Quintain Ltd

WEMBLEY WESTERN CORRIDOR STUDY

Final Report

005
MAY 2018

CONFIDENTIAL

Quintain Ltd

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Final Report

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CONTENTS

APPENDICES

EXECUTIVE SUMMARY

The Western Corridor Study (WCS) was secured in the s106 agreement dated 23 December 2016 attached to London Borough of Brent (LBB) planning permission 15/5550. The s106 defines the WCS as: "a transport study of the vehicle corridor from Forty Lane south to Harrow Road Triangle which study will establish the works required to meet the Owner's Western Corridor Study Objectives and the Council's Western Corridor Study Objectives."

The Owner's WCS Objectives are: (a) linking the WCS Junctions to optimise traffic light co-ordination; (b) improving traffic capacity; and (c) lengthening the northbound carriageway.

The Council's WCS Objectives are: (a) reconnecting North End Road to Bridge Road; (b) improving the junction of Brook Avenue/Bridge Road; (c) widening the road bridge over the Chiltern Railway line between the Harrow Road Triangle and South Way; and (d) improving the York House gyratory.

The corridor scheme designs were based on either the Owner's highway works schemes or Council's highway works schemes. Where scheme drawings were available, the highway works are based on that information as far as reasonably practicable. Where scheme drawings were not available, new scheme drawings have been developed to reflect the works described in the s106 obligation or Council's WCS Objectives. Following initial design and model runs further options were tested and refined to achieve the best overall solution. The design development followed a process of engagement and evolution with Quintain and LBB.

A traffic micro-simulation model was developed to assist in the design and optimisation of the WCS schemes. The base year WCS model was developed using traffic surveys conducted in July 2016 for a typical weekday AM and PM peak hour. The base model was calibrated and validated against observed traffic flows and journey times using TfL's Modelling Guidelines and Model Auditing Process (MAP). A forecast year model (2031) was projected from this base model which takes forecast traffic demand in the form of committed development, plus background traffic growth as forecast by TfL in the West London Highway Assignment Model (WeLHAM).

Traffic modelling results shows that bus and general traffic journey times through the corridor in 2031 are forecast to be largely maintained at similar levels as today (2016 base year). The largest increases in journey time are limited to around one minute, and many other routes shows journey time improvements.

Traffic growth associated with Wembley Park results in localised increases in peak hour traffic on east-west routes by 2031. However, this level of demand is unlikely to eventuate due to the lower level of car parking than originally proposed and less traffic intensive land uses being brought forward than was considered in outline planning applications. Therefore the results represent a conservative upper end forecast.

The WCS has developed and tested a coordinated package of highway and traffic signalling improvements for the study corridor which meet the WCS objectives. It sets the blueprint for the corridor and demonstrates that, combined, the interventions will deliver improvements along the corridor. However the interventions will need to come forward in a phased manner as they are individually subject to separate planning and funding constraints. In addition, schemes will be subject to further consultation, technical approval and detailed design.

1 INTRODUCTION

1.1 REPORT PURPOSE

1.1.1. The Western Corridor Study (WCS) was secured in the s106 agreement dated 23 December 2016 attached to London Borough of Brent (LBB) planning permission 15/5550. The methodology for the WCS was set out in 'Traffic Modelling Scoping Report, WSP, May 2017' and the model calibration process was set out in 'Local Model Validation Report, WSP, January 2018'. This report is the final output from the WCS.

1.2 WESTERN CORRIDOR STUDY

THE STUDY

1.2.1. Section seven of the sixth schedule of the S106 secures the WCS as follows:

> *"Unless otherwise agreed, the Owner must undertake, submit to and obtain approval of the Western Corridor Study from the Council within 12 months of a Material Start on the Development."*
>
> *"The Owner must implement the Owner's Western Corridor Study Works in accordance with the approved Western Corridor Study and the agreed timescales contained therein (or such other amended works and/or timescales as may be agreed with the Council."*

1.2.2. The S106 defines the WCS as:

> *"a transport study of the vehicle corridor from Forty Lane south to Harrow Road Triangle which study will establish the works required to meet the Owner's Western Corridor Study Objectives and the Council's Western Corridor Study Objectives."*

WCS OBJECTIVES

1.2.3. The S106 defines the Owner's WCS Objectives as:

> *"(a) linking the WCS Junctions to optimise traffic light co-ordination;*
>
> *(b) improving traffic capacity;*
>
> *(c) lengthening the northbound carriageway."*

1.2.4. The S106 defines the Council's WCS Objectives as:

> *"(a) reconnecting North End Road to Bridge Road;*
>
> *(b) improving the junction of Brook Avenue/Bridge Road;*
>
> *(c) widening the road bridge over the Chiltern Railway line between the Harrow Road Triangle and South Way; and*
>
> *(d) improving the York House gyratory."*

WCS JUNCTIONS

1.2.5. The WCS Junctions are defined as:

> *"(a) Forty Lane/ Bridge Road;*
>
> *(b) Empire Way I Wembley Park Drive;*
>
> *(c) Fulton Road I Empire Way;*
>
> *(d) Engineers Way / Empire Way;*
>
> *(e) Lakeside Way I Empire Way;*
>
> *(f) Royal Route / Empire Way;*
>
> *(g) South Way I Wembley Hill Road;*
>
> *(h) Harrow Road / Wembley Hill Road / Wembley High Road (also known as Harrow Road Triangle)."*

1.2.6. **Figure 1** shows the locations of the WCS Junctions (in red) and the locations set out in the Councils WCS Objectives (in blue).

Figure 1 – Corridor Study Key Locations

WCS WORKS

1.2.7. The S106 defines the Owner's WCS Works as:

> *"those works established in an approved Western Corridor Study as being necessary to meet the Owners Western Corridor Study Objectives but excluding any works that it is agreed between the Council and the Owner are required to be delivered under agreements made pursuant to Section 106 of the 1990 Act and/or Section 106A of the 1990 Act for other developments in the vicinity of the Development or Developments."*

1.2.8. The S106 defines the Council's WCS Works as:

> *"those works established in an approved Western Corridor Study as necessary to meet the Council's Western Corridor Objectives."*

1.3 REPORT STRUCTURE

1.3.1. This report is composed of the following sections:

- **Chapter 1: Introduction** – sets out the context and objectives of the study.
- **Chapter 2: Owner's Highway Works** – describes the highway works which are defined as the responsibility of Quintain ('the owner') within the S106 agreement.
- **Chapter 3: Council's Highway Works** – describes the highway works which are defined as the responsibility of LB Brent ('the Council') within the S106 agreement.
- **Chapter 4: Corridor Scheme Design Development** – describes the development of the coordinated highway design through the study corridor, and presents the proposed highway design.
- **Chapter 5: Forecast Traffic Demand and Committed Developments** – sets out the assumptions and calculations used to determine the future year traffic demand for the corridor study.
- **Chapter 6: Traffic Modelling** – summarises the key traffic modelling results including bus and general traffic journey times.
- **Chapter 7: Conclusions** – provides an overall summary of the study and key findings.

2 OWNER'S HIGHWAY WORKS

2.1 INTRODUCTION

2.1.1. Various highway works are proposed as part of approved planning permissions which were considered within the WCS. This section describes the relevant secured highway works.

2.2 MASTERPLAN, 2016 (REF: 15/5550)

2.2.1. The Eighth Schedule of the 23 December 2016 Masterplan s106 details secured works to the highway and paragraph 2.2 of the s106 requires that:

> *"The Owner must carry out the Highway Works in accordance with the timescales set out in Column 2 of the Table in Annex 1 to this Schedule."*

2.2.2. An extract of Annex 1 of the Eighth Schedule as far as it relates to the WCS is reproduced in **Figure 2** together with commentary in **Table 1**.

Table 1 - Highway Works (23 Dec 2016 s106)

REF	*ANNEX 1 – HIGHWAY WORKS*			COMMENTARY	
	ITEM	*DESCRIPTION OF HIGHWAY WORKS*	*TIMESCALE OF DELIVERY*	DRAWING	STATUS
A1	*1*	*Works at the signalised junction of Fulton Road and Empire Way substantially in accordance with Plan 06*	*Prior to Occupation of Plots NW09 and NW10*	Plan 06 (1894-SK-016 Rev A)	Not yet undertaken
A2	*2*	*Works at the gyratory junction of the Wembley Park Drive and Empire Way gyratory substantially in accordance with Plan 06*	*Prior to Occupation of the earlier of Plot NW09, Plot NW10 and the opening to the public of any part of the Park.*	Plan 06 (1894-SK-016 Rev A)	Not yet undertaken
A3	*3*	*Works in the vicinity of the junction of Wembley Hill Road and Royal Route to include the provision of a raised junction table across the bell-mouth of Royal Route and upgrading of the zebra crossing outside York House to a pelican or toucan crossing.*	*Prior to Occupation of the Primary School on the York House School Site PROVIDED THAT if the Primary School is not provided on the York House School Site the Owner will not be required to carry out these works.*	N/A	Not yet undertaken
A4	*4*	*Works to provide a pedestrian crossing facility in the vicinity of the junction of Empire Way/Lakeside Way.*	*Within 12 months of Material Start.*	N/A	Not yet undertaken- some initial design work understood to be being undertaken by LBB

2.2.3. The drawing referred to in the s106 in relation to A1 and A2 is presented below and in **Appendix A**.

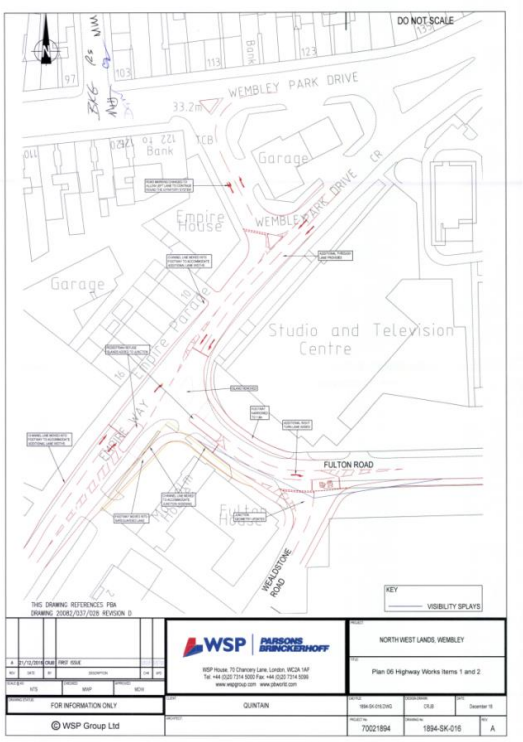


Figure 2 - North West Lands 2011 Highway Works – Plan 06 (1894-SK-016 Rev A)

2.3 NORTH WEST LANDS, 2011 (REF: 10/3032)

2.3.1. The First Schedule of the 24 November 2011 North West Lands s106 details secured works to the highway. The works related to the WCS are described in paragraph 16.3 and are reproduced below together with commentary.

Table 2 – North West Lands 2011 Highway Works

REF			COMMENTARY DRAWING	STATUS
B1	*16.3*	*The owner shall pay the council a contribution of £300,000 towards the carrying out by the Council of the Forty Lane / Bridge Road works such payment to be paid within four weeks of a notice in writing by the Council which it may serve at any point following the earlier of the commencement of construction of the 650th dwelling or of the MSCP, and subject to the notice containing evidence that the council has the requisite internal approvals to proceed with the said works.*	20082-036-041A	Not yet triggered

2.3.2. Note that paragraphs 16.2 and 16.4 of the 24 November 2011 North West Lands s106 also describe highway works but these paragraphs have been cancelled by a Deed of Variation (21 July 2017) to the North West Lands S106 Agreement and superseded by the 23 December 2016 Masterplan s106.

2.3.3. The drawings referred to in the North West Lands s106 are presented below and in **Appendix A**, and relates to item C of the Owners WCS objectives.

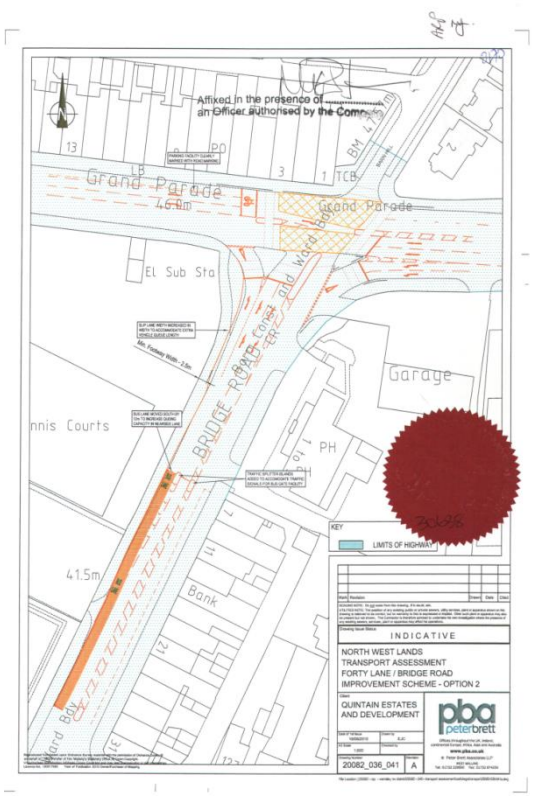


Figure 3 – North West Lands 2011 Highway Works (20082-036-041A)

2.4 SOUTH WEST LANDS, 2016 (REF: 14/4931)

2.4.1. The Seventh Schedule of the 23 December 2016 South West Lands s106 details secured works to the highway and paragraph 2.2 of the s106 requires that:

> *"The Owner must carry out the Highway Works in accordance with the timescales set out in Column 2 of the Table in Annex 1 to this Schedule."*

2.4.2. An extract of Annex 1 of the Seventh Schedule as far as it relates to the WCS is reproduced in Figure 4 together with commentary in **Table 3** and Table 4.

Table 3 – South West Lands s106 Highway Works 2016

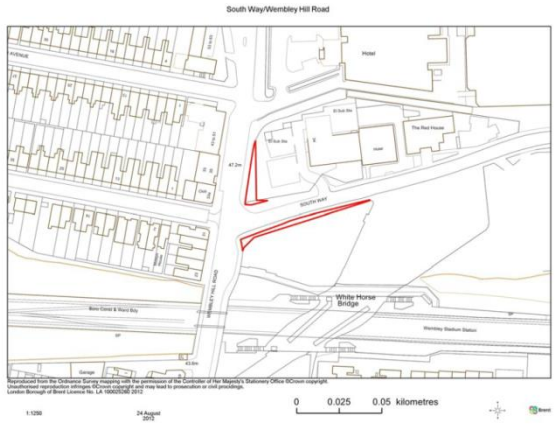
REF	*ANNEX 1 – HIGHWAY WORKS*			COMMENTARY	
	ITEM	*DESCRIPTION OF HIGHWAY WORKS*	*TIMESCALE OF DELIVERY*	DRAWING	STATUS
C1	*5*	*Widening of South Way at the junction with Wembley Hill Road in accordance with the Wembley Area Action Plan proposals showing illustratively on Map 20.7.*	*Within 12 months of receipt of written notice from the council provided that no such notice may be served by the council prior to the date that the Council has obtained control of the land required to carry out these works that is not land with the owner's ownership and further provided that no such notice may be served during construction of plots SW01 and SW02*	WAAP Map 20.7	Not yet undertaken

2.4.3. Paragraph 3.1 of the Seventh Schedule of the 23 December 2016 South West Lands s106 also identifies safeguarded land at this location as follows.

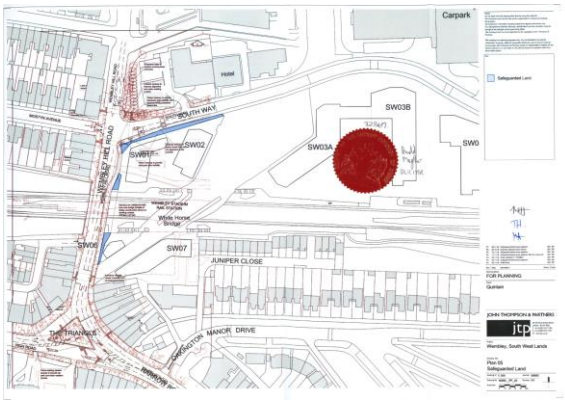
Table 4 – South West Lands 2011 Highway Works

REF			COMMENTARY DRAWING	STATUS
C1	*3.1*	*The Owner will safeguard from development or other encroachment the land shown shaded blue on Plan 05 (to the extent that such land is within the ownership of the Owner) and will use reasonable endeavours to ensure that it is laid out and kept to a standard sufficient for use but the public as a footpath on a temporary basis from practical completion of the adjacent Plot until such date as the highway works set out as item no 5 in Annex 1 to this schedule have been carried out or until 25 years from the date of this Deed whichever is the earlier.*	Plan 05	Not yet triggered

2.4.4. The drawings referred to in the s106 are presented below and in **Appendix A**.



Map 20.7 Land take required at W6 and W7



WAAP Map 20.7 Plan 05

Figure 4 – South West Lands 2016 Highway Works

2.5 STAGE 1 MASTERPLAN, 2004 (REF: 03/3200) (AS REFERENCED IN MASTERPLAN 2016)

2.5.1. Paragraph 2.4 of the Eighth Schedule of the 23 December 2016 Masterplan s106 requires that:

> *"If the Empire Way/Engineers Way Highway Works have not been completed pursuant to the 2012 Deed, the Owner must carry out and complete those works in accordance with the provisions of paragraph 1 above (or such other amended procedures as may be agreed between the Owner and the Council) no later than 12 months from the earlier of Practical Completion of the Northern Park Area and Practical Completion of the Southern Park Area."*

The Fourth Schedule of the 23 May 2012 Masterplan s106 details secured works to the highway. The works related to the WCS and saved by the Eighth Schedule of the 23 December 2016 Masterplan s106 are described in paragraph 3 and are reproduced in **Table 5**.

Table 5 – Stage 1 Masterplan 2004 Highway Works

REF			COMMENTARY DRAWING	STATUS
D1	*3*	*Empire Way/Engineers Way*	N/A	All works discharged by the 2017 Deed of Variation, with the exception of the "*two entry lanes for southbound traffic*" part of item (a) and item (d) which have not yet been undertaken.
	(a)	*~~Widening of the northern arm of Empire Way to provide a 3 metre wide central pedestrian refuge and~~ two entry lanes for southbound traffic.*		
	(b)	*~~Amendments to existing crossing facilities, incorporating the provision of a new staggered crossing on the northern Empire Way arm of the junction, widening of the central pedestrian island on the Engineers Way arm of the junction to 4 metres and provision of advanced cycle stop lines on each entry arm~~.*		
	(c)	*~~Removal of existing pedestrian crossing 50 metres south of the junction, including tactile paving, reinstatement of full height kerbs etc~~.*		
	(d)	*Modifications to the traffic signal controller system to link signals within a UTC/SCOOT network along the Empire Way/Wembley Hill Road corridor between Harrow Road and Forty Lane.*		
	(e)	*~~Provision of at least 3.5 metres of clear footway around the South Eastern corner of the junction excluding structures and such replacements as may be agreed with the Council in the future~~.*		

2.5.2. All other highway works secured in the Stage 1 Masterplan s106 (23 May 2012) are understood to have been either discharged (constructed) or cancelled by the Stage 1 Deed of Variation (28 July 2017) and superseded by the 23 December 2016 Masterplan s106.

2.6 SUMMARY OF OWNER'S HIGHWAY WORKS LOCATIONS

2.6.1. **Figure 5** summarises the location of the highway works secured though previous planning permissions and the references listed in the tables which describe the works.

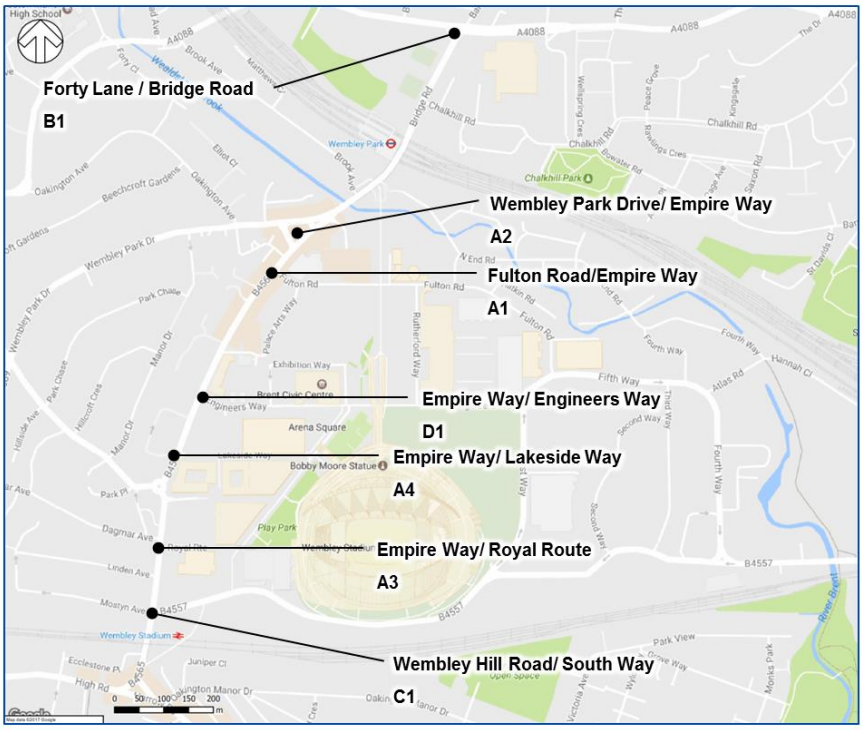


Figure 5 – Owner's Highway Works Key Locations

3 COUNCIL'S HIGHWAY WORKS

3.1 INTRODUCTION

3.1.1. Various highway works are proposed by the council which will need to be considered within the western corridor study. This section describes the relevant highway works.

3.2 NORTH END ROAD / BRIDGE ROAD

3.2.1. In 1991 the Bobby Moore Bridge was constructed to carry Bridge Road over Olympic Way. To allow construction, North End Road junction to Bridge Road was permanently disconnected with the only access to properties being from Fulton Road via Albion Way. It is one of the Council's WCS Objectives to reconnect the North End Road to Bridge Road. The reconnection of North End Road to Bridge Road is technically challenging owing to a level difference of approximately three metres between the two roads and limited highway land available to undertake any works.

3.2.2. To test the practicability of the reconnection the Borough undertook a traffic and structural feasibility study in 2008/9 ('Optimising Capacity - Connection of North End Road with Bridge Road, MVA/Gifford, 2009'). The most recent data available is provided in drawings 16634/HW/100/001 Rev B (**Figure 6**) and 16634/HW/100/002 Rev B (**Figure 7**). These drawings are presented below and in **Appendix A**.

Figure 6 – North End Road / Bridge Road Highway Works (16634/HW/100/001 Rev B)

Figure 7 – North End Road / Bridge Road Highway Works (16634/HW/100/002 Rev B)

3.3 BROOK AVENUE / BRIDGE ROAD

3.3.1. Owing to its close proximity to North End Road, the Bridge Road/ Brook Avenue junction was included within the MVA/Gifford study for North End Road and Bridge Road. Following a meeting on 6th March 2017 with Council officers it is understood that the objective for this junction is to improve road safety and improve pedestrian facilities. A scheme has now been identified under the Fulton Quarter Masterplan application Ref. 17/3059. Although a Council obligation within the WCS this will now be brought forward by Quintain.

3.4 WEMBLEY HILL ROAD CHILTERN RAILWAY BRIDGE

3.4.1. The proposal to widen the Chiltern Railway bridge is associated with proposals for the Harrow Road/ Wembley Hill Road/ Wembley High Road junction (Harrow Road Triangle or Wembley Triangle). The report 'Wembley Triangle Outline Design Stage 2 Report, JMP, 2010' considered outline design options to improve the Wembley Triangle. The objective was to cater for the increasing demand.

3.4.2. The study developed 6 highway layouts with half the options based around maintaining the existing bridge (do-minimum), with the remaining options based around widening the bridge (do-maximum. The study recommends that the do-maximum option (Option 3B) is progressed with widening of the bridge and land take at South Way to allow for an extended right turn lane into South Way. This is shown in drawing STH4441-PR-03B Rev A (**Figure 8**) presented below and in **Appendix A**.

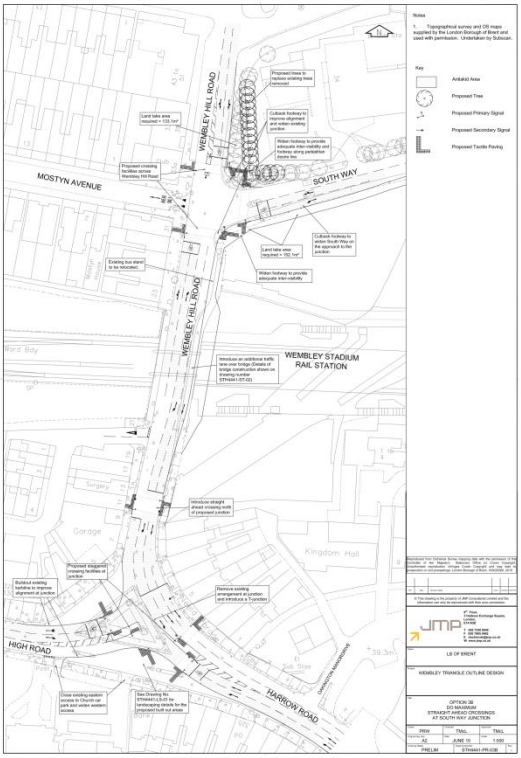


Figure 8 - Wembley Hill Road Chiltern Railways Bridge Highway Works (STH4441-PR-03B Rev A)

3.5 YORK HOUSE GYRATORY

3.5.1. The York House Gyratory was replaced by a roundabout in around 2012. It is understood that the roundabout results in issues in terms of both capacity (causing concerns for bus reliability) and safety (particularly for pedestrians). The aims are therefore to improve both capacity (and bus reliability) and safety for pedestrians. A scheme has not yet been identified.

3.6 OTHER PROPOSALS

A404 HIGH ROAD

3.6.1. It is understood that the Borough has undertaken a study to seek to reduce the traffic levels on the High Road passing through the shopping area at Wembley Central. We understand this proposal has been put on hold. A scheme that reduces traffic levels on the High Road will alter traffic flows in the wider area, including the Western Corridor study area. For the purposes of this study it will be assumed that the current traffic patterns and movements will remain.

3.7 SUMMARY OF COUNCIL'S HIGHWAY WORKS LOCATIONS

3.7.1. **Figure 9** summarises the location of the Council's highway works.

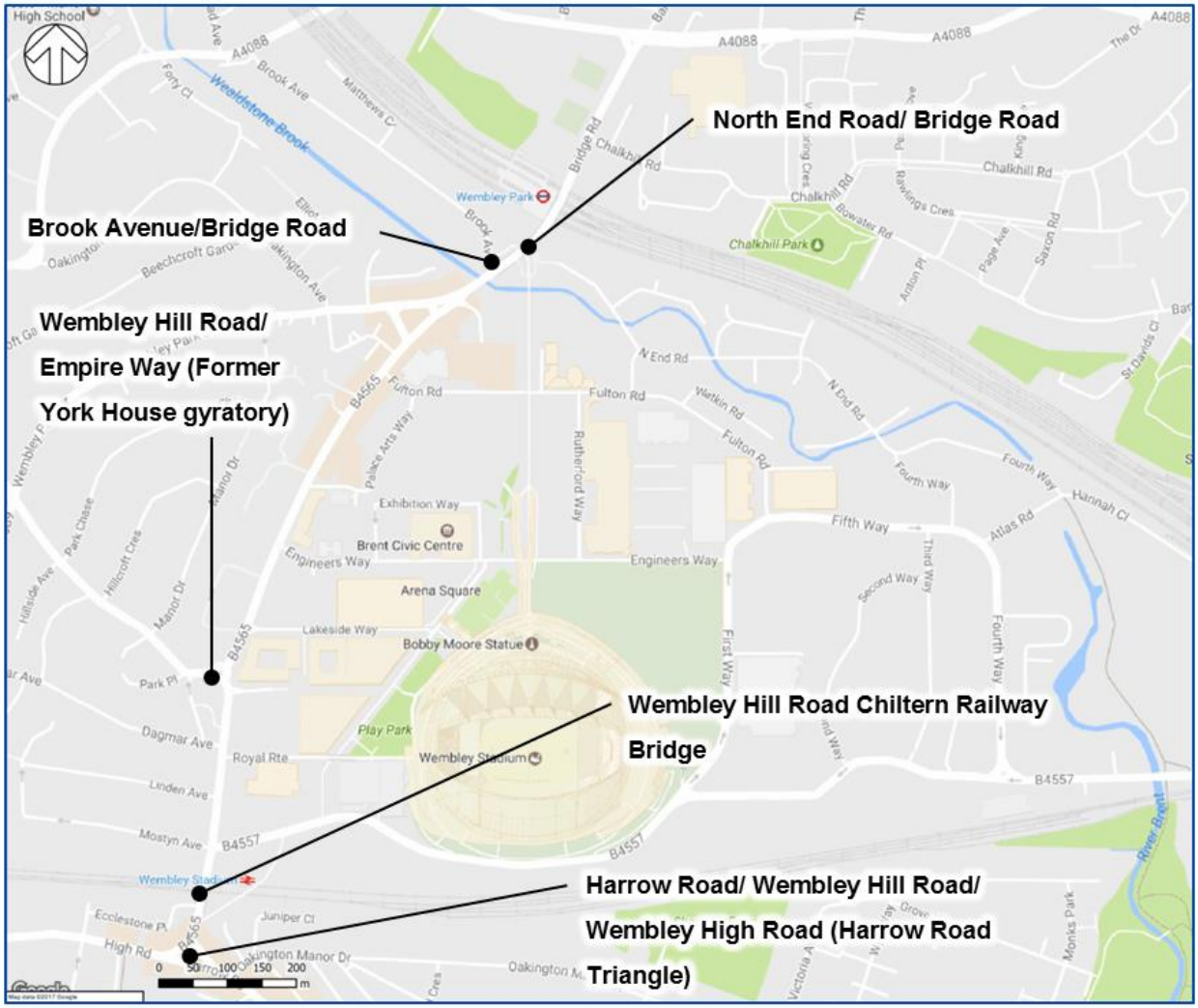


Figure 9 – Council Highway Works Key Locations

4 CORRIDOR SCHEME DESIGN DEVELOPMENT

4.1 DESIGN PROCESS

4.1.1. The corridor scheme design includes:

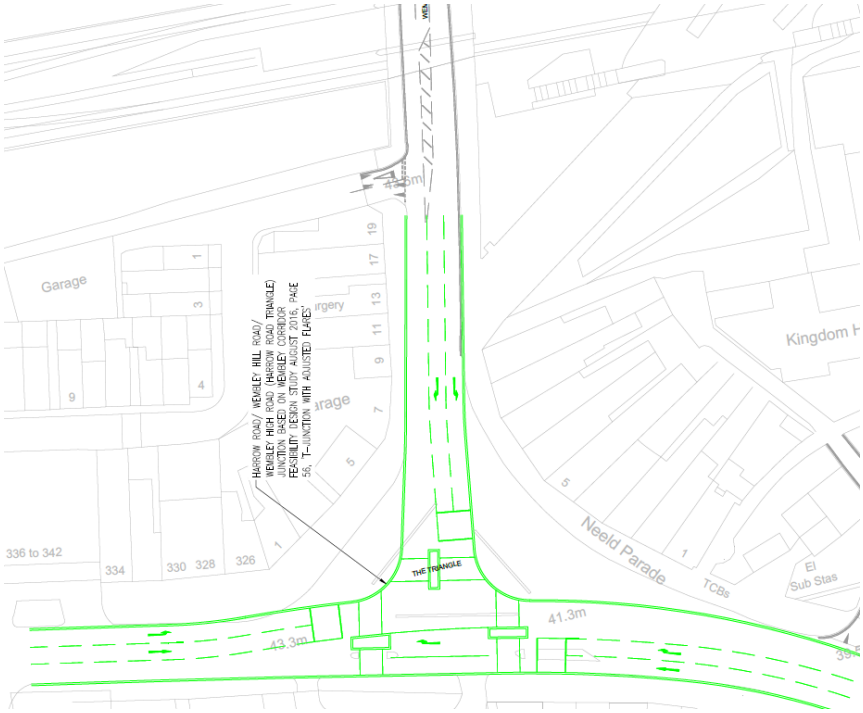
- the owner's highway works schemes committed as s106 obligations described in Chapter 2;
  - where scheme drawings were available, the highway works are based on that information as far as reasonably practicable;
  - where scheme drawings were not available, new scheme drawings have been developed to reflect the works described in the s106 obligation;
- the council's highway works schemes described in Chapter 3;
  - where scheme drawings were available, the highway works are based on that information as far as reasonably practicable;
  - where scheme drawings were not available, new scheme drawings have been developed to reflect the aims of the schemes described in the Council's WCS Objectives.

4.1.2. Following initial design and model runs further options have been tested and refined to achieve the best overall solution in the context of the Owner's WCS Objectives and the Council's WCS Objectives.

4.2 DESIGN SCHEMES

4.2.1. **Figure 10** shows each of the schemes included within the WCS together with the source of the final design. This follows a process of engagement and evolution with Quintain and LBB. The WCS scheme drawings are provided in **Appendix B**.

Figure 10 – Corridor Scheme Drawings



Harrow Road/ Wembley Hill Road/ Wembley High Road (Harrow Road Triangle) and Wembley Hill Road Chiltern Railway Bridge

Source:

Based on 'Wembley Corridor Feasibility Design Study August 2016, Page 56, T-junction with Adjusted Flares'

Commentary:

Scheme reflects LBB's preferred option for the remodelling of this junction to prioritise pedestrians and maximise public realm.

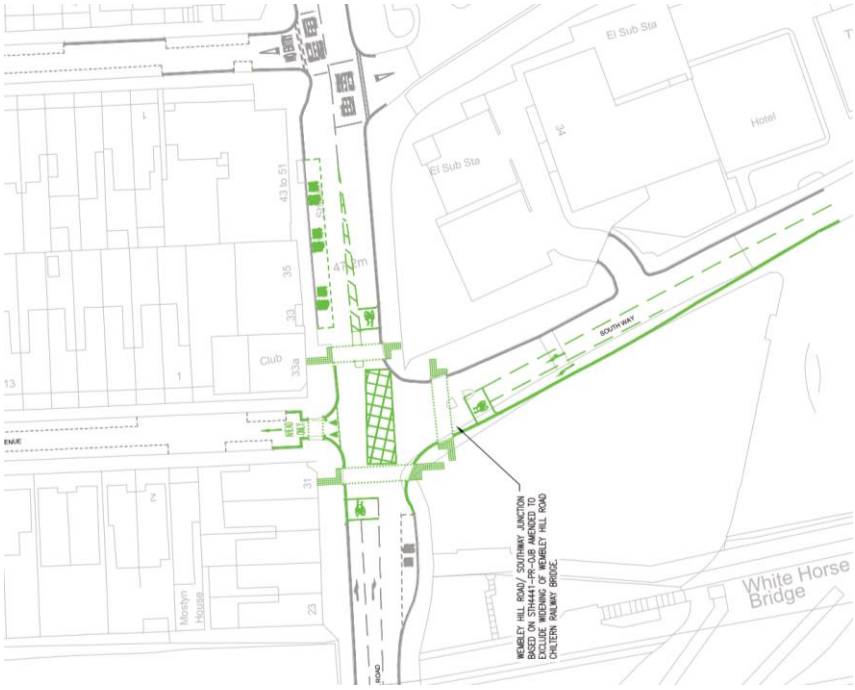
Wembley Hill Road Chiltern Railway Bridge remains as existing as per LBB's preference as widening is now not expected to be viable.

Estimated Implementation Date:

Q1 2020

Delivered by:

LB Brent



Wembley Hill Road/ South Way

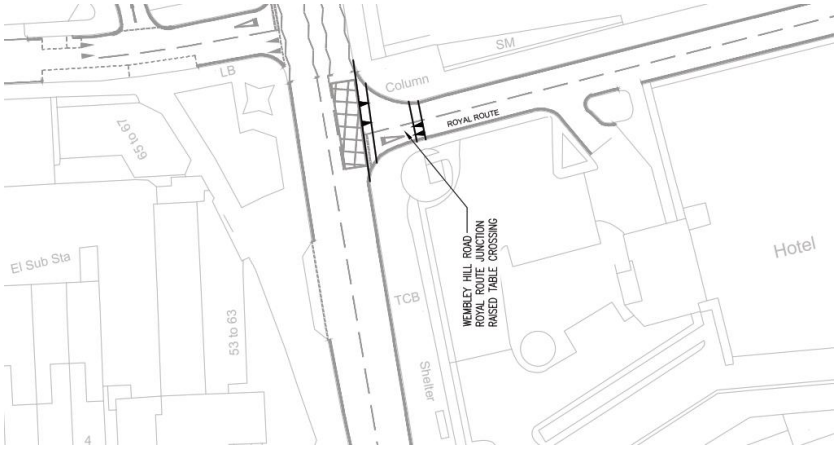
Source:
Ref C1, Based on drawing STH4441-PR-OJB and consistent with 'Plan 05' of South West Lands 2011

Commentary:
Scheme design reflects scheme secured through s106 amended to reflect retained width on Wembley Hill Road Chiltern Railway Bridge.

Main changes from s106 scheme are single lane exit on southern arm and single lane approach on northern arm.

Estimated Implementation Date:
Q1 2022 - 12 months post occupation of SW01/02

Delivered by:
Quintain



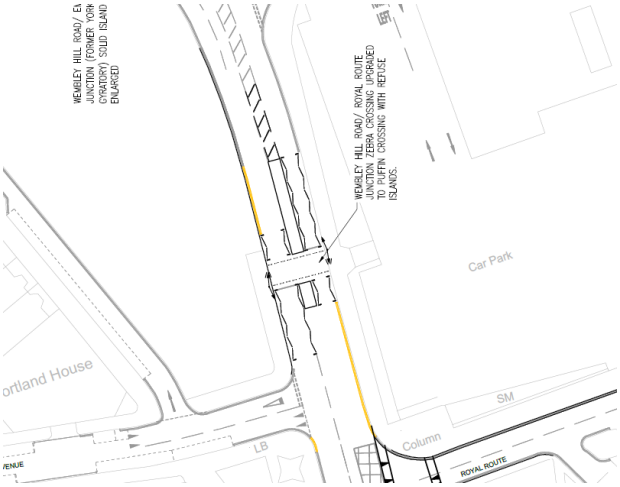
Empire Way/ Royal Route

Source:
Ref A3, New scheme design

Commentary:
Simple junction entry table as described in, and required by Masterplan 2016 s106.

Estimated Implementation Date:
Q3 2019 – prior to occupation of the school (September 2019)

Delivered by:
Quintain



Empire Way/ Royal Route

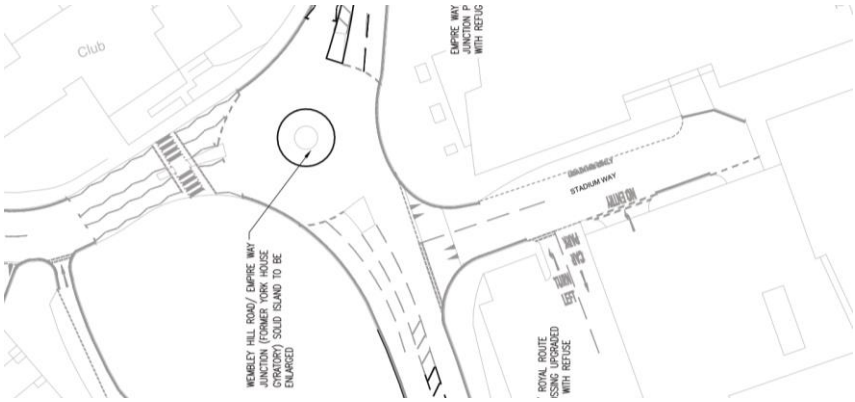
Source:
Ref A3, New scheme design

Commentary:
Conversion of zebra to puffin crossing including introduction of central median to allow crossing in shadow of signals.

Northbound lane width minimum of 4.8m to allow two lanes of northbound traffic on event days.

Estimated Implementation Date:
Q3 2019 – prior to occupation of the school (September 2019)

Delivered by:
Quintain/York House School developer



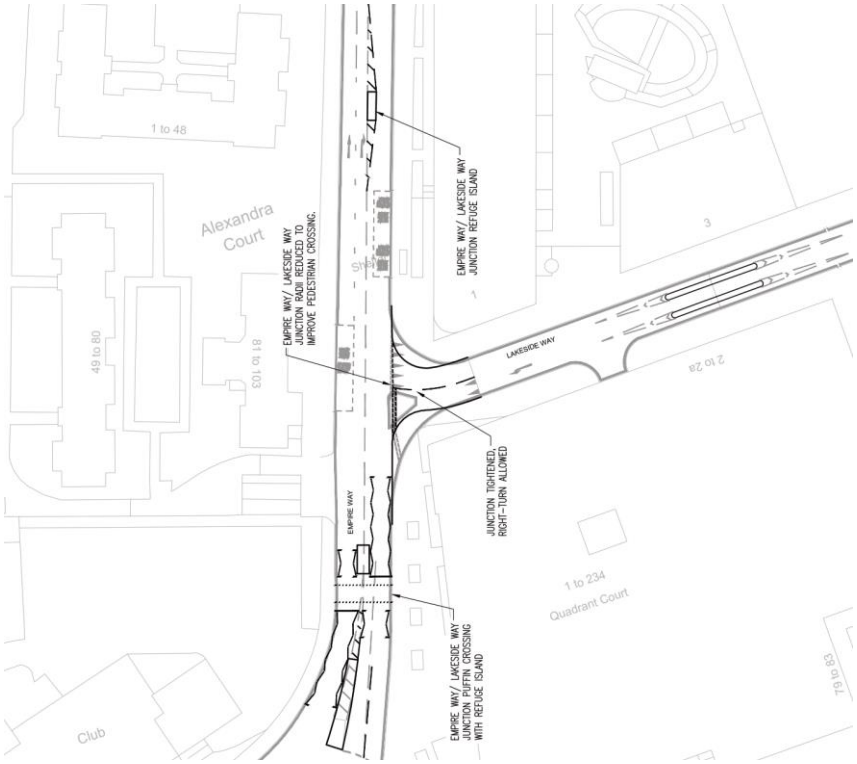
Wembley Hill Road/ Empire Way (Former York House Gyratory)

Source:
New scheme design

Commentary:
Hardened central island to prevent vehicle overrun and encourage lower vehicle speeds through the junction.

Estimated Implementation Date:
Q3 2019

Delivered by:
LB Brent



Empire Way/ Lakeside Way

Source:

Ref A4, New scheme design

Commentary:

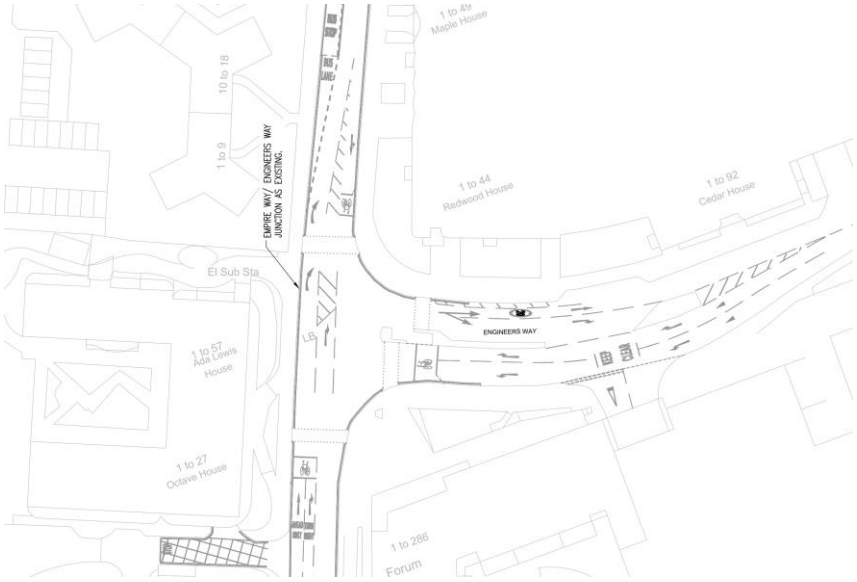
Introduction of puffin crossing to facilitate crossing between Lakeside Way and Wembley Hill Road.

Introduction of an island to provide greater protection to pedestrians crossing between Lakeside Way and Empire Way.

Tightening of junction radii at Empire Way/ Lakeside Way to ease pedestrian crossing of Lakeside Way and Empire Way and slow vehicles on entry of, and approach to, junction.

Estimated Implementation Date:
Q2 2018

Delivered by:
Quintain



Empire Way/ Engineers Way

Source:
Ref D1, Existing layout

Commentary:
As existing, retaining partial improvement scheme already implemented including improved vehicle capacity compared with prior arrangement (at time improvement scheme was secured) and improved pedestrian capacity (relative to secured improvement scheme).

Fulton Road/ Empire Way

Source:
Ref A1, Based on 70035926-SK-04 B following 'Fulton Road/ Empire Way, Junction Mitigation Review, September 2017'

Commentary:
Revision compared with s106 scheme to better reflect currently anticipated demand while retaining flexibility of right turn from Empire Way to Fulton Road.

Estimated Implementation Date:
Q4 2021 – prior to occupation of NW09/10

Delivered by:
Quintain

Wembley Park Drive/ Empire Way

Source:
Ref A2, Based on 70035926-SK-04 B following 'Fulton Road/ Empire Way, Junction Mitigation Review, September 2017'

Commentary:
Revision compared with s106 scheme to better reflect currently anticipated demand and improving northbound capacity.

Estimated Implementation Date:
Q4 2021 – prior to occupation of NW09/10 (works undertaken at same time as Fulton Road Junction)

Delivered by:
Quintain

Brook Avenue/ Bridge Road

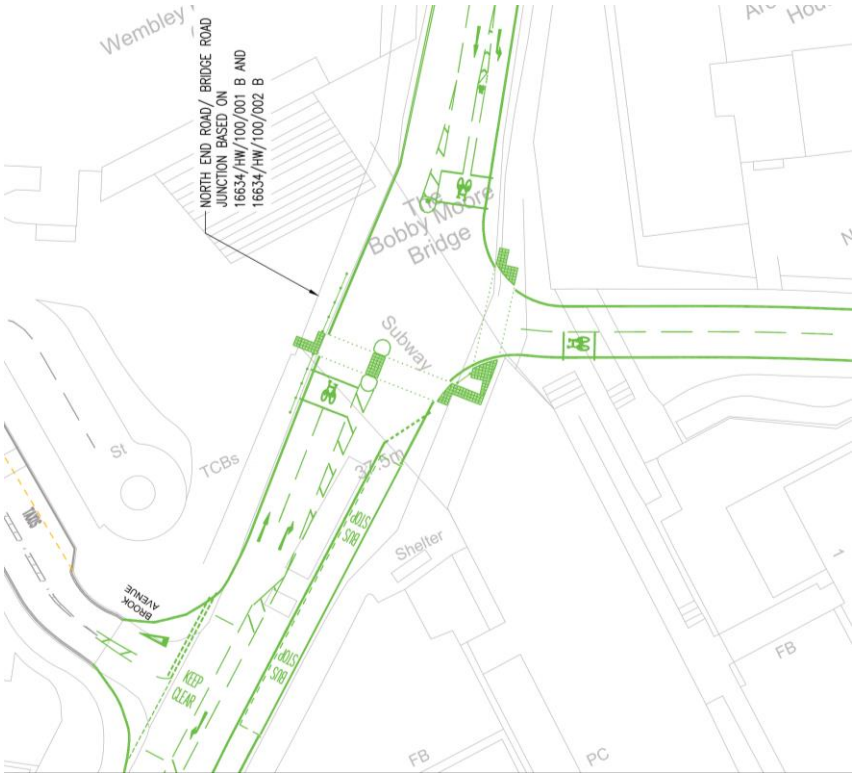
Source:
New scheme

Commentary:
Introduction of puffin crossings and widening of central island to improve pedestrian crossing; now to be secured as part of the Fulton Quarter application.

Scheme also includes relocation of bus stop and re-provision of on-street parking to better reflect desire lines.

Estimated Implementation Date:
Q1 2022

Delivered by:
Quintain



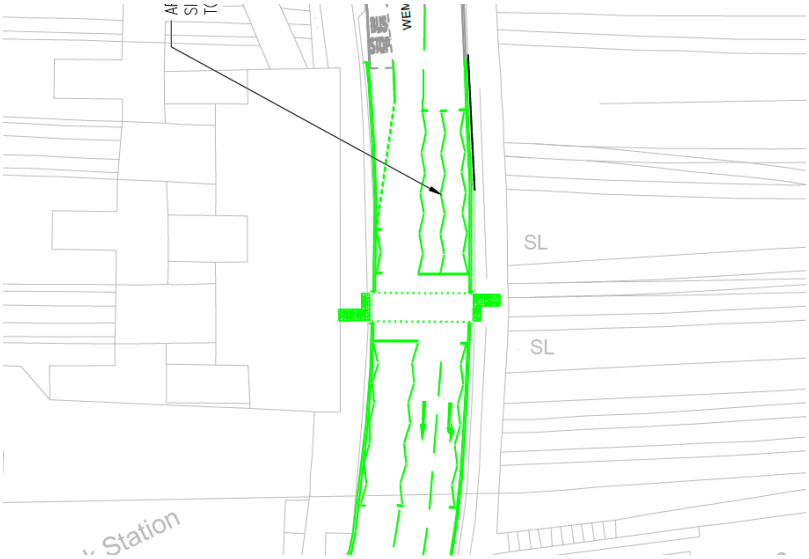
North End Road/ Bridge Road

Source:
Based on 'Optimising Capacity - Connection of North End Road with Bridge Road, MVA/Gifford, 2009' drawings 16634/HW/100/001 Rev B and 16634/HW/100/002 Rev B.

Commentary:
Scheme retained as per previous feasibility study.

Estimated Implementation Date:
Q4 2019

Delivered by:
LB Brent



Bridge Road Pelican crossing adjacent to Wembley Park Station

Source:
New scheme.

Commentary:
Additional southbound lane introduced to add traffic capacity and alleviate southbound queueing.

Estimated Implementation Date:
Q4 2019

Delivered by:
LB Brent

Forty Lane/ Bridge Road

Source:
Ref B1, Based on drawing HD24/01/0

Commentary:
Updated to reflect the latest LBB scheme proposal.

Estimated Implementation Date:
Q2 2021

Delivered by:
LB Brent

5 FORECAST TRAFFIC DEMAND AND COMMITTED DEVELOPMENTS

5.1 INTRODUCTION

5.1.1. The base year WCS model was developed using traffic surveys conducted in July 2016. The WCS takes account of forecast traffic demand in the form of committed development projected to come forward in the study period, plus background traffic growth as forecast by TfL in the West London Highway Assignment Model (WeLHAM). This section sets out the approach to developing the 2031 AM/PM peak hour forecast traffic demand for the WCS.

5.2 COMMITTED DEVELOPMENTS

5.2.1. This section outlines the committed development relevant to the WCS assessment. This is based on the approach to committed development agreed for the Transport Assessment (TA) dated December 2015 which supported application 15/5550 (the revised Wembley Park Masterplan application). As of September 2015, that TA identified:

- Committed Development which would result in a material traffic generation and which was then considered in detail; and
- Committed Development which would not result in a traffic impact on the highway network or would result in a de minimis impact and which was then excluded from the assessment.

5.2.2. The list below deals with committed developments in the same way as the December 2015 TA and considers whether or not they were active in July 2016 (when traffic surveys were undertaken for use in the WCS).

- Committed developments carried forwards from 15/5550 December 2015 TA:
  - 03/3200 Stage 1 Wembley Park Masterplan (Quintain)
  - 14/4931 South West Lands (Quintain)
  - 10/3032 North West Lands (Quintain)
  - 13/1522 Ground Floor West, Olympic Office Centre, 8 Fulton Road
    - Opened September 2016 for student accommodation by Unite (non-traffic generating)
    - Remainder under construction by Barratt for 211 flats with 52 car parking spaces
  - 13/2832 Costco, 30 Second Way
    - Opened August 2016 (not included in baseline surveys)
- Committed developments included in the 15/5550 December 2015 TA but now excluded:
  - 13/1995 Lycee International de Londes Winston Churchill
    - Opened for years 1-11 September 2015 (year 12 added September 2016 and year 13 September 2017), included in baseline surveys
- New committed developments included since 15/5550 December 2015 TA:
  - 15/5550 Revised Wembley Park Masterplan (Quintain)
- New committed developments excluded since 15/5550 December 2015 TA due to nil or de minimis impact on the highway network:
  - 15/4708 Apex House Fulton Road and Albion House Albion Way, Student Accommodation
    - Vehicle trips: 0 AM & 0 PM
  - 16/4156 Heron House Wembley Hill Road , 40 flats
    - Immediately west of Wembley Hill Road/ Empire Way (Former York House gyratory)
    - Vehicle trips: 3 AM & 5 PM
  - 15/4550 Chesterfield House Park Lane, 239 Flats
    - Beyond study area, c. 500m beyond southern extent

  - Vehicle trips: 19 AM & 25 PM

- 16/0223 Elsley Primary School Tokyngton Avenue, expansion by 2FE
  - Beyond study area, c. 500m beyond southern extent
  - School trips will be linked locally to trips arising from residential so it would be double counting to consider the traffic generation explicitly
  - Vehicle trips: 185 AM & 25 PM
- 15/4743 Brent House High Road, 248 flats
  - Immediately adjacent to Harrow Road/ Wembley Hill Road/ Wembley High Road (Harrow Road Triangle)
  - Only 20 parking spaces
- 154473 Montrose Crescent Car Park, 186 flats
  - Beyond study area, c. 800m beyond southern extent
  - Only 20 parking spaces
- 16/1698 Cottrell House Wembley Hill Road, 55 flats
  - Within study area (opposite Empire Way/ Royal Route)
  - Vehicle trips: 7 AM & 7 PM
- 16/1401 Amex House North End Road, 195 flats
  - On edge of study area, c.200m from North End Road/ Bridge Road
  - Vehicle trips: 13 AM & 2 PM
- 16/4997 Wembley Point 1 Harrow Road, 382 flats
  - Beyond study area, c. 1300m beyond southern extent
  - Vehicle trips: 59 AM & 64 PM

5.2.3. Of the committed developments identified as 'Quintain', **Table 6** below sets out their current status relative to the way in which the permissions have been assessed in transport terms.

5.2.4. Some development is currently under construction but not operational and therefore surveyed flows will, to some extent, be higher than they will be in the long term once construction has ended. At this stage the on-going construction is not expected to be a material traffic generator and so has not been considered any further but this may be reconsidered in due course.

5.2.5. The committed development traffic included within the WCS for specific developments is presented in **Table 7** and **Appendix C**. This is drawn from relevant Transport Assessments.

5.2.6. This assumes that all aspects of each permission will be built out as was assessed within the relevant planning applications. In reality, the Quintain developments are likely to generate significantly less traffic than was forecast due to lower level of car parking than originally proposed and less traffic intensive land uses being brought forward than was considered in outline planning applications.

Table 6 – Quintain Development Status

Application No.	03/3200[2]		14/4931[1]		10/3032[2]		15/5550[2]	
Location	Wembley Park Masterplan		South West Lands		North West Lands		Revised Wembley Park Masterplan	
Open at time of survey (July 2016)	Open	Future	Open	Future	Open	Future	Open	Future
Food Retail (sqm)	0	0	0	0	0	0	0	0
Non-Food Retail (sqm)	16,448	3,682	0	0	0	7,742	0	7,042
Offices (sqm)	417	0	0	750	0	9,230	0	47,796
Hotel (sqm)	25,400	12,118	0	250	0	0	0	25,584
Residential (dwellings)	525	336	0	726	0	1,197	0	3,428
Leisure (sqm)	8,016	2,101	0	0	0	0	0	159
Apart Hotels (sqm)	4,333	0	0	0	0	0	0	0
Community (sqm)	856	0	0	100	0	0	0	4,449
Food / Drink Facilities (sqm)	10,969	0	0	500	0	0	0	213
Local Retail (sqm)	1155	0	0	375	0	1,753	0	0
Wembley Retail Park (sqm)	0	0	0	0	0	0	0	0
School (sqm)	0	0	0	0	0	0	0	5,945

1 based on Scenario 1 presented in TA Addendum March 2016 as the most intensive scenario
2 based on December 2015 TA Appendix W

Table 7 – Trip Generation

	AM			PM		
	In	Out	Total	In	Out	Total
Costco	15	14	29	185	195	380
Olympic Office	2	24	26	15	8	24
South West Lands Resi	7	82	89	53	28	81
South West Lands Hotel	15	59	74	31	10	41
South West Lands Office	6	1	7	1	6	7
West Lands Hotel	50	121	171	91	28	119
West Lands Non-Resi	173	91	264	121	331	452
West Lands Resi	3	36	39	25	13	38
North West Lands Resi	18	170	188	120	64	184
North East Lands Resi	18	187	205	134	72	206
East Lands Resi	12	118	130	84	45	129

Source: Masterplan iTransport December 2015 Transport Assessment; Costco ttp consulting September 2013 Transport Assessment; Southwest Lands iTransport December 2014 Transport Assessment

5.3 STRATEGIC TRAFFIC DEMAND GROWTH

5.3.1. TfL's strategic highway assignment model of West London (WeLHAM) was used to derive an origin-destination matrix for the WCS area for the agreed forecast year (2031) to align with HAM modelled years.

5.3.2. The WeLHAM reference models were interrogated for the 2012 base year and 2031 forecast year. A sub-network / cordon matrix was extracted from both models and the difference between 2031 and 2012 calculated for each peak hour. The net change in trips between 2012 (HAM base year) and 2031 was checked for the Wembley masterplan area against the first principles trip generation calculations for committed developments described in section 5.2. The WeLHAM model was then updated to represent development flows more accurately. This approach took account of the effect of the known Wembley area developments on local traffic capacity, and therefore wider traffic re-assignment.

5.3.3. The pro-rata traffic growth from 2016 to 2031 was then applied incrementally to the calibrated and validated 2016 VISSIM base model peak hour demand matrices to derive a set of 2031 peak hour demands.

5.3.4. The WeLHAM model was not used for a strategic highway impact assessment which was outside the scope of the WCS. It was used for the specific purpose of providing forecast traffic demand matrices for the VISSIM traffic model.

5.3.5. **Figure 11** shows the 2016 and 2031 traffic demand matrix totals. It shows that background growth between 2016 and 2031 represents an increase of 6% and 3% in the AM and PM peak hours respectively. Examination of the matrices shows that this growth is almost exclusively associated with through movements on the A406 North Circular, which is outside the WCS scope, and east-west through movements along the A4088 Forty Lane. There is little background growth predicted along the Western Corridor itself.

5.3.6. Taking projected development traffic into account the methodology predicted an additional 9% and 11% growth over the 2031 forecast background growth for AM and PM peak hours respectively. Overall, the matrix totals in 2031 represented an increase over 2016 traffic demand in the AM peak of 16% and in the PM peak of 14%.

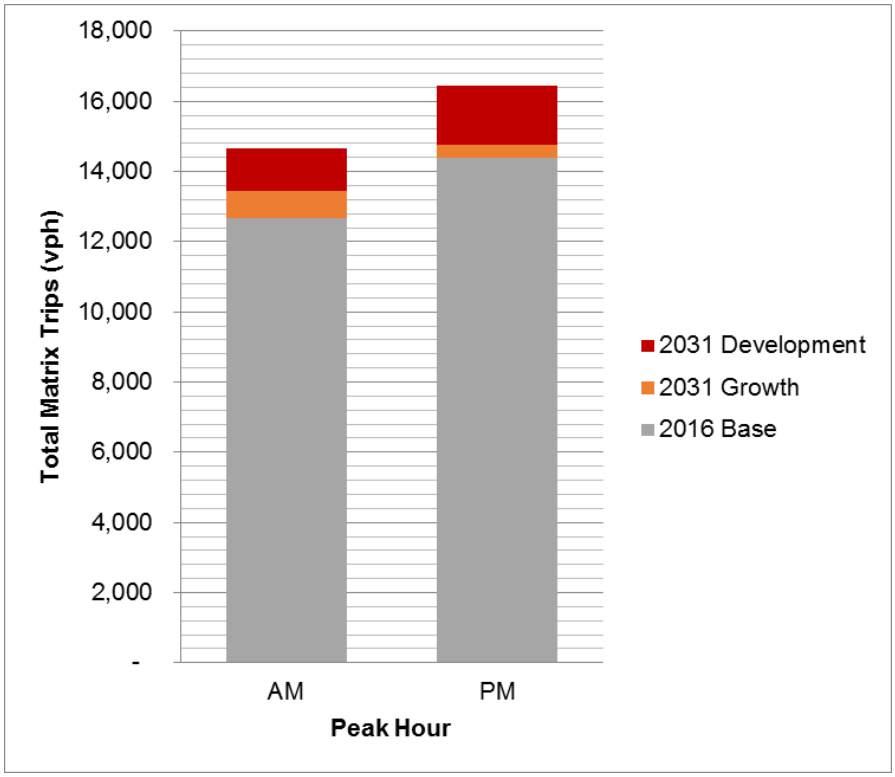


Figure 11 - 2016 and 2031 Traffic Demand Matrix Totals

6 TRAFFIC MODELLING

6.1 INTRODUCTION

6.1.1. The traffic modelling approach, which was agreed with Council, was described in the WCS Scoping Report (May 2017). The approach included the development of a micro-simulation traffic model (VISSIM) calibrated / validated to a 2016 base year, plus development of a 2031 forecast year scheme model which was informed by traffic forecasts for the corridor as taken from TfL's WeLHAM model. It was agreed that the model would reflect a typical weekday AM and PM peak period on a non-event day.

6.1.2. This chapter describes the development of the 2016 AM / PM base year VISSIM model. It also describes the development of the 2031 forecast model and key modelling results – traffic flows, journey times and queue behaviour.

6.2 BASE MODEL DEVELOPMENT

6.2.1. The VISSIM base model development, calibration and validation is documented in the *Wembley: Western Corridor – Local Model Validation Report: VISSIM Base Modelling* (January 2018); otherwise referred to as the LMVR. This section provides a summary of that report.

6.2.2. The base model was developed in accordance with TfL Modelling Guidelines and the Model Auditing Process (MAP). TfL's VISSIM template file was used as a starting point for the coding to ensure TfL's bespoke parameter set was adopted.

6.2.3. The base model was developed in VISSIM v8.00-15. The VISSIM model represents the 5th July 2016 when the surveys were conducted and covers a two hour period which includes the peak hour, as well as the half hour before (warm-up) and half hour following the peak (cool-down).

6.2.4. The model was developed using dynamic assignment since the network includes route alternatives and the changes introduced in the future scenarios may impact driver route choice. The base year matrix was developed based on Automatic Number Plate Recognition (ANPR) surveys.

MODEL EXTENTS

6.2.5. The model extent is shown on **Figure 12**. The WCS extent is shown within the red boundary. The WCS area includes the full western corridor (Wembley Hill Road, Empire Way and Bridge Road) between Harrow Road and Forty Lane, and includes all of the WCS junctions defined in Section 1.2 (WCS Junctions).

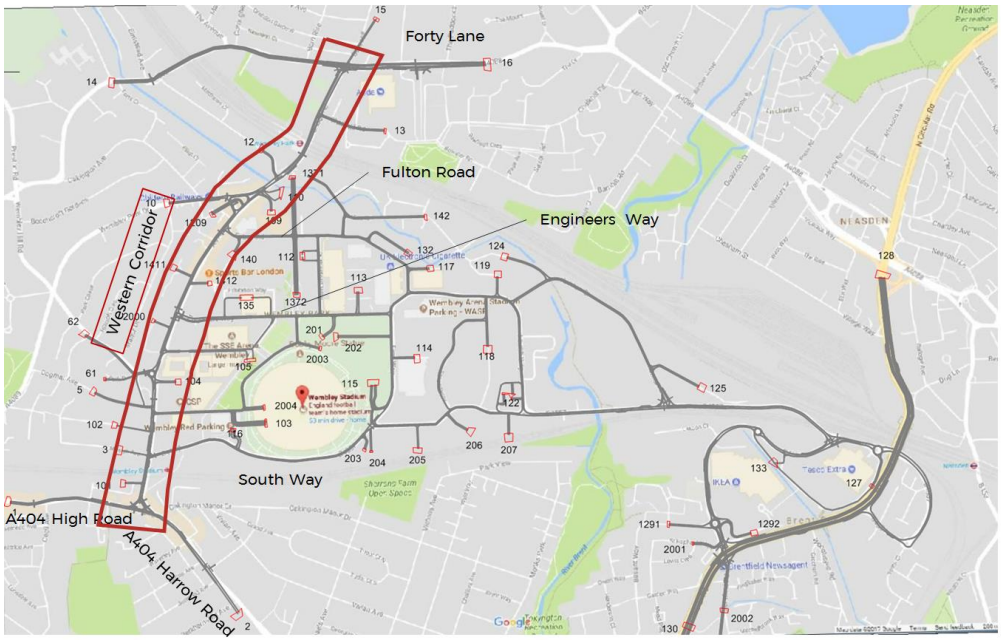


Figure 12 – VISSIM Model Network Structure and WCS Extent

6.2.6. The full model extends to the east well beyond the WCS itself in order to better model traffic movements across the Wembley Park area, and capture the alternative driver route choice. Whilst the North Circular is included within the full model, the junction itself has not been modelled in detail.

TRAFFIC DATA

6.2.7. ATC, MCC, ANPR and queue data were collected at all junctions in the study area in July 2016 to measure the current traffic flow conditions. The ATC, MCC and ANPR counts were compiled into traffic flow spreadsheets and separated by vehicle classes into:

- Lights - included cars (motorcyclists converted to cars with 0.2 factor), taxis and LGV;
- Heavies - included OGV1 and OGV2.

6.2.8. ANPR data at most entries to the network along with MCC data at all junctions were used to generate the base matrices for the VISSIM model. ATC data was extracted to provide information on the incoming and outgoing flows on main links around the network.

6.2.9. Bus services were coded separately into the model, on static routes with fixed frequencies. Information on the service routes and timetables was obtained from the TfL London Buses website. Bus stop dwell times were set to the average stop time 20sec (2sec standard deviation).

6.2.10. ANPR surveys were conducted at 23 locations and covered all major entries to the network. The data were analysed to include only external movements for lights and heavies. Those data formed approximately 80% of the total trips in the network.

6.2.11. A SATURN buffer network was built to ‘furness’ the prior matrices to include internal movements within the network. The model was checked for route selection and a Matrix Estimation (ME) process was run based on the MCC counts to factor the trips. Further manual manipulation was conducted to the post ME base matrix when the calibration checks were conducted.

SIGNAL CONTROL DATA

6.2.12. Signal timings were calculated from TfL timing sheet, UTC plans and SCOOT messages provided by TfL. The phases, staging orders, intergreens and phase delays were obtained from signal timing sheet and coded into the modelling. All signalised junctions were modelled using fixed timings using vehicle actuated programming (VisVAP) - TfL AnyPlan VAP file.

6.2.13. The model outputs were obtained for analysis periods of 08:00-09:00 and 17:00-18:00. UTC, SCOOT data and demand dependency data were also used to ensure correct signal timings in the shoulders of the analysis periods.

6.2.14. The following TfL referenced nodes were coded into the model:

- 28/002 A406 North Circular Road / Brentfield Road / Drury Road
- 28/034 Forty Avenue / Bridge Road / Forty Lane / Barn Hill
- 28/047 Bridge Road by Wembley Park Station
- 28/079 A404 Wembley High Road / A479 Wembley Hill Road / Wembley Triange / Harrow Road
- 28/091 Wembley High Road by Cecil Avenue
- 28/126 A404 Harrow Road / Neeld Crescent
- 28/139 Empire Way / Fulton Road
- 28/169 Empire Way / Engineers Way
- 28/170 B4557 South Way / Wembley High Road
- 28/174 Forty Lane / Kings Drive / Asda Access
- 28/193 B4557 Great Central Way / Drury Way
- 28/194 B4557 Great Central Way / Hannah Close
- 28/219 A4088 Forty Avenue by Brook Avenue

6.2.15. Signals were coordinated in the model to align with the existing UTC groupings shown in **Figure 14**.

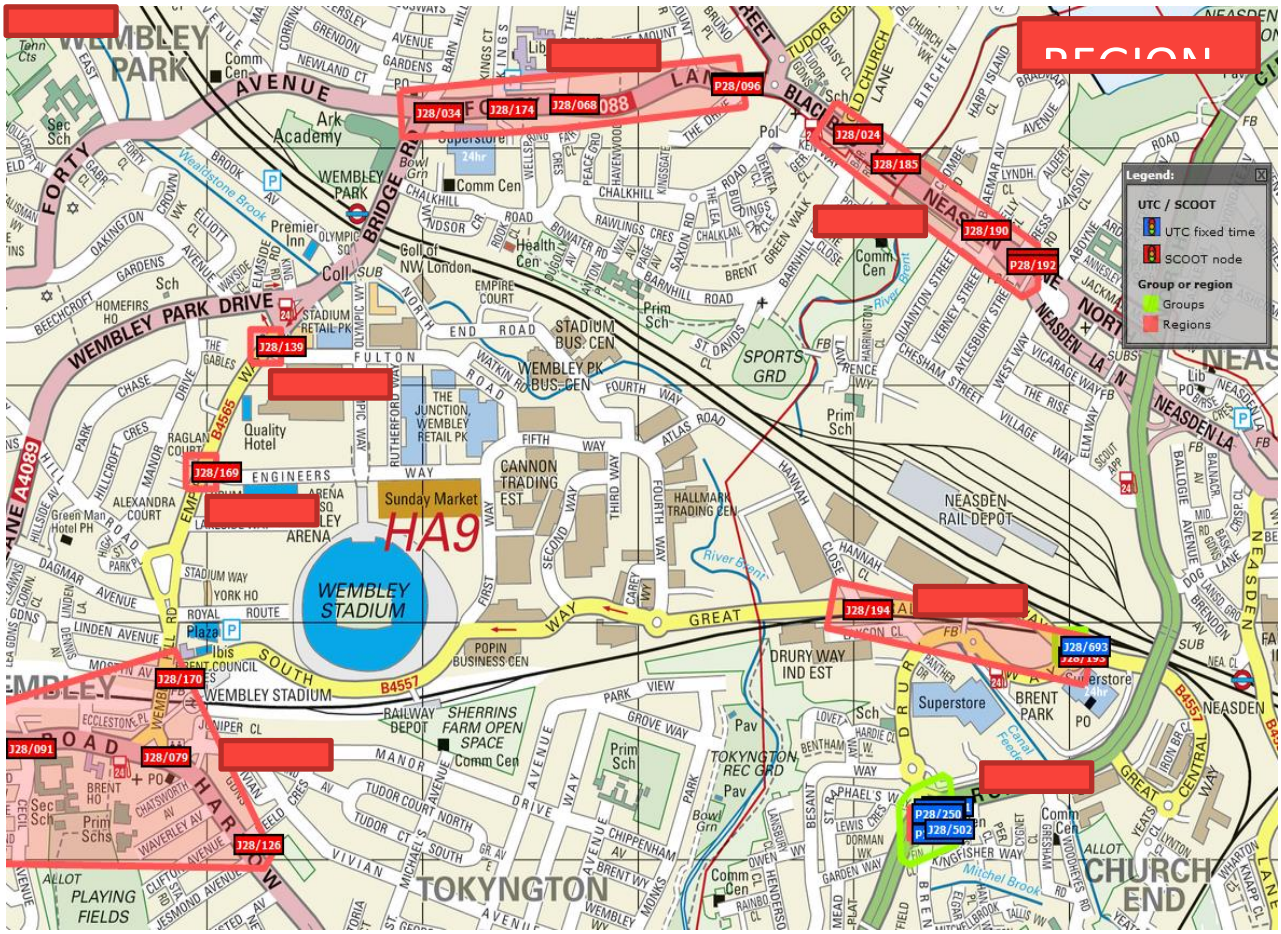


Figure 13 – Traffic Signal Coordination Groupings

6.2.16. At pedestrian crossings where the demand dependency of the crossing was recorded as less than 100%, pedestrian input was input to replicate the number of times the pedestrian stage was called within an hour. Checks were completed on demand dependent pedestrian crossing and calibrated against onsite data.

6.2.17. Demand dependent indicative right turns were modelled to only call the indicative phase when vehicles were present, as registered by vehicle detectors within the model.

TRAFFIC FLOW CALIBRATION / VALIDATION

6.2.18. The model calibration on MCC turning counts for all junctions which were used to build the VISSIM model. All measured junction turn flows were summed across the model and compared against the equivalent observed turn flows from survey (260 individual turn counts). The overall AM and PM comparison by vehicle type is provided in **Table 8**.

6.2.19. The ATC flows for the survey day which were not used in the model build were used as an independent source to validate the model. The overall validation results are shown in **Table 9**.

6.2.20. The flow calibration shows that the overall traffic levels in the model replicate the observed traffic levels with GEH values much less than 5 (i.e. Department for Transport WebTAG criteria) for all vehicle types. The validation flows presents good match against most counts with the 'heavies' presenting high GEH results. This discrepancy can be attributed to the accuracy of the ATC distinguishing between vehicle categories, which would explain some of the higher levels of light vehicles and lower levels of heavy vehicles.

Table 8 – Traffic Flow Calibration Summary Statistics

Vehicle type	Period	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
AM Peak	Lights	37,167	38,039	872	2.3%	1.8
	Heavies	2,118	1,813	-305	-14.4%	0.8
	Buses	1,357	1,213	-144	-10.6%	0.5
PM Peak	Lights	45,370	44,711	-659	-1.5%	2.3
	Heavies	860	690	-170	-19.8%	0.6
	Buses	1,253	1,201	-52	-4.2%	0.4

Table 9 – Traffic Flows Validation Overall Statistics

Vehicle type	Period	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
AM Peak	Lights	6,743	7,051	578	8.9%	3.1
	Heavies	514	250	-264	-51.4%	3.3
	Buses	-	243	243	-	4.3
PM Peak	Lights	7,464	8,113	649	8.7%	2.6
	Heavies	374	84	-290	-77.6%	4.3
	Buses	-	240	240	-	4.3

6.2.21. **Figure 14** provides an x-y plot of observed vs. modelled flows for both calibration and validation counts for the AM and PM peaks. Comparisons confirm that calibration flows match well with the observed data (R^2 = 0.9916 to 0.968) and that there is no significant over or under-representation of flows in the model (gradient = 0.9781 to 0.9567). The validation counts also match well with observed, with three counts across the two peaks not meeting validation criteria. These relate to increases in flow on Wembley Hill Road from Royal Route (N) to Linden Avenue (S) and on Empire Way from Fulton Road (N) to Engineers Way (S) in the AM Peak model, and on South Way from Second Way (E) to First Way (W) in the PM Peak model.

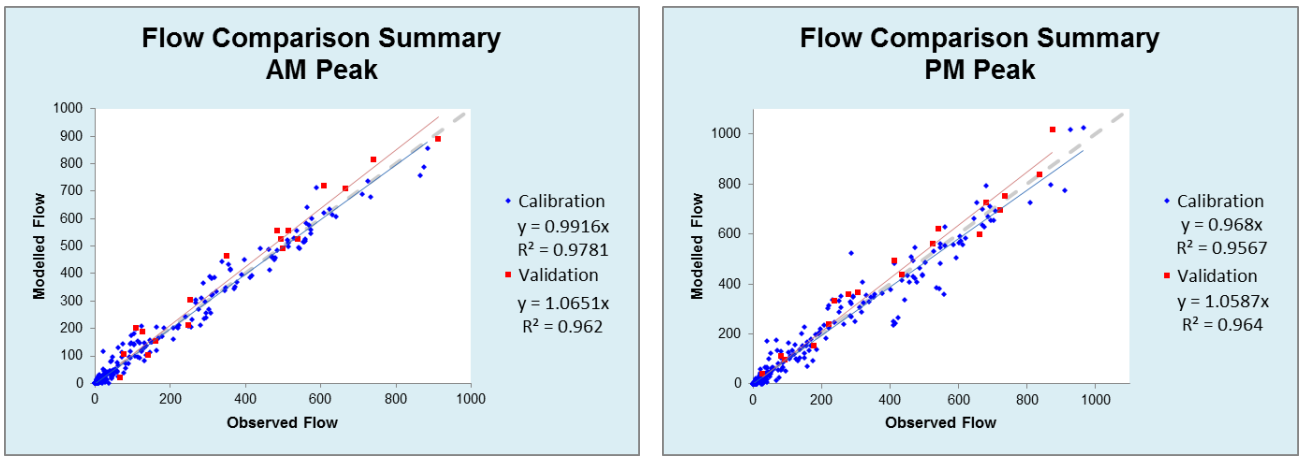


Figure 14 – AM and PM Peak Hour Modelled vs. Observed Traffic Flows

JOURNEY TIME COMPARISON

6.2.22. Journey time validation was carried out for twelve general traffic routes and four bus routes across the network. The journey time were completed with tracking vehicles method for both general traffic and buses. The general traffic routes and the bus routes are illustrated in **Figure 15**.

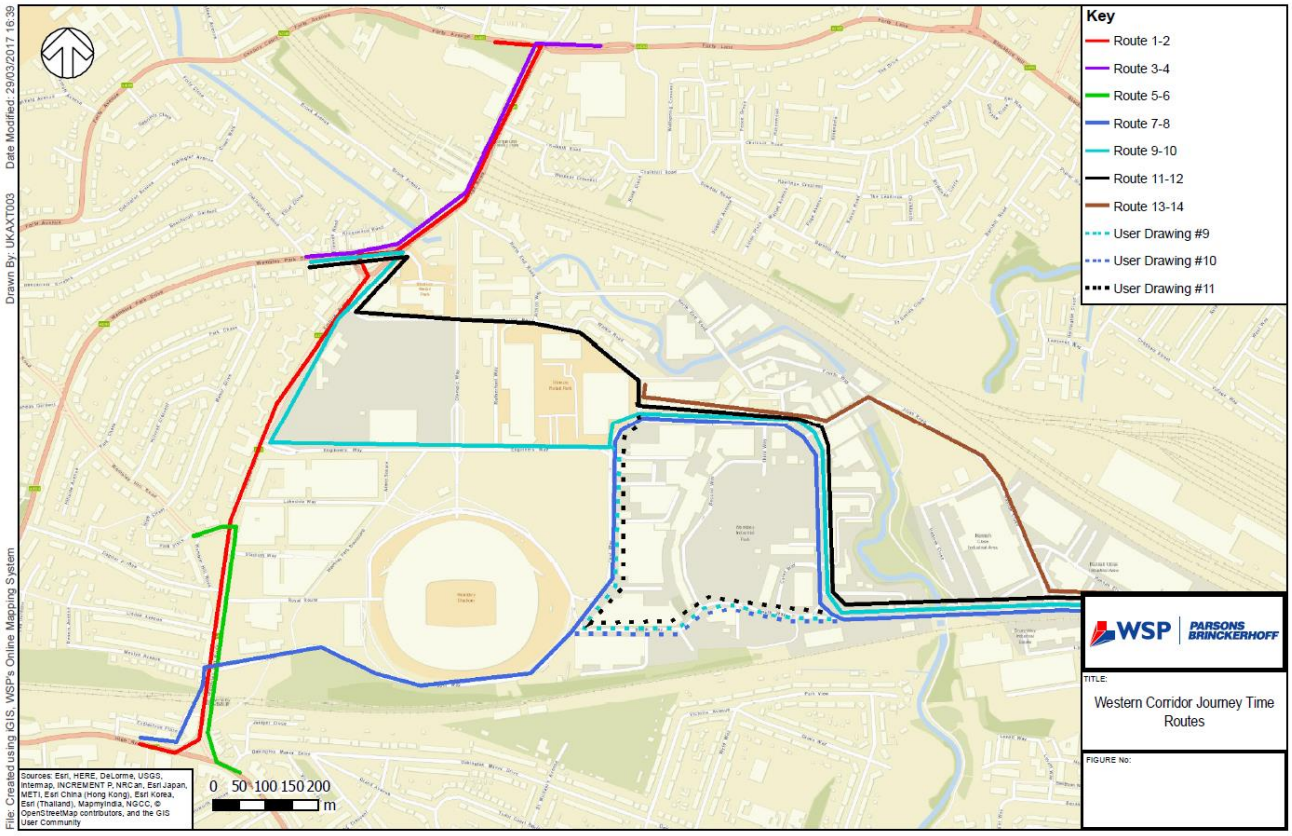


Figure 15 – Journey Time Routes

6.2.23. The following general traffic routes were assessed:

- **Route 1**: Western Corridor NB from Wembley Park Drive gyratory to A4088 Forty Lane
- **Route 2**: Western Corridor SB from A4088 Forty Lane to A404 High Road
- **Route 3**: Western Corridor EB from Wembley Park Drive EB to A4088 Forty Lane
- **Route 4**: Western Corridor WB from A4088 Forty Lane to Wembley Park Drive
- **Route 5**: Western Corridor EB from Wembley Hill Rd to Harrow Rd
- **Route 6**: Western Corridor WB from A404 Harrow Rd to Wembley Hill Rd
- **Route 7**: Wembley Park EB through South Way from A404 High Rd to Fourth Way
- **Route 8**: Wembley Park WB through South Way from South Way to A404 High Rd
- **Route 9**: Wembley Park EB through Engineers Way from A4089 Wembley Park Drive to Fourth Way
- **Route 10**: Wembley Park WB through Engineers Way from Great Central Way to A4089 Wembley Park Drive
- **Route 11**: Wembley Park EB through Fulton Road from A4089 Wembley Park Drive to Great Central Way
- **Route 12**: Wembley Park WB through Fulton Road from Great Central Way to A4089 Wembley Park Drive.

6.2.24. In addition to these, the following bus routes were also assessed:

- **Bus Route 1**: 223 NB from A404 High Road to A4088 Forty Lane
- **Bus Route 2**: 223 SB from A4088 Forty Lane to A404 High Road
- **Bus Route 3**: 206 EB from A4088 Forty Lane to Great Central Way
- **Bus Route 4**: 206 WB from Great Central Way to A4088 Forty Lane

6.2.25. Full details of the Journey Time Validation statistics are shown in **Appendix BD**.

6.2.26. The AM peak modelled data presents a good level of comparison against the observed data collected, with eleven of the twelve modelled general traffic routes falling within +/-15% (DfT WebTAG criteria). All four bus journey times sit within 15% of observed in the AM peak model. In the PM peak, there is a slightly higher level of discrepancy to the observed data, with eight of the twelve general traffic routes sitting within the +/-15% threshold. Three of the four bus journey times are also within target criteria (+/- 15%).

6.2.27. Overall the AM and PM peak journey times showed a good level of validation between modelled and observed data, suggesting both models provide an accurate representation of peak period traffic conditions.

SUMMARY

6.2.28. The base models developed to support the WCS show a good level of calibration and validation for such a large scale model.

6.2.29. A comparison between the 2016 MCCs and the flows output from the model show a very good match across 260 turn count comparisons, with all of the summary measurements showing a GEH less than 5 (DfT WebTAG criteria) for the corresponding observed counts.

6.2.30. There are some differences between observed and modelled queues, however, with the high level of correlation in journey times, and the level of judgement and coverage involved in observing queue lengths, these differences have maintained reasonable differences.

6.2.31. Overall, the modelled peak periods are shown to provide accurate representation of onsite conditions observed during the 2016 traffic surveys, and it can therefore be concluded that the models provide a robust base scenario for testing the impacts and benefits of the WCS proposals on the local highway network.

6.3 CORRIDOR SCHEME MODEL DEVELOPMENT

6.3.1. Following the development of the 2016 base models, a future year VISSIM model was developed to show the traffic operations performance of the WCS scheme proposals. The future year VISSIM model represented a 2031 future year and included the proposed junction / corridor designs, 2031 future year traffic flows and committed development trips.

NETWORK CODING

6.3.2. The future year proposed layout for the Western Corridor was coded into VISSIM as per the final designs descried within Chapter 4 of this report. The scheme development and modelling progressed iteratively, with earlier model versions identifying issues which were subsequently addressed through design refinements. The scheme model as coded using 'Scenario Management feature within VISSIM 8, enabling coding changes to be made and carried forwards between different options if required. This also enabled changes to be duplicated across different peak models, ensuring coding consistency.

TRAFFIC SIGNALS

6.3.3. One of the WCS objectives, as defined in the s106 agreement, is "*linking the WCS Junctions to optimise traffic light co-ordination*". Analysis of traffic movements from the ANPR survey showed that the corridor could be divided into three distinct sections:

- Harrow Road to York House Roundabout – typically carrying through traffic between Harrow Road and Wembley Hill Road;
- York House Roundabout to Wembley Park Drive – typically local traffic movements and much lower peak hour flows than other two sections; and
- Wembley Park Drive to Forty Lane – typically carrying through traffic between Wembley Park Drive and Forty Lane.

6.3.4. Given the distinct nature of these three segments, it was proposed to coordinate the signalised junctions through the corridor as shown in **Figure 16**. This arrangement allows the coordination of traffic signals along the key traffic carrying corridors, and also allows the signals along Empire Way (between York House Roundabout and Wembley Park Drive gyratory) to operate with a lower cycle time when traffic flows allowed, and therefore minimise pedestrian crossing delay.

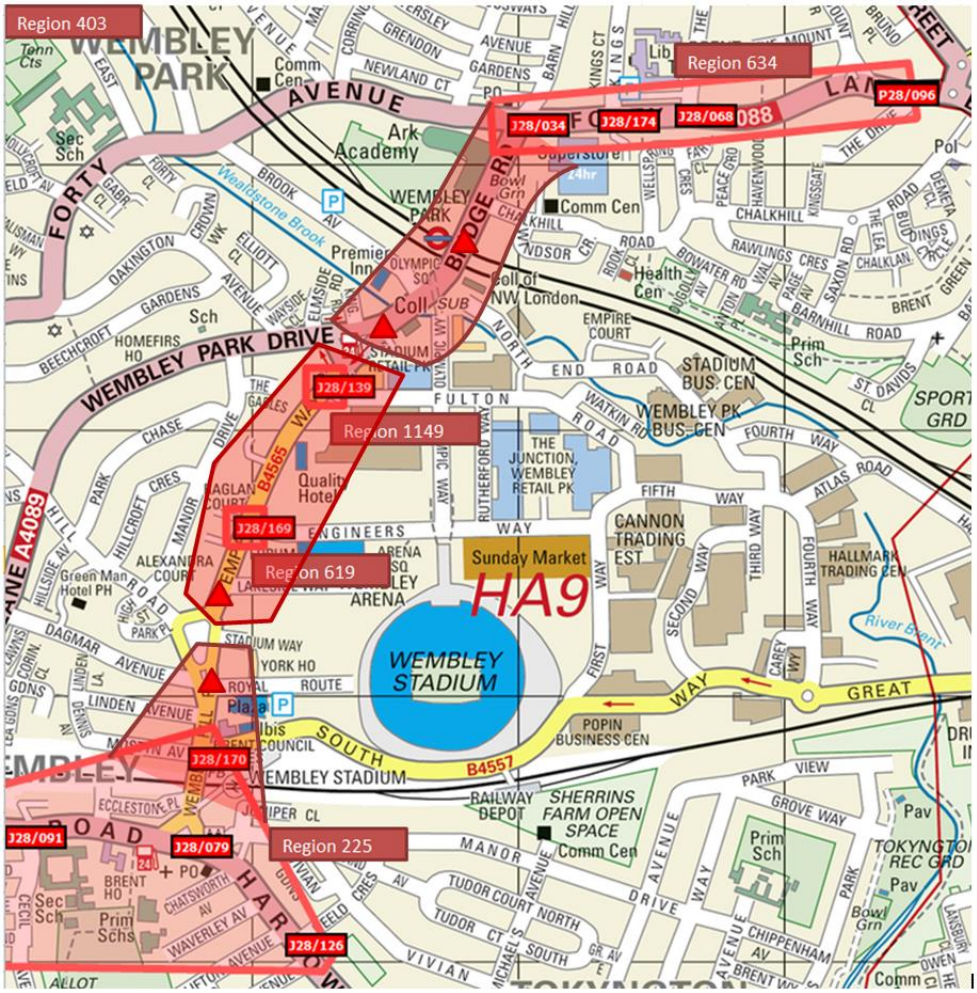


Figure 16 – Proposed Traffic Signal Groupings

6.3.5. The proposed signal coordination changes include:

- extending Region 225 from Harrow Road to include the proposed signalised pedestrian crossing on Wembley Hill Road between Dagmar Way and Stadium Way;
- creating a new Urban Traffic Control (UTC) Region combining the existing Regions 619 and 1149 representing the Empire Way junctions with Engineers Way and Fulton Road respectively; and
- extending Region 634 from Forty Lane to include the signalised pedestrian crossing on Bridge Road outside Wembley Park Station, the new junction connecting North End Road with Bridge Road, and the proposed signalised crossings to the north of the Wembley Park Drive / Bridge Road gyratory.

6.3.6. Initial junction modelling assessments in LinSig showed a cycle time of 104 seconds to be appropriate for the full Western Corridor, and thus was taken through the full corridor in both peaks. A manual signal optimisation method was used to create the most streamlined operation through the corridor. After implementation, the actual signal timings applied 'on-street' are determined by TfL and will be optimised using the real-time adaptive traffic control system SCOOT (Split Cycle Offset Optimisation Technique). TfL also conduct a rolling programme of signal timing reviews to ensure that timings meet prevailing policy objectives.

6.3.7. The linking, coordination and optimisation of traffic signals through the corridor will be the responsibility of TfL's traffic signals team. It is proposed that signalling infrastructure required for coordination is installed as part of the junction improvement works and commissioned onto TfL's UTC system by TfL at the same time. At existing signal installations we recommend that TfL review the signal grouping as part of their signal 'timing review' process, and seek to implement the above proposed coordination protocol when possible within that programme. The coordination of traffic signals through the corridor will therefore be implemented in a phased manner, which is aligned with the wider programme of junction improvements.

6.3.8. The Method of Control (MoC) at a traffic signal defines the sequence of phases / stages that run through during the signal cycle time. The MoC was changed at several junctions along the Western Corridor, in particular where junction designs were changed, or where a new junction has been created. These changes in MoC are discussed below.

A404 Harrow Road / Wembley Hill Road

6.3.9. The junction of Wembley Hill Road with High Road and Harrow Road is changed significantly from its current design as described in Section 4.2. The MoC implemented at this junction (**Figure 17**) was designed to provide a high level of pedestrian crossing facility whilst maximising traffic capacity. At this junction an all-round pedestrian crossing stage was provided. All pedestrian crossings are 'single stage' / 'straight across' pedestrian movements.

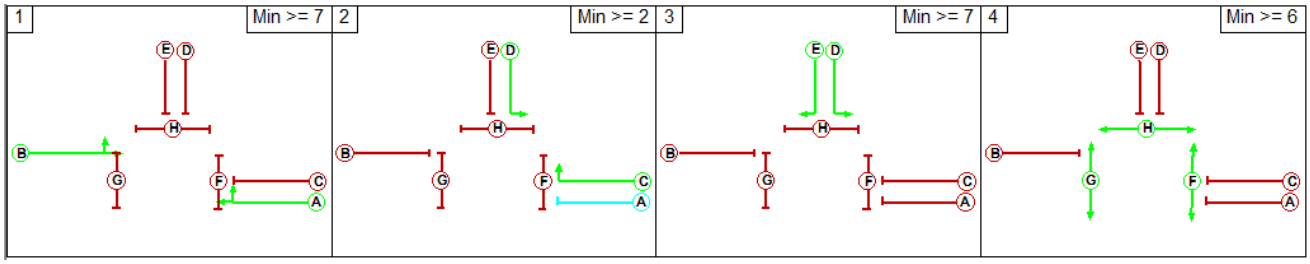


Figure 17: Wembley Hill Road / High Road / Harrow Road Proposed Method of Control

Wembley Hill Road / South Way

6.3.10. At the junction of Wembley Hill Road with South Way, the main MoC change is allowing the left turn from South Way to run at the same time as the right turn from Wembley Hill Road (S). The proposed design is described in Section 4.2. The MoC is shown in **Figure 18**.

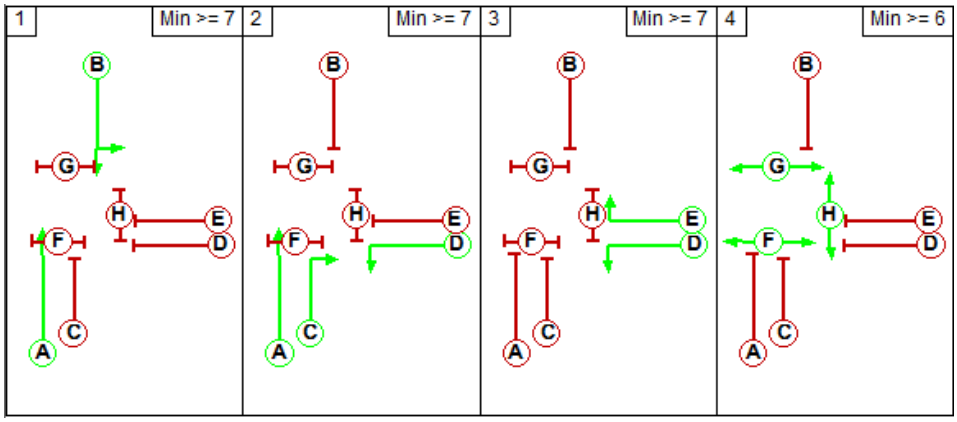


Figure 18: Wembley Hill Road / South Way Proposed Method of Control

Empire Way / Fulton Road

6.3.11. The redesign of the Fulton Road junction with Empire Way allows a right turn movement from the south into Fulton Road. There are also separate streams for the southbound movements, allowing the potential of a left turn early start. The proposed design is described in Section 4.2. The MoC is shown in **Figure 19.**

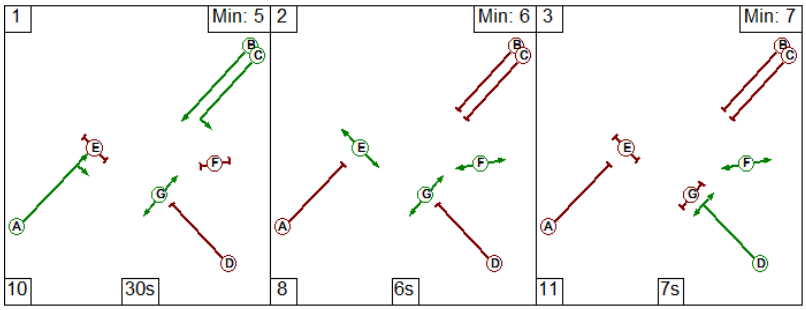


Figure 19 - Empire Way / Fulton Road Proposed Method of Control

Bridge Road / North End Road

6.3.12. At the proposed new junction of Bridge Road with North End Road, the junction will operate with a four stage arrangement, with the main north – south movement followed by the unopposed right turn from Bridge Road into North End Road, North End Road itself, and finally an all-around pedestrian stage. The proposed design is described in Section 4.2. The MoC is shown in **Figure 20**.

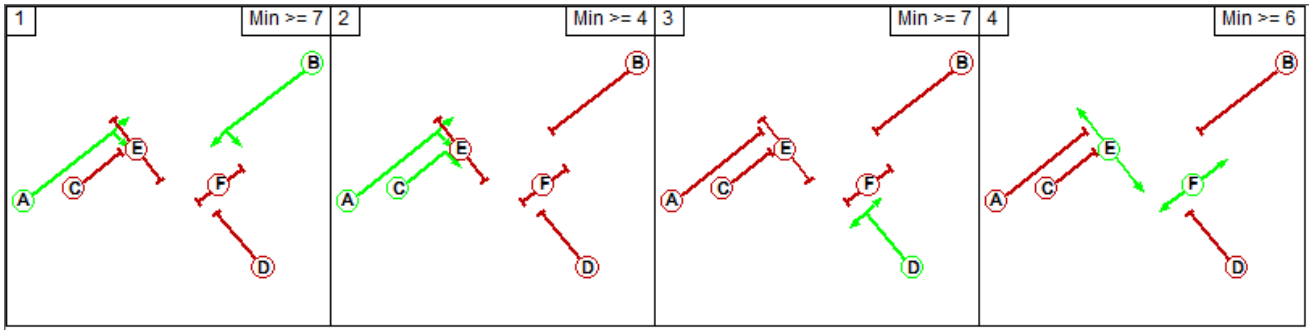


Figure 20: Bridge Road / North End Road Proposed Method of Control

Bridge Road / Forty Lane / Forty Avenue

6.3.13. The redesign of the Forty Lane junction includes improved pedestrian facilities, with straight over crossings replacing a two stage crossing on the western side of the junction, and the current four part crossing on the southern side of the junction being reduced to a three stage crossing. The proposed design is described in Section 4.2. The MoC is shown in **Figure 21**.

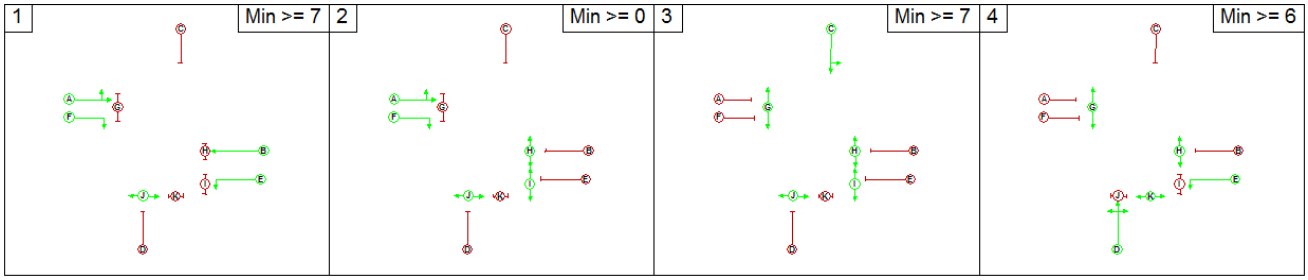


Figure 21 - Forty Avenue / Bridge Road / Forty Lane / Barn Lane Proposed Method of Control

6.4 CORRIDOR PERFORMANCE RESULTS

6.4.1. The results described in this section demonstrate the traffic performance forecast for the Western Corridor in 2031 weekday peak hours with the proposed highway and pedestrian crossing improvements. Comparisons are made against base year model which represents typical 2016 peak hour conditions.

TRAFFIC FLOWS

6.4.2. Peak hour traffic flows were extracted from the VISSIM model for east-west movements across the corridor. The two screenlines (Eastern SL and Western SL) are shown in **Figure 22**.

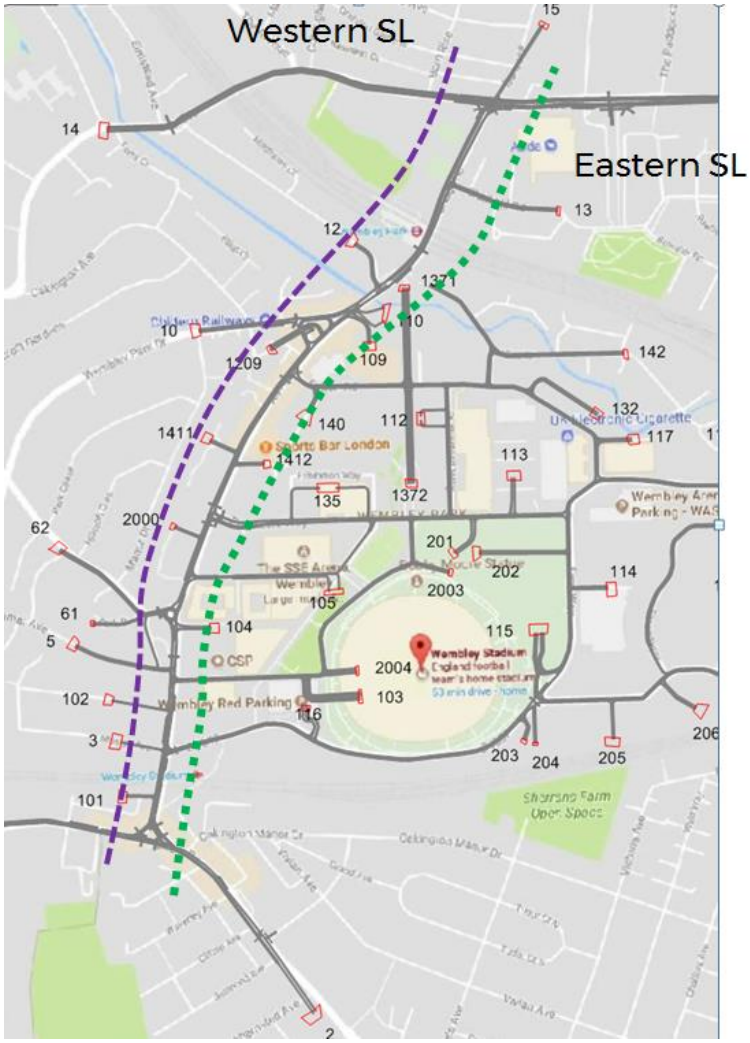


Figure 22 – Traffic Flow Screenlines

6.4.3. The traffic flows across the Eastern screenline are shown in **Table 10** for the AM peak. Overall there is an increase in traffic crossing the screenline as expected; particularly in the westbound direction towards the study corridor in the morning peak (73% increase). Royal Route and South Way are also forecast to carry more traffic as a result of local development related traffic movements, although it is noted that this level of demand is unlikely to eventuate due to the lower level of car parking than originally proposed and less traffic intensive land uses being brought forward than was considered in outline planning applications. The proposed North End Road connection is forecast to carry around 480 vehicles per hour (two-way) in the AM peak. In the eastbound direction, the North End Road connection appears to cause a significant drop in traffic on Fulton Road (-375 vph) as it represents a faster alternative route which avoids several signalised junctions.

6.4.4. The traffic flows across the Eastern screenline are shown in **Table 11** for the PM peak. There is a general increase in traffic crossing the screenline with the eastbound movement towards Wembley Park showing the largest increase (57%). Royal Route and South Way are forecast to carry more traffic due to local development related traffic movements, although it is noted that this level of demand is unlikely to eventuate due to the lower level of car parking than originally proposed and less traffic intensive land uses being brought forward than was considered in outline planning applications. The North End Road connection is forecast to carry 550 vph (two-way) in the PM peak, although there is less evidence in the PM peak of traffic levels dropping on Fulton Road as a result of the new connection.

Table 10 – Eastern Screenline Traffic Flows (AM Peak Hour)

Eastern Screenline Westbound

	Base	2031	Diff	%Diff
Chalkhill Road	251	227	-24	-9%
North End Road	0	149	149	0%
Fulton Road	143	224	82	57%
Engineers Way	149	145	-4	-2%
Lakeside Way	36	17	-18	-51%
Stadium Way	29	27	-1	-4%
Royal Route	17	258	241	1401%
B4557 South Way	108	214	107	99%
Sum	**732**	**1263**	**531**	**73%**

Eastern Screenline Eastbound

	Base	2031	Diff	%Diff
Chalkhill Road	125	103	-21	-17%
North End Road	0	329	329	0%
Fulton Road	517	143	-375	-72%
Engineers Way	311	253	-58	-19%
Lakeside Way	34	24	-10	-29%
Stadium Way	39	35	-3	-9%
Royal Route	69	262	193	278%
B4557 South Way	165	203	38	23%
Sum	**1259**	**1352**	**93**	**7%**

Table 11– Eastern Screenline Traffic Flows (PM Peak Hour)

Eastern Screenline Westbound

	Base	2031	Diff	%Diff
Chalkhill Road	156	156	0	0%
North End Road	0	352	352	0%
Fulton Road	406	424	19	5%
Engineers Way	319	245	-75	-23%
Lakeside Way	27	8	-19	-70%
Stadium Way	50	52	2	4%
Royal Route	177	308	132	75%
B4557 South Way	273	387	114	42%
Sum	**1408**	**1933**	**524**	**37%**

Eastern Screenline Eastbound

	Base	2031	Diff	%Diff
Chalkhill Road	147	140	-7	-5%
North End Road	0	200	200	0%
Fulton Road	147	117	-31	-21%
Engineers Way	173	209	35	20%
Lakeside Way	36	34	-2	-6%
Stadium Way	32	34	2	7%
Royal Route	74	181	107	146%
B4557 South Way	121	231	110	91%
Sum	**730**	**1146**	**416**	**57%**

JOURNEY TIMES

6.4.5. Bus and general traffic journey times were recorded for the routes shown in **Figure 23**.

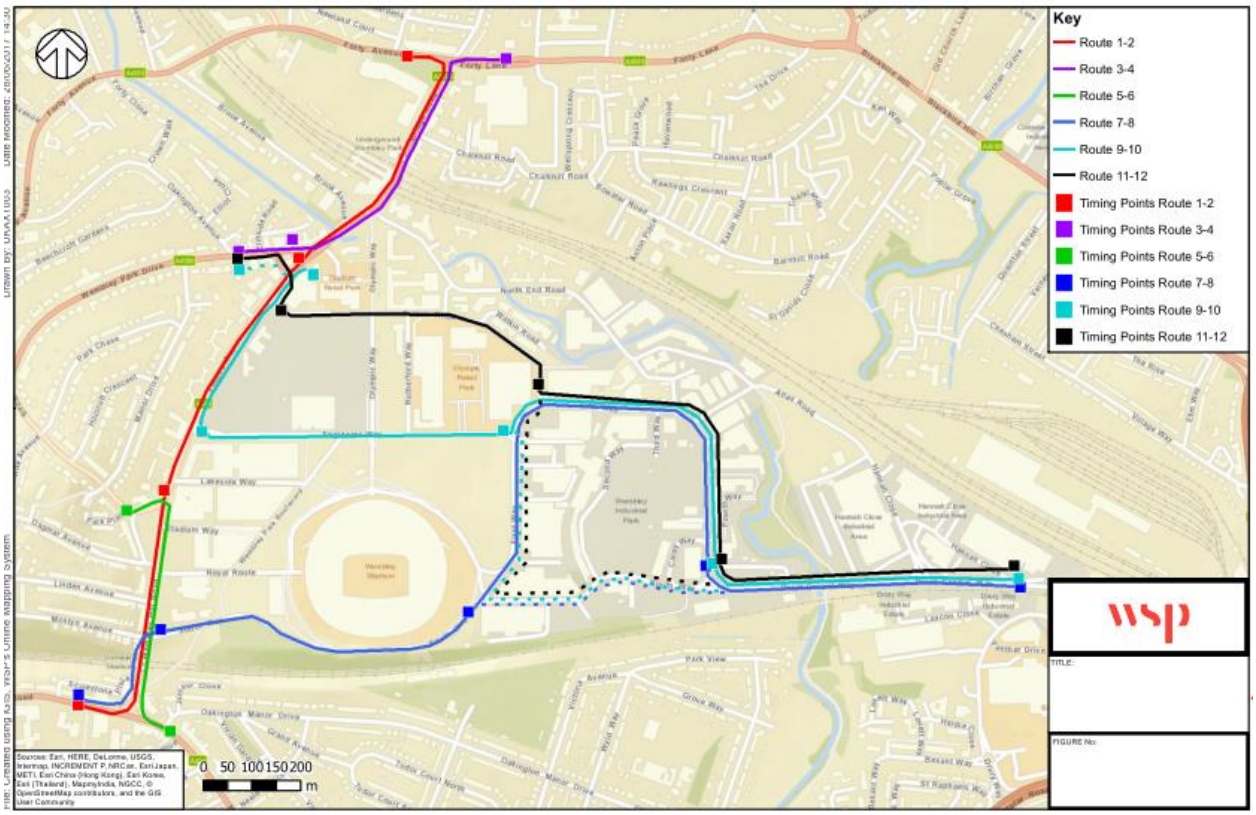


Figure 23 – Journey Time Routes

6.4.6. Of primary interest to the WCS are journey times along Routes 1 to 6, which show the forecast journey times north-south along the corridor:

- **Route 1**: Western Corridor NB from Wembley Park Drive gyratory to A4088 Forty Lane
- **Route 2**: Western Corridor SB from A4088 Forty Lane to A404 High Road
- **Route 3**: Western Corridor EB from Wembley Park Drive EB to A4088 Forty Lane
- **Route 4**: Western Corridor WB from A4088 Forty Lane to Wembley Park Drive
- **Route 5**: Western Corridor EB from Wembley Hill Rd to Harrow Rd
- **Route 6**: Western Corridor WB from A404 Harrow Rd to Wembley Hill Rd

6.4.7. General traffic routes 7 to 12 forecast journey times for east-west movements across the corridor:

- **Route 7**: Wembley Park EB through South Way from A404 High Rd to Fourth Way
- **Route 8**: Wembley Park WB through South Way from South Way to A404 High Rd
- **Route 9**: Wembley Park EB through Engineers Way from A4089 Wembley Park Drive to Fourth Way
- **Route 10**: Wembley Park WB through Engineers Way from Great Central Way to A4089 Wembley Park Drive
- **Route 11**: Wembley Park EB through Fulton Road from A4089 Wembley Park Drive to Great Central Way
- **Route 12**: Wembley Park WB through Fulton Road from Great Central Way to A4089 Wembley Park Drive.

6.4.8. The bus route journey times are represented by:

- **Bus Route 1**: 223 NB from A404 High Road to A4088 Forty Lane
- **Bus Route 2**: 223 SB from A4088 Forty Lane to A404 High Road
- **Bus Route 3**: 206 EB from A4088 Forty Lane to Great Central Way
- **Bus Route 4**: 206 WB from Great Central Way to A4088 Forty Lane

6.4.9. For the purpose of this comparison the results have been filtered to only include the journey time sections within the study area (i.e. from the Western Corridor to First Way).

6.4.10. The detailed bus and general traffic journey time tables are provided in **Appendix BD** for the AM and PM peaks. Journey times are shown for 2016 base year as well as 2031 scenario with the WCS improvements.

6.4.11. In the AM peak, the 2031 forecast journey times along the corridor are generally slightly higher than current journey times, and in most cases the 2031 journey times are within one minute of base year journey times. The AM peak general traffic journey time results are shown in **Figure 24**.

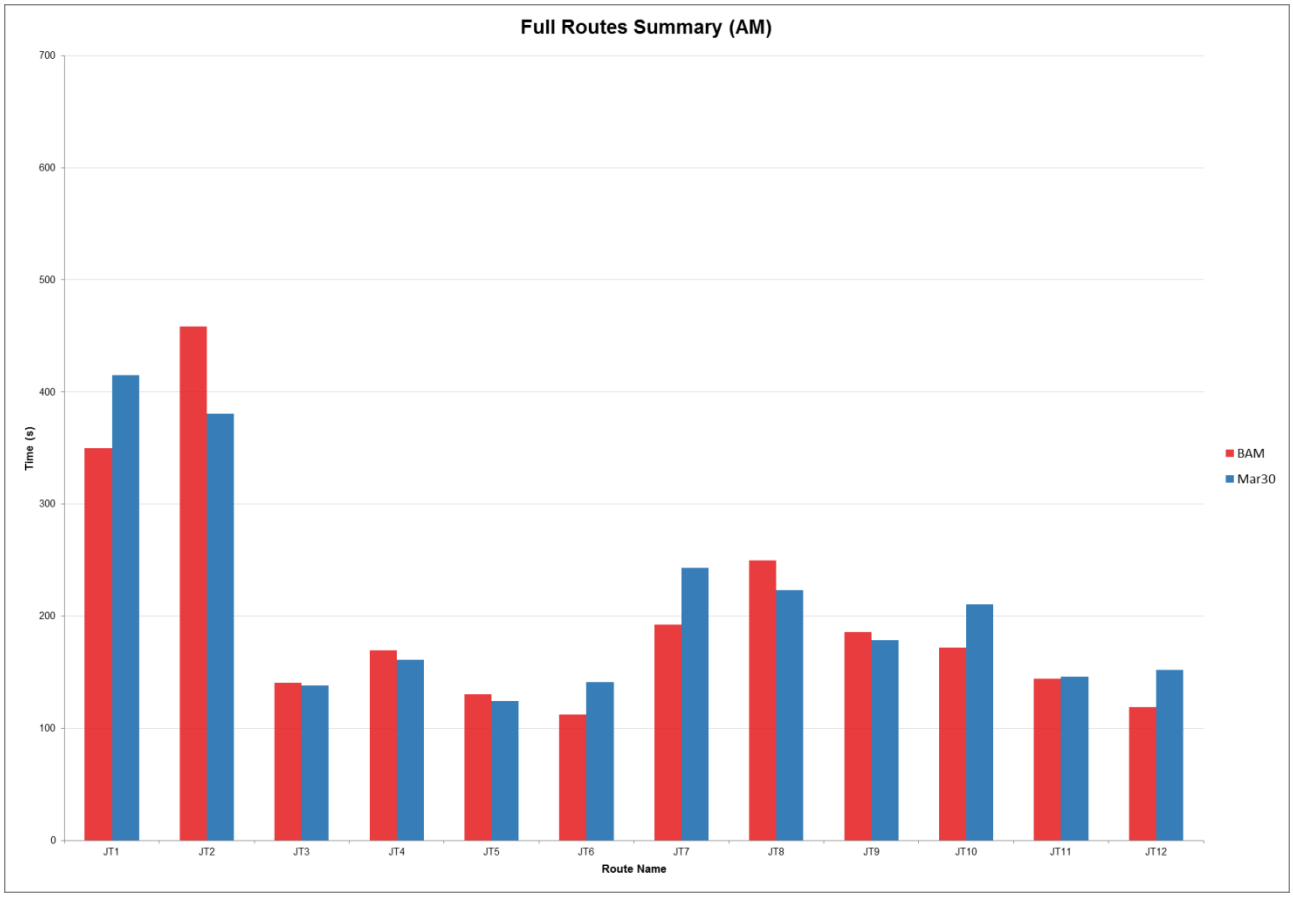


Figure 24 – Base vs. WCS Model Journey Time Comparisons (AM Peak)

6.4.12. The AM peak hour journey times forecast in 2031 with the WCS improvements in place are generally close to those in the 2016 base year model. Along the corridor the northbound journey time is forecast to increase by around one minute. This increased delay occurs on the southern section of the corridor between Harrow Road and Fulton Road junctions, and is thought to be partly due to new signalised pedestrian crossings along the route. Southbound general traffic journey times through the corridor are forecast to improve by over one minute. Journey time improvements are thought to be due to better traffic signal coordination through the corridor, which minimises the number of stops vehicles experience.

6.4.13. East-west movements across the corridor are also forecast in 2031 with the WCS improvements in place to experience journey times which are similar to those experienced today. Some routes show increases (less than one minute), and other routes forecast reductions in journey time.

6.4.14. The PM peak is busier than the AM and general traffic journey times are higher in this peak, when compared with the AM peak. However, journey times in the PM peak show less variation than in the AM peak, with several journey time routes, such as Route 1 northbound along the full length of the corridor, showing improvements in journey times. This can be attributed to improvements to improved traffic signal coordination through the corridor. The PM peak general traffic journey time results are shown in **Figure 25**.

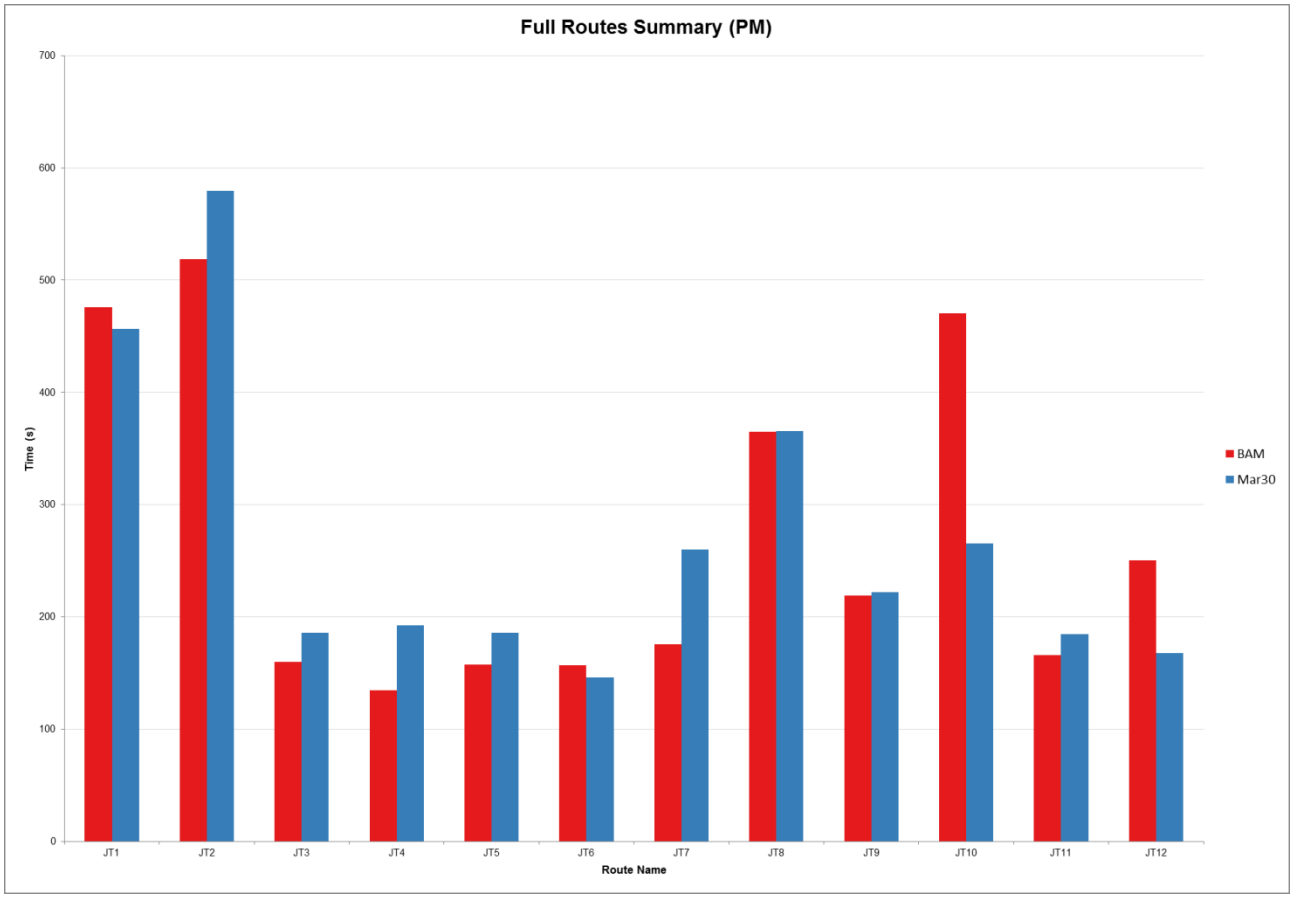


Figure 25 – Base vs. WCS Model Journey Time Comparisons (PM Peak)

6.4.15. In the southbound direction, there is an increase in journey time of around one minute which mainly occurs between Forty Lane and Wembley Park Drive gyratory. This increase in delay is likely to be due to the new North End Road junction and the new signalised pedestrian crossings proposed north of the Wembley Park Drive gyratory. Route 7 is forecast to increase journey time by 84 seconds which is attributed to an increase in queuing on the High Road approach to Wembley Hill Road and northbound queue on approach to South Way junction.

6.4.16. The westbound routes along Engineers Way and Fulton Road show a significant improvement thought to be due to the establishment of an alternative route via North End Road which has reduced the number of traffic movements on both routes.

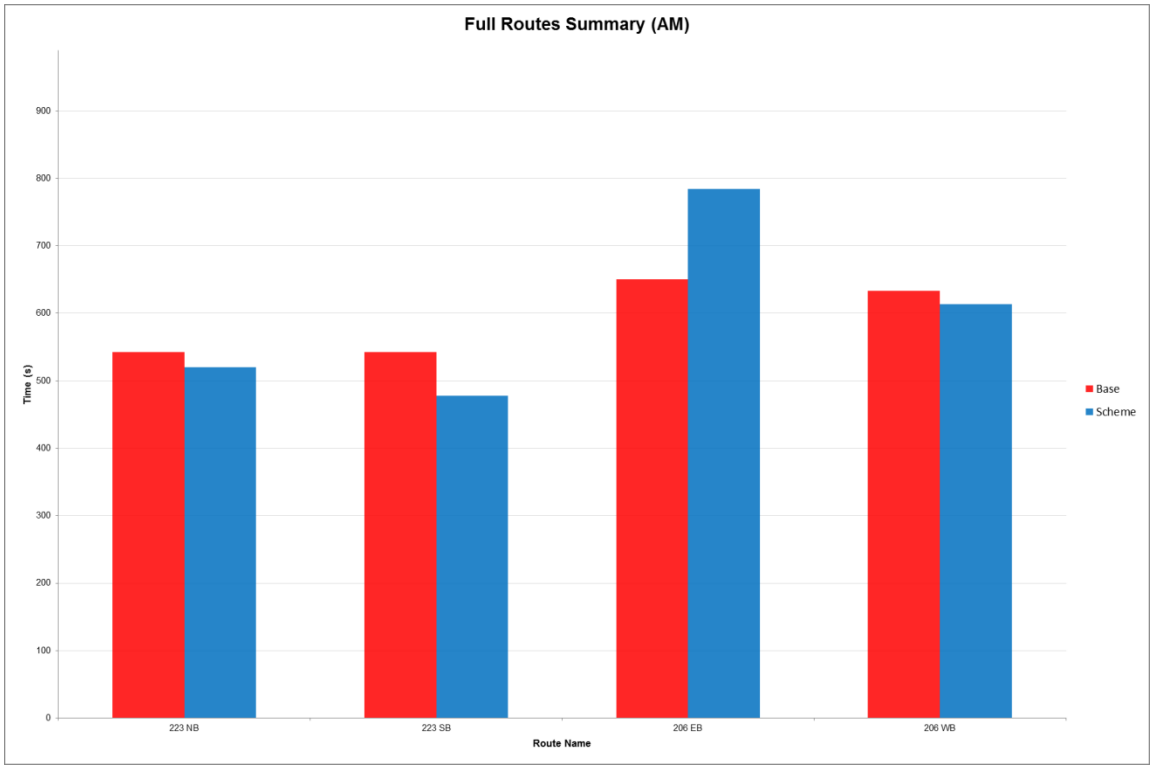


Figure 26 – AM Bus Journey Time Result Comparison

6.4.17. Bus journey times in the AM peak (**Figure 26**) are forecast to be improved when compared with the 2016 base year, with only one route showing a slight increase in journey time (22 seconds). Bus routes in the PM peak (**Figure 27**) generally show a small increase in journey time, when compared with the 2016 base year. The largest increase forecast is just over a minute (62 seconds, 17%).

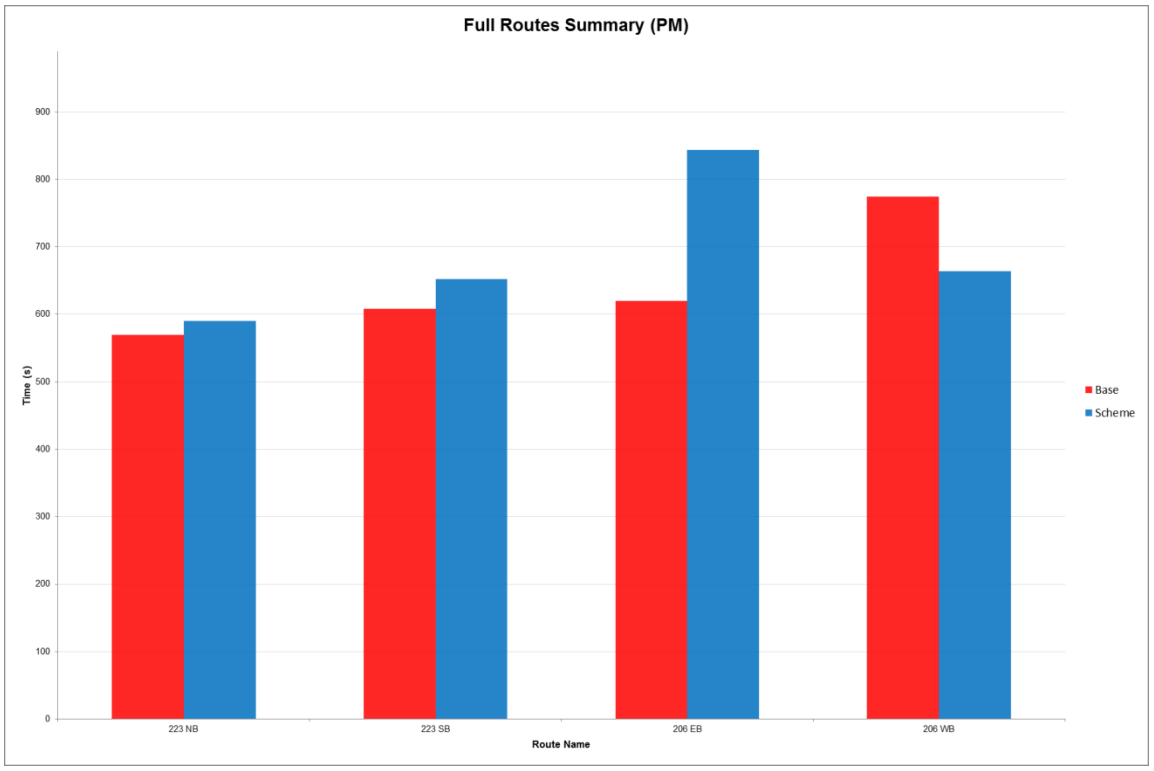


Figure 27 – PM Bus Journey Time Result Comparison

QUEUING BEHAVIOUR

6.4.18. Queue lengths have been measured at each signalised approach along the study corridor, with these results shown in **Appendix E.** General queuing behaviour through the corridor is described below.

AM Peak Hour

6.4.19. Overall queuing in the 2031 AM peak model with WCS improvements in place is similar to the 2016 AM peak base model. There are long, but mostly stable, queues occurring on the A404 High Road approach to Wembley Hill Road. Queues on the eastern arm (Harrow Road approach) fluctuate at around 150m. Southbound traffic along the corridor is forecast to experience intermittent broken queues from the York House roundabout through to Harrow Road junction. These queues are due to various points of 'friction' at the proposed signalised pedestrian crossing south of the roundabout, around the bus stop north of South Way junction, and at the South Way and Harrow Road junctions themselves. .

6.4.20. Queues on South Way, Engineers Way and Fulton Road approaches are small throughout the AM peak hour. However there are long queues at times on North End Road approach to the Wembley Park Road junction. In reality, drivers may adjust to this level of queuing and choose to travel via Fulton Road as an alternative. It is noted however that the North End Road route from Fulton Road allows drivers to avoid three signalised junctions, when compared with travelling directly via Fulton Road, Empire Way, Wembley Park Road route.

6.4.21. Intermittent traffic queues along the corridor are forecast northbound through the Wembley Park Road gyratory due to the proposed signalised pedestrian crossing north of the gyratory, and the proposed North End Road junction.

6.4.22. In the southbound direction traffic queues form on approach to the signalised crossing adjacent to the Wembley Park station and proposed North End Road junction. These queues are generally slow moving and extend back to the Forty Lane junction at times. Queues are forecast on Chalkhill Road at a similar level as seen in the base model. The Chalkhill Road queues form due to the difficulty drivers experience joining Bridge Road due to slow moving queues on that route.

6.4.23. The proposed Forty Lane junction improvements result in similar levels of queuing around the junction, with the largest queues occurring on the east and west arms, with queues peaking at just over 400m from the eastern arm heading south onto the corridor.

PM Peak Hour

6.4.24. The PM peak is generally busier than the AM peak as implied by the matrix totals described in section 5.3.

6.4.25. In the PM peak, there are similar levels of queuing at the A404 High Road / Wembley Hill Road junction as forecast in the AM peak. Longer queues are forecast southbound along Wembley Hill Road and Empire Way, extending back through the Engineers Way junction at times. As a consequence, long queues form on Engineers Way and Royal Route approaches during the peak. The queueing on Royal Route is unlikely to occur due to the lower level of car parking than originally proposed and less traffic intensive land uses being brought forward than was considered in outline planning applications. Queues grow on the South Way approach through the peak hour, implying that the junction has reached its capacity.

6.4.26. Elsewhere along the corridor there are longer queues observed around the new North End Road junction and through the Wembley Park Road gyratory, although these are intermittent, rather than persistent queues. Queues on the North End Road approach itself extend back to Fulton Road by the end of the peak hour.

6.4.27. At the Forty Lane junction queuing is forecast to most predominant be on the western arm, exceeding 220m at some points during the peak hour. However, these queues remain consistent and are shown to dissipate quickly when the approach is given traffic 'green', whilst queuing on all other approaches remains modest.

7 CONCLUSIONS

7.1.1. The Western Corridor Study has undertaken highways design and traffic modelling work to establish the works required to meet the Owner's Objectives and Council's Objectives as secured by the s106 agreement attached to planning permission 15/5550 (23 December 2016).

7.1.2. The coordinated package of highway designs have been developed in close cooperation with LB Brent and Quintain to meets the study objectives which are set out in Chapter 1. Highway design proposals have been tested in traffic micro-simulation (VISSIM) based on a 2031 forecast demand for the AM and PM peak hours. The VISSIM model was used iteratively to refine the highway design, and optimise signal timings and coordination to maximise the efficiency of traffic through the corridor. Traffic modelling results shows that bus and general traffic journey times through the corridor in 2031 are forecast to be largely maintained at similar levels as today (2016 base year). The largest journey time increases, compared with 2016 base year, are limited to around one minute, whilst many routes are forecast to show improved journey times.

7.1.3. Traffic growth associated with Wembley Park results in localised increases in peak hour traffic on east-west routes by 2031. However, it is considered unlikely that the development demand which has been modelled through the study will eventuate at this level due to lower rates of parking being delivered than at planning. Therefore the results presented here represent a conservative upper end forecast.

7.1.4. Overall the study has demonstrated that the package of proposed highway works will meet the WCS objectives as set out in Chapter 1.

7.2 NEXT STEPS

7.2.1. The WCS has developed and tested a coordinated package of highway and traffic signalling improvements for the study corridor. It sets the blueprint for the corridor and demonstrates that, combined, the interventions will deliver improvements along the corridor. However the interventions will need to come forward in a phased manner as they are individually subject to separate planning and funding constraints. In addition, schemes will be subject to further consultation, technical approval and detailed design.

Appendix A

HIGHWAY SCHEME DRAWINGS

DO NOT SCALE

WEMBLEY PARK DRIVE

33.2m

TCB

ROAD MARKING CHANGED TO ALLOW LEFT LANE TO CONTINUE ROUND THE GYRATORY SYSTEM

ADDITIONAL THROUGH LANE PROVIDED

CHANNEL LINE MOVED INTO FOOTWAY TO ACCOMMODATE ADDITIONAL LANE WIDTHS

PEDESTRIAN REFUGE ISLANDS ADDED TO JUNCTION

ISLAND REMOVED

FOOTWAY NARROWED TO 1.9m

ADDITIONAL RIGHT TURN LANE ADDED

CHANNEL LINE MOVED INTO FOOTWAY TO ACCOMMODATE ADDITIONAL LANE WIDTHS

CHANNEL LINE MOVED TO ACCOMMODATE JUNCTION WIDENING

FOOTWAY MOVED INTO SAFEGUARDED LAND

JUNCTION GEOMETRY UPDATED

FULTON ROAD

EMPIRE WAY

WEMBLEY PARK DRIVE

WEALDSTONE ROAD

Bank

Garage

Empire House

Studio and Television Centre

Fulton House

THIS DRAWING REFERENCES PBA DRAWING 20082/037/028 REVISION D

KEY

VISIBILITY SPLAYS

REV	DATE	BY	DESCRIPTION	CHK	APD
A	21/12/2016	CRJB	FIRST ISSUE	MWP	MDW

SCALE @ A3: NTS

CHECKED: MWP

APPROVED: MDW

DRAWING STATUS: FOR INFORMATION ONLY

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PROJECT: NORTH WEST LANDS

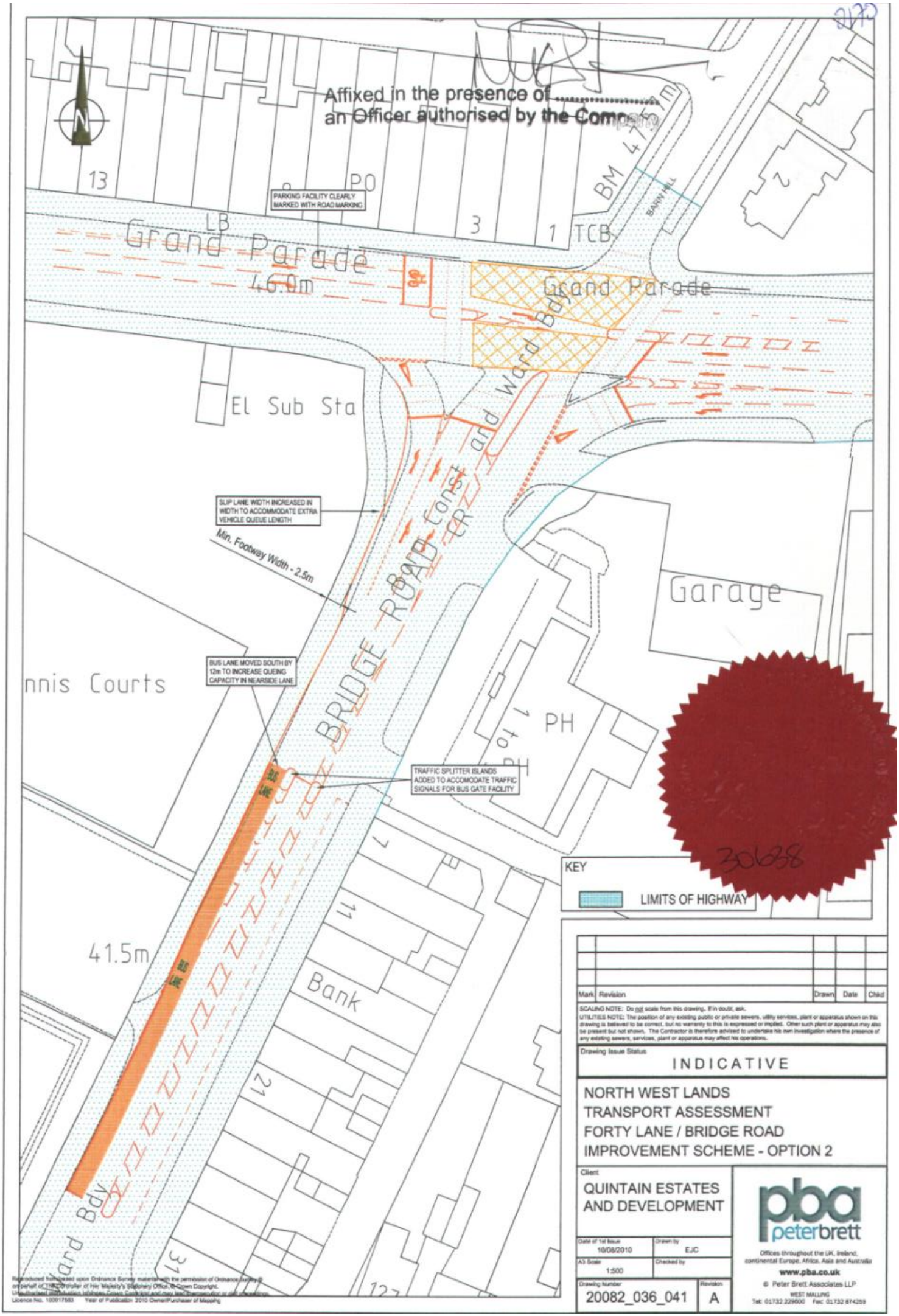
TITLE: EMPIRE WAY / FULTON ROAD JUNCTION

CLIENT: QUINTAIN

ARCHITECT:

CAD FILE:	DESIGN-DRAWN:	DATE:
1894-SK-016.DWG	CRJB	December 16

PROJECT No:	DRAWING No:	REV:
70021894	1894-SK-016	A



Mark	Revision	Drawn	Date	Chkd

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Drawing Issue Status

INDICATIVE

NORTH WEST LANDS TRANSPORT ASSESSMENT FORTY LANE / BRIDGE ROAD IMPROVEMENT SCHEME - OPTION 2

Client

QUINTAIN ESTATES AND DEVELOPMENT

Date of 1st Issue	Drawn by
19/08/2010	EJC
A3 Scale	Checked by
1:500	

Drawing Number: 20082_036_041

Revision: A

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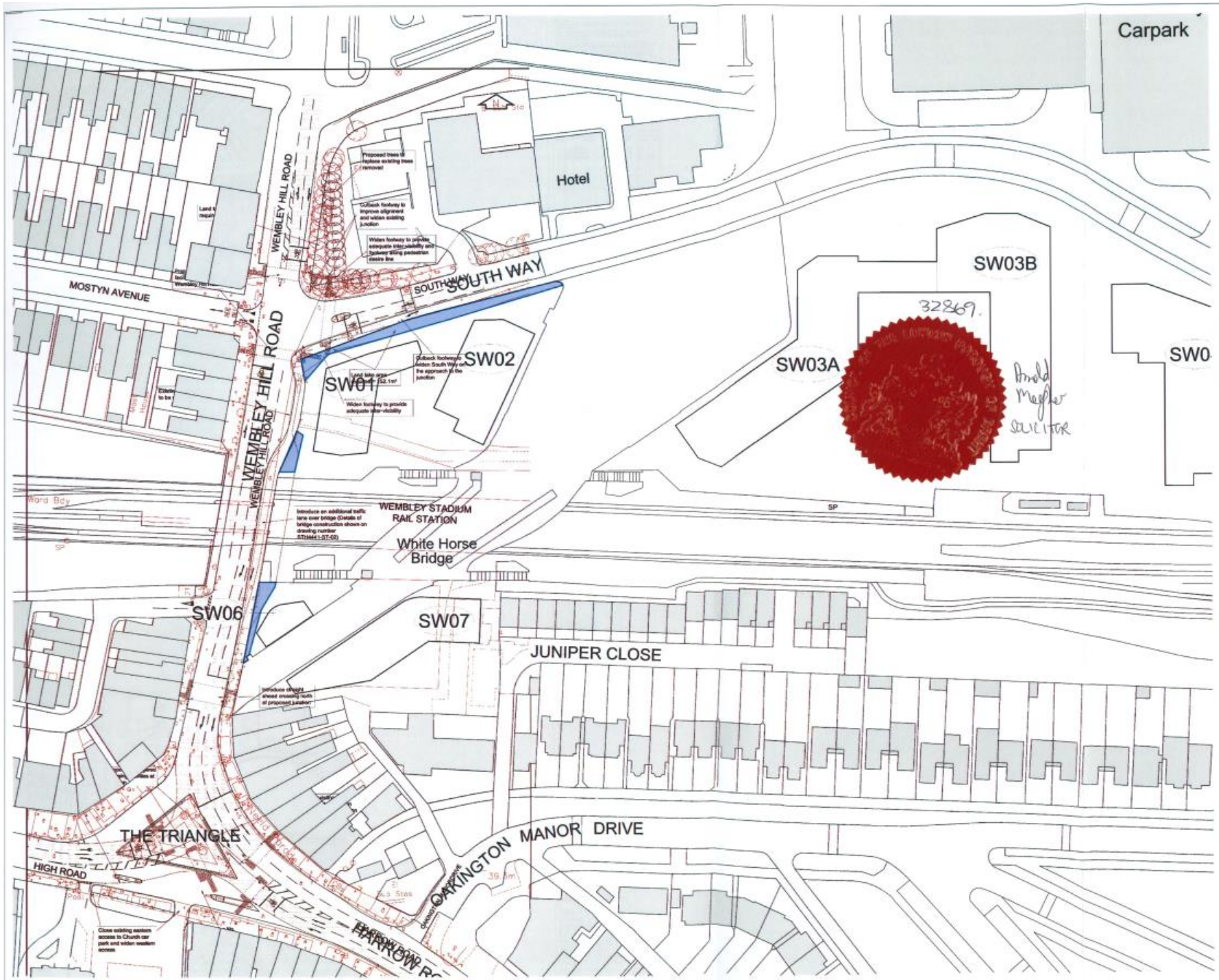

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Key

Safeguarded Land

Rev	Date	Description	Drawn	Chkd
P7	05.12.16	Safeguarded land areas updated.	DN	RP
P6	05.12.16	Underlay and plot extent shown	DN	RP
P5	23.11.16	Safeguarded land areas updated.	DN	RP
P4	14.11.16	Safeguarded land areas updated. Red line removed	DN	RP
P3	08.11.16	Scale updated to 1:500@A1	DN	RP
P2	04.11.16	Safeguarded land areas updated.	DN	RP
P1	03.11.16	S106 Issue	DN	RP

Drawing Status
FOR PLANNING

Client
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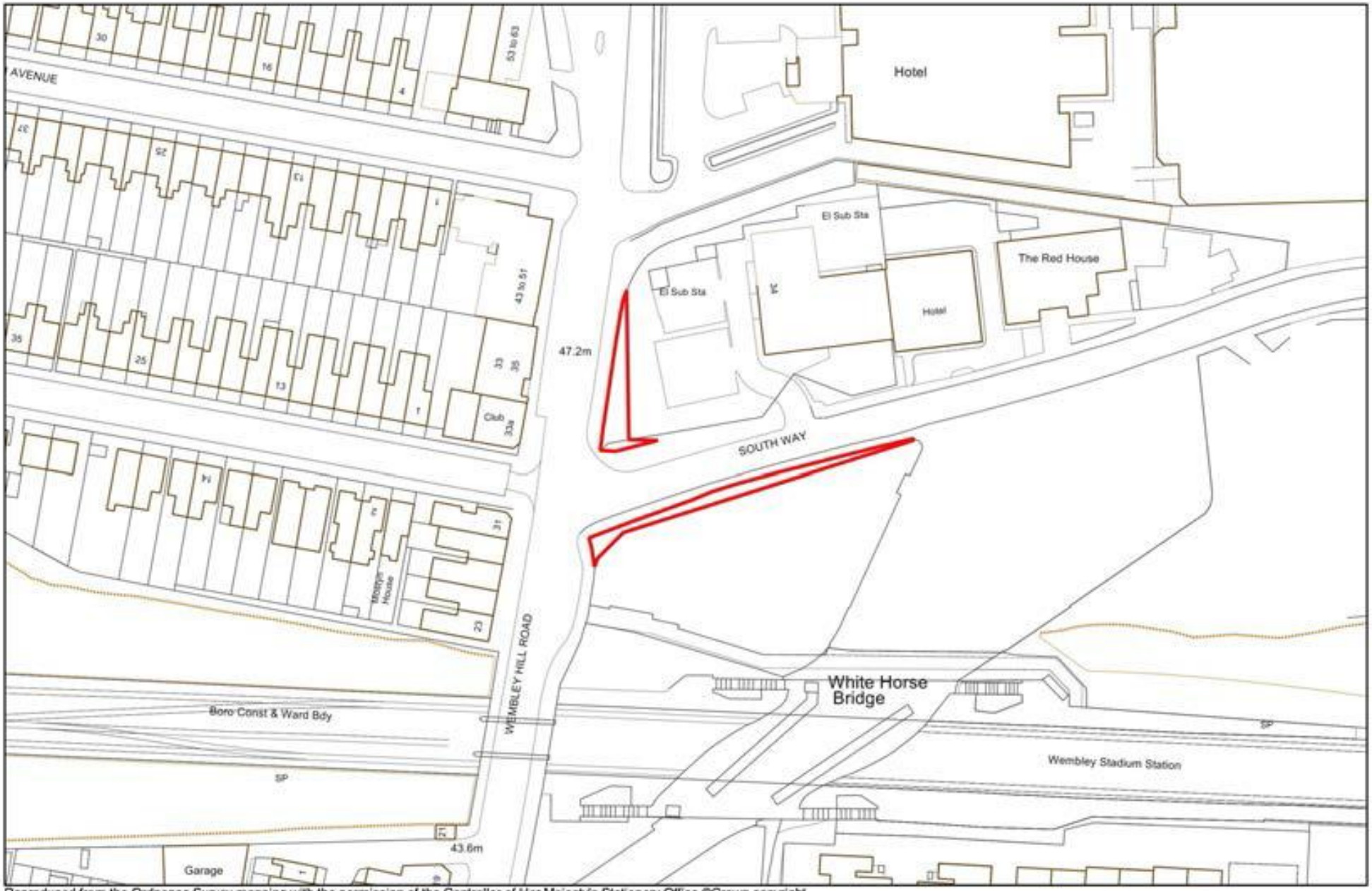
Project
Wembley, South West Lands

Drawing Title
Plan 05
Safeguarded Land

Scale @ A1 1: 500 Job No. 00882
Drawing No. 00882_PP_25 Revision P7
Scale Bar 0 10 20 30 40 50m

South Way/Wembley Hill Road



0 0.025 0.05 kilometres

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24 August 2012

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NOTES

1. This drawing should only be read in relation to subject of the Title. Other information shown on drawing is to be considered indicative only. Reference should be made to appropriate drawing series for other information.
2. Refer to drawings for specific information,
   - 101 – Profiles
   - 104 – Cross Sections
   - 200 – Setting Out
   - 500 – Drainage
   - 700 – Pavement
   - 1200 – Signs and Road Markings
   - 1400 – Street Lighting
   - 2700 – Existing Services

KEY

- Site Boundary
- Pedestrian Guardrail to B.S. 7818
- Red coloured tactile paving at signal controlled pedestrian crossing
- Buff coloured tactile paving at uncontrolled pedestrian crossing
- BL Internally illuminated or 'Deflecta' style bollard
- GB Grit/salt box

Rev.	Drawn	Chkd.	Apprvd.	Date	Description
B	HEE	MRD	ADL	09.08.10	DETAILED DESIGN SUBMISSION
A	HEE	MRD		12.07.10	PRELIMINARY ISSUE Updated following S2 RSA
-	SLS	MRD		10.03.10	PRELIMINARY ISSUE

Client

London Borough of Brent
Environmental Services
Transportation Service Unit
Brent House 349-357 High Road
Wembley, Middlesex, HA9 6BZ

Project

NORTH END ROAD CONNECTION TO BRIDGE ROAD/WEMBLEY PARK DRIVE

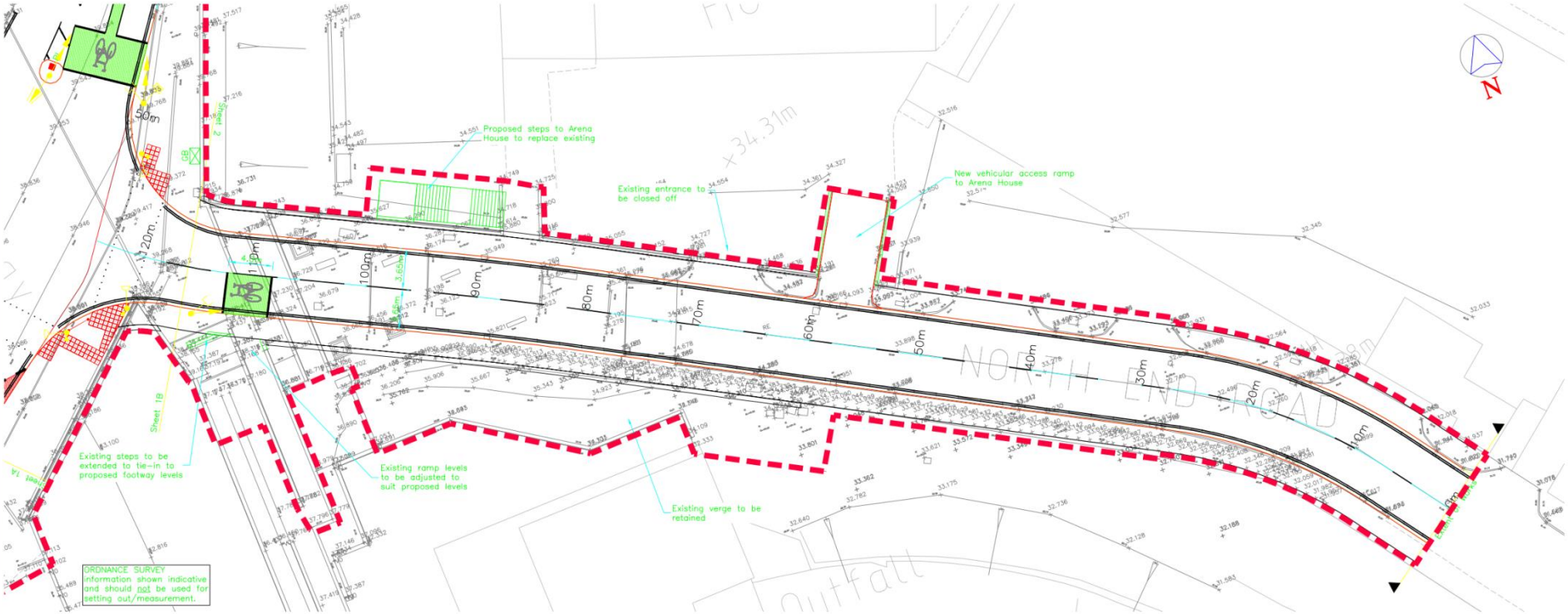
Drawing Title

GENERAL ARRANGEMENT
Sheet 1 of 2

Gifford

Scale (at A1)	Date	Drawn
1:200	MAR.2010	SLS

Drg. no.	Rev.
16634/HW/100/001	B



NOTES

1. This drawing should only be read in relation to subject of the Title. Other information shown on drawing is to be considered indicative only. Reference should be made to appropriate drawing series for other information.
2. Refer to drawings for specific information,
   101 – Profiles
   104 – Cross Sections
   200 – Setting Out
   500 – Drainage
   700 – Pavement
   1200 – Signs and Road Markings
   1400 – Street Lighting
   2700 – Existing Services

KEY

- Site Boundary
- Pedestrian Guardrail to B.S. 7818
- Red coloured tactile paving at signal controlled pedestrian crossing
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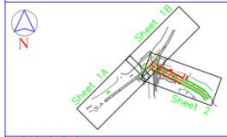


Rev.	Drawn	Check	Approv.	Date	Description
B	THE	MRD	AGU	09.08.10	DETAILED DESIGN SUBMISSION
A	THE	MRD		12.07.10	PRELIMINARY ISSUE Updated following S2 RSA
-	SLS	MRD		10.03.10	PRELIMINARY ISSUE

Client

London Borough of Brent
Environmental Services
Transportation Service Unit
Brent House 349-357 High Road
Wembley, Middlesex, HA9 6BZ

Project

NORTH END ROAD CONNECTION TO BRIDGE ROAD/WEMBLEY PARK DRIVE

Drawing Title

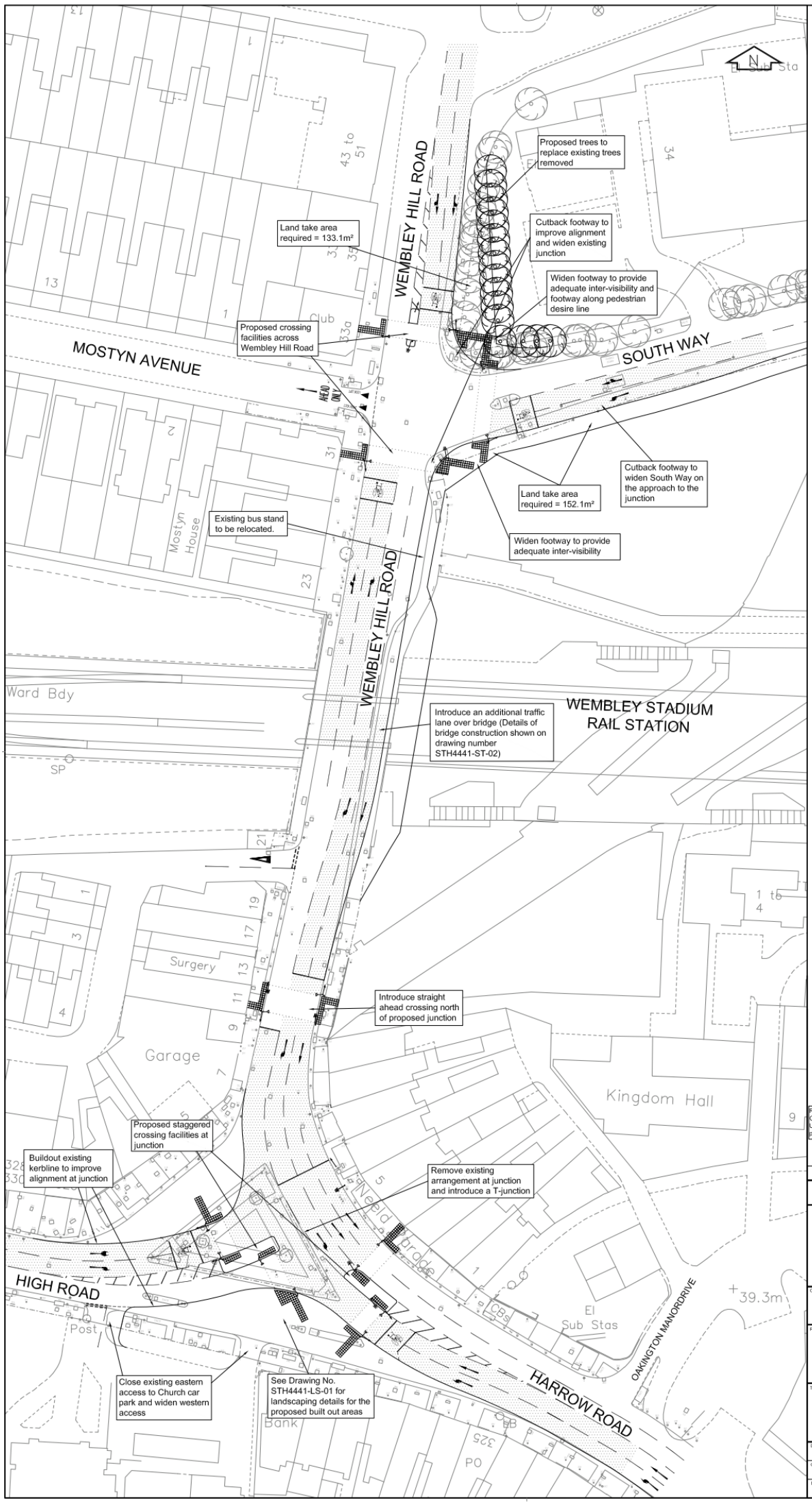
GENERAL ARRANGEMENT
Sheet 2 of 2

Gifford

Rainbow Studios 79-83 Southwark Street , London SE1 0PN
Tel: 020 7960 2424 Fax: 020 7960 2425 www.giffordukl.com

Scale (at A1)	Date	Drawn
1:200	MAR.2010	SLS

Drg. no.	Rev.
16634/HW/100/002	B



Notes

1. Topographical survey and OS maps supplied by the London Borough of Brent and used with permission. Undertaken by Subscan.

Key

- Antiskid Area
- Proposed Tree
- Proposed Primary Signal
- Proposed Secondary Signal
- Proposed Tactile Paving

Rev.	Date	Revision details	Drawn	Checked	Approved

JMP
8th Floor,
3 Harbour Exchange Square,
London,
E14 9GE
T 020 7536 8040
F 020 7005 0462
E docklands@jmp.co.uk
W www.jmp.co.uk

Client: LB OF BRENT

Project: WEMBLEY TRIANGLE OUTLINE DESIGN

Title: OPTION 3B
DO MAXIMUM
STRAIGHT AHEAD CROSSINGS
AT SOUTH WAY JUNCTION

Drawn	Checked	Approved
PRW	TMcL	TMcL
Original drg. size	Date	Scale
A2	JUNE 10	1:500
Drawing Status	Drawing Number	Rev.
PRELIM	STH4441-PR-03B	-

Appendix B

WCS SCHEME DRAWINGS

DO NOT SCALE

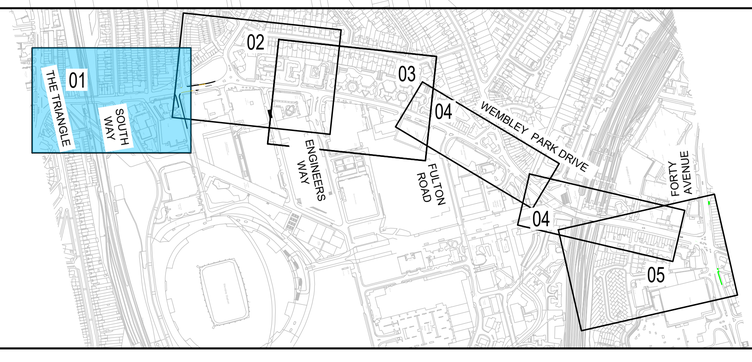
NOTE:
1. EXISTING ROAD MARKINGS FOR GUIDANCE ONLY.

HARROW ROAD/ WEMBLEY HILL ROAD/ WEMBLEY HIGH ROAD (HARROW ROAD TRIANGLE) JUNCTION BASED ON WEMBLEY CORRIDOR FEASIBILITY DESIGN STUDY AUGUST 2016, PAGE 56, 'T-JUNCTION WITH ADJUSTED FLARES'

WEMBLEY HILL ROAD/ SOUTHWAY JUNCTION BASED ON STH4441-PR-0JB AMENDED TO EXCLUDE WIDENING OF WEMBLEY HILL ROAD CHILTERN RAILWAY BRIDGE.

WEMBLEY HILL ROAD ROYAL ROUTE JUNCTION RAISED TABLE CROSSING

FOR CONTINUATION SEE SHEET 70035527-FB-02



KEY PLAN (NOT TO SCALE)

REV	DATE	BY	DESCRIPTION	CHK	APP
P04	17/04/2018	RJM	MINOR AMENDMENTS	PW	PW
P03	17/01/2018	RJM	MINOR AMENDMENTS	PW	GH
P02	28/11/2017	JTC	MINOR AMENDMENTS	MB	GH
P01	18/10/2017	CRJB	FIRST ISSUE	MB	GH

DRAWING STATUS: S2 - FOR INFORMATION

WSP House, 70 Chancery Lane, London, WC2A 1AF, UK
T+ 44 (0) 207 314 5000, F+ 44 (0) 207 314 5111
wsp.com

CLIENT: QUINTAIN

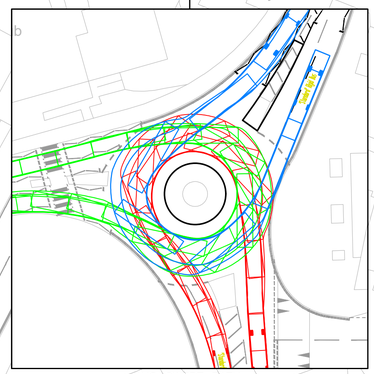
ARCHITECT:

SITE/PROJECT: WESTERN CORRIDOR STUDY
LONDON BOROUGH OF BRENT

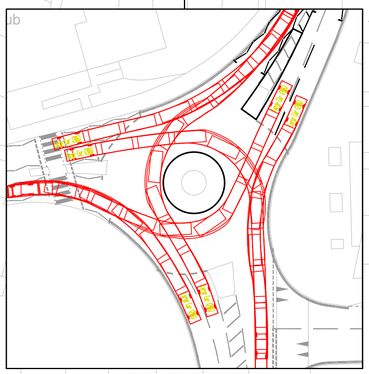
TITLE: FUTURE BASE
SHEET 1 OF 5

SCALE @ A1:	CHECKED:		APPROVED:
1:500	MB		GH
PROJECT NO:	DESIGNED:	DRAWN:	DATE:
70022897	BW	CRJB	April 18

DRAWING No: 70022897-FB-01 REV: P04



BUS SWEPT PATH



LARGE CAR SWEPT PATH

WEMBLEY HILL ROAD/ EMPIRE WAY JUNCTION (FORMER YORK HOUSE GYRATORY) SOLID ISLAND TO BE ENLARGED

EMPIRE WAY/ LAKESIDE WAY JUNCTION RADII REDUCED TO IMPROVE PEDESTRIAN CROSSING.

EMPIRE WAY/ LAKESIDE WAY JUNCTION PUFFIN CROSSING WITH REFUGE ISLAND

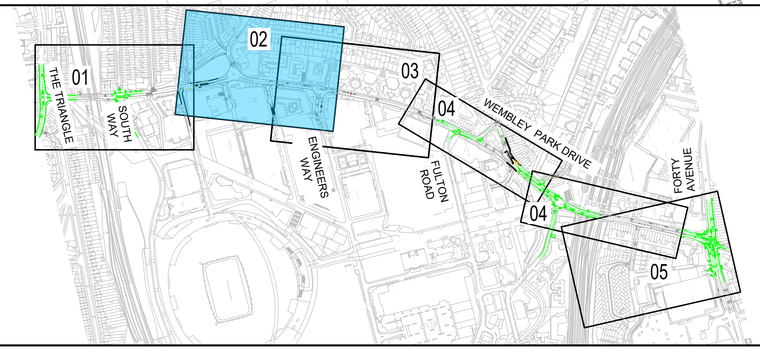
JUNCTION TIGHTENED, RIGHT-TURN ALLOWED

EMPIRE WAY/ LAKESIDE WAY JUNCTION REFUGE ISLAND

WEMBLEY HILL ROAD/ ROYAL ROUTE JUNCTION ZEBRA CROSSING UPGRADED TO PUFFIN CROSSING WITH REFUSE ISLANDS.

FOR CONTINUATION SEE SHEET 70035527-FB-01

FOR CONTINUATION SEE SHEET 70035527-FB-03



KEY PLAN (NOT TO SCALE)

DO NOT SCALE

NOTE:

1. EXISTING ROAD MARKINGS FOR GUIDANCE ONLY.

REV	DATE	BY	DESCRIPTION	CHK	APP
P03	17/04/2018	RJM	MINOR AMENDMENTS	PW	PW
P02	28/11/2017	JTC	MINOR AMENDMENTS	MB	GH
P01	18/10/2017	CRJB	FIRST ISSUE	MB	GH

DRAWING STATUS: S2 - FOR INFORMATION

WSP House, 70 Chancery Lane, London, WC2A 1AF, UK
T+ 44 (0) 207 314 5000, F+ 44 (0) 207 314 5111
wsp.com

CLIENT: QUINTAIN

ARCHITECT:

SITE/PROJECT: WESTERN CORRIDOR STUDY
LONDON BOROUGH OF BRENT

TITLE: FUTURE BASE
SHEET 2 OF 5

SCALE @ A1:	CHECKED:	APPROVED:
1:500	MB	GH

PROJECT NO:	DESIGNED:	DRAWN:	DATE:
70022897	BW	CRJB	April 18

DRAWING No: 70022897-FB-02 REV: P03

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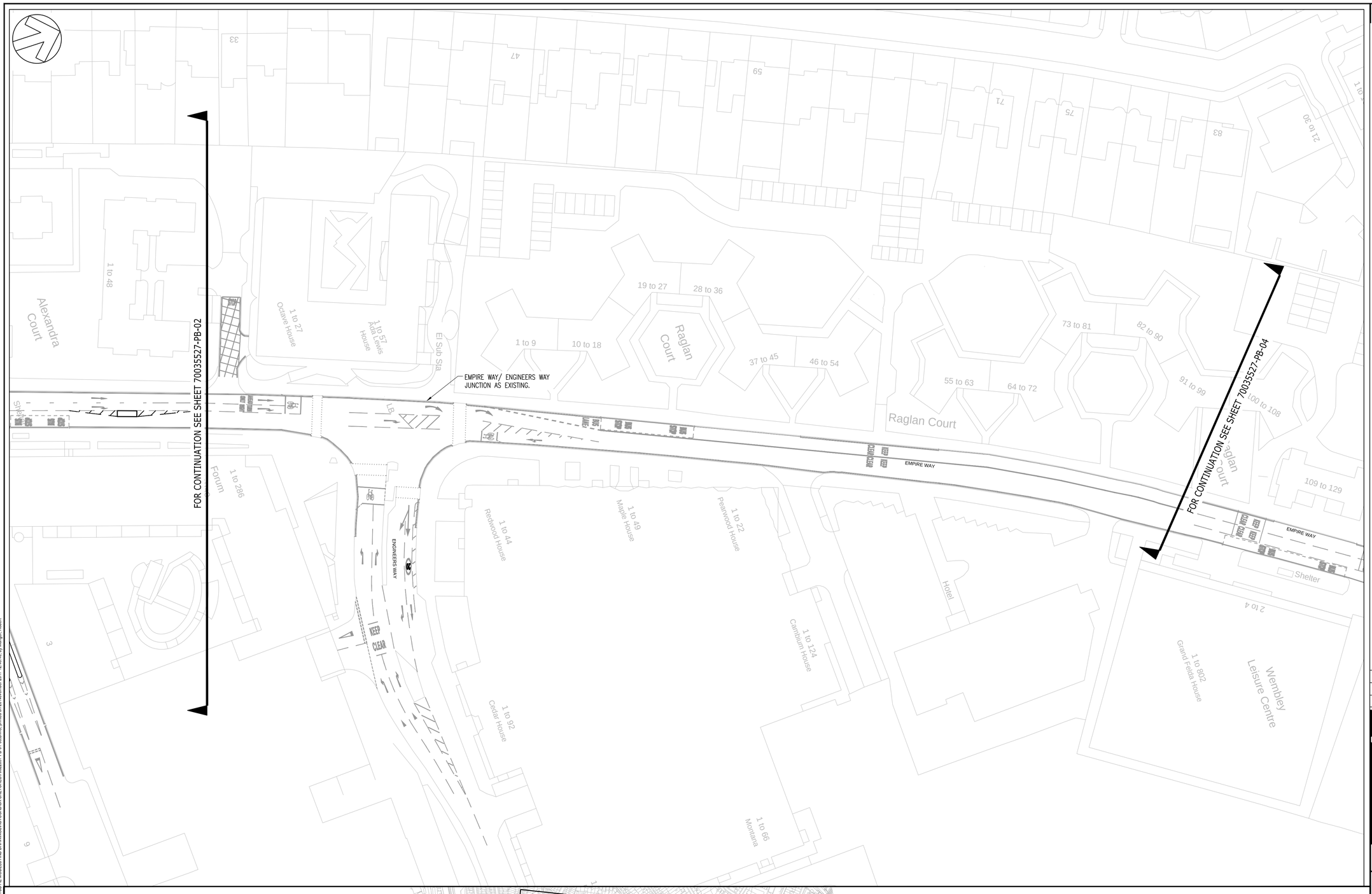
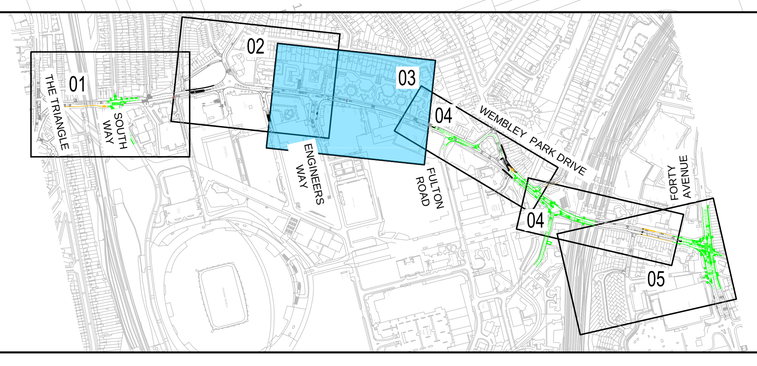
DO NOT SCALE

NOTE:
1. EXISTING ROAD MARKINGS FOR GUIDANCE ONLY.





KEY PLAN (NOT TO SCALE)

REV	DATE	BY	DESCRIPTION	CHK	APP
P02	28/11/2017	JTC	MINOR AMENDMENTS	MB	GH
P01	18/10/2017	CRJB	FIRST ISSUE	MB	GH

DRAWING STATUS: S2 - FOR INFORMATION

WSP House, 70 Chancery Lane, London, WC2A 1AF, UK
T+ 44 (0) 207 314 5000, F+ 44 (0) 207 314 5111
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CLIENT: QUINTAIN

ARCHITECT:

SITE/PROJECT: WESTERN CORRIDOR STUDY
LONDON BOROUGH OF BRENT

TITLE: FUTURE BASE
SHEET 3 OF 5

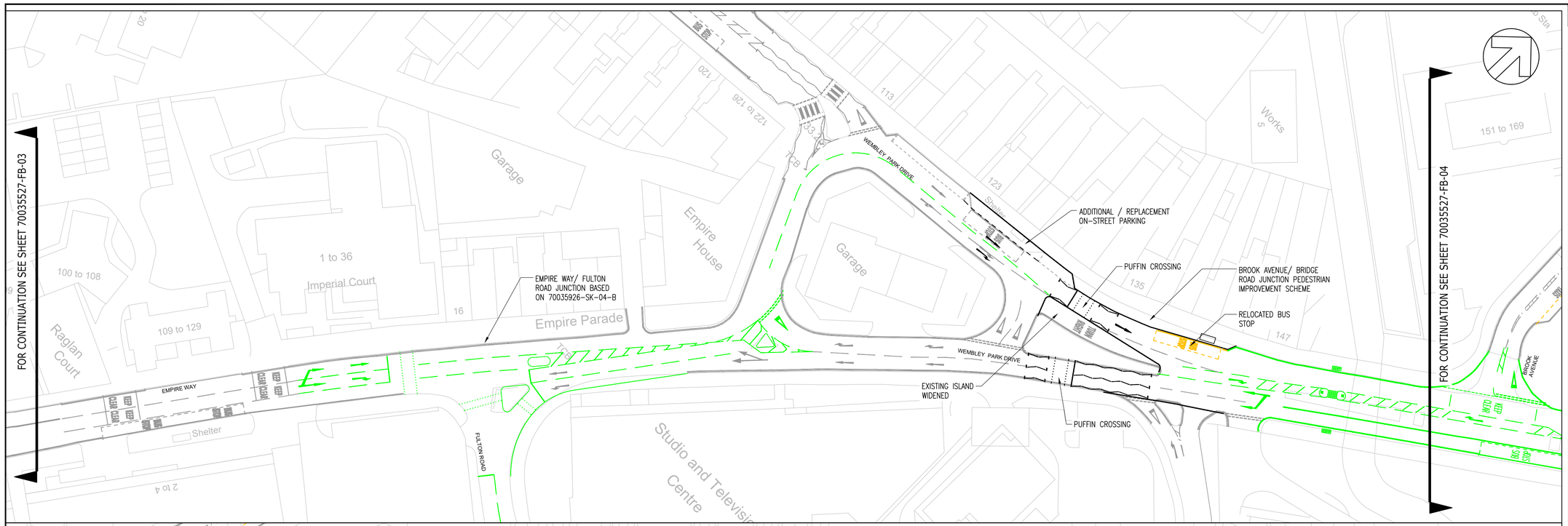
SCALE @ A1:	CHECKED:		APPROVED:
1:500	MB		GH
PROJECT NO:	DESIGNED:	DRAWN:	DATE:
70022897	BW	CRJB	November 17

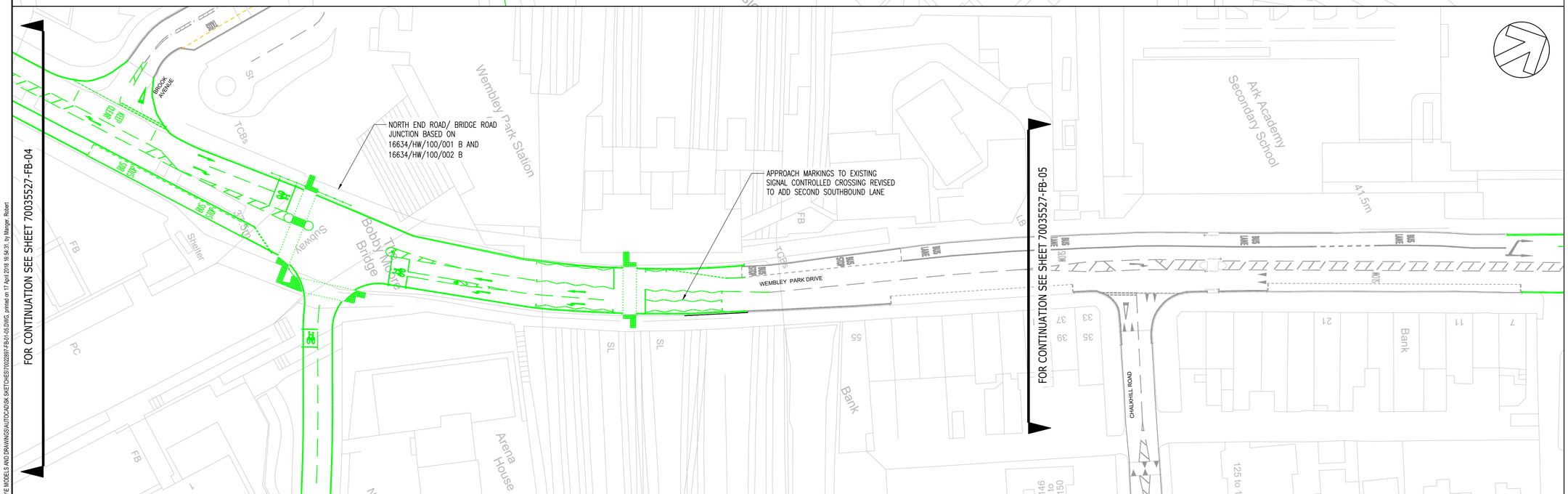
DRAWING No: 70022897-FB-03 REV: P02

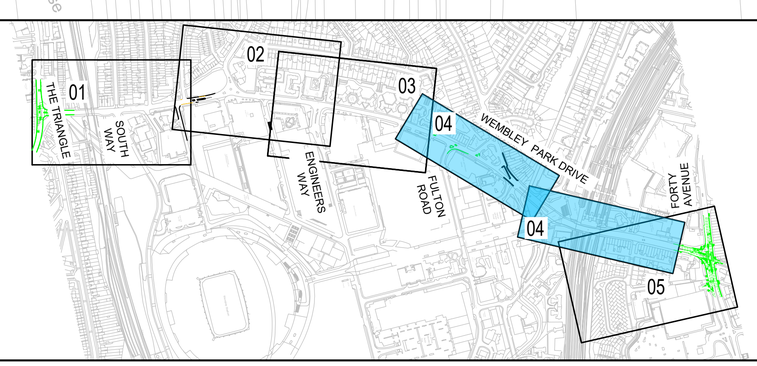
DO NOT SCALE

NOTE:

EXISTING ROAD MARKINGS FOR GUIDANCE ONLY.







KEY PLAN (NOT TO SCALE)

REV	DATE	BY	DESCRIPTION	CHK	APP
P03	17/04/2018	RJM	MINOR AMENDMENTS	JTW	JTW
P02	28/11/2017	JTC	MINOR AMENDMENTS	MB	GH
P01	18/10/2017	CRJB	FIRST ISSUE	MB	GH

DRAWING STATUS: S2 - FOR INFORMATION

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T+ 44 (0) 207 314 5000, F+ 44 (0) 207 314 5111
wsp.com

CLIENT: QUINTAIN

ARCHITECT:

SITE/PROJECT: WESTERN CORRIDOR STUDY
LONDON BOROUGH OF BRENT

TITLE: FUTURE BASE
SHEET 4 OF 5

SCALE @ A1:	CHECKED:	APPROVED:
1:500	MB	GH

PROJECT NO:	DESIGNED:	DRAWN:	DATE:
70022897	BW	CRJB	April 18

DRAWING No: 70022897-FB-04 REV: P03

File name: I:\UK.WSPGROUP.COM\CENTRAL DATA\PROJECTS\70022897 - WESTERN CORRIDOR STUDY\E MODELS AND DRAWINGS\AUTOCAD\SK SKETCHES\70022897-FB-01-05.DWG, printed on 17 April 2018 16:54:31, by Manger, Robert

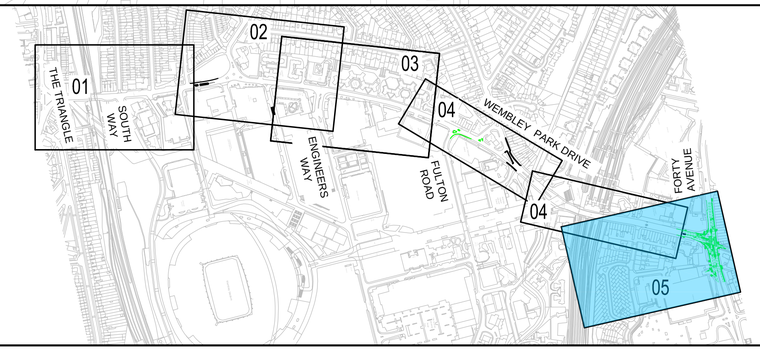
DO NOT SCALE

NOTE:

1. EXISTING ROAD MARKINGS FOR GUIDANCE ONLY.

FOR CONTINUATION SEE SHEET 70035527-FB-04

FORTY LANE/ BRIDGE ROAD JUNCTION BASED ON HD24/01/0



KEY PLAN (NOT TO SCALE)

REV	DATE	BY	DESCRIPTION	CHK	APP
P02	28/11/2017	JTC	MINOR AMENDMENTS	MB	GH
P01	18/10/2017	CRJB	FIRST ISSUE	MB	GH

DRAWING STATUS: S2 - FOR INFORMATION

WSP House, 70 Chancery Lane, London, WC2A 1AF, UK
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ARCHITECT:

SITE/PROJECT: WESTERN CORRIDOR STUDY
LONDON BOROUGH OF BRENT

TITLE: FUTURE BASE
SHEET 5 OF 5

SCALE @ A1:	CHECKED:		APPROVED:
1:500	MB		GH
PROJECT NO:	DESIGNED:	DRAWN:	DATE:
70022897	BW	CRJB	November 17

DRAWING No: 70022897-FB-05 REV: P02

Appendix C

TRIP GENERATION TABLES

TRIP GENERATION

For Assessment

	AM			PM			Sat		
	In	Out	Tot	In	Out	Tot	In	Out	Tot
Costco	15	14	29	185	195	380	371	347	718
Olympic Office	2	24	26	15	8	24	9	8	17
South West Lands Resi	7	82	89	53	28	81	30	27	57
South West Lands Hotel	15	59	74	31	10	41	48	45	93
South West Lands Office	6	1	7	1	6	7	0	0	0
West Lands Hotel	50	121	171	91	28	119	121	115	236
West Lands Non-Resi	173	91	264	121	331	452	426	382	808
West Lands Resi	3	36	39	25	13	38	14	13	27
North West Lands Resi	18	170	188	120	64	184	69	63	132
North East Lands Resi	18	187	205	134	72	206	76	69	145
East Lands Resi	12	118	130	84	45	129	48	44	92

Masterplan: Yet to be built **As of July 2016** **As of July 2016**

	AM			PM			Sat			
	In	Out	Tot	In	Out	Tot	In	Out	Tot	
West Lands Hotel	50	121	171	91	28	119	121	115	236	As per Appendix X (final page minus one) of iTransport December 2015 Transport Assessment
West Lands Non-Resi	173	91	264	121	331	452	426	382	808	As per Appendix X (final page minus one) of iTransport December 2015 Transport Assessment
West Lands Resi	3	36	39	25	13	38	14	13	27	As per Appendix X (final page minus two) of iTransport December 2015 Transport Assessment
North West Lands Resi	18	170	188	120	64	184	69	63	132	As per Appendix X (final page minus two) of iTransport December 2015 Transport Assessment
North East Lands Resi	18	187	205	134	72	206	76	69	145	As per Appendix X (final page minus two) of iTransport December 2015 Transport Assessment
East Lands Resi	12	118	130	84	45	129	48	44	92	As per Appendix X (final page minus two) of iTransport December 2015 Transport Assessment
Total	274	723	997	575	553	1128	754	686	1440	As per Table 9.4 and Appendix X (final page) of iTransport December 2015 Transport Assessment

Masterplan: All

	AM			PM			Sat			
	In	Out	Tot	In	Out	Tot	In	Out	Tot	
West Lands Hotel	90	217	307	162	50	212	217	205	422	As per Appendix U (final page minus one) of iTransport December 2015 Transport Assessment
West Lands Non-Resi	228	127	355	212	523	735	754	675	1429	As per Appendix U (final page minus one) of iTransport December 2015 Transport Assessment
West Lands Resi	8	93	101	63	33	96	36	33	69	As per Appendix U (final page minus three) of iTransport December 2015 Transport Assessment
North West Lands Resi	18	170	188	120	64	184	69	63	132	As per Appendix U (final page minus three) of iTransport December 2015 Transport Assessment
North East Lands Resi	18	187	205	134	72	206	76	69	145	As per Appendix U (final page minus three) of iTransport December 2015 Transport Assessment
East Lands Resi	12	118	130	84	45	129	48	44	92	As per Appendix U (final page minus three) of iTransport December 2015 Transport Assessment
Total	374	912	1286	775	787	1562	1200	1089	2289	As per Table 9.4 and Appendix U (final page) of iTransport December 2015 Transport Assessment

Masterplan: Built **As of July 2016** **As of July 2016**

	AM			PM			Sat		
	In	Out	Tot	In	Out	Tot	In	Out	Tot
West Lands Hotel	40	96	136	71	22	93	96	90	186
West Lands Non-Resi	55	36	91	91	192	283	328	293	621
West Lands Resi	5	57	62	38	20	58	22	20	42
North West Lands Resi	0	0	0	0	0	0	0	0	0
North East Lands Resi	0	0	0	0	0	0	0	0	0
East Lands Resi	0	0	0	0	0	0	0	0	0

Non-Masterplan

	AM			PM			Sat			
	In	Out	Tot	In	Out	Tot	In	Out	Tot	
Costco	15	14	29	185	195	380	371	347	718	As per Table 6.4 of ttp consulting September 2013 Transport Assessment
Olympic Office	2	24	26	15	8	24	9	8	17	211 dwellings applying the agreed residential trip rate* from Table 9.1 of the iTransport December 2015 Transport Assessment
South West Lands Resi	7	82	89	53	28	81	30	27	57	As per Table 8.2 of iTransport December 2014 Transport Assessment
South West Lands Hotel	15	59	74	31	10	41	48	45	93	As per Table 8.2 of iTransport December 2014 Transport Assessment
South West Lands Office	6	1	7	1	6	7	0	0	0	As per Table 8.2 of iTransport December 2014 Transport Assessment
Total	45	180	225	285	247	533	458	427	885	

***Olympic Office Trip Rates** **Dwellings: 211** **Dwellings: 211**

	AM			PM			Sat		
	In	Out	Tot	In	Out	Tot	In	Out	Tot
Residential Trip Rate	0.01	0.112	0.122	0.073	0.039	0.112	0.042	0.038	0.080

SOURCE DATA

Appendix X (final page minus one) of iTransport December 2015 Transport Assessment

NET TRIP GENERATION - NON-RESIDENTIAL

Land Use	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	Arrivals	Departures	2-Way	Arrivals	Departures	2-Way	Arrivals	Departures	2-Way
Employment (Office)	76	11	**87**	17	53	**70**	5	5	**10**
Retail (A3 - Café)	4	2	**6**	1	1	**2**	7	7	**14**
Retail (A3 - Restaurants)	0	0	**0**	0	0	**0**	0	0	**0**
Retail (local needs)	28	23	**51**	28	27	**55**	89	89	**178**
Retail (designer / sports outlet)	23	13	**36**	75	250	**325**	325	281	**606**
Leisure	0	0	**0**	0	0	**0**	0	0	**0**
Hotel	50	121	**171**	91	28	**119**	121	115	**236**
Gym	0	0	**0**	0	0	**0**	0	0	**0**
School*	42	42	**84**	0	0	**0**	0	0	**0**
TOTAL	**223**	**212**	**435**	**212**	**359**	**571**	**547**	**497**	**1044**

*School trips have been discounted due to residential internalisation of education trips to the primary school.

Appendix U (final page minus one) of iTransport December 2015 Transport Assessment

NET TRIP GENERATION - NON-RESIDENTIAL

Land Use	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	Arrivals	Departures	2-Way	Arrivals	Departures	2-Way	Arrivals	Departures	2-Way
Employment (Office)	76	10	**86**	17	39	**56**	5	5	**10**
Retail (A3 - Café)	15	7	**22**	2	5	**7**	6	26	**32**
Retail (A3 - Restaurants)	0	0	**0**	22	0	**22**	8	20	**28**
Retail (local needs)	44	34	**78**	29	40	**69**	119	135	**254**
Retail (designer / sports outlet)	42	25	**67**	131	425	**556**	601	473	**1074**
Leisure	0	0	**0**	3	6	**9**	5	6	**11**
Hotel	90	217	**307**	162	50	**212**	217	205	**422**
Gym	5	5	**10**	8	8	**16**	10	10	**20**
School*	46	46	**92**	0	0	**0**	0	0	**0**
TOTAL	**318**	**344**	**662**	**374**	**573**	**947**	**971**	**880**	**1851**

*School trips have been discounted due to residential internalisation of education trips to the primary school.

Appendix X (final page minus two) of iTransport December 2015 Transport Assessment

TOTAL RESIDENTIAL TRIP GEN (Minus Discounted Internal Trips)

AREA / PLOT	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	Arr	Dep	2-Way	Arr	Dep	2-Way	Arr	Dep	2-Way
Plots NE01/NE02/NE03	6	63	69	45	25	70	25	23	48
Plots NE04/NE05/NE06	12	124	136	89	47	136	51	46	97
TOTAL NE Lands	18	187	205	134	72	206	76	69	145
Plots E01/E02	5	49	54	35	19	54	20	18	38
Plot E03	7	69	76	49	26	75	28	26	54
TOTAL E Lands	12	118	130	84	45	129	48	44	92
TOTAL NW Lands	18	170	188	120	64	184	69	63	132
TOTAL W Lands	3	36	39	25	13	38	14	13	27
TOTAL	**51**	**511**	**562**	**363**	**194**	**557**	**207**	**189**	**396**

Appendix U (final page minus three) of iTransport December 2015 Transport Assessment

TOTAL RESIDENTIAL TRIP GEN (Minus Discounted Internal Trips)

AREA / PLOT	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	Arr	Dep	2-Way	Arr	Dep	2-Way	Arr	Dep	2-Way
Plots NE01/NE02/NE03	6	63	69	45	25	70	25	23	48
Plots NE04/NE05/NE06	12	124	136	89	47	136	51	46	97
TOTAL NE Lands	18	187	205	134	72	206	76	69	145
Plots E01/E02	5	49	54	35	19	54	20	18	38
Plot E03	7	69	76	49	26	75	28	26	54
TOTAL E Lands	12	118	130	84	45	129	48	44	92
TOTAL NW Lands	18	170	188	120	64	184	69	63	132
TOTAL W Lands	8	93	101	63	33	96	36	33	69
TOTAL	**56**	**568**	**624**	**401**	**214**	**615**	**229**	**209**	**438**

Appendix X (final page) of iTransport December 2015 Transport Assessment

Net Trip Generation (Full Masterplan)

LAND USE	VEHICULAR TRIP GENERATION								
	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	Arrivals	Departures	2-Way	Arrivals	Departures	2-Way	Arrivals	Departures	2-Way
Total Masterplan Residential	56	568	**624**	401	214	**615**	229	209	**438**
Total Masterplan Non-Residential*	318	344	**662**	374	573	**947**	971	880	**1,851**
TOTAL RE-MASTERPLAN	**374**	**912**	**1,286**	**775**	**787**	**1,562**	**1,200**	**1,089**	**2,289**

*Includes linked trip discounts.

COMPLETE MASTERPLAN	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	Arr	Dep	2-Way	Arr	Dep	2-Way	Arr	Dep	2-Way
Extant / Existing Trips*	491	751	1,242	962	1,112	2,074	1,710	1,692	3,402
TOTAL RE-MASTERPLAN	374	912	1,286	775	787	1,562	1,200	1,089	2,289
NET CHANGE	**-117**	**161**	**44**	**-187**	**-325**	**-512**	**-510**	**-603**	**-1,113**

*Includes extant consent of Stage 1 + NW Lands and Existing traffic from Wembley Retail Park.

Appendix U (final page) of iTransport December 2015 Transport Assessment

Net Trip Generation (Full Masterplan) - Built Elements Removed

LAND USE	VEHICULAR TRIP GENERATION								
	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	Arrivals	Departures	2-Way	Arrivals	Departures	2-Way	Arrivals	Departures	2-Way
Total Masterplan Residential	51	511	**562**	363	194	**557**	207	189	**396**
Total Masterplan Non-Residential*	223	212	**435**	212	359	**571**	547	497	**1,044**
TOTAL RE-MASTERPLAN	**274**	**723**	**997**	**575**	**553**	**1,128**	**754**	**686**	**1,440**

COMPLETE MASTERPLAN	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	Arr	Dep	2-Way	Arr	Dep	2-Way	Arr	Dep	2-Way
Extant / Existing Trips*	406	627	1,033	763	786	1,549	1,329	1,321	2,650
TOTAL RE-MASTERPLAN	274	723	997	575	553	1,128	754	686	1,440
NET CHANGE	**-132**	**96**	**-36**	**-188**	**-233**	**-421**	**-575**	**-635**	**-1,210**

*Includes extant consent of Stage 1 + NW Lands and Existing traffic from Wembley Retail Park

SOURCE DATA

Table 8.2 of iTransport December 2014 Transport Assessment

Table 8.2: Agreed Vehicular Trip Generation – Proposed Development Scenario 1 ('worst case')

Land Use	Multiplier	Morning Peak (08:00 - 09:00)			Evening Peak (17:00 - 18:00)		
		Arr	Dep	Total	Arr	Dep	Total
C3 Residential	726 units	7	82	89	53	28	81
C1 Hotel*	250 beds	15	59	74	31	10	41
A1 Retail (local format foodstore)	375sqm	6	5	11	6	6	12
A3-A4 Café / Restaurant	500sqm	9	10	19	2	4	6
B1 Office	750sqm	6	1	7	1	6	7
D1 Community	100sqm	2	1	3	0	1	1
Total		**45**	**158**	**203**	**93**	**55**	**148**

Source: Technical Note ITL9328-009 TN Response to TfL Comments on Trip Rates – Table 3.2

Table 6.4 of ttp consulting September 2013 Transport Assessment

Table 6.4: Vehicle Trips (VPH)

Weekday AM Peak (08:00 - 09:00)			Weekday PM Peak (17:00 - 18:00)			Saturday Peak (13:00 - 14:00)		
Arrive	Depart	2-Way	Arrive	Depart	2-Way	Arrive	Depart	2-Way
15	14	29	185	195	380	371	347	718

Table 9.1 of iTransport December 2015 Transport Assessment

Table 9.1: Agreed Gross Vehicular Trip Rates – Masterplan

Land Use	Multiplier	Morning Peak			Evening Peak			Saturday Peak		
		Arr	Dep	Total	Arr	Dep	Total	Arr	Dep	Total
A1 Retail (local retail)	per 100 sqm	1.595	1.346	2.941	1.642	1.534	3.176	5.106	5.106	10.212
A1 Retail (designer outlet)	per 100 sqm	0.132	0.076	0.208	0.410	1.347	1.757	1.759	1.522	3.281
A3-A4 Café	per 100 sqm	1.774	1.129	2.903	0.484	0.484	0.968	3.115	3.346	6.461
A3-A4 Restaurant	per 100 sqm	0.000	0.000	0.000	0.521	0.000	0.521	0.204	0.219	0.423
B1 Office	per 100 sqm	0.132	0.020	0.152	0.033	0.096	0.129	0.009	0.010	0.019
C1 Hotel[9]	per 100 sqm	0.134	0.322	0.456	0.242	0.074	0.316	0.321	0.303	0.624
C3 Residential	per dwelling	0.010	0.112	0.122	0.073	0.039	0.112	0.042	0.038	0.080
D1 School	per pupil	0.138	0.138	0.276	0.000	0.000	0.000	0.000	0.000	0.000
D2 Gym[10]	per 100 sqm	0.286	0.269	0.555	0.472	0.472	0.944	0.606	0.610	1.216
D2 Leisure (cinema)	per 100 sqm	0.000	0.000	0.000	0.216	0.216	0.432	0.191	0.159	0.350

Source: Signet Planning and Flanagan Lawrence Development Quanta Revision 20 and TASR Tables 7.12 & 7.14

RE-MASTERPLAN DEVELOPMENT MATRIX USED FOR 2015 ITRANSPORT TRIP ASSESSMENT

Yet to be Built

Plot	Status	Land Use	Floor Area (GEA sqm)	Units / Pupils	Source
NE01	Re-Masterplan Application	Residential		248	Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Employment (Office)	128		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Community	892		Flanagan Lawrance Schedule 08/11/15 - Rev 20
NE02	Re-Masterplan Application	Residential		200	Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Community	360		Flanagan Lawrance Schedule 08/11/15 - Rev 20
NE03	Re-Masterplan Application	Residential		168	Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Community	138		Flanagan Lawrance Schedule 08/11/15 - Rev 20
NE04	Re-Masterplan Application	Residential		502	Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Employment (Office)	1309		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Community	1116		Flanagan Lawrance Schedule 08/11/15 - Rev 20
NE05	Re-Masterplan Application	Residential		516	Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Employment (Office)	511		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Community (gym)	159		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Community Retail (A3 - café)	213		Flanagan Lawrance Schedule 08/11/15 - Rev 20
NE06	Re-Masterplan Application	Residential		190	Flanagan Lawrance Schedule 08/11/15 - Rev 20
E01 / E02	Re-Masterplan Application	Residential		478	Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Community	934		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	MUGA	685		Flanagan Lawrance Schedule 08/11/15 - Rev 20
E03 & Coachpark	Re-Masterplan Application	Residential		672	Flanagan Lawrance Schedule 08/11/15 - Rev 20
NW01 (under construction)	Cumulative Development	Residential		474	NWLs Drawdown (provided by Signet 25/08/2015)
	Cumulative Development	Retail (local needs)	1061		NWLs Drawdown (provided by Signet 25/08/2015) - provided as 'local retail' as a worst case
NW04	Cumulative Development	Employment (Office)	9230		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Cumulative Development	Retail (designer / sports outlet)	3844		Flanagan Lawrance Schedule 08/11/15 - Rev 20
NW06 (planning approval)	Cumulative Development	Residential		362	NWLs Drawdown (provided by Signet 25/08/2015)
	Cumulative Development	Retail (local needs)	692		NWLs Drawdown (provided by Signet 25/08/2015) - provided as 'local retail' as a worst case
NW07/08	Cumulative Development	Residential		361	Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Cumulative Development	Retail (designer / sports outlet)	3898		Flanagan Lawrance Schedule 11/05/15
NW09/10/11	Re-Masterplan Application	Residential		454	Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Retail (designer / sports outlet)	1778		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Employment (Office)	1439		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Community	324		Flanagan Lawrance Schedule 08/11/15 - Rev 20
W03	Cumulative Development	Residential		336	Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Cumulative Development	Retail (designer / sports outlet)	3682		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Cumulative Development	D2 Leisure (assumed gym)	2101		Flanagan Lawrance Schedule 08/11/15 - Rev 20
W06 (worst case AM Peak)	Re-Masterplan Application	Hotel	25584		Flanagan Lawrance Schedule 08/11/15 - Rev 20
W08 (worst case AM Peak)	Re-Masterplan Application	Employment (Office)	25453		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Retail (designer / sports outlet)	3261		Flanagan Lawrance Schedule 08/11/15 - Rev 20
W10 (worst case trip gen)	Re-Masterplan Application	Retail (designer / sports outlet)	1763		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Employment (Office)	17712		Flanagan Lawrance Schedule 08/11/15 - Rev 20
W11	Re-Masterplan Application	Hotel	12118		Flanagan Lawrance Schedule 08/11/15 - Rev 20
W12	Re-Masterplan Application	Employment (Office)	1244		Flanagan Lawrance Schedule 08/11/15 - Rev 20
	Re-Masterplan Application	Retail (designer outlet)	240		Flanagan Lawrance Schedule 08/11/15 - Rev 20
School (located on Western Lands)	Re-Masterplan Application	School		675	Consultant's Estimates Based on 3FE Primary School (30 students per form, + nursery)
	Re-Masterplan Application	Other Uses			-

Yet to be Built Summary

	Floor Area (GEA sqm)	Units / Pupils
Residential	0	4961
Employment (Office)	57026	0
Community	3764	0
Community (gym)	159	0
Community Retail (A3 - café)	213	0
MUGA	685	0
Retail (local needs)	1753	0
Retail (designer / sports outlet)	18226	0
D2 Leisure (assumed gym)	2101	0
Hotel	37702	0
Retail (designer outlet)	240	0
School	0	675

Built

Plot	Status	Land Use	Floor Area (GEA sqm)	Units / Pupils	Source
W01 (built)	Built (traffic in baseline)	Residential	0	286	Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Employment (Office)	417		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Retail (A3 - restaurant)	242		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Community	856		Stage 1 Drawdown (provided by Signet 25/08/2015)
W04 (built)	Built (traffic in baseline)	Residential	0	234	Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Retail (designer / sports outlet)	2800		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Retail (local needs)	618		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Retail (A3 - café)	116		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Gym - Lifestyle Fitness	1708		Stage 1 Drawdown (provided by Signet 25/08/2015)
W05 (built)	Built (traffic in baseline)	Student Residential	16562	660	Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Residential		5	Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Hotel	25400		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Aparthotel	4333		Stage 1 Drawdown (provided by Signet 25/08/2015) - assume the same trip rate as hotel
	Built (traffic in baseline)	Retail (designer / sports outlet)	4280		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Retail (local needs)	390		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Retail (A3 - restaurant)	3042		Stage 1 Drawdown (provided by Signet 25/08/2015)
W07 (built)	Built (traffic in baseline)	Retail (designer / sports outlet)	9068		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Retail (local needs)	147		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Retail (A3 - restaurant)	6963		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Retail (A3 - café)	606		Stage 1 Drawdown (provided by Signet 25/08/2015)
	Built (traffic in baseline)	Leisure	6308		Stage 1 Drawdown (provided by Signet 25/08/2015)
York House (existing)	Built (traffic in baseline)	Retail (designer outlet)	300		Stage 1 Drawdown (provided by Signet 25/08/2015)

Built Summary

	Floor Area (GEA sqm)	Units / Pupils
Residential	0	525
Employment (Office)	417	0
Community	856	0
Retail (local needs)	1155	0
Retail (designer / sports outlet)	16148	0
Hotel	25400	0
Retail (designer outlet)	300	0
Retail (A3 - restaurant)	10247	0
Retail (A3 - café)	722	0
Gym - Lifestyle Fitness	1708	0
Student Residential	16562	660
Aparthotel	4333	0
Leisure	6308	0

WCS WSP Scoping Report Table 4.1

	WPM		SWL		NWL		RWMPM		Total (Excl. SWL)	
	Open	Future	Open	Future	Open	Future	Open	Future	Open	Future
Food Retail (sqm)	0	0	0	0	0	0	0	0	0	0
Non-Food Retail (sqm)	16448	3682	0	0	0	7742	0	7,042	16448	18466
Offices (sqm)	417	0	0	750	0	9230	0	47,796	417	57026
Hotel (sqm)	25400	12118	0	250	0	0	0	25,584	25400	37702
Residential (dwellings)	525	336	0	726	0	1197	0	3,428	525	4961
Leisure (sqm)	8016	2101	0	0	0	0	0	159	8016	2260
Apart Hotels (sqm)	4333	0	0	0	0	0	0	0	4333	0
Community (sqm)	856	0	0	100	0	0	0	4,449	856	4449
Food / Drink Facilities (sqm)	10969	0	0	500	0	0	0	213	10969	213
Local Retail (sqm)	1155	0	0	375	0	1753	0	0	1155	1753
Wembley Retail Park (sqm)	0	0	0	0	0	0	0	0	0	0
School (sqm)	0	0	0	0	0	0	0	5,945	0	5945

Appendix D

JOURNEY TIME RESULTS

Base Model Journey Time Validation

Peak	Route No.	Observed Journey Time (sec)	Modelled Journey Time (sec)	Difference (s)	Difference (%)
AM Peak	Route 1 NB	408	350	-58	-14%
	Route 2 SB	486	458	-28	-6%
	Route 3 EB	121	140	19	16%
	Route 4 WB	180	170	-10	-6%
	Route 5 EB	126	131	5	4%
	Route 6 WB	101	112	11	11%
	Route 7 EB	397	389	-8	-2%
	Route 8 WB	364	371	7	2%
	Route 9 EB	324	357	33	10%
	Route 10 WB	330	335	5	2%
	Route 11 EB	290	303	13	4%
	Route 12 WB	310	281	-29	-9%
	Bus Route 1 NB	529	543	14	3%
	Bus Route 2 SB	566	543	-23	-4%
	Bus Route 3 EB	576	651	75	13%
	Bus Route 4 WB	590	634	44	7%
PM Peak	Route 1 NB	541	476	-65	-12%
	Route 2 SB	558	518	-40	-7%
	Route 3 EB	172	160	-12	-7%
	Route 4 WB	159	135	-24	-15%
	Route 5 EB	187	158	-29	-16%
	Route 6 WB	144	157	13	9%
	Route 7 EB	396	364	-32	-8%
	Route 8 WB	455	499	44	10%
	Route 9 EB	349	380	31	9%
	Route 10 WB	512	649	137	27%
	Route 11 EB	373	314	-59	-16%
	Route 12 WB	364	425	61	17%
	Bus Route 1 NB	648	573	-75	-12%
	Bus Route 2 SB	624	607	-17	-3%
	Bus Route 3 EB	590	620	30	5%
	Bus Route 4 WB	643	771	128	20%

Base vs. WCS Model Journey Time Comparisons (AM and PM Peaks)

Peak	Route No.	2016 Base Journey Time (sec)	2031 Future Journey Time (sec)	Difference (s)	Difference (%)
AM Peak	Route 1 NB	350	415	65	19%
	Route 2 SB	458	380	-78	-17%
	Route 3 EB	140	138	-2	-1%
	Route 4 WB	170	161	-9	-5%
	Route 5 EB	131	125	-6	-5%
	Route 6 WB	112	141	29	26%
	Route 7 EB	193	243	50	26%
	Route 8 WB	250	223	-27	-11%
	Route 9 EB	186	179	-7	-4%
	Route 10 WB	172	211	39	22%
	Route 11 EB	144	146	2	1%
	Route 12 WB	119	152	33	28%
	Bus Route 1 NB	543	520	-23	-4%
	Bus Route 2 SB	543	478	-65	-12%
	Bus Route 3 EB	380	402	22	6%
	Bus Route 4 WB	416	398	-18	-4%
PM Peak	Route 1 NB	476	457	-19	-4%
	Route 2 SB	518	580	62	12%
	Route 3 EB	160	186	26	16%
	Route 4 WB	135	192	57	42%
	Route 5 EB	158	186	28	18%
	Route 6 WB	157	146	-11	-7%
	Route 7 EB	176	260	84	48%
	Route 8 WB	365	366	1	0%
	Route 9 EB	219	222	3	1%
	Route 10 WB	471	265	-206	-44%
	Route 11 EB	166	185	19	11%
	Route 12 WB	251	168	-83	-33%
	Bus Route 1 NB	570	590	20	4%
	Bus Route 2 SB	607	652	45	7%
	Bus Route 3 EB	357	419	62	17%
	Bus Route 4 WB	542	422	-120	-22%

Appendix E

QUEUE RESULTS

AM Peak Queue Lengths

	High Road					South Way			Engineers Way			Forty Lane			Fulton Road				N End Road	
Maximum Length (m)	1 - 079-1	2 - 079-4	3 - 079-6	5 - 079-9	6 - 079-10	7 - 170-1	8 - 170-3	9 - 170-2	10 - 169-1	11 - 169-3	12 - 169-2	15 - 034-1	16 - 034-6	17 - 034-2	18 - 034-3	41 - 139-1	42 - 139-4	43 - 139-3	44 - 139-2	45 - North	46 - North	47 - North
08:00:00	110	88	88	89	85	72	49	410	62	41	109	109	407	67	13	50	51	34	66	311	156	170
08:05:00	127	89	89	90	76	98	53	418	69	52	97	120	429	118	13	53	57	22	60	291	159	190
08:10:00	129	86	86	97	97	90	65	446	71	47	125	94	429	146	14	48	48	20	58	316	227	189
08:15:00	142	120	120	90	89	83	65	410	63	61	178	113	435	185	15	47	58	21	104	288	217	192
08:20:00	166	145	143	80	79	81	58	431	71	76	182	109	427	253	13	51	64	42	82	294	214	194
08:25:00	136	143	143	87	87	81	59	471	78	79	213	112	434	187	16	58	80	47	145	310	224	205
08:30:00	159	131	131	78	78	76	76	462	67	75	234	103	430	234	14	57	95	48	177	283	194	251
08:35:00	174	133	133	96	88	76	103	472	81	58	222	100	423	184	16	76	85	80	155	280	139	280
08:40:00	167	117	117	105	105	83	129	464	120	39	200	105	430	185	10	73	97	89	171	298	178	312
08:45:00	157	114	114	101	100	90	114	463	156	31	206	149	431	220	14	113	124	78	175	321	139	306
08:50:00	147	161	162	92	92	90	116	453	181	40	201	158	427	220	17	102	134	50	163	316	159	320
08:55:00	184	148	148	98	92	103	120	444	153	32	204	146	430	220	17	106	163	78	188	249	146	372

PM Peak Queue Lengths

	High Road					South Way			Engineers Way			Forty Lane			Fulton Road				N End Road	
Maximum Length (m)	1 - 079-1	2 - 079-4	3 - 079-6	5 - 079-9	6 - 079-10	7 - 170-1	8 - 170-3	9 - 170-2	10 - 169-1	11 - 169-3	12 - 169-2	15 - 034-1	16 - 034-6	17 - 034-2	18 - 034-3	41 - 139-1	42 - 139-4	43 - 139-3	44 - 139-2	45 - North	46 - North	47 - North
17:00:00	261	189	189	134	133	78	156	281	62	73	53	158	50	86	21	106	162	25	139	163	77	322
17:05:00	294	170	170	141	141	76	135	356	53	138	90	160	55	73	17	106	146	19	218	82	82	370
17:10:00	341	197	197	118	118	123	110	366	57	152	110	151	62	83	20	103	104	13	240	137	95	375
17:15:00	335	225	225	135	134	103	87	426	39	139	109	159	56	77	20	94	88	57	267	100	102	366
17:20:00	345	255	255	138	138	112	76	446	66	84	103	171	72	107	20	85	128	50	236	165	113	332
17:25:00	350	285	285	152	151	110	83	458	65	53	120	177	58	166	15	70	246	56	235	158	95	359
17:30:00	340	306	306	136	136	59	105	461	58	32	136	206	45	152	18	88	193	90	196	166	154	346
17:35:00	344	314	314	132	132	28	162	456	71	39	104	231	55	135	19	116	164	90	194	165	155	345
17:40:00	344	296	296	150	150	46	370	420	81	30	86	219	60	115	20	127	161	71	124	154	106	323
17:45:00	356	292	292	151	151	39	496	374	63	25	38	216	77	181	27	88	113	77	162	139	98	318
17:50:00	366	274	274	115	115	33	507	330	66	38	49	204	57	140	20	107	57	68	155	190	101	315
17:55:00	382	251	251	107	107	27	507	265	47	34	75	224	56	167	19	67	44	13	137	121	211	257

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