PROPOSED LIDL FOODSTORE

Former Hayes Pool and Fitness Centre, Central Avenue, Hayes Town

Response to Highway Officer Comments
On behalf of Lidl UK

January 2016

CONTENTS

Appendices

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INTRODUCTION

1 Gateway TSP has been instructed by Lidl UK to prepare this Technical Note in response to comments received from the Highway Officer at the London Borough of Hillingdon in relation to an application for a Lidl foodstore at the former Hayes pool and fitness centre site, Central Avenue, Hayes (reference 1942/APP/2015/4127).

2 This Technical Note seeks to address the comments raised by the Highway Officer at the London Borough of Hillingdon in his email dated 23rd December 2015. The report is structured with the comments from the Highway Officer provided in italics for ease of reference.

HIGHWAY OFFICER COMMENTS

3 This section of the report addresses each point made by the Highway Officer at the London Borough of Hillingdon. The comments have been divided into numerous sections, to provide an easy to follow response to the comments.

Access Visibility

"Location of the proposed access in close proximity to the bus stop and vehicle crossover opposite is unsatisfactory due to concern relating to sightlines and conflicting traffic movements."

4 To address the issues with visibility, two drawings have been created to provide the visibility splays associated with the proposed access arrangement. Drawing 15/0302/SK06, which is included at **Appendix A**, demonstrates the achievable visibility splays along Church Road, showing 2.4 by 43 metres to the north and 2.4 by 34 metres to the south, accounting for the proximity of the roundabout junction.

5 Drawing 15/0302/SK07, which is included at **Appendix B**, has been created to demonstrate the practical visibility achievable when a bus is present at the bus stop. London Buses require drivers to pull up in line with the bus stop flag (or shelter, but since no shelter is provided in this location it is not applicable). In this drawing the visibility splay is measured 0.5 metres into the carriageway, measured from the edge of the stationary bus. This allows all vehicles, including cyclists, to be seen as they would not realistically be positioned closer whilst overtaking the vehicle, providing the Church Road carriageway is clear from obstructions.

6 The practical visibility indicates that 23 metres would be achievable from the Lidl site access junction to the north. This is equivalent to an oncoming vehicle speed of 19 miles per hour. Given the proximity to the Botwell Lane roundabout, it is not considered likely that cars would overtake the bus at the posted speed limit due to potential oncoming vehicles entering the road from the roundabout. On this basis, the practical visibility achievable reflects the likely vehicle speeds in the event that a vehicle is able to overtake a stationary bus.

7 In addition, onsite observations have indicated that on-street parking occurs in this location. There are no parking or waiting restrictions that would prevent such parking. If a bus arrives at the southbound bus stop whilst there are vehicles parked on the western side of the Church Road carriageway this will (and currently does) block free-flow conditions along Church Road.

8 The temporary blocking is an existing occurring situation on this part of the highway network. The following photographs highlight the location and level of on-street parking observed in this location.

Photographs: Observed Parking along Church Road Adjacent to Bus Stop

9 It should be noted that the TfL Accessible Bus Stop Design Guidance document (January 2006) indicates that bus stops should not impact on the visibility splays at junctions. This document states that:

"Any relocation of the stopping position of the bus closer to the junction should have regard to visibility for drivers of vehicles leaving the side road. While a bus using the stop is a temporary obstruction, the bus stop post/flag, passenger shelter and waiting passengers should not unduly obscure sight lines."

10 It should also be considered that the proposed access arrangements have been subject independent review in the Stage 1 Road Safety Audit (included at Appendix I of the Transport Assessment), which raised no safety problems or comments in relation to the access proposal.

11 On this basis, the impact of the bus stop on the site access visibility splays is considered to be temporary and therefore to have minimal impact on the operation of the site access junction.

Access Adoption Extent

"The extent of land offered for adoption at the proposed access should be clarified; ensuring safe pedestrian crossing facility and surface drainage from private and public land are adequately addressed. "

12 It is considered that the extent of land offered for adoption would cover the entire raised table and ramp within the Lidl site. This is illustrated in an adoption extent drawing, included at **Appendix C**, which highlights the adoption boundary in red.

Servicing Arrangements

"The proposed service access arrangements are unsatisfactory. The swept path analysis shows the requisite turning movements of delivery vehicles cannot be satisfactorily accommodated on the existing road layout and the proposed access, even in precision driving conditions. The manoeuvring within the site is far from ideal and in part relies on rear transfer space for disabled parking spaces. A designated service access should be provided from Central Avenue."

13 The vehicle swept paths provided within the Servicing Management Plan at Appendix J of the Transport Assessment indicate that a 16.5 metre articulated vehicle can successfully access the site and servicing area.

14 Additional swept paths have been provided post-application submission to demonstrate that vehicles can access the site via Botwell Lane in either direction, with vehicles able to traverse the roundabout to access and egress Church Road. On this basis, it can be considered that the existing road layout can accommodate the delivery vehicles associated with the site.

15 The servicing arrangement provided at the site is no different to that which was approved during the previous planning consent at the site (reference 1942/APP/2013/3565), which included delivery vehicles reversing past the site access to enter a dedicated servicing area. This application provides a net benefit to the site, with the reversing distance of the delivery vehicle reduced accordingly. In addition, no reversing manoeuvres are undertaken in the vicinity of the site access, reducing the risk of conflicts at the site access and the potential for queuing on the local highway network as vehicles wait for the servicing manoeuvres to be completed.

16 It should also be noted that the vehicle swept paths provided for the consented scheme also required the vehicle to manoeuvre over the hatching area associated with the Blue Badge Holder spaces. Given this is an occasional occurrence with the vehicle servicing the site once per day, the potential for a servicing vehicle to be delayed through a user in the Blue Badge space is considered to be minimal.

17 Numerous examples of servicing within the car park have been accepted at Lidl sites within the London Borough of Hillingdon. The Lidl store at Cowley Road, Uxbridge operates in this manner, with schemes approved at Victoria Road, South Ruislip and the previous consented scheme at this site serviced through the car park.

18 On this basis, the principle of servicing within the car park is considered to be established for this scheme. Therefore, the need for a dedicated servicing access from Central Avenue is not considered realistic or necessary at the site.

Hayes Town Centre Improvements

"The future modelling scenarios should take account of the Hayes Town Centre scheme (copy of the town centre TA to follow in a separate e-mail) and the committed developments listed below."

19 To assess the impacts of the development on the Hayes town centre improvements scheme highway network, the supplied VISSIM models have been modelled for the 2016 baseline with proposed Lidl development trips for the weekday evening peak hour and Saturday peak hour respectively.

20 A summary report is included at **Appendix D** summarising the impact of the development, and indicates minimal delay on the network as a result of the proposed Lidl store inclusion.

Committed Developments

"Traffic related to committed developments should be included in the models as new instead of net traffic. Traffic growth from the wider area, such as the Southall Gas Works development should be considered under background traffic growth.

1. *Redevelopment of the Old Vinyl Factory with UTC instead of Cinema (refer to the latest TA)*
2. *20 Blyth Road (application ref. 1425/APP/2011/3040)*
3. *Land East of The Former EMI Site Blyth Road Hayes (application ref. 51588/APP/2011/2253)*

4. *Enterprise House, 133 Blyth Road Hayes (application ref. 67283/APP/2010/2112)*

5. *Trident House (application ref. 3151/APP/2014/2408, allowed on appeal)*

6. *Union House, 23 Clayton Road (application ref. 35250/APP/2014/3506)*

7. *Lake Farm School (application ref. 68911/APP/2012/2983)*

8. *Golden Cross Botwell Lane Hayes (application ref. 4607/APP/2013/3144)"*

Southall Gas Works

21 At the request of Highway Officers at the London Borough of Hillingdon, the Southall gas works development has been included as background traffic growth, with growth factors obtained from the TEMPRO database. Traffic growth factors have been obtained for the Hillingdon (main) area categories, with Table 3.4 of the Transport Assessment providing the identified growth factors applied within the TA and within this Technical Note.

Redevelopment of the Old Vinyl Factory with UTC

22 The Old Vinyl Factory Redevelopment was considered as a committed development within the Transport Assessment. A Transport Assessment, produced by Alan Baxter & Associates, accompanying the application included a scope for assessment that extended only as far north as Printinghouse Lane and Station Road, and on this basis the development was not included within the Transport Assessment as a committed development proposal.

23 Subsequent to this, an application has been approved to replace the cinema aspect of the redevelopment with a University Technical College (UTC). The Transport Assessment accompanying this development proposal was prepared by Campbell Reith Consulting Engineers and indicates that the UTC development would result in an overall decrease in traffic on the highway network in the weekday evening peak hour compared to the consented cinema use.

24 Based on the decrease in traffic flows, and the absence of any traffic flow data to the north of Hayes town centre, no further assessment of the development has been undertaken. In addition, no Saturday assessment was undertaken in either Transport Assessment for the two applications at the site.

20 Blyth Road, Hayes

25 The redevelopment of 20 Blyth Road is accompanied by a Transport Assessment and TA Addendum prepared by WSP. The TA Addendum indicates that the development could generate 38 two-way vehicular movements in the weekday evening peak hour. The assessment undertaken involves a weekday peak hour assessment, and therefore no traffic flow data is available for the Saturday peak hour.

26 The assessment study area accompanying this planning application is the same as that used within the Old Vinyl Factory application, and therefore no traffic flow data is available to the north of Hayes town centre. On this basis, there is no available data for the assessment of this development within the Lidl study network and therefore no further assessment has been undertaken.

Land East of the Former EMI Site, Blyth Road, Hayes

27 This site is located adjacent to the Old Vinyl Factory main development site and is accompanied by a Transport Statement prepared by Alan Baxter & Associates. This Transport Assessment does not include any junction capacity modelling and therefore no vehicle flows are provided.

28 The Transport Statement identifies that the proposal would result in a net decrease in vehicle movements associated with the redevelopment of the site. On this basis, no further assessment has been undertaken of this committed development.

Enterprise House, 133 Blyth Road, Hayes

29 A planning application (reference 2013/3592) was approved at the site to change the use to 96 residential units and retaining 4,500 square metres employment floorspace at the site. This application was accompanied by a Transport Statement (TS) prepared by TTP Consulting Limited dated November 2013.

30 The TS indicates that the trip generation of the development would result in a decrease in trips on the highway network compared to the existing use of the site. On this basis, this site will not be considered further within the proposed Lidl foodstore assessment.

Trident House, Station Road, Hayes

31 Trident House was subject to a planning application (reference 2014/2408) to change the use of the site from Use Class B1 to form 98 residential units. This application was initially refused but has subsequently been approved on appeal.

32 An additional application at the site (reference 2014/3777) sought permission to change the use of the building from Use Class B1 to form 60 residential units. As the 98 unit scheme was approved on appeal, this is the site layout which will be considered in this section.

33 The 98 unit scheme was accompanied by a Transport Assessment prepared by Cole Easdon Consultants Limited dated July 2014. This TA indicates that the development would result in a net decrease in traffic associated with the site, compared to the existing site use, and therefore this application will not be considered as a committed development for the proposed Lidl foodstore.

Union House, 23 Clayton Road, Hayes

34 Enzygo Environmental Consultants Limited prepared a Transport Statement to accompany an application for a change of use at the site from Use Class B1 to form 46 residential units.

35 This TS indicates that the development would result in a decrease in traffic compared to the existing site use during the assessed peak hours and therefore this development and will not be considered further as part of the proposed Lidl assessment.

Golden Cross Public House, Botwell Lane, Hayes

36 Within the Transport Assessment accompanying this application, the redevelopment of the former Golden Cross Public House site was considered as a committed development for the 50 bedroom hotel scheme. This development was assumed to be incorporated into background traffic growth within the TA.

37 Planning permission has subsequently been granted, and in the process of being built, for a residential development comprising 22 dwellings at the site. The Transport Assessment accompanying the development proposal, prepared by Glanville Consultants, indicates that the residential development would generate less traffic than the previously proposed hotel scheme. On this basis, with the scheme generating 4 two-way vehicle movements in the weekday evening peak hour, it is considered that this traffic will be incorporated into the background traffic growth already accounted for within the assessments provided in the Transport Assessment submitted.

Lake Farm School, Botwell Common Road, Hayes

38 The Lake Farm School application is accompanied by a Transport Assessment (version final 4) prepared by Parsons Brinckerhoff, dated March 2013. This assesses the traffic impacts associated with a three-form entry primary school with a capacity of 600 students.

39 The Transport Assessment for the school assesses the weekday morning and afternoon peak hours, associated with the start and end of a school day. As such, the school is not anticipated to be a vehicle trip generator during the Lidl assessed Saturday peak period.

40 The TA produced by Parsons Brinckerhoff indicates that the development could generate 20 arrivals and 34 departures between the hours of 16:00 – 17:00 (Tables 24 and 25), coinciding with the 16:30 – 17:30 peak hour identified on the network from the surveys undertaken within the Lidl assessment. For purposes of robustness, the higher hourly trip values (i.e. 16:00 – 17:00) are assessed within this section.

41 The traffic study area for this development does not extend as far as the Church Road roundabout junction along Botwell Lane, with the school site access junction onto Botwell Lane forming the southern extent of the modelling study area. By applying the trip distributions calculated from the PM school peak hour development flows (Table 28), 63% of departures depart the site south along Botwell Lane and 47% arrive from Botwell Lane to the south. This indicates that 21 vehicles travel southbound along Botwell Lane and 9 vehicles accessing the site from the south. These movements have been distributed through the Botwell Lane/Church Road roundabout junction based on surveyed turning proportions.

42 Revised junction capacity assessment have been undertaken for the 2016 and 2020 future year baselines, to include the Lake Farm School committed development. The proposed Lidl development traffic flows have also been assessed with the revised future baseline position. The 2016 and 2020 summary results for the revised baseline and baseline with development are provided in Tables 1 and 2 below. The full model report is included for reference at **Appendix E**.

Link	2016 PM Future Year Baseline with Committed Development		2016 PM Future Year Baseline (with Com Dev) with Development	
	RFC	Queue	RFC	Queue
Botwell Lane (nw)	0.578	1.38	0.596	1.48
Church Road	0.280	0.42	0.324	0.51
Botwell Lane (to town centre)	0.603	1.56	0.624	1.70

Table 1: 2016 Weekday Evening Peak Hour Updated ARCADY Model Summary

Link	2020 PM Future Year Baseline with Committed Development		2020 PM Future Year Baseline with Development	
	RFC	Queue	RFC	Queue
Botwell Lane (nw)	0.620	1.63	0.642	1.79
Church Road	0.302	0.47	0.347	0.57
Botwell Lane (to town centre)	0.652	1.91	0.670	2.07

Table 2: 2020 Weekday Evening Peak Hour Updated ARCADY Model Summary

43 Tables 1 and 2 indicate that the Church Road/Botwell Lane roundabout operates within capacity in the future 2016 and 2020 scenarios both for the updated baseline and with the Lidl development included.

Summary

44 In summary, it is considered that the provided list of committed development schemes are located outside of the impact area for the proposed foodstore development. A number of these sites result in a decrease in vehicular trips on the highway network, compared to the existing site uses. On this basis, it can be considered that committed development is included within background growth at the site.

Foodstore Trip Generation Assessment

"The traffic impact assessment for a generic foodstore should be based on comparable sample sites."

45 The trip generation for the proposed Lidl foodstore has been based on the methodology undertaken within the consented scheme Transport Assessment.

46 To provide a robust assessment for this larger store format, the approved trip rates have been subject to a 10% sensitivity uplift factor, to account for the proposed store being larger in size than the previous store proposal and the surveyed stores upon which the trip rates are calculated. This sensitivity uplift is considered to represent a robust assessment of the proposals at the site.

47 It is considered that this presents the most robust assessment of the site use, with limitations associated with the TRICS food superstore category, as detailed within the Transport Assessment accompanying the current application, remaining valid and necessitating the use of the Lidl London trip rates on this occasion.

SUMMARY

48 Gateway TSP has been instructed by Lidl UK to prepare this Technical Note to address comments received from the Highway Officer at the London Borough of Hillingdon on an application to redevelop the former Hayes Pool and Fitness Centre to form a Lidl foodstore (reference 1942/APP/2015/4127).

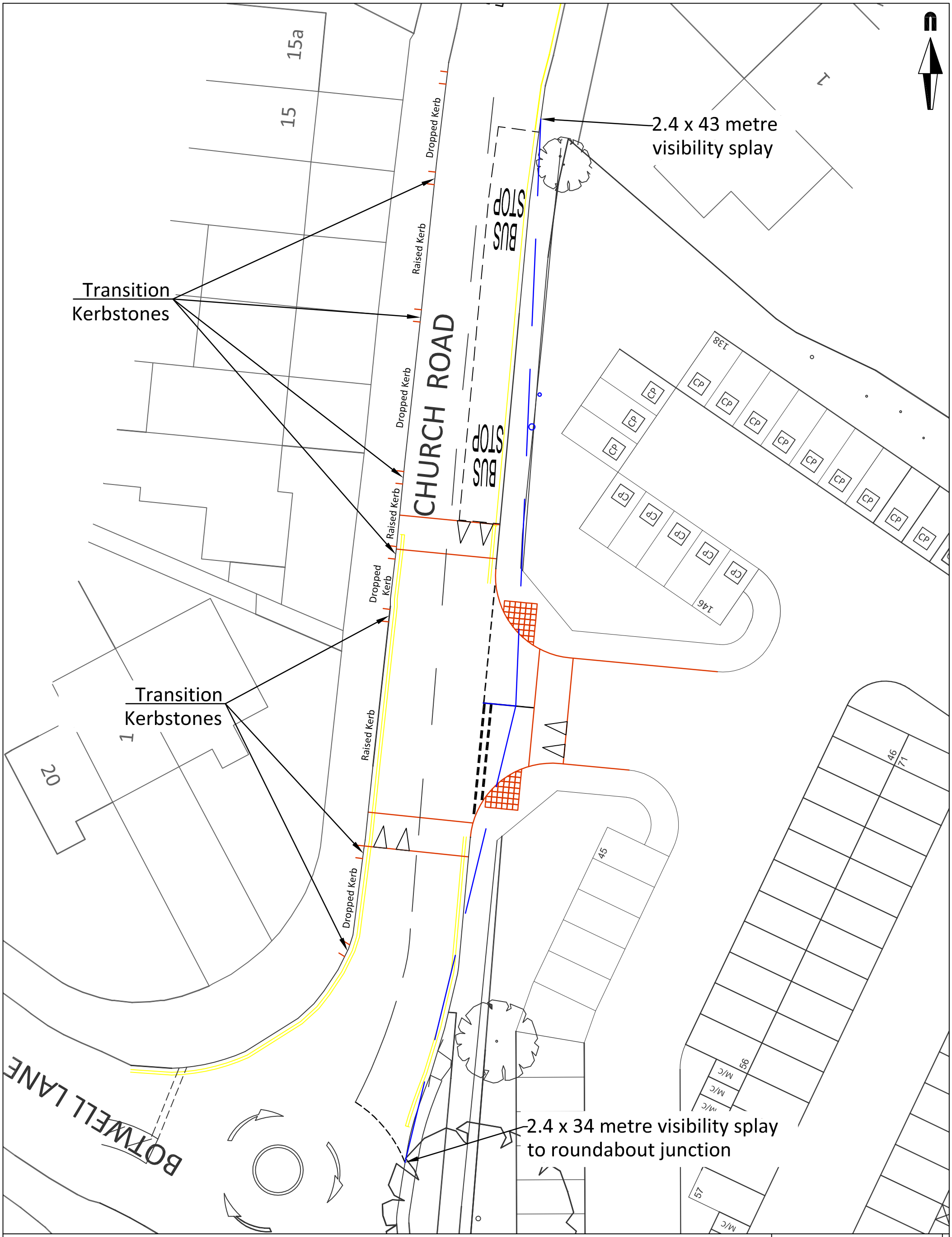
49 This Technical Note seeks to provide additional information and justification in response to comments received from the Highway Officer at the London Borough of Hillingdon in an email dated 23rd December 2015. It is considered that this TN provides sufficient information to enable the planning application to be determined.

Gateway TSP

APPENDICES

APPENDIX A

Drawing 15/0302/SK06



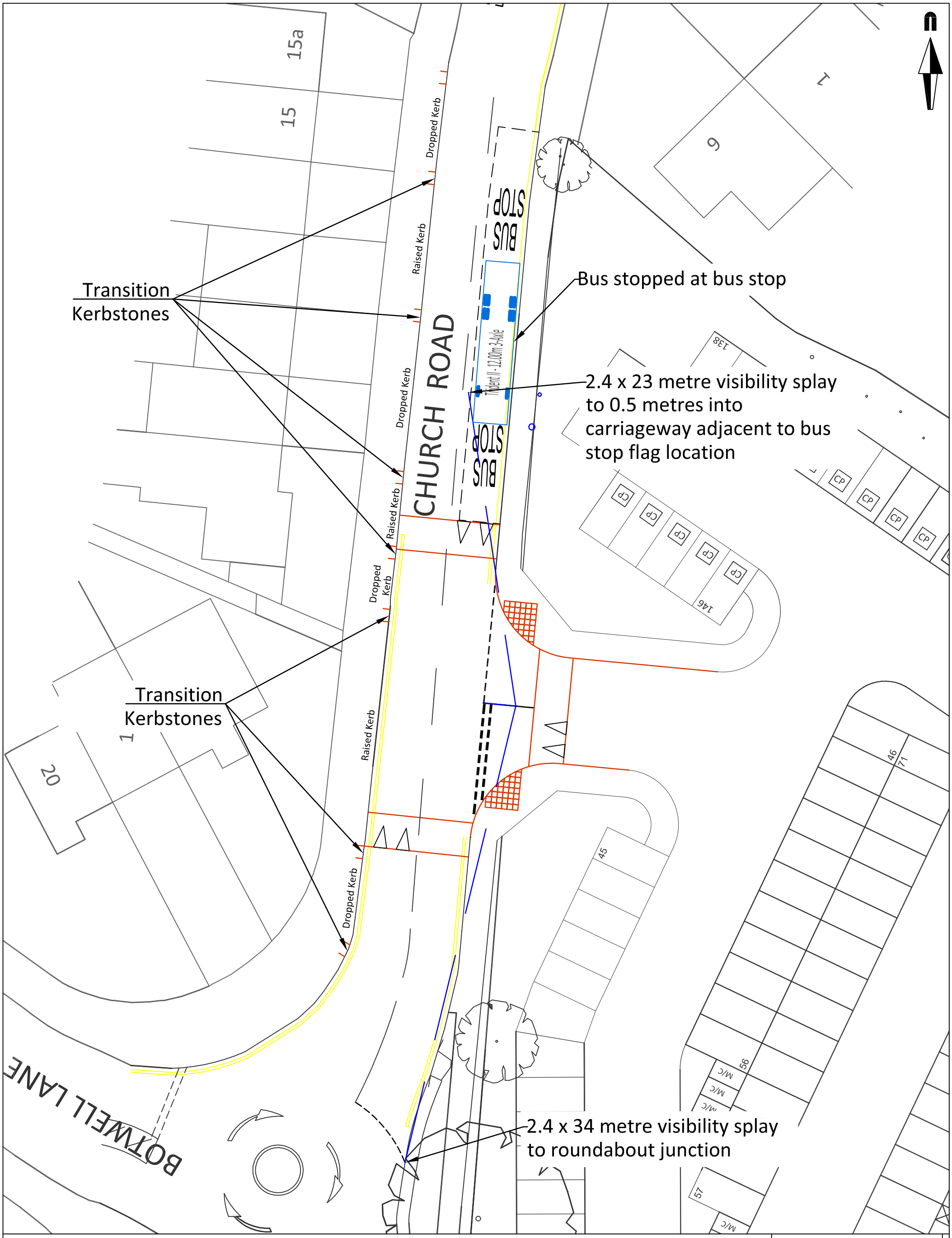
Gateway TSP *Transport Planning & Design* Surrey Technology Centre, 40 Occam Road, Guildford, Surrey GU2 7YG www.gateway-tsp.co.uk admin@gateway-tsp.co.uk 01483 685220	client LIDL UK	project BOTWELL LANE, HAYES	title SITE ACCESS JUNCTION WITH VISIBILITY SPLAYS

scale	drawn by	date
1/250 @ A3	MF	JAN 16

drawing number	rev
15/0302/SK06	-

APPENDIX B

Drawing 15/0302/SK07



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project
BOTWELL LANE, HAYES

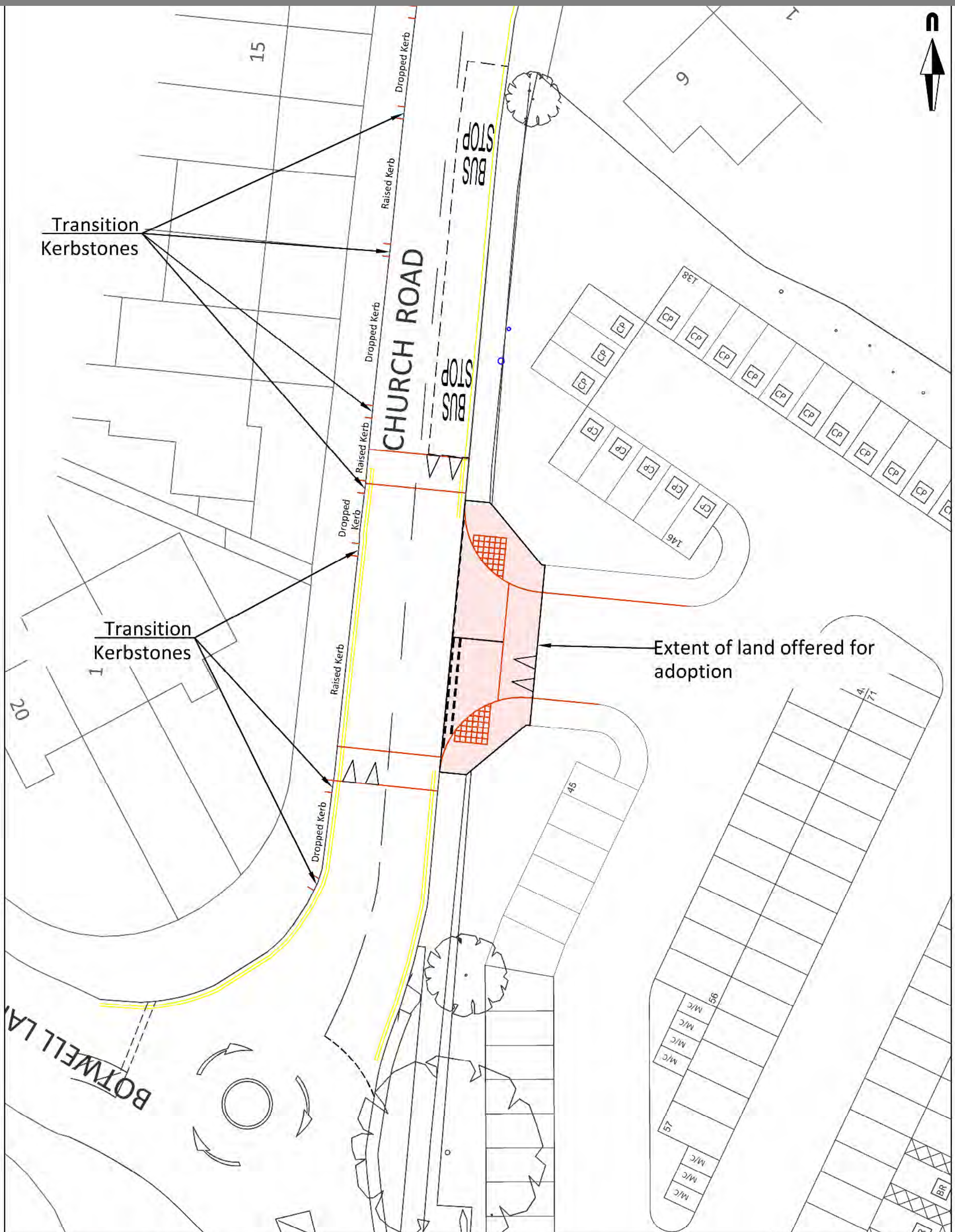
title
SITE ACCESS JUNCTION WITH PRACTICAL VISIBILITY SPLAYS

scale	drawn by	date
1/250 @ A3	MF	JAN 16

drawing number	rev
15/0302/SK07	-

APPENDIX C

Site Access Junction - Extent of Adoptable Highway



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title
SITE ACCESS JUNCTION ADOPTION EXTENT

scale	drawn by	date
1/250 @ A3	MF	JAN 16

drawing number	rev
15/0302/SK08	-

APPENDIX D

VISSIM Report

Prepared by:	**Carl Moreno**	**Reviewed by:**	**Luke Best**
Client:	**Gateway TSP (F.A.O Laura Fitzgerald)**	**Date:**	**19/01/16**

Proposed Lidl Foodstore Impact Assessment

Introduction

Multimodal Ltd have been commissioned by Gateway TSP to test the impact of a proposed Lidl Foodstore on the surrounding network in Hayes Town. The new foodstore is to be located on the former Hayes Pool / Fitness Centre site adjacent to Botwell Lane and accessed via Church Road through a raised entry priority junction.

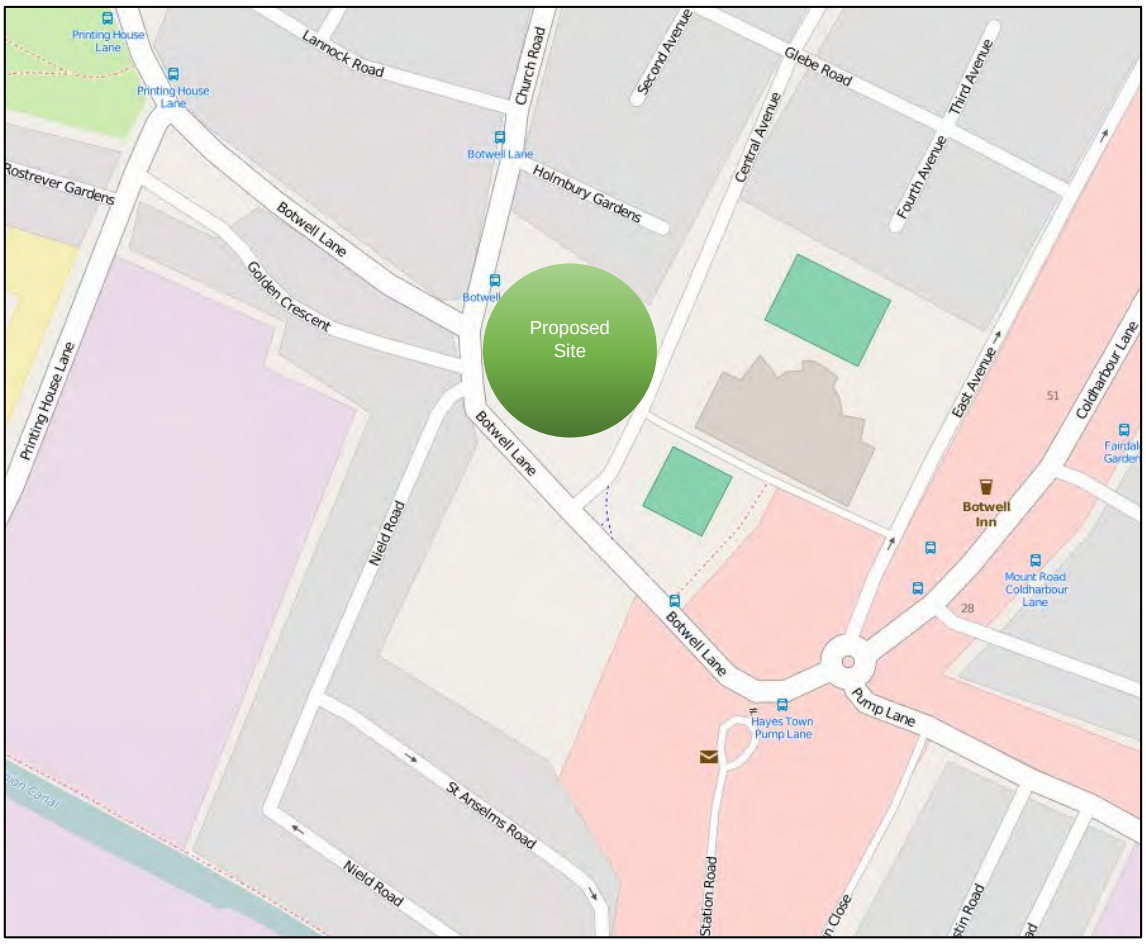

Figure 1: Site location

The site is expected to generate:

- 94 arrivals and 94 departures in the PM Peak;
- 136 arrivals and 127 departures in the Saturday Peak.

The AM Peak trips are not considered in this assessment.

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The following paragraphs summarise the traffic modelling undertaken to assess the impact of the proposed Lidl Foodstore.

Previous Modelling

To take into account the proposed re-opening of Station Road (works currently ongoing), which may impact the assignment of trips in the area of interest, a Hayes Town Centre model, produced by Steer Davies Gleave has been used as the base on which to test the proposed site. This model, built in VISSIM version 5.4 has the following extents and includes the proposed double roundabout which provides through access for Station Road.

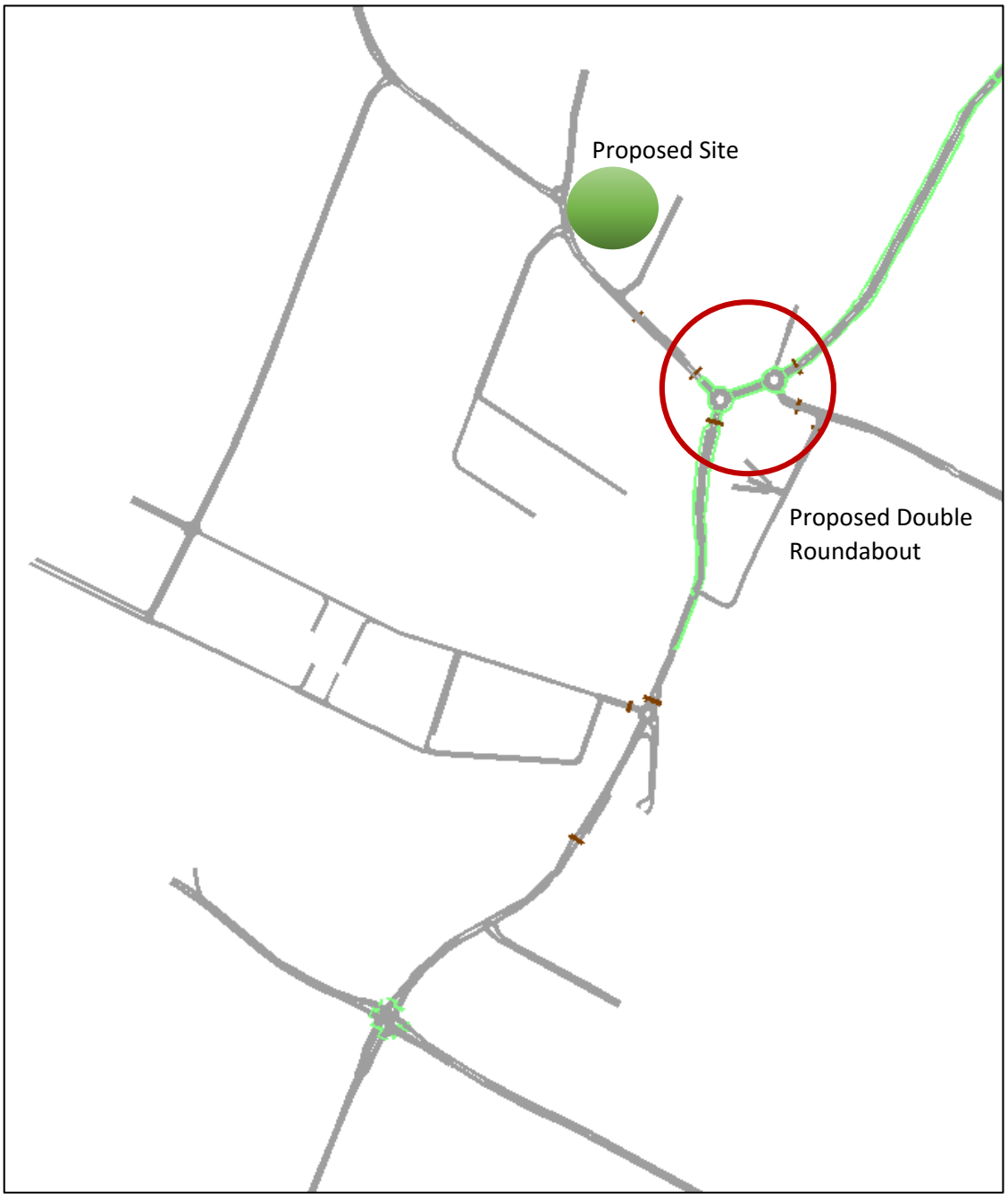

Figure 2: Hayes Town Centre VISSIM model

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Trip Distribution

The distribution of Foodstore Trips around the network has been determined as follows:

- The PM and Saturday Left in / right out trips from / to Church Rd are as per Figures 5.1 and 5.2 of the T.A produced by Gateway TSP (*Proposed Lidl Foodstore, November 2015*). This equates to 52 IN / 49 OUT in the PM Peak and 75 IN / 68 OUT in the Saturday Peak;
- The distribution of left out trips (45 in the PM and 59 on the Saturday) is based on the distribution of traffic entering the network via Church Road in the Hayes Town Centre model, produced by Steer Davies Gleave;
- Similarly, the distribution of right in trips (42 in the PM and 61 on the Saturday) is also based on the distribution of traffic exiting the network via Church Road in the Hayes Town Centre model, produced by Steer Davies Gleave.
- Figures 3 and 4 show the distribution of trips calculated.

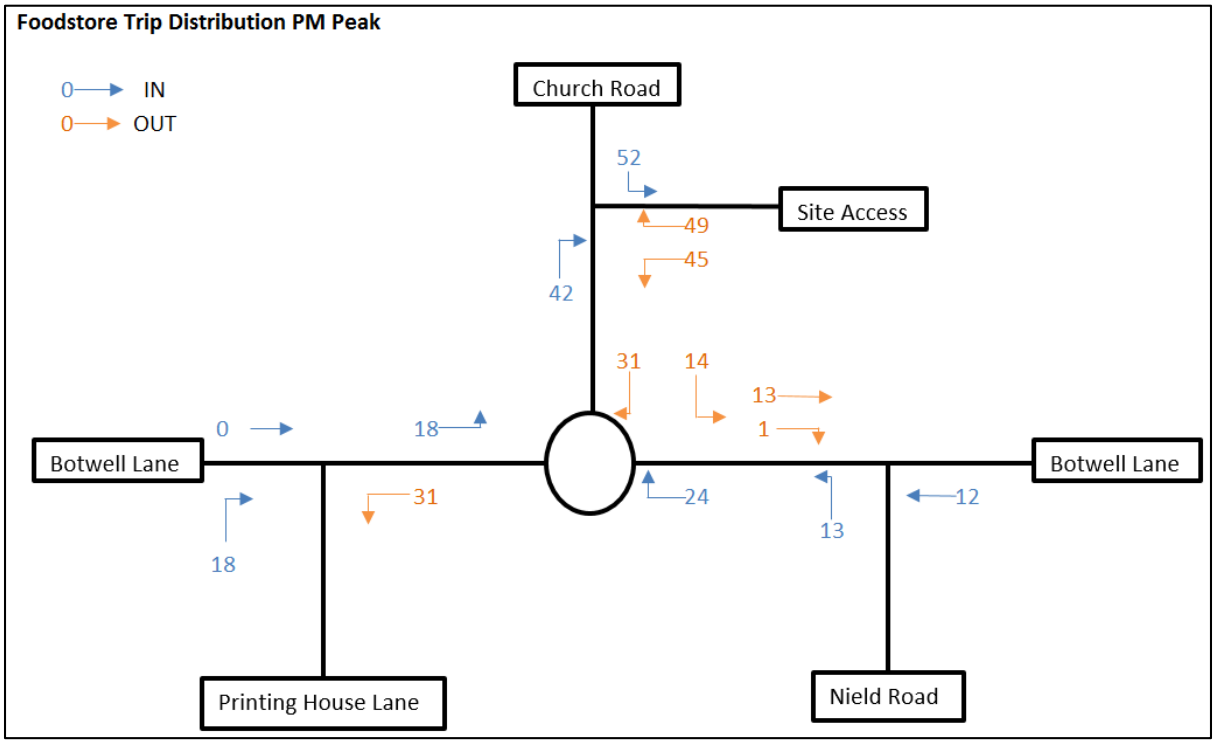

Figure 3: PM Peak Foodstore Total Trips

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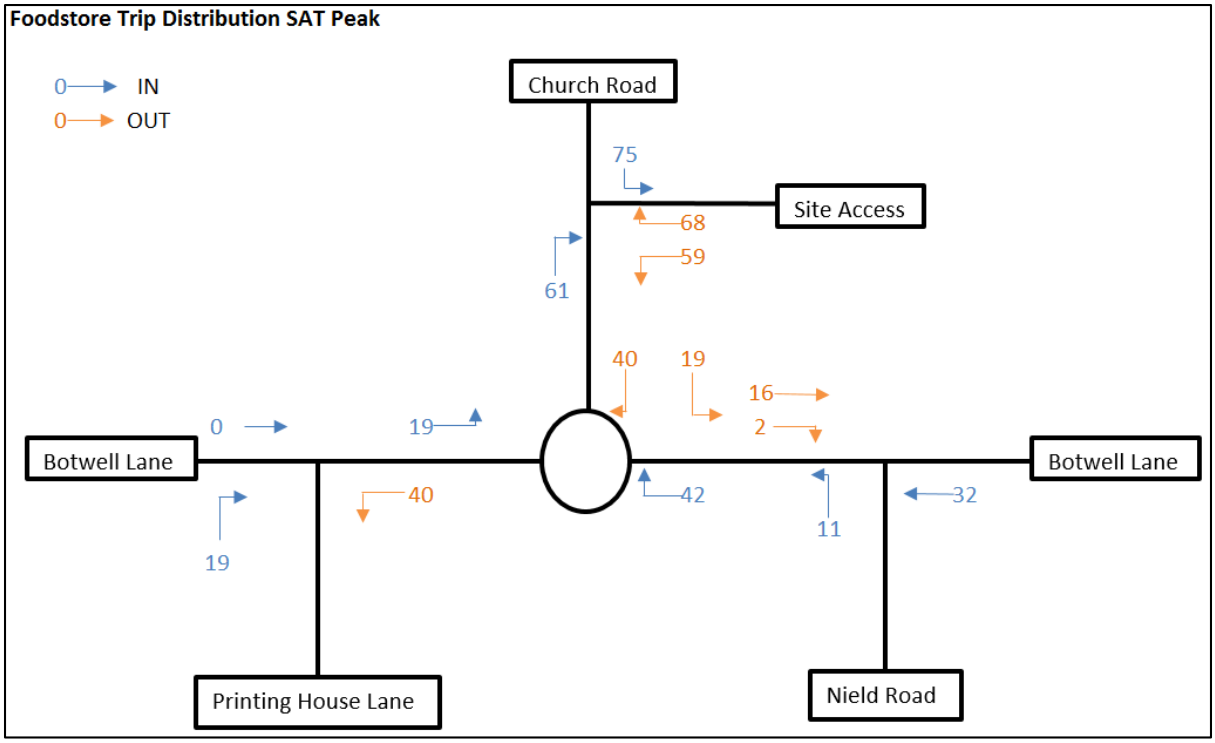

Figure 4: Saturday Peak Foodstore Total Trips

Diverted Trips

As per Figures 5.1 and 5.2 of the T.A produced by Gateway TSP (*Proposed Lidl Foodstore, November 2015*) and based on the layout of the surrounding network, diverted trips have been assumed to originate from the Botwell Lane / Church Road Roundabout to the south of the site or from Uxbridge Road and residential areas to the north of the site, with a 60/40 split between the two. Figure 5 shows the distribution of diverted trips for the PM and Saturday Peaks. The existing flows in the models used for the assessment have been adjusted accordingly to take into account these diverted trips.

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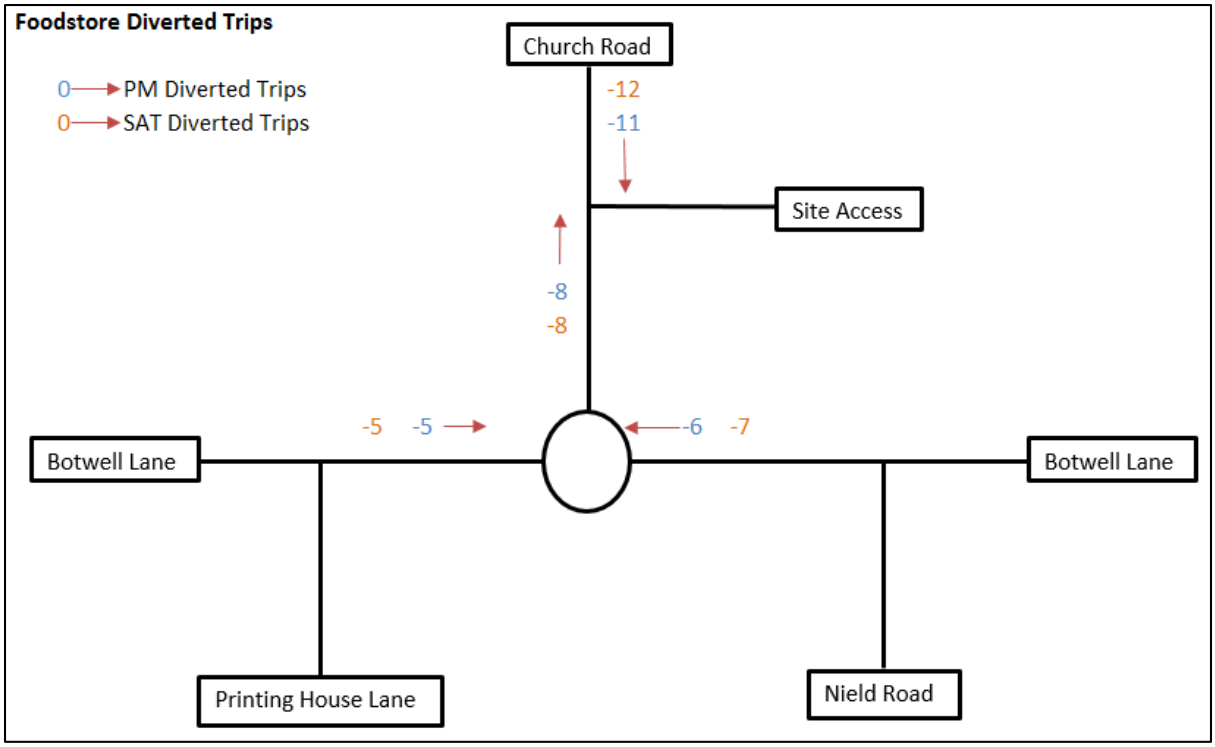

Figure 5: Foodstore Diverted Trips

Assessment Years

The impact of the proposed foodstore has been assessed for:

- The opening year (planned for 2016).

The following growth factors have been used to uplift background traffic in the models to the assessment year, as shown in Table 1.

Time Period	Weekday PM Growth Factor	Saturday Daytime Growth Factor
2015-2016	1.0174	1.0183

Table 1: Tempro Growth Factors*

**source: Page 29 Transport Assessment On behalf of Lidl UK - Gateway TSP*

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VISSIM Model Specification

Based on the Hayes Town Centre modelling already undertaken, the traffic models have been developed using the following specification:

VISSIM Version – 5.40-13.

Testing Year – 2016.

Time Periods

- PM Peak period between 16:30 and 18:30 (includes 30 minute warm up and cool down periods); and
- Saturday Peak period between 12:15 and 14:15 (includes 30 minute warm up and cool down periods).

Evaluation Periods

- PM Peak period between 17:00 and 18:00; and
- Saturday Peak period between 12:45 and 13:45.

Model Results Comparison

The models have been run for results over 10 random seeds to reflect day to day variation in arrival patterns and averaged for comparison.

The models have been assessed for:

- Junction Delays;
- Overall Network Performance; and
- Average Maximum Queues.

2016 Junction Delays

Appendix A summarises the junction delay comparison between the *2016 Base* and *2016 with Development* Scenarios.

The main observations are:

- In the PM Peak, the 2016 with / without development scenarios have very similar levels of delay with very small fluctuations which are considered negligible. Broadly speaking, the differences in delay are within 1-2 seconds, however there are various approach turning movements with a worst case 5-11 seconds difference, again considered negligible;
- The Saturday Peak has a similar outcome with very small fluctuations between the 2016 with / without development scenarios. The most significant increase in delay occurs at the Botwell Lane / Nield Road Junction, in particular on the Nield Road left and right turn movements. These experience an increase of 12.1 seconds and 13.8 seconds respectively, most likely attributed to the increase in development traffic turning left onto Botwell Lane.

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2016 Network Performance

Table 3 summarises an overall network performance comparison between the *2016 Base and 2016 with Development* Scenarios. The main conclusions from this comparison are:

- Comparing the Average Delay per vehicles (secs) the PM Peak shows 1.87 seconds reduction in delay in the *with Development* Scenario, however a Total delay time (hr) increase of 1.49 hours. This suggests that although more vehicles are getting caught in delay conditions, this is for a lower average duration;
- The opposite appears to occur in the Saturday Peak with both an increase in Average Delay per vehicles (secs) of 15.22 seconds and Total delay time (hr) of 28.10 hours;
- However, overall the results show that the *2016 with Development* Scenario has minimal impact on delay per trip in the PM Peak with a 0.14% increase. The Saturday Peaks shows an increase in delay per trip of 4.43%.

Network Performance Data 2016	PM PEAK		SAT PEAK	
	Base	With Development	Base	With Development
Total travel time (hr)	331.44	333.57	290.05	320.65
Average Delay per vehicle (secs)	106.47	104.60	98.26	113.48
Average Stopped Delay per vehicle (secs)	39.83	38.48	40.84	43.81
Average speed (mph)	9.90	9.92	10.32	9.57
Total delay time (hr)	157.40	158.90	131.55	159.65
Percentage delay per trip	**47.49%**	**47.63%**	**45.35%**	**49.79%**
Number of vehicles in the network at end of simulation	410.56	420.78	336.90	354.00
Number of vehicles that have left the network at end of simulation	4923.00	5056.67	4494.00	4713.60

Table 3: 2016 Network Performance

2016 Queue comparison

Figures 6 & 7 show the PM and Saturday Peak Maximum queue lengths for each junction approach. Overall, the *2016 Base and 2016 with Development* Scenarios have similar queue profiles, suggesting the additional development vehicles have minimal impact on the network.

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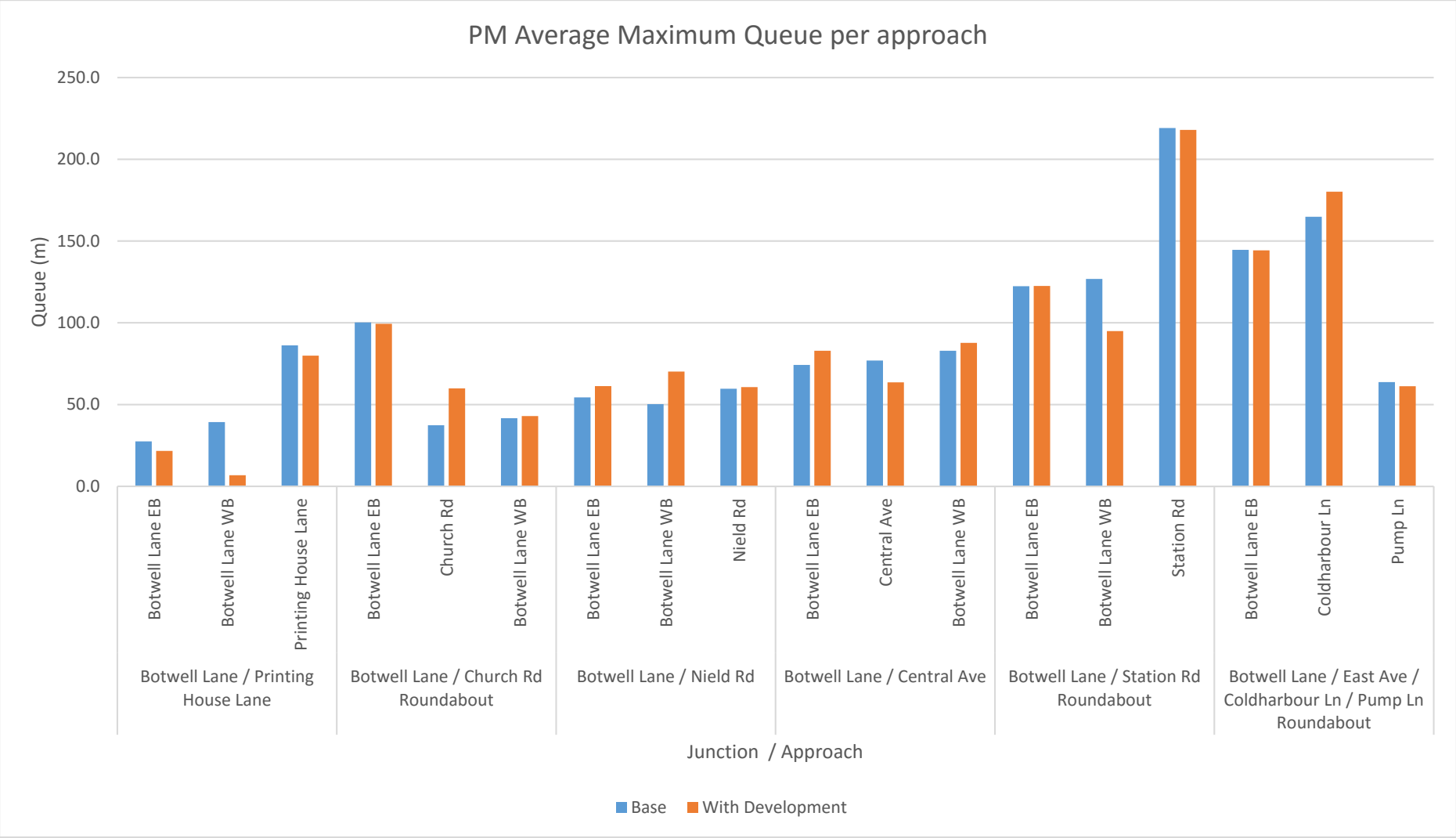

Figure 6: 2016 PM Queues

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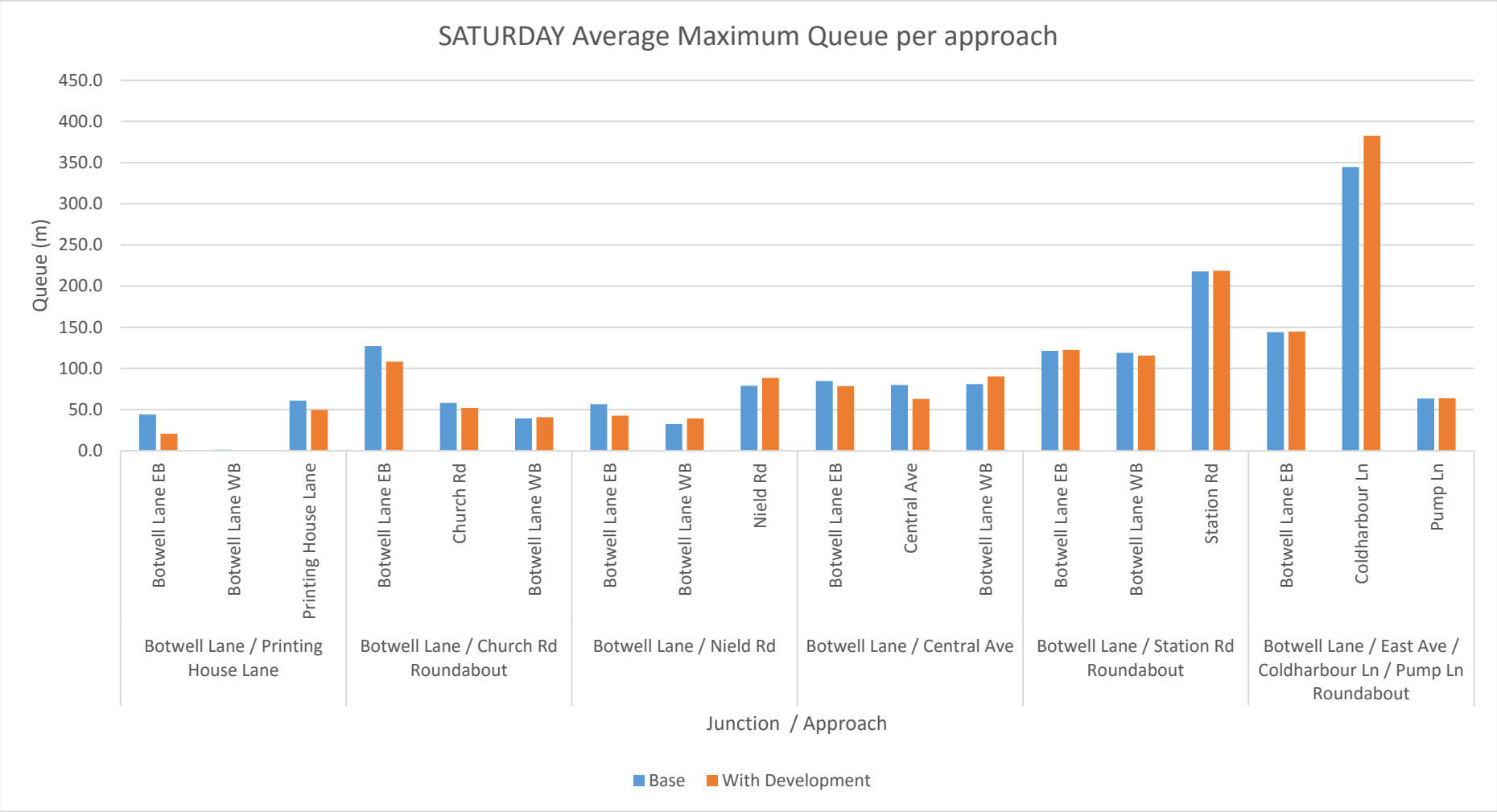

Figure 7: 2016 Saturday Queues

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Conclusion

The testing undertaken using the Hayes Town Centre model to assess the impact of a proposed foodstore located adjacent to Botwell Lane and accessed via Church Road shows that the increase of development trips has minimal impact on the surrounding network in both the PM and Saturday Peaks. However, the Saturday peak appears to be worst affected with an increase in delay per trip of 4.43%.

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APPENDIX A

Junction Delays			PM PEAK				SAT PEAK			
			Base	With Development			Base	With Development		
	Movement		Delay (s)		Diff.	% Diff.	Delay (s)		Diff.	% Diff.
Junction	Approach	Turn								
Botwell Lane / Printing House Lane	Botwell Lane EB	Ahead	4.4	4.1	-0.3	-6.6%	3.9	3.7	-0.2	-5.1%
		Printing House Ln	8.8	8.7	-0.1	-1.1%	7.7	7.8	0.1	0.6%
	Botwell Lane WB	Printing House Ln	4.3	3.2	-1.2	-26.9%	2.6	2.9	0.3	11.9%
		Ahead	5.1	4.4	-0.7	-13.8%	3.5	3.1	-0.3	-9.5%
	Printing House Lane	Left	11.2	11.9	0.7	6.5%	8.1	7.4	-0.6	-8.0%
		Right	13.5	12.9	-0.6	-4.5%	9.5	9.7	0.3	3.1%
	Junction Total		**47.3**	**45.2**	**-2.1**	**-4.5%**	**35.3**	**34.7**	**-0.5**	**-1.5%**
Botwell Lane / Church Rd Roundabout	Botwell Lane EB	Church Rd	10.2	9.5	-0.8	-7.4%	22.4	25.6	3.2	14.1%
		Ahead	10.5	8.7	-1.8	-17.1%	21.9	23.6	1.8	8.1%
	Church Rd	Left	10.4	8.4	-2.0	-19.2%	11.0	12.8	1.8	16.2%
		Right	8.3	7.2	-1.1	-13.5%	9.6	12.8	3.1	32.5%
	Botwell Lane WB	Ahead	2.1	2.3	0.2	7.3%	1.9	2.2	0.3	17.1%
		Church Rd	2.4	2.5	0.1	4.2%	2.3	2.6	0.3	14.1%
	Junction Total		**43.9**	**38.5**	**-5.4**	**-12.3%**	**69.0**	**79.5**	**10.5**	**15.2%**
Botwell Lane / Nield Rd	Botwell Lane EB	Ahead	3.2	2.6	-0.6	-19.9%	4.5	4.7	0.1	2.9%
		Nield Rd	6.3	6.3	0.0	0.7%	6.7	6.7	0.0	0.1%
	Botwell Lane WB	Nield Rd	3.5	3.6	0.1	2.5%	2.3	2.6	0.3	12.2%
		Ahead	5.4	6.1	0.7	12.8%	3.9	4.5	0.7	17.6%
	Nield Rd	Left	20.2	16.3	-3.9	-19.4%	33.2	45.3	12.1	36.4%
		Right	26.6	21.1	-5.5	-20.8%	43.0	56.8	13.8	32.1%
	Junction Total		**65.3**	**56.0**	**-9.3**	**-14.2%**	**93.6**	**120.6**	**27.0**	**28.9%**
Botwell Lane / Central Ave	Botwell Lane EB	Central Ave	6.7	5.5	-1.2	-18.1%	7.3	7.9	0.6	8.4%
		Ahead	12.6	11.0	-1.6	-12.5%	16.2	16.0	-0.2	-1.2%
	Central Ave	Left	32.5	21.4	-11.1	-34.1%	35.8	28.6	-7.2	-20.1%
		Right	27.4	20.1	-7.2	-26.5%	29.4	26.2	-3.2	-10.9%
	Botwell Lane WB	Ahead	4.6	4.5	-0.1	-1.5%	3.9	3.8	-0.1	-3.3%
		Central Ave	6.3	6.9	0.6	9.8%	6.3	6.4	0.0	0.8%
	Junction Total		**90.1**	**69.5**	**-20.6**	**-22.8%**	**98.8**	**88.7**	**-10.1**	**-10.2%**
Botwell Lane / Station Rd Roundabout	Botwell Lane EB	Ahead	40.3	40.6	0.3	0.8%	46.0	47.5	1.6	3.4%
		Station Rd	49.0	49.5	0.5	1.1%	57.4	56.2	-1.2	-2.2%
	Botwell Lane WB	Station Rd	8.0	7.5	-0.5	-6.4%	9.2	9.3	0.1	0.9%
		Ahead	9.3	8.5	-0.8	-8.5%	10.5	10.8	0.3	3.0%
	Station Rd	Left	109.1	105.0	-4.0	-3.7%	122.4	131.2	8.9	7.3%
		Right	106.1	103.2	-2.8	-2.7%	124.2	134.6	10.4	8.4%
	Junction Total		**321.8**	**314.5**	**-7.3**	**-2.3%**	**369.6**	**389.5**	**20.0**	**5.4%**
Botwell Lane / East Ave / Coldharbour Ln / Pump Ln Roundabout	Botwell Lane EB	East Ave	9.8	9.3	-0.6	-5.6%	9.6	10.4	0.9	8.9%
		Coldharbour Ln	15.2	15.8	0.6	3.7%	16.2	16.7	0.5	3.0%
		Pump Ln	13.9	14.2	0.3	2.4%	16.4	17.1	0.8	4.7%
	Coldharbour Ln	Pump Ln	49.6	51.9	2.2	4.5%	80.2	88.0	7.8	9.7%
		Botwell Lane WB	48.0	48.5	0.5	1.1%	80.7	89.5	8.8	10.9%
		East Ave	49.4	49.1	-0.3	-0.7%	78.5	88.9	10.4	13.2%
	Pump Ln	Botwell Lane WB	9.7	9.5	-0.2	-2.3%	10.5	10.5	0.1	0.5%
		East Ave	9.0	9.1	0.1	1.2%	8.7	8.8	0.1	1.3%
		Coldharbour Ln	14.7	14.6	-0.1	-0.4%	12.2	12.9	0.7	5.8%
	Junction Total		**219.3**	**221.9**	**2.6**	**1.2%**	**312.8**	**342.7**	**29.9**	**9.6%**
	Network Total		**787.7**	**745.7**	**-42.1**	**-5.3%**	**979.0**	**1055.7**	**76.8**	**7.8%**

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APPENDIX E

Updated JUNCTIONS 8 Modelling Report

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

For sales and distribution information, program advice and maintenance, contact TRL:
Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk

Filename: 15-0302 Botwell Lane Church Road Com Dev Arcady.arc8
Path: P:\2015\15-0302 lidl hayes4\Analysis\Modelling
Report generation date: 22/01/2016 12:50:51

Summary of junction performance

	PM			
	Queue (PCU)	Delay (s)	RFC	LOS
	Existing Junction Layout - 2016 Future Year Baseline with Committed and Proposed Development			
Arm 1	1.48	7.28	0.60	A
Arm 2	0.51	5.45	0.32	A
Arm 3	1.70	7.88	0.62	A
	Existing Junction Layout - 2016 Future Year Baseline with Committed Development			
Arm 1	1.38	6.90	0.58	A
Arm 2	0.42	5.21	0.28	A
Arm 3	1.56	7.37	0.60	A
	Existing Junction Layout - 2020 Future Year Baseline with Committed and Proposed Development			
Arm 1	1.79	8.22	0.64	A
Arm 2	0.57	5.76	0.35	A
Arm 3	2.07	8.98	0.67	A
	Existing Junction Layout - 2020 Future Year Baseline with Committed Development			
Arm 1	1.63	7.68	0.62	A
Arm 2	0.47	5.48	0.30	A
Arm 3	1.91	8.41	0.65	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D3 - 2016 Future Year Baseline with Committed Development, PM " model duration: 16:30 - 17:30
"D5 - 2020 Future Year Baseline with Committed Development, PM" model duration: 16:30 - 17:30
"D7 - 2016 Future Year Baseline with Committed and Proposed Development, PM" model duration: 16:30 - 17:30
"D9 - 2020 Future Year Baseline with Committed and Proposed Development, PM" model duration: 16:30 - 17:30

Run using Junctions 8.0.6.541 at 22/01/2016 12:50:50

File summary

Title	Botwell Lane/Church Road Roundabout Junction
Location	Hayes
Site Number	
Date	22/01/2016
Version	
Status	
Identifier	
Client	
Jobnumber	15/0302
Enumerator	Gateway TSP
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	Veh	PCU	perTimeSegment	s	-Min	perMin

Existing Junction Layout - 2016 Future Year Baseline with Committed Development, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Existing Junction Layout	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2016 Future Year Baseline with Committed Development, PM	2016 Future Year Baseline with Committed Development	PM		DIRECT	16:30	17:30	60	15		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
1	Botwell Lane/Church Road Roundabout	Roundabout	1,2,3			6.84	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Botwell Lane (NW)	
2	2	Church Road	
3	3	Botwell Lane (SE)	Town Centre Approach Arm

Capacity Options

Arm	Minimum Capacity (PCU/TS)	Maximum Capacity (PCU/TS)
1	0.00	24999.75
2	0.00	24999.75
3	0.00	24999.75

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.50	5.50	3.32	15.00	17.00	15.00	
2	3.50	4.70	4.87	25.00	17.00	12.50	
3	3.30	5.10	5.64	35.00	17.00	14.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/TS)	Final Slope	Final Intercept (PCU/TS)
1		(calculated)	(calculated)	0.597	328.200
2		(calculated)	(calculated)	0.616	338.226
3		(calculated)	(calculated)	0.621	341.709

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

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

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/TS)	Flow Scaling Factor (%)
1	DIRECT	✓	N/A	100.000
2	DIRECT	✓	N/A	100.000
3	DIRECT	✓	N/A	100.000

Turning Proportions

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (16:30-16:45)

		To		
		1	2	3
From	1	1.000	40.000	120.000
	2	30.000	0.000	31.000
	3	119.000	36.000	0.000

Turning Proportions (Veh) - Junction 1 - (16:30-16:45)

		To		
		1	2	3
From	1	0.01	0.25	0.75
	2	0.49	0.00	0.51
	3	0.77	0.23	0.00

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (16:45-17:00)

		To		
		1	2	3
From	1	0.000	35.000	143.000
	2	38.000	0.000	18.000
	3	136.000	20.000	0.000

Turning Proportions (Veh) - Junction 1 - (16:45-17:00)

		To		
		1	2	3
From	1	0.00	0.20	0.80
	2	0.68	0.00	0.32
	3	0.87	0.13	0.00

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (17:00-17:15)

		To		
		1	2	3
From	1	1.000	32.000	118.000
	2	34.000	0.000	33.000
	3	161.000	22.000	1.000

Turning Proportions (Veh) - Junction 1 - (17:00-17:15)

		To		
		1	2	3
From	1	0.01	0.21	0.78
	2	0.51	0.00	0.49
	3	0.88	0.12	0.01

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (17:15-17:30)

		To		
		1	2	3
From	1	3.000	41.000	117.000
	2	37.000	0.000	15.000
	3	148.000	23.000	1.000

Turning Proportions (Veh) - Junction 1 - (17:15-17:30)

		To		
		1	2	3
From	1	0.02	0.25	0.73
	2	0.71	0.00	0.29
	3	0.86	0.13	0.01

Vehicle Mix

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

		To		
		1	2	3
From	1	1.000	1.000	1.027
	2	1.022	1.000	1.168
	3	1.036	1.130	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	2.7
	2	2.2	0.0	16.8
	3	3.6	13.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.58	6.90	1.38	A
2	0.28	5.21	0.42	A
3	0.60	7.37	1.56	A

Main Results for each time segment

Main results: (16:30-16:45)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	164.24	163.06	40.41	0.00	304.09	0.540	1.18	6.458	A
2	66.87	66.50	123.35	0.00	262.27	0.255	0.37	5.030	A
3	163.96	162.88	31.48	0.00	322.17	0.509	1.08	5.937	A

Main results: (16:45-17:00)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	181.86	181.66	22.72	0.00	314.65	0.578	1.38	6.902	A
2	59.86	59.89	146.64	0.00	247.93	0.241	0.34	5.119	A
3	163.50	163.48	38.79	0.00	317.64	0.515	1.10	6.117	A

Main results: (17:00-17:15)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	154.19	154.56	25.80	0.00	312.81	0.493	1.00	5.820	A
2	73.29	73.21	123.49	0.00	262.18	0.280	0.42	5.209	A
3	192.66	192.20	35.76	0.00	319.52	0.603	1.56	7.375	A

Main results: (17:15-17:30)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	164.16	164.05	26.99	0.00	312.10	0.526	1.12	6.192	A
2	55.33	55.47	124.12	0.00	261.80	0.211	0.29	4.644	A
3	180.32	180.47	40.80	0.00	316.39	0.570	1.41	6.952	A

Existing Junction Layout - 2020 Future Year Baseline with Committed Development, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Existing Junction Layout	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2020 Future Year Baseline with Committed Development, PM	2020 Future Year Baseline with Committed Development	PM		DIRECT	16:30	17:30	60	15		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
1	Botwell Lane/Church Road Roundabout	Roundabout	1,2,3			7.65	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Botwell Lane (NW)	
2	2	Church Road	
3	3	Botwell Lane (SE)	Town Centre Approach Arm

Capacity Options

Arm	Minimum Capacity (PCU/TS)	Maximum Capacity (PCU/TS)
1	0.00	24999.75
2	0.00	24999.75
3	0.00	24999.75

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.50	5.50	3.32	15.00	17.00	15.00	
2	3.50	4.70	4.87	25.00	17.00	12.50	
3	3.30	5.10	5.64	35.00	17.00	14.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/TS)	Final Slope	Final Intercept (PCU/TS)
1		(calculated)	(calculated)	0.597	328.200
2		(calculated)	(calculated)	0.616	338.226
3		(calculated)	(calculated)	0.621	341.709

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

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

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/TS)	Flow Scaling Factor (%)
1	DIRECT	✓	N/A	100.000
2	DIRECT	✓	N/A	100.000
3	DIRECT	✓	N/A	100.000

Turning Proportions

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (16:30-16:45)

		To		
		1	2	3
From	1	1.000	43.000	128.000
	2	32.000	0.000	33.000
	3	127.000	38.000	0.000

Turning Proportions (Veh) - Junction 1 - (16:30-16:45)

		To		
		1	2	3
From	1	0.01	0.25	0.74
	2	0.49	0.00	0.51
	3	0.77	0.23	0.00

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (16:45-17:00)

		To		
		1	2	3
From	1	0.000	37.000	153.000
	2	41.000	0.000	20.000
	3	146.000	22.000	0.000

Turning Proportions (Veh) - Junction 1 - (16:45-17:00)

		To		
		1	2	3
From	1	0.00	0.19	0.81
	2	0.67	0.00	0.33
	3	0.87	0.13	0.00

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (17:00-17:15)

		To		
		1	2	3
From	1	1.000	34.000	126.000
	2	36.000	0.000	35.000
	3	173.000	24.000	1.000

Turning Proportions (Veh) - Junction 1 - (17:00-17:15)

		To		
		1	2	3
From	1	0.01	0.21	0.78
	2	0.51	0.00	0.49
	3	0.87	0.12	0.01

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (17:15-17:30)

		To		
		1	2	3
From	1	3.000	44.000	125.000
	2	40.000	0.000	16.000
	3	159.000	25.000	1.000

Turning Proportions (Veh) - Junction 1 - (17:15-17:30)

		To		
		1	2	3
From	1	0.02	0.26	0.73
	2	0.71	0.00	0.29
	3	0.86	0.14	0.01

Vehicle Mix

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

		To		
		1	2	3
From	1	1.000	1.000	1.027
	2	1.022	1.000	1.168
	3	1.036	1.130	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	2.7
	2	2.2	0.0	16.8
	3	3.6	13.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.62	7.68	1.63	A
2	0.30	5.48	0.47	A
3	0.65	8.41	1.91	A

Main Results for each time segment

Main results: (16:30-16:45)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	175.46	174.08	42.63	0.00	302.77	0.580	1.38	7.061	A
2	71.25	70.83	131.41	0.00	257.31	0.277	0.42	5.278	A
3	174.51	173.27	33.51	0.00	320.92	0.544	1.24	6.394	A

Main results: (16:45-17:00)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	194.13	193.88	24.98	0.00	313.30	0.620	1.63	7.681	A
2	65.26	65.28	156.85	0.00	241.64	0.270	0.40	5.460	A
3	176.12	176.05	41.85	0.00	315.74	0.558	1.30	6.749	A

Main results: (17:00-17:15)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	164.40	164.88	28.05	0.00	311.47	0.528	1.16	6.291	A
2	77.67	77.60	131.79	0.00	257.07	0.302	0.47	5.484	A
3	207.35	206.74	37.82	0.00	318.24	0.652	1.91	8.405	A

Main results: (17:15-17:30)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	175.38	175.23	29.25	0.00	310.75	0.564	1.30	6.760	A
2	59.57	59.71	132.32	0.00	256.75	0.232	0.32	4.862	A
3	193.97	194.16	43.87	0.00	314.49	0.617	1.72	7.859	A

Existing Junction Layout - 2016 Future Year Baseline with Committed and Proposed Development, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Existing Junction Layout	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2016 Future Year Baseline with Committed and Proposed Development, PM	2016 Future Year Baseline with Committed and Proposed Development	PM		DIRECT	16:30	17:30	60	15		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
1	Botwell Lane/Church Road Roundabout	Roundabout	1,2,3			7.21	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Botwell Lane (NW)	
2	2	Church Road	
3	3	Botwell Lane (SE)	Town Centre Approach Arm

Capacity Options

Arm	Minimum Capacity (PCU/TS)	Maximum Capacity (PCU/TS)
1	0.00	24999.75
2	0.00	24999.75
3	0.00	24999.75

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.50	5.50	3.32	15.00	17.00	15.00	
2	3.50	4.70	4.87	25.00	17.00	12.50	
3	3.30	5.10	5.64	35.00	17.00	14.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/TS)	Final Slope	Final Intercept (PCU/TS)
1		(calculated)	(calculated)	0.597	328.200
2		(calculated)	(calculated)	0.616	338.226
3		(calculated)	(calculated)	0.621	341.709

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

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

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/TS)	Flow Scaling Factor (%)
1	DIRECT	✓	N/A	100.000
2	DIRECT	✓	N/A	100.000
3	DIRECT	✓	N/A	100.000

Turning Proportions

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (16:30-16:45)

		To		
		1	2	3
From	1	1.000	45.000	119.000
	2	37.000	0.000	36.000
	3	117.000	40.000	0.000

Turning Proportions (Veh) - Junction 1 - (16:30-16:45)

		To		
		1	2	3
From	1	0.01	0.27	0.72
	2	0.51	0.00	0.49
	3	0.75	0.25	0.00

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (16:45-17:00)

		To		
		1	2	3
From	1	0.000	40.000	142.000
	2	45.000	0.000	23.000
	3	135.000	25.000	0.000

Turning Proportions (Veh) - Junction 1 - (16:45-17:00)

		To		
		1	2	3
From	1	0.00	0.22	0.78
	2	0.66	0.00	0.34
	3	0.84	0.16	0.00

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (17:00-17:15)

		To		
		1	2	3
From	1	1.000	37.000	117.000
	2	41.000	0.000	38.000
	3	160.000	27.000	1.000

Turning Proportions (Veh) - Junction 1 - (17:00-17:15)

		To		
		1	2	3
From	1	0.01	0.24	0.75
	2	0.52	0.00	0.48
	3	0.85	0.14	0.01

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (17:15-17:30)

		To		
		1	2	3
From	1	3.000	46.000	116.000
	2	44.000	0.000	20.000
	3	147.000	28.000	1.000

Turning Proportions (Veh) - Junction 1 - (17:15-17:30)

		To		
		1	2	3
From	1	0.02	0.28	0.70
	2	0.69	0.00	0.31
	3	0.84	0.16	0.01

Vehicle Mix

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

		To		
		1	2	3
From	1	1.000	1.000	1.027
	2	1.018	1.000	1.140
	3	1.036	1.110	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	2.7
	2	1.8	0.0	14.0
	3	3.6	11.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.60	7.28	1.48	A
2	0.32	5.45	0.51	A
3	0.62	7.88	1.70	A

Main Results for each time segment

Main results: (16:30-16:45)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	168.21	166.95	44.10	0.00	301.89	0.557	1.26	6.739	A
2	78.71	78.25	122.29	0.00	262.93	0.299	0.46	5.242	A
3	165.61	164.48	38.44	0.00	317.86	0.521	1.13	6.147	A

Main results: (16:45-17:00)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	185.83	185.61	27.86	0.00	311.58	0.596	1.48	7.281	A
2	72.03	72.05	145.59	0.00	248.58	0.290	0.44	5.403	A
3	167.61	167.55	45.76	0.00	313.32	0.535	1.19	6.465	A

Main results: (17:00-17:15)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	158.16	158.56	30.90	0.00	309.77	0.511	1.08	6.091	A
2	85.06	84.98	122.49	0.00	262.80	0.324	0.51	5.446	A
3	196.73	196.22	42.76	0.00	315.18	0.624	1.70	7.882	A

Main results: (17:15-17:30)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	168.13	168.01	32.08	0.00	309.06	0.544	1.20	6.496	A
2	67.59	67.73	123.09	0.00	262.43	0.258	0.37	4.887	A
3	184.37	184.53	47.78	0.00	312.06	0.591	1.54	7.406	A

Existing Junction Layout - 2020 Future Year Baseline with Committed and Proposed Development, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Existing Junction Layout	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2020 Future Year Baseline with Committed and Proposed Development, PM	2020 Future Year Baseline with Committed and Proposed Development	PM		DIRECT	16:30	17:30	60	15		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
1	Botwell Lane/Church Road Roundabout	Roundabout	1,2,3			8.11	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Botwell Lane (NW)	
2	2	Church Road	
3	3	Botwell Lane (SE)	Town Centre Approach Arm

Capacity Options

Arm	Minimum Capacity (PCU/TS)	Maximum Capacity (PCU/TS)
1	0.00	24999.75
2	0.00	24999.75
3	0.00	24999.75

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.50	5.50	3.32	15.00	17.00	15.00	
2	3.50	4.70	4.87	25.00	17.00	12.50	
3	3.30	5.10	5.64	35.00	17.00	14.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/TS)	Final Slope	Final Intercept (PCU/TS)
1		(calculated)	(calculated)	0.597	328.200
2		(calculated)	(calculated)	0.616	338.226
3		(calculated)	(calculated)	0.621	341.709

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

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

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/TS)	Flow Scaling Factor (%)
1	DIRECT	✓	N/A	100.000
2	DIRECT	✓	N/A	100.000
3	DIRECT	✓	N/A	100.000

Turning Proportions

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (16:30-16:45)

		To		
		1	2	3
From	1	1.000	48.000	127.000
	2	39.000	0.000	38.000
	3	126.000	43.000	0.000

Turning Proportions (Veh) - Junction 1 - (16:30-16:45)

		To		
		1	2	3
From	1	0.01	0.27	0.72
	2	0.51	0.00	0.49
	3	0.75	0.25	0.00

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (16:45-17:00)

		To		
		1	2	3
From	1	0.000	43.000	152.000
	2	47.000	0.000	25.000
	3	144.000	27.000	0.000

Turning Proportions (Veh) - Junction 1 - (16:45-17:00)

		To		
		1	2	3
From	1	0.00	0.22	0.78
	2	0.65	0.00	0.35
	3	0.84	0.16	0.00

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (17:00-17:15)

		To		
		1	2	3
From	1	1.000	39.000	125.000
	2	43.000	0.000	40.000
	3	171.000	29.000	1.000

Turning Proportions (Veh) - Junction 1 - (17:00-17:15)

		To		
		1	2	3
From	1	0.01	0.24	0.76
	2	0.52	0.00	0.48
	3	0.85	0.14	0.00

Turning Counts / Proportions (Veh/ TS) - Junction 1 - (17:15-17:30)

		To		
		1	2	3
From	1	3.000	49.000	124.000
	2	46.000	0.000	21.000
	3	157.000	30.000	1.000

Turning Proportions (Veh) - Junction 1 - (17:15-17:30)

		To		
		1	2	3
From	1	0.02	0.28	0.70
	2	0.69	0.00	0.31
	3	0.84	0.16	0.01

Vehicle Mix

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

		To		
		1	2	3
From	1	1.000	1.000	1.027
	2	1.019	1.000	1.141
	3	1.036	1.111	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	2.7
	2	1.9	0.0	14.1
	3	3.6	11.1	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.64	8.22	1.79	A
2	0.35	5.76	0.57	A
3	0.67	8.98	2.07	A

Main Results for each time segment

Main results: (16:30-16:45)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	179.43	177.94	47.41	0.00	299.91	0.598	1.49	7.435	A
2	83.10	82.59	130.34	0.00	257.97	0.322	0.51	5.523	A
3	178.31	176.97	40.49	0.00	316.58	0.563	1.34	6.740	A

Main results: (16:45-17:00)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	199.10	198.80	30.12	0.00	310.23	0.642	1.79	8.221	A
2	76.42	76.43	155.79	0.00	242.30	0.315	0.49	5.761	A
3	179.18	179.12	47.84	0.00	312.03	0.574	1.39	7.090	A

Main results: (17:00-17:15)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	168.38	168.92	33.13	0.00	308.44	0.546	1.25	6.610	A
2	89.46	89.38	130.81	0.00	257.68	0.347	0.57	5.760	A
3	210.38	209.70	44.84	0.00	313.89	0.670	2.07	8.981	A

Main results: (17:15-17:30)

Arm	Total Demand (PCU/TS)	Entry Flow (PCU/TS)	Circulating Flow (PCU/TS)	Pedestrian Demand (Ped/TS)	Capacity (PCU/TS)	RFC	End Queue (PCU)	Delay (s)	LOS
1	179.35	179.19	34.33	0.00	307.72	0.583	1.40	7.126	A
2	70.84	71.00	131.29	0.00	257.39	0.275	0.40	5.109	A
3	196.98	197.20	49.87	0.00	310.77	0.634	1.85	8.324	A