660	605	28	5
3	Kennington Park Road (Between Stockwell Road and Union Road)	0	0	861	605	869	609	5	3
4	Battersea Park Road (Between Kirtling Street and Prince of Wales Drive)	0	0	423	430	434	428	12	3
5	Battersea Park Road (Between Prince of Whales Drive and Queenstown Road)	18	18	591	392	623	398	27	11
6	Battersea Park Road (Between Queenstown Road and Latchmere Road)	18	18	533	657	542	673	2	24
7	Wandsworth Road (Between Nine Elms Lane and Lansdowne Way)	52	0	480	482	479	465	-2	-20
8	Wandsworth Road (Between Lansdowne Way and Union Road)	52	52	421	470	437	502	20	42
9	Wandsworth Road (Between Union Road and Silverthorne Road)	52	52	533	560	560	587	33	31
10	Vauxhall Gyratory (Wandsworth Road)	52		2245		2282		36	
11	Vauxhall Gyratory (Kennington Lane)	52		2317		2341		25	
12	Vauxhall Gyratory (Lambeth Road)	52		1974		1981		7	
13	Vauxhall Gyratory (Parry Street)	52		1931		1988		57	

C1: Construction

TABLE 4.4 COMPARISON OF CLOHAM BASE (2009) AND SCENARIO 2 (2018 PEAK)

AM Peak Flows	Main Road Links	Hourly Traffic (PCU)							
		Construction Traffic		CLOHAM Base 2009 AM (A)		CLOHAM + Construction 2018 AM (B)		Difference B-A	
		SW	NE	SW	NE	SW	NE	SW	NE
1	Kennington Park Road (Between Kennington Road and Camberwell New Road)	16	16	942	1148	967	1175	25	28
2	Kennington Park Road (Between Camberwell New Road and Stockwell Road)	16	16	371	753	392	783	21	29
3	Kennington Park Road (Between Stockwell Road and Union Road)	16	16	347	649	366	675	20	26
4	Battersea Park Road (Between Kirtling Street and Prince of Wales Drive)	0	0	472	417	468	433	-4	15
5	Battersea Park Road (Between Prince of Whales Drive and Queenstown Road)	10	10	538	571	547	570	9	-2
6	Battersea Park Road (Between Queenstown Road and Latchmere Road)	10	10	380	649	399	646	19	-3
7	Wandsworth Road (Between Nine Elms Lane and Lansdwone Way)	14	0	238	676	247	673	9	-3
8	Wandsworth Road (Between Lansdowne Way and Union Road)	14	14	260	662	273	677	13	15
9	Wandsworth Road (Between Union Road and Silverthorne Road)	14	14	539	585	553	595	14	10
10	Vauxhall Gyratory (Wandsworth Road)	14		2658		2699		41	
11	Vauxhall Gyratory (Kennington Lane)	14		1652		1698		46	
12	Vauxhall Gyratory (Lambeth Road)	14		2098		2120		22	
13	Vauxhall Gyratory (Parry Street)	14		2395		2414		19	

PM Peak Flows	Main Road Links	Hourly Traffic (PCU)							
		Construction Traffic		CLOHAM Base 2009 PM (A)		CLOHAM + Construction 2018 PM (B)		Difference B-A	
		SW	NE	SW	NE	SW	NE	SW	NE
1	Kennington Park Road (Between Kennington Road and Camberwell New Road)	16	16	734	690	744	703	25	0
2	Kennington Park Road (Between Camberwell New Road and Stockwell Road)	16	16	635	599	655	615	28	5
3	Kennington Park Road (Between Stockwell Road and Union Road)	16	16	861	605	873	618	5	3
4	Battersea Park Road (Between Kirtling Street and Prince of Wales Drive)	0	0	423	430	422	429	12	3
5	Battersea Park Road (Between Prince of Whales Drive and Queenstown Road)	10	10	591	392	600	397	27	11
6	Battersea Park Road (Between Queenstown Road and Latchmere Road)	10	10	533	657	539	667	2	24
7	Wandsworth Road (Between Nine Elms Lane and Lansdwone Way)	14	0	480	482	479	481	-2	-20
8	Wandsworth Road (Between Lansdowne Way and Union Road)	14	14	421	470	429	484	20	42
9	Wandsworth Road (Between Union Road and Silverthorne Road)	14	14	533	560	543	572	33	31
10	Vauxhall Gyratory (Wandsworth Road)	14		2245		2270		25	
11	Vauxhall Gyratory (Kennington Lane)	14		2317		2326		9	
12	Vauxhall Gyratory (Lambeth Road)	14		1974		1977		3	
13	Vauxhall Gyratory (Parry Street)	14		1931		1949		18	

Local Traffic Assessment

4.41 This section presents the results obtained from the local traffic modelling assessment.

Local Assessment Modelling

4.42 The CLOHAM model results indicate that the NLE construction would be ‘capacity-Neutral’. Therefore, in line with the traffic modelling methodology recommended by TfL (as applied to the Thames Tideway Tunnel project), there is no requirement for undertaking local traffic modelling. Traffic modelling has been performed to ensure the robustness of this analysis and to examine and potential queuing or congestion effects at a local level.

4.43 Traffic surveys were conducted on 12 July 2012, and TfL Surface Transport provided calibrated and validated base models for the following UTC Regions:

- R294 - Nine Elms Lane
- R363 - Kennington Park Road

4.44 These models have been used for carrying out the local traffic modelling assessment.

4.45 For the two modelled construction scenarios, the additional NLE construction traffic has been included. In addition, a further assessment has used the R294 model to include the proposed new junction arrangements incorporating the Battersea Power Station site access required for the construction of the NLE.

4.46 The following priority junctions that provide access to worksites have been added to the R363 - Kennington Park Road TRANSYT model.

- Kennington Park Road / Stannary Street
- Kennington Park Road / Kennington Green (North)
- Kennington Park Road / Kennington Green (South)

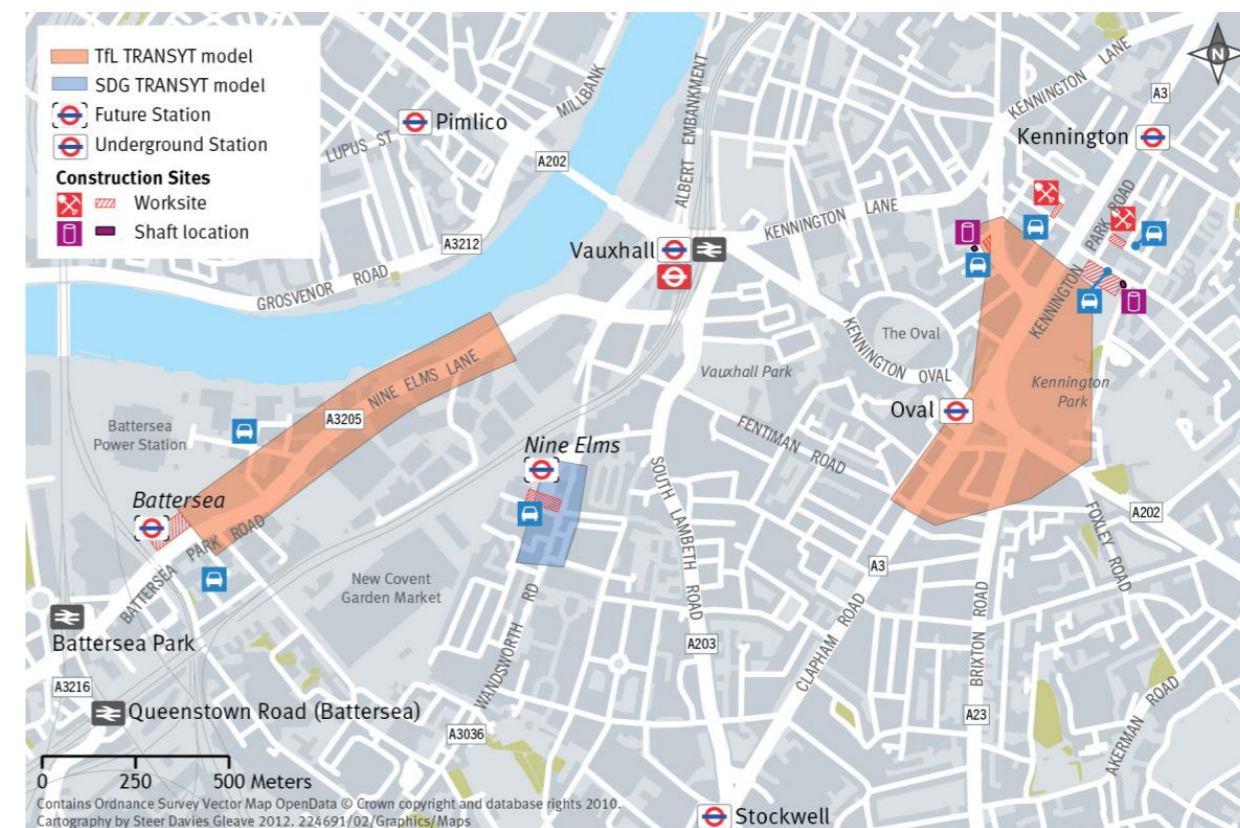
4.47 However, Brixton Road / Camberwell New Road junction has been amended in order to reflect updated signal timings provided by TfL. Based on this, Stage 2 includes the left turn from east Camberwell New Road into Brixton Road and the inter-greens have been adjusted accordingly. Link delays and bonus green times for the node have been retained.

4.48 NLE construction traffic flows were also included in the R363 model.

4.49 The TRANSYT model for the Wandsworth Road / Pascal Street junction has been developed by SDG in line with TfL Traffic Modelling Guidelines. Traffic flows have been inputted from the surveys undertaken on 12 July 2012 and the base 2012 model has been calibrated / validated with Saturation Flow and Degree of Saturation observations where possible.

4.50 Figure 4.10 below shows the junctions that have been assessed using TRANSYT (for the modelling of traffic signal junctions and priority junctions). All junctions that form access to the worksites have been assessed.

FIGURE 4.10 JUNCTIONS ASSESSED IN TRANSYT



C1: Construction

TRANSYT Modelling: R294 - Kirtling Street / Nine Elms Lane Junction and Battersea Park Road / Battersea Station Proposed Site Access Junction

- 4.51 According to results obtained from TRANSYT the NLE construction flows will not have any impact on the Nine Elms Lane / Kirtling Street junction. These results are expected as no construction flows go through this junction in these scenarios because all construction traffic travels to/from the south.
- 4.52 Table 4.5 shows the TRANSYT results for the new temporary junction at Battersea Park Road to access to access the Battersea worksite.

TABLE 4.5 BATTERSEA PARK ROAD / BATTERSEA STATION SITE ACCESS JUNCTION TRANSYT RESULTS

Scenario	Degree of Saturation (%)			Mean Delay (seconds)			Mean Max Queue (PCU)		
	Base	1	2	Base	1	2	Base	1	2
AM Peak									
Battersea Park Road Northbound	53	46	46	2.6	14.3	14.2	2	15	15
Battersea Park Road Southbound	60	49	49	10.6	4.9	4.9	22	14	14
BPS Site Access	-	11	6	-	47.9	47.2	-	1	0
PM Peak									
Battersea Park Road Northbound	43	43	42	1.8	13.1	13.0	1	13	12
Battersea Park Road Southbound	52	48	48	6.3	7.3	7.3	18	19	19
BPS Site Access	-	12	7	-	43.9	43.4	-	0	0

- 4.53 Overall, the new arrangement for the Battersea Station Site Access with the NLE construction flows for both scenarios has negligible effect on the junction and network operation.
- 4.54 In both time periods, the Degree of Saturation (DoS) decreases.
- 4.55 Queues on Battersea Park Road increase because the cycle time for the construction access is twice as long as the existing scenario (at present the pelican crossing operates on a double cycled basis compared with the rest of the signals in this area).

TRANSYT Modelling: R294 - Pascal Street / Wandsworth Road Junction

- 4.56 Table 4.6 below shows the results from the TRANSYT model for the Pascal Street / Wandsworth Road junction, which will form the access to Nine Elms Station. The base model results have been compared with Scenarios 1 and 2. All background flow exiting and entering Pascal Street and the turning filter green arrow currently allocated to the right turn movement from Wandsworth Road into Pascal Street has been removed. This is due to the traffic flows on Pascal Street being reduced to a much lower amount as the access to the Sainsbury's parking area will be closed throughout construction.

TABLE 4.6 PASCAL STREET / WANDSWORTH ROAD JUNCTION TRANSYT RESULTS

Scenario	Degree of Saturation (%)			Mean Delay (seconds)			Mean Max Queue (PCU)		
	Base	1	2	Base	1	2	Base	1	2
AM Peak									
Wandsworth Road (Southbound)	35	35	35	14.6	14.6	14.6	5	5	5
Wilcox Street	5	5	5	44.3	44.3	44.3	0	0	0
Wandsworth Road (Northbound)	91	94	89	46.0	55.4	43.5	20	23	19
Pascal Street	60	62	40	65.7	66.6	55.9	3	3	2
PM Peak									
Wandsworth Road (Southbound)	62	62	60	22.5	22.5	21.4	10	10	10
Wilcox Street	3	3	3	36.8	36.8	38.0	0	0	0
Wandsworth Road (Northbound)	71	75	68	33.0	35.0	30.7	11	12	10
Pascal Street	76	77	68	62.5	63.7	58.8	6	6	5

- 4.57 According to results obtained from TRANSYT, the NLE construction flows will have a slightly negative impact on the Pascal Street / Wandsworth Road junction during Scenario 1. The DoS on the northbound approach to the junction will increase to from 91% to 94% during the AM peak only. Construction traffic flows are expected to remain at this level for approximately 3 months. The junction currently operates close to capacity levels (91%). For scenario 2, the NLE construction flows will have negligible impacts on the junction operation as the additional flows are very low or non-existent.

TRANSYT Modelling: R363 - Kennington Park Road / Kennington Park Place Junction

4.58 Table 4.7 below shows the results from the TRANSYT model for the Kennington Park Place / Kennington Park Road junction, which is included in the R363 - Kennington Park Road model. The TfL Base model results have been compared with Scenarios 1 and 2.

TABLE 4.7 KENNINGTON PARK PLACE / KENNINGTON PARK ROAD JUNCTION TRANSYT RESULTS

Scenario	Degree of Saturation (%)			Mean Delay (seconds)			Mean Max Queue (PCU)		
	Base	1	2	Base	1	2	Base	1	2
AM Peak									
Kennington Park Road Northbound	66	66	68	17.8	17.8	18.8	13	13	13
Kennington Park Place	80	80	87	58.3	58.3	68.3	9	9	11
Kennington Park Road Southbound	77	77	77	30.7	30.7	30.7	16	16	16
PM Peak									
Kennington Park Road Northbound	90	90	92	48.4	48.3	52.9	17	17	19
Kennington Park Place	66	66	73	60.7	60.7	66.7	4	4	5
Kennington Park Road Southbound	83	83	83	31.7	31.7	31.7	18	18	18

4.59 According to the results obtained from TRANSYT, the NLE construction flows will have a slight negative impact on this junction for Scenario 2, increasing the Degree of Saturation on Kennington Park Road northbound from 90% to 92% in the PM Peak period.

4.60 Scenario 1 does not have any additional flows compared to the base R363 model, therefore no impact is expected during the construction phase.

TRANSYT Modelling: R363 - Kennington Road / Stannary Street

4.61 Table 4.8 below shows the results from the TRANSYT model for the Kennington Road / Stannary Street junction, which is included in the R363 - Kennington Park Road model. The TfL base model does not include the Kennington Road / Stannary Street junction and the model has been extended to include it.

TABLE 4.8 KENNINGTON ROAD /STANNARY STREET JUNCTION TRANSYT RESULTS

Scenario	Degree of Saturation (%)			Mean Delay (seconds)			Mean Max Queue (PCU)		
	Base	1	2	Base	1	2	Base	1	2
AM Peak									
Stannary Street	7	7	7	4.5	4.5	4.5	0	0	0
Kennington Road Northbound	41	41	41	1.5	1.5	1.5	2	0	0
Kennington Road Southbound	15	15	15	1.2	1.2	1.2	0	0	0
PM Peak									
Stannary Street	8	8	8	5.5	5.5	5.5	0	0	0
Kennington Road Northbound	28	28	28	1.2	1.2	1.2	0	0	0
Kennington Road Southbound	30	30	30	1.5	1.5	1.5	0	0	0

4.62 According to the results obtained from TRANSYT, the impact of the NLE construction flows on the Kennington Road / Stannary Street junction will have a negligible impact. This is because additional construction traffic flows are low.

C1: Construction

TRANSYT Modelling: R363 - Kennington Road / Kennington Green (South)

4.63 Table 4.9 below shows the results from the TRANSYT model for the Kennington Road / Kennington Green (South) junction, which is included in the R363 - Kennington Park Road model. The TfL base model does not include the Kennington Road / Kennington Green (South) junction and the model has been extended to include it.

TABLE 4.9 KENNINGTON ROAD /KENNINGTON GREEN (SOUTH) JUNCTION TRANSYT RESULTS

Scenario	Degree of Saturation (%)			Mean Delay (seconds)			Mean Max Queue (PCU)		
	Base	1	2	Base	1	2	Base	1	2
AM Peak									
Kennington Green (south)	15	15	15	13.9	13.9	13.9	1	1	1
Kennington Road Northbound	41	41	41	1.5	1.5	1.5	0	0	0
Kennington Road Southbound	19	19	19	1.1	1.1	1.1	0	0	0
PM Peak									
Kennington Green (south)	20	20	20	7.2	7.2	7.2	0	0	0
Kennington Road Northbound	28	28	28	1.2	1.2	1.2	0	0	0
Kennington Road Southbound	39	39	39	1.5	1.5	1.5	0	0	0

4.64 According to the results obtained from TRANSYT, the NLE construction traffic on the Kennington Road / Kennington Green (South) junction will have a negligible impact. This is because additional construction traffic flows are low.

TRANSYT Modelling: R363 - Kennington Road / Kennington Green (North)

4.65 Table 4.10 below shows the results from the TRANSYT model for the Kennington Road / Kennington Green (North) junction, which is included in the R363 - Kennington Park Road model. The TfL base model does not include the Kennington Road / Kennington Green (North) junction and the model has been extended to include it.

TABLE 4.10 KENNINGTON ROAD /KENNINGTON GREEN (NORTH) JUNCTION TRANSYT RESULTS

Scenario	Degree of Saturation (%)			Mean Delay (secs)			Mean Max Queue (PCU)		
	Base	1	2	Base	1	2	Base	1	2
AM Peak									
Kennington Green (north)	3	3	3	10.8	10.8	10.8	0	0	0
Kennington Road Northbound	41	41	41	1.5	1.5	1.5	0	0	0
Kennington Road Southbound	19	19	19	1.1	1.1	1.1	0	0	0
PM Peak									
Kennington Green (north)	5	5	5	6.6	6.6	6.6	0	0	0
Kennington Road Northbound	28	28	28	1.2	1.2	1.2	0	0	0
Kennington Road Southbound	39	39	39	1.5	1.5	1.5	0	0	0

4.66 According to the results obtained from TRANSYT, the impact of the NLE construction flows on the Kennington Road / Kennington Green (North) junction will have a negligible impact. This is because additional construction traffic flows are low.

Local Traffic Assessment Conclusions

4.67 Although the area wide modelling assessment has shown that the expected increase in traffic flows due the construction of NLE scheme is not sufficient to require local junction modelling, this modelling has been undertaken to understand issues at junctions near each construction site in more detail.

4.68 The TRANSYT modelling has shown that the only two signalised junctions where there could be a negative impact on traffic flows is at the junction of Pascal Street / Wandsworth Road and Kennington Park Place / Kennington Park Road. The models of the junctions show that they already operate near capacity (above 90% DoS).

4.69 The traffic generated by the NLE scheme is expected to increase this to 94% at the junction of Wandsworth Road / Pascal Street (during the AM peak in Scenario 1) and 92% at the junction of Kennington Park Place / Kennington Park Road (during the PM peak in Scenario 2).

4.70 The scope for providing physical mitigation measures e.g. lane widening etc., is limited at both these locations and hence more appropriate mitigation measures would be to reduce the peaks in traffic flow by adjusting the construction programme and / or restricting construction vehicle movements during certain times of the day. These measures could be considered if congestion problems are observed once construction has begun.

Traffic Impact Assessment Conclusions

- 4.71 Based on the results of the assessment carried out using the CLoHAM model, the effect of the NLE construction at an area wide level is expected to be 'Capacity-Neutral'.
- 4.72 The local traffic assessment concluded that there will be two junctions where there could be a negative impact as a result of NLE construction traffic but that these will be for a limited time period and only during certain times of the day. For these reasons, physical mitigation measures are not considered appropriate and impacts will be managed through the code of construction practice and Construction Traffic Management Plan.

5 Parking Impact Assessment

Introduction

- 5.1 The impact of the proposed construction works on parking has been assessed by analysing the movement of construction vehicles to and from each work site and determining which parking spaces need to be suspended to enable safe and effective access, as well as taking account of parking spaces that need to be suspended for the worksites themselves.
- 5.2 Where spaces need to be suspended for the duration of the construction period, the potential to accommodate the associated reduction in parking capacity is then considered.
- 5.3 The impact of access by construction vehicles to each construction site on parking is summarised in Table 5.1.

TABLE 5.1 SUMMARY OF PARKING IMPACT

Worksite	Duration (years)	Parking spaces temporarily suspended throughout construction period			Periodic Suspension
		Construction site	10m rigid & Large tipper	Total	Low loader
Radcot Street	2	12 (including 2 car club spaces)	3	15	8
Harmsworth Street	2	10	3	13	8
Kennington Green Phase 1	2.5 - 3	10	0	10	0
Kennington Green Phase 2 (additional)	3 months	2	0	2	0
Kennington Park	2.5 - 3	13	0	13	3
Nine Elms	4	4 (Car) 5 (Motorcycle)	9	13 (Car) 5 (Motorcycle)	0
Battersea	4	0	0	0	0
Total		51	15	66 (Car)	19

- 5.4 This analysis shows that five of the six worksites require the suspension of parking spaces to enable construction to occur. 66 spaces will be removed during the construction period for all work sites.

Impact of Reduced Parking Capacity

- 5.5 The impact of the reduction in parking capacity during construction has been considered using the results of the parking beat survey. For each survey area the number of parking spaces suspended for the worksites has been incorporated into the calculation of parking demand and availability. These spaces include those required by construction and those required to accommodate a 10m rigid lorry and large tipper. The Figures 5.1-5.3 show the per cent of spaces occupied during each beat; the lower the rate of occupancy, the more empty parking is available. The figures show the current

parking occupancy and the occupancy with the proposed spaces to be suspended removed from the total.

FIGURE 5.1 PARKING DEMAND FOLLOWING SPACES SUSPENDED DUE TO CONSTRUCTION - KENNINGTON GREEN AND RADCOT STREET

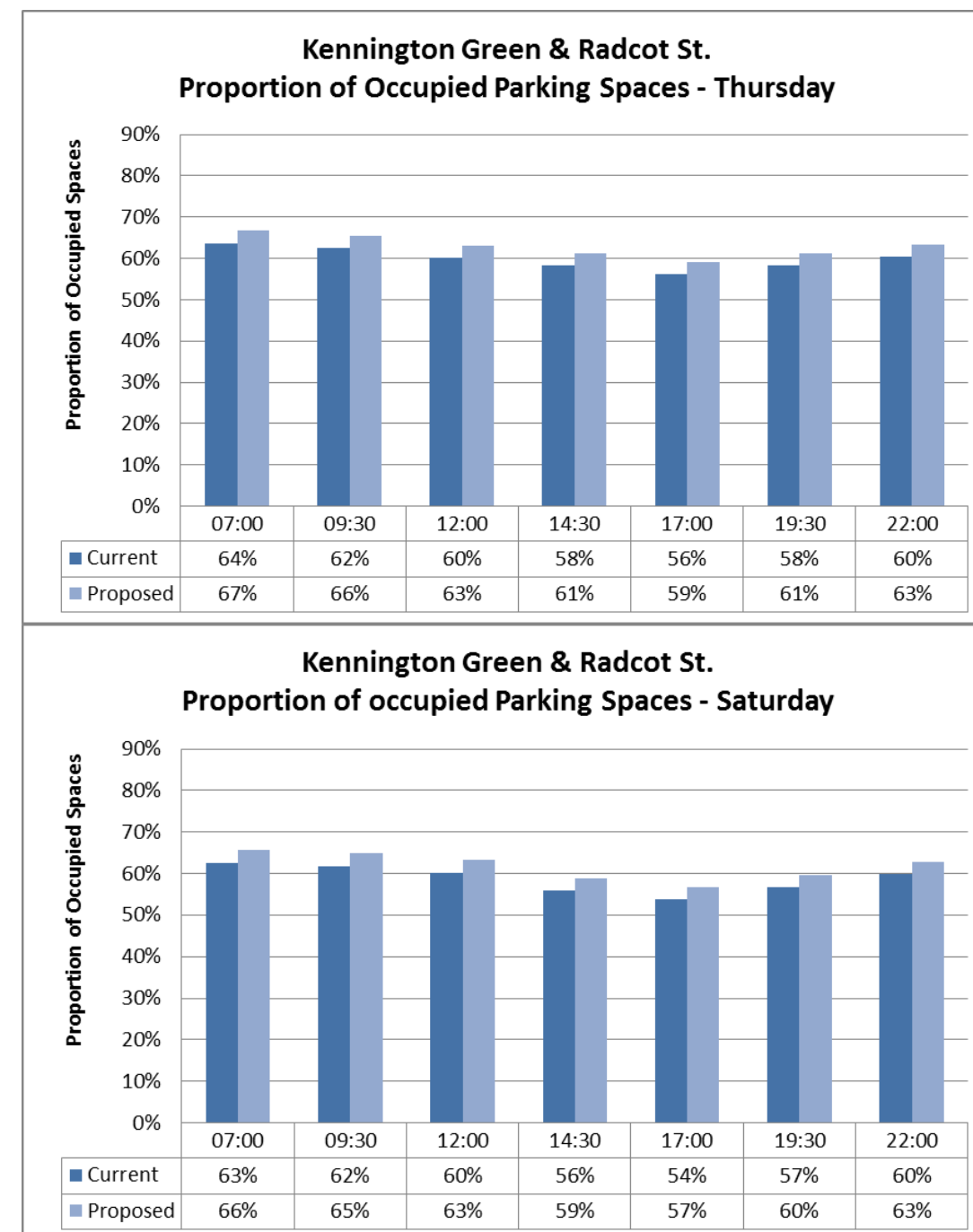


FIGURE 5.2 PARKING DEMAND FOLLOWING SPACES SUSPENDED DUE TO CONSTRUCTION - KENNINGTON PARK PLACE & HARMSWORTH STREET

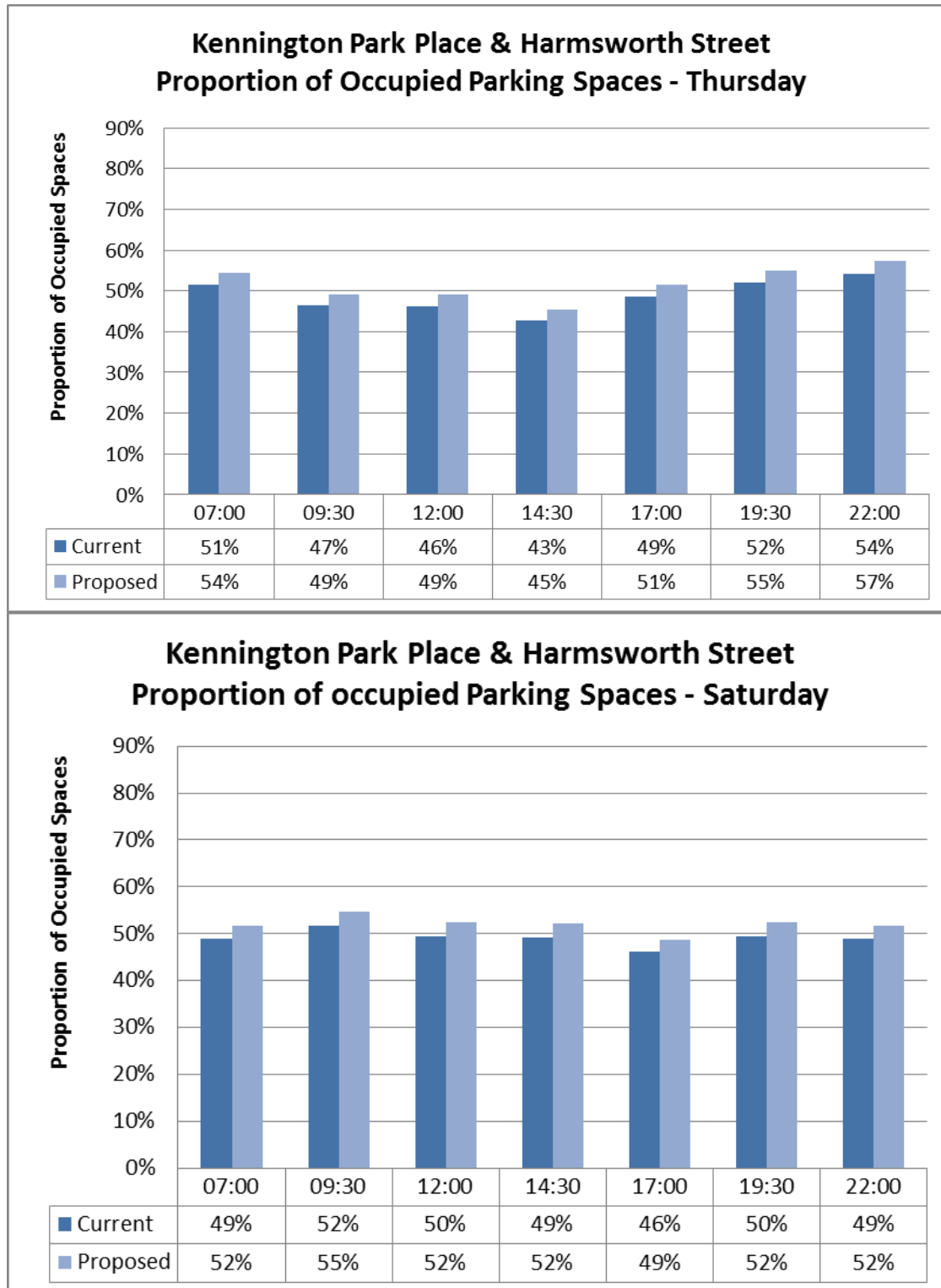
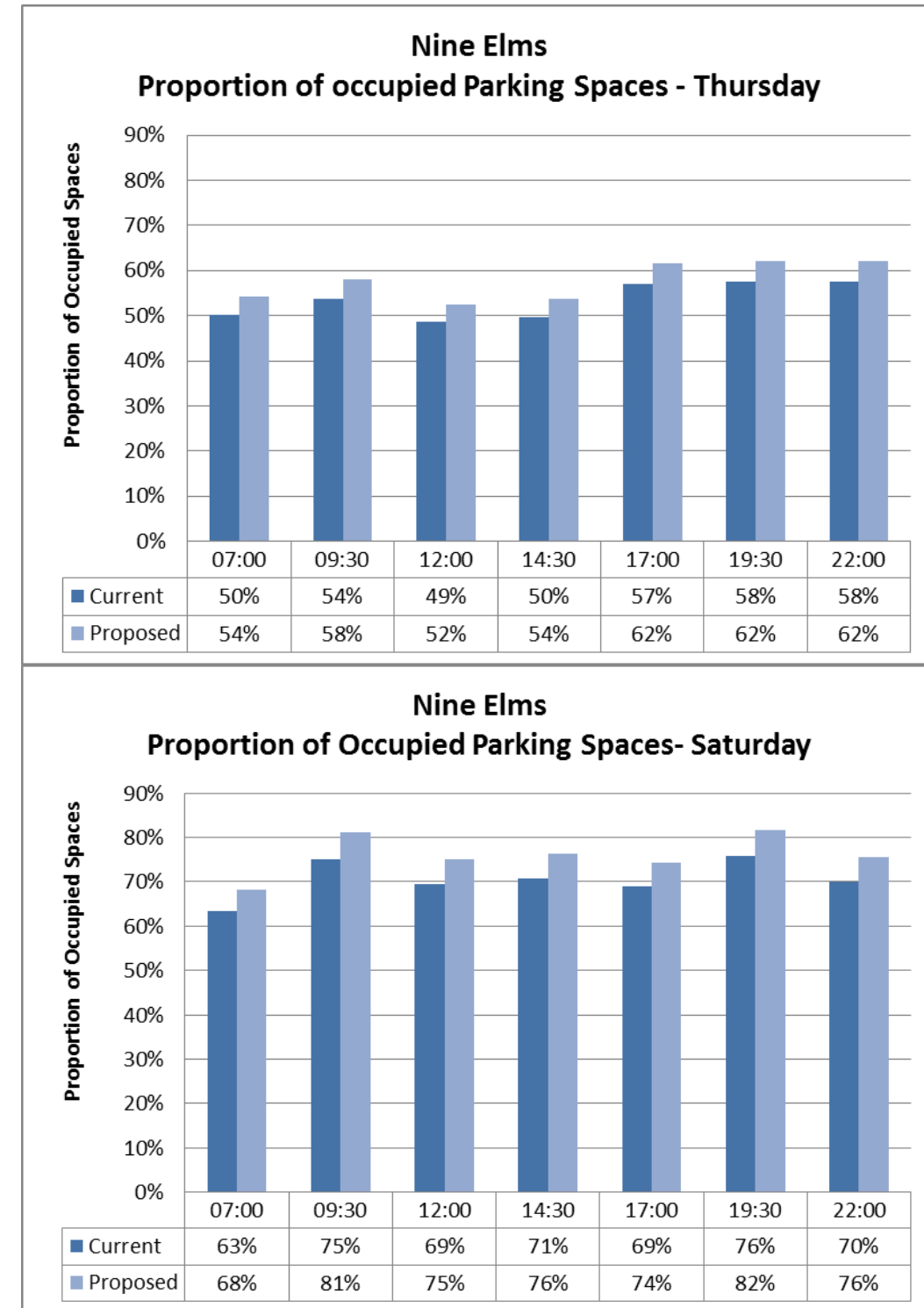


FIGURE 5.3 PARKING DEMAND FOLLOWING SPACES SUSPENDED DUE TO CONSTRUCTION - NINE ELMS



5.6 Parking demand graphs for Battersea north and south are not shown because no impact is expected on the parking levels as no parking will be suspended due to construction.

- 5.7 This analysis shows that for all areas there is sufficient spare parking capacity to accommodate the expected reduction in parking capacity due to the construction works for the NLE.

Parking Analysis at Street Level

- 5.8 In the previous section, parking was analysed by aggregating many streets around each site. While this is appropriate at the neighbourhood level, a more detailed analysis of the local streets where parking is to be suspended is required to identify and manage any additional parking stress caused by NLE construction. This has been undertaken and detailed spreadsheets of the parking impacts on each of the streets where parking is to be suspended due to construction activities can be in Appendix B of this Report.
- 5.9 Parking spaces suspended due to construction activities include those required by the construction site and those required to accommodate a 10m rigid lorry and large tipper. Additional spaces will be required in exceptional circumstances to accommodate a low loader. These vehicles will be required at the beginning and end of construction for the delivery of large pieces of equipment (cranes, Tunnel Boring Machines, etc.).
- 5.10 This analysis was conducted with an assumed maximum parking space occupancy rate of 85% or less.

Radcot Street

- 5.11 Parking capacity at the Radcot Street site is expected to be reduced by fifteen spaces including two designated for Car Club use. The demand from the thirteen general use spaces has been applied to and absorbed by the surrounding streets (Methley, Ravensdon and Stannary Streets). Occupancy on the surrounding streets remains less than 85% at all times. The Car Club spaces are proposed to be moved to the north end of Stannary Street by changing the regulation on two existing spaces. This is expected to have a minimal impact on Stannary Street as parking occupancy remains below 85%.

Harmsworth Street and Kennington Park

- 5.12 The suspension of parking spaces at Kennington Park Place and Harmsworth Street should have little effect on the parking supply in the surrounding areas. There is sufficient supply on Kennington Park Place and Harmsworth Street to absorb any displaced demand from the worksites.

Kennington Green

- 5.13 Kennington Green will require twelve parking spaces to be suspended. Two Car Club spaces will be relocated to vacant kerb space on Montford Street. The car club spaces would be moved to two newly created kerb side spaces on adjacent Montford Place for the duration of construction. Based on the occupancy rates from the survey data, all displaced parking demand can be absorbed by the excess parking supply available on adjacent Montford Street for weekdays and weekends. During Phase 2 of construction, an additional two spaces will be suspended for approximately 3 months. Montford Place has enough excess supply to absorb this additional displaced demand (occupancy rates are below 85% at all times).
- 5.14 There is a currently a proposal by London Borough of Lambeth to change a 'shared use' space on Stannary Street into a 'disabled' space. This space has been removed from the total available spaces on Stannary Street throughout this analysis.

Nine Elms

- 5.15 All of the parking on Pascal Street will be suspended for the duration of construction. Detailed parking analysis has shown that there is sufficient capacity for all displaced vehicles on nearby streets without increasing parking occupancy above 85 % (Davison Gardens, Hartington Road and Wilcox Road). Site visits have shown that many of the vehicles currently parked on Pascal Street are related to the businesses operating there. Before construction begins, these businesses would be relocated and, as a result, parking demand is expected to drop.
- 5.16 A motorcycles parking area that can accommodate five motorcycles on Pascal Street would be suspended for the duration of construction. Motorcycles are expected to be accommodated easily in the surrounding residential neighbourhood. There is additional motorcycle parking on Davidson Gardens.

Battersea

- 5.17 No parking spaces are expected to be suspended due to construction activities at the Battersea site and therefore no analysis is needed.

Conclusions

- 5.18 The parking assessment shows that although there will be a reduction in parking at the Kennington sites and the Nine Elms Site, there is sufficient existing parking capacity on nearby streets to accommodate the parking demand displaced due to the construction of the NLE.

6 Pedestrian Impacts & Mitigation Measures

6.1 The construction of the NLE would affect the pedestrian environment immediately around each of the worksites. A series of measures to reduce the impact of NLE construction on the pedestrian environment has been proposed. Diagrams of the proposed measures have been included in Appendix A of this Report. At all sites where a diversion is required, signage will be provided directing pedestrians around the closed footway.

Radcot Street

6.2 The construction site at Radcot Street will permit both footways to remain open during construction. The south-eastern footway would remain open and at full width throughout construction. The footway on the northwest side of the street would be reduced in width. This reduction would prevent two wheelchair users from passing each other.

6.3 Dropped kerb facilities already exist at the junction with Ravensdon Street. At the north end of the site, and dropped kerbs will be installed to allow those in wheelchairs to use the full width southern footway.

6.4 The pedestrian desire line crosses the site entrance which could cause conflict during construction. To ensure the safety of pedestrians, a banksman will be used during the reversing movements of all large vehicles.

6.5 The footway outside the builders merchants is to be temporarily narrowed to a width of 2.0m to ease vehicle movements along Stannary Street. This change will provide slightly more road space for vehicles and hence reduce the potential for conflicts between large vehicles using the builders merchants and those accessing the construction site.

Harmsworth Street

6.6 The western half of the footway on the south side of Harmsworth Street will be closed during construction. The southern half would remain open to provide 24 hour emergency access to Bishop's House Day Nursery throughout construction. The north footway will remain open and will be lined with hoarding from the construction site. The pedestrian crossing at the T junction with De Laune Street will cross the site entrance. All reversing lorry movements will require the use of a banksman.

6.7 Keyworth Primary School is located north of the Harmsworth Street construction site. As students will live in close proximity to the site and could use some of the same roads as the construction vehicles, extra care must be taken in this area. The construction firm contracted to construct the NLE will be required, through the Construction Logistics Plan, to liaise with the school to ensure students, teachers and parents know of the construction and are aware of the alternative pedestrian routes to the school, avoiding the construction routes and sites.

Kennington Green

6.8 Construction activities at Kennington Green have the greatest impact of all the sites on pedestrians and the pedestrian realm. This is due to footway closures, two construction phases and the volumes of pedestrians that currently use the area.

6.9 The footways surrounding Kennington Green and the crossing on Kennington Road will be closed for the duration of construction. An existing pedestrian island to the south of the current crossing has been recommended for upgrade to enhance existing crossing facilities.

6.10 The footways to the north and where the footway narrows to the west have been recommended for upgrading to accommodate the increase in pedestrian traffic caused by the diversions. The upgrades include widening the footway to 2.5m and relocating bollards to 450mm from the new kerb. These upgrades will be especially important on the footway to the north (Link 1.1-5) as it performed very poorly in the PERS audit and received a red rating (Appendix C5).

6.11 During phase one, pedestrians will be required to detour around Kennington Green. This will not be an extensive diversion and disruption to the footways and the pedestrian environment are expected to be minimal.

6.12 Phase 2 will require pedestrians to make a longer diversion as all links on the west side of Kennington Road near the worksite are expected to be closed. This will require pedestrians who currently use the west footway to cross to the east side of Kennington Road to continue their journey. This closure will impact the more than 1,100 pedestrians per day who have an origin or destination north of Kennington Green and who utilise Montford Place. However, the proposed diversion would only marginally increase the walking distance (300 meters) or time (4-5 minutes) and is only expected to be in place for 3 months.

Kennington Park

6.13 An extensive section of footway will be closed along Kennington Park Place to provide vehicle access to the site and pedestrians will be required to cross to the north side of the street and continue along the footway to avoid the construction area. A temporary footway with dropped facilities is recommended at the west corner of Kennington Park Place and St. Agnes Place to provide a safe and convenient crossing location.

6.14 The construction site is located opposite the Bishop's House Day Nursery. Users of the nursery will continue to be able to access the site on foot from the south or west foot using the signalised crossing of Kennington Park Place / Kennington Road to access the northern footway of Kennington Park Place and the entrance to the nursery. Users from the east will be able to access the entrance as currently. Users accessing the nursery by car will continue to have use of parking spaces to the east of the 'School Keep Clear' area.

Nine Elms

6.15 The footway on the west side of Wandsworth Road, including two crossings at Pascal Street, will be closed for the duration of construction. The diversion around the closed footway will require pedestrians to divert from the desire line. It will require pedestrians to cross Wandsworth Road and use the east side of the road. However, the number of pedestrians using this footway is expected to be reduced due to the closure of Sainsbury's supermarket for most of the construction activity at Nine Elms.

6.16 The footway on the north side of Pascal Street will be closed for the duration of construction. This is not expected to impact pedestrians as this is a dead end street and during construction, there is no reason to use this footway as it does not lead anywhere.

Battersea

6.17 The impact on the pedestrian environment around Battersea Station is expected to be minimal. There will be a new signalised junction at the access point to the site which will control pedestrian movements with a green/red man. The pedestrian footway to the north side of Battersea Park Road will be maintained.

7 Summary and Conclusions

- 7.1 This assessment has examined how the construction of the proposed Northern Line Extension would affect traffic flows, local parking arrangements and the effects on the pedestrian environment. The study has focused on arrangements near the proposed temporary and permanent shafts and the new Underground stations near the Battersea and Nine Elms areas
- 7.2 The analysis has used up-to-date traffic surveys to understand existing traffic conditions and the impact of the construction proposals on junction performance has been assessed at the strategic area level (using CLOHAM) and the local level (using TRANSYT).
- 7.3 In summary, the strategic area analysis has indicated that the effect of the NLE will be “Capacity-Neutral”, meanwhile, the junction analysis has shown that although construction traffic will exacerbate any existing congestion problems the increase is not sufficient to justify physical mitigation measures (e.g. junction widening).
- 7.4 An assessment has also been undertaken of the need to temporarily suspend parking bays to enable each site to be accessed by construction vehicles and for the worksite itself. Parking beat survey data has then been used to determine whether there is sufficient space to accommodate the relocated parking demand. The analysis shows that with the parking suspended due to construction activities, there is sufficient space to park on-street on surrounding streets to accommodate the vehicles currently parking in the construction area.
- 7.5 The pedestrian assessment shows that the pedestrian environments in the areas around the proposed worksites are of generally good quality. The area around Battersea is a notable exception with a very poor environment and footways due to the industrial land uses in the area. While the construction of the NLE will cause some disruption to the pedestrian environment, the impacts would be minimal with appropriate mitigation measures.

APPENDIX

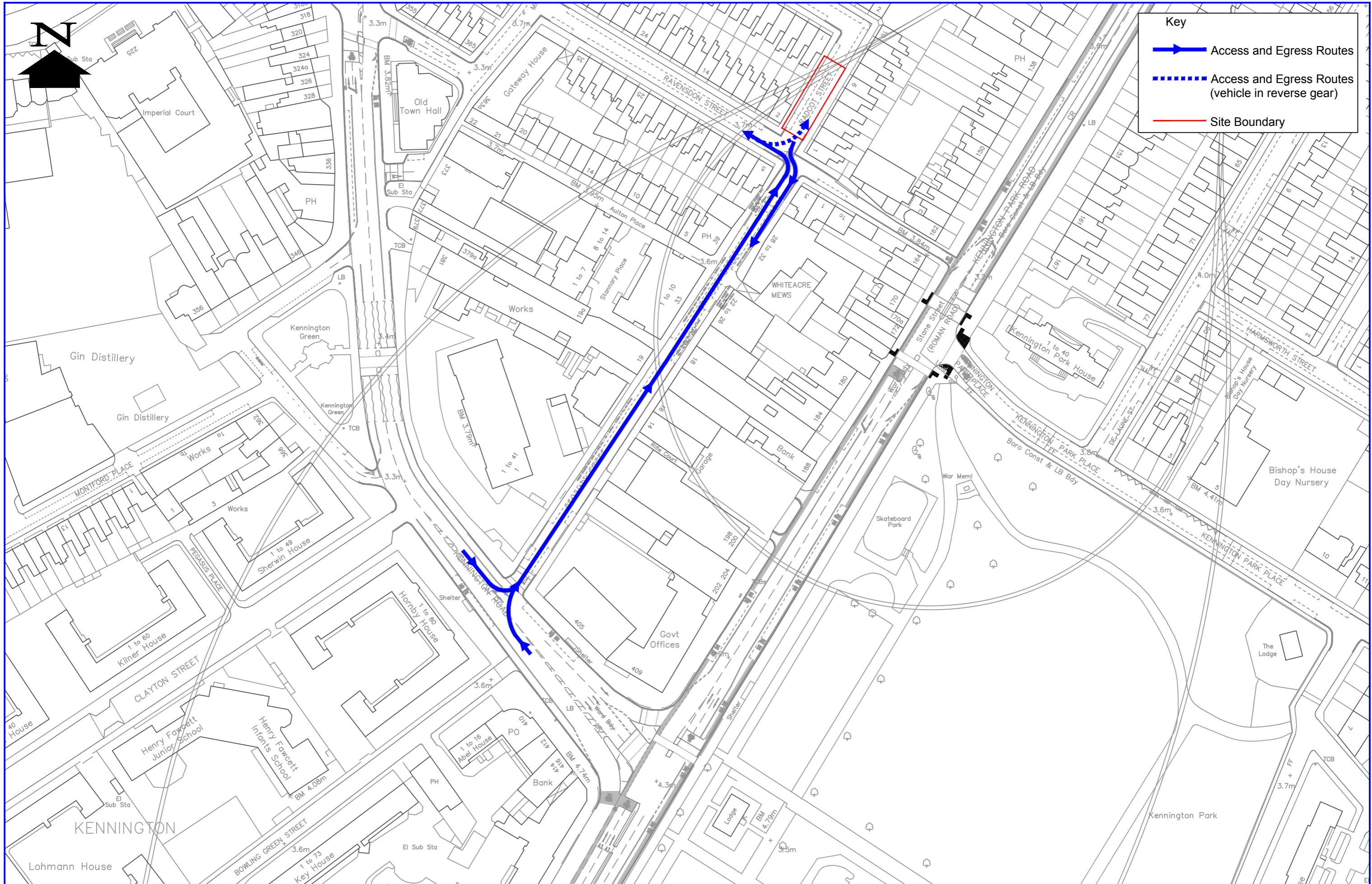
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DETAILED WORKSITE DRAWINGS

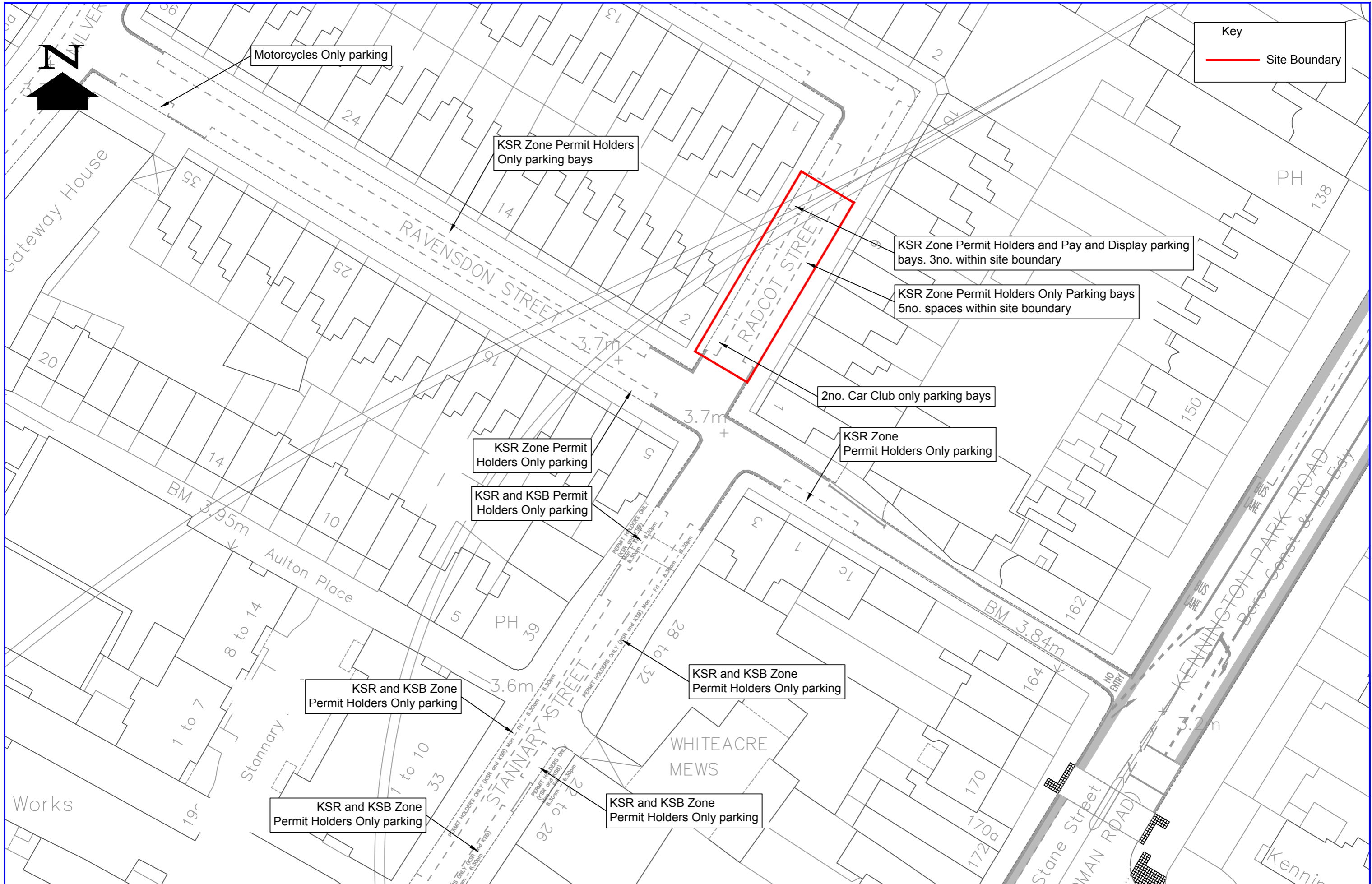
A1 DETAILED WORKSITE DRAWINGS

The following drawings have coded the work sites as follows:

Worksite	Number code
Radcot Street	1
Harmsworth Street	2
Kennington Green	3
Kennington Park	4
Nine Elms	5
Battersea	6



Northern Line Extension
 Radcot Street - Access and Egress Routes

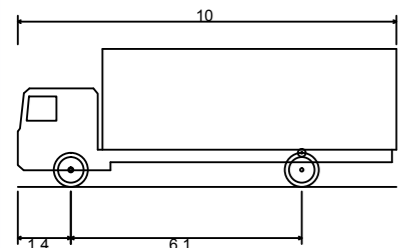
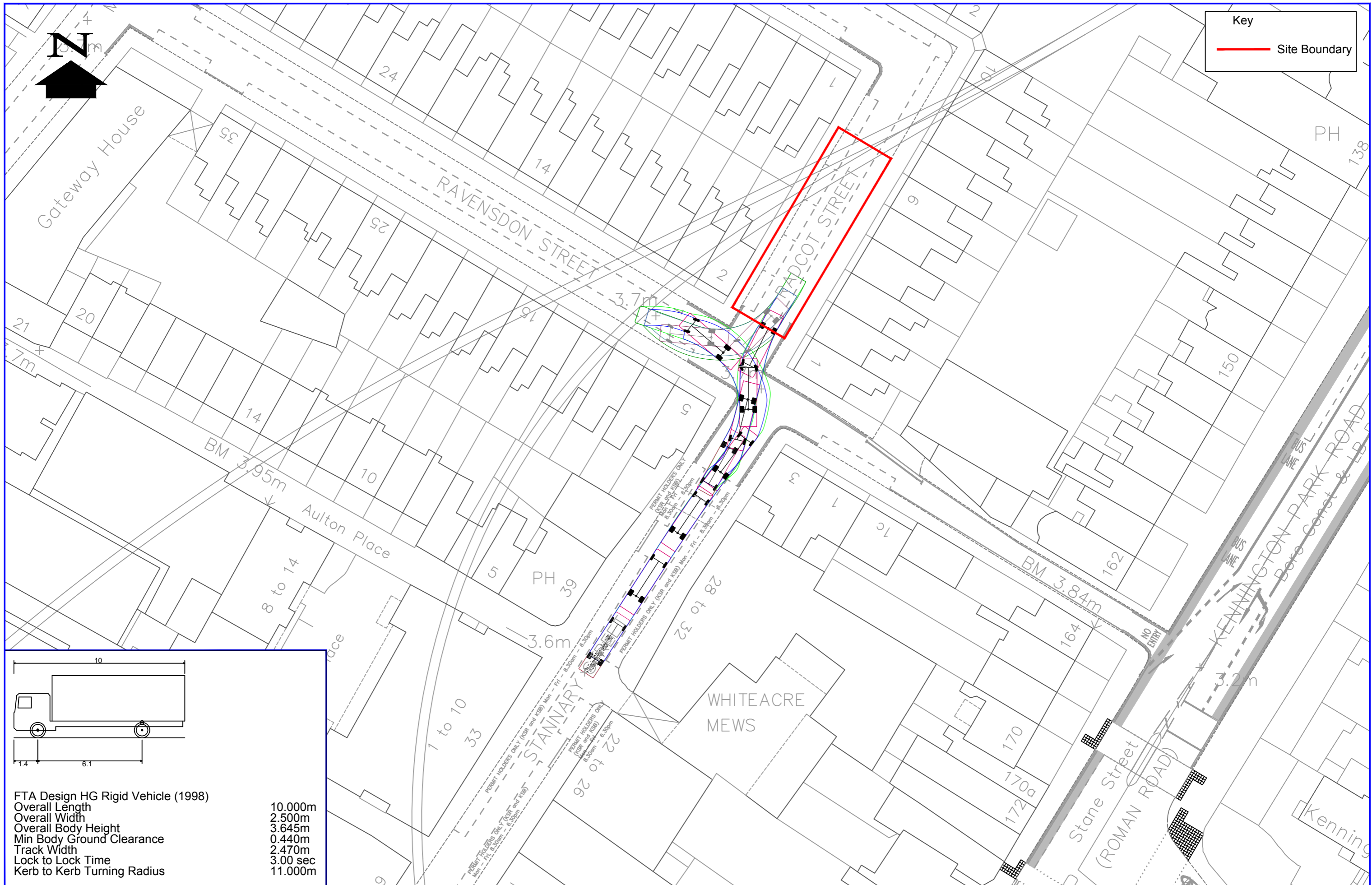


Key
— Site Boundary



Key

— Site Boundary



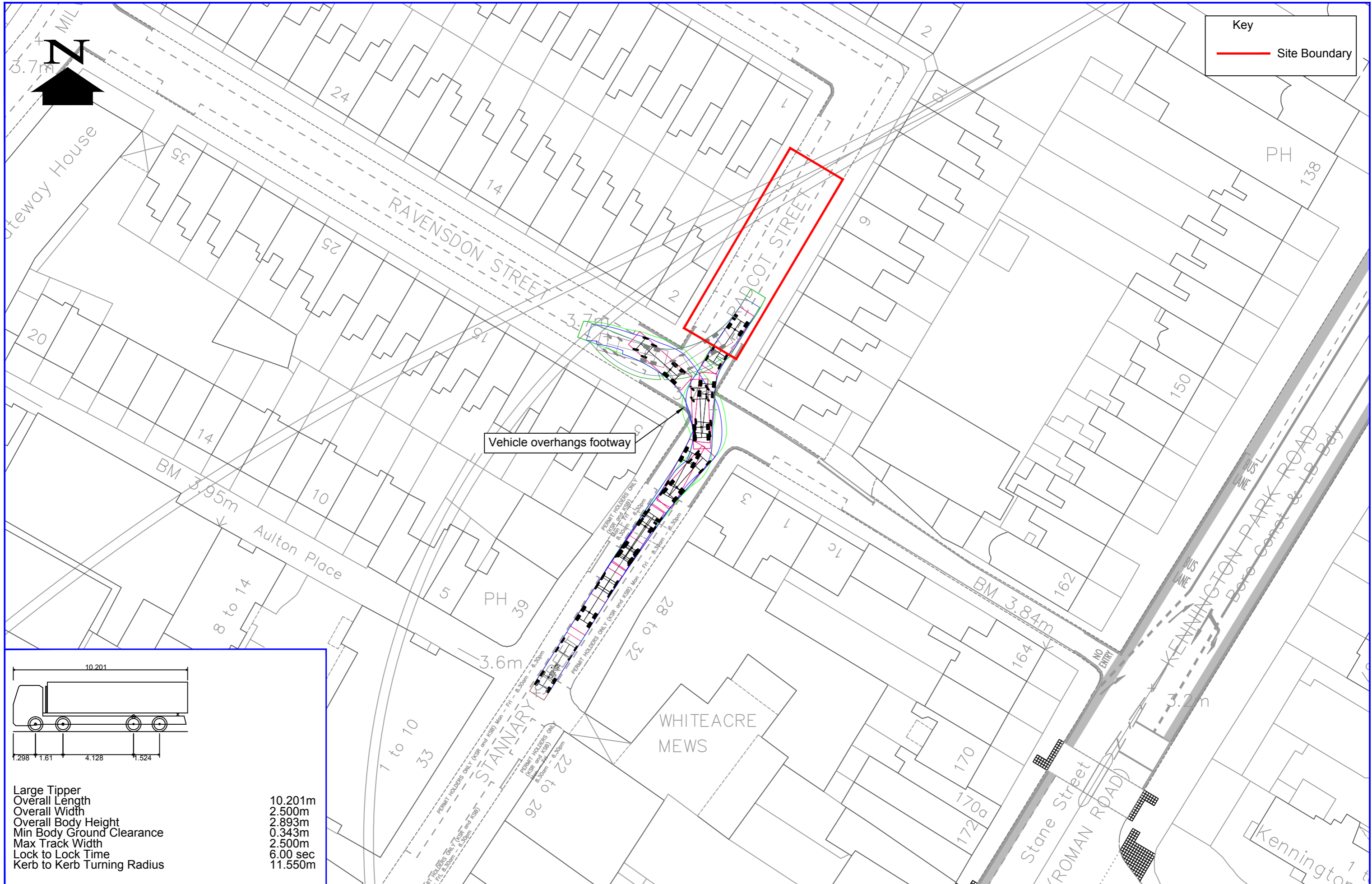
FTA Design HG Rigid Vehicle (1998)	
Overall Length	10.000m
Overall Width	2.500m
Overall Body Height	3.645m
Min Body Ground Clearance	0.440m
Track Width	2.470m
Lock to Lock Time	3.00 sec
Kerb to Kerb Turning Radius	11.000m

Northern Line Extension
Radcot Street - 10m Rigid Track Analysis

steer davis gleave

Drawn: CJP	Date: 09/01/13	Scale: 1:500	Figure No: 1-3
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CAD REFERENCE: F:\Projects\224\6\91\03\CAD\Drawings\22469102-1.2.dwg



Key

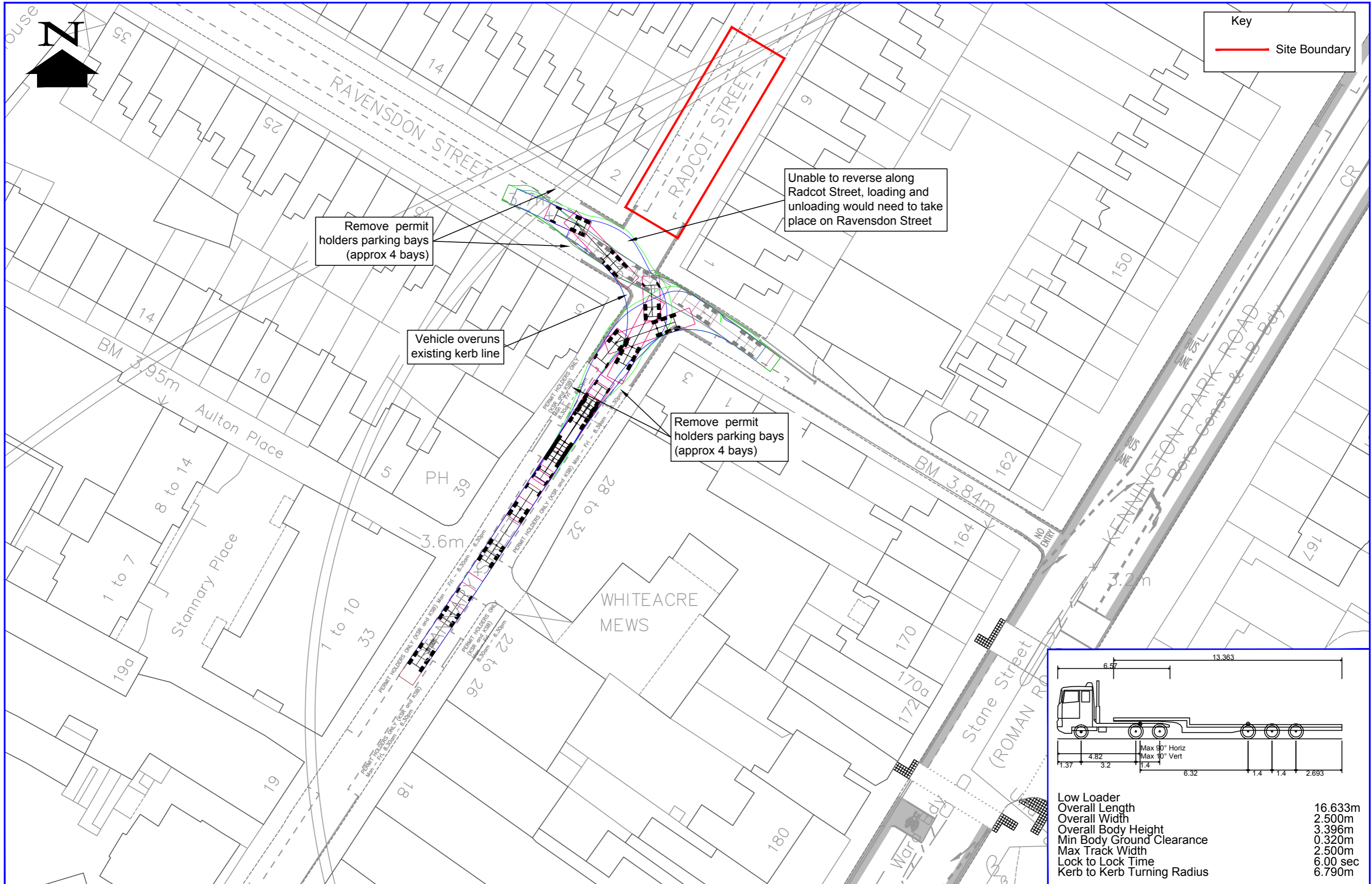
— Site Boundary

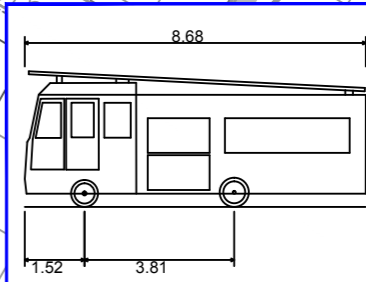
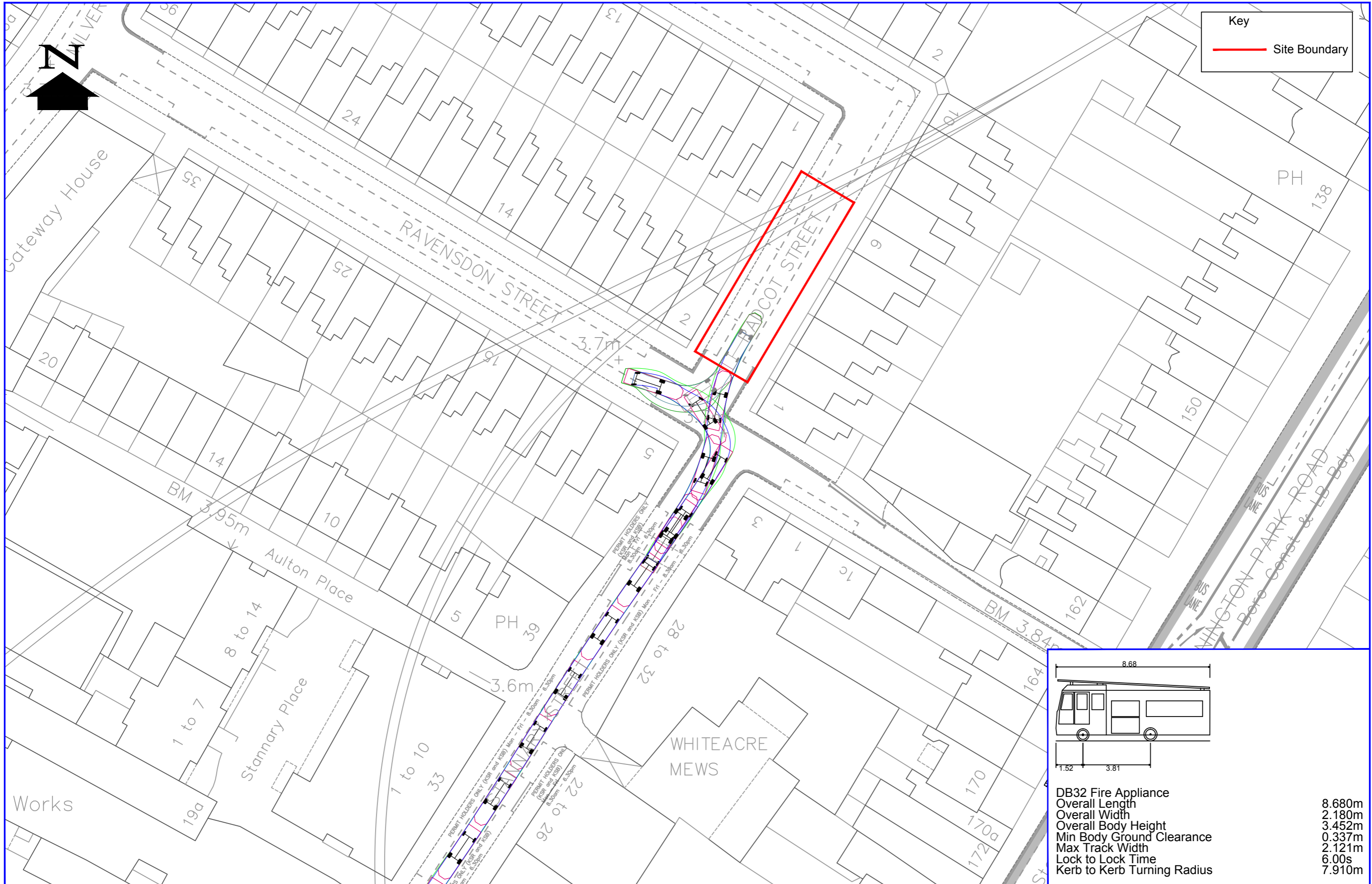
Large Tipper	
Overall Length	10.201m
Overall Width	2.500m
Overall Body Height	2.893m
Min Body Ground Clearance	0.343m
Max Track Width	2.500m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	11.550m

Vehicle overhangs footway

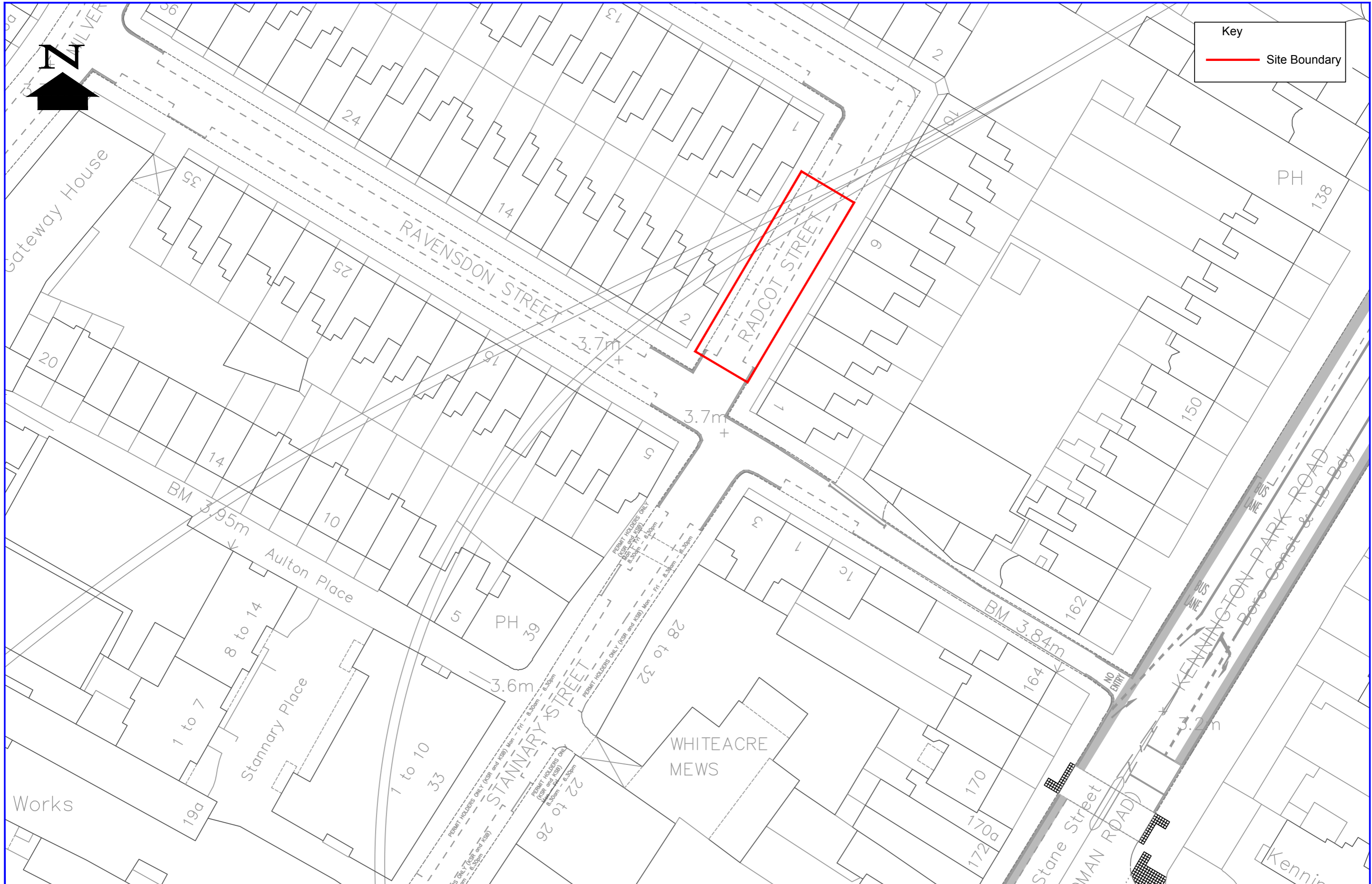
Northern Line Extension
 Radcot Street - Large Tipper Track Analysis

Drawn: CJP	Date: 09/01/13	Scale: 1:500	Figure No: 1-4
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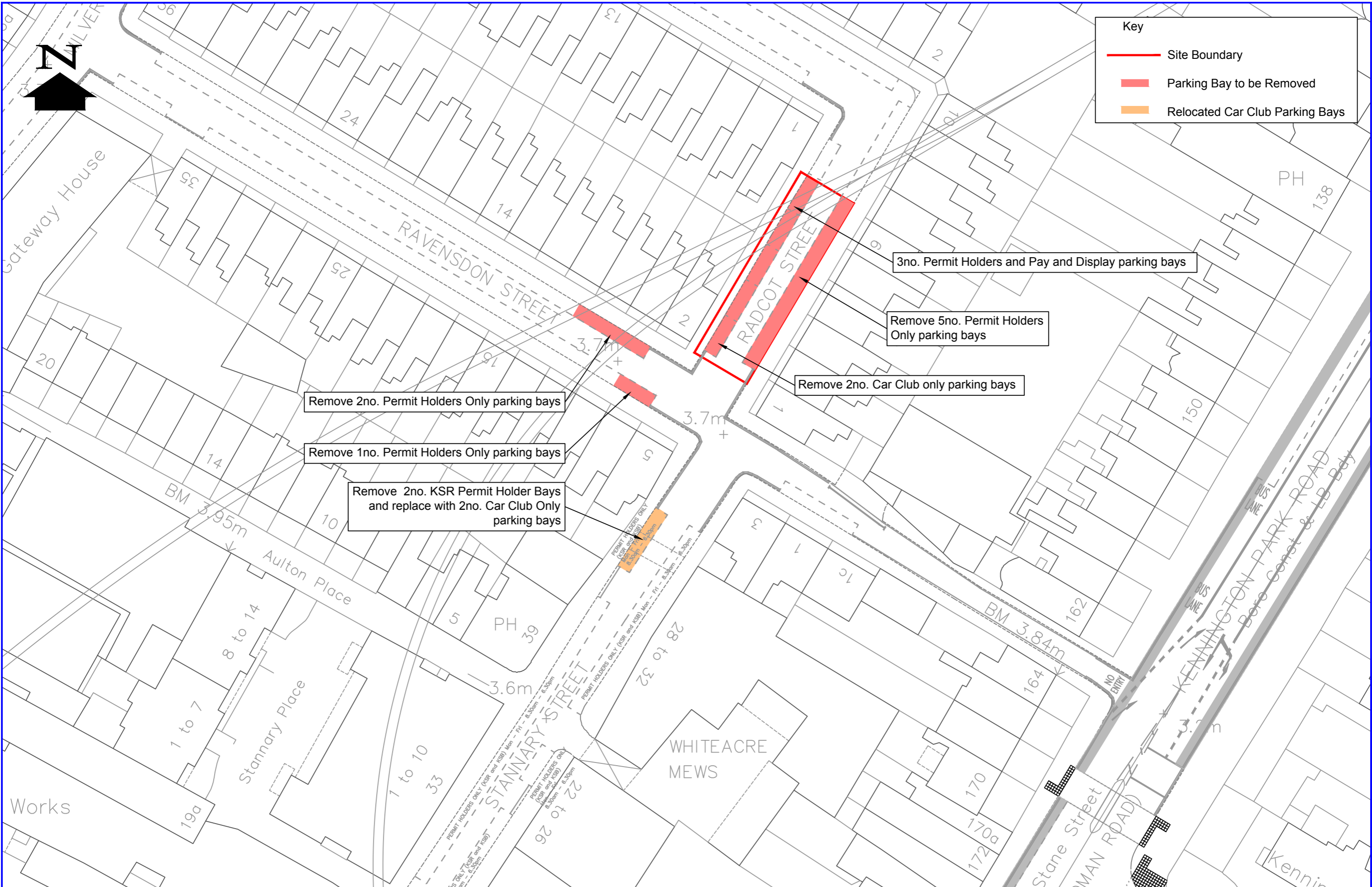
DB32 Fire Appliance	
Overall Length	8.680m
Overall Width	2.180m
Overall Body Height	3.452m
Min Body Ground Clearance	0.337m
Max Track Width	2.121m
Lock to Lock Time	6.00s
Kerb to Kerb Turning Radius	7.910m





Key

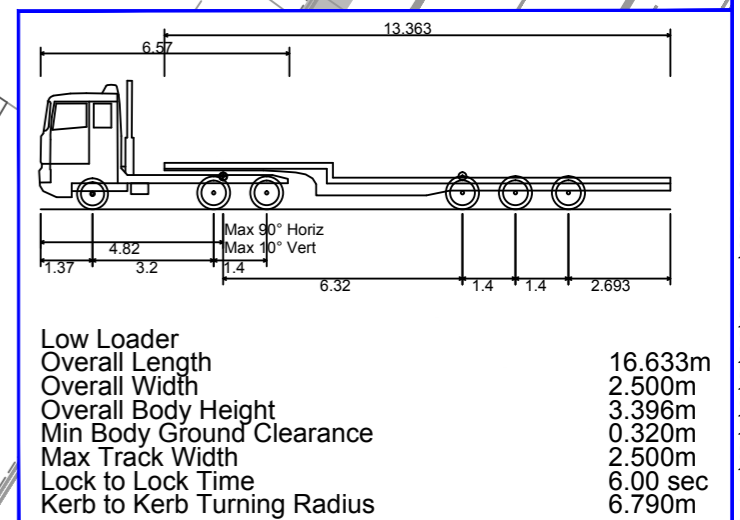
- Site Boundary
- Parking Bay to be Removed
- Relocated Car Club Parking Bays

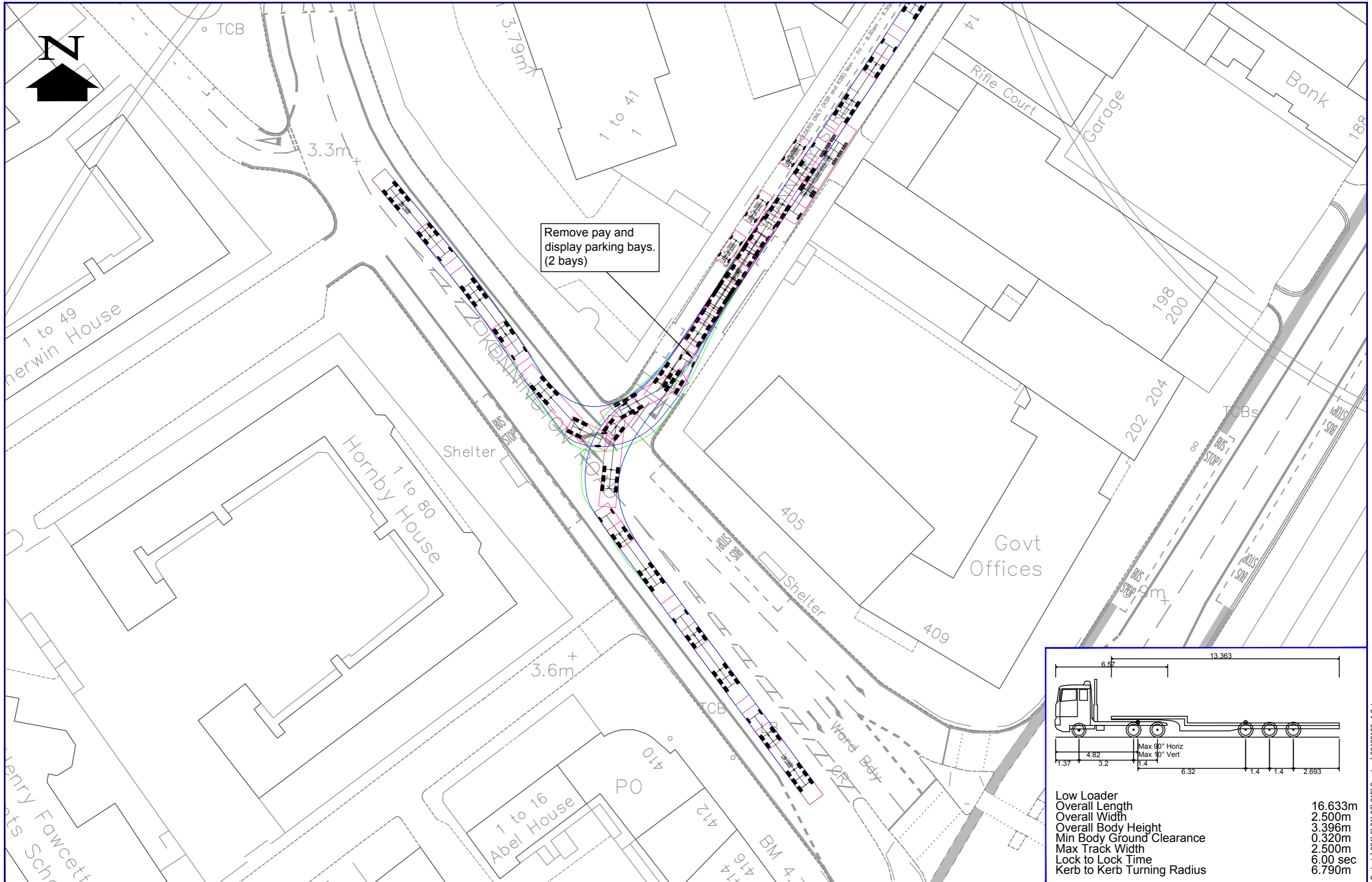




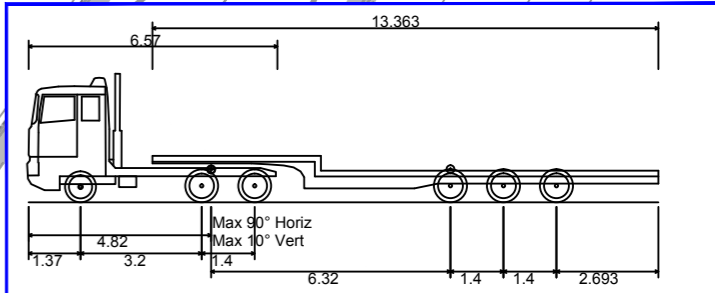
Vehicles cannot pass through when vehicles are unloading at builders merchant. The removal of permit holders and pay and display parking bays will need to be considered during low loader access.

Moran Builders and Pumber Merchants
198/204 Kennington Park Road





Remove pay and display parking bays. (2 bays)



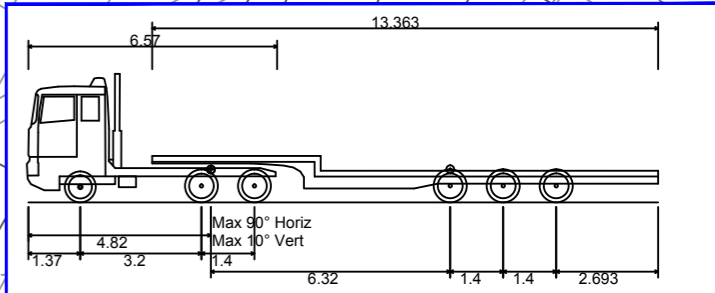
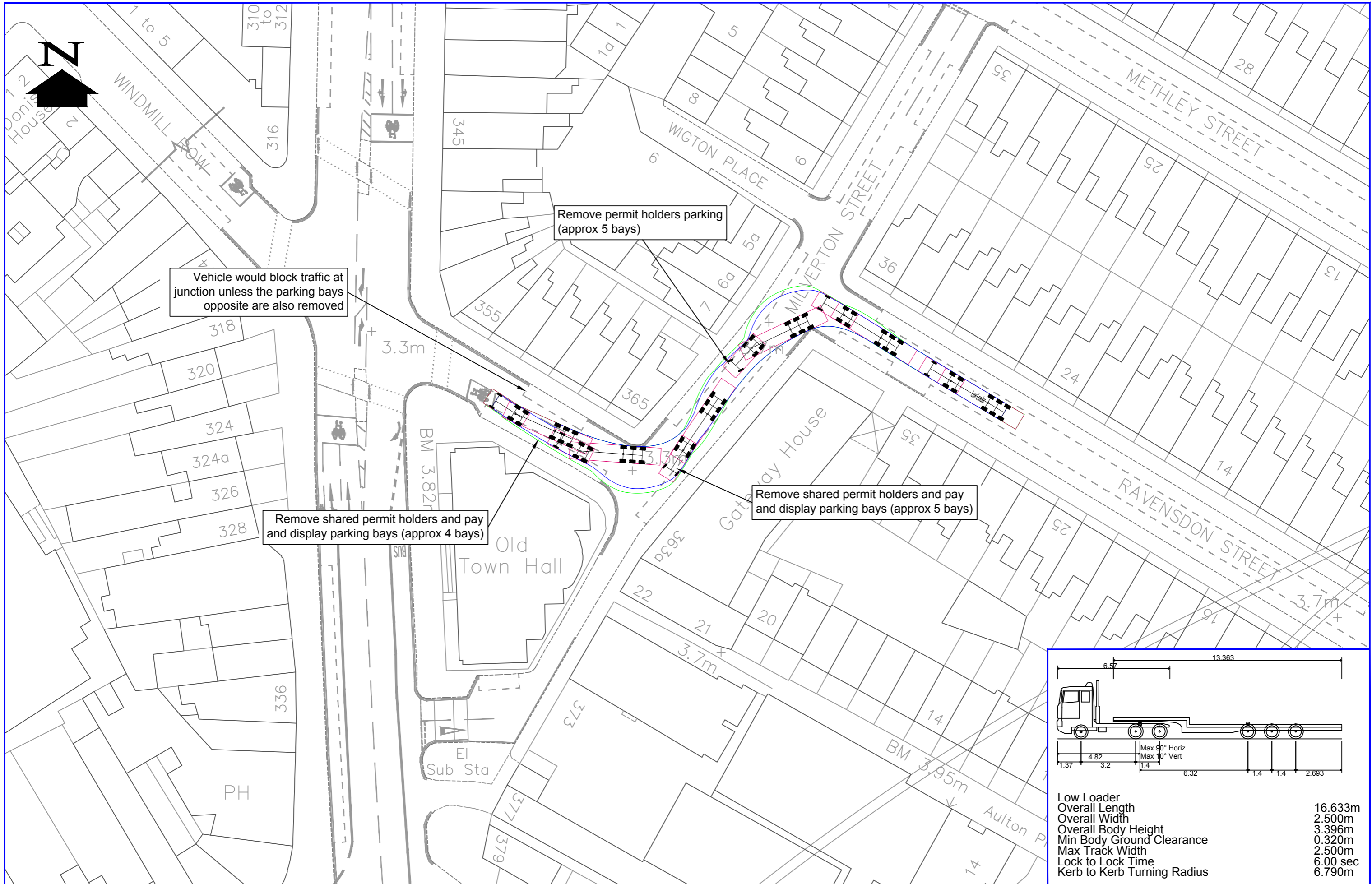
Low Loader	
Overall Length	16.633m
Overall Width	2.500m
Overall Body Height	3.396m
Min Body Ground Clearance	0.320m
Max Track Width	2.500m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	6.790m

Northern Line Extension

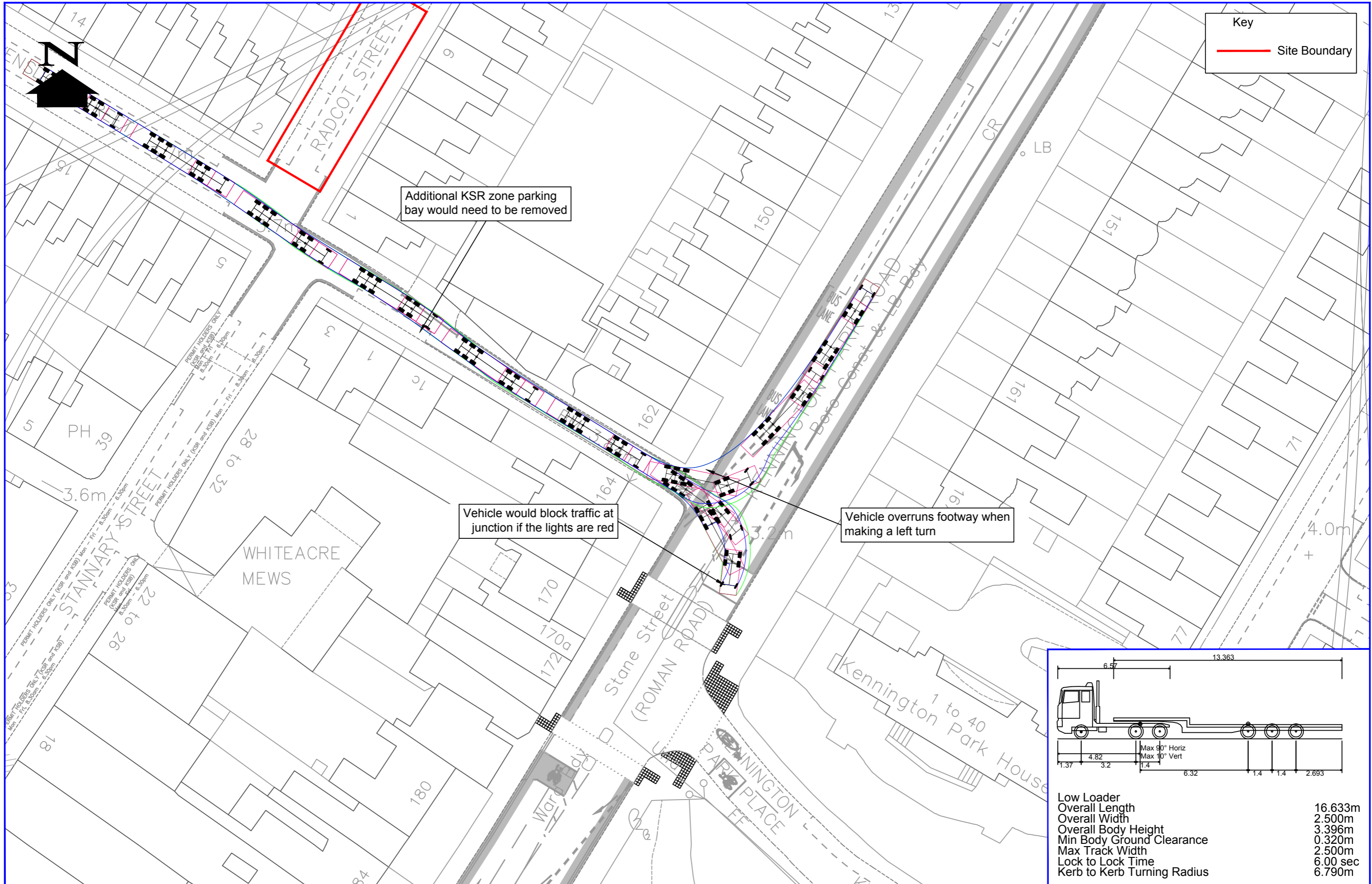
Radcot Street - Entrance / Exit via Stannary Street - Low Loader Track Analysis



Drawn: CJP	Date: 26/07/12	Scale: 1:500	Figure No: 1-10
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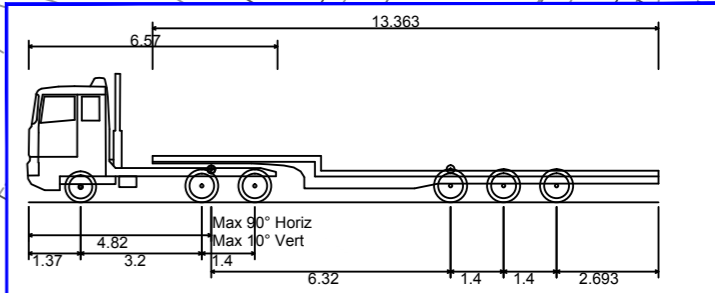
Low Loader	
Overall Length	16.633m
Overall Width	2.500m
Overall Body Height	3.396m
Min Body Ground Clearance	0.320m
Max Track Width	2.500m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	6.790m



Additional KSR zone parking bay would need to be removed

Vehicle would block traffic at junction if the lights are red

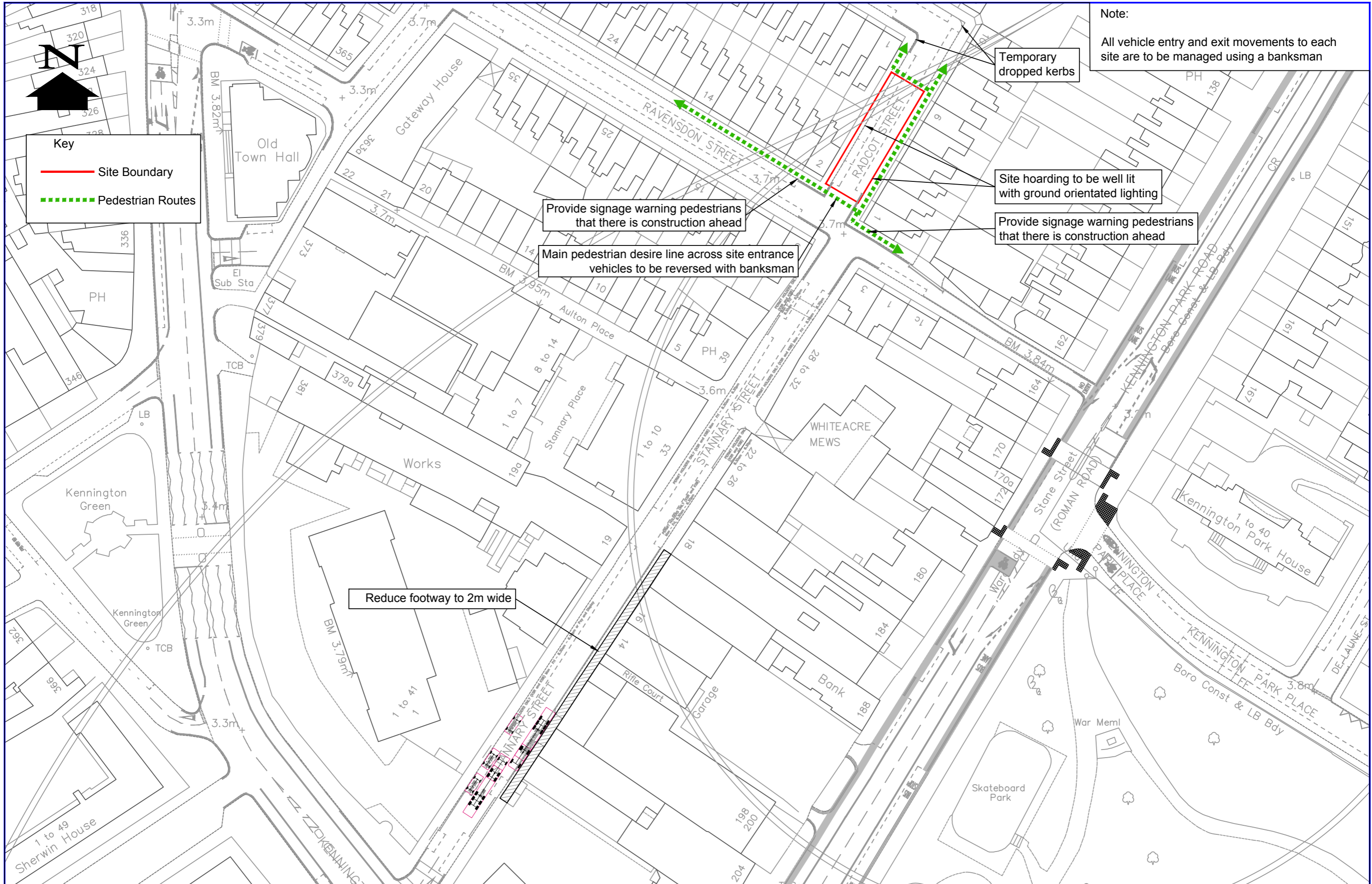
Vehicle overruns footway when making a left turn



Low Loader	
Overall Length	16.633m
Overall Width	2.500m
Overall Body Height	3.396m
Min Body Ground Clearance	0.320m
Max Track Width	2.500m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	6.790m

Northern Line Extension

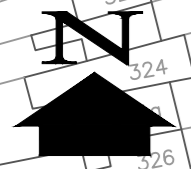
Radcot Street - Alternative Exit to the South - Low Loader Track Analysis

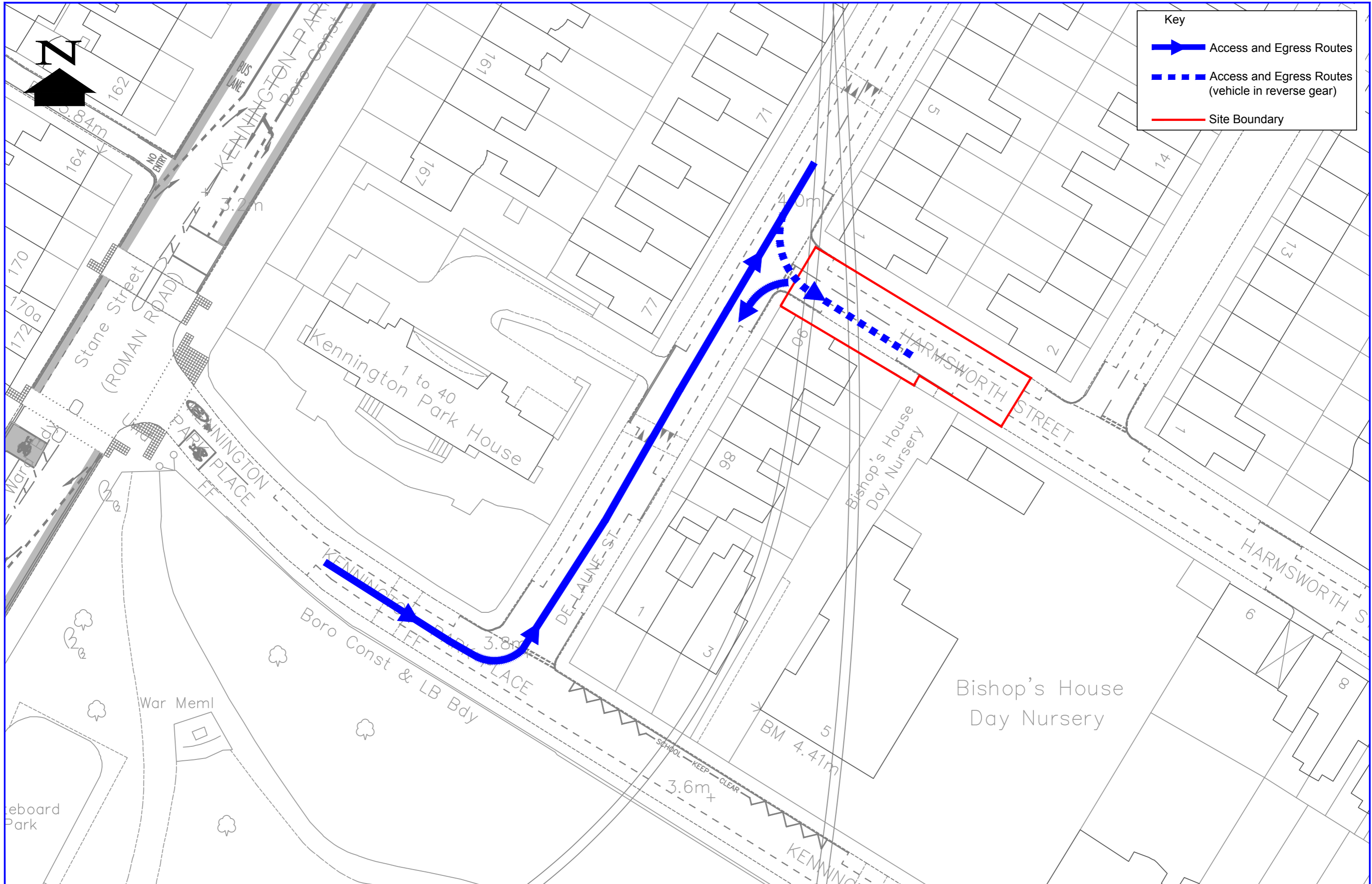


Note:
All vehicle entry and exit movements to each site are to be managed using a banksman

Key

- Site Boundary
- - - Pedestrian Routes



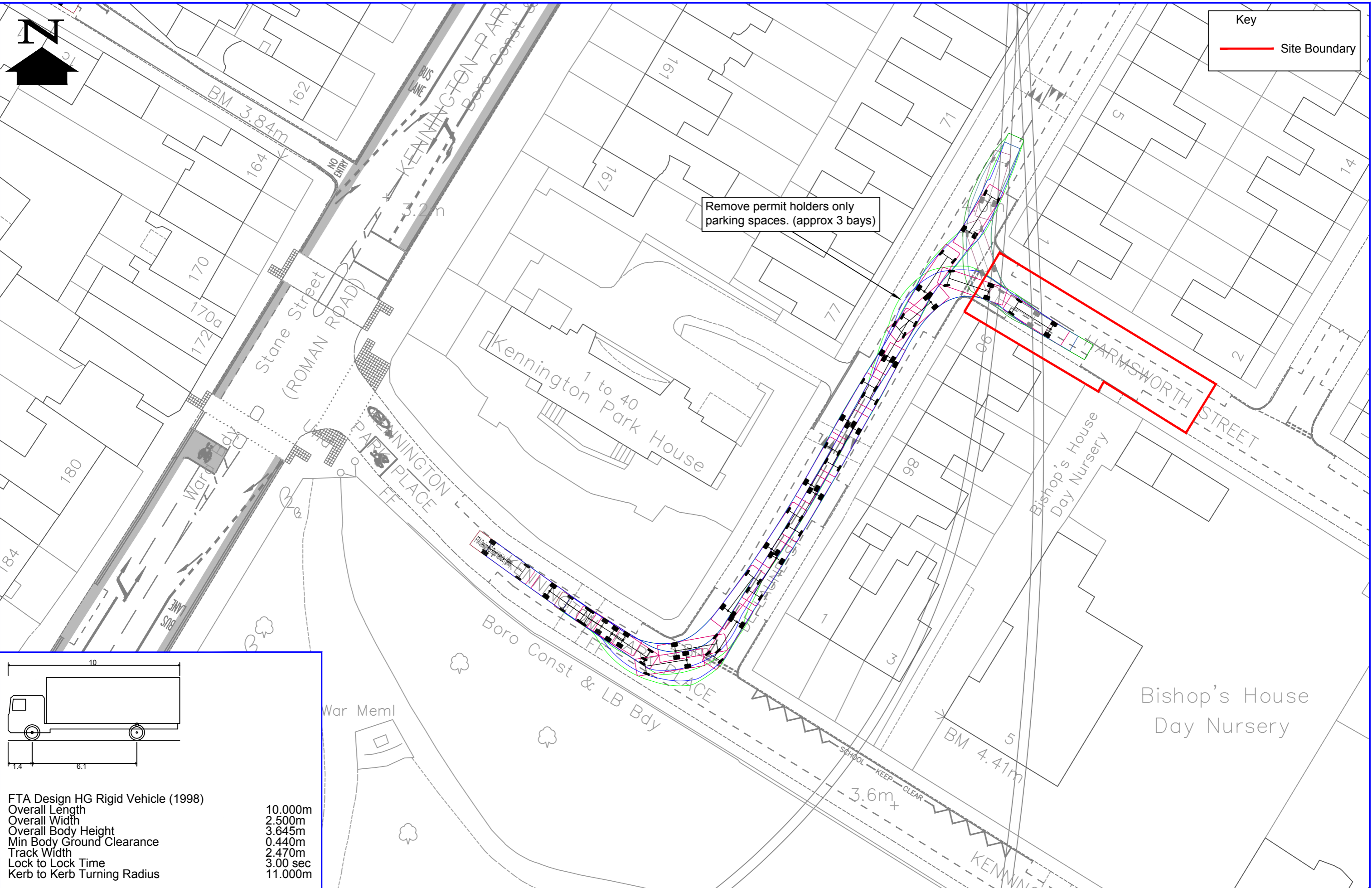


Northern Line Extension
 Harmsworth Street - Access and Egress Routes

steer davis gleave

Drawn: CJP	Date: 09/01/13	Scale: 1:500	Figure No: 2-1
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CAD REFERENCE: F:\Projects\224\6\91\03\CAD\Drawings\22469102-2.2.dwg



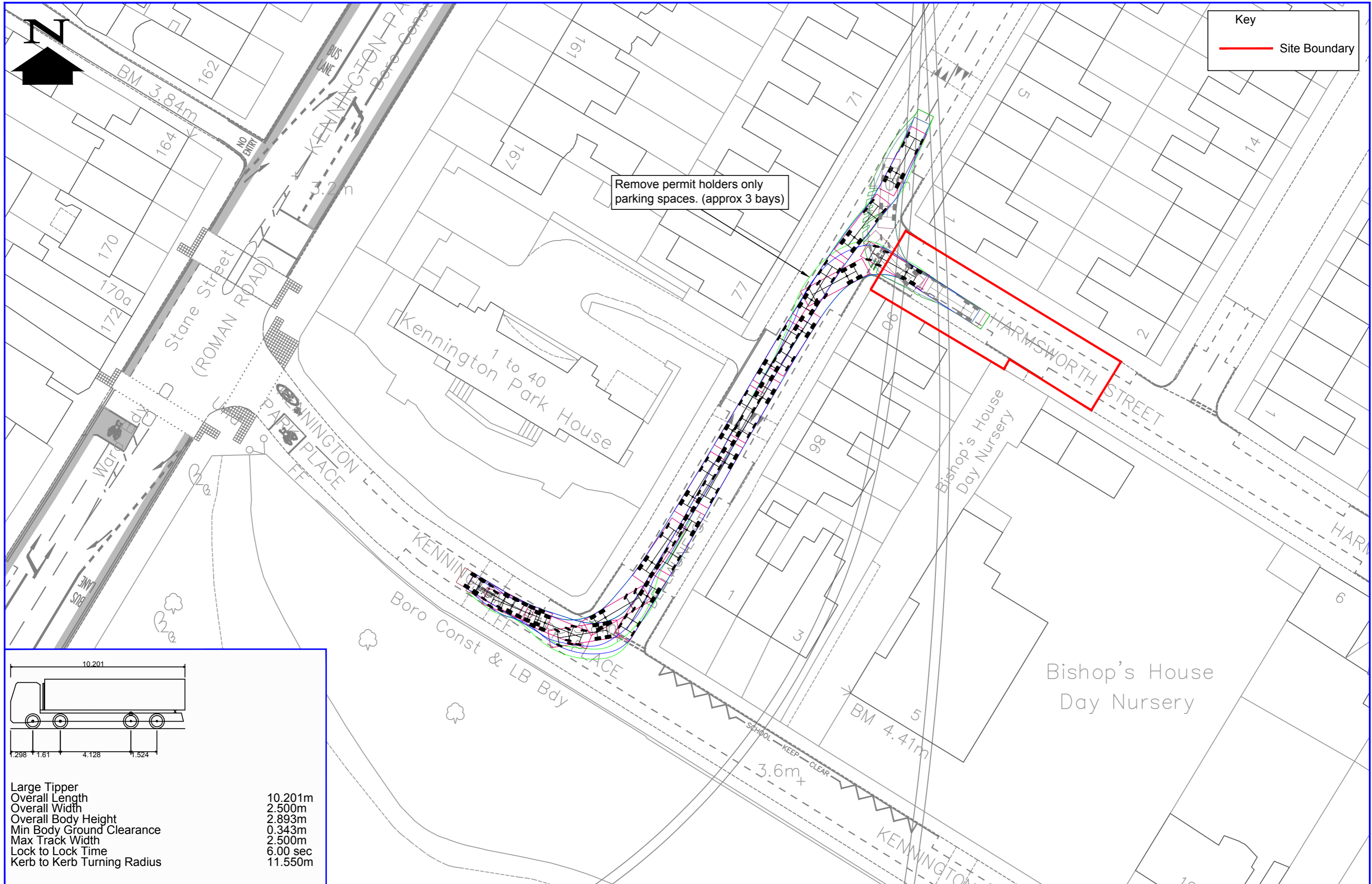
Remove permit holders only parking spaces. (approx 3 bays)

Key
— Site Boundary

FTA Design HG Rigid Vehicle (1998)

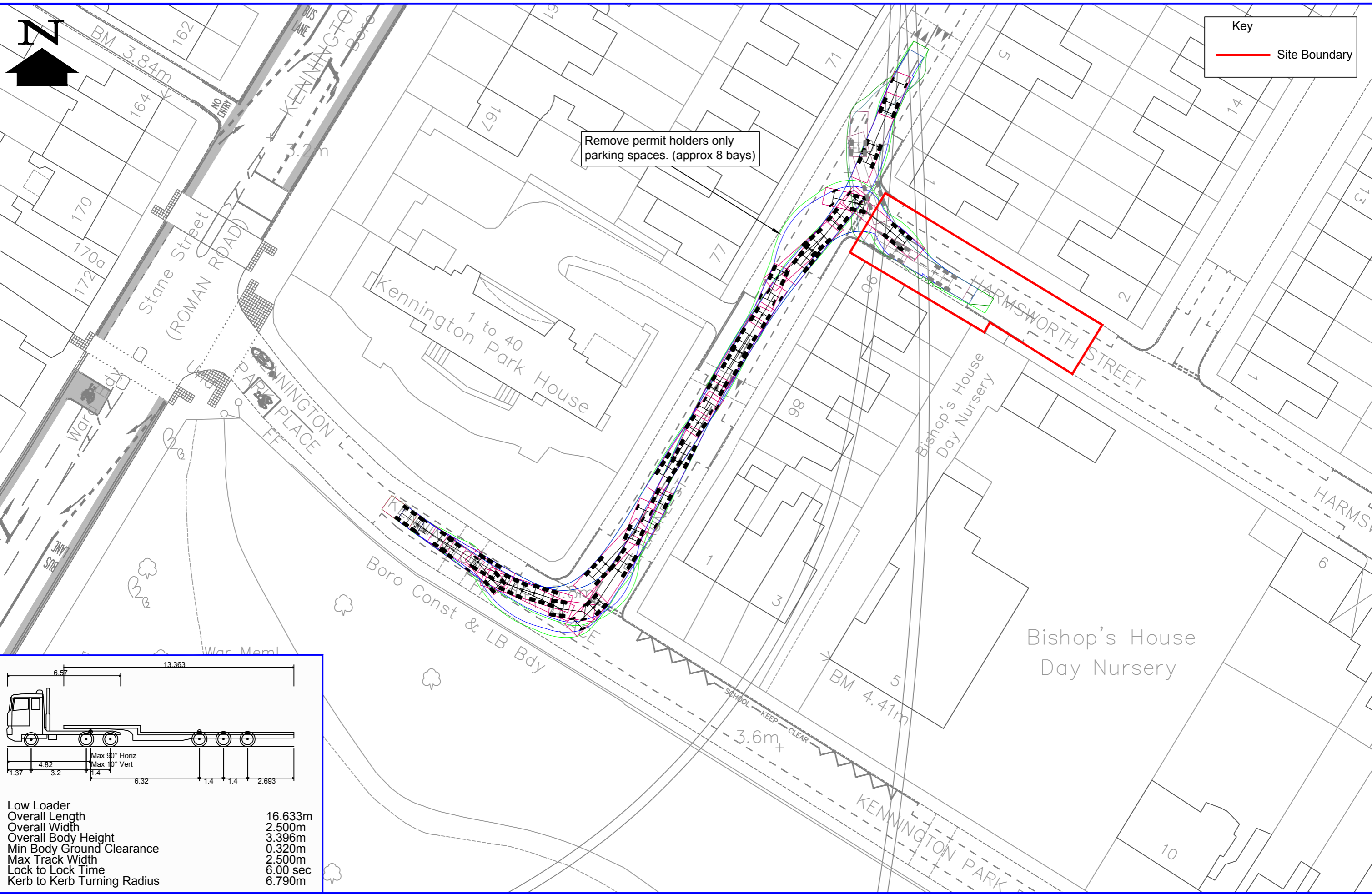
Overall Length	10.000m
Overall Width	2.500m
Overall Body Height	3.645m
Min Body Ground Clearance	0.440m
Track Width	2.470m
Lock to Lock Time	3.00 sec
Kerb to Kerb Turning Radius	11.000m

Northern Line Extension
 Harmsworth Street - 10m Rigid - Track Analysis



Large Tipper	
Overall Length	10.201m
Overall Width	2.500m
Overall Body Height	2.893m
Min Body Ground Clearance	0.343m
Max Track Width	2.500m
Lock to Lock Time	6.00 sec
Kerb to Kerb Turning Radius	11.550m

Northern Line Extension
Harmsworth Street - Large Tipper - Track Analysis

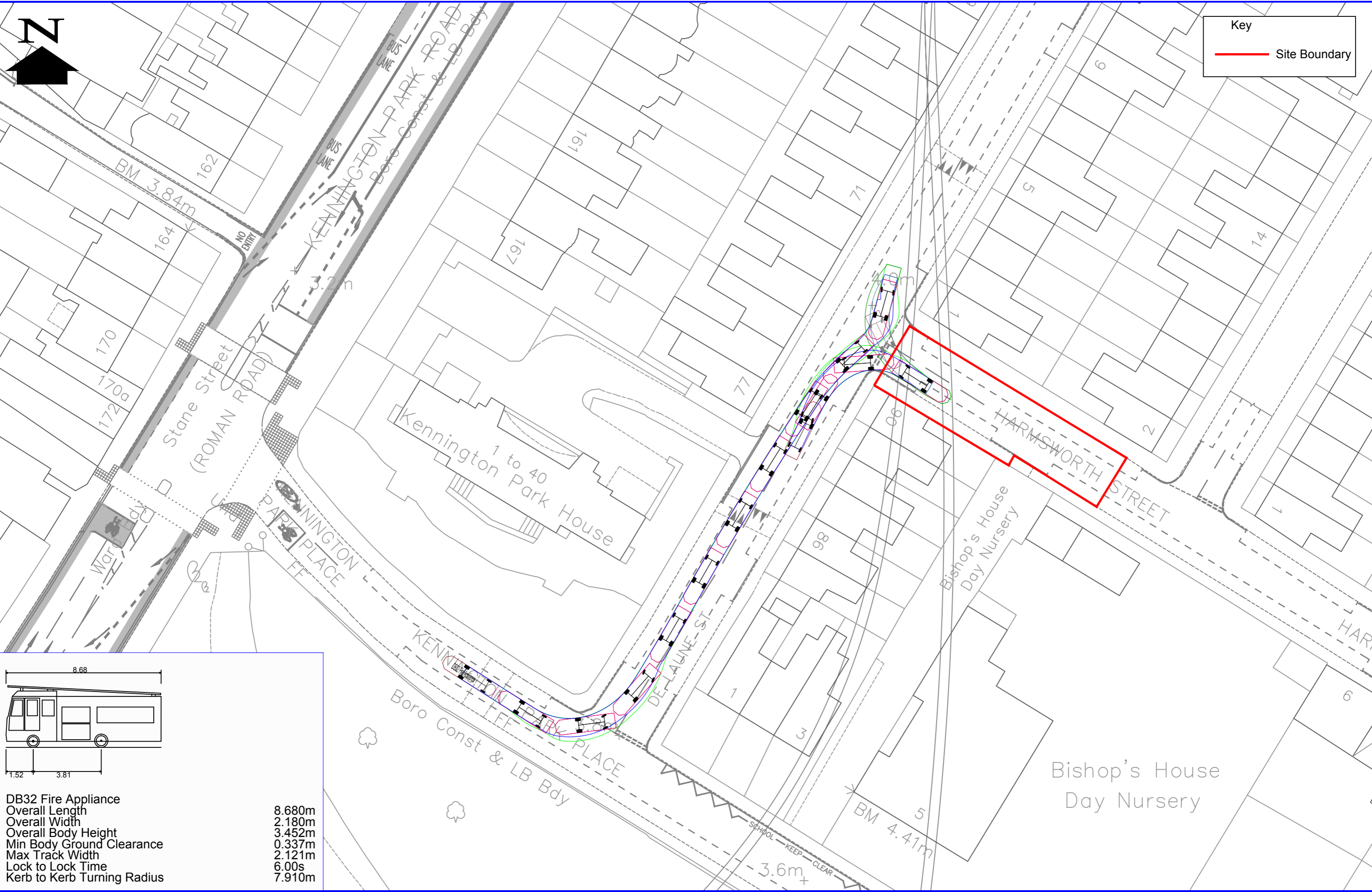


Northern Line Extension
Harmsworth Street - Low Loader - Track Analysis

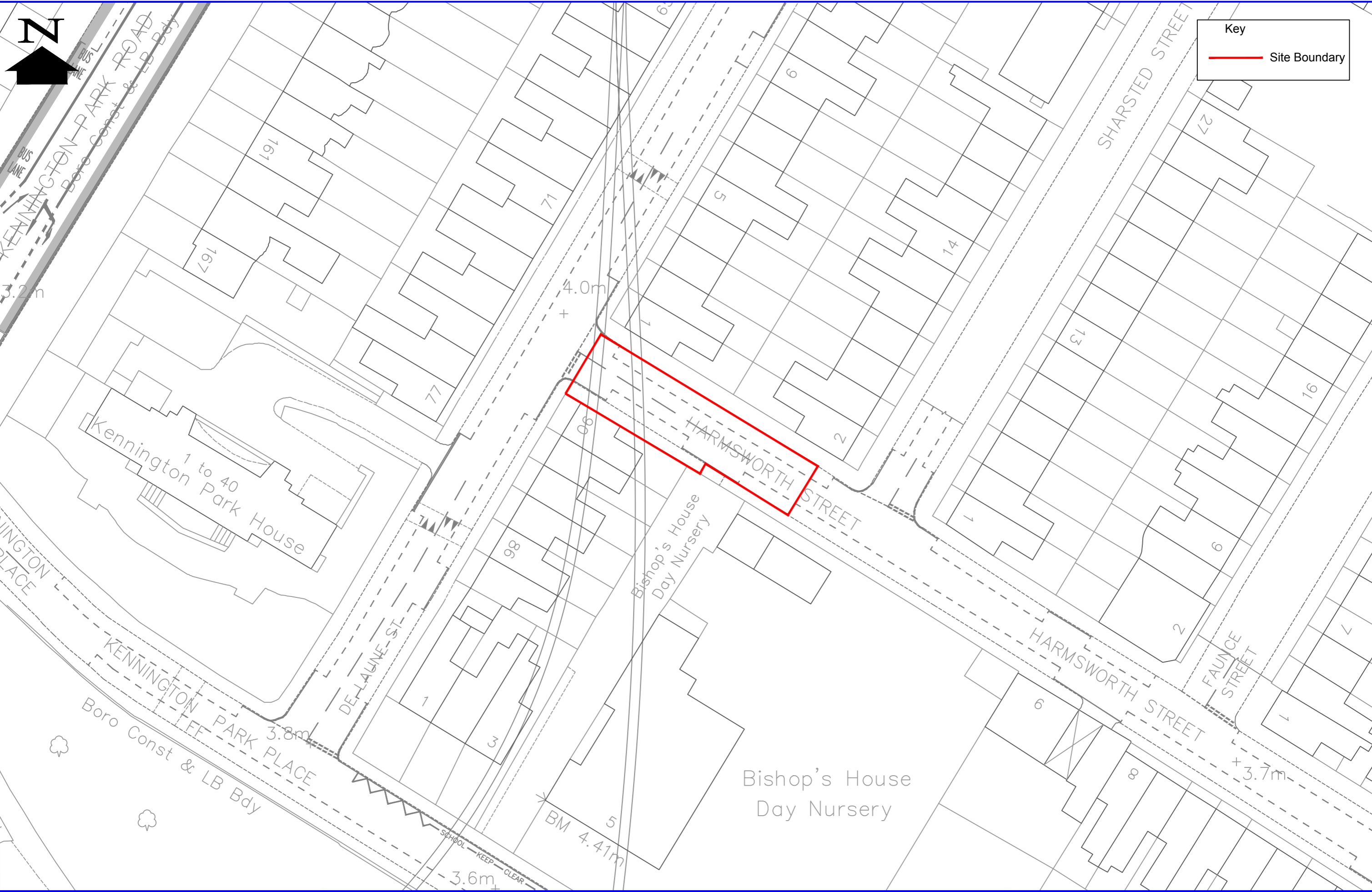
steer davis gleave

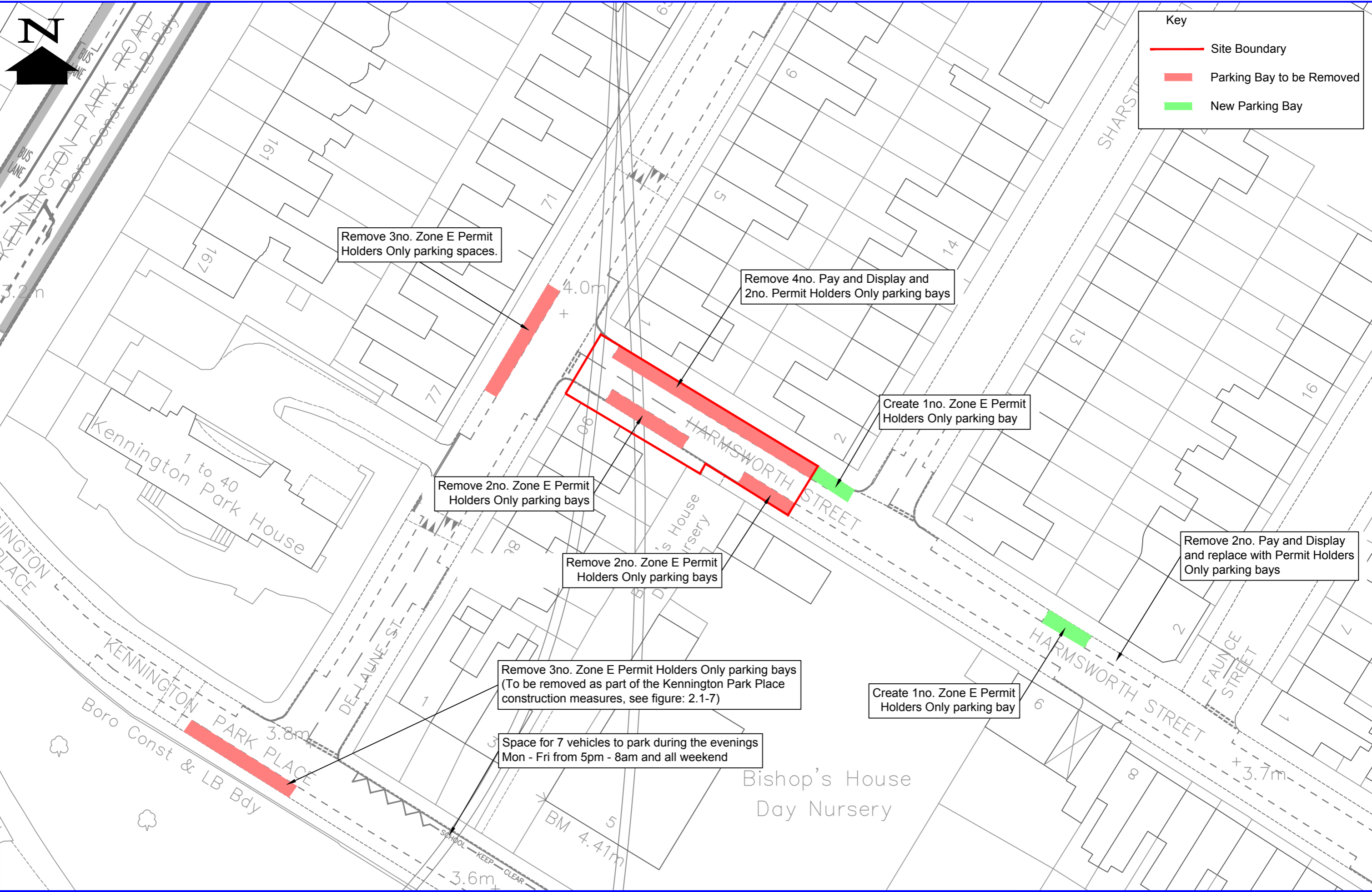
Drawn: CJP	Date: 09/01/13	Scale: 1:500	Figure No: 2-5
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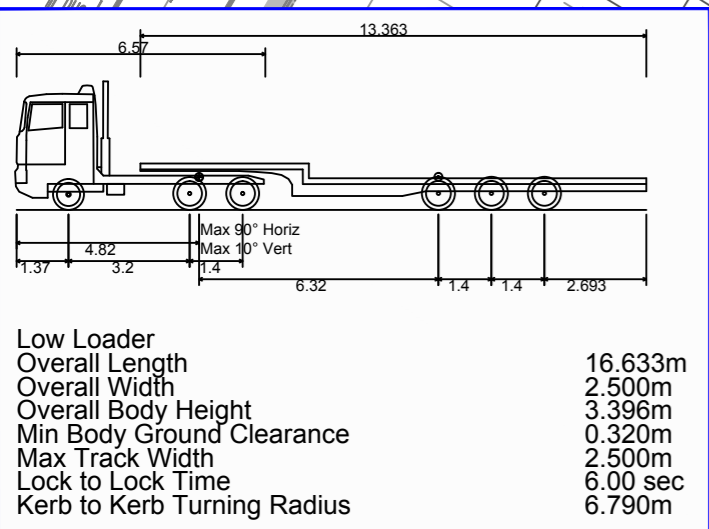
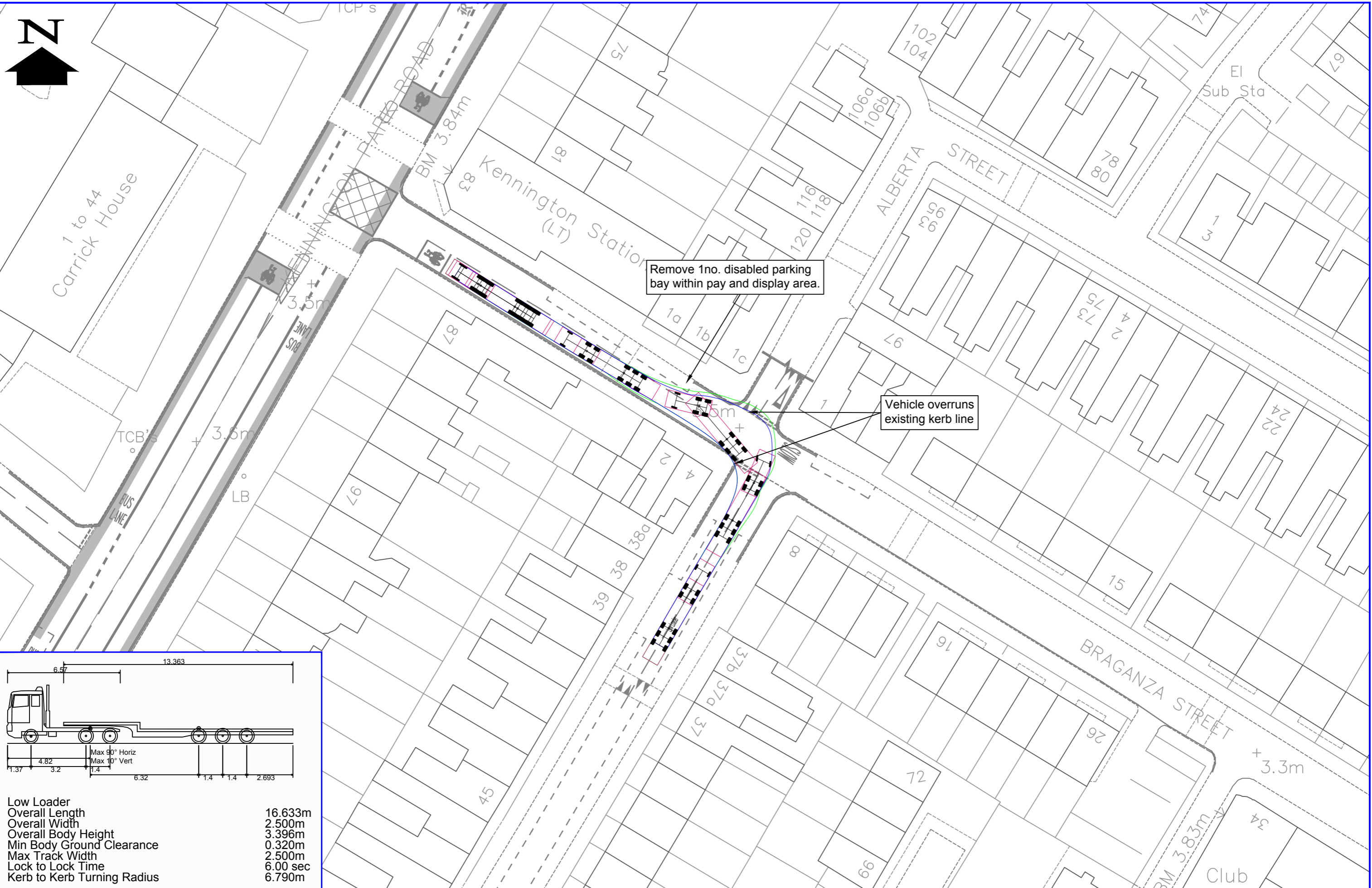
CAD REFERENCE: F:\Projects\224\6\91\03\CAD\Drawings\22469102-2.2.dwg



Northern Line Extension
 Harmsworth Street - Emergency Vehicle Track Analysis







Northern Line Extension

Harmsworth Street - Alternative Exit Route to the North - Low Loader Track Analysis



Drawn: CJP	Date: 09/01/13	Scale: 1:500	Figure No: 2-9
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