

local transport projects 

traffic engineering and transport planning

Keepmoat Homes Ltd

**Proposed Residential Development
St Helen's Boulevard, Barnsley
Transport Assessment**

February 2019

Armstrong House,
The Flemingate Centre,
Beverley,
HU17 0NW

 01482 679 911

 info@local-transport-projects.co.uk

 www.local-transport-projects.co.uk

Registered No. 5295328

Keepmoat Homes Ltd

Proposed Residential Development St Helen's Boulevard, Barnsley Transport Assessment

February 2019

Client Commission

Client:	Keepmoat Homes Ltd	Date Commissioned:	June 2017
---------	--------------------	--------------------	-----------

LTP Quality Control

Job No:	LTP/17/2880	File Ref:	St Helen's Boulevard Barnsley TA Final Issue 1A		
Issue	Revision	Description	Originated	Checked	Date
1	A	Updated site quantum	SW	-	25/02/2019
1	-	Final issue for planning	ET/MR	SW	08/01/2018
Authorised for Issue:				TK	

LTP PROJECT TEAM

As part of our commitment to quality the following team of transport professionals was assembled specifically for the delivery of this project. Relevant qualifications are shown and CVs are available upon request to demonstrate our experience and credentials.

Team Member	LTP Designation	Qualifications
Tony Kirby	Director (Project Manager)	IEng MSc MCIHT FIHE
Steven Windass	Head of Transport Planning	BSc(Hons) MSc(Eng) MCIHT MIHE
Mike Raynor	Senior Transport Planner	BA(Hons) MIHE
Eamonn Tuton	Graduate Transport Planner	BSc(Hons) MSc

The contents of this document must not be copied or reproduced, in whole or in part, without the written consent of Local Transport Projects Ltd.

Document Control

www.local-transport-projects.co.uk

PROPOSED RESIDENTIAL DEVELOPMENT ST HELEN'S BOULEVARD, BARNSELEY TRANSPORT ASSESSMENT

CONTENTS

EXECUTIVE SUMMARY	4
1. INTRODUCTION	5
1.1 Background	5
1.2 Scope	5
2. SITE BACKGROUND.....	7
2.1 Site Location & Previous Use	7
2.2 Development Proposals & Access Arrangements.....	7
2.3 Local Plan Allocation & Planning History	8
3. SITE ASSESSMENT.....	9
3.1 Introduction	9
3.2 Local Highway Network	9
3.4 Pedestrian Provision	11
3.7 Cycling Provision	15
3.8 Public Transport Provision	16
4. ROAD CASUALTY APPRAISAL	17
4.1 Collision Record	17
4.2 Collision Conditions	17
4.3 Collision Times	18
4.4 Collision Locations	18
4.5 Casualties.....	18
4.6 Road Safety Impact.....	19
5. TRIP GENERATION PROJECTIONS	20
5.1 Introduction	20
5.2 Proposed Traffic Generation.....	20
5.3 Modal Split & Person Trip Generation	21
6. TRAFFIC IMPACT	23
6.1 Existing Network Traffic Flows.....	23
6.2 Peak Hours.....	23
6.3 Assessment Scenarios.....	23
6.4 Trip Distribution & Assignment.....	24
6.6 Impact on Local Junctions.....	25
6.7 St Helen's Boulevard/Carlton Road Junction Capacity Assessment.....	25
6.8 Rotherham Road/Carlton Road Junction Capacity Assessment.....	27
6.9 Traffic Impact Summary.....	29
7. CONCLUSIONS	30
8. REFERENCES	32

APPENDICES

Appendix 1 – Site Layout Plan	
Appendix 2 – PIC Study Plot	
Appendix 3 – TRICS Output	
Appendix 4 – Network Diagrams	
Appendix 5 – TEMPro Traffic Growth	
Appendix 6 – Gravity Model	
Appendix 7 – Junction Modelling Results	

TABLES

Table 1: Key Trip Attractors by Foot.....	11
Table 2: Collision History.....	17
Table 3: Collision Conditions	17
Table 4: Collisions by Time of Year.....	18
Table 5: Collisions by Day & Time	18
Table 6: Casualty Road User Groups	19
Table 7: Projected Vehicle Trip Generation	20
Table 8: Projected Person Trip Generation.....	21
Table 9: Projected Modal Trip Generation.....	21
Table 10: Gravity Model Results	25
Table 11: Predicted Traffic Impact at Key Local Junctions.....	25
Table 12: St Helen's Boulevard/Carlton Road Junction Capacity Assessment.....	26
Table 13: Rotherham Road/Carlton Road Signal Junction Capacity Assessment	28

FIGURES

Figure 1: Site Location.....	7
Figure 2: Housing Sites H24 and H33	8
Figure 3: Local Public Rights of Way.....	14
Figure 4: Extract of BMBC National and Regional Cycle Network Map	15
Figure 5: Gravity Model Zones	24
Figure 6: St Helen's Boulevard/Carlton Road Priority Junction	26
Figure 7: St Helen's Boulevard/Carlton Road Priority Junction Traffic Streams	27
Figure 8: Rotherham Road/Carlton Road Signal Junction.....	28

PHOTOS

Photo 1: St Helen's Boulevard..... 9

Photo 2: Carlton Road 10

Photo 3: St Helen's Avenue..... 10

Photo 4: A633 (Rotherham Road) 11

Photo 5: Pedestrian Infrastructure on St Helen's Boulevard (West of Access) 12

Photo 6: Pedestrian Infrastructure on St Helen's Boulevard (East of Access) 13

Photo 7: Pedestrian Infrastructure on Carlton Road 13

Photo 8: Pedestrian Build Out on Carlton Road..... 14

Photo 9: Northbound Bus Stop on Carlton Road 16

EXECUTIVE SUMMARY

This Transport Assessment (TA) provides a detailed appraisal of transport aspects associated with the proposed residential development on land off St Helen's Boulevard in Barnsley, South Yorkshire.

The proposals involve a planning application for a residential development of 101 dwellings. The development will be accessed via the existing access south of St Helen's Boulevard. It is understood that the development would involve a mix of housing types, including an element of affordable housing.

The site is located approximately 3.5km from Barnsley town centre, with access to pedestrian, cycle and public transport facilities. The proposed development site is located close to good pedestrian routes, with good quality footways within close proximity of the site, providing good access to local amenities. The site is located within a reasonable cycle ride of the majority of the built-up area of Barnsley. The nearest bus stops to the proposed development are located on Carlton Road, providing travel in both directions, situated an approximately 140m (northbound) and 270m (southbound) walk from the proposed development site providing access to the #12 service. The nearest rail station to the site is Barnsley Rail Station which is located approximately 2.8km south-west of the site providing access to local, regional and national destinations including Leeds, Sheffield, Huddersfield and Nottingham.

Road casualty information obtained from the Department for Transport (DfT) shows that 14 collisions occurred within the study area around the proposed development site during the 5-year study period. Analysis of the study collisions has not revealed any identifiable existing collision issues associated with the expected movements generated by the proposed development, therefore it is considered that there are no existing road safety issues pertinent to the development of the site.

The vehicle trip generation for the residential development has been projected using the nationally recognised TRICS database. Overall, these projections indicate that when the application site is fully constructed (101 dwellings) it is expected to generate a maximum of 50 two-way vehicle trips during the AM and PM peak hours.

Junction capacity assessments that have been undertaken as part of this TA indicate that the local junctions would be expected to operate within capacity with the development fully constructed.

Based on the assessments detailed within this TA, it is considered that the proposed development should not have a material impact on the operation of the local highway network. Therefore, as the impact of the proposals is not expected to be severe, the proposals are considered to be in accordance with the NPPF, which states that *"development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe"* (DCLG, 2012).

This TA demonstrates that the proposed residential development would not be expected to have a detrimental impact in road safety, traffic and highway terms.

I. INTRODUCTION

I.1 Background

- 1.1.1 Local Transport Projects Ltd (LTP) has been commissioned to produce a Transport Assessment (TA) in support of a planning application for a proposed residential development on land off St Helen's Boulevard in Barnsley, South Yorkshire. A plan of the proposed site layout is attached as Appendix 1.
- 1.1.2 The local planning and highway authority for the site is Barnsley Metropolitan Borough Council (BMBC).
- 1.1.3 LTP has also been commissioned to prepare a 'Travel Plan' (TP) for the proposed development (LTP, 2018), which outlines the approach to encouraging travel by sustainable modes at the site. Although the TP has been prepared as a standalone document, both the TA and TP are linked and should be read in conjunction with each other.

I.2 Scope

- 1.2.1 The scope of this report has been agreed with BMBC Highway Development Management (ref: Barbara Wilson). The report is written in accordance with the Government's 'Planning Practice Guidance' (DCLG, 2014), as summarised below:
 - **Executive Summary:** A non-technical summary of the report outlining the key outcomes of the assessment.
 - **Introduction & Description of Proposals:**
 - Description of the development site, including location and existing access arrangements;
 - Summary of relevant planning and allocation history for the site;
 - Description of the proposed development including site layout, pedestrian/cycle facilities and proposed access arrangements.
 - **Site Assessment:**
 - Site assessments to determine existing traffic conditions, such as posted speed limits, road restrictions, highway geometry, on-street parking restrictions and any other relevant features of the local area;
 - Assessment of the sustainable transport infrastructure (pedestrian, cycle and public transport) local to the site.
 - **Road Casualty Appraisal:** Examination of road collision records (5 year study period) and assessment of the road safety impact of the proposed development on the local highway network.
 - **Traffic Impact:**
 - Calculation of the projected trip generation for the proposed development;
 - Consideration of any relevant consented developments within the local area and any committed changes to the surrounding highway network;

- Predict the distribution of the vehicle trips generated by the site onto the local highway network;
- Calculation of suitable future traffic growth factor(s) utilising the Department for Transport's (DfT) approved models and software; and
- Assessment of the likely traffic impact of the proposed development on the operation of the local highway network.
- **Access, Parking & Internal Layout:** Description of the proposed access arrangements and internal layout of the site, including consideration of the proposed parking provision, access/servicing arrangements and suitability of proposed access arrangements.
- **Conclusions:** Conclusions summarising the outcomes of the TA, including a commentary on the suitability of the proposals in terms of traffic impact and road safety.

1.2.2 This TA report has been prepared in accordance with the above scope and reference has been made to the following documents where appropriate:

- Barnsley Draft Local Plan (BMBC, 2016a);
- South Yorkshire Local Transport Plan 2011-2026 (SYLTP, 2015);
- Planning Practice Guidance (DCLG, 2014);
- Barnsley Supplementary Planning Document: Parking (BMBC, 2012);
- National Planning Policy Framework (DCLG, 2012);
- Barnsley Local Development Framework Adopted Core Strategy (BMBC, 2011);
- Guidance on Transport Assessment (DfT, 2007a);
- Manual for Streets (DfT, 2007b); and
- The Unitary Development Plan Volume 2: Community Areas (BMBC, 2000).

2. SITE BACKGROUND

2.1 Site Location & Previous Use

- 2.1.1 The site is located in the town of Barnsley, approximately 3.5km to the north-east of the town centre within South Yorkshire. The site was previously home to Springwell Community Special School which closed in 2014 and is bound by a combination of woodland/fields to the east and south. Existing residential dwellings served via St Helen's Avenue form the western boundary of the site and St Helen's Boulevard forms the northern boundary, which also serves Springwell Alternative Academy. The approximate extents of the site are shown within Figure 1.

Figure 1: Site Location



Source Imagery: Copyright Google Earth Pro (License Key-JCPMR5M58LXF2GE)

2.2 Development Proposals & Access Arrangements

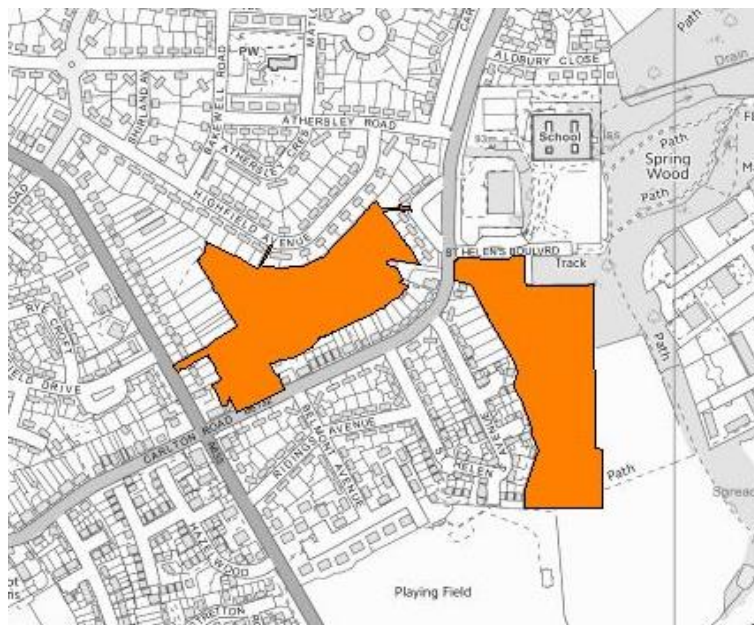
- 2.2.1 The proposals involve a development of 101 dwellings. It is understood that the development would involve a mix of housing types, including an element of affordable housing. Further details regarding the development proposals are provided on the site layout plan attached in Appendix 1.
- 2.2.2 The development is to be served by the existing access junction from St Helen's Boulevard. The main access road through the development site will serve a number of dwellings directly, with additional connecting culs-de-sac providing access to other properties, and potential future links to adjacent land. Footways will also be provided alongside the main internal road.

- 2.2.3 It is envisaged that the internal highway network of the site will be designed in accordance with 'Manual for Streets' (DfT, 2007b) to ensure that refuse vehicles can utilise the highway alignment and turning heads to enter and exit the site in a forward gear.
- 2.2.4 The proposed parking for the residential development is expected to be provided in accordance with the requirements of BMBC Highways, with sufficient provision to accommodate the demand generated by the development.

2.3 Local Plan Allocation & Planning History

- 2.3.1 The proposed development site forms land allocated for housing development (ref: H33) within the draft version of the Barnsley Local Plan (BMBC, 2016a). The extents of the H33 site, and H24 site to the west, are shown within Figure 2.

Figure 2: Housing Sites H24 and H33



Source: BMBC, 2016b

- 2.3.2 It is understood that there have been no relevant planning applications relating to the proposed development site.

3. SITE ASSESSMENT

3.1 Introduction

- 3.1.1 This section provides a summary of the transport infrastructure local to the application site and the opportunities for sustainable modes of travel to/from the proposed residential development. An assessment of the local highway network in the vicinity of the development site is provided below.

3.2 Local Highway Network

- 3.2.1 The application site would be accessed by all modes via the existing priority junction with St Helen's Boulevard situated to the north of the site. St Helen's Boulevard is a private road that is approximately 7.3m in width that forms a cul-de-sac and intersects with Carlton Road (B1632) to the west, via a simple priority junction. St Helen's Boulevard forms a two-way single carriageway that provides access to Springwell Alternative Academy and is subject to a 30mph speed limit with a traffic calming feature in the form of a priority build-out. There are no existing waiting restrictions in the vicinity of the site with an existing layby on the southern side for approximately five cars.

Photo 1: St Helen's Boulevard



- 3.2.2 Carlton Road (B6132) is a two-way single carriageway that connects Church Street to the north-east and the A61 to the south-west and measures approximately 6.7m in width. The road is subject to a 20mph speed limit north of the priority junction with St Helen's Boulevard. To the south, the road is subject to a 30mph speed limit and there are a number of traffic calming measures present, including speed humps, priority build-outs and speed cameras. There are no existing waiting restrictions on Carlton Road within the vicinity of the site.

Photo 2: Carlton Road

- 3.2.3 St Helen's Avenue is a two-way single carriageway that intersects with Carlton Road via a simple priority T-junction. The road measures approximately 4.8m in width and is subject to a 30mph speed limit. There are no existing waiting restrictions along the entire length of St Helen's Avenue.

Photo 3: St Helen's Avenue

- 3.2.4 The A633 connects Barnsley and Rotherham and in the vicinity of the site, the road forms Rotherham Road at the signalised crossroads with Carlton Road. The A633 is a two-way single carriageway that is subject to a 30mph speed limit with No Waiting At Any Time (NWAAT) restrictions in the vicinity of the signal junction with Carlton Road.

Photo 4: A633 (Rotherham Road)



3.4 Pedestrian Provision

- 3.4.1 Guidance from the Chartered Institution of Highways & Transportation (CIHT) suggests a preferred maximum walking distance of 2km for a number of trips, including commuting and school trips (IHT, 2000). The proposed development site is located within a 2km walking distance of a large number of local trip attractors, as shown within Table 1:

Table 1: Key Trip Attractors by Foot

Trip Attractor	Walking Route	Walking Distance*
Education		
Springwell Alternative Academy	St Helen's Boulevard	30m
Holy Trinity School	St Helen's Boulevard - Carlton Road (B6132)	700m
Athersley South Primary School	St Helen's Boulevard - Carlton Road (B6132) - Rotherham Road (A633) - Wakefield Road (A61)	1.3km
Laithes Primary School	St Helen's Boulevard - Carlton Road (B6132) - Athersley Road - Bakewell Road - Wingfield Road	1.7km
Burton Road Primary School	St Helen's Boulevard - Carlton Road (B6132) - Rotherham Road (A633) - Wakefield Road (A61) - Burton Road	1.8km
Retail		
Tesco Express	St Helen's Boulevard - Carlton Road (B6132)	500m
Farmfoods	St Helen's Boulevard - Carlton Road (B6132) - Rotherham Road (A633)	700m
Factory Foods	St Helen's Boulevard - Carlton Road (B6132) - Rotherham Road (A633) - Wakefield Road (A61)	1.3km
Health		
Rotherham Road Medical Centre	St Helen's Boulevard - Carlton Road (B6132) - Athersley Road - Highfield Avenue - Rotherham Road (A633)	650m
R D Hill Chemist	St Helen's Boulevard - Carlton Road (B6132) - Athersley Road - Bakewell Road - Highfield Avenue	800m
The Co-operative Pharmacy	St Helen's Boulevard - Carlton Road (B6132) - Rotherham Road (A633) - Wakefield Road (A61)	1.7km
St Georges Medical Practice	St Helen's Boulevard - Carlton Road (B6132) - Rotherham Road (A633) - Wakefield Road (A61)	1.7km
Roundhouse Medical Centre	St Helen's Boulevard - Carlton Road (B6132) - Rotherham Road (A633) - Wakefield Road (A61)	1.8km

Trip Attractor	Walking Route	Walking Distance*
Akram Z A Pharmacy	St Helen's Boulevard - Carlton Road (B6132) - Rotherham Road (A633) - Westgate - Cross Street - High Street - Judy Row	1.8km
Leisure		
Barnsley Bowl	St Helen's Boulevard - Carlton Road (B6132)	160m
Worship/Community Use		
Blessed Sacrament Catholic Church	St Helen's Boulevard - Carlton Road (B6132) - Athersley Road - Matlock Road	500m
St Helen's Church	St Helen's Boulevard - Carlton Road (B6132) - Athersley Road - Bakewell Road - Wingfield Road - Laithes Lane	1.8km
Monk Bretton Methodist Church	St Helen's Boulevard - Carlton Road (B6132) - Rotherham Road (A633) - Westgate - Cross Road - High Street - Well Lane	2.0km

*Walking distances are approximate (measured along footways, rather than as the crow flies) and have been measured from the existing access from St Helen's Boulevard.

- 3.4.2 Table 1 shows that the proposed development site is located within a reasonable walking distance (up to 2km) of a large number of local amenities. The proposals are to provide footway provision to tie-in with the existing provision on St Helen's Boulevard. Pedestrian links are also to be provided to connect with the existing Public Right of Way (PRoW) to the south of the site and Oak Head Close/St Helen's Avenue to the west.
- 3.4.3 The proposed development site is located close to good pedestrian routes, with pedestrian infrastructure serving a large residential area to the west of the site.
- 3.4.4 To the west of the existing access junction, footways are provided on both sides of St Helen's Boulevard. The footways appear to be in good condition and vary in width between 1.9m and 3.0m, however the footways appear to be unlit. The footways provide access to the pedestrian infrastructure available on Carlton Road.

Photo 5: Pedestrian Infrastructure on St Helen's Boulevard (West of Access)



- 3.4.5 To the east of the existing access junction, there is a footway on the southern side of St Helen's Boulevard that is approximately 1.5m in width and appears to be in reasonable condition, however it appears to be unlit. It provides access to the Public Right of Way (PRoW) situated to the east of the site.

Photo 6: Pedestrian Infrastructure on St Helen's Boulevard (East of Access)



- 3.5.1 There are footways on both sides of Carlton Road that are between 1.5m and 1.7m in width and appear to be well lit and in reasonable condition. They provide access to the large residential area of Athersley South to the west of the site and the pedestrian infrastructure on Rotherham Road to the south-west.

Photo 7: Pedestrian Infrastructure on Carlton Road



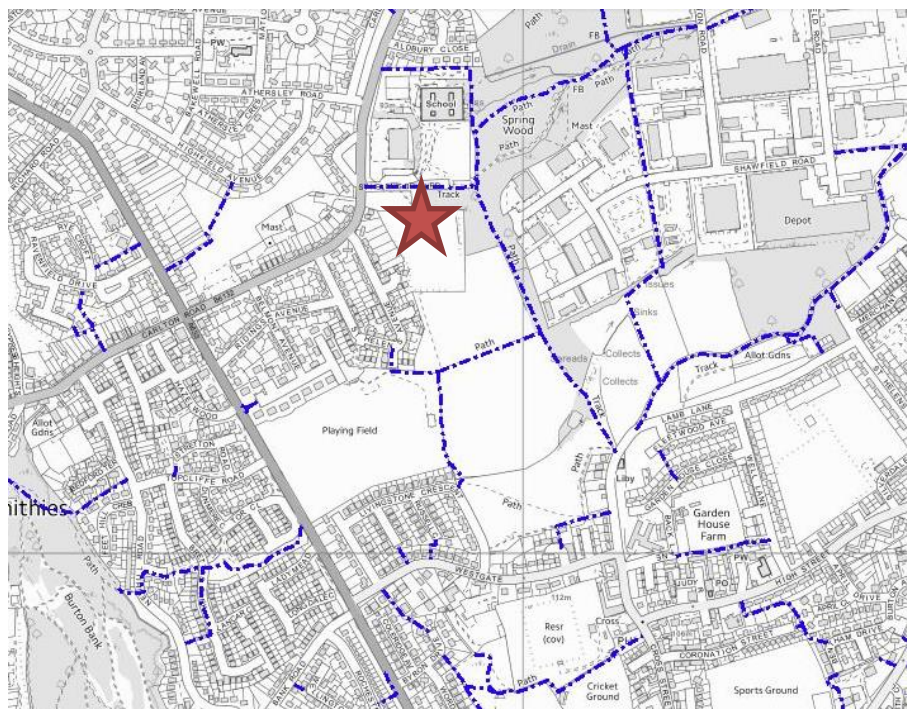
- 3.5.2 The local footways are complemented by existing crossing facilities, including pedestrian refuge points and priority build-outs which feature tactile paving and dropped kerbs.

Photo 8: Pedestrian Build Out on Carlton Road



- 3.6.1 Figure 3 shows the existing PRoW within the vicinity of the site (site indicated by red star). There are a number of public footpaths within close proximity of the site which are highlighted in blue, with one running along the southern parcel of the site although the alignment will not be altered as part of the proposals.

Figure 3: Local Public Rights of Way



Source: BMBC, 2017a

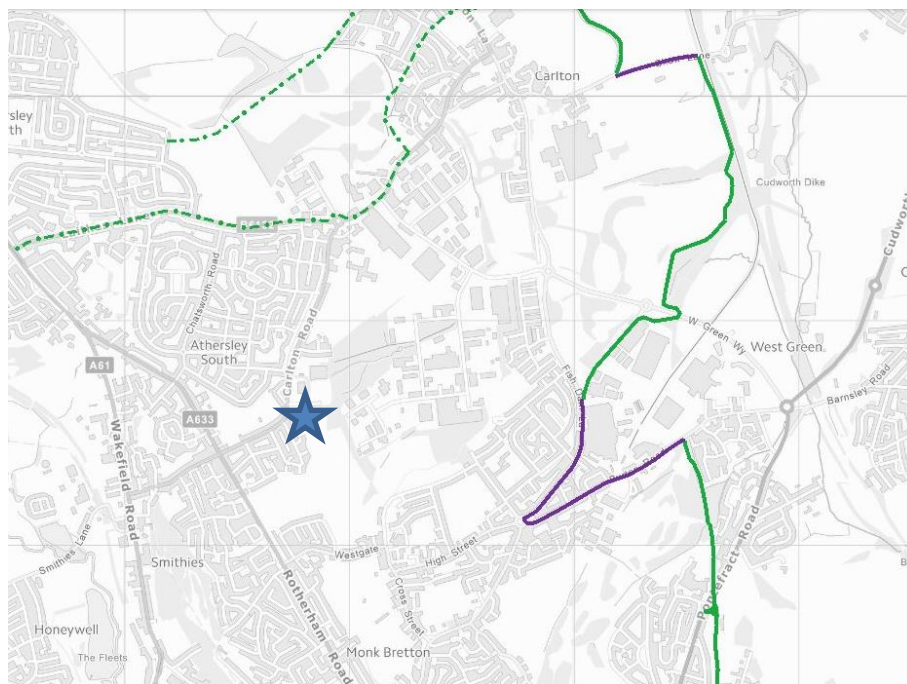
- 3.6.2 The pedestrian infrastructure within the vicinity of the site appears to generally be sufficient to facilitate the movements of mobility and visually impaired people, with the provision of dropped kerbs and tactile paving at most local junctions and crossing points within the local area. The footways are generally of sufficient width and surface quality to accommodate the passage of wheelchairs (DfT, 2002).

- 3.6.3 The proposed internal pedestrian routes appear to be of adequate width, with step-free access between the site and the local footway network; it is considered that the site can be suitably accessed on foot by all users, including those accompanied by young children and the mobility impaired.
- 3.6.4 A number of measures to promote walking trips to and from the site are outlined within the site Travel Plan (LTP, 2018).

3.7 Cycling Provision

- 3.7.1 Cycling is a low cost and healthy alternative to car use, which can substitute for short car trips, or can form part of a longer journey by public transport. The DfT state that *"in common with other modes, many utility cycle journeys are under three miles (5km), although, for commuter journeys, a trip distance of over five miles (8km) is not uncommon"* (DfT, 2008).
- 3.7.2 The proposed development site is located within a reasonable cycle ride, up to 5km (approximately 15 minutes at the average cycling speed of 12mph), of the majority of the built-up area of Barnsley as well as the villages of Cudworth, Mapplewell and Royston.
- 3.7.3 An extract of the online 'BMBC National and Regional Cycle Routes Map' (BMBC, 2017b) is provided in Figure 4 and shows the cycle facilities in the local area (site highlighted by blue star). Off-road routes are highlighted in green and on-road routes highlighted in purple.

Figure 4: Extract of BMBC National and Regional Cycle Network Map



Source: BMBC, 2017b

- 3.7.4 There is a segregated foot/cycleway approximately 1.0km to the north of the site at the Laithes Lane/Longfields Road/Carlton Road roundabout which forms part of the National Cycle Network (NCN) Route 67 and the TransPennine Trail. NCN Route 67 runs between Loughborough and Northallerton where it joins NCN Route 71.
- 3.7.5 Given the proximity of the site to signed NCN routes, and that most local roads are subject to 20mph or 30mph speed limits, it is considered that the local environment within the vicinity of the site is generally conducive to encouraging cycling trips.
- 3.7.6 A number of measures to promote cycling trips to and from the site are outlined within the site Travel Plan (LTP, 2018).

3.8 Public Transport Provision

- 3.8.1 Guidance outlined within 'Guidelines for Public Transport in Development' (IHT, 1999) states that the generally acceptable maximum walking distance that a bus stop should be located from a development site is 400m, although it is acknowledged that actual walking distances can be notably longer. The nearest bus stops are located on Carlton Road, providing travel in both directions, situated an approximately 140m (northbound) and 270m (southbound) walk from the site. There are additional stops located on Carlton Road and Athersley Road situated to the north-west of the site within a 400m walk of the site.

Photo 9: Northbound Bus Stop on Carlton Road



- 3.8.2 The #12 bus service provides four services every hour between Barnsley Interchange and Athersley South which can be accessed from the local bus stops.
- 3.8.3 The nearest rail station to the site is Barnsley Rail Station which is located approximately 2.8km south-west of the site and accessible via the local bus services. The station accommodates Northern services, providing access to local, regional and national rail services to destinations, including Leeds, Sheffield, Huddersfield and Nottingham.
- 3.8.4 A number of measures to encourage public transport use to and from the site are outlined within the site Travel Plan (LTP, 2018).

4. ROAD CASUALTY APPRAISAL

4.1 Collision Record

- 4.1.1 Personal Injury Collision (PIC) data for the highway network local to the site for the five-year study period (01/10/2011 to 30/09/2016) was obtained via a search of the DfT's road safety data (DfT, 2016).
- 4.1.2 A total of 14 collisions occurred within the study area, which includes St Helen's Boulevard and sections of Carlton Road, St Helen's Avenue and a number of junctions within the vicinity of the site. The study area and the locations of the collisions are shown on the plan attached as Appendix 2. Table 2 below outlines the collision history of the study area:

Table 2: Collision History

Year	1	2	3	4	5	Total
From	01/10/2011	01/10/2012	01/10/2013	01/10/2014	01/10/2015	
To	30/09/2012	30/09/2013	30/09/2014	30/09/2015	30/09/2016	
Fatal	-	-	-	-	-	0
Serious	-	2	2	-	-	4
Slight	2	1	3	3	1	10
Total	2	3	5	3	1	14

- 4.1.3 The collision records show that the number of PICs per year has remained low throughout the study period with a peak of five collisions occurring during the third study year. A single collision occurred during the latest study year. There were four Killed or Seriously Injured (KSI) collisions recorded during the study period, resulting in a severity ratio of 28.6%.

4.2 Collision Conditions

- 4.2.1 Table 3 below summarises the collisions by road surface, weather and lighting conditions:

Table 3: Collision Conditions

Road Surface	Collisions	%
Dry	9	64.3%
Wet	5	35.7%
Weather	Collisions	%
Fine	10	71.4%
Rain	2	14.3%
Unknown	2	14.3%
Lighting	Collisions	%
Daylight	7	50.0%
Dark	7	50.0%

- 4.2.2 As illustrated in Table 3, the majority of collisions did not occur with an adverse road surface or weather conditions.

4.3 Collision Times

4.3.1 Table 4 summarises the collisions by time of year:

Table 4: Collisions by Time of Year

Time of Year	Collisions	%
Winter (Dec-Feb)	4	28.6%
Spring (Mar-May)	4	28.6%
Summer (Jun-Aug)	2	14.3%
Autumn (Sep-Nov)	4	28.6%

4.3.2 Table 4 shows that the collisions occurred relatively evenly across the year with the fewest collisions occurring during the summer months.

4.3.3 Table 5 below summarises the collisions by day of week and also the time of day:

Table 5: Collisions by Day & Time

	Morning (06:00- 11:00)	Lunch (11:00- 14:00)	Afternoon (14:00- 19:00)	Evening (19:00- 01:00)	Night (01:00- 06:00)	Total	%
Monday	-	-	1	-	-	1	7.1%
Tuesday	1	1	-	2	-	4	28.6%
Wednesday	-	-	1	1	-	2	14.3%
Thursday	-	-	-	-	-	0	0.0%
Friday	-	-	4	-	-	4	28.6%
Saturday	-	-	1	1	-	2	14.3%
Sunday	-	-	-	1	-	1	7.1%
Total	1	1	7	5	0	14	
%	7.1%	7.1%	50.0%	35.7%	0.0%		

4.3.4 Table 5 highlights that no collisions occurred on a Thursday. Half of collisions occurred during the afternoon period, with no collisions occurring during the night time period.

4.4 Collision Locations

4.4.1 The locations of the 14 study collisions (shown on the plot attached as Appendix 2) can be summarised as follows:

- 11 PICs occurred at the Rotherham Road/Carlton Road junction;
- 1 PIC occurred at the Carlton Road/St Helen's Avenue junction;
- 1 PIC occurred at the Carlton Road/Laithes Lane/Longfields Road roundabout; and
- 1 PIC occurred on Carlton Road (not at a junction).

4.4.2 It should be noted that no collisions have occurred at the site access or on St Helen's Boulevard during the five year study period.

4.5 Casualties

4.5.1 A total of 21 casualties resulted from the 14 recorded injury collisions during the study period. Table 6 below provides a breakdown of the casualties according to the mode of travel and age group:

Table 6: Casualty Road User Groups

Road User Group	Age (years)						Total	%
	0 to 15	16 to 20	21 to 25	26 to 45	46 to 65	66+		
Pedestrian	3	2	-	1	-	-	6	28.6%
Cyclist	-	-	-	1	-	-	1	4.8%
Power Two-Wheeler (PTW)	-	2	-	-	2	-	4	19.0%
Car Driver	-	-	-	2	2	-	4	19.0%
Car Passenger	-	2	-	-	-	-	2	9.5%
Minibus/Bus Passenger	-	-	-	-	1	-	1	4.8%
Goods Vehicle Occupant	-	-	-	1	2	-	3	14.3%
Total	3	6	0	5	7	0	21	
%	14.3%	28.6%	0.0%	23.8%	33.3%	0.0%		

4.5.2 Table 6 shows that over a quarter (28.6%) of casualties were pedestrians. A third of casualties were aged between 46 and 65 years old, with no casualties aged 66 years and over.

4.6 Road Safety Impact

4.6.1 A total of 14 collisions, resulting in 21 casualties, have occurred within the study area during the five year study period. Analysis of the study collisions has not revealed any identifiable existing collision issues associated with the expected movements of the proposed development, therefore it is considered that there are no existing road safety issues pertinent to the development of the site.

4.6.2 If the proposed site access junction and internal roads are designed with due consideration to road safety, with appropriate highway design features incorporated into the detailed design, then the proposals should not have a detrimental road safety impact on the local highway network and should not adversely affect the safety of pedestrians and cyclists.

5. TRIP GENERATION PROJECTIONS

5.1 Introduction

- 5.1.1 As previously outlined, the proposals involve the construction of 101 residential dwellings and will feature a mix of properties, including an element of affordable housing.

5.2 Proposed Traffic Generation

- 5.2.1 The TRICS database is a nationally recognised collection of traffic counts and trip generation statistics for calculating trip rates at development sites. The TRICS database (v7.4.2) has been interrogated to find suitable data to assist in projecting the trip generation of the proposed residential development.

- 5.2.2 In order to derive reflective trip rates, vehicle trip generation statistics within the 'Houses Privately Owned' category (03-A) of the TRICS database have been interrogated. To ensure that only trip generation statistics for comparable sites were used in calculations, the TRICS sites were filtered to the following criteria:

- Survey type: Multi-modal sites;
- Size: 50 to 150 dwellings;
- TRICS location type: 'Suburban Area' and 'Edge of Town';
- Regions: England only, excluding Greater London sites;
- Weekday survey data only (exclusion of Saturday and Sunday surveys); and
- Recent survey data only (exclusion of surveys undertaken prior to 01/01/2009).

- 5.2.3 As there were less than 20 comparable sites in the database after filtering (13 survey sites), mean trip rates (as weighted and calculated by the TRICS software) have been used to project the vehicle trip generation of the proposed development, in accordance with good practice guidelines (TCL, 2016). Details of the site selection and trip rates taken from the TRICS database are attached in full within Appendix 3, with the projected vehicle trip rates and generation shown in Table 7.

Table 7: Projected Vehicle Trip Generation

	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
	Arrivals	Departures	Arrivals	Departures
Houses Privately Owned (03-A)				
Vehicle Trip Rates (per dwelling)	0.135	0.360	0.341	0.161
Development Vehicle Trips (101 dwellings)	14	36	34	16

- 5.2.4 The trip generation projections shown in Table 7 indicate that the development is expected to generate 50 two-way vehicle trip movements during the AM and PM peak hours.

- 5.2.5 A Travel Plan (LTP, 2018) has been produced in association with this TA to help promote and encourage sustainable travel to/from the proposed development. In order to ensure that this assessment robustly analyses a 'worst-case scenario', the potential vehicle trip reducing benefits of the site Travel Plan have not been taken into account within trip generation projections. However, it is worth noting that the Travel Plan would be expected to increase the number of trips generated by sustainable modes, and reduce the number of car trips.

5.3 Modal Split & Person Trip Generation

- 5.3.1 The TRICS sites utilised to predict the traffic generation of the development (see Section 5.2) contain multi-modal information, therefore the person trip generation has been predicted based on the person trip rates derived from the comparable TRICS sites, summarised in Table 8 and shown in full as Appendix 3.

Table 8: Projected Person Trip Generation

	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
	Arrivals	Departures	Arrivals	Departures
Houses Privately Owned (03-A)				
Person Trip Rates (per dwelling)	0.208	0.715	0.586	0.246
Development Person Trips (101 dwellings)	21	72	59	25

- 5.3.2 The modal split of the development has been predicted based on travel pattern information from the comparable residential development sites in the TRICS database, with the number of trips generated by each mode projected utilising the total person trip generation for the site, as summarised in Table 9.

Table 9: Projected Modal Trip Generation

Person Trips	Modal Split	12 Hour (07:00-19:00) Two-Way Trips
Vehicle Drivers	58.2%	439
Vehicle Passengers	18.1%	136
Vehicle Occupants	76.3%	575
Pedestrians	19.5%	147
Cyclists	2.3%	18
Public Transport Users	2.0%	15
TOTAL	100%	754

* The total may not represent the sum of its parts due to rounding

- 5.3.3 These modal split predictions indicate that under half of person trips (41.8%) generated by the development would be expected to be made by sustainable modes (pedestrian, cycle, public transport and car passenger).

- 5.3.4 It is noted that journey to work data from the 2011 National Census could be utilised to predict the modal split of trips generated by the site, however this dataset only represents commuting trips and does not account for journey purposes associated with other trips generated by residential sites, with varying modal splits across different journey purposes and time periods. It is therefore considered to be more representative to base the modal split projections for the proposed residential development on recorded trip generation data from comparable sites within the TRICS database.
- 5.3.5 The previous educational use (primary school) associated with the site would have been expected to generate a number of AM and PM peak hour vehicle trips, possibly more than the peak hour traffic generation for the proposed residential use particularly during the AM peak, as such it is considered that the traffic impact of the proposals should be considered in the context of the impact associated with the previous use.

6. TRAFFIC IMPACT

6.1 Existing Network Traffic Flows

- 6.1.1 To inform this TA, traffic counts were undertaken on Tuesday 17th October 2017 during school term time at the following junctions as requested by BMBC Highways:
- Carlton Road/St Helen's Boulevard junction; and
 - Rotherham Road/Carlton Road signal junction.
- 6.1.2 The obtained traffic flows across the aforementioned junctions are illustrated in the network diagrams attached as Appendix 4.

6.2 Peak Hours

- 6.2.1 The baseline traffic surveys indicate that the network peak hours for the local highway network are weekday AM (07:45-08:45) and PM (16:15-17:15), based on the total number of traffic movements (in terms of Passenger Car Units (PCUs)) recorded across the two junctions. The weekday peak hours for the local highway network reflect the 'worst-case' scenario in terms of network traffic flows, therefore this TA considers the operation of the junctions against these peak periods.

6.3 Assessment Scenarios

- 6.3.1 The proposals have been tested against the following weekday AM and PM peak hour traffic flow scenarios:
- **2017 Base** - Traffic flows recorded and observed during the October 2017 traffic surveys;
 - **2022 Do Nothing** - '2017 Base' network traffic flows growthed to 2022;
 - **2022 With Development** - '2022 Do Nothing' flows with the addition of traffic associated with the proposed development.
- 6.3.2 The traffic impact of the proposals is typically assessed against the predicted traffic flows 5 years after registration of the planning application, in accordance with guidance from the DfT with respect to the local highway network (DfT, 2007a). At the time of producing this TA, it was assumed that the planning application would be submitted in 2017, therefore the proposals for the application site have been assessed against a horizon year of 2022.
- 6.3.3 The network traffic flows at 2022 have been predicted using the DfT's '*National Traffic Model*' (NTM) and '*National Trip End Model*' (NTEM). The growth factor obtained from the NTM has been adjusted to reflect local circumstances from the NTEM, using TEMPro software (Trip End Model Presentation Programme), see Appendix 5. In accordance with the DfT's '*Transport Analysis Guidance*' (TAG), the underlying NTEM growth forecasts for households and jobs have also been adjusted to reflect the local development traffic that has been explicitly incorporated into the traffic projections of this TA, in order to avoid double-counting the associated traffic flows.

6.4 Trip Distribution & Assignment

- 6.4.1 The distribution of traffic associated with the application site has been predicted utilising a gravity model based upon commuting patterns of existing residents within the 'Barnsley 007' and 'Barnsley 010' MSOAs (Middle Layer Super Output Areas), within which the site is situated. 'Location of usual residence and place of work by method of travel to work' data from the 2011 National Census (ONS, 2014) shows the proportion of local residents travelling to each workplace destination (MSOAs and local authority districts) by mode of travel.
- 6.4.2 This trip distribution data has been combined with an assessment of route choice (traffic assignment) to determine the likely distribution of development traffic across the highway network. The predicted traffic assignment has been undertaken utilising journey planning tools to help determine the relative attractiveness of alternative routes, with consideration of influences such as the location and size of settlements and employment areas within each workplace destination, existing directional traffic signing strategy at local junctions and known existing traffic conditions on the relevant routes. The defined zones utilised within the gravity model calculations are illustrated in Figure 5.

Figure 5: Gravity Model Zones



Source Imagery: Copyright Google Earth Pro (License Key-JCPMR5M58LXF2GE)

- 6.5.1 The detailed calculations of the gravity model are attached as Appendix 6, with the results summarised in Table 10:

Table 10: Gravity Model Results

Zone	Route	Distribution Split (%)
A	Longfields Road	1.0%
B	Carlton Road (NE)	18.1%
C	Laithes Lane	1.8%
D	A633 (N)	21.5%
E	Carlton Road (SW)	32.6%
F	A633 (S)	23.6%
G	Carlton Road Employment (Barnsley 007)	1.3%
TOTAL		100.0%

* The total may not represent the sum of its parts due to rounding

6.6 Impact on Local Junctions

- 6.6.1 The predicted increase in traffic across the local highway network as a result of the development is summarised in Table 11.

Table 11: Predicted Traffic Impact at Key Local Junctions

Junction	Zones	Development Impact (Two-Way Vehicle Trips)
AM PEAK		
St Helen's Boulevard/Carlton Road Junction	All	+50
Carlton Road/Staithes Lane/Longfields Road Roundabout	A,B,C	+11
Carlton Road/Rotherham Road Junction	D,E,F	+39
PM PEAK		
St Helen's Boulevard/Carlton Road Junction	All	+50
Carlton Road/Staithes Lane/Longfields Road Roundabout	A,B,C	+12
Carlton Road/Rotherham Road Junction	D,E,F	+38

- 6.6.2 The traffic projections summarised in Table 11 indicate that the development of the site is expected to generate less than 30 two-way vehicle trips at the Carlton Road/Staithes Lane/Longfields Road roundabout during both peak periods and therefore below the typical threshold for assessment of "30 two-way peak hour vehicle trips" (DfT, 2007a). A maximum of 39 two-way vehicle trips are expected to utilise the Carlton Road/Rotherham Road signal junction during the AM peak, with 38 two-way vehicle trips during the PM peak, therefore the impact has been assessed in Section 6.7 below.

6.7 St Helen's Boulevard/Carlton Road Junction Capacity Assessment

- 6.7.1 In order to assess the ability of the St Helen's Boulevard/Carlton Road junction to accommodate the traffic associated with residential development at the site, a junction capacity assessment has been undertaken using Junctions 9 modelling software, which is a software package produced by Transport Research Laboratory (TRL) that provides an industry standard method for assessing roundabout and priority junction capacity, queuing and delay. An aerial image of the St Helen's Boulevard/Carlton Road junction can be seen in Figure 6.

Figure 6: St Helen's Boulevard/Carlton Road Priority Junction



Source Imagery: Copyright Google Earth Pro (License Key-JCPMR5M58LXF2GE)

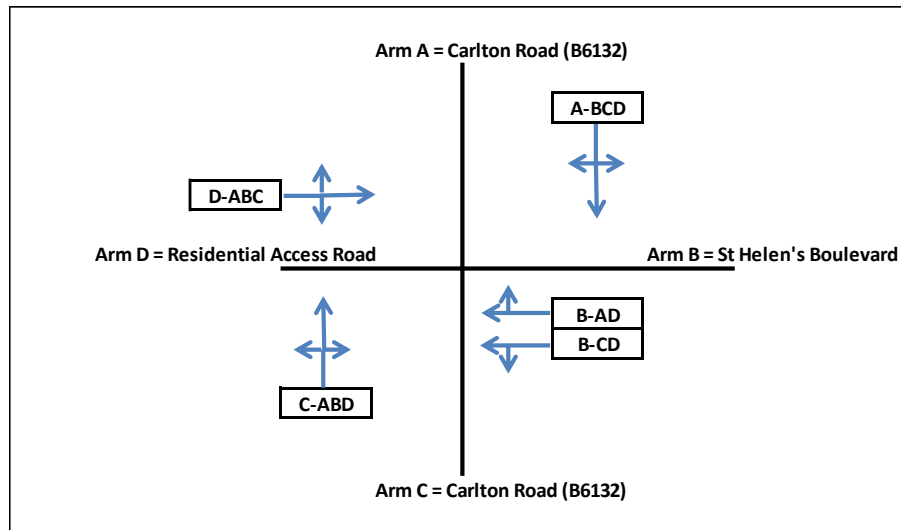
6.7.2 The input parameters used to create the Junctions 9 model have been measured from relevant scaled Ordnance Survey plans and scaled aerial imagery. The model has been validated against peak hour observations. The baseline and projected future peak hour traffic flows have been assessed against the existing junction layout, the results of which are summarised in Table 12 and the full modelling output attached as Appendix 7.

Table 12: St Helen's Boulevard/Carlton Road Junction Capacity Assessment

Stream		2017 Base		2022 Do Nothing		2022 With Development	
		Max. RFC	Max. End Q	Max. RFC	Max. End Q	Max. RFC	Max. End Q
AM	B-CD	2.3%	0.0	2.5%	0.0	7.9%	0.1
	B-AD	1.9%	0.0	2.0%	0.0	4.9%	0.1
	A-BCD	0.3%	0.0	0.3%	0.0	0.3%	0.0
	D-ABC	0.0%	0.0	0.0%	0.0	0.0%	0.0
	C-ABD	12.8%	0.3	14.6%	0.3	17.6%	0.4
	Overall	12.8%	0.3	14.6%	0.3	17.6%	0.4
PM	B-CD	3.5%	0.0	3.9%	0.0	6.2%	0.1
	B-AD	0.9%	0.0	0.9%	0.0	2.2%	0.0
	A-BCD	0.0%	0.0	0.0%	0.0	0.0%	0.0
	D-ABC	0.0%	0.0	0.0%	0.0	0.0%	0.0
	C-ABD	2.2%	0.0	2.5%	0.0	9.0%	0.2
	Overall	3.5%	0.0	3.9%	0.0	9.0%	0.2

6.7.3 The traffic streams referenced in Table 12 are illustrated in Figure 7.

Figure 7: St Helen's Boulevard/Carlton Road Priority Junction Traffic Streams

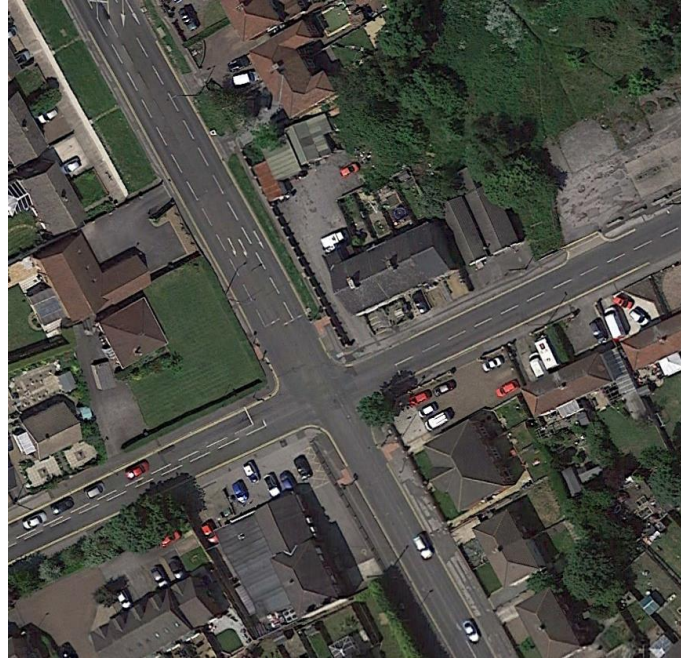


6.7.4 The capacity assessment results shown in Table 12 indicate that the St Helen's Boulevard/Carlton Road (B6132) junction would be expected to operate well within capacity across all scenarios in both peak periods. The modelling results indicate that the maximum Ratio of Flow to Capacity (RFC) during the peak hours is likely to be 17.6% (AM peak), which is well below the typical target level of 85%.

6.8 Rotherham Road/Carlton Road Junction Capacity Assessment

6.8.1 In order to assess the ability of the Rotherham Road/Carlton Road signal junction to accommodate the traffic associated with residential development at the site, a junction capacity assessment has been undertaken using LinSig v3 modelling software, an industry standard design and assessment tool for traffic signal junctions. Signal controller data for the junction model has been requested, however none has been provided by BMBC, therefore suitable assumptions have been made regarding cycle times, intergreens and phasing based on the video footage captured as part of the surveys. The geometric input parameters have been obtained from scaled Ordnance Survey plans and scaled aerial imagery. An aerial image of the Rotherham Road /Carlton Road signal junction can be seen in Figure 8.

Figure 8: Rotherham Road/Carlton Road Signal Junction



Source Imagery: Copyright Google Earth Pro (License Key-JCPMR5M58LXF2GE)

6.8.2 The baseline and projected future peak hour traffic flows have been assessed against the existing junction layout, the results of which are summarised in Table 13 and the complete modelling output in Appendix 7.

Table 13: Rotherham Road/Carlton Road Signal Junction Capacity Assessment

Movement From	2017 Base		2022 Do Nothing		2022 With Development		2022 Development Impact	
	Degree of Saturation (%)	Mean Max Queue (PCU)	Degree of Saturation (%)	Mean Max Queue (PCU)	Degree of Saturation (%)	Mean Max Queue (PCU)	Degree of Saturation (%)	Mean Max Queue (PCU)
AM Peak (07:45-08:45)								
A633 (Rotherham Road) North	44.9%	4.6	47.4%	5.2	48.5%	5.2	+1.1%	-
B6132 (Carlton Road) East	77.2%	9.1	85.5%	11.3	88.2%	13.5	+2.7%	+2.2
A633 (Rotherham Road) South	79.0%	10.8	84.2%	12.9	86.6%	13.3	+2.4%	+0.4
B6132 (Carlton Road) West	51.2%	5.0	56.9%	5.8	56.1%	6.4	-0.8%	+0.6
Overall Practical Reserve Capacity (PRC)	+13.9%		+5.2%		+2.0%		-3.2%	
PM Peak (16:15-17:15)								
A633 (Rotherham Road) North	55.4%	6.1	59.1%	6.7	60.9%	6.7	+1.8%	-
B6132 (Carlton Road) East	67.8%	6.7	73.4%	8.2	73.6%	8.9	+0.2%	+0.7
A633 (Rotherham Road) South	67.4%	8.2	72.7%	9.2	75.4%	9.4	+2.7%	+0.2
B6132 (Carlton Road) West	61.3%	5.8	66.3%	7.0	66.2%	7.7	-0.1%	+0.7
Overall Practical Reserve Capacity (PRC)	+32.7%		+22.6%		+19.4%		-3.2%	

6.8.3 The Degree of Saturation (DoS) quoted within Table 13 is a ratio of the demand versus capacity on each approach to the junction, with a value of 100% meaning that demand and capacity are equal. The results of the capacity assessments presented in Table 13 indicate that the existing traffic signal junction is predicted to operate with Practical Reserve Capacity (PRC) during the future year scenarios with the proposed development in place.

- 6.8.4 It is noted that the impact of the proposed development on the junction is not considered to be severe, particularly as the junction is expected to operate within capacity. The maximum DoS increase during both peak periods is expected to be 2.7%, with an overall PRC reduction of 3.2%.
- 6.8.5 The junction currently forms part of an Urban Traffic Control (UTC) system, with tools currently in operation at the junction that maximise operational efficiency, such as MOVA (Microprocessor Optimised Vehicle Actuation). The capacity-enhancing benefits of such additional tools cannot be represented accurately within the LinSig modelling programme, therefore it would be reasonable to assume that the modelling results outlined above represent an underestimation of the capacity of the junction operation.

6.9 Traffic Impact Summary

- 6.9.1 The DfT has previously issued guidance that transport assessment of development impacts could be based on a threshold of *"30 two-way peak hour vehicle trips"* (DfT, 2007a). This guidance acknowledged that this threshold was not to be applied rigidly, but rather that it provided *"a useful point of reference from which to commence discussions"*.
- 6.9.2 This national DfT guidance has now been superseded and replaced with the *'National Planning Policy Framework'* (NPPF) (DCLG, 2012) and its accompanying *'Planning Practice Guidance'* (PPG) (DCLG, 2014). NPPF and PPG require that transport assessment is undertaken for *"developments that generate significant amounts of movement"*, although this is not defined. It is therefore acknowledged that there is no set threshold for assessment within the current national planning policy. In determining whether the development site is expected to have a material impact on the local highway network, the traffic projections for the development site (see Section 5.2) have been compared against the current and previous Government guidance.
- 6.9.3 The development proposals are expected to generate a maximum of 50 two-way vehicle movements at the site during the AM and PM peak hours.
- 6.9.4 Based on the junction capacity assessments undertaken, the local junctions are expected to operate within capacity with a residential development of 101 dwellings during the future 2022 scenarios both with and without the proposed development. Furthermore, the previous educational use (primary school) associated with the site would have been expected to generate a number of AM and PM peak hour vehicle trips, possibly more than the peak hour traffic generation for the proposed residential use particularly during the AM peak, as such it is considered that the traffic impact of the proposals should be considered in the context of the impact associated with the previous use.
- 6.9.5 Therefore, as the impact of a residential development at the site is not expected to be severe, the development is in accordance with the *'National Planning Policy Framework'* (DCLG, 2012), which states that *"development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe"*.

7. CONCLUSIONS

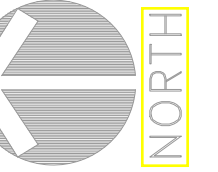
- 7.1.1 This TA provides a detailed appraisal of transport aspects associated with the proposed residential development on land south of St Helen's Boulevard, Barnsley.
- 7.1.2 The scope of this report has been agreed with BMBC Highways as part of pre-application scoping and has been produced in accordance with the relevant local and national guidance.
- 7.1.3 A Travel Plan (LTP, 2018) that provides a strategy for encouraging sustainable travel at the proposed development site has been produced in conjunction with this TA as a separate document.
- 7.1.4 The proposals involve a development of 101 dwellings. It is understood that the development would involve a mix of housing types, including an element of affordable housing. The development is to be served by the existing access junction from St Helen's Boulevard.
- 7.1.5 The site is located approximately 3.5km north-east of Barnsley town centre, with access to pedestrian, cycle and public transport facilities. The proposed development site is located close to good pedestrian routes, with good quality footways within close proximity of the site, providing good access to local amenities. The site is located within a reasonable cycle ride of the majority of the built-up area of Barnsley. The nearest bus stops to the proposed development are located on Carlton Road, providing travel in both directions, situated an approximately 140m (northbound) and 270m (southbound) walk from the proposed development site providing access to the #12 service. The nearest rail station to the site is Barnsley Rail Station which is located approximately 2.8km south-west of the site providing access to local, regional and national destinations including Leeds, Sheffield, Huddersfield and Nottingham.
- 7.1.6 A road casualty study showed that 14 PICs occurred within the study area around the proposed development site during the 5-year study period. Analysis of the study collisions has not revealed any identifiable existing collision issues associated with the expected movements generated by the proposed development, therefore it is considered that there are no existing road safety issues pertinent to the development of the site. If the proposed access junction and internal roads of the proposed development are designed with due consideration to road safety, then the proposals should not have a detrimental road safety impact on the local transport network and should not adversely affect the safety of pedestrians and cyclists.
- 7.1.7 The vehicle and person trip generation of the proposed development has been projected using the nationally recognised TRICS database. The traffic projections indicate that when fully-built, the proposed residential development is expected to generate 50 two-way vehicle trips during the AM and PM peak hours.

- 7.1.8 The modal split of the proposed development has been predicted based on travel pattern information from the comparable residential development sites in the TRICS database. The modal split predictions indicate that under half of person trips (41.8%) generated by the development would be expected to be made by sustainable modes (pedestrian, cycle, public transport and car passenger).
- 7.1.9 The distribution and assignment of traffic associated with the proposed development has been predicted utilising a gravity model based upon commuting patterns of existing residents in the local area.
- 7.1.10 In order to assess the ability of local junctions to accommodate the traffic associated with the proposed development, junction capacity assessments have been undertaken at two local junctions, using Junctions 9 and LinSig v3 modelling software. The results show that the local junctions are expected to operate within capacity in 2022 with the development in place. Furthermore, the previous educational use (primary school) associated with the site would have been expected to generate a number of AM and PM peak hour vehicle trips, possibly more than the peak hour traffic generation for the proposed residential use particularly during the AM peak.
- 7.1.11 Based on the assessments detailed in this TA, it is considered that the proposed residential development would not be expected to have a material impact on the operation of the local highway network. Therefore, as the impact of the residential development at the site is not expected to be severe, the development is in accordance with the '*National Planning Policy Framework*' (NPPF) which states that "*development should only be prevented or refused on grounds where the residual impacts of development are severe*" (DCLG, 2012).
- 7.1.12 It is concluded from the assessments within this TA that the proposed development would not be expected to have a detrimental impact in road safety, traffic and highway terms.

8. REFERENCES

- BMBC (Barnsley Metropolitan Borough Council), 2017a. BMBC Public Rights of Way Map [online: <https://www.barnsley.gov.uk/barnsley-maps/public-rights-of-way/>].
- BMBC, 2017b. BMBC National and Regional Cycle Routes Map [online: <https://www.barnsley.gov.uk/services/roads-travel-and-parking/traffic-lights-road-signs-and-markings/cycle-lanes-and-routes/>].
- BMBC, 2016a. Barnsley Draft Local Plan.
- BMBC, 2016b. Barnsley Draft Barnsley Local Plan Allocations Map.
- BMBC, 2014. Barnsley Transport Strategy 2014-2033 (Draft).
- BMBC, 2012. Supplementary Planning Document: Parking.
- BMBC, 2011. Barnsley Local Development Framework Adopted Core Strategy.
- BMBC, 2000. The Unitary Development Plan Volume 2: Community Areas.
- CIHT (Chartered Institution of Highways and Transportation), 2010. Manual for Streets 2: Wider Application of the Principles.
- DCLG (Department for Communities and Local Government), 2014. Planning Practice Guidance – Travel Plans, Transport Assessments and Statements in Decision-Taking (ID: 42-06/03/2014) [online: <http://planningguidance.planningportal.gov.uk>].
- DCLG, 2012. National Planning Policy Framework.
- DfT (Department for Transport), 2016. Road Safety Data [online: <http://data.gov.uk/dataset/road-accidents-safety-data>] (released June 2016).
- DfT, 2014. Transport Analysis Guidance.
- DfT, 2008. LTN 02/08 – Cycle Infrastructure Design.
- DfT, 2007a. Guidance on Transport Assessment.
- DfT, 2007b. Manual for Streets.
- DfT, 2002. Inclusive Mobility.
- IHT (Institution of Highways and Transportation), 2000. Guidelines for Providing for Journeys on Foot.
- IHT, 1999. Guidelines for Public Transport in Development.
- LTP (Local Transport Projects). 2018. Proposed Residential Development, St Helen's Boulevard, Barnsley - Travel Plan.
- ONS (Office for National Statistics), 2014. England & Wales National Census 2011, Special Workplace Statistics (released 25/07/2014).
- SYLTP (South Yorkshire Local Transport Plan Partnership), 2015. South Yorkshire Local Transport Plan 2011-2026.
- TCL (TRICS Consortium Ltd), 2016. TRICS Good Practice Guide 2016.

Appendix I – Site Layout Plan



Legend

- Existing Dwellings
- Site Boundary edged red
- Proposed Dwellings
- Primary Street
- Secondary Street
- Private Drive
- 1.8m high timber close boarded screen fence
- Lockable gate
- Indicative Landscaping
- Existing trees removed / pruned shown dashed
- Existing trees / hedgerows to remain.
- Existing Public Right of Way crossing the site.
- Open space.
- 2m wide service strip within secondary street
- 2m wide easement strip within private drive

Schedule of Accommodation					
House Type			No.	%	
Ha	Halkhead	2 storey semi-detached	2 bed, 4 person	17	24
Da	Darbury	2 storey semi-detached	3 bed, 5 person	35	35
Wa	Warwick	2 storey detached	3 bed, 5 person	4	4
Wl	Windsor	2 storey semi-detached	3 bed, 5 person	1	1
Wi	Windsor	2 storey detached	3 bed, 5 person	10	9
Ba	Barnburgh	2.5 storey semi-detached	3 bed, 5 person	18	18
We	Wernworth	2 storey semi-detached	3 bed, 5 person	3	1
Ro	Roffway	2 storey detached	4 bed, 6 person	10	9
Ea	Eaton	2 storey detached	4 bed, 7 person	3	3
				101	
Total					
Red line site area		51 978 sq. m.	7.9 Acres	3.2 Ha	
Area excluded for POS calculation		1 727 sq. m.	0.43 Acres	0.17 Ha	

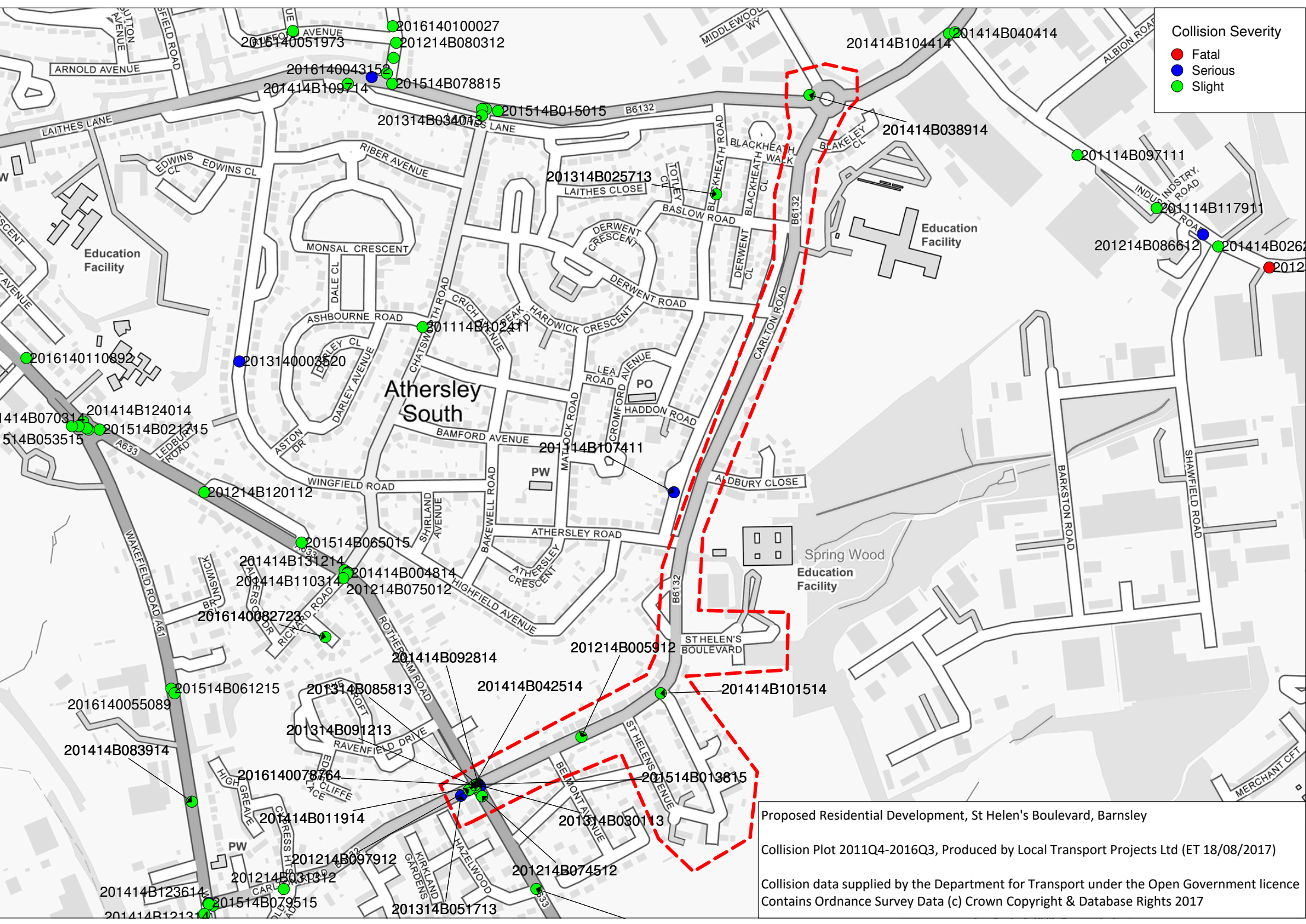


project	St Helens Boulevard Carlton Barnsley	scale @ A1	1:500
client	Keepmoat Homes Ltd	date	Sept 17
title	Planning Layout	revision	A
		drawing no.	17-196-02

Vista Architecture & Urban Design
35 Finchwell Road
Handsworth
Sheffield
S13 9AS
Telephone: 0114 4534284
www.vista-architecturedesign.com



Appendix 2 – PIC Study Plot



Collision Severity

- Fatal
- Serious
- Slight

Proposed Residential Development, St Helen's Boulevard, Barnsley

Collision Plot 2011Q4-2016Q3, Produced by Local Transport Projects Ltd (ET 18/08/2017)

Collision data supplied by the Department for Transport under the Open Government licence
Contains Ordnance Survey Data (c) Crown Copyright & Database Rights 2017

Appendix 3 – TRICS Output

Projected Vehicle Trip Generation

101 dwellings

Vehicle Trip Rates (per dwelling)

Time	IN	OUT	TOTAL
07:00-08:00	0.069	0.274	0.343
08:00-09:00	0.135	0.36	0.495
09:00-10:00	0.15	0.162	0.312
10:00-11:00	0.14	0.178	0.318
11:00-12:00	0.147	0.156	0.303
12:00-13:00	0.164	0.155	0.319
13:00-14:00	0.161	0.15	0.311
14:00-15:00	0.148	0.164	0.312
15:00-16:00	0.219	0.14	0.359
16:00-17:00	0.243	0.158	0.401
17:00-18:00	0.341	0.161	0.502
18:00-19:00	0.221	0.146	0.367

TOTAL	2.138	2.204	4.342
--------------	--------------	--------------	--------------

TRICS v7.4.2 MM, Mean 03-A, 50-150 dwells, England only (exc. GL), 'Edge of Town' and 'Suburban Area', exc. Sat/Sun, 04+ (13)

Vehicle Trips

IN	OUT	TOTAL
7	28	35
14	36	50
15	16	31
14	18	32
15	16	31
17	16	33
16	15	31
15	17	32
22	14	36
25	16	41
34	16	50
22	15	37

216	223	439
------------	------------	------------

Projected Person Trip Generation

Person Trip Rates (per dwelling)

Time	IN	OUT	TOTAL
07:00-08:00	0.103	0.439	0.542
08:00-09:00	0.208	0.715	0.923
09:00-10:00	0.231	0.291	0.522
10:00-11:00	0.233	0.297	0.530
11:00-12:00	0.233	0.246	0.479
12:00-13:00	0.264	0.241	0.505
13:00-14:00	0.259	0.263	0.522
14:00-15:00	0.233	0.267	0.500
15:00-16:00	0.479	0.265	0.744
16:00-17:00	0.466	0.281	0.747
17:00-18:00	0.586	0.246	0.832
18:00-19:00	0.365	0.247	0.612

TOTAL	3.660	3.798	7.458
--------------	--------------	--------------	--------------

Projected Person Trip Generation

Person Trip Rates (per dwelling)

Time	IN	OUT	TOTAL
07:00-08:00	10	44	54
08:00-09:00	21	72	93
09:00-10:00	23	29	52
10:00-11:00	24	30	54
11:00-12:00	24	25	49
12:00-13:00	27	24	51
13:00-14:00	26	27	53
14:00-15:00	24	27	51
15:00-16:00	48	27	75
16:00-17:00	47	28	75
17:00-18:00	59	25	84
18:00-19:00	37	25	62

TOTAL	370	384	754
--------------	------------	------------	------------

Projected Modal Split

Proportion of Vehicle Trips

Time	IN	OUT	TOTAL
07:00-08:00	67.0%	62.4%	63.3%
08:00-09:00	64.9%	50.3%	53.6%
09:00-10:00	64.9%	55.7%	59.8%
10:00-11:00	60.1%	59.9%	60.0%
11:00-12:00	63.1%	63.4%	63.3%
12:00-13:00	62.1%	64.3%	63.2%
13:00-14:00	62.2%	57.0%	59.6%
14:00-15:00	63.5%	61.4%	62.4%
15:00-16:00	45.7%	52.8%	48.3%
16:00-17:00	52.1%	56.2%	53.7%
17:00-18:00	58.2%	65.4%	60.3%
18:00-19:00	60.5%	59.1%	60.0%

TOTAL	58.4%	58.0%	58.2%
--------------	--------------	--------------	--------------

Projected Modal Trip Generation - (100 dwellings)

Mode	Split	12-Hour (07:00-19:00)		
		IN	OUT	TOTAL
Vehicle Drivers	58.2%	215	224	439
Vehicle Passengers	18.1%	67	69	136
Vehicle Occupants Sub-Total	76.3%	282	293	575

Pedestrian	19.5%	72	75	147
Pedal-cycle	2.3%	9	9	18
Public Transport	2.0%	7	8	15
	23.8%	88	91	179

Total Person Trips	100%	370	384	754
---------------------------	-------------	------------	------------	------------

Calculation Reference: AUDIT-342901-170911-0935

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
 Category : A - HOUSES PRIVATELY OWNED
MULTI-MODAL VEHICLES

Selected regions and areas:

02	SOUTH EAST	
	HC HAMPSHIRE	1 days
	SC SURREY	1 days
03	SOUTH WEST	
	DV DEVON	2 days
04	EAST ANGLIA	
	NF NORFOLK	1 days
06	WEST MIDLANDS	
	SH SHROPSHIRE	2 days
07	YORKSHIRE & NORTH LINCOLNSHIRE	
	NY NORTH YORKSHIRE	3 days
	SY SOUTH YORKSHIRE	1 days
09	NORTH	
	CB CUMBRIA	1 days
	DH DURHAM	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Number of dwellings
 Actual Range: 50 to 116 (units:)
 Range Selected by User: 50 to 150 (units:)

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/09 to 28/03/17

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	3 days
Tuesday	3 days
Wednesday	1 days
Thursday	3 days
Friday	3 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	13 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaken using machines.

Selected Locations:

Suburban Area (PPS6 Out of Centre)	9
Edge of Town	4

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone	10
No Sub Category	3

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

C3

13 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

1,001 to 5,000	2 days
5,001 to 10,000	6 days
10,001 to 15,000	3 days
15,001 to 20,000	1 days
20,001 to 25,000	1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

5,001 to 25,000	3 days
25,001 to 50,000	3 days
75,001 to 100,000	4 days
100,001 to 125,000	1 days
125,001 to 250,000	1 days
250,001 to 500,000	1 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	2 days
1.1 to 1.5	11 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

Yes	1 days
No	12 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	13 days
-----------------	---------

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1	CB-03-A-04	SEMI DETACHED		CUMBRIA
	MOORCLOSE ROAD			
	SALTERBACK			
	WORKINGTON			
	Edge of Town			
	No Sub Category			
	Total Number of dwellings:	82		
	Survey date: FRIDAY	24/04/09	Survey Type: MANUAL	
2	DH-03-A-01	SEMI DETACHED		DURHAM
	GREENFIELDS ROAD			
	BISHOP AUCLAND			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:	50		
	Survey date: TUESDAY	28/03/17	Survey Type: MANUAL	
3	DV-03-A-02	HOUSES & BUNGALOWS		DEVON
	MILLHEAD ROAD			
	HONITON			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:	116		
	Survey date: FRIDAY	25/09/15	Survey Type: MANUAL	
4	DV-03-A-03	TERRACED & SEMI DETACHED		DEVON
	LOWER BRAND LANE			
	HONITON			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:	70		
	Survey date: MONDAY	28/09/15	Survey Type: MANUAL	
5	HC-03-A-18	HOUSES & FLATS		HAMPSHIRE
	CANADA WAY			
	LIPHOOK			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:	62		
	Survey date: TUESDAY	29/11/16	Survey Type: MANUAL	
6	NF-03-A-02	HOUSES & FLATS		NORFOLK
	DEREHAM ROAD			
	NORWICH			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:	98		
	Survey date: MONDAY	22/10/12	Survey Type: MANUAL	
7	NY-03-A-06	BUNGALOWS & SEMI DET.		NORTH YORKSHIRE
	HORSEFAIR			
	BOROUGHBRIDGE			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:	115		
	Survey date: FRIDAY	14/10/11	Survey Type: MANUAL	

LIST OF SITES relevant to selection parameters (Cont.)

8	NY-03-A-09	MIXED HOUSING		NORTH YORKSHIRE
	GRAMMAR SCHOOL LANE			
	NORTHALLERTON			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:		52	
	Survey date: MONDAY		16/09/13	Survey Type: MANUAL
9	NY-03-A-10	HOUSES AND FLATS		NORTH YORKSHIRE
	BOROUGHBRIDGE ROAD			
	RIPON			
	Edge of Town			
	No Sub Category			
	Total Number of dwellings:		71	
	Survey date: TUESDAY		17/09/13	Survey Type: MANUAL
10	SC-03-A-04	DETACHED & TERRACED		SURREY
	HIGH ROAD			
	BYFLEET			
	Edge of Town			
	Residential Zone			
	Total Number of dwellings:		71	
	Survey date: THURSDAY		23/01/14	Survey Type: MANUAL
11	SH-03-A-04	TERRACED		SHROPSHIRE
	ST MICHAEL'S STREET			
	SHREWSBURY			
	Suburban Area (PPS6 Out of Centre)			
	No Sub Category			
	Total Number of dwellings:		108	
	Survey date: THURSDAY		11/06/09	Survey Type: MANUAL
12	SH-03-A-05	SEMI-DETACHED/TERRACED		SHROPSHIRE
	SANDCROFT			
	SUTTON HILL			
	TELFORD			
	Edge of Town			
	Residential Zone			
	Total Number of dwellings:		54	
	Survey date: THURSDAY		24/10/13	Survey Type: MANUAL
13	SY-03-A-01	SEMI DETACHED HOUSES		SOUTH YORKSHIRE
	A19 BENTLEY ROAD			
	BENTLEY RISE			
	DONCASTER			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:		54	
	Survey date: WEDNESDAY		18/09/13	Survey Type: MANUAL

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL VEHICLES

Calculation factor: 1 DWELLS

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	13	77	0.069	13	77	0.274	13	77	0.343
08:00 - 09:00	13	77	0.135	13	77	0.360	13	77	0.495
09:00 - 10:00	13	77	0.150	13	77	0.162	13	77	0.312
10:00 - 11:00	13	77	0.140	13	77	0.178	13	77	0.318
11:00 - 12:00	13	77	0.147	13	77	0.156	13	77	0.303
12:00 - 13:00	13	77	0.164	13	77	0.155	13	77	0.319
13:00 - 14:00	13	77	0.161	13	77	0.150	13	77	0.311
14:00 - 15:00	13	77	0.148	13	77	0.164	13	77	0.312
15:00 - 16:00	13	77	0.219	13	77	0.140	13	77	0.359
16:00 - 17:00	13	77	0.243	13	77	0.158	13	77	0.401
17:00 - 18:00	13	77	0.341	13	77	0.161	13	77	0.502
18:00 - 19:00	13	77	0.221	13	77	0.146	13	77	0.367
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:		2.138			2.204			4.342	

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: $COUNT/TRP*FACT$. Trip rates are then rounded to 3 decimal places.

Parameter summary

Trip rate parameter range selected: 50 - 116 (units:)
 Survey date range: 01/01/09 - 28/03/17
 Number of weekdays (Monday-Friday): 13
 Number of Saturdays: 0
 Number of Sundays: 0
 Surveys automatically removed from selection: 0
 Surveys manually removed from selection: 0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are shown. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL TOTAL PEOPLE

Calculation factor: 1 DWELLS

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	13	77	0.103	13	77	0.439	13	77	0.542
08:00 - 09:00	13	77	0.208	13	77	0.715	13	77	0.923
09:00 - 10:00	13	77	0.231	13	77	0.291	13	77	0.522
10:00 - 11:00	13	77	0.233	13	77	0.297	13	77	0.530
11:00 - 12:00	13	77	0.233	13	77	0.246	13	77	0.479
12:00 - 13:00	13	77	0.264	13	77	0.241	13	77	0.505
13:00 - 14:00	13	77	0.259	13	77	0.263	13	77	0.522
14:00 - 15:00	13	77	0.233	13	77	0.267	13	77	0.500
15:00 - 16:00	13	77	0.479	13	77	0.265	13	77	0.744
16:00 - 17:00	13	77	0.466	13	77	0.281	13	77	0.747
17:00 - 18:00	13	77	0.586	13	77	0.246	13	77	0.832
18:00 - 19:00	13	77	0.365	13	77	0.247	13	77	0.612
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			3.660			3.798			7.458

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

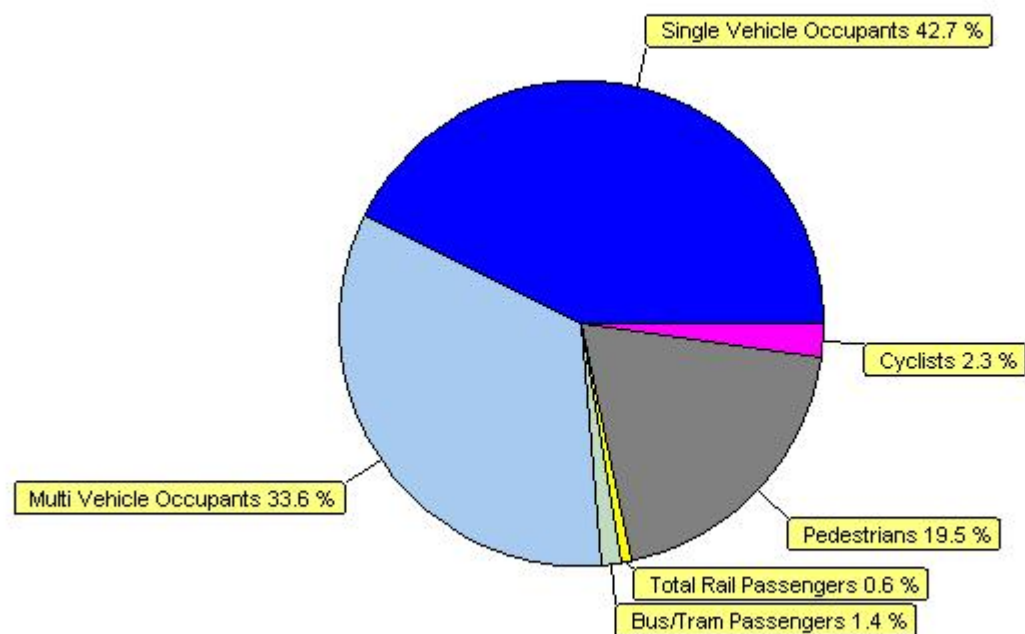
To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: $COUNT/TRP*FACT$. Trip rates are then rounded to 3 decimal places.

Parameter summary

Trip rate parameter range selected:	50 - 116 (units:)
Survey date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	13
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are shown. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

Modal Split Percentages

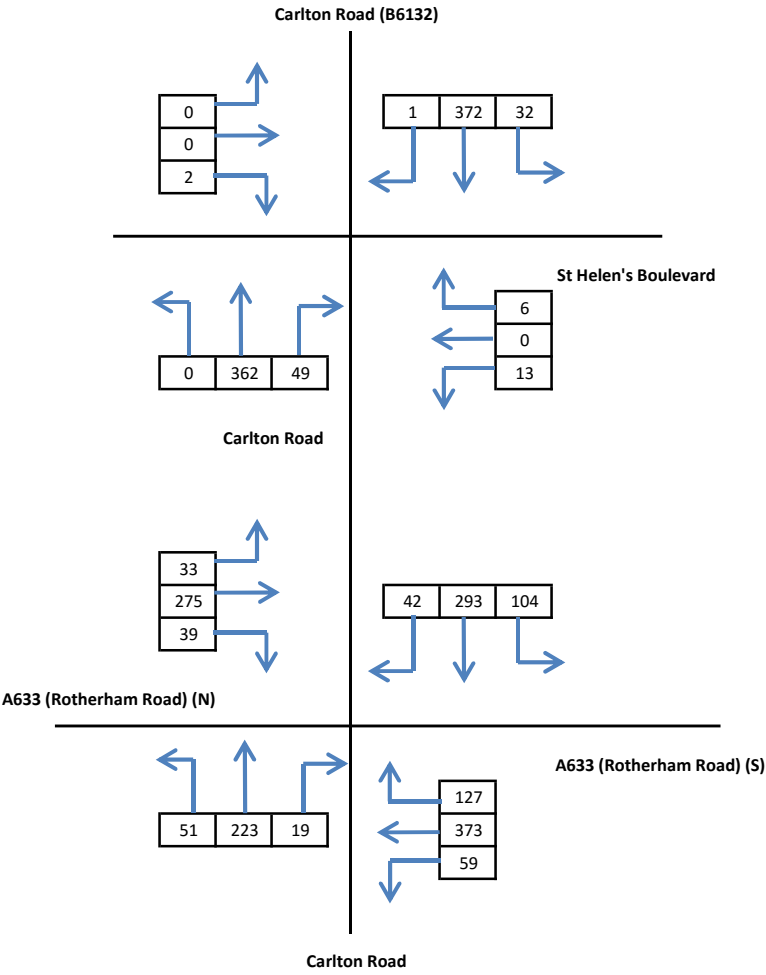


Time Range/Peak Period Selection

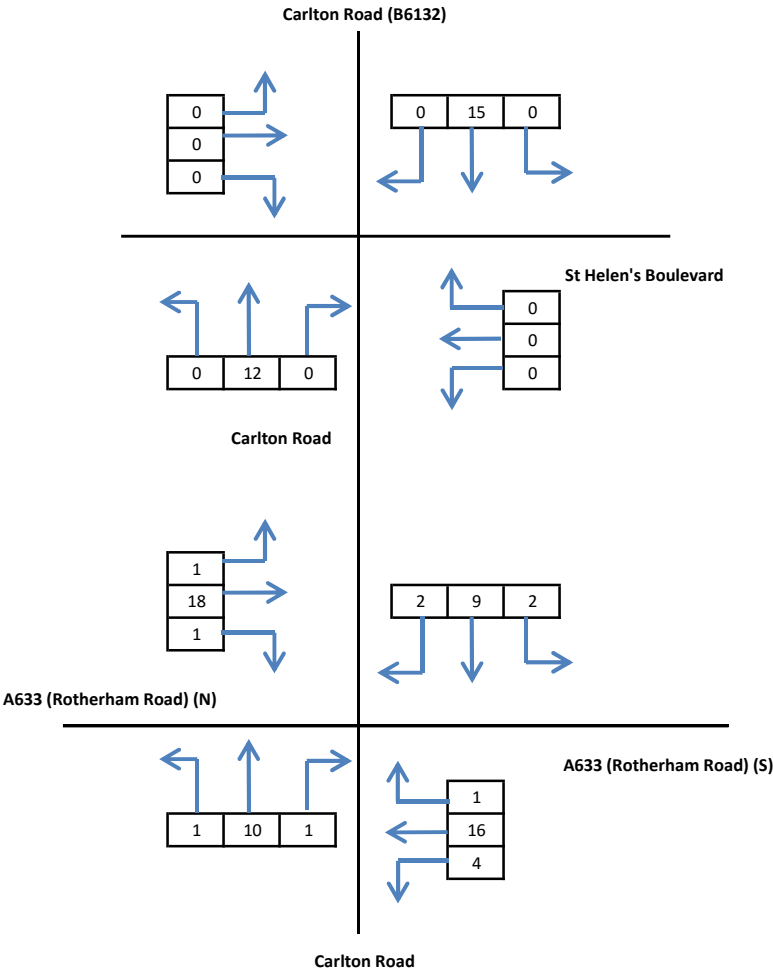
Direction: Totals / Use All Times

Appendix 4 – Network Diagrams

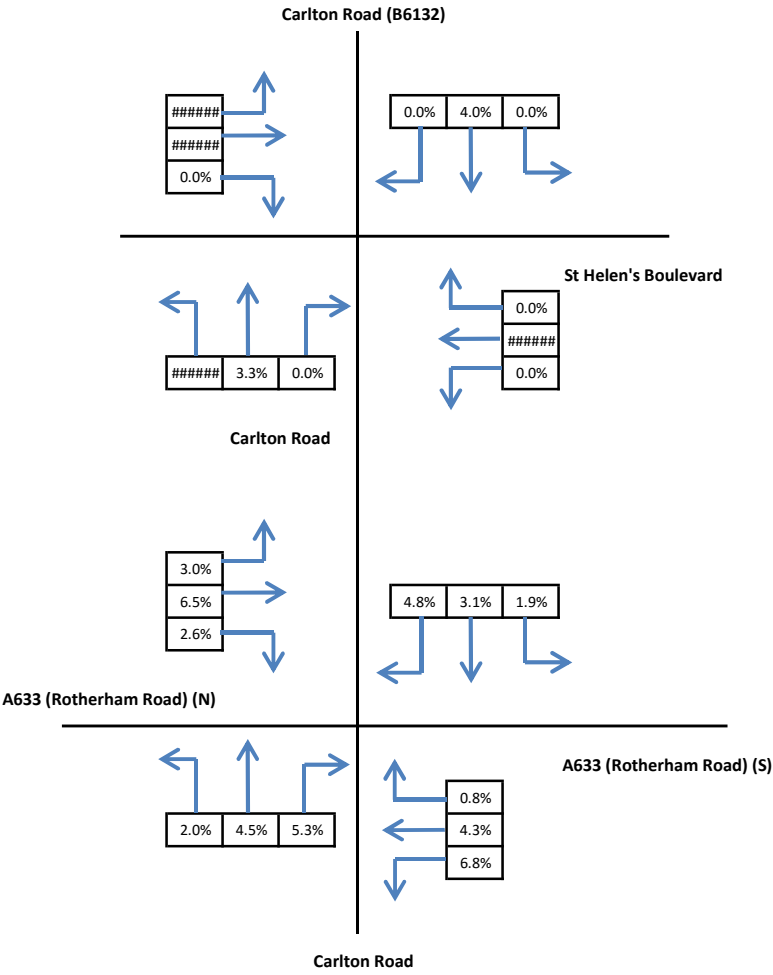
2017 Base
AM Peak (07:45-08:45)
Vehicles



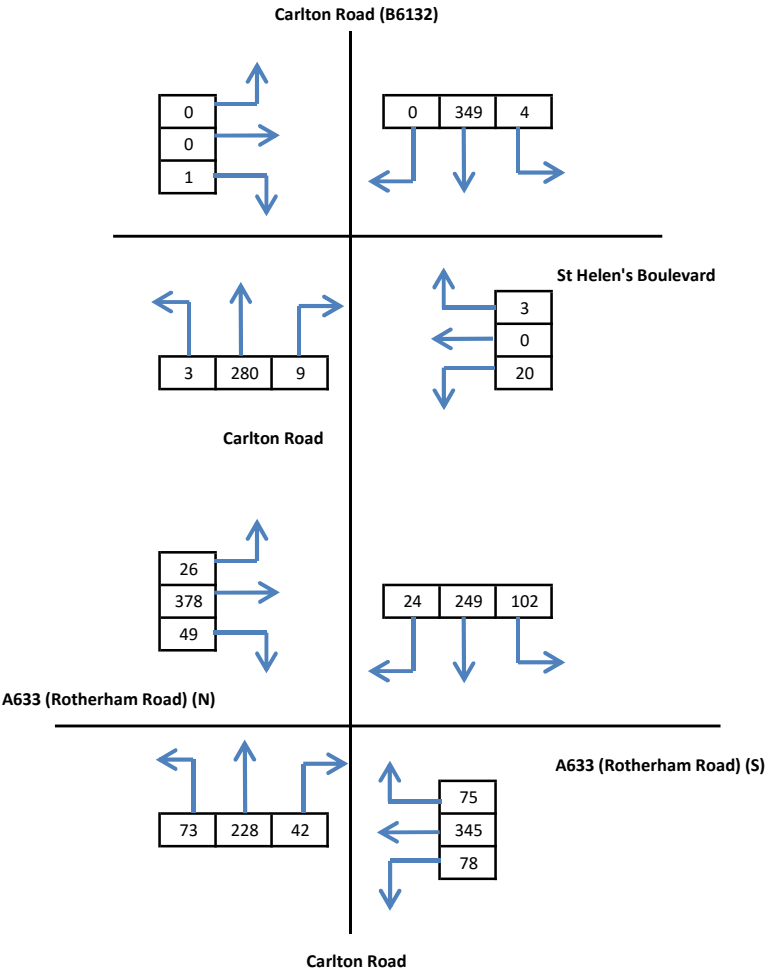
2017 Base
AM Peak (07:45-08:45)
HCVs



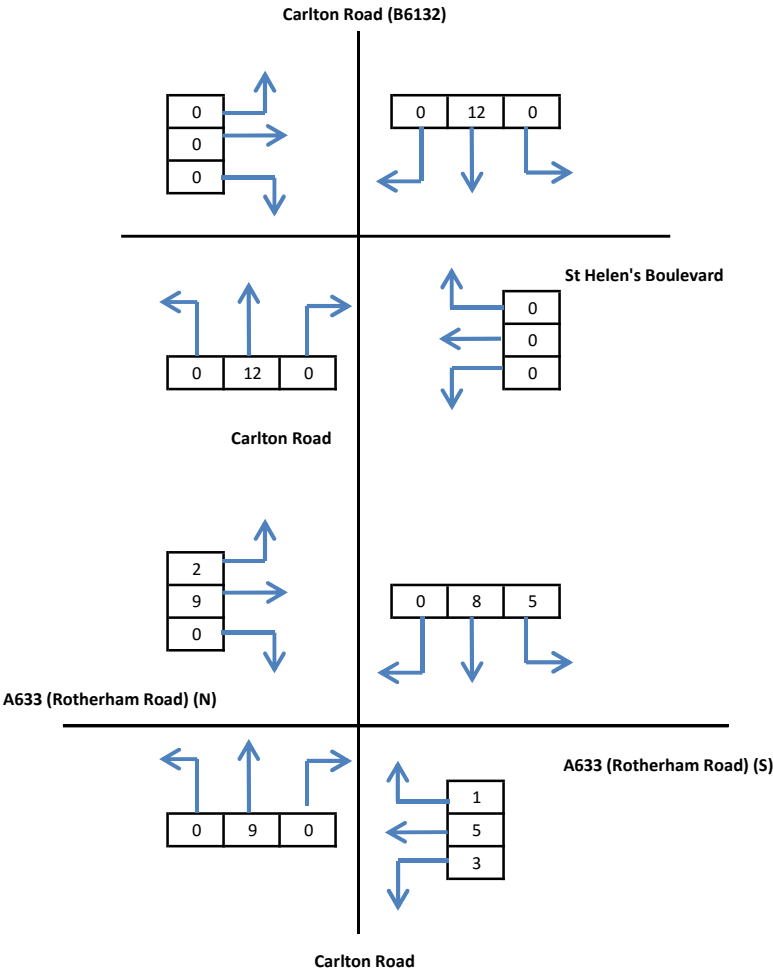
2017 Base
AM Peak (07:45-08:45)
HCVs (%)



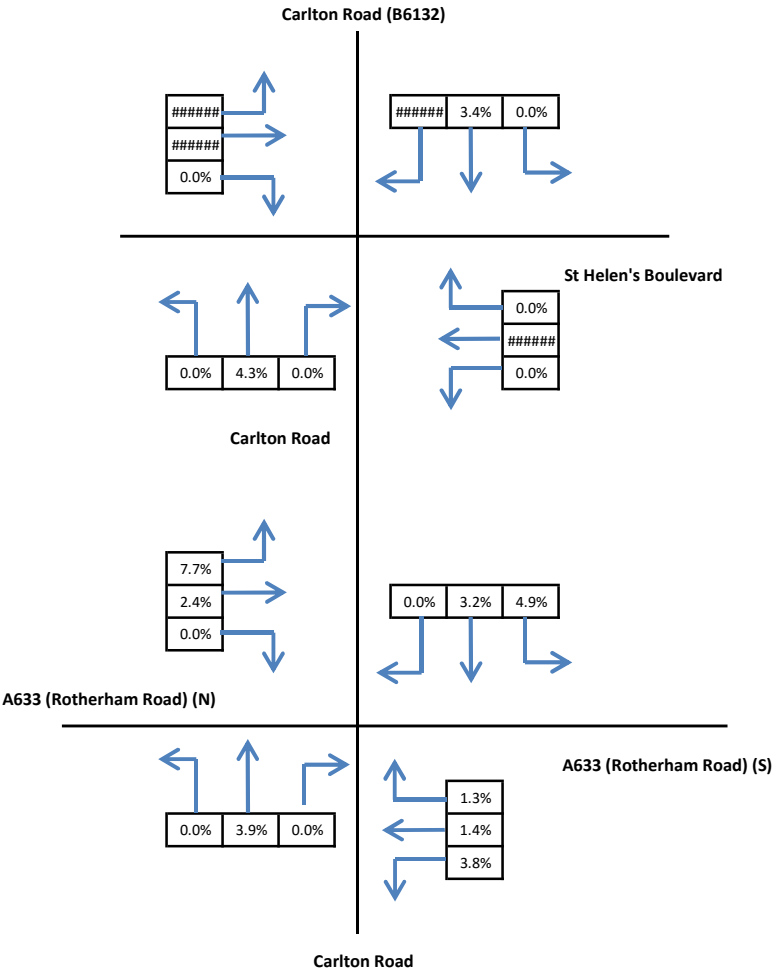
2017 Base
PM Peak (16:15-17:15)
Vehicles



2017 Base
PM Peak (16:15-17:15)
HCVs



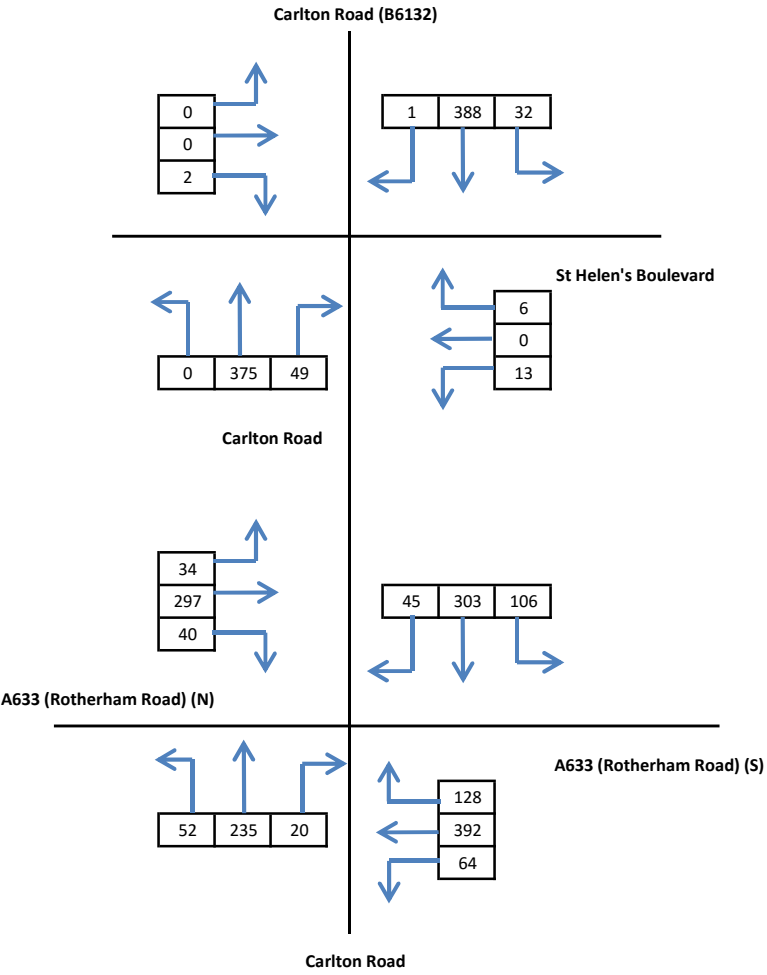
2017 Base
PM Peak (16:15-17:15)
HCVs (%)



2017 Base

AM Peak (07:45-08:45)

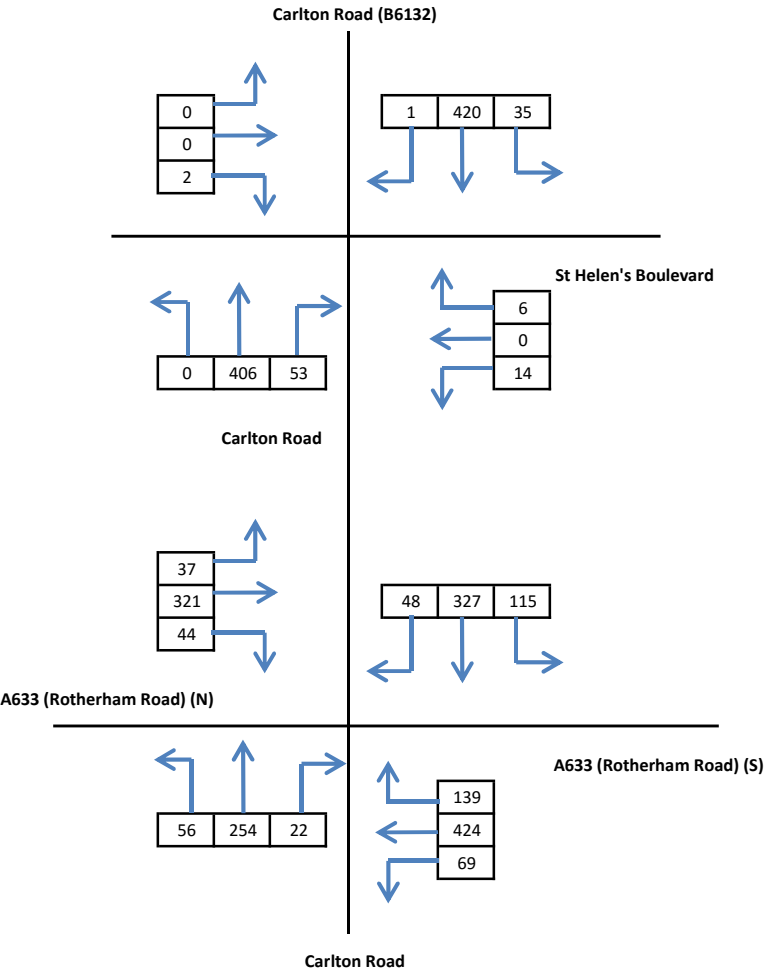
PCUs



2022 Do Nothing

AM Peak (07:45-08:45)

PCUs

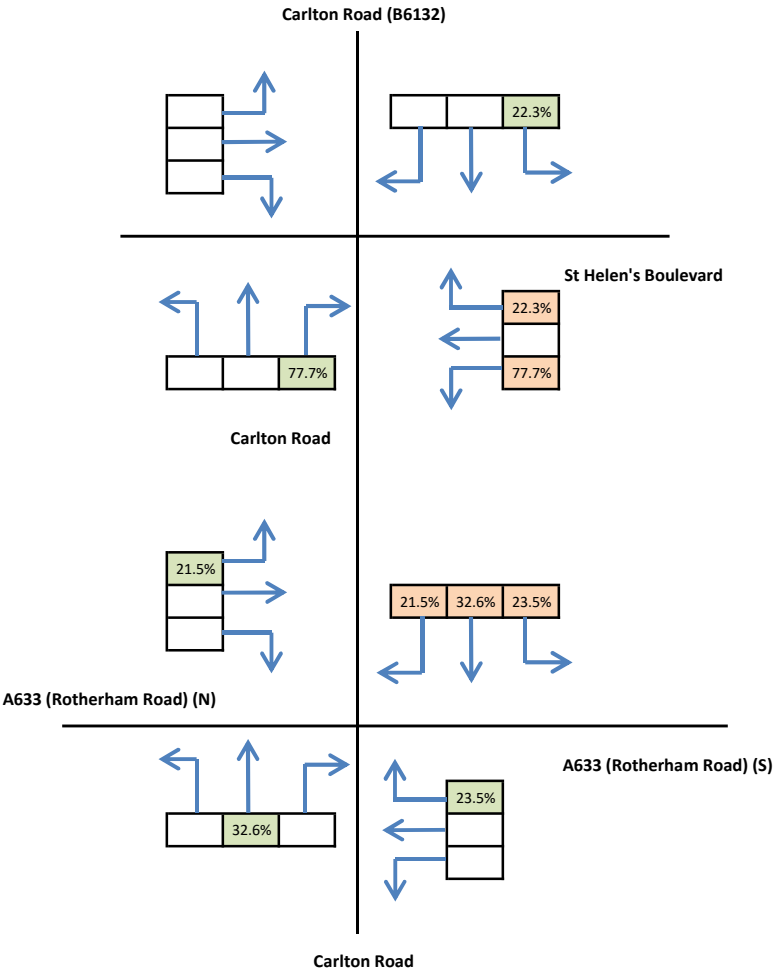


Tempro Traffic Growth 2017 to 2022

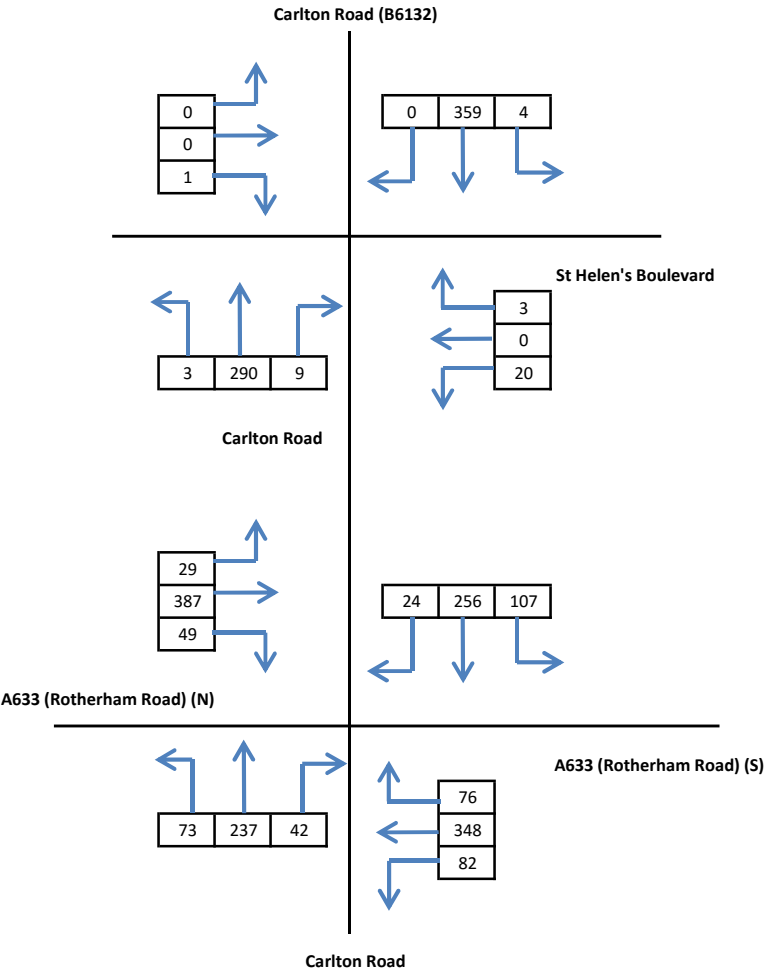
8.2%

Residential Trip Distribution

AM Peak (07:45-08:45)



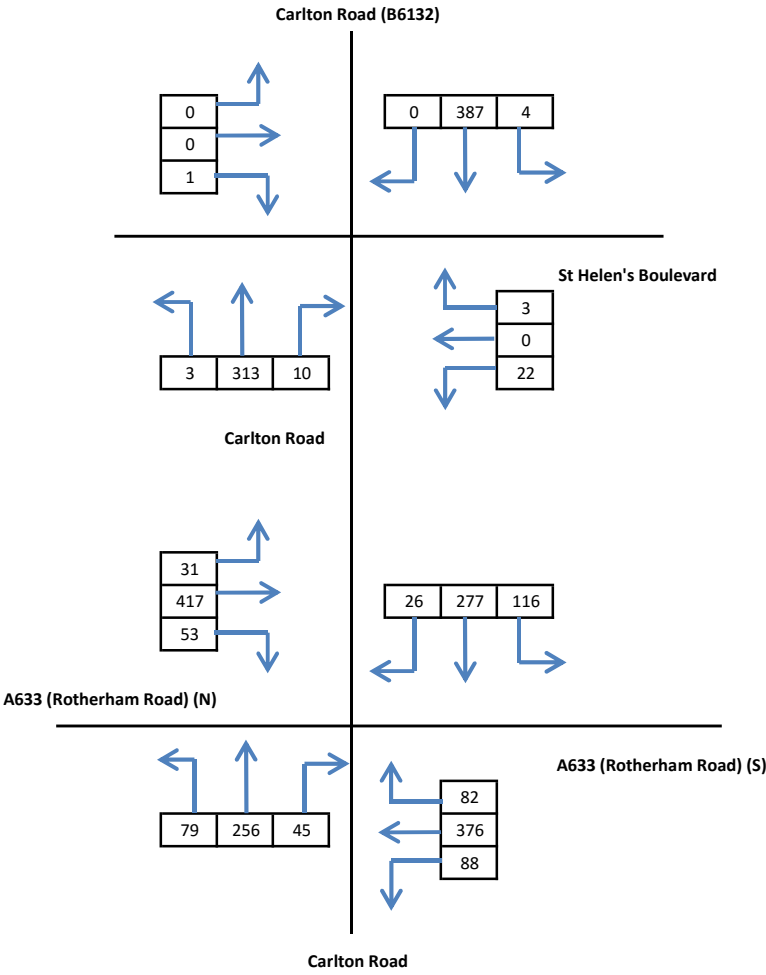
2017 Base
PM Peak (16:15-17:15)
PCUs



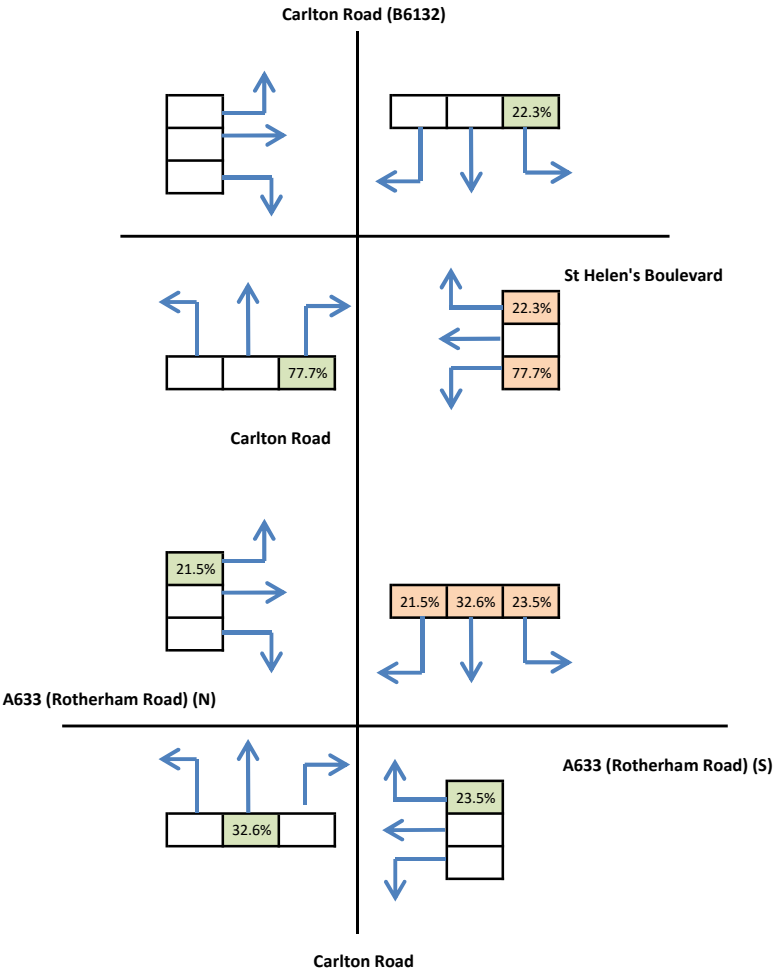
2022 Do Nothing
PM Peak (16:15-17:15)
PCUs

Tempro Traffic Growth 2017 to 2022

8.0%



Residential Trip Distribution
PM Peak (16:15-17:15)



AM Peak (07:45-08:45)

Arrivals

Departures

14
36



AM Peak (07:45-08:45)

Carlton Road (B6132)

0
0
2

↑
→
↓

St Helen's Boulevard

1	420	38
---	-----	----

←
↓
→

Carlton Road

0	406	64
---	-----	----

←
↑
→

St Helen's Boulevard

14
0
42

↑
←
↓

Carlton Road

40
321
44

↑
→
↓

A633 (Rotherham Road) (S)

56	339	123
----	-----	-----

←
↓
→

Carlton Road

56	259	22
----	-----	----

←
↑
→

A633 (Rotherham Road) (S)

142
424
69

↑
←
↓

Residential Development Trips

PM Peak (16:15-17:15)

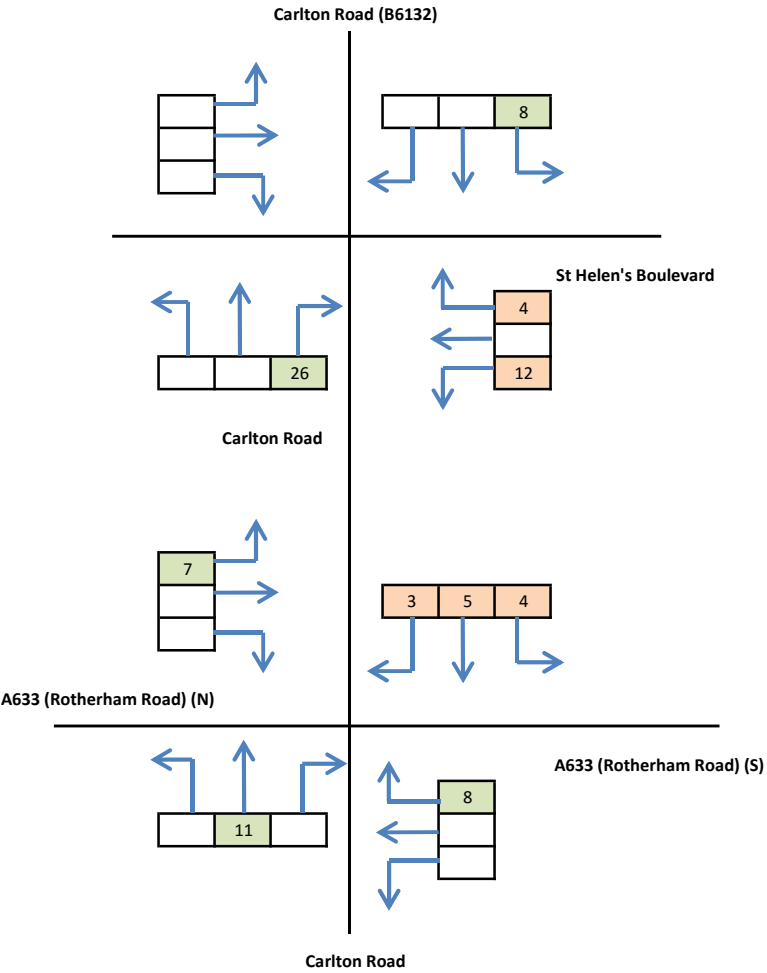
PCUs

Arrivals

34

Departures

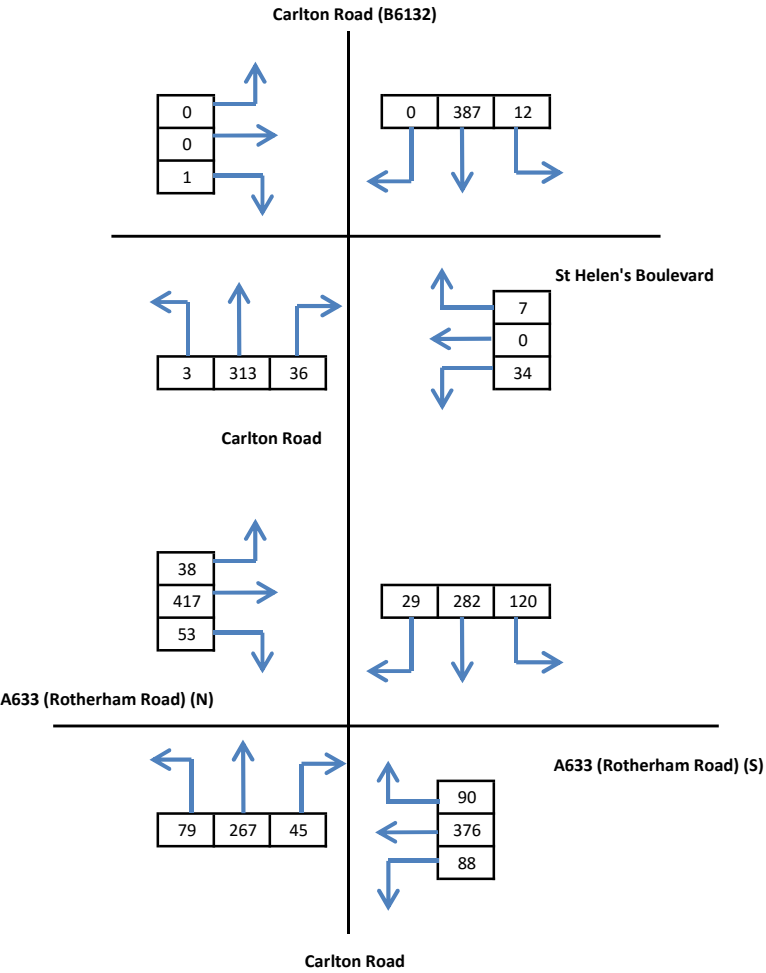
16



2022 With Development

PM Peak (16:15-17:15)

PCUs



Appendix 5 – TEMPPro Traffic Growth

Appendix 6 – Gravity Model

Proposed Trip Distribution & Assignment - Gravity Model

Origin MSOA: Barnsley 007 and Barnsley 010
Stage 1: Trip Distribution

Area of Workplace	Type	All people	Works mainly at or from home	Underground, metro, light rail or tram	Train	Bus, minibus or coach	Taxi or minicab	Motorcycle, scooter or moped	Driving a car or van	Passenger in a car or van	Bicycle	On foot	Other
Wakefield	Y&H Local Authority	609	0	0	4	24	3	6	516	48	0	7	1
Barnsley 013	MSOA Level	1,158	0	0	3	218	11	7	503	87	6	323	0
Barnsley 012	MSOA Level	588	0	0	2	38	4	4	276	59	3	202	0
Sheffield	Y&H Local Authority	361	0	2	57	1	5	257	23	0	7	0	
Barnsley 010	MSOA Level	508	0	2	4	48	5	6	215	45	8	173	2
Leeds	Y&H Local Authority	277	0	0	23	9	0	1	221	15	1	5	2
Barnsley 002	MSOA Level	380	0	0	1	26	2	7	207	49	21	66	1
Rotherham	Y&H Local Authority	287	0	0	6	43	0	3	212	17	2	2	2
Barnsley 007	MSOA Level	451	0	0	1	25	1	8	203	29	6	176	2
Barnsley 015	MSOA Level	302	0	0	2	45	7	1	191	14	5	35	2
Kirklees	Y&H Local Authority	141	0	0	4	1	1	1	121	8	0	5	0
Doncaster	Y&H Local Authority	136	0	0	1	11	1	1	110	10	0	1	1
Barnsley 004	MSOA Level	153	0	0	0	24	2	1	91	17	2	16	0
Barnsley 005	MSOA Level	124	0	0	0	9	0	3	85	20	3	4	0
Barnsley 011	MSOA Level	100	0	0	0	12	2	0	70	11	2	2	1
Barnsley 017	MSOA Level	103	0	0	0	17	1	1	63	6	0	15	0
Barnsley 023	MSOA Level	76	0	0	0	10	1	2	58	4	1	0	0
Barnsley 009	MSOA Level	103	0	0	0	13	1	0	56	12	4	17	0
Barnsley 028	MSOA Level	76	0	0	0	6	1	2	52	6	1	8	0
Barnsley 006	MSOA Level	65	0	0	0	5	0	3	49	6	0	2	0
Barnsley 019	MSOA Level	76	0	0	0	8	2	0	50	7	2	7	0
Barnsley 021	MSOA Level	67	0	0	0	8	1	0	46	7	0	5	0
Barnsley 026	MSOA Level	62	0	0	0	13	0	1	38	6	2	2	0
Bradford	Y&H Local Authority	42	0	0	3	1	0	0	35	2	0	1	0
Barnsley 022	MSOA Level	41	0	0	0	1	0	1	32	5	0	2	0
Barnsley 018	MSOA Level	46	0	0	0	8	1	0	31	1	0	5	0
Barnsley 016	MSOA Level	49	0	0	0	7	1	0	29	10	0	2	0
Barnsley 001	MSOA Level	49	0	0	0	7	0	0	27	10	0	3	0
Barnsley 020	MSOA Level	30	0	0	0	2	0	0	26	1	0	0	1
Barnsley 030	MSOA Level	40	0	0	0	6	0	1	25	3	0	4	1
Barnsley 008	MSOA Level	49	0	0	0	6	0	1	24	13	2	3	0
Barnsley 003	MSOA Level	28	0	0	0	3	0	0	23	1	0	1	0
Barnsley 027	MSOA Level	26	0	0	1	1	0	0	22	1	0	1	0
Selby	Y&H Local Authority	22	0	0	0	0	0	1	20	1	0	0	0
Barnsley 014	MSOA Level	20	0	0	0	0	0	0	18	2	0	0	0
Barnsley 024	MSOA Level	19	0	0	1	1	0	0	15	1	0	1	0
Calderdale	Y&H Local Authority	14	0	0	1	1	0	0	13	0	0	0	0

Vehicle Trip Generating Mode	%
525	12.66%
521	12.56%
284	6.85%
263	6.34%
226	5.45%
222	5.35%
216	5.21%
215	5.18%
212	5.11%
199	4.80%
123	2.97%
112	2.70%
94	2.27%
88	2.12%
72	1.74%
65	1.57%
61	1.47%
57	1.37%
55	1.33%
52	1.25%
52	1.25%
47	1.13%
39	0.94%
35	0.84%
33	0.80%
32	0.77%
30	0.72%
29	0.70%
26	0.63%
26	0.63%
25	0.60%
23	0.55%
22	0.53%
21	0.51%
18	0.43%
15	0.36%
13	0.31%
TOTAL	4,148 100.00%

Stage 2: Traffic assignment for each O-D pair

Area of Workplace	Type	A	B	C	D	E	F	G	TOTAL
Wakefield	Y&H Local Authority	45.00%			55.00%				100%
Barnsley 013	MSOA Level					95.00%	5.00%		100%
Barnsley 012	MSOA Level					50.00%	50.00%		100%
Sheffield	Y&H Local Authority						100.00%		100%
Barnsley 010	MSOA Level					95.00%	5.00%		100%
Leeds	Y&H Local Authority				100.00%				100%
Barnsley 002	MSOA Level	20.00%	80.00%						100%
Rotherham	Y&H Local Authority					10.00%	90.00%		100%
Barnsley 007	MSOA Level		50.00%	25.00%				25.00%	100%
Barnsley 015	MSOA Level					45.00%	55.00%		100%
Kirklees	Y&H Local Authority				25.00%	75.00%			100%
Doncaster	Y&H Local Authority		30.00%				70.00%		100%
Barnsley 004	MSOA Level			25.00%	75.00%				100%
Barnsley 005	MSOA Level				100.00%				100%
Barnsley 011	MSOA Level	10.00%					90.00%		100%
Barnsley 017	MSOA Level					90.00%	10.00%		100%
Barnsley 023	MSOA Level						100.00%		100%
Barnsley 009	MSOA Level		75.00%			25.00%			100%
Barnsley 028	MSOA Level					85.00%	15.00%		100%
Barnsley 006	MSOA Level		90.00%				10.00%		100%
Barnsley 019	MSOA Level					90.00%	10.00%		100%
Barnsley 021	MSOA Level					50.00%	50.00%		100%
Barnsley 026	MSOA Level						100.00%		100%
Bradford	Y&H Local Authority				100.00%				100%
Barnsley 022	MSOA Level						100.00%		100%
Barnsley 018	MSOA Level					70.00%	30.00%		100%
Barnsley 016	MSOA Level				10.00%	90.00%			100%
Barnsley 001	MSOA Level		100.00%						100%
Barnsley 020	MSOA Level						100.00%		100%
Barnsley 030	MSOA Level					85.00%	15.00%		100%
Barnsley 008	MSOA Level		100.00%						100%
Barnsley 003	MSOA Level		100.00%						100%
Barnsley 027	MSOA Level					100.00%			100%
Selby	Y&H Local Authority		100.00%						100%
Barnsley 014	MSOA Level		50.00%				50.00%		100%
Barnsley 024	MSOA Level					100.00%			100%
Calderdale	Y&H Local Authority				100.00%				100%

Stage 3: Total zonal distribution of traffic

Area of Workplace	Type	A	B	C	D	E	F	G	TOTAL
Wakefield	Y&H Local Authority	0.00%	5.70%	0.00%	6.96%	0.00%	0.00%	0.00%	12.66%
Barnsley 013	MSOA Level	0.00%	0.00%	0.00%	0.00%	11.93%	0.63%	0.00%	12.56%
Barnsley 012	MSOA Level	0.00%	0.00%	0.00%	3.42%	3.42%	0.00%	0.00%	6.85%
Sheffield	Y&H Local Authority	0.00%	0.00%	0.00%	0.00%	0.00%	6.34%	0.00%	6.34%
Barnsley 010	MSOA Level	0.00%	0.00%	0.00%	0.00%	5.18%	0.27%	0.00%	5.45%
Leeds	Y&H Local Authority	0.00%	0.00%	0.00%	5.35%	0.00%	0.00%	0.00%	5.35%
Barnsley 002	MSOA Level	1.04%	4.17%	0.00%	0.00%	0.00%	0.00%	0.00%	5.21%
Rotherham	Y&H Local Authority	0.00%	0.00%	0.00%	0.00%	0.52%	4.66%	0.00%	5.18%
Barnsley 007	MSOA Level	0.00%	2.56%	1.28%	0.00%	0.00%	0.00%	1.28%	5.11%
Barnsley 015	MSOA Level	0.00%	0.00%	0.00%	0.00%	2.16%	2.64%	0.00%	4.80%
Kirklees	Y&H Local Authority	0.00%	0.00%	0.00%	0.74%	2.22%	0.00%	0.00%	2.97%
Doncaster	Y&H Local Authority	0.00%	0.81%	0.00%	0.00%	0.00%	1.89%	0.00%	2.70%
Barnsley 004	MSOA Level	0.00%	0.00%	0.57%	1.70%	0.00%	0.00%	0.00%	2.27%
Barnsley 005	MSOA Level	0.00%	0.00%	0.00%	2.12%	0.00%	0.00%	0.00%	2.12%
Barnsley 011	MSOA Level	0.00%	0.17%	0.00%	0.00%	0.00%	1.56%	0.00%	1.74%
Barnsley 017	MSOA Level	0.00%	0.00%	0.00%	0.00%	1.41%	0.16%	0.00%	1.57%
Barnsley 023	MSOA Level	0.00%	0.00%	0.00%	0.00%	0.00%	1.47%	0.00%	1.47%
Barnsley 009	MSOA Level	0.00%	1.03%	0.00%	0.00%	0.34%	0.00%	0.00%	1.37%
Barnsley 028	MSOA Level	0.00%	0.00%	0.00%	0.00%	1.13%	0.20%	0.00%	1.33%
Barnsley 006	MSOA Level	0.00%	1.13%	0.00%	0.00%	0.00%	0.13%	0.00%	1.25%
Barnsley 019	MSOA Level	0.00%	0.00%	0.00%	0.00%	1.13%	0.13%	0.00%	1.25%
Barnsley 021	MSOA Level	0.00%	0.00%	0.00%	0.00%	0.57%	0.57%	0.00%	1.13%
Barnsley 026	MSOA Level	0.00%	0.00%	0.00%	0.00%	0.00%	0.94%	0.00%	0.94%
Bradford	Y&H Local Authority	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.84%
Barnsley 022	MSOA Level	0.00%	0.00%	0.00%	0.00%	0.00%	0.80%	0.00%	0.80%
Barnsley 018	MSOA Level	0.00%	0.00%	0.00%	0.00%	0.54%	0.23%	0.00%	0.77%
Barnsley 016	MSOA Level	0.00%	0.00%	0.00%	0.07%	0.65%	0.00%	0.00%	0.72%
Barnsley 001	MSOA Level	0.00%	0.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.70%
Barnsley 020	MSOA Level	0.00%	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%	0.63%
Barnsley 030	MSOA Level	0.00%	0.00%	0.00%	0.00%	0.53%	0.09%	0.00%	0.63%
Barnsley 008	MSOA Level	0.00%	0.60%	0.00%	0.00%	0.00%	0.00%	0.00%	0.60%
Barnsley 003	MSOA Level	0.00%	0.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.55%
Barnsley 027	MSOA Level	0.00%	0.00%	0.00%	0.00%	0.53%	0.00%	0.00%	0.53%
Selby	Y&H Local Authority	0.00%	0.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.51%
Barnsley 014	MSOA Level	0.00%	0.22%	0.00%	0.00%	0.00%	0.22%	0.00%	0.43%
Barnsley 024	MSOA Level	0.00%	0.00%	0.00%	0.00%	0.36%	0.00%	0.00%	0.36%
Calderdale	Y&H Local Authority	0.00%	0.00%	0.00%	0.31%	0.00%	0.00%	0.00%	0.31%
Sub-total		1.04%	18.14%	1.84%	21.53%	32.62%	23.55%	1.28%	100.00%

Notes

Source: 2011 National Census - Travel to work flows
Table WU03EW - Location of usual residence and place of work by method of travel to work (MSOA level)
Based on 2011 Middle-Layer Super Output Areas (MSOA)
Local authorities in Yorkshire & Humber region only
MSOA/LA with fewer than 10 people travelling by a vehicle trip generating modes have been excluded

Area of Workplace	Type	Mode of transport											
		All people	Works mainly at or from home	Underground, metro, light rail or tram	Train	Bus, minibus or coach	Taxi or minicab	Motorcycle, scooter or moped	Driving a car or van	Passenger in a car or van	Bicycle	On foot	Other
Barnsley 029	MSOA Level	20	0	0	1	4	0	0	9	2	0	4	0
York	Y&H Local Authority	10	0	0	1	0	0	0	9	0	0	0	0
North Lincolnshire	Y&H Local Authority	6	0	0	0	0	0	0	6	0	0	0	0
East Riding of Yorkshire	Y&H Local Authority	5	0	0	0	0	0	0	5	0	0	0	0
Barnsley 025	MSOA Level	4	0	0	0	0	0	0	4	0	0	0	0
Harrogate	Y&H Local Authority	6	0	0	2	0	0	0	3	0	0	1	0
Craven	Y&H Local Authority	1	0	0	0	0	0	0	1	0	0	0	0
Kingston upon Hull, City of	Y&H Local Authority	1	0	0	0	0	0	0	1	0	0	0	0
Hambleton	Y&H Local Authority	0	0	0	0	0	0	0	0	0	0	0	0
North East Lincolnshire	Y&H Local Authority	0	0	0	0	0	0	0	0	0	0	0	0
Richmondshire	Y&H Local Authority	0	0	0	0	0	0	0	0	0	0	0	0
Pudsey	Y&H Local Authority	0	0	0	0	0	0	0	0	0	0	0	0
Scarborough	Y&H Local Authority	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 7 – Junction Modelling Results

Junctions 9			
PICADY 9 - Priority Intersection Module			
Version: 9.0.1.4646 [] © Copyright TRL Limited, 2017			
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			
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution			

Filename: St Helens Boulevard Carlton Road Junction.j9

Path: Z:\Projects\2880 Carlton Road Barnsley\Data

Report generation date: 01/11/2017 12:35:33

- »Existing Layout - 2017 Base, AM
- »Existing Layout - 2017 Base, PM
- »Existing Layout - 2022 Do Nothing, AM
- »Existing Layout - 2022 Do Nothing, PM
- »Existing Layout - 2022 With Development, AM
- »Existing Layout - 2022 With Development, PM

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
Existing Layout - 2017 Base								
Stream B-CD	0.0	5.94	0.02	A	0.0	6.00	0.04	A
Stream B-AD	0.0	10.55	0.02	B	0.0	9.96	0.01	A
Stream A-BCD	0.0	4.91	0.00	A	0.0	0.00	0.00	A
Stream D-ABC	0.0	0.00	0.00	A	0.0	0.00	0.00	A
Stream C-ABD	0.3	5.09	0.13	A	0.0	4.99	0.02	A
Existing Layout - 2022 Do Nothing								
Stream B-CD	0.0	6.09	0.03	A	0.0	6.10	0.04	A
Stream B-AD	0.0	11.28	0.02	B	0.0	10.30	0.01	B
Stream A-BCD	0.0	4.76	0.00	A	0.0	0.00	0.00	A
Stream D-ABC	0.0	0.00	0.00	A	0.0	0.00	0.00	A
Stream C-ABD	0.3	5.10	0.15	A	0.0	4.96	0.02	A
Existing Layout - 2022 With Development								
Stream B-CD	0.1	6.66	0.08	A	0.1	6.30	0.06	A
Stream B-AD	0.1	11.93	0.05	B	0.0	10.60	0.02	B
Stream A-BCD	0.0	4.77	0.00	A	0.0	0.00	0.00	A
Stream D-ABC	0.0	0.00	0.00	A	0.0	0.00	0.00	A
Stream C-ABD	0.4	5.25	0.18	A	0.2	5.17	0.09	A

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

File summary

File Description

Title	St Helens Boulevard/Carlton Road (B6132) Junction
Location	Barnsley, South Yorkshire
Site number	
Date	01/11/2017
Version	
Status	
Identifier	
Client	Keepmoat
Jobnumber	2880
Enumerator	LTP\MR
Description	

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	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2017 Base	AM	ONE HOUR	07:30	09:00	15
D2	2017 Base	PM	ONE HOUR	16:00	17:30	15
D3	2022 Do Nothing	AM	ONE HOUR	07:30	09:00	15
D4	2022 Do Nothing	PM	ONE HOUR	16:00	17:30	15
D5	2022 With Development	AM	ONE HOUR	07:30	09:00	15
D6	2022 With Development	PM	ONE HOUR	16:00	17:30	15

Analysis Set Details

ID	Name	Network flow scaling factor (%)
A1	Existing Layout	100.000

Existing Layout - 2017 Base, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	St Helen's Boulevard/Carlton Road (B6132) Junction	Crossroads	Two-way	0.71	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Carlton Road (B6132) (N)		Major
B	St Helens Boulevard		Minor
C	Carlton Road (B6132) (S)		Major
D	untitled		Minor

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
A - Carlton Road (B6132) (N)	6.50			67.0	✓	0.00
C - Carlton Road (B6132) (S)	6.50			150.0	✓	0.00

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

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B - St Helens Boulevard	One lane plus flare		10.00	5.10	3.75	3.75	3.75	✓	1.00	22	56
D - untitled	One lane	2.20								220	38

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for A-D	Slope for B-A	Slope for B-C	Slope for B-D	Slope for C-A	Slope for C-B	Slope for C-D	Slope for D-A	Slope for D-B	Slope for D-C
1	A-D	613	-	-	-	-	-	-	0.232	0.332	0.232	-	-	-
1	B-A	528	0.094	0.238	0.238	-	-	-	0.150	0.340	-	0.238	0.238	0.119
1	B-C	741	0.111	0.281	-	-	-	-	-	-	-	-	-	-
1	B-D, nearside lane	576	0.103	0.259	0.259	-	-	-	0.163	0.371	0.163	-	-	-
1	B-D, offside lane	528	0.094	0.238	0.238	-	-	-	0.150	0.340	0.150	-	-	-
1	C-B	661	0.250	0.250	0.358	-	-	-	-	-	-	-	-	-
1	D-A	596	-	-	-	-	-	-	0.226	-	0.089	-	-	-
1	D-B, nearside lane	523	0.148	0.148	0.336	-	-	-	0.235	0.235	0.093	-	-	-
1	D-B, offside lane	523	0.148	0.148	0.336	-	-	-	0.235	0.235	0.093	-	-	-
1	D-C	523	-	0.148	0.336	0.118	0.235	0.235	0.235	0.235	0.093	-	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2017 Base	AM	ONE HOUR	07:30	09:00	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Carlton Road (B6132) (N)		✓	401	100.000
B - St Helens Boulevard		✓	19	100.000
C - Carlton Road (B6132) (S)		✓	424	100.000
D - untitled		✓	2	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
	A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
From A - Carlton Road (B6132) (N)	0	32	368	1
From B - St Helens Boulevard	6	0	13	0
From C - Carlton Road (B6132) (S)	375	49	0	0
From D - untitled	0	0	2	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
	A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
From A - Carlton Road (B6132) (N)	0	0	4	0
From B - St Helens Boulevard	0	0	0	0
From C - Carlton Road (B6132) (S)	3	0	0	0
From D - untitled	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
B-CD	0.02	5.94	0.0	A
B-AD	0.02	10.55	0.0	B
A-BCD	0.00	4.91	0.0	A
A-B				
A-C				
D-ABC	0.00	0.00	0.0	A
C-ABD	0.13	5.09	0.3	A
C-D				
C-A				

Main Results for each time segment

07:30 - 07:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	10	659	0.015	10	0.0	5.544	A
B-AD	5	405	0.011	4	0.0	8.992	A
A-BCD	1	747	0.002	1	0.0	4.899	A
A-B	24			24			
A-C	277			277			
D-ABC	0	429	0.000	0	0.0	0.000	A
C-ABD	58	776	0.075	57	0.1	5.070	A
C-D	0			0			
C-A	261			261			

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	12	643	0.018	12	0.0	5.703	A
B-AD	5	381	0.014	5	0.0	9.588	A
A-BCD	2	775	0.002	2	0.0	4.725	A
A-B	29			29			
A-C	330			330			
D-ABC	0	407	0.000	0	0.0	0.000	A
C-ABD	76	801	0.095	76	0.2	5.033	A
C-D	0			0			
C-A	305			305			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	14	620	0.023	14	0.0	5.938	A
B-AD	7	348	0.019	7	0.0	10.552	B
A-BCD	2	817	0.003	2	0.0	4.499	A
A-B	35			35			
A-C	404			404			
D-ABC	0	376	0.000	0	0.0	0.000	A
C-ABD	107	837	0.128	107	0.3	5.008	A
C-D	0			0			
C-A	360			360			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	14	620	0.023	14	0.0	5.938	A
B-AD	7	348	0.019	7	0.0	10.554	B
A-BCD	2	817	0.003	2	0.0	4.504	A
A-B	35			35			
A-C	404			404			
D-ABC	0	376	0.000	0	0.0	0.000	A
C-ABD	107	837	0.128	107	0.3	5.016	A
C-D	0			0			
C-A	360			360			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	12	643	0.018	12	0.0	5.705	A
B-AD	5	381	0.014	5	0.0	9.591	A
A-BCD	2	775	0.002	2	0.0	4.738	A
A-B	29			29			
A-C	330			330			
D-ABC	0	407	0.000	0	0.0	0.000	A
C-ABD	77	801	0.096	77	0.2	5.053	A
C-D	0			0			
C-A	305			305			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	10	659	0.015	10	0.0	5.548	A
B-AD	5	405	0.011	5	0.0	8.998	A
A-BCD	1	746	0.002	1	0.0	4.907	A
A-B	24			24			
A-C	277			277			
D-ABC	0	429	0.000	0	0.0	0.000	A
C-ABD	58	776	0.075	58	0.1	5.087	A
C-D	0			0			
C-A	261			261			

Existing Layout - 2017 Base, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	St Helen's Boulevard/Carlton Road (B6132) Junction	Crossroads	Two-way	0.32	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2017 Base	PM	ONE HOUR	16:00	17:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Carlton Road (B6132) (N)		✓	363	100.000
B - St Helens Boulevard		✓	23	100.000
C - Carlton Road (B6132) (S)		✓	302	100.000
D - untitled		✓	1	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
	A - Carlton Road (B6132) (N)	0	4	359	0
	B - St Helens Boulevard	3	0	20	0
	C - Carlton Road (B6132) (S)	290	9	0	3
	D - untitled	0	0	1	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
	A - Carlton Road (B6132) (N)	0	0	3	0
	B - St Helens Boulevard	0	0	0	0
	C - Carlton Road (B6132) (S)	4	0	0	0
	D - untitled	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
B-CD	0.04	6.00	0.0	A
B-AD	0.01	9.96	0.0	A
A-BCD	0.00	0.00	0.0	A
A-B				
A-C				
D-ABC	0.00	0.00	0.0	A
C-ABD	0.02	4.99	0.0	A
C-D				
C-A				

Main Results for each time segment

16:00 - 16:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	15	658	0.023	15	0.0	5.600	A
B-AD	2	409	0.006	2	0.0	8.857	A
A-BCD	0	559	0.000	0	0.0	0.000	A
A-B	3			3			
A-C	270			270			
D-ABC	0	452	0.000	0	0.0	0.000	A
C-ABD	10	740	0.013	10	0.0	4.982	A
C-D	2			2			
C-A	215			215			

16:15 - 16:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	18	643	0.028	18	0.0	5.760	A
B-AD	3	390	0.007	3	0.0	9.288	A
A-BCD	0	549	0.000	0	0.0	0.000	A
A-B	4			4			
A-C	323			323			
D-ABC	0	435	0.000	0	0.0	0.000	A
C-ABD	12	758	0.016	12	0.0	4.890	A
C-D	3			3			
C-A	256			256			

16:30 - 16:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	22	622	0.035	22	0.0	5.996	A
B-AD	3	365	0.009	3	0.0	9.958	A
A-BCD	0	535	0.000	0	0.0	0.000	A
A-B	4			4			
A-C	395			395			
D-ABC	0	411	0.000	0	0.0	0.000	A
C-ABD	17	783	0.022	17	0.0	4.769	A
C-D	3			3			
C-A	312			312			

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	22	622	0.035	22	0.0	5.996	A
B-AD	3	365	0.009	3	0.0	9.958	A
A-BCD	0	535	0.000	0	0.0	0.000	A
A-B	4			4			
A-C	395			395			
D-ABC	0	411	0.000	0	0.0	0.000	A
C-ABD	17	783	0.022	17	0.0	4.774	A
C-D	3			3			
C-A	312			312			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	18	643	0.028	18	0.0	5.763	A
B-AD	3	390	0.007	3	0.0	9.290	A
A-BCD	0	549	0.000	0	0.0	0.000	A
A-B	4			4			
A-C	323			323			
D-ABC	0	435	0.000	0	0.0	0.000	A
C-ABD	12	758	0.016	12	0.0	4.904	A
C-D	3			3			
C-A	256			256			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	15	658	0.023	15	0.0	5.601	A
B-AD	2	409	0.006	2	0.0	8.858	A
A-BCD	0	559	0.000	0	0.0	0.000	A
A-B	3			3			
A-C	270			270			
D-ABC	0	452	0.000	0	0.0	0.000	A
C-ABD	10	740	0.013	10	0.0	4.988	A
C-D	2			2			
C-A	215			215			

Existing Layout - 2022 Do Nothing, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	St Helen's Boulevard/Carlton Road (B6132) Junction	Crossroads	Two-way	0.72	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2022 Do Nothing	AM	ONE HOUR	07:30	09:00	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Am	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Carlton Road (B6132) (N)		✓	456	100.000
B - St Helens Boulevard		✓	20	100.000
C - Carlton Road (B6132) (S)		✓	459	100.000
D - untitled		✓	2	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
From	A - Carlton Road (B6132) (N)	0	35	420	1
	B - St Helens Boulevard	6	0	14	0
	C - Carlton Road (B6132) (S)	406	53	0	0
	D - untitled	0	0	2	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
From	A - Carlton Road (B6132) (N)	0	0	4	0
	B - St Helens Boulevard	0	0	0	0
	C - Carlton Road (B6132) (S)	3	0	0	0
	D - untitled	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
B-CD	0.03	6.09	0.0	A
B-AD	0.02	11.28	0.0	B
A-BCD	0.00	4.76	0.0	A
A-B				
A-C				
D-ABC	0.00	0.00	0.0	A
C-ABD	0.15	5.10	0.3	A
C-D				
C-A				

Main Results for each time segment

07:30 - 07:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	11	650	0.016	10	0.0	5.629	A
B-AD	5	389	0.012	4	0.0	9.355	A
A-BCD	1	771	0.002	1	0.0	4.755	A
A-B	26			26			
A-C	316			316			
D-ABC	0	418	0.000	0	0.0	0.000	A
C-ABD	65	783	0.084	65	0.2	5.077	A
C-D	0			0			
C-A	280			280			

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	13	632	0.020	13	0.0	5.815	A
B-AD	5	363	0.015	5	0.0	10.077	B
A-BCD	2	805	0.002	2	0.0	4.561	A
A-B	31			31			
A-C	377			377			
D-ABC	0	393	0.000	0	0.0	0.000	A
C-ABD	87	810	0.107	87	0.2	5.051	A
C-D	0			0			
C-A	326			326			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	15	606	0.025	15	0.0	6.094	A
B-AD	7	326	0.020	7	0.0	11.274	B
A-BCD	3	854	0.003	3	0.0	4.312	A
A-B	38			38			
A-C	461			461			
D-ABC	0	359	0.000	0	0.0	0.000	A
C-ABD	124	849	0.146	123	0.3	5.044	A
C-D	0			0			
C-A	382			382			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	15	606	0.025	15	0.0	6.094	A
B-AD	7	326	0.020	7	0.0	11.276	B
A-BCD	3	854	0.003	3	0.0	4.320	A
A-B	38			38			
A-C	461			461			
D-ABC	0	359	0.000	0	0.0	0.000	A
C-ABD	124	850	0.146	124	0.3	5.054	A
C-D	0			0			
C-A	381			381			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	13	631	0.020	13	0.0	5.819	A
B-AD	5	363	0.015	5	0.0	10.081	B
A-BCD	2	805	0.002	2	0.0	4.576	A
A-B	31			31			
A-C	377			377			
D-ABC	0	393	0.000	0	0.0	0.000	A
C-ABD	87	810	0.108	88	0.2	5.073	A
C-D	0			0			
C-A	325			325			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	11	650	0.016	11	0.0	5.633	A
B-AD	5	389	0.012	5	0.0	9.362	A
A-BCD	1	770	0.002	1	0.0	4.763	A
A-B	26			26			
A-C	316			316			
D-ABC	0	417	0.000	0	0.0	0.000	A
C-ABD	66	783	0.084	66	0.2	5.097	A
C-D	0			0			
C-A	280			280			

Existing Layout - 2022 Do Nothing, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	St Helen's Boulevard/Carlton Road (B6132) Junction	Crossroads	Two-way	0.33	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2022 Do Nothing	PM	ONE HOUR	16:00	17:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Carlton Road (B6132) (N)		✓	391	100.000
B - St Helens Boulevard		✓	25	100.000
C - Carlton Road (B6132) (S)		✓	326	100.000
D - untitled		✓	1	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
From	A - Carlton Road (B6132) (N)	0	4	387	0
	B - St Helens Boulevard	3	0	22	0
	C - Carlton Road (B6132) (S)	313	10	0	3
	D - untitled	0	0	1	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
From	A - Carlton Road (B6132) (N)	0	0	3	0
	B - St Helens Boulevard	0	0	0	0
	C - Carlton Road (B6132) (S)	4	0	0	0
	D - untitled	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
B-CD	0.04	6.10	0.0	A
B-AD	0.01	10.30	0.0	B
A-BCD	0.00	0.00	0.0	A
A-B				
A-C				
D-ABC	0.00	0.00	0.0	A
C-ABD	0.02	4.96	0.0	A
C-D				
C-A				

Main Results for each time segment

16:00 - 16:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	17	653	0.025	16	0.0	5.660	A
B-AD	2	400	0.006	2	0.0	9.048	A
A-BCD	0	555	0.000	0	0.0	0.000	A
A-B	3			3			
A-C	291			291			
D-ABC	0	445	0.000	0	0.0	0.000	A
C-ABD	11	747	0.015	11	0.0	4.948	A
C-D	2			2			
C-A	232			232			

16:15 - 16:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	20	636	0.031	20	0.0	5.837	A
B-AD	3	380	0.007	3	0.0	9.534	A
A-BCD	0	544	0.000	0	0.0	0.000	A
A-B	4			4			
A-C	348			348			
D-ABC	0	427	0.000	0	0.0	0.000	A
C-ABD	14	766	0.019	14	0.0	4.850	A
C-D	3			3			
C-A	276			276			

16:30 - 16:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	24	614	0.039	24	0.0	6.100	A
B-AD	3	353	0.009	3	0.0	10.298	B
A-BCD	0	528	0.000	0	0.0	0.000	A
A-B	4			4			
A-C	426			426			
D-ABC	0	401	0.000	0	0.0	0.000	A
C-ABD	20	794	0.025	20	0.0	4.722	A
C-D	3			3			
C-A	336			336			

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	24	614	0.039	24	0.0	6.100	A
B-AD	3	353	0.009	3	0.0	10.298	B
A-BCD	0	528	0.000	0	0.0	0.000	A
A-B	4			4			
A-C	426			426			
D-ABC	0	401	0.000	0	0.0	0.000	A
C-ABD	20	794	0.025	20	0.0	4.729	A
C-D	3			3			
C-A	336			336			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	20	636	0.031	20	0.0	5.840	A
B-AD	3	380	0.007	3	0.0	9.535	A
A-BCD	0	544	0.000	0	0.0	0.000	A
A-B	4			4			
A-C	348			348			
D-ABC	0	427	0.000	0	0.0	0.000	A
C-ABD	14	767	0.019	14	0.0	4.864	A
C-D	3			3			
C-A	276			276			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	17	652	0.025	17	0.0	5.663	A
B-AD	2	400	0.006	2	0.0	9.048	A
A-BCD	0	555	0.000	0	0.0	0.000	A
A-B	3			3			
A-C	291			291			
D-ABC	0	445	0.000	0	0.0	0.000	A
C-ABD	11	747	0.015	11	0.0	4.956	A
C-D	2			2			
C-A	232			232			

Existing Layout - 2022 With Development, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	St Helen's Boulevard/Carlton Road (B6132) Junction	Crossroads	Two-way	1.11	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2022 With Development	AM	ONE HOUR	07:30	09:00	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Am	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Carlton Road (B6132) (N)		✓	459	100.000
B - St Helens Boulevard		✓	56	100.000
C - Carlton Road (B6132) (S)		✓	470	100.000
D - untitled		✓	2	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
From	A - Carlton Road (B6132) (N)	0	38	420	1
	B - St Helens Boulevard	14	0	42	0
	C - Carlton Road (B6132) (S)	406	64	0	0
	D - untitled	0	0	2	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
From	A - Carlton Road (B6132) (N)	0	0	4	0
	B - St Helens Boulevard	0	0	0	0
	C - Carlton Road (B6132) (S)	3	0	0	0
	D - untitled	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
B-CD	0.08	6.66	0.1	A
B-AD	0.05	11.93	0.1	B
A-BCD	0.00	4.77	0.0	A
A-B				
A-C				
D-ABC	0.00	0.00	0.0	A
C-ABD	0.18	5.25	0.4	A
C-D				
C-A				

Main Results for each time segment

07:30 - 07:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	32	632	0.050	31	0.1	5.997	A
B-AD	11	381	0.028	10	0.0	9.702	A
A-BCD	1	770	0.002	1	0.0	4.759	A
A-B	29			29			
A-C	316			316			
D-ABC	0	414	0.000	0	0.0	0.000	A
C-ABD	79	782	0.101	78	0.2	5.177	A
C-D	0			0			
C-A	275			275			

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	38	613	0.062	38	0.1	6.258	A
B-AD	13	354	0.036	13	0.0	10.528	B
A-BCD	2	804	0.002	2	0.0	4.565	A
A-B	34			34			
A-C	377			377			
D-ABC	0	389	0.000	0	0.0	0.000	A
C-ABD	105	810	0.130	105	0.3	5.182	A
C-D	0			0			
C-A	317			317			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	46	587	0.079	46	0.1	6.657	A
B-AD	15	317	0.049	15	0.1	11.922	B
A-BCD	3	854	0.003	3	0.0	4.315	A
A-B	42			42			
A-C	461			461			
D-ABC	0	354	0.000	0	0.0	0.000	A
C-ABD	150	849	0.176	149	0.4	5.232	A
C-D	0			0			
C-A	368			368			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	46	587	0.079	46	0.1	6.658	A
B-AD	15	317	0.049	15	0.1	11.927	B
A-BCD	3	853	0.003	3	0.0	4.321	A
A-B	42			42			
A-C	461			461			
D-ABC	0	354	0.000	0	0.0	0.000	A
C-ABD	150	849	0.176	150	0.4	5.249	A
C-D	0			0			
C-A	368			368			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	38	613	0.062	38	0.1	6.261	A
B-AD	13	354	0.036	13	0.0	10.537	B
A-BCD	2	804	0.002	2	0.0	4.580	A
A-B	34			34			
A-C	377			377			
D-ABC	0	389	0.000	0	0.0	0.000	A
C-ABD	105	810	0.130	106	0.3	5.210	A
C-D	0			0			
C-A	317			317			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	32	631	0.050	32	0.1	6.004	A
B-AD	11	381	0.028	11	0.0	9.716	A
A-BCD	1	770	0.002	1	0.0	4.767	A
A-B	29			29			
A-C	316			316			
D-ABC	0	414	0.000	0	0.0	0.000	A
C-ABD	79	783	0.102	80	0.2	5.201	A
C-D	0			0			
C-A	274			274			

Existing Layout - 2022 With Development, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	St Helen's Boulevard/Carlton Road (B6132) Junction	Crossroads	Two-way	0.75	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2022 With Development	PM	ONE HOUR	16:00	17:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Carlton Road (B6132) (N)		✓	399	100.000
B - St Helens Boulevard		✓	41	100.000
C - Carlton Road (B6132) (S)		✓	352	100.000
D - untitled		✓	1	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
From	A - Carlton Road (B6132) (N)	0	12	387	0
	B - St Helens Boulevard	7	0	34	0
	C - Carlton Road (B6132) (S)	313	36	0	3
	D - untitled	0	0	1	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		A - Carlton Road (B6132) (N)	B - St Helens Boulevard	C - Carlton Road (B6132) (S)	D - untitled
From	A - Carlton Road (B6132) (N)	0	0	3	0
	B - St Helens Boulevard	0	0	0	0
	C - Carlton Road (B6132) (S)	4	0	0	0
	D - untitled	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
B-CD	0.06	6.30	0.1	A
B-AD	0.02	10.60	0.0	B
A-BCD	0.00	0.00	0.0	A
A-B				
A-C				
D-ABC	0.00	0.00	0.0	A
C-ABD	0.09	5.17	0.2	A
C-D				
C-A				

Main Results for each time segment

16:00 - 16:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	26	648	0.040	25	0.0	5.784	A
B-AD	5	398	0.013	5	0.0	9.155	A
A-BCD	0	549	0.000	0	0.0	0.000	A
A-B	9			9			
A-C	291			291			
D-ABC	0	440	0.000	0	0.0	0.000	A
C-ABD	40	746	0.053	39	0.1	5.157	A
C-D	2			2			
C-A	223			223			

16:15 - 16:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	31	631	0.048	31	0.1	5.993	A
B-AD	6	377	0.017	6	0.0	9.713	A
A-BCD	0	536	0.000	0	0.0	0.000	A
A-B	11			11			
A-C	348			348			
D-ABC	0	421	0.000	0	0.0	0.000	A
C-ABD	52	765	0.067	51	0.1	5.116	A
C-D	3			3			
C-A	262			262			

16:30 - 16:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	37	608	0.062	37	0.1	6.303	A
B-AD	8	347	0.022	8	0.0	10.603	B
A-BCD	0	519	0.000	0	0.0	0.000	A
A-B	13			13			
A-C	426			426			
D-ABC	0	393	0.000	0	0.0	0.000	A
C-ABD	71	792	0.089	71	0.2	5.071	A
C-D	3			3			
C-A	314			314			

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	37	608	0.062	37	0.1	6.303	A
B-AD	8	347	0.022	8	0.0	10.604	B
A-BCD	0	519	0.000	0	0.0	0.000	A
A-B	13			13			
A-C	426			426			
D-ABC	0	393	0.000	0	0.0	0.000	A
C-ABD	71	792	0.090	71	0.2	5.078	A
C-D	3			3			
C-A	314			314			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	31	631	0.048	31	0.1	5.997	A
B-AD	6	377	0.017	6	0.0	9.717	A
A-BCD	0	536	0.000	0	0.0	0.000	A
A-B	11			11			
A-C	348			348			
D-ABC	0	421	0.000	0	0.0	0.000	A
C-ABD	52	765	0.068	52	0.1	5.134	A
C-D	3			3			
C-A	262			262			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-CD	26	648	0.040	26	0.0	5.788	A
B-AD	5	398	0.013	5	0.0	9.158	A
A-BCD	0	548	0.000	0	0.0	0.000	A
A-B	9			9			
A-C	291			291			
D-ABC	0	440	0.000	0	0.0	0.000	A
C-ABD	40	746	0.054	40	0.1	5.169	A
C-D	2			2			
C-A	223			223			

User and Project Details

Project:	A633/B6132 Signal Junction
Title:	Proposed Residential Development, Land South of St Helen's Boulevard
Location:	Barnsley, South Yorkshire
Client:	Keepmoat Homes
Site Ref(s):	2880
Additional detail:	
File name:	Rotherham Road Carlton Road Signal Junction.lsg3x
Author:	MR
Company:	LTP
Address:	

Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Pedestrian		6	6
F	Pedestrian		6	6

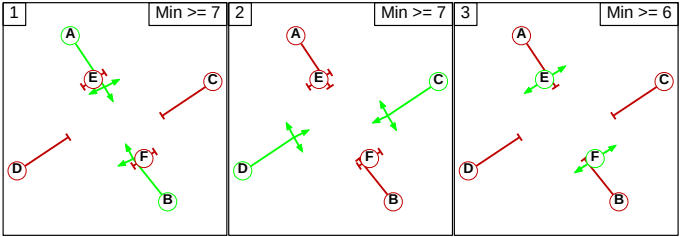
Phase Intergreens Matrix

	Starting Phase						
Terminating Phase		A	B	C	D	E	F
	A		-	5	5	5	7
	B	-		5	5	7	5
	C	5	5		-	6	6
	D	5	5	-		6	7
	E	10	10	10	10		-
	F	8	8	8	8	-	

Phases in Stage

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

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

		To Stage		
From Stage		1	2	3
	1		5	7
	2	5		7
	3	10	10	

Give-Way Lane Input Data

Junction: A633/B6132											
Lane	Movement	Max Flow when Giving Way (PCU/Hr)	Min Flow when Giving Way (PCU/Hr)	Opposing Lane	Opp. Lane Coeff.	Opp. Mvmnts.	Right Turn Storage (PCU)	Non-Blocking Storage (PCU)	RTF	Right Turn Move up (s)	Max Turns in Intergreen (PCU)
1/2 (A633 (Rotherham Road) North)	8/1 (Right)	1439	0	3/1	1.09	To 5/1 (Ahead) To 8/1 (Left)	2.00	-	0.50	2	2.00
2/1 (B6132 (Carlton Road) East)	5/1 (Right)	1439	0	4/1	1.09	To 5/1 (Left) To 6/1 (Ahead)	2.00	2.00	0.50	2	2.00
3/1 (A633 (Rotherham Road) South)	6/1 (Right)	1439	0	1/1	1.09	All	2.00	2.00	0.50	2	2.00
4/1 (B6132 (Carlton Road) West)	7/1 (Right)	1439	0	2/1	1.09	To 7/1 (Left) To 8/1 (Ahead)	2.00	2.00	0.50	2	2.00

Lane Input Data

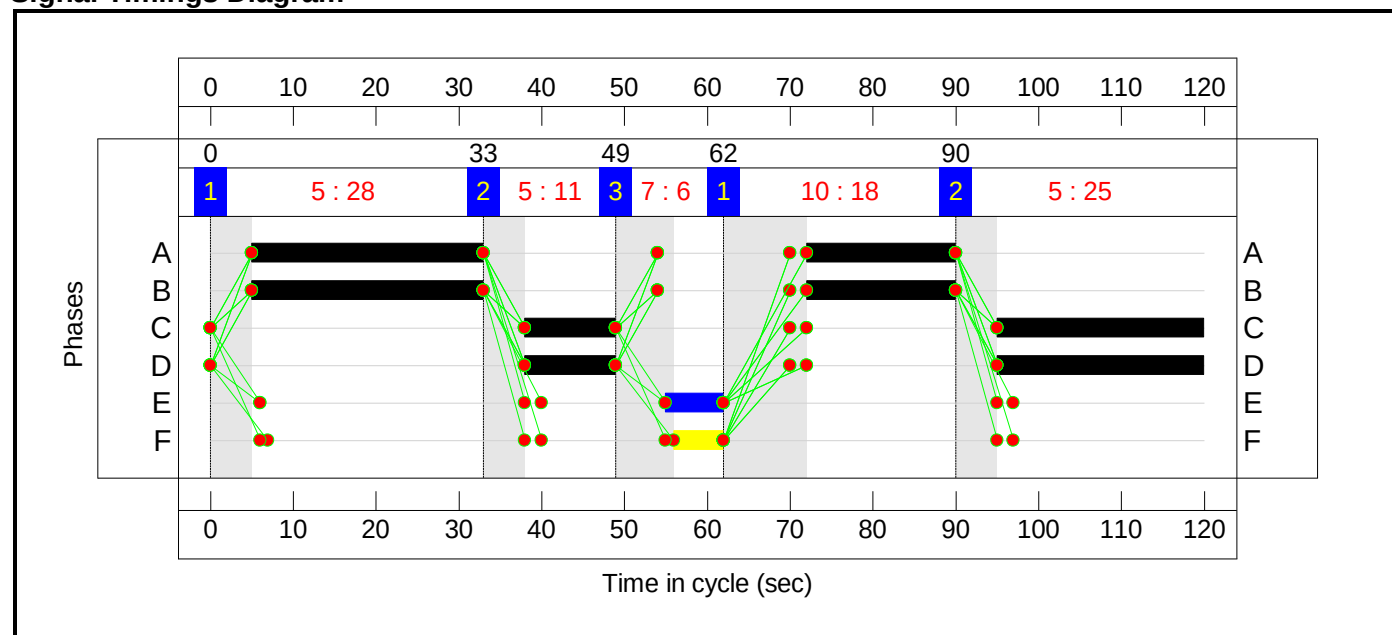
Junction: A633/B6132												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (A633 (Rotherham Road) North)	U	A	2	3	60.0	Geom	-	3.25	0.00	Y	Arm 6 Left	4.00
											Arm 7 Ahead	Inf
1/2 (A633 (Rotherham Road) North)	O	A	2	3	12.0	Geom	-	3.00	0.00	Y	Arm 8 Right	8.30
2/1 (B6132 (Carlton Road) East)	O	C	2	3	60.0	Geom	-	3.50	0.00	Y	Arm 5 Right	12.10
											Arm 7 Left	7.70
											Arm 8 Ahead	Inf
3/1 (A633 (Rotherham Road) South)	O	B	2	3	60.0	Geom	-	3.50	0.00	Y	Arm 5 Ahead	Inf
											Arm 6 Right	10.56
											Arm 8 Left	5.10
4/1 (B6132 (Carlton Road) West)	O	D	2	3	60.0	Geom	-	4.00	0.00	Y	Arm 5 Left	4.50
											Arm 6 Ahead	Inf
											Arm 7 Right	12.87
5/1 (A633 (Rotherham Road) North)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (B6132 (Carlton Road) East)	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1 (A633 (Rotherham Road) South)	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1 (B6132 (Carlton Road) West)	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2017 Base AM'	07:45	08:45	01:00	
2: '2017 Base PM'	16:15	17:15	01:00	
3: '2022 Do Nothing AM'	07:45	08:45	01:00	
4: '2022 Do Nothing PM'	16:15	17:15	01:00	
5: '2022 With Development AM'	07:45	08:45	01:00	
6: '2022 With Development PM'	16:15	17:15	01:00	

Scenario 1: '2017 Base AM' (FG1: '2017 Base AM', Plan 1: 'Network Control Plan 1')

Signal Timings Diagram



Traffic Flows, Desired

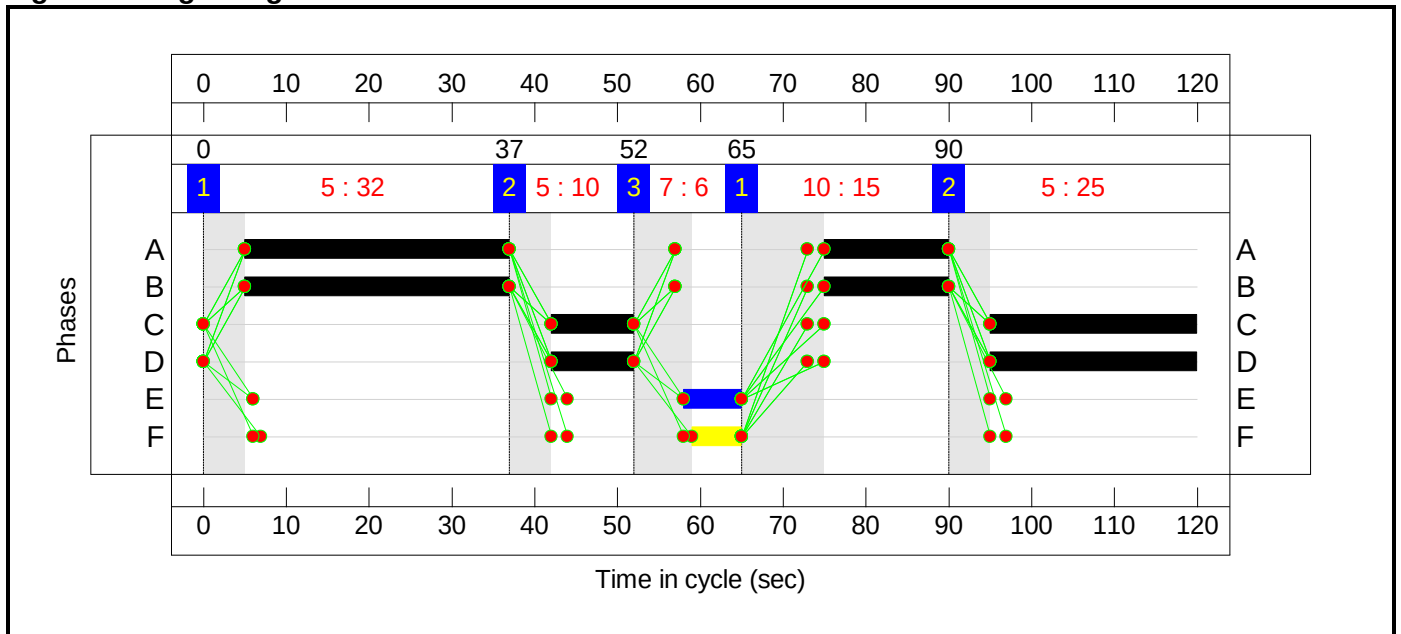
Desired Flow :

	Destination					
	A	B	C	D	Tot.	
Origin	A	0	34	297	40	371
	B	45	0	106	303	454
	C	392	128	0	64	584
	D	52	235	20	0	307
	Tot.	489	397	423	407	1716

Junction: A633/B6132								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (A633 (Rotherham Road) North)	3.25	0.00	Y	Arm 6 Left	4.00	10.3 %	1868	1868
				Arm 7 Ahead	Inf	89.7 %		
1/2 (A633 (Rotherham Road) North)	3.00	0.00	Y	Arm 8 Right	8.30	100.0 %	1622	1622
2/1 (B6132 (Carlton Road) East)	3.50	0.00	Y	Arm 5 Right	12.10	9.9 %	1858	1858
				Arm 7 Left	7.70	23.3 %		
3/1 (A633 (Rotherham Road) South)	3.50	0.00	Y	Arm 8 Ahead	Inf	66.7 %	1848	1848
				Arm 5 Ahead	Inf	67.1 %		
				Arm 6 Right	10.56	21.9 %		
				Arm 8 Left	5.10	11.0 %		
4/1 (B6132 (Carlton Road) West)	4.00	0.00	Y	Arm 5 Left	4.50	16.9 %	1894	1894
				Arm 6 Ahead	Inf	76.5 %		
				Arm 7 Right	12.87	6.5 %		
5/1 (A633 (Rotherham Road) North Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (B6132 (Carlton Road) East Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (A633 (Rotherham Road) South Lane 1)	Infinite Saturation Flow						Inf	Inf
8/1 (B6132 (Carlton Road) West Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 2: '2017 Base PM' (FG2: '2017 Base PM', Plan 1: 'Network Control Plan 1')

Signal Timings Diagram



Traffic Flows, Desired

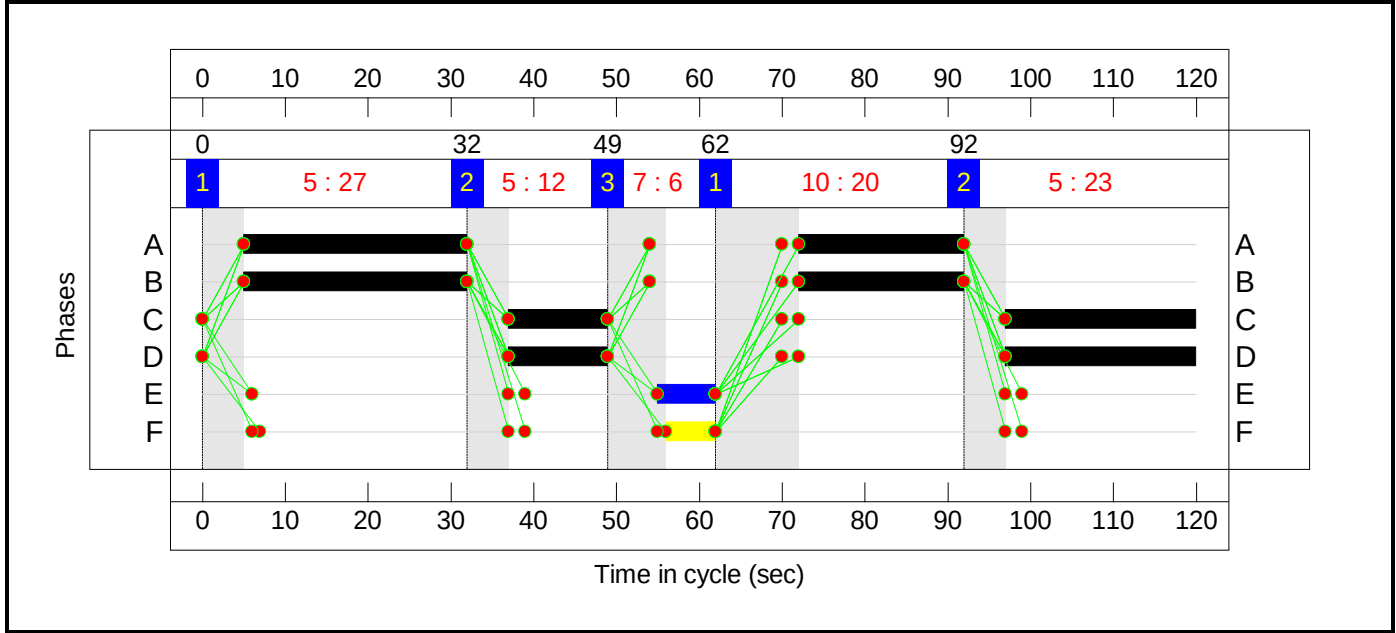
Desired Flow :

	Destination					
	A	B	C	D	Tot.	
Origin	A	0	29	387	49	465
	B	24	0	107	256	387
	C	348	76	0	82	506
	D	73	237	42	0	352
	Tot.	445	342	536	387	1710

Junction: A633/B6132								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (A633 (Rotherham Road) North)	3.25	0.00	Y	Arm 6 Left	4.00	7.0 %	1891	1891
				Arm 7 Ahead	Inf	93.0 %		
1/2 (A633 (Rotherham Road) North)	3.00	0.00	Y	Arm 8 Right	8.30	100.0 %	1622	1622
2/1 (B6132 (Carlton Road) East)	3.50	0.00	Y	Arm 5 Right	12.10	6.2 %	1851	1851
				Arm 7 Left	7.70	27.6 %		
3/1 (A633 (Rotherham Road) South)	3.50	0.00	Y	Arm 8 Ahead	Inf	66.1 %	1838	1838
				Arm 5 Ahead	Inf	68.8 %		
				Arm 6 Right	10.56	15.0 %		
				Arm 8 Left	5.10	16.2 %		
4/1 (B6132 (Carlton Road) West)	4.00	0.00	Y	Arm 5 Left	4.50	20.7 %	1861	1861
				Arm 6 Ahead	Inf	67.3 %		
				Arm 7 Right	12.87	11.9 %		
5/1 (A633 (Rotherham Road) North Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (B6132 (Carlton Road) East Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (A633 (Rotherham Road) South Lane 1)	Infinite Saturation Flow						Inf	Inf
8/1 (B6132 (Carlton Road) West Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 3: '2022 Do Nothing AM' (FG3: '2022 Do Nothing AM', Plan 1: 'Network Control Plan 1')

Signal Timings Diagram



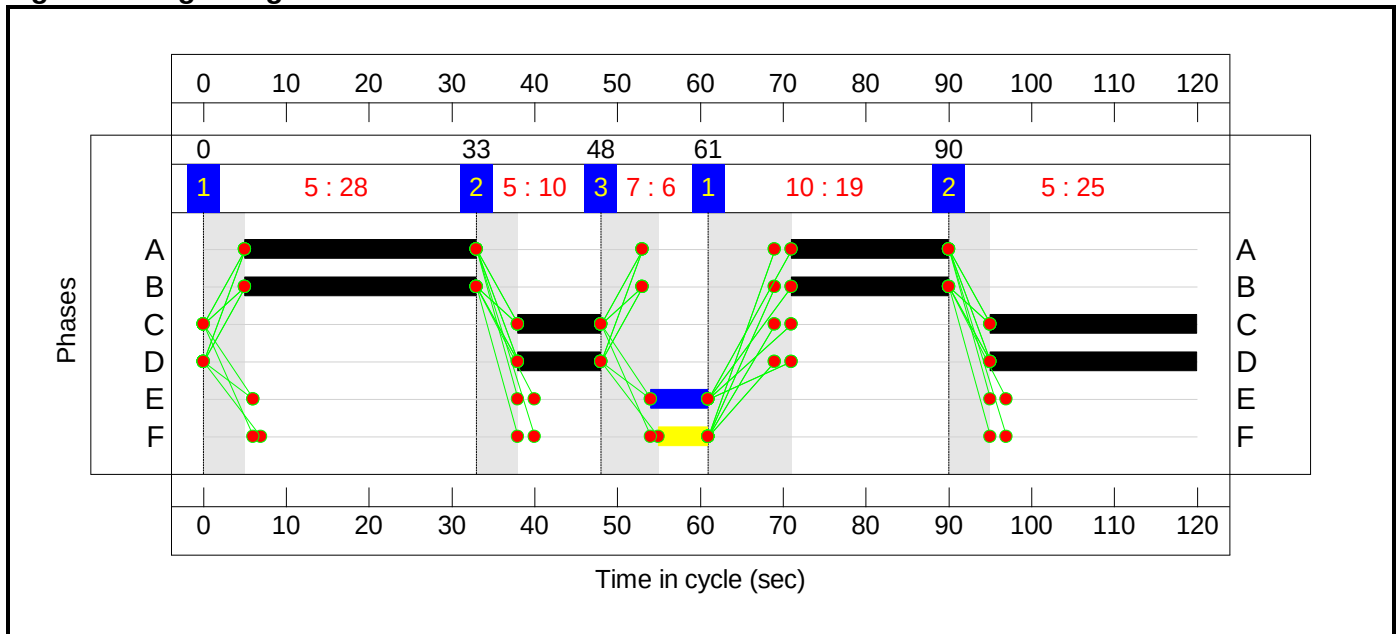
Traffic Flows, Desired

Desired Flow :

	Destination					
	A	B	C	D	Tot.	
Origin	A	0	37	321	44	402
	B	48	0	115	327	490
	C	424	139	0	69	632
	D	56	254	22	0	332
	Tot.	528	430	458	440	1856

Junction: A633/B6132								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (A633 (Rotherham Road) North)	3.25	0.00	Y	Arm 6 Left	4.00	10.3 %	1868	1868
				Arm 7 Ahead	Inf	89.7 %		
1/2 (A633 (Rotherham Road) North)	3.00	0.00	Y	Arm 8 Right	8.30	100.0 %	1622	1622
2/1 (B6132 (Carlton Road) East)	3.50	0.00	Y	Arm 5 Right	12.10	9.8 %	1858	1858
				Arm 7 Left	7.70	23.5 %		
3/1 (A633 (Rotherham Road) South)	3.50	0.00	Y	Arm 8 Ahead	Inf	66.7 %	1848	1848
				Arm 5 Ahead	Inf	67.1 %		
				Arm 6 Right	10.56	22.0 %		
				Arm 8 Left	5.10	10.9 %		
4/1 (B6132 (Carlton Road) West)	4.00	0.00	Y	Arm 5 Left	4.50	16.9 %	1894	1894
				Arm 6 Ahead	Inf	76.5 %		
				Arm 7 Right	12.87	6.6 %		
5/1 (A633 (Rotherham Road) North Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (B6132 (Carlton Road) East Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (A633 (Rotherham Road) South Lane 1)	Infinite Saturation Flow						Inf	Inf
8/1 (B6132 (Carlton Road) West Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 4: '2022 Do Nothing PM' (FG4: '2022 Do Nothing PM', Plan 1: 'Network Control Plan 1')
Signal Timings Diagram



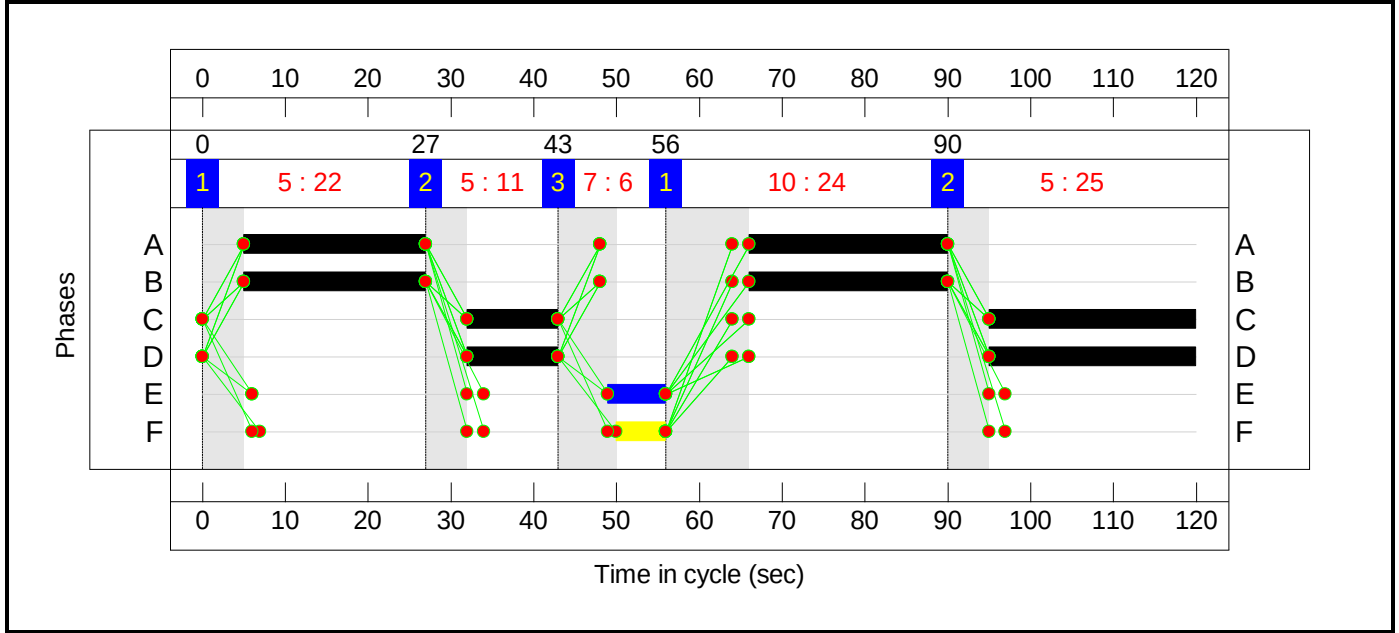
Traffic Flows, Desired
Desired Flow :

		Destination				
Origin		A	B	C	D	Tot.
	A	0	31	417	53	501
	B	26	0	116	277	419
	C	376	82	0	88	546
	D	79	256	45	0	380
	Tot.	481	369	578	418	1846

Junction: A633/B6132								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (A633 (Rotherham Road) North)	3.25	0.00	Y	Arm 6 Left	4.00	6.9 %	1891	1891
				Arm 7 Ahead	Inf	93.1 %		
1/2 (A633 (Rotherham Road) North)	3.00	0.00	Y	Arm 8 Right	8.30	100.0 %	1622	1622
2/1 (B6132 (Carlton Road) East)	3.50	0.00	Y	Arm 5 Right	12.10	6.2 %	1851	1851
				Arm 7 Left	7.70	27.7 %		
3/1 (A633 (Rotherham Road) South)	3.50	0.00	Y	Arm 8 Ahead	Inf	66.1 %	1839	1839
				Arm 5 Ahead	Inf	68.9 %		
				Arm 6 Right	10.56	15.0 %		
				Arm 8 Left	5.10	16.1 %		
4/1 (B6132 (Carlton Road) West)	4.00	0.00	Y	Arm 5 Left	4.50	20.8 %	1860	1860
				Arm 6 Ahead	Inf	67.4 %		
				Arm 7 Right	12.87	11.8 %		
5/1 (A633 (Rotherham Road) North Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (B6132 (Carlton Road) East Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (A633 (Rotherham Road) South Lane 1)	Infinite Saturation Flow						Inf	Inf
8/1 (B6132 (Carlton Road) West Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 5: '2022 With Development AM' (FG5: '2022 With Development AM', Plan 1: 'Network Control Plan 1')

Signal Timings Diagram



Traffic Flows, Desired

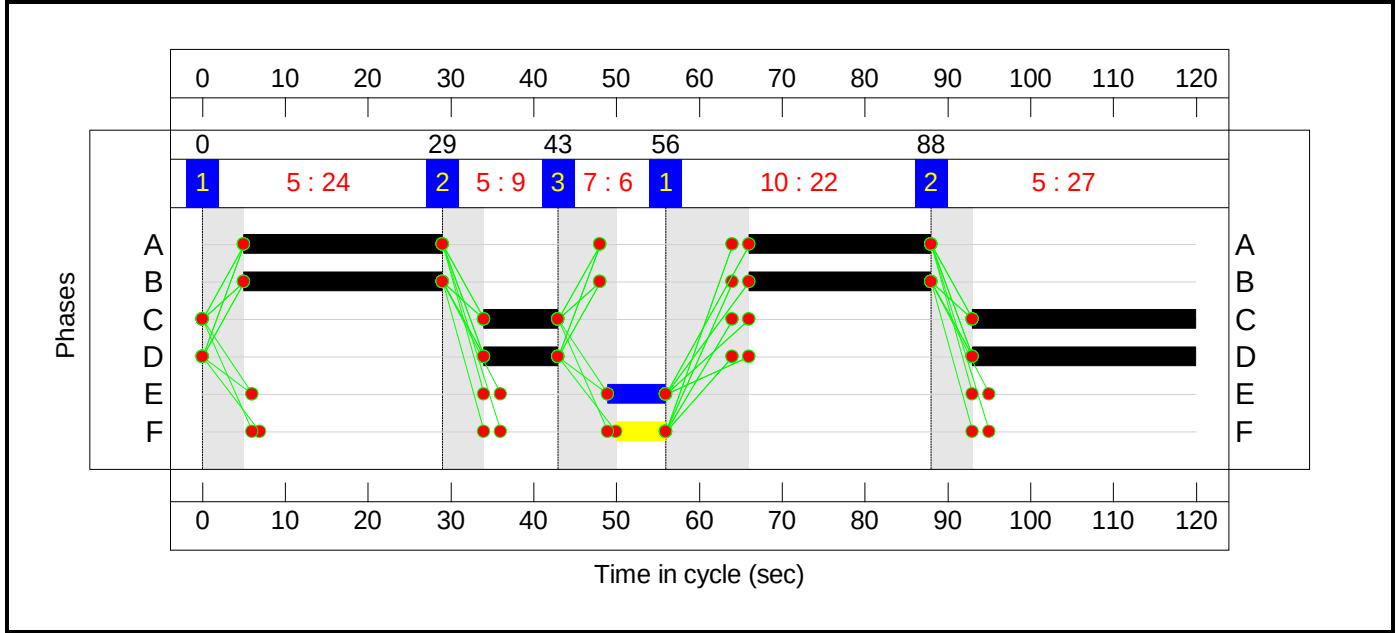
Desired Flow :

	Destination					
	A	B	C	D	Tot.	
Origin	A	0	40	321	44	405
	B	56	0	123	339	518
	C	424	142	0	69	635
	D	56	259	22	0	337
	Tot.	536	441	466	452	1895

Junction: A633/B6132								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (A633 (Rotherham Road) North)	3.25	0.00	Y	Arm 6 Left	4.00	11.1 %	1863	1863
				Arm 7 Ahead	Inf	88.9 %		
1/2 (A633 (Rotherham Road) North)	3.00	0.00	Y	Arm 8 Right	8.30	100.0 %	1622	1622
2/1 (B6132 (Carlton Road) East)	3.50	0.00	Y	Arm 5 Right	12.10	10.8 %	1854	1854
				Arm 7 Left	7.70	23.7 %		
3/1 (A633 (Rotherham Road) South)	3.50	0.00	Y	Arm 8 Ahead	Inf	65.4 %	1847	1847
				Arm 5 Ahead	Inf	66.8 %		
				Arm 6 Right	10.56	22.4 %		
				Arm 8 Left	5.10	10.9 %		
4/1 (B6132 (Carlton Road) West)	4.00	0.00	Y	Arm 5 Left	4.50	16.6 %	1896	1896
				Arm 6 Ahead	Inf	76.9 %		
				Arm 7 Right	12.87	6.5 %		
5/1 (A633 (Rotherham Road) North Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (B6132 (Carlton Road) East Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (A633 (Rotherham Road) South Lane 1)	Infinite Saturation Flow						Inf	Inf
8/1 (B6132 (Carlton Road) West Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 6: '2022 With Development PM' (FG6: '2022 With Development PM', Plan 1: 'Network Control Plan 1')

Signal Timings Diagram



Traffic Flows, Desired

Desired Flow :

	Destination					
	A	B	C	D	Tot.	
Origin	A	0	38	417	53	508
	B	29	0	120	282	431
	C	376	90	0	88	554
	D	79	267	45	0	391
	Tot.	484	395	582	423	1884

Junction: A633/B6132								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (A633 (Rotherham Road) North)	3.25	0.00	Y	Arm 6 Left	4.00	8.4 %	1881	1881
				Arm 7 Ahead	Inf	91.6 %		
1/2 (A633 (Rotherham Road) North)	3.00	0.00	Y	Arm 8 Right	8.30	100.0 %	1622	1622
2/1 (B6132 (Carlton Road) East)	3.50	0.00	Y	Arm 5 Right	12.10	6.7 %	1849	1849
				Arm 7 Left	7.70	27.8 %		
3/1 (A633 (Rotherham Road) South)	3.50	0.00	Y	Arm 8 Ahead	Inf	65.4 %	1837	1837
				Arm 5 Ahead	Inf	67.9 %		
				Arm 6 Right	10.56	16.2 %		
				Arm 8 Left	5.10	15.9 %		
4/1 (B6132 (Carlton Road) West)	4.00	0.00	Y	Arm 5 Left	4.50	20.2 %	1864	1864
				Arm 6 Ahead	Inf	68.3 %		
				Arm 7 Right	12.87	11.5 %		
5/1 (A633 (Rotherham Road) North Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (B6132 (Carlton Road) East Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (A633 (Rotherham Road) South Lane 1)	Infinite Saturation Flow						Inf	Inf
8/1 (B6132 (Carlton Road) West Lane 1)	Infinite Saturation Flow						Inf	Inf

Network Results

Scenario 1: '2017 Base AM' (FG1: '2017 Base AM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Start Green (s)	End Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)
Network: Proposed Residential Development, Land South of St Helen's Boulevard	-	-	N/A	-	-		-	-	-	-	-	-	-	-	79.0%	-	-	217
A633/B6132	-	-	N/A	-	-		-	-	-	-	-	-	-	-	79.0%	-	-	217
1/1+1/2	A633 (Rotherham Road) North Left Ahead Right	U+O	N/A	N/A	A		2	46	5(72)	33(90)	-	371	1868:1622	738+89	44.9 : 44.9%	371	371	32
2/1	B6132 (Carlton Road) East Right Left Ahead	O	N/A	N/A	C		2	36	38(95)	49(0)	-	454	1858	588	77.2%	454	454	45
3/1	A633 (Rotherham Road) South Ahead Right Left	O	N/A	N/A	B		2	46	5(72)	33(90)	-	584	1848	739	79.0%	584	584	128
4/1	B6132 (Carlton Road) West Left Ahead Right	O	N/A	N/A	D		2	36	38(95)	49(0)	-	307	1894	600	51.2%	307	307	12

Item	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Uniform Stops (stops)	Av. Uniform Stops Per PCU (stops/pcu)	Back of Uniform Q At End of Red(pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)	De-silver Threshold (pcu)	Average Excess Queue (pcu)	Weighted Deg Sat (%)	Weighted Total Delay (pcuHr)	Ignoring Random Delay ?
Network: Proposed Residential Development, Land South of St Helen's Boulevard	0	16	7.7	4.4	0.3	12.4	-	1589.6	-	-	-	-	-	-	-	79.0%	12.4	-
A633/B6132	0	16	7.7	4.4	0.3	12.4	-	1589.6	-	-	-	-	-	-	-	79.0%	12.4	-
1/1+1/2	0	8	1.3	0.4	0.1	1.9	18.3	300.3	0.8	3.3	4.2	0.4	4.6	-	0.00	44.9 : 44.9%	1.9	-
2/1	0	0	2.4	1.6	0.0	4.0	32.1	432.4	1.0	5.4	7.4	1.6	9.1	-	0.00	77.2%	4.0	-
3/1	0	0	2.6	1.8	0.1	4.5	27.7	590.5	1.0	5.8	8.9	1.8	10.8	-	0.00	79.0%	4.5	-
4/1	0	8	1.4	0.5	0.0	2.0	23.6	266.3	0.9	3.7	4.5	0.5	5.0	-	0.00	51.2%	2.0	-
C1 PRC for Signalled Lanes (%): 13.9 Total Delay for Signalled Lanes (pcuHr): 12.44 Cycle Time (s): 120 PRC Over All Lanes (%): 13.9 Total Delay Over All Lanes(pcuHr): 12.44																		

Scenario 2: '2017 Base PM' (FG2: '2017 Base PM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Start Green (s)	End Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)
Network: Proposed Residential Development, Land South of St Helen's Boulevard	-	-	N/A	-	-		-	-	-	-	-	-	-	-	67.8%	-	-	167
A633/B6132	-	-	N/A	-	-		-	-	-	-	-	-	-	-	67.8%	-	-	167
1/1+1/2	A633 (Rotherham Road) North Left Ahead Right	U+O	N/A	N/A	A		2	47	5(75)	37(90)	-	465	1891:1622	751+88	55.4 : 55.4%	465	465	43
2/1	B6132 (Carlton Road) East Right Left Ahead	O	N/A	N/A	C		2	35	42(95)	52(0)	-	387	1851	571	67.8%	387	387	24
3/1	A633 (Rotherham Road) South Ahead Right Left	O	N/A	N/A	B		2	47	5(75)	37(90)	-	506	1838	751	67.4%	506	506	76
4/1	B6132 (Carlton Road) West Left Ahead Right	O	N/A	N/A	D		2	35	42(95)	52(0)	-	352	1861	574	61.3%	352	352	24

Scenario 3: '2022 Do Nothing AM' (FG3: '2022 Do Nothing AM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Start Green (s)	End Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)
Network: Proposed Residential Development, Land South of St Helen's Boulevard	-	-	N/A	-	-		-	-	-	-	-	-	-	-	85.5%	-	-	226
A633/B6132	-	-	N/A	-	-		-	-	-	-	-	-	-	-	85.5%	-	-	226
1/1+1/2	A633 (Rotherham Road) North Left Ahead Right	U+O	N/A	N/A	A		2	47	5(72)	32(92)	-	402	1868:1622	755+93	47.4 : 47.4%	402	402	26
2/1	B6132 (Carlton Road) East Right Left Ahead	O	N/A	N/A	C		2	35	37(97)	49(0)	-	490	1858	573	85.5%	490	490	48
3/1	A633 (Rotherham Road) South Ahead Right Left	O	N/A	N/A	B		2	47	5(72)	32(92)	-	632	1848	750	84.2%	632	632	139
4/1	B6132 (Carlton Road) West Left Ahead Right	O	N/A	N/A	D		2	35	37(97)	49(0)	-	332	1894	584	56.9%	332	332	13

Item	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Uniform Stops (stops)	Av. Uniform Stops Per PCU (stops/pcu)	Back of Uniform Q At End of Red(pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)	De-silver Threshold (pcu)	Average Excess Queue (pcu)	Weighted Deg Sat (%)	Weighted Total Delay (pcuHr)	Ignoring Random Delay ?
Network: Proposed Residential Development, Land South of St Helen's Boulevard	0	27	8.6	6.4	0.4	15.4	-	1759.6	-	-	-	-	-	-	-	85.5%	15.4	-
A633/B6132	0	27	8.6	6.4	0.4	15.4	-	1759.6	-	-	-	-	-	-	-	85.5%	15.4	-
1/1+1/2	0	18	1.4	0.4	0.2	2.1	18.5	326.7	0.8	3.7	4.8	0.4	5.2	-	0.00	47.4 : 47.4%	2.1	-
2/1	0	0	2.7	2.8	0.0	5.5	40.5	483.6	1.0	6.1	8.6	2.8	11.3	-	0.00	85.5%	5.5	-
3/1	0	0	2.8	2.6	0.1	5.5	31.4	654.6	1.0	6.5	10.4	2.6	12.9	-	0.00	84.2%	5.5	-
4/1	0	9	1.6	0.7	0.1	2.4	25.5	294.8	0.9	4.2	5.2	0.7	5.8	-	0.00	56.9%	2.4	-
		C1	PRC for Signalled Lanes (%):				5.2	Total Delay for Signalled Lanes (pcuHr):				15.44	Cycle Time (s): 120					
			PRC Over All Lanes (%):				5.2	Total Delay Over All Lanes(pcuHr):				15.44						

Scenario 4: '2022 Do Nothing PM' (FG4: '2022 Do Nothing PM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Start Green (s)	End Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)
Network: Proposed Residential Development, Land South of St Helen's Boulevard	-	-	N/A	-	-		-	-	-	-	-	-	-	-	73.4%	-	-	188
A633/B6132	-	-	N/A	-	-		-	-	-	-	-	-	-	-	73.4%	-	-	188
1/1+1/2	A633 (Rotherham Road) North Left Ahead Right	U+O	N/A	N/A	A		2	47	5(71)	33(90)	-	501	1891:1622	758+90	59.1 : 59.1%	501	501	53
2/1	B6132 (Carlton Road) East Right Left Ahead	O	N/A	N/A	C		2	35	38(95)	48(0)	-	419	1851	571	73.4%	419	419	26
3/1	A633 (Rotherham Road) South Ahead Right Left	O	N/A	N/A	B		2	47	5(71)	33(90)	-	546	1839	751	72.7%	546	546	82
4/1	B6132 (Carlton Road) West Left Ahead Right	O	N/A	N/A	D		2	35	38(95)	48(0)	-	380	1860	574	66.3%	380	380	27

Item	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Uniform Stops (stops)	Av. Uniform Stops Per PCU (stops/pcu)	Back of Uniform Q At End of Red(pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)	De-silver Threshold (pcu)	Average Excess Queue (pcu)	Weighted Deg Sat (%)	Weighted Total Delay (pcuHr)	Ignoring Random Delay ?
Network: Proposed Residential Development, Land South of St Helen's Boulevard	0	18	8.3	4.4	0.4	13.0	-	1706.8	-	-	-	-	-	-	-	73.4%	13.0	-
A633/B6132	0	18	8.3	4.4	0.4	13.0	-	1706.8	-	-	-	-	-	-	-	73.4%	13.0	-
1/1+1/2	0	0	1.9	0.7	0.2	2.8	19.9	422.5	0.8	4.4	6.0	0.7	6.7	-	0.00	59.1 : 59.1%	2.8	-
2/1	0	0	2.2	1.4	0.0	3.6	30.7	392.1	0.9	5.1	6.9	1.4	8.2	-	0.00	73.4%	3.6	-
3/1	0	0	2.3	1.3	0.1	3.7	24.4	524.7	1.0	5.3	7.9	1.3	9.2	-	0.00	72.7%	3.7	-
4/1	0	18	1.9	1.0	0.1	3.0	28.3	367.4	1.0	4.6	6.0	1.0	7.0	-	0.00	66.3%	3.0	-
C1 PRC for Signalled Lanes (%): 22.6 Total Delay for Signalled Lanes (pcuHr): 13.04 Cycle Time (s): 120 PRC Over All Lanes (%): 22.6 Total Delay Over All Lanes(pcuHr): 13.04																		

Scenario 5: '2022 With Development AM' (FG5: '2022 With Development AM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Start Green (s)	End Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)
Network: Proposed Residential Development, Land South of St Helen's Boulevard	-	-	N/A	-	-		-	-	-	-	-	-	-	-	88.2%	-	-	256
A633/B6132	-	-	N/A	-	-		-	-	-	-	-	-	-	-	88.2%	-	-	256
1/1+1/2	A633 (Rotherham Road) North Left Ahead Right	U+O	N/A	N/A	A		2	46	5(66)	27(90)	-	405	1863:1622	744+91	48.5 : 48.5%	405	405	44
2/1	B6132 (Carlton Road) East Right Left Ahead	O	N/A	N/A	C		2	36	32(95)	43(0)	-	518	1854	587	88.2%	518	518	56
3/1	A633 (Rotherham Road) South Ahead Right Left	O	N/A	N/A	B		2	46	5(66)	27(90)	-	635	1847	734	86.6%	635	635	142
4/1	B6132 (Carlton Road) West Left Ahead Right	O	N/A	N/A	D		2	36	32(95)	43(0)	-	337	1896	600	56.1%	337	337	14

Item	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Uniform Stops (stops)	Av. Uniform Stops Per PCU (stops/pcu)	Back of Uniform Q At End of Red(pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)	De-silver Threshold (pcu)	Average Excess Queue (pcu)	Weighted Deg Sat (%)	Weighted Total Delay (pcuHr)	Ignoring Random Delay ?
Network: Proposed Residential Development, Land South of St Helen's Boulevard	0	8	9.1	7.6	0.4	17.0	-	1831.2	-	-	-	-	-	-	-	88.2%	17.0	-
A633/B6132	0	8	9.1	7.6	0.4	17.0	-	1831.2	-	-	-	-	-	-	-	88.2%	17.0	-
1/1+1/2	0	0	1.5	0.5	0.2	2.1	19.0	336.7	0.8	3.6	4.7	0.5	5.2	-	0.00	48.5 : 48.5%	2.1	-
2/1	0	0	3.0	3.4	0.0	6.4	44.7	522.9	1.0	7.1	10.1	3.4	13.5	-	0.00	88.2%	6.4	-
3/1	0	0	2.9	3.0	0.1	6.1	34.4	672.6	1.1	6.4	10.2	3.0	13.3	-	0.00	86.6%	6.1	-
4/1	0	8	1.7	0.6	0.1	2.4	25.6	299.1	0.9	4.6	5.8	0.6	6.4	-	0.00	56.1%	2.4	-
C1 PRC for Signalled Lanes (%): 2.0 Total Delay for Signalled Lanes (pcuHr): 17.04 Cycle Time (s): 120 PRC Over All Lanes (%): 2.0 Total Delay Over All Lanes(pcuHr): 17.04																		

Scenario 6: '2022 With Development PM' (FG6: '2022 With Development PM', Plan 1: 'Network Control Plan 1')

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Start Green (s)	End Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)
Network: Proposed Residential Development, Land South of St Helen's Boulevard	-	-	N/A	-	-		-	-	-	-	-	-	-	-	75.4%	-	-	199
A633/B6132	-	-	N/A	-	-		-	-	-	-	-	-	-	-	75.4%	-	-	199
1/1+1/2	A633 (Rotherham Road) North Left Ahead Right	U+O	N/A	N/A	A		2	46	5(66)	29(88)	-	508	1881:1622	748+87	60.9 : 60.9%	508	508	53
2/1	B6132 (Carlton Road) East Right Left Ahead	O	N/A	N/A	C		2	36	34(93)	43(0)	-	431	1849	586	73.6%	431	431	27
3/1	A633 (Rotherham Road) South Ahead Right Left	O	N/A	N/A	B		2	46	5(66)	29(88)	-	554	1837	735	75.4%	554	554	90
4/1	B6132 (Carlton Road) West Left Ahead Right	O	N/A	N/A	D		2	36	34(93)	43(0)	-	391	1864	590	66.2%	391	391	29

Item	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Uniform Stops (stops)	Av. Uniform Stops Per PCU (stops/pcu)	Back of Uniform Q At End of Red(pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)	De-silver Threshold (pcu)	Average Excess Queue (pcu)	Weighted Deg Sat (%)	Weighted Total Delay (pcuHr)	Ignoring Random Delay ?
Network: Proposed Residential Development, Land South of St Helen's Boulevard	0	18	8.6	4.6	0.5	13.7	-	1768.2	-	-	-	-	-	-	-	75.4%	13.7	-
A633/B6132	0	18	8.6	4.6	0.5	13.7	-	1768.2	-	-	-	-	-	-	-	75.4%	13.7	-
1/1+1/2	0	0	2.0	0.8	0.2	2.9	20.7	436.8	0.9	4.3	5.9	0.8	6.7	-	0.00	60.9 : 60.9%	2.9	-
2/1	0	2	2.3	1.4	0.0	3.7	30.8	405.6	0.9	5.6	7.6	1.4	8.9	-	0.00	73.6%	3.7	-
3/1	0	0	2.4	1.5	0.1	4.0	26.2	548.9	1.0	5.2	7.8	1.5	9.4	-	0.00	75.4%	4.0	-
4/1	0	16	2.0	1.0	0.1	3.1	28.2	376.9	1.0	5.1	6.7	1.0	7.7	-	0.00	66.2%	3.1	-
C1 PRC for Signalled Lanes (%): 19.4 Total Delay for Signalled Lanes (pcuHr): 13.70 Cycle Time (s): 120 PRC Over All Lanes (%): 19.4 Total Delay Over All Lanes(pcuHr): 13.70																		