Lake District National Park Authority

Bowness Bay - A Location for Strategic Regeneration

Traffic Assessment


AMEC Environment & Infrastructure UK Limited

August 2012

Copyright and Non-Disclosure Notice

Third-Party Disclaimer

Lake District National Park Authority

Bowness Bay - A Location for Strategic Regeneration

Bowness Bay Traffic Assessment

AMEC Environment & Infrastructure UK Limited

August 2012

Report for

Chris Warren
Team Leader - Spatial Planning and Communities
Lake District National Park Authority
Murley Moss
Oxenholme Road
Kendal
LA9 7RL

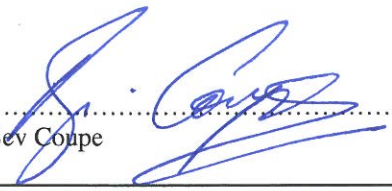
Main Contributors

Bev Coupe
James McGavin
Adrian Simms

Issued by

James McGavin

Approved by



Bev Coupe

AMEC Environment & Infrastructure UK Limited

Gables House, Kenilworth Road, Leamington Spa,
Warwickshire CV32 6JX, United Kingdom
Tel +44 (0) 1926 439 000
Fax +44 (0) 1926 439 010

32588rr0207

h:\projects\32588 bowness bay traffic assessments (sub file)\1 client\reports\final\32588 transport assessment v3.doc

Certificate No. FS 13881

Certificate No. EMS 69090

Contents

1. Introduction

1.1 Background

The Lake District National Park Authority (LDNPA) has appointed AMEC E&I UK to assess a potential closure of Glebe Road and the implications this would have on local parking demand and the immediate local highway network.

1.1.1 Context

The LDNPA has identified Bowness Bay and The Glebe as a strategic regeneration location and is seeking to allocate the land through their Allocations of Land Development Plan document (DPD). The purpose of the allocation is to develop Bowness Bay and The Glebe as a world class visitor destination, and to enable the LDNPA to deliver public benefits through private sector contributions or other opportunities from commercial development. The overall boundary includes sites for a hotel, an improved car park at Braithwaite Fold, a visitor attraction, a retail and visitor centre, and public realm enhancements.

Evidence highlights that the area has deteriorated, in particular the public realm, despite it being a popular destination for visitors. The focus of LDNPA is to maintain visitor numbers to Bowness Bay and The Glebe and ensure its continued economic contribution to the local area.

Bowness Bay and The Glebe is the busiest destination in the National Park and is part of the Windermere Waterfront Programme (a coordinated series of visitor attractions around Windermere Lake). A critical feature of the programme is to reduce vehicle movements by encouraging people to travel between attractions and their accommodation by boat, bus, walking or bicycle. The aspiration is for Bowness Bay and The Glebe to be a major gateway for the Windermere Waterfront Programme.

Moving and parked cars are a dominant feature of the area, particularly between the Tourist Information Centre and the site of the proposed hotel. The majority of visitors arrive by car, travelling either from Windermere through Bowness, or from the Crook Road. The majority of visitors then enter Glebe Road by the Tourist Information Centre and search for a free on-road car parking space. Cars often travel around Glebe Road several times, passing Braithwaite Fold, as their drivers search for an empty space.

1.1.2 Purpose of the study

A key part of improving the visitor experience is to make the area more user-friendly for pedestrians and cyclists, and to improve Bowness Bay and The Glebe as a visitor destination by reducing the numbers of moving and parked cars along Glebe Road.

With reference to the above, the key tasks outlined by the LDNPA are summarised as follows:

- Junction capacity assessments of the A592/Glebe Road entry junction and the A592/Glebe Road exit junction to establish current junction capacity.
- Identification of any queuing along the A592, between the traffic lights next to the Bowness Bay piers and A592/Glebe Road exit junction.
- Current parking demand at the Glebe Road car park, the Braithwaite Fold car park and the on-street parking along Glebe Road.
- Potential for Braithwaite Fold car park to absorb displaced parking should Glebe Road be closed.
- Implications of displaced traffic on highway capacity, specifically the A592/Glebe Road exit junction.
- Identification of any potential improvements required as a direct result of the displaced traffic.
- Options and recommendation on the most appropriate section of Glebe Road to close. This decision will have regard to the need to provide an enjoyable experience for pedestrians, public realm improvements, the need to improve the visitor experience by making the lake more accessible from The Green Glebe (by removing parked cars), and the need for delivery and service vehicles to access businesses along Glebe Road.

1.1.3 Project Approach

The project approach has been informed by the Client brief, (included as Appendix A), discussion with the local highway authority officer, an inception meeting held on 24 May 2012 (minutes of meeting included in Appendix B) and a site visit, undertaken on the same day.

Traffic turning counts at the two Glebe Road junctions and parking surveys were undertaken by a survey consultancy on 02 June 2012 and 03 June 2012 between 09:00 and 18:00. In addition, automatic traffic counts (ATCs) were undertaken from 30 May 2012 to 06 June 2012.

Analysis of the survey results have led to the identification of options and recommendations for the Glebe Road closure and highway improvements on the A592.

1.2 Report Structure

The structure of this report is set out below:

- Local Context - this chapter provides information on the local area, the local highway network, local sustainable travel links and reports on local highway safety;
- Data Collection - this chapter sets out the data collected as part of the study, the location and methodology of each data set collected and the significance of the data;
- Glebe Road Closure Options – this chapter sets out the available closure options and provides both relative advantages and disadvantages;
- Capacity Assessment - this chapter of the report provides an overview of local highway capacity within the vicinity of the area of interest for both the existing local highway configuration and the future Glebe Road closure options;
- Development Potential – this section considers the size of hotel development that could be accommodated for each of the road closure options; and

- Summary and Conclusions.

2. Local Context

2.1 Site Location and Surrounding Area

Bowness Bay and The Glebe are located to the south-west of Bowness-on-Windermere town centre and form part of the town's main tourist attraction. Bowness Bay, which is situated to the north of The Glebe accommodates a series of local shops, restaurants, a marina and ferry port which offers cruises between Bowness Bay and a number of destinations located to the north and south of the town. A general site location plan is provided within Figure 2.1.

The Glebe is a large recreational area, bound by Glebe Road, and comprises tennis courts, a pitch and put, a picnic area and managed parkland. To the south-east of The Glebe, a cemetery, an associated chapel and a number of private dwellings are present, opposite which is Braithwaite Fold car park and a small caravan site.

2.2 Local Highway Network

The local highway network comprises Glebe Road, the A592 and Rectory Road. Glebe Road is a local unclassified highway which routes around the periphery of The Glebe and is subject to a 30mph speed limit. The highway is linked to the A592 at two locations and forms a semi-circular arrangement which is subject to a one-way restriction. The one-way section is enforced upon entry to Glebe Road to the north-east of The Glebe up until its junction with the caravan site entry point located opposite the cemetery. From this point Glebe Road accommodates two-way traffic flow providing access to the caravan site, Braithwaite Fold car park and a small number of dwellings which have frontage access to Glebe Road.

Glebe Road has a varying carriageway width which was recorded during the site visit as being a maximum of 7.45m to a minimum of 4.9m along the southern section of the highway. To the north of The Glebe, Glebe Road provides footways to either side of the carriageway which typically measure 2.4m wide. This provision is present between the Glebe Road entry junction and the Marina's main reception building, at which point the footway along the western side of the carriageway terminates whilst the eastern footway continues along Glebe Road and ties in with the footway provision along the A592. Along the northern and westerns sides of Glebe Road, the highway is lit with lighting columns positioned at staggered intervals along both sides of the carriageway. Along the southern side of the carriageway this provision is reduced, with columns positioned along one side of the carriageway only.

On-street parking is provided along the majority of Glebe Road and is restricted to one side of the carriageway. The provision is intermittent and delineated by dashed white lining. Sections where parking is not permitted are marked with double yellow lines and/or 'keep clear' markings. All on-street parking is free of charge and has a 'no return in two hour' time restriction between 9:00 and 19:00. The parking restriction is seasonal and is enforceable between Good Friday and the 31 October.

Glebe Road provides access to two car parks known as the Glebe Road car park and Braithwaite Fold car park, both of which are managed by South Lakeland District Council (SLDC). Both car parks operate a 'pay and display' system and are categorised by the District Council as 'long stay' provision.

Glebe Road also provides service access to the businesses located to the west and north of the highway. These include six dropped kerb access points, three of which have bollards, one has a gate and the remaining two directly serve the business frontage, and a fully constructed bell mouth access which serves the Marina reception.

The A592 is a principal strategic highway route which provides a link between Penrith to the north-east and Newby Bridge to the south of Bowness. The highway has a varying carriageway width of between 6.2m and 7.0m and within the vicinity of Bowness Bay and The Glebe has a speed limit of 30mph.

From the northern Glebe Road entry junction and the southern Glebe Road exit junction, a footway is provided along the entirety of the western side and partially along the eastern of the carriageway. The eastern footway terminates upon meeting Back Belsfield Road, which serves both a number of dwellings and hotel. The western footway continues past the Glebe Road exit junction and terminates upon meeting the Windermere Marina Village access located approximately 550m south of Glebe Road. Both footways vary in width between a minimum of 1.8m and a maximum of 2.4m. The A592 is lit with lighting columns positioned at staggered intervals along either side of the carriageway.

Rectory Road is a local highway which is largely pedestrianised and restricts motorised vehicles to 'access only'. The highway routes between The Glebe and the cemetery and provides a traffic free link between Glebe Road and the A592. Upon approach to the A592, Rectory Road forms the main access into the Windermere Lake Cruises coach park, which provides parking for approximately 28 coaches. The coach park is also accompanied by a single building which provides a group ticket purchase desk and a café.

2.3 Sustainable Travel Links

2.3.1 Walking

The Glebe and Bowness Bay are highly accessible via the local footway network with footways provided throughout the town and the surrounding area. Footways are present along at least one side of Glebe Road and the A592 and Rectory Road provides a largely traffic free access, linking the southern side of The Glebe with the northern side. Both Glebe Road and the A592 are well lit and Rectory Road provides partial street lighting at varying points along its length.

Public Rights of Way (PRoW) are available opposite Rectory Road providing a link to a shore line path that routes north along lakeside and ties back into Glebe Road via Cockshott Wood.

Pedestrian crossing facilities are available on the A592, adjacent to the north Glebe Road access only junction. The crossings take the form of pedestrian refuge island to the south of the Glebe Road junction and a signal controlled crossing to the north. The southern crossing point provides a link between the tourist information centre and a nearby southbound bus stop and has dropped kerbs but no tactile paving.

2.3.2 Cycling

Within the vicinity of Bowness Bay, opportunities for cyclists are limited. The closest recreational cycle routes to The Glebe are located on the western side of Lake Windermere and can be accessed via a local ferry service which operates between 'Ferry Nab Bowness' and 'Far Sawrey'. The ferry service offers passage for vehicles, pedestrians and cyclists. Further details concerning the available service are provided within paragraph 2.3.5.

From 'Far Sawrey', two recreational cycle routes are available, both of which commence from Harrow Slack car park, one of which is designed for experienced cyclists and the other families.

2.3.3 Travel by Bus

A bus terminus is located adjacent to the ferry terminal, just north of the A592/Glebe Road access only junction. The terminus provides a segregated turning circle, pole and timetable. A southbound bus stop is located opposite the tourist information centre and provides a pole, timetable and seating.

The following table provides a summary of the available services for one direction of travel only. For each service there is a corresponding departure for the reverse route.

Table 2.1 Summary of Local Bus Services

No.	Route Summary	Approximate Frequency			Hours of Operation
		Mon to Fri	Saturday	Sunday	
55	Keswick - Grasmere - Ambleside - Windermere - Bowness Pier	4 Services: 09:41, 11:32, 13:52, 16:49	4 Services: 09:41, 11:32, 13:52, 16:49	4 Services: 09:41, 11:32, 13:52, 16:49	09:41-16:51
508	Penrith - Glenridding – Patterdale - Windermere - Bowness	4 Services: 11:02, 13:02, 15:02, 18:02	4 Services: 11:20, 13:22, 16:20, 18:22	4 Services: 11:20, 13:22, 16:20, 18:22	09:10-18:22
599	Windermere Station - Bowness Pier	Every 20 minutes	Approximately every 20 minutes	Approximately every 20 minutes	07:25-9:00 (Mon-Fri) 07:31-19:30 (Sat) 09:20-19:00 (Sun)
618	Ambleside - Windermere - Bowness - Ulverston - Barrow	5 Services: 06:43, 08:20, 11:18, 14:20, 17:10	5 Services: 06:43, 08:20, 11:18, 14:20, 17:10	No Service	06:43-17:56

2.3.4 Travel by Train

Windermere train station is located approximately 2.6km north-east of the station and can be readily accessed via the available bus services and local footway links.

The following table provides a summary of the available service.

Table 2.2 Summary of Local Train Services

Route Summary	Approximate Frequency			Hours of Operation
	Mon to Fri	Saturday	Sunday	
Manchester - Bolton - Chorley - Preston - Lancaster - Oxenholme - Kendal - Burneside - Staveley - Windermere	Approximately every 45 minutes	Between 45 minutes and 60 minutes	Approximately every 60 minutes	06:41-22:39 (Mon – Fri) 06:41-21:34 (Sat) 10:58-20:35 (Sun)

2.3.5 Travel by Ferry

Bowness Bay and The Glebe are situated in close proximity to two ferry terminals, the nearest being the Windermere Cruises service which operates from the Bowness Bay piers. The services offered are typically aimed at tourists seeking to access either Brockhole or Ambleside to the north or Lakeside to the south. The service runs all year round with a reduced service during the winter months.

Further ferry services are available from 'Ferry Nab Bowness' to 'Far Sawrey', which is located on the western side of the lake. The 'Ferry Nab Bowness' pier is located approximately 840m walk from the Braithwaite Fold car park and be accessed via the available PRoW situated to the west. The ferry link offers both pedestrians and cyclists the chance to travel to the western side of the Lake Windermere without taking a car and Table 2.3 provides a summary of the available service:

Table 2.3 Summary of Local Ferry Services

Winter/ Summer	Route Summary	Approximate Frequency			Hours of Operation
		Mon to Fri	Saturday	Sunday	
Winter	Ferry Nab Bowness - Ferry House Far Sawry	Approximately every 20 minutes	Approximately every 20 minutes	Approximately every 20 minutes	06:50-20:50 (Mon - Sat) 09:50-20:50 (Sun)
Summer	Ferry Nab Bowness - Ferry House Far Sawry	Approximately every 20 minutes	Approximately every 20 minutes	Approximately every 20 minutes	06:50-21:50 (Mon - Sat) 09:10-21:50 (Sun)

2.4 Personal Injury Accident Data (PIA)

PIA Data has been obtained from Cumbria County Council for the latest five year period. The study area includes Glebe Road and a section of the A592 which spans both Glebe Road junctions as well as a 100m section to the north and a 230m section to the south of the respective junctions.

Within the latest five year period, a total of eight PIAs have been recorded, two of which have been classified as serious and the remaining six have been classified as slight in severity. Five of the accidents involved vulnerable road users which includes four pedestrians and a motorcyclist.

The first pedestrian accident was classified as slight in severity and occurred on Glebe Road on the 31 March 2009. The accident occurred when a pedestrian, under the influence of alcohol, stepped out to stop a passing taxi resulting in a collision. The only contributory factor was "*impaired by alcohol (pedestrian)*".

The second pedestrian accident was classified as slight in severity and occurred on Glebe Road on the 20 June 2010. The accident occurred when a parked vehicle set off from the kerb not realising that a pedestrian was sat on the boot lid. The pedestrian subsequently fell from the vehicle leading to injury. Only possible contributory factors were identified and these were "*careless/reckless (driver/rider behaviour)*" and "*dangerous action in the carriageway (pedestrian)*".

The third pedestrian accident was classified as slight in severity and occurred on The Glebe on the 05 December 2010. The accident, which involved a sledge, occurred when a child sledging within the parkland area, left the park and hit an unattended parked vehicle causing damage to the vehicle and slight injury to the child. No contributory factors were provided.

The final pedestrian accident was classified as serious in severity and occurred on the A592 (approximately 100m south of the northerly Glebe Road/A592 junction). The accident was recorded on the 12 August 2011 and occurred when a vehicle travelling northbound, mounted the footway and collided with a pedestrian. The vehicle subsequently rejoined the carriageway and did not stop. Three 'very likely' contributory factors were identified and these were: "*fatigue (driver/rider impairment)*", "*loss of control (driver/rider error)*" and "*vehicle travelling along pavement (driver/rider injudicious action)*".

The accident involving a motorcyclist was classified as serious in severity and occurred on the A592 at the junction with Back Belsfield Road. The accident was recorded on 06 July 2009 and occurred when the motorcyclist undertook an overtake manoeuvre of slow moving traffic and was subsequently struck by a vehicle 'pulling out' of the slow moving traffic. The contributory factors identified were "*failed to look properly (driver/rider error)*", "*failed to signal/misleading signal (driver/rider error)*" and "*vehicle blind spot (driver/rider vision affected)*". The three contributory factors identified were all attributable to the driver of the vehicle.

Of the remaining three slight accidents, one involved a vehicle pulling out in front of an oncoming vehicle and the remaining two were rear shunts.

Each of the recorded accidents has been attributed to a human error and not with a fault in the design or maintenance of the local highway.

Key

Approximate site location

0 km — 3 km

Scale 1:50,000 @ A4

Lake District National Park Authority
Bowness Bay Traffic Assessment

Figure 2.1
Site Location

June 2012
32588-R02.ai bernb

amec

3. Data Collection

3.1 Introduction

Traffic survey data has been obtained over the course of the June bank holiday weekend in order to assess parking demand and local highway capacity during a period of peak seasonal demand. Several types of data have been collected which include parking beat surveys, ATCs, queue surveys and turning count surveys. A plan detailing the location of each survey is available on Figure 3.1.

All but the ATC surveys were undertaken on 02 June 2012 and 03 June 2012 between the hours of 09:00 and 18:00. The ATC data was collected over a seven day period between the 30 May 2012 and the 02 June 2012. The weather for both the Saturday and Sunday was recorded as warm and cloudy and no incidents within the highway i.e. accidents, emergency road works, were recorded. The survey data is included in Appendix C.

3.2 Automatic Traffic Counts

The ATCs were laid in the following positions:

- the A592 approximately 90m north of the Back Belsfield Road/A592 junction (Site 1); and
- Glebe Road between Glebe Drive and the A592 (Site 2).

Chart 3.2 provides a summary of the data collected over the seven day survey period for the A592 (Site 1).

As can be seen from Chart 3.2, the increase in two-way traffic flow over the bank holiday period is almost double that of the midweek period, with the majority of traffic recorded between the hours 10:30 and 18:45. Conversely, the majority of traffic recorded on the Friday prior to bank holiday was between the hours of 08:30 and 18:00, which accords with the typical working day.

Chart 3.3 provides a summary of the data collected over the seven day survey period for Glebe Road (Site 2).

As can be seen from Chart 3.3 the pattern of movement over the course of the day is more irregular with greater variation in traffic flow over the course of the day. This pattern reflects the varying levels of occupancy and duration of stay for both the short term (on-street) and long term (car parks) parking provision which is illustrated in sections 3.5, 3.6 and 3.7.

3.2.1 Comparison with Annual Average Daily Traffic flow data

In the interests of verifying whether the June bank holiday weekend is representative of peak seasonal demand, Annual Average Daily Traffic (AADT) flow data has been obtained from the Traffic Flow Data System (also known as TRADS) for a permanent ATC located on the A592 approximately 1.7km south of the Glebe Road exit junction.

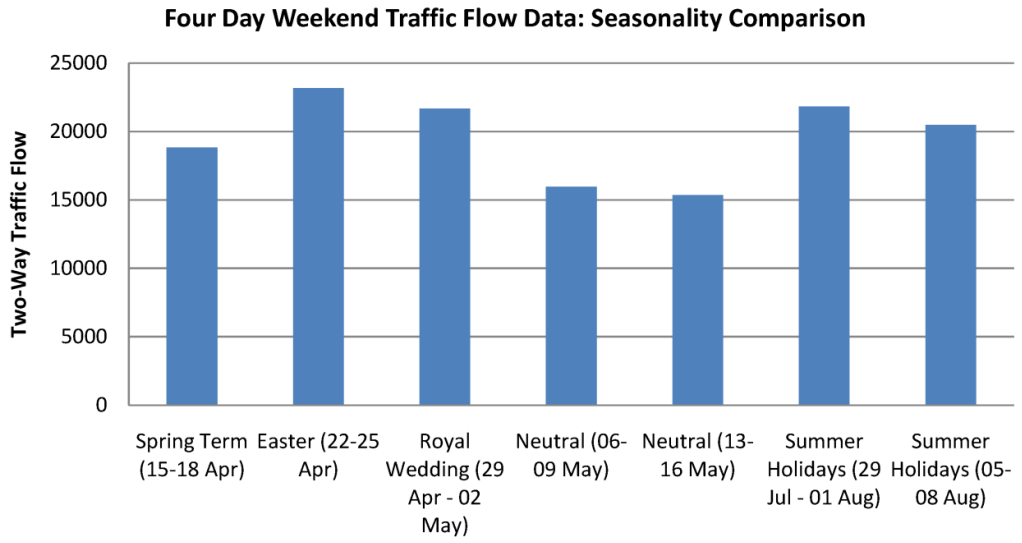
Since data from summer 2012 is not yet available, a comparison has been made with data obtained for the 2011 Easter Weekend. As with the June 2012 bank holiday weekend, the April 2011 Easter weekend covered a four day period and as such provided similar opportunities for tourists to visit the Lake District.

In addition to the above, data was also obtained for the weekend prior to the Easter weekend, the three weekends following the Easter weekend, the last weekend in July and the first weekend in August. The weekend prior to the Easter weekend was during the school spring term holiday, the following weekend was the Royal Wedding, the weekends following the Royal Wedding were neutral and the weekends during July and August represent the beginning of the school summer holiday.

The selected weekends are considered to provide a robust summary of events which affect traffic flow and thus will identify whether events outside of the summer period attract a similar level of traffic.

To ensure consistency with the Easter weekend, all other weekend data includes both the Friday and Monday. Chart 3.1 provides a summary of the data:

Chart 3.1 Two-Way Traffic Flow Summary



The results shown within Chart 3.1 clearly indicate that the increase in traffic during the Easter 2011 bank holiday weekend was comparable to the seasonal variation in traffic experienced during the summer months. As such it is considered that the data obtained over the June 2012 bank holiday weekend represents a worse case scenario in terms of both parking demand and the corresponding implications on highway capacity.

Chart 3.2 ATC Summary Site 1

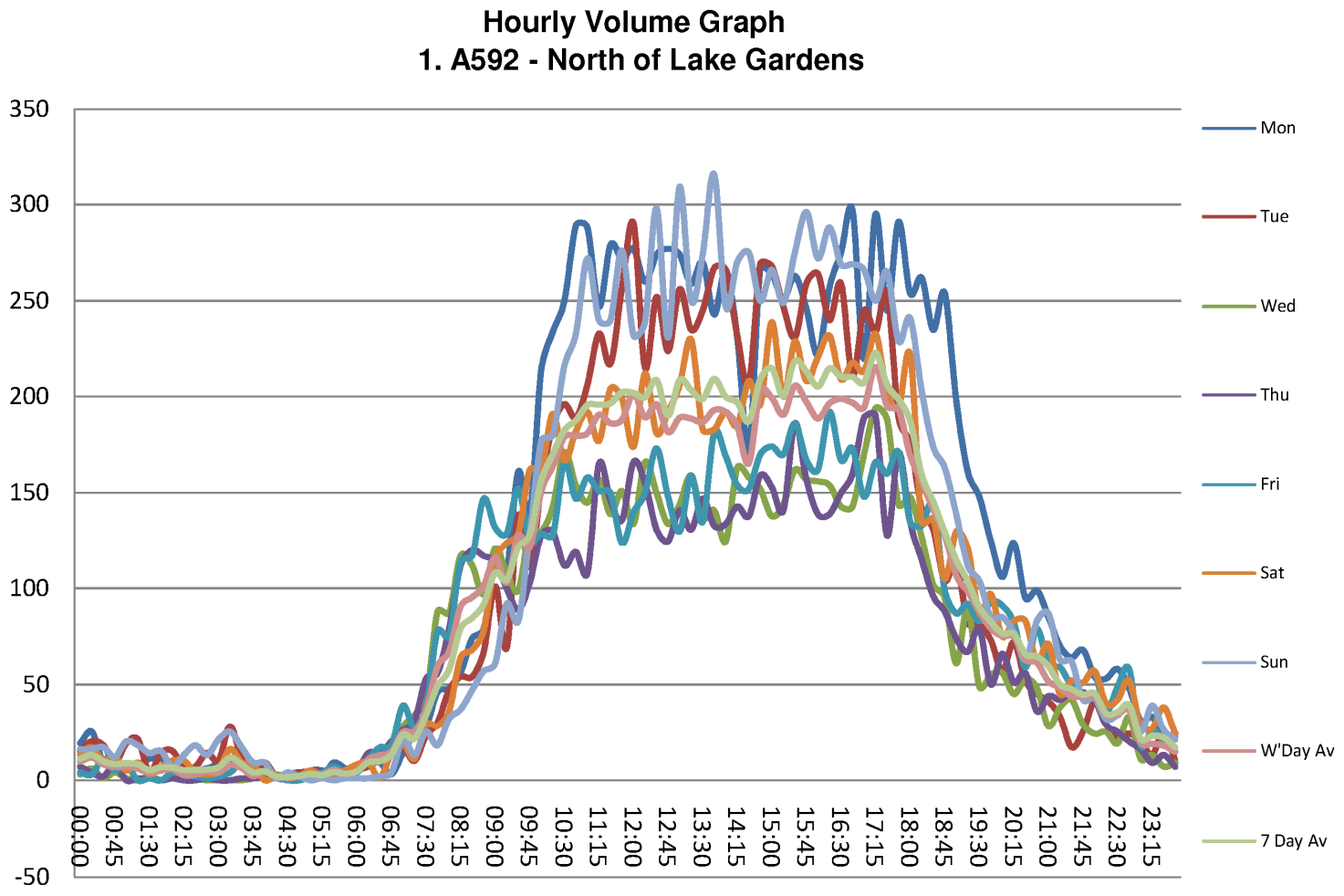
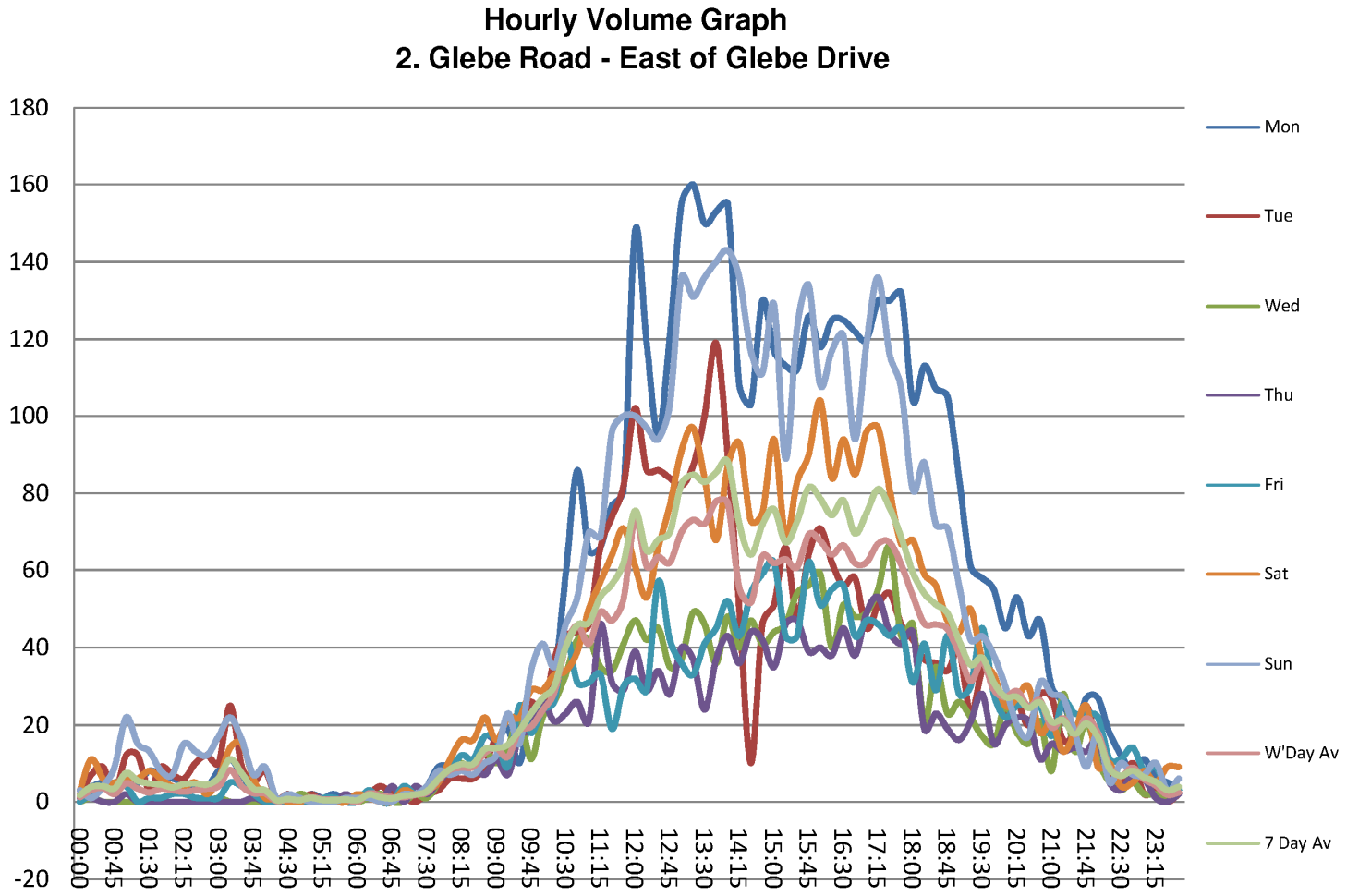


Chart 3.3 ATC Summary Site 2



3.3 Junction Turning Count Surveys

Classified turning counts were undertaken at two locations using video capture. The junctions surveyed were:

- A592/Glebe Road (entry); and
- A592/Glebe Road (exit).

Data from the turning count information has been analysed to establish the peak hours for both the Saturday and Sunday survey days. Based on sum of all traffic approaching the junctions the following peak hours have been established:

Table 3.1 Summary of Turning Count Data

Summary of Turning Count Data		Saturday	Sunday
A592/Glebe Road (entry)	Peak Hour	14:45-15:45	13:00-14:00
	Total Number of Vehicles	1,132	1,454
A592/Glebe Road (exit)	Peak Hour	16:15-17:15	13:15-14:15
	Total Number of Vehicles	1,017	1,277

As inferred by Table 3.1, the highest proportion of traffic was recorded on a Sunday for both junctions with the corresponding peak hours recorded at similar times. The Saturday peak hour data indicates that visitors to the area made their journey later in the day which is consistent with the expected arrival time for the first day of the bank holiday weekend.

Chart 3.4 provides a daily profile for all vehicles entering and exiting Glebe Road on the Saturday which indicates that throughout the day the level of traffic entering Glebe Road exceeds the level of traffic exiting and as such that parking accumulation along Glebe Road and within both car parks is relatively constant with between 300 and 400 vehicles parked at anyone time.

.

Chart 3.4 Glebe Road Daily Traffic Profile - Saturday

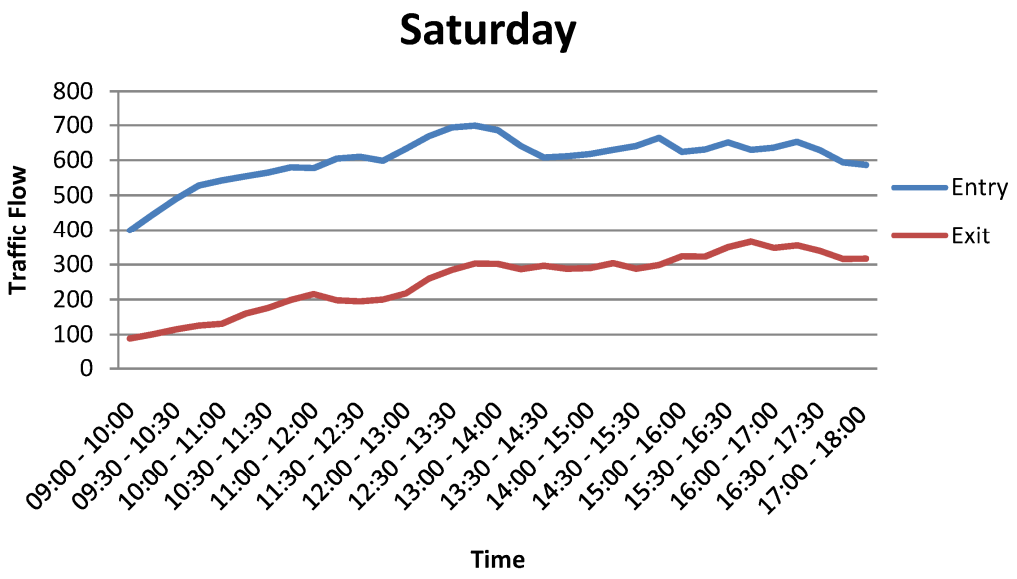
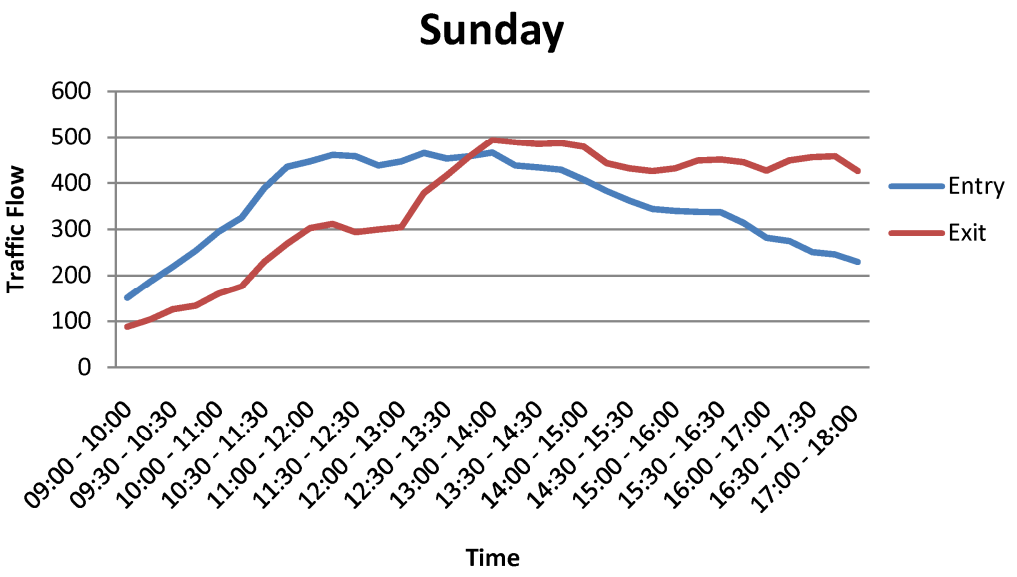


Chart 3.5 provides a daily profile for all vehicles entering and existing Glebe Road on the Sunday.

Chart 3.5 Glebe Road Daily Traffic Profile - Sunday



Up until approximately 12:30 Chart 3.5 shows a paralleled increase in entry and exit traffic along Glebe Road. From 12:30 the level of traffic exiting begins to exceed the level of traffic entering and by approximately 13:30 the level of traffic exiting Glebe Road exceeds the level of entry traffic and shows a relatively steady stream of exiting

traffic compared with a diminishing level of entry traffic. This is an indication that parking availability becomes saturated by midday and as a result less visitors are attempting to park over the course of the afternoon. The relatively consistent volume of afternoon exiting traffic is attributed to the steady increase in entry traffic during the course of the morning.

As well as turning count data, queue length data was also obtained for both the Glebe Road entry and exit junctions. These have been used to validate the results of the junction capacity assessments.

The survey set up included automatic number plate recognition (ANPR) surveys at both junctions to identify the quantum of vehicles that circulate around Glebe Road and the A592 seeking a parking space. However, the survey company has reported that there was a technical issue with the set up of the cameras which meant that the ANPR analysis was not possible. The survey company has instead provided data on the number of vehicles which circulated the road in less than 15 minute intervals. This identified that 121 vehicles entered and exited Glebe Road within a 15 minute period during the Sunday peak period of 13:15 to 14:15. This could be attributable to pick up and set down as well as drivers searching for a car parking space. As it is felt to be potentially unreliable data, it has not been incorporated within the assessment work, i.e. extracted from the data set, therefore the assessment takes a worst case scenario.

3.4 Glebe Road Car Park Survey

The Glebe Road car park is located to the west of the A592/Glebe Road entry junction and is categorised by SLDC as a long stay parking facility. The car park has a capacity of 135 parking bays and operates a 'pay and display' system which is enforceable on a 24 hour basis with overnight parking (18:00-08:00) charged at a flat rate of £1.00. The following sets out the tariffs for parking during the day:

- up to 3 hours - £4.00;
- up to 4 hours - £5:00;
- up to 6 hours - £6:00; and
- up to 10 hours - £7:00.

In the interests of capturing duration of stay, number plate data was manually recorded in 15 minutes intervals. Table 3.2 provides a set of summary statistics for both the Saturday and the Sunday:

Table 3.2 Parking Duration Summary

Summary Statistics	02 June 2012	03 June 2012
Average Duration of Stay (minutes)	158	72
Minimum Duration of Stay (minutes)	540	495

Summary Statistics	02 June 2012	03 June 2012
Maximum Duration of Stay (minutes)	15	15
Number of Vehicles (and **percentage proportion**) over the day which stayed between 0 and 100 minutes	82 (**34.7%**)	588 (**73.5%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 101 and 200 minutes	86 (**36.4%**)	127 (**15.9%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 201 and 300 minutes	42 (**17.8%**)	50 (**6.3%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 301 and 400 minutes	20 (**8.5%**)	29 (**3.6%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 401 and 500 minutes	4 (**1.7%**)	6 (**0.8%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 501 and 600 minutes	2 (**0.8%**)	0 (**0.0%**)
Total number of vehicles (and **percentage proportion**)	236 (**100.0%**)	800 (**100.0%**)

Table 3.2 indicates that the average duration of stay was more than double on Saturday than on Sunday, and that on Saturday, two thirds of visitors stayed up to 200 minutes, whilst on Sunday this was reduced to 100 minutes. The reduction in duration of stay is reflected in visitor turnover which on Sunday was over three times higher than on Saturday.

Chart 3.10 provides an occupancy summary for Saturday parking survey data.

Chart 3.10 Glebe Road Car Park Occupation Summary - Saturday

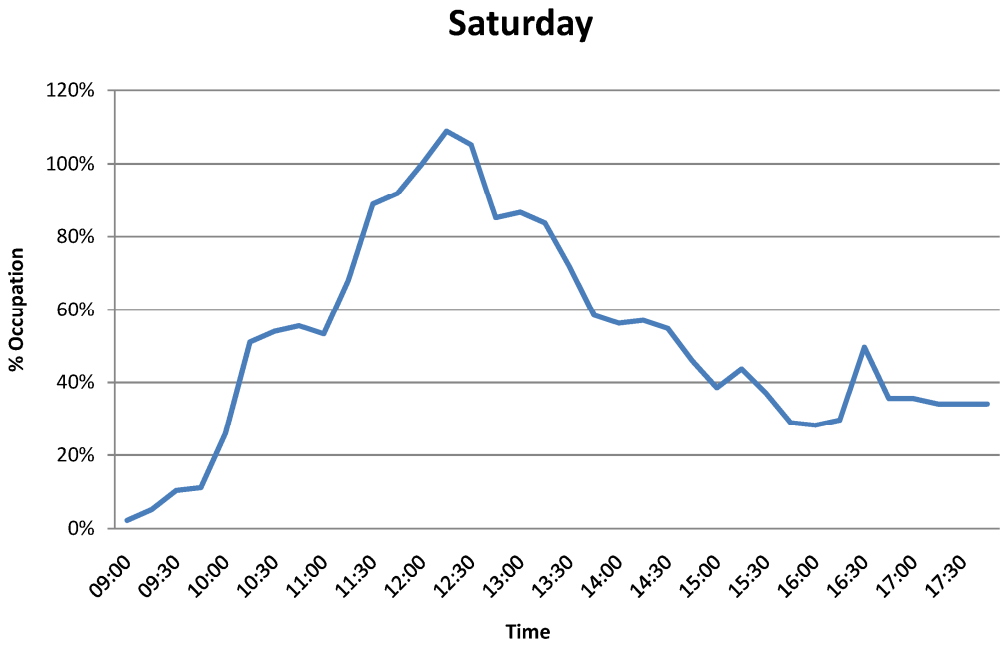


Chart 3.10 indicates that parking occupancy increased sharply from between 09:30 and 10:00 and peaked at between 12:00 and 12:30 with a saturation level of 109%. This increase above the available number of parking bays is attributed to a proportion of vehicles waiting within the car park for a space to become available. Following the lunch time period the level of occupancy dropped gradually over the afternoon period with a slight increase observed between 16:30 and 17:00.

Chart 3.11 provides an occupancy summary for Sunday parking survey data.

Chart 3.11 Glebe Road Car Park Occupation Summary - Sunday

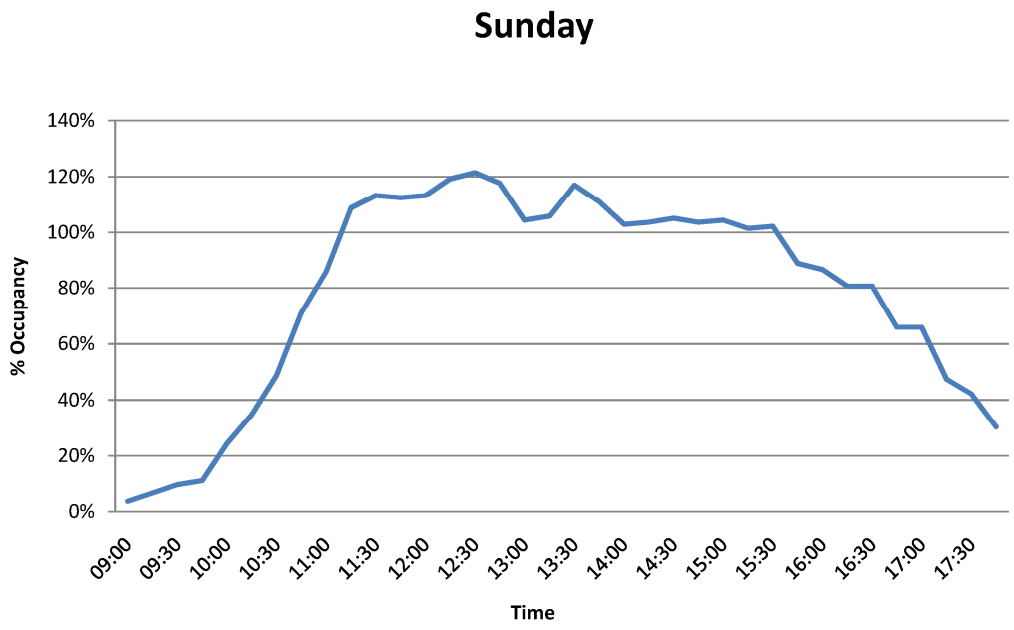


Chart 3.11 indicates a significant change in parking demand and general occupancy levels on the Sunday compared with the Saturday. From approximately 10:00, occupancy levels increased steeply and exceeded 100% by between 11:00 and 11:30, from this point occupancy levels remained above the 100% maximum occupancy level for approximately four hours. This observation indicates that a significant portion of visitors waited for a space to become available rather than seek an alternative and thus validates the reduction in duration of stay and higher visitor turnover highlighted within Table 3.2.

3.5 Braithwaite Fold Car Park Survey

Braithwaite Fold car park is located to the south of The Glebe and has an approximate capacity of 400 car parking spaces. The car park's opening hours are seasonal and are advertised as being between Easter and the 31 October. The car park operates a 'pay and display' system which is enforceable on a 24 hour basis with overnight parking (18:00-08:00) charged at a flat rate of £1.00. The car park is advertised as a long stay facility and the following sets out the tariffs for parking during the day:

- up to 3 hours - £4.00;
- up to 4 hours - £5:00;
- up to 6 hours - £6:00; and
- up to 10 hours - £7:00.

In the interests of capturing duration of stay, number plate data was manually recorded in 15 minutes intervals. Table 3.3 provides a set of summary statistics for both the Saturday and the Sunday:

Table 3.3 Parking Duration Summary

Summary Statistics	02 June 2012	03 June 2012
Average Duration of Stay (minutes)	211	201
Minimum Duration of Stay (minutes)	420	540
Maximum Duration of Stay (minutes)	75	15
Number of Vehicles (and **percentage proportion**) over the day which stayed between 0 and 100 minutes	13 (**5.5%**)	63 (**11.6%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 101 and 200 minutes	103 (**43.6%**)	256 (**47.1%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 201 and 300 minutes	95 (**40.3%**)	138 (**25.4%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 301 and 400 minutes	21 (**8.9%**)	67 (**12.3%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 401 and 500 minutes	4 (**1.7%**)	19 (**3.5%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 501 and 600 minutes	0 (**0.0%**)	1 (**0.2%**)
Total number of vehicles (and **percentage proportion**)	236 (**100.0%**)	544 (**100.0%**)

In contrast to the Glebe Road car park results, Table 3.3 indicates that approximately three quarters of visitors on both the Saturday and Sunday stayed for durations of between 101 and 400 minutes with the average duration being 211 minutes and 201 minutes on the Saturday and Sunday respectively. Visitor turnover on the Saturday was similar to the Glebe Road car park and as with the Glebe Road car park the Sunday visitor numbers at Braithwaite Fold car parking increased although by two rather than four times.

Chart 3.12 provides an occupancy summary for Saturday parking survey data which indicates that parking occupancy at the Braithwaite Fold car park did not begin to increase significantly until approximately 11:45, from this point demand rose sharply peaking at 13:00 at approximately 55%. From 14:00 the level of occupancy declined steadily leaving only three vehicles parked in the car park by 18:00.

Chart 3.12 Braithwaite Fold Car Park Occupation Summary - Saturday

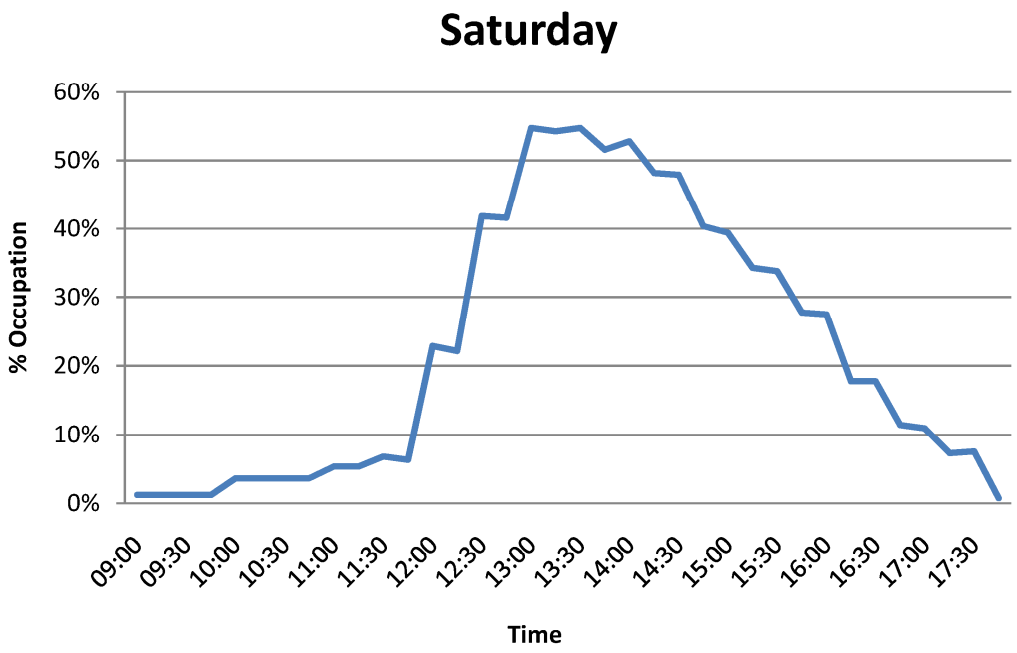


Chart 3.13 provides an occupancy summary for Sunday parking survey data.

Chart 3.13 Braithwaite Fold Car Park Occupation Summary - Sunday

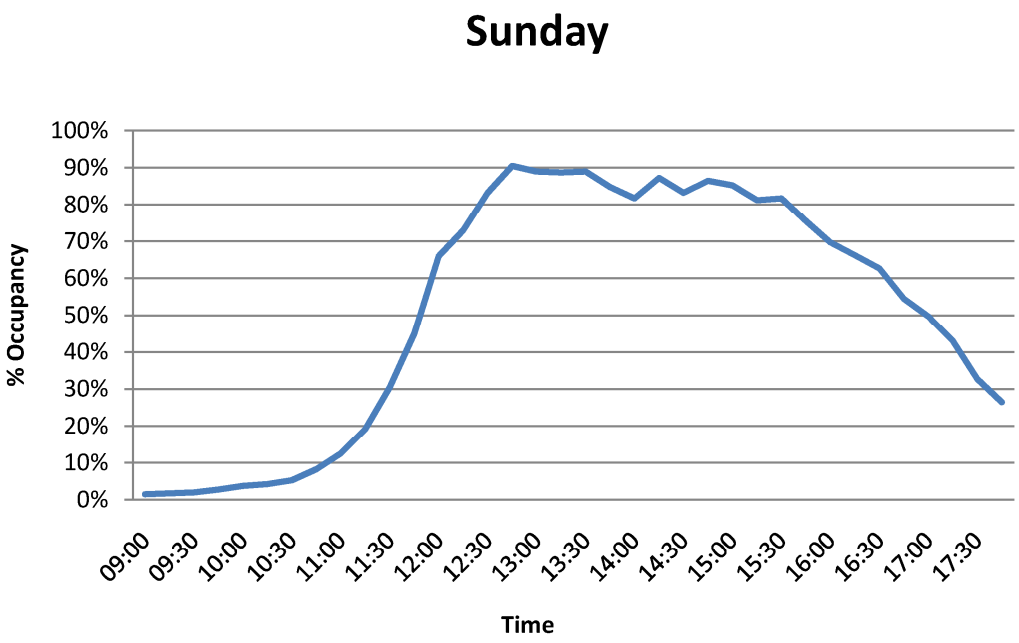


Chart 3.13 indicates that the build up in occupancy on Sunday follows a similar pattern to Saturday, with a gradual increase in from between 11:15 and 12:45, at which point occupancy plateaus at around 90%. From 13:00 to 13:15 the survey company reported that the car park was closed by the car park attendants due to constraints on capacity. At the time of closure, the car park was reported to be 91% full which equates to 362 vehicles. This observation indicates that the maximum advertised level of parking cannot be achieved which is most likely attributable to the lack of delineated parking bays.

Peak occupancy levels continue from 12:45 to 15:45 at which time there is a linear reduction in occupancy leaving 106 vehicles (27%) parked at 18:00.

3.6 Glebe Road On-Street Parking Survey

As with the car park beat surveys, the on-street parking surveys were conducted at 15 minutes intervals and used number plate recording to establish duration of stay. The on-street parking availability was split into six zones (A to F) and a plan detailing the extent of each zone is provided within Figure 3.2. All on-street parking is free of charge and has a two hour no return in two hour time restriction between 9:00 and 19:00. The parking restriction is seasonal and is enforceable between Good Friday and the 31 October.

Each of the zones has a varying level of parking provision and prior to the start of the survey an estimate of the number of available spaces was undertaken by assuming a standard parallel parking length of 6.0m. Due to the varying size of vehicles and lack of any parallel parking bay markings, the estimated number of bays is subject to a

degree of variation which is dependent on the vehicles size and the driver's ability. As a result occupancy figures regularly exceed the 100% threshold.

As a guide, the following provides a summary of the estimated number of parallel parking bays within each parking zone:

- Zone A - 11;
- Zone B - 16;
- Zone C - 23;
- Zone D - 7;
- Zone E - 42; and
- Zone F - 12.

Table 3.4 provides a set of summary statistics for the Saturday:

Table 3.4 Parking Duration Summary

Summary Statistics: 02 June	**Zone A**	**Zone B**	**Zone C**	**Zone D**	**Zone E**	**Zone F**
Average Duration of Stay (minutes)	77	76	78	92	78	72
Minimum Duration of Stay (minutes)	15	15	15	15	15	15
Maximum Duration of Stay (minutes)	255	195	285	165	435	165
Number of Vehicles (and **percentage proportion**) over the day which stayed between 0 and 100 minutes	31 (**68.9%**)	48 (**64.0%**)	75 (**67.0%**)	13 (**52.0%**)	102 (**67.5%**)	29 (**69.0%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 101 and 200 minutes	10 (**22.2%**)	27 (**36.0%**)	34 (**30.4%**)	12 (**48.0%**)	45 (**29.8%**)	13 (**31.0%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 201 and 300 minutes	4 (**8.9%**)	0 (**0.0%**)	3 (**2.7%**)	0 (**0.0%**)	2 (**1.3%**)	0 (**0.0%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 301 and 400 minutes	0 (**0.0%**)	0 (**0.0%**)	0 (**0.0%**)	0 (**0.0%**)	1 (**0.7%**)	0 (**0.0%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 401 and 500 minutes	0 (**0.0%**)	0 (**0.0%**)	0 (**0.0%**)	0 (**0.0%**)	1 (**0.7%**)	0 (**0.0%**)
Total number of vehicles (and **percentage proportion**)	45 (**100.0%**)	75 (**100.0%**)	112 (**100.0%**)	25 (**100.0%**)	151 (**100.0%**)	42 (**100.0%**)

Table 3.4 indicates that the average parking duration for all zones is typically between 1 and 1½ hours but that in Zones A, C and E, the maximum duration of stay exceeds the maximum permitted duration of stay, in one case by as much as 5¼ hours (Zone E).

Chart 3.14 provides a summary of occupancy for all parking zones on the Saturday, which shows that parking occupancy over the course of the day fluctuates significantly which reflects the typically low dwell times affiliated with short term parking. The fluctuations peak at around 100% in all zones during the middle portion of the day (11:00-16:00) and drop to approximately 50% with some dropping at low at 33%. The variation in fluctuations is attributed not only to the low duration of stay times but also the variation in the size of vehicles parking. This observation has been verified on-site.

Table 3.5 provides a set of summary statistics for the Sunday and Chart 3.15 provides a summary of occupancy for all parking zones on the Sunday.

Chart 3.14 On-street Parking Occupation Summary - Saturday

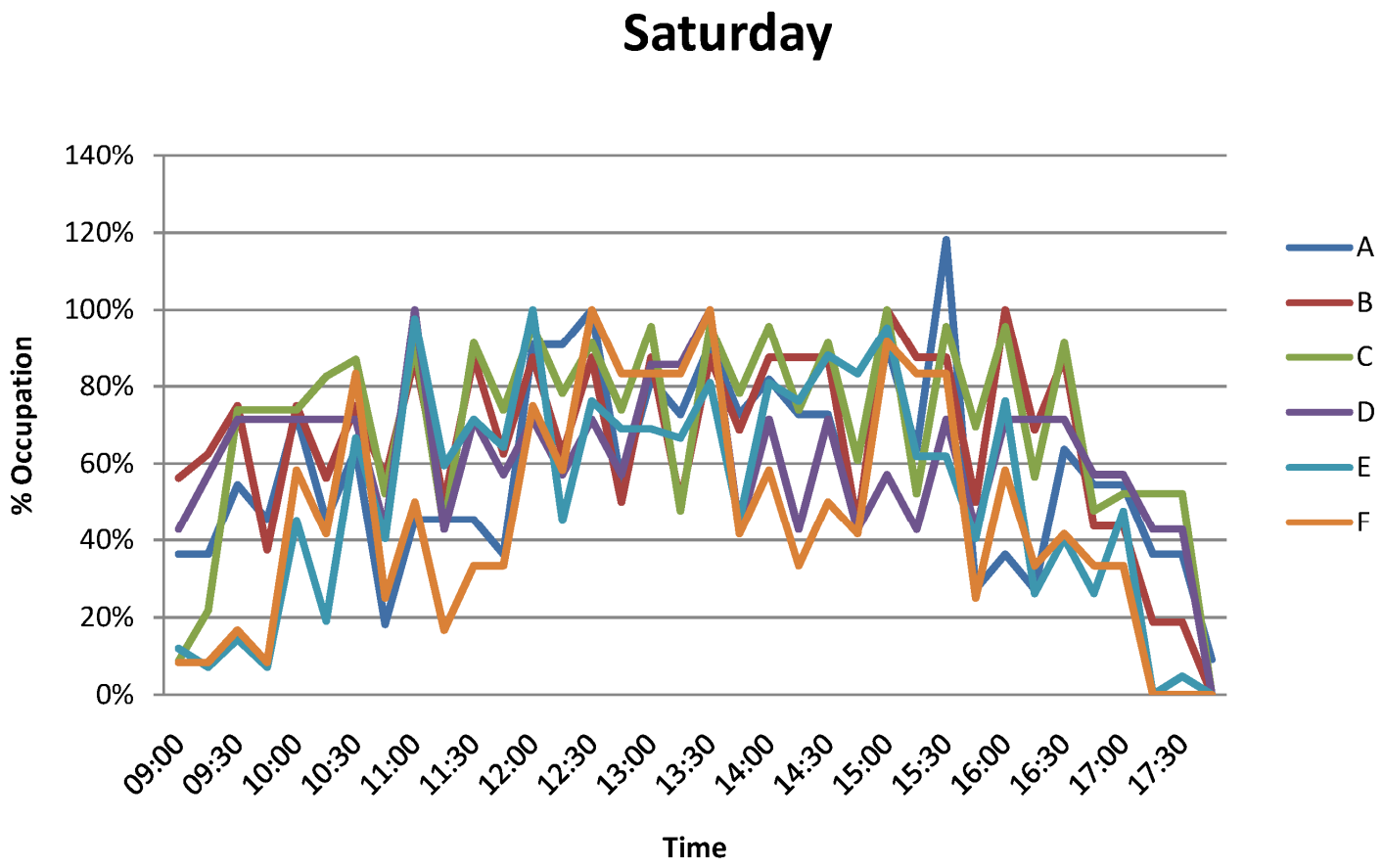


Chart 3.15 On-street Parking Occupation Summary - Sunday

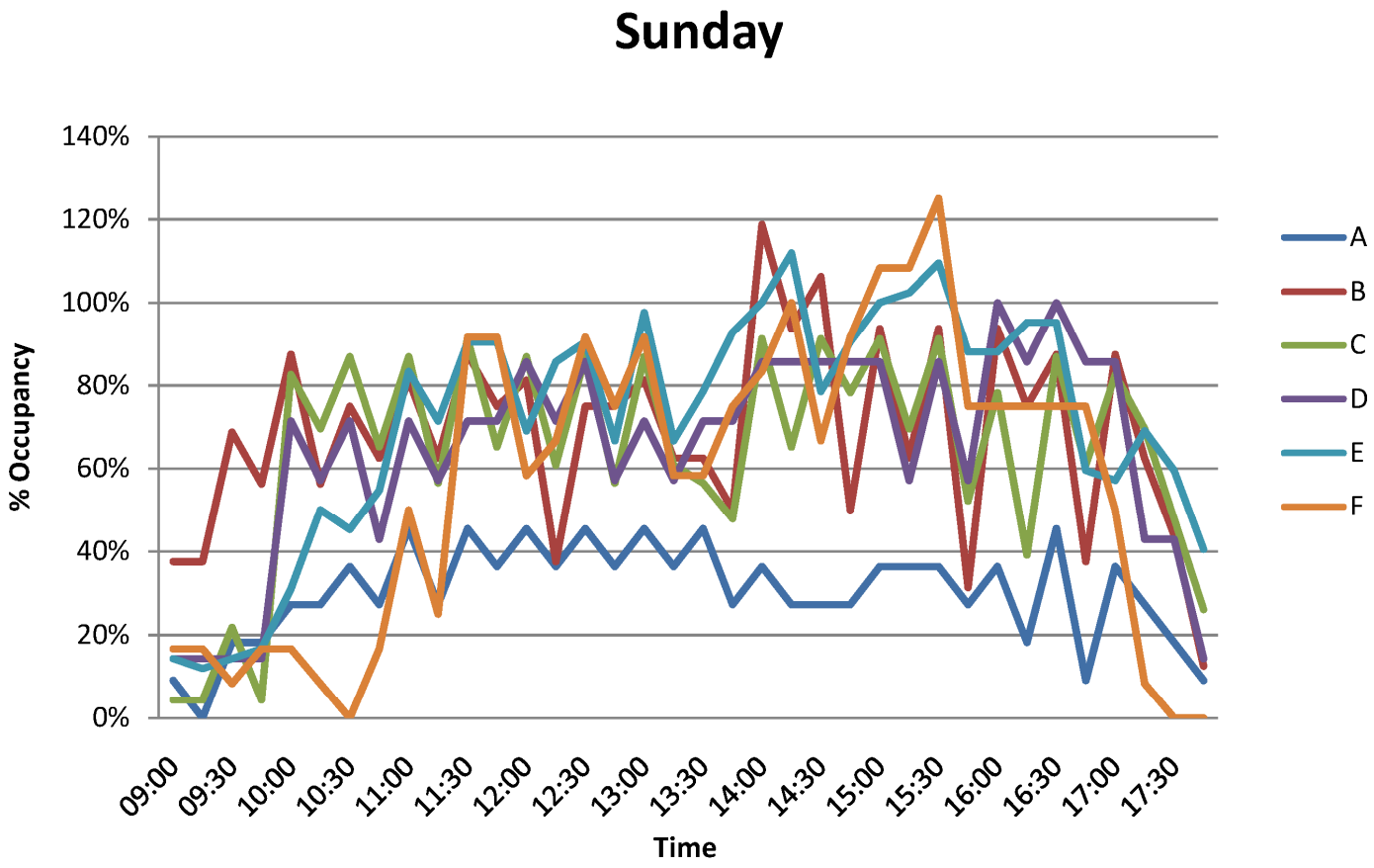


Chart 3.14 shows that parking occupancy over the course of the day fluctuates significantly which reflects the typically low dwell times affiliated with short term parking. The fluctuations peak at around 100% in all zones during the middle portion of the day (11:00-16:00) and drop to approximately 50% with some dropping at low at 33%. The variation in fluctuations is attributed not only to the low duration of stay times but also the variation in the size of vehicles parking. This observation has been verified on-site.

Table 3.5 provides a set of summary statistics for the Sunday.

Table 3.5 Parking Duration Summary

Summary Statistics: 03 June	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
Average Duration of Stay (minutes)	82	68	76	116	102	97
Minimum Duration of Stay (minutes)	15	15	15	15	15	15
Maximum Duration of Stay (minutes)	240	345	360	540	540	345
Number of Vehicles (and **percentage proportion**) over the day which stayed between 0 and 100 minutes	14 (**63.6%**)	68 (**78.2%**)	78 (**75.0%**)	11 (**52.4%**)	99 (**62.7%**)	17 (**44.7%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 101 and 200 minutes	7 (**31.8%**)	17 (**19.5%**)	20 (**19.2%**)	7 (**33.3%**)	45 (**28.5%**)	20 (**52.6%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 201 and 300 minutes	1 (**4.5%**)	1 (**1.1%**)	5 (**4.8%**)	2 (**9.5%**)	6 (**3.8%**)	0 (**0.0%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 301 and 400 minutes	0 (**0.0%**)	1 (**1.1%**)	1 (**1.0%**)	0 (**0.0%**)	6 (**3.8%**)	1 (**2.6%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 401 and 500 minutes	0 (**0.0%**)	0 (**0.0%**)	0 (**0.0%**)	0 (**0.0%**)	0 (**0.0%**)	0 (**0.0%**)
Number of Vehicles (and **percentage proportion**) over the day which stayed between 501 and 600 minutes	0 (**0.0%**)	0 (**0.0%**)	0 (**0.0%**)	1 (**4.8%**)	2 (**1.3%**)	0 (**0.0%**)
Total number of vehicles (and **percentage proportion**)	22 (**100.0%**)	87 (**100.0%**)	104 (**100.0%**)	21 (**100.0%**)	158 (**100.0%**)	38 (**100.0%**)

Unlike the duration of stay data recorded on the Saturday, the average duration of stay on Sunday varies between one and two hours with 90% of visitors staying for up to 200 minutes. The proportion of those exceeding the two hour limit has increased, although only marginally.

As with Chart 3.14, Chart 3.15 shows fluctuations in occupancy throughout the day. From 10:00 to 15:30 there is a general increase in occupancy across all zones bar Zone A, which shows occupancy levels between 20% and 40% throughout the day. The peak park period appears to be between 14:00 and 16:00, during which time occupancy is generally between 80% and 120%.

3.7 Summary

The data analysis has indicated that of the two days surveyed, the Sunday was the most onerous in terms of car park occupancy, duration of stay and impact on the local highway. Parking demand within the Glebe Road car park and the Braithwaite Fold car were at their most consistent over the Sunday period, with high, steady occupancy rates between the late morning and the late afternoon. This observation is verified by the entry and exit flows along Glebe Road obtained from the turning count surveys.

On-street parking occupancy fluctuated on both days, but with a clear increase in occupancy during the Sunday period. This observation is also coupled with a change in duration of stay which increased from a maximum of 1½ hours to 2 hours.

An assessment has been undertaken to identify the peak parking period using the percentage occupancy figures for each of the car parks and the on-street parking zones. The outcome of the assessment indicates that the peak period on the Sunday was between 13:00 and 14:00. Table 3.6 provides a summary of the parking occupancy for this period broken down into 15 minute intervals.

Table 3.6 Peak Parking Occupancy Summary

Parking Facility		Number of Available Spaces	Number of Bays Occupied (Times)			
			13:00-13:15	13:15-13:30	13:30-13:45	13:45-14:00
On-street	Zone A	11	4	5	3	4
	Zone B	16	10	10	8	19
	Zone C	23	14	13	11	21
	Zone D	7	4	5	5	6
	Zone E	42	28	33	39	42
	Zone F	12	7	7	9	10
Braithwaite Fold Car Park		400	355	356	339	327
Glebe Road Car Park		135	143	158	150	139
Total		**646**	565	587	564	568

Table 3.6 indicates that the peak time period surveyed was between 13:15 and 13:30, at which time there were 587 vehicles parked, which equates to an occupancy level of 90.9% of the possible 646 parking spaces.

Based on the figures obtained, the closure of Glebe Road car park and removal of the Glebe Road on-street parking would necessitate an increase in capacity at Braithwaite Fold car park of approximately 187 spaces to facilitate current demand, i.e. an increase from 400 to 587 spaces, which is well within the potential capacity of the car park.

Lake District National Park Authority
Bowness Bay Traffic Assessment

Figure 3.1
Traffic Data Collection Location Plan

June 2012
32588-R03ai bernb

amec

4. Car Parking Options Appraisal

4.1 Introduction

From the assessment undertaken in Section 3, the data analysis has been utilised to establish the peak periods of parking demand for the study area. This section provides an appraisal of the car parking options for the future years (2015, 2020, and 2025) which were identified during the inception meeting:

- Do Nothing – parking situation remains the same as does the traffic management system.
- Do Something – all car parking is accommodated within the Braithwaite Fold car park and car park traffic uses the southern junction. This will enable improvements to the public realm on Glebe Road.

All future growth assumptions have been derived from TEMPRO 6.2 NTEM Dataset version 6.2 and TableAF09, which is the Department for Transport (DfT) nationally endorsed methodology for calculating future traffic growth. The TEMPRO database is primarily utilised to calculate increases in local highway demand using a 'Trip End Model' that takes account of locally derived factors and thus does not specifically consider the implications of increased network flow on parking demand. However, since an increase in traffic on the local network will more than likely lead to an increase in local parking demand, the application of the growth factors can be utilised for guidance purposes.

4.2 Car Parking Capacity

In considering future parking demand, the following growth factors have been obtained using the methodology described above for the Windermere area:

- 2012-2015: 1.006.
- 2012-2020: 1.068.
- 2012-2025: 1.131.

These factors have been applied to the peak parking demand referenced in Table 3.6 and Table 4.1 provides a summary of the results.

Table 4.1 Future Peak Parking Demand

Future Demand Years	Growth Factor	Parking Demand 2012	Future Parking Demand	Additional Parking Required at Braithwaite Fold Car Park
2015	1.006	587	591	191
2020	1.068	587	627	227
2025	1.131	587	664	264

Based on the results presented within Table 4.1, the increase in traffic would necessitate an increase in parking provision of 264 parking bays. It is appreciated from the LDNPA 'Preferred Options Consultation Report' (September 2011) that SLDC have aspiration to increase parking at Braithwaite Fold car park to 821 spaces. It is therefore considered that any future demand could be accommodated at Braithwaite Fold car park.

4.3 Junction Capacity Assessments

4.3.1 Introduction

This section sets out the constraints in relation to junction capacity of the 'Do Nothing' and 'Do Something' scenarios in the future design years and considers both the northern and southern Glebe Road / A592 junctions.

4.3.2 Do Nothing

Junction capacity assessments have been undertaken at both the Glebe Road entry and exit junctions for the 'Do Nothing' existing situation and consider the impact of traffic growth for assessment years 2015, 2020 and 2025. The growth rates identified within section 4.2 have been utilised within this assessment and applied to the peak hour turning count data for the Sunday survey results, since these were the most onerous.

With reference to Table 3.1, the Sunday peak hour for the junctions was 13:15-14:15 which is the period that has been assessed. The junction capacity assessments have been undertaken using TRL's PICADY version 5, which is the nationally accepted 'industry' means of assessing junction capacity.

Table 4.2 provides a summary of the results for the Glebe Road entry junction and includes the maximum Ratio of Flow to Capacity (RFC), the queue at the start of the 15 minute period and the queue at the end of the 15 minute period. The queue lengths are presented within vehicles and for the purposes of estimating the length of road space a typical vehicle length of 5.5m has been assumed. The RFC value is a measure of junction saturation, with a value of 0.900 (90% saturation) generally accepted to be the maximum operation capacity of a junction.

A copy of the junction modelling is presented within Appendix D and the junction arms have been labelled as follows:

- Arm A: A592 (south).
- Arm B: Glebe Road (entry).
- Arm C: A592 (north).

Table 4.2 A592/Glebe Road Entry Junction – Do Nothing

Year	Movement	Max RFC Value	Start Queue (Veh)	End Queue (Veh)
2012	C-AB	0.585	1.39	1.43
2015	C-AB	0.591	1.43	1.46
2020	C-AB	0.647	1.83	1.90
2025	C-AB	0.707	2.44	2.53

As inferred from Table 4.2, the Glebe Road entry junction is anticipated to continue to operate within capacity in 2025 with a maximum queue length of the 2.53 vehicles (approximately 14m).

Table 4.3 sets out the modelling results for the Glebe Road exit junction. For reference, the junction arms have been labelled as follows:

- Arm A: A592 (south).
- Arm B: Glebe Road (exit).
- Arm C: A592 (north).

Table 4.3 A592/Glebe Road Exit Junction – Do Nothing

Year	Movement	Max RFC Value	Start Queue (Veh)	End Queue (Veh)
2012	B - A	0.425	0.72	0.73
	B - C	0.760	2.82	2.98
	C - AB	0.097	0.20	0.20
2015	B - A	0.433	0.74	0.75
	B - C	0.760	2.83	2.98
	C - AB	0.097	0.20	0.20
2020	B - A	0.475	0.87	0.89
	B - C	0.829	3.95	4.31
	C - AB	0.106	0.23	0.23
2025	B - A	0.516	1.02	1.04
	B - C	**0.900**	**5.83**	**6.84**
	C - AB	0.117	0.26	0.27

As can be seen from Table 4.3, the junction is anticipated to reach operational capacity (0.900) by 2025 with queue lengths along Glebe Road of 6.84 vehicles (approximately 38m).

4.3.3 Do Something

This scenario assumes that all traffic uses the southern junction as a worst case scenario. The same growth factors derived in Section 4.2 have been applied to 2012 traffic flow data. A copy of the modelling results are contained within Appendix E and Table 4.4 sets out the results of the 'Do Something' scenario.

Table 4.4 A592/Glebe Road Exit Junction – Do Something

Year	Movement	Max RFC Value	Start Queue (Veh)	End Queue (Veh)
2015	B - A	0.549	1.12	1.17
	B - C	0.748	2.65	2.80
	C - AB	0.818	5.18	5.66
2020	B - A	0.630	1.47	1.60
	B - C	0.823	3.73	4.13
	C - AB	**0.914**	**8.77**	**10.69**
2025	B - A	0.723	1.95	2.31
	B - C	**0.907**	**5.63**	**6.99**
	C - AB	**0.988**	**15.21**	**20.82**

As highlighted within Table 4.4, the junction is anticipated to exceed operational capacity in both 2020 and 2025 with queue lengths in 2025 at a maximum of 20.82 vehicles (approximately 115m) along the A592 northern approach.

If Braithwaite Fold is to become the only car park location thereby enabling improvements to the public realm along Glebe Road, measures would be required to ensure the continued satisfactory operation of the southern Glebe Road junction.

4.4 Proposed Mitigation – Do Something Scenario

Based on the outcome of the 'Do Something' scenario, a design solution has been formulated to increase the capacity at the A592/Glebe Road (exit) junction. The main issues arising from the PICADY junction modelling were queuing along the A592 southbound approach caused by the lack of any dedicated right turn lane facility. The available carriageway width along the northern approach is restricted and as a result it would not be feasible to introduce a right hand turn lane. Furthermore this would not suffice to addressing the queuing land capacity issues along Glebe Road.

Therefore the least onerous option would be to provide a mini-roundabout junction and a preliminary design has been provided within Figure 4.5. The mini-roundabout would provide two approach lanes on each arm providing stacking space for all movements. This would necessitate a slight realignment of the junction and the use of the existing verge and footway located on the southern junction radii. A copy of the proposed scheme is provided within Figure 4.1.

To verify the appropriateness of the roundabout design option, a junction capacity model has been undertaken utilising TRL's ARCADY software, which is the nationally accepted 'industry' means of assessing roundabout capacity. A full copy of the modelling results is contained within Appendix F and Table 4.5 sets out a summary of the modelling results. For reference, the junction arms have been labelled as follows:

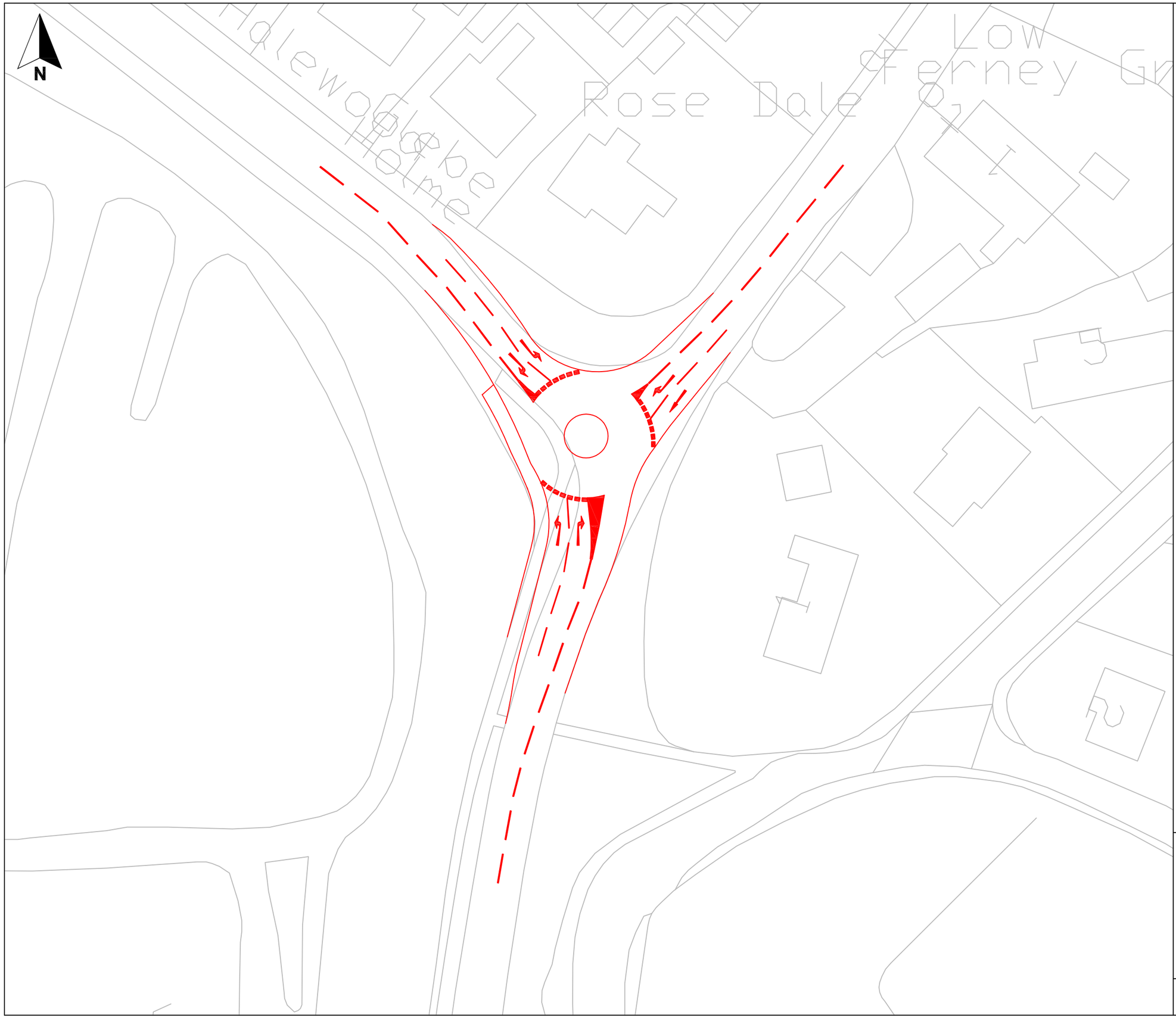
- Arm 1: A592 (north).
- Arm 2: A592 (south).
- Arm 3: Glebe Road.

Table 4.5 A592/Glebe Road Exit Junction - Closure of Glebe Road

Year	Movement	Max RFC Value	Start Queue (Veh)	End Queue (Veh)
2015	Arm 1	0.740	2.69	2.77
	Arm 2	0.518	1.05	1.06
	Arm 3	0.601	1.47	1.49
2020	Arm 1	0.792	3.49	3.64
	Arm 2	0.560	1.24	1.26
	Arm 3	0.646	1.76	1.79
2025	Arm 1	0.840	4.58	4.88
	Arm 2	0.600	1.45	1.48
	Arm 3	0.652	1.80	1.84

As can be seen from Table 4.5, the proposed roundabout solution is able to accommodate all traffic movements and the predicted increase in traffic for all of the future year scenarios.

Based on the results presented in Table 4.4 in the 'Do Something' scenario, the trigger point for the roundabout mitigation scheme would be between 2015 and 2020.



Key

Proposed scheme

0 m 30 m

Scale 1:500 @ A3

Lake District National Park Authority
Bowness Bay Traffic Assessment

Figure 4.1
Glebe Road/A592 Junction Improvement Scheme - Preliminary Design

June 2012
32588-01.dwg yadap

amec

5. Glebe Road Closure Options Appraisal

5.1 Introduction

The previous section established that Braithwaite Fold car park can accommodate all parking demand and that all car park traffic can be transferred to the southern junction, thereby enabling public realm improvements to Glebe Road.

The closure of Glebe Road has been identified by LDNPA as a scheme which would deliver significant benefits to adjacent businesses and tourists visiting the local area. As referenced within the introduction, Glebe Road is primarily used to access the Glebe Road car park and for on-street parking. These uses generate significant levels of traffic during the peak season and segregate the Bowness Bay area and the Glebe Recreational area. The closure of Glebe Road would yield a number of universal benefits such as:

- Lower traffic flows along Glebe Road.
- Reduced segregation of pedestrians between Bowness Bay and The Glebe.
- Benefits to highway safety.

The application of the closure is subject to a number of restrictions and cannot be applied to the full extent of Glebe Road due to the access rights of local businesses. The following sets out four road closure options which could be implemented. Each option is presented with a description and accompanying plan as well as the main advantages and disadvantages of each option.

5.2 Option 1A - Road Closure and Restricted Access

Description

Option 1 considers the permanent closure of a section of Glebe Road between the edge of the existing disabled and motorcycle parking, located adjacent to the tourist information centre, and the service access for the Aquarius building. The permanently closed section of highway could be raised to the height of the adjacent footway and surfaced appropriately. The closure would apply to all vehicles except for emergency vehicles and would be enforced through the provision of locked bollards.

Between the permanent road closure and the existing ‘build out’ located to the west of the caravan club entrance, two-way ‘access only’ traffic would be permitted to maintain service and employee access. The three main service access points and associated employee/business user car parks are highlighted on the Option 1A Scheme Plan (Figure 5.1). As part of this option, signage would be located opposite each of these service access points advising users to exit right only to reduce the occurrence of vehicles turning within the highway adjacent to the permanent road closure section.

The ‘access only’ section of Glebe Road would be controlled through the provision of appropriate signage and surface treatments which would be identified during any detailed planning work. It is however recommended that some form of Traffic Regulation Order (TRO) be implemented as part of this option to prevent on-street parking.

Clear and consistent signage would need to be provided throughout the town and at the Glebe Road/A592 junctions to direct visitors to Braithwaite Fold car park. The introduction of real time parking availability signage within the town and on the A592 would support the new parking proposals.

Advantages

The advantages of this option are:

- Access to disabled parking and motorcycle parking outside of the tourist information centre is retained.
- The existing taxi rank is not affected by the proposal and will continue to serve the immediate area.
- Pedestrians are afforded a section of raised highway which will increase the connectivity between the Aquarius building and the piers with the wider Glebe recreational area.

Disadvantages

The disadvantages of this option are:

- The closure of access from the northern junction would increase the level of traffic at the southern Glebe Road junction and impact upon junction capacity, requiring junction improvements.
- The closure option will result in two-way traffic along a large section of Glebe Road. Although for ‘access only’, pedestrians walking along Glebe Road would require increased caution due to the change in traffic behaviour along Glebe Road i.e. the presence of two-way traffic flow.
- The carriageway space required for two-way vehicle movements would not allow for an increase in footway widths (should this be desirable as part of the regeneration proposals) without encroaching onto the adjacent Glebe recreational area.
- The signs required to inform and enforce the closure would increase street clutter and impact upon the aesthetics of the local area.
- The extent of the road closure is relatively minimal and restrained by existing access rights, thus reducing the overall benefit of the closure.
- The requirement to provide a turning head before the road closure to accommodate any traffic that tries to exit Glebe Road to the north.

5.3 Option 1B - Road Closure and Restricted Access

Description

Option 1B provides a similar scheme to Option 1A, but with an extension of the permanent closure from the Aquarius building service access to the Glebe Road intersection with the A592. Option 1B is illustrated within Figure 5.2.

Advantages

The advantages of this Option are:

- This option would increase the strength of the road closure scheme by providing a larger traffic free area for pedestrians and increasing the opportunity to access the tourist information centre. Access to Glebe's recreation activities such as golf and tennis would be further brought into the pedestrian realm by providing seamless traffic free access from the bus interchange/pier.

Disadvantages

The disadvantages of this option are:

- Loss of convenient, centrally located disabled and motorcycle parking bays, which would have to be relocated.
- Loss of taxi rank which would have to be relocated.

5.4 Option 2 - Restricted Access

Description

Option 2 would propose an 'access only' solution that would continue to utilise the existing one way system. Access would be restricted to business access for employees and service vehicles and emergency vehicles. The 'access only' would occur from the Glebe Road / A592 junction intersection and terminate at the existing build-out located to the west of caravan club entrance.

As part of improvements to pedestrian accessibility, the carriageway would be narrowed to 3.5m thus providing a wider footway. The narrowing would occur concurrently with the extent of the 'access only' restriction.

As with Option 1, a TRO should be implemented to prevent any parking from occurring. This could take the form of double yellow lines and/or appropriately located signage.

Clear and consistent signage would need to be provided throughout the town and at the Glebe Road/A592 junctions to direct visitors to Braithwaite Fold car park. The introduction of real time parking availability signage within the town and on the A592 would support the new parking proposals.

Option 2 is illustrated within Figure 5.3.

Advantages

The advantages of this option are:

- A reduction in the number of vehicles using the southern Glebe Road junction compared to Options 1A/B as access only vehicles will enter through the northern junction.
- The potential to increase pedestrian footway width along the entirety of Glebe Road, thereby supporting the improvements to the public realm.
- The preservation of the existing one-way system, which would reduce any confusion and maintain road safety for existing road users, regular visitors to the area and pedestrians.
- The preservation of the disabled parking, motorcycle parking and taxi rank.

Disadvantages

The disadvantages of this option are:

- No section of permanent traffic free space for pedestrians.

5.5 Option 3 – Road Closure and Restricted Access

Description

Option 3 would seek to permanently close a section of Glebe Road between the Marina access and the Rectory farm access, thus creating two two-way entry/exits at the northern and southern Glebe Road / A592 junction. The permanently closed section of highway would be raised to the height of the adjacent footway and surfaced appropriately. The closure would apply to all vehicles except for emergency vehicles and would be enforced through the provision of locked bollards.

Either side of the permanent road closure, two-way ‘access only’ traffic would be permitted to maintain service and employee access. As part of this option, signage would be located opposite each of these service access points advising users to exit right only to reduce the occurrence of vehicles turning within the highway adjacent to the permanent road closure section.

The ‘access only’ section of Glebe Road would be controlled through the provision of appropriate signage and surface treatments which would be identified during any detailed planning work. It is however recommended that some form of TRO be implemented as part of this option to prevent on-street parking.

Clear and consistent signage would need to be provided throughout the town and at the Glebe Road/A592 junctions to direct visitors to Braithwaite Fold car park. The introduction of real time parking availability signage within the town and on the A592 would support the new parking proposals.

Option 3 is illustrated within Figure 5.4.

Advantages

The advantages of this option are:

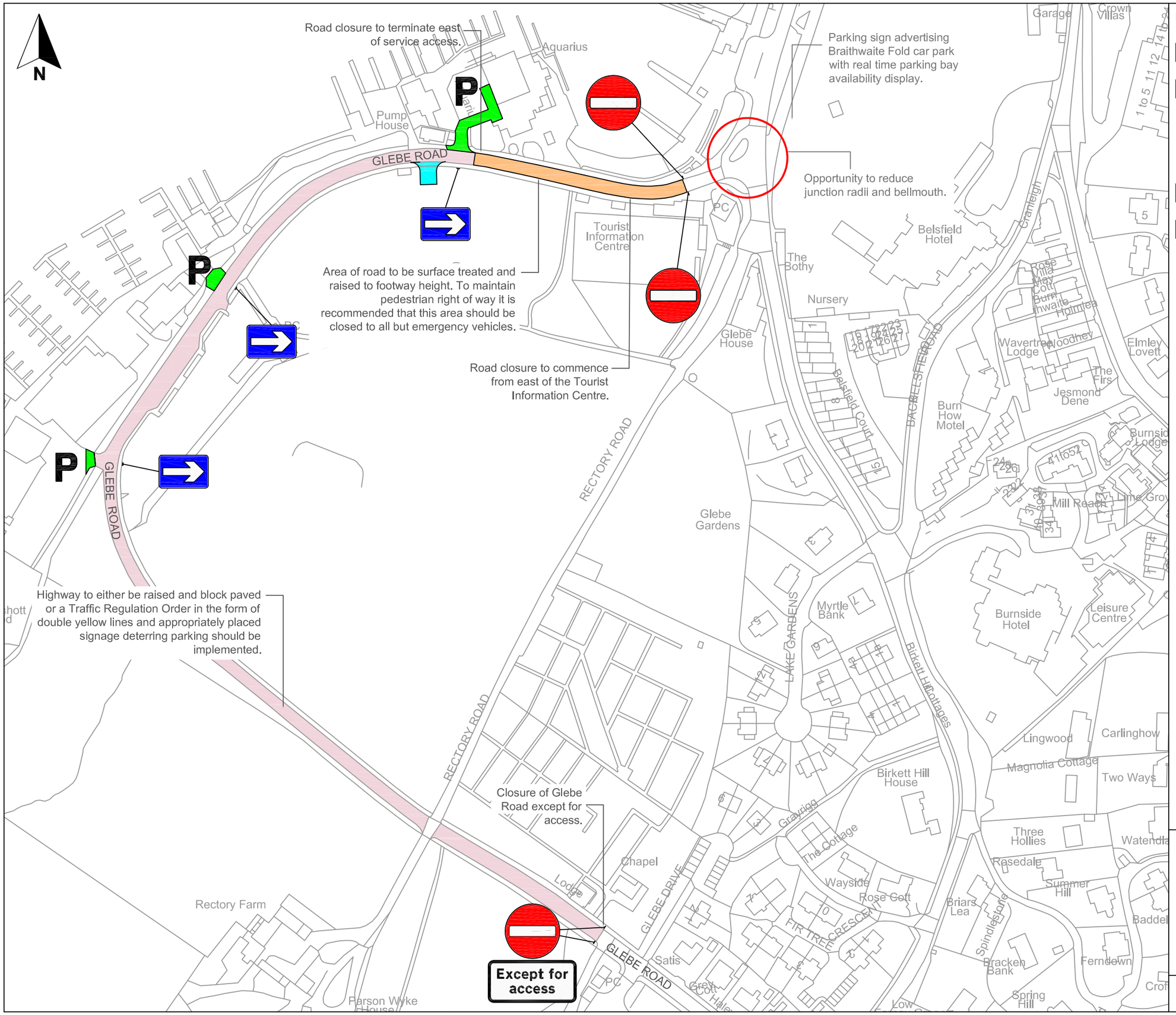
- A reduction in the amount of traffic using the southern Glebe Road junction compared to Option 1A, 1B and 2.
- Provision of a larger traffic free area which would enhance user experience when travelling between the Marina and the Braithwaite Fold car park.
- Segregation of business orientated traffic and car parking traffic.

Disadvantages

The disadvantages of this option are:

- The northern Glebe Road junction becomes open to all traffic movements.
- Continued segregation between the Aquarius building/pier and the Glebe recreational area.
- The closure of access from the northern junction would increase the level of traffic at the southern Glebe Road junction and impact upon junction capacity, requiring junction improvements.
- The closure option will result in two-way traffic along a large section of Glebe Road. Although for 'access only', pedestrians walking along Glebe Road would require increased caution due to the change in traffic behaviour along Glebe Road i.e. the presence of two-way traffic flow.
- The carriageway space required for two-way vehicle movements would not allow for an increase in footway widths (should this be desirable as part of the regeneration proposals) without encroaching onto the adjacent Glebe recreational area.
- The signs required to inform and enforce the closure would increase street clutter and impact upon the aesthetics of the local area.
- The extent of the road closure is relatively minimal and restrained by existing access rights, thus reducing the overall benefit of the closure.
- The requirement to provide a turning head before the road closure to accommodate any traffic that tries to exit Glebe Road to the north.
- The lack of any support for the aspiration to improve the public realm between the town centre and the Glebe recreational area.

The following section considers the traffic generation from a potential hotel development which is part of the Bowness Bay regeneration project and would be a trip attraction in its own right. The potential size of the development has been appraised, taking into account each of the road closure options and assuming the roundabout mitigation scheme is in place.



Lake District National Park Authority
Bowness Bay Traffic Assessment

Figure 5.1
Option 1A: Indicative Road Closure Scheme

Aug 2012
32588-05 Fig 5.1 Option 1A.dwg
geffv

amec

N

Road closure to terminate east of service access.

Parking sign advertising Braithwaite Fold car park with real time parking bay availability display.

Opportunity to reduce junction radii and bellmouth.

Area of road to be surface treated and raised to footway height. To maintain pedestrian right of way it is recommended that this area should be closed to all but emergency vehicles.

Road closure to commence from junction intersection.

Highway to either be raised and block paved or a Traffic Regulation Order in the form of double yellow lines and appropriately placed signage deterring parking should be implemented.

Closure of Glebe Road except for access.

Except for access

GLEBE ROAD

RECTORY ROAD

LAKE GARDENS

BACKFIELD

Aquarius
Pump House
Tourist Information Centre
PC
Glebe House
Nursery
The Bothy
Belsfield Hotel
Belsfield Court
Garage
Crown Villas
Cramleigh
Rose Villa
May Cott
Burnthwaite
Holmlea
Wavertree Lodge
Woodney
Elmley Lovett
The Firs
Jesmond Dene
Burn How Motel
Burnside Lodge
Mill Reach
Glebe Gardens
Myrtle Bank
Burnside Hotel
Leisure Centre
Birkett Hill Cottages
Birkett Hill House
Lingwood
Carlinghow
Magnolia Cottage
Two Ways
Three Hollies
Rosedale
Summer Hill
Briars Lea
Spindlestone
Bracken Bank
Ferndown
Spring Hill
Rectory Farm
Lodge
Chapel
GLEBE DRIVE
Satis
Grey Croft
Hale
Parson Wyke House
Wayside
Rose Cott
The Cottage
Graysrigg
FIR TREE CRESCENT
Low

Key

- Road closure - pedestrian area
- Existing businesses: Service access points
- P — Existing businesses: employee parking areas
- Service vehicles and access only - two-way traffic
- Potential turning head

0 m — 100 m

Scale 1:2000 @ A3

Lake District National Park Authority
Bowness Bay Traffic Assessment

Figure 5.2
Option 1B: Indicative Road Closure Scheme

Aug 2012
32588-06 Fig 5.2 Option 1B.dwg
geffv

amec

N

Parking sign advertising Braithwaite Fold car park with real time parking bay availability display.

Maintain current one way status.

Opportunity to reduce junction radii and bellmouth.

Restricted access to commence east of the Tourist Information Centre.

Except for access

Highway to be narrowed to 3.5m and either be raised and block paved or a Traffic Regulation Order in the form of double yellow lines and appropriately placed signage deterring parking should be implemented.

Maintain current one way status.

GLEBE ROAD

RECTORY ROAD

BACK BELSFIELD ROAD

LAKE GARDENS

Pump House

Tourist Information Centre

PC

The Bothy

Nursery

Glebe House

Belsfield Hotel

Cramleigh

Rose Villa

May Cott

Burn Inwaite

Holmlea

Wavertree Lodge

Bloodhey

Elmley Lovett

The Firs

Jesmond Dene

Burn How Motel

Belsfield Court

Glebe Gardens

Burnside Hotel

Leisure Centre

Myrtle Bank

Birkett Hill Cottages

Birkett Hill House

Lingwood

Carlinghow

Magnolia Cottage

Two Ways

Three Hollies

Rosedale

Summer Hill

Briars Lea

Spindleston

Bracken Bank

Ferndown

Spring Hill

Fir Trees

Low Ferney Green

Rose Dale

Grayrigg

The Cottage

Wayside

Rose Cott

FIR TREE CRESCENT

Chapel

Lodge

GLEBE DRIVE

Satis

Crest

Halewood

Glebe Holme

Rectory Farm

Parson Wyke House

Mill Reach

Lime Grov

Burnside Lodge

Baddel

Crof

Brantwood

Key

- Service vehicles and access only - one-way traffic, carriageway narrowed to 3.5m
- Existing businesses: Service access points
- P Existing businesses: employee parking areas

0 m 100 m

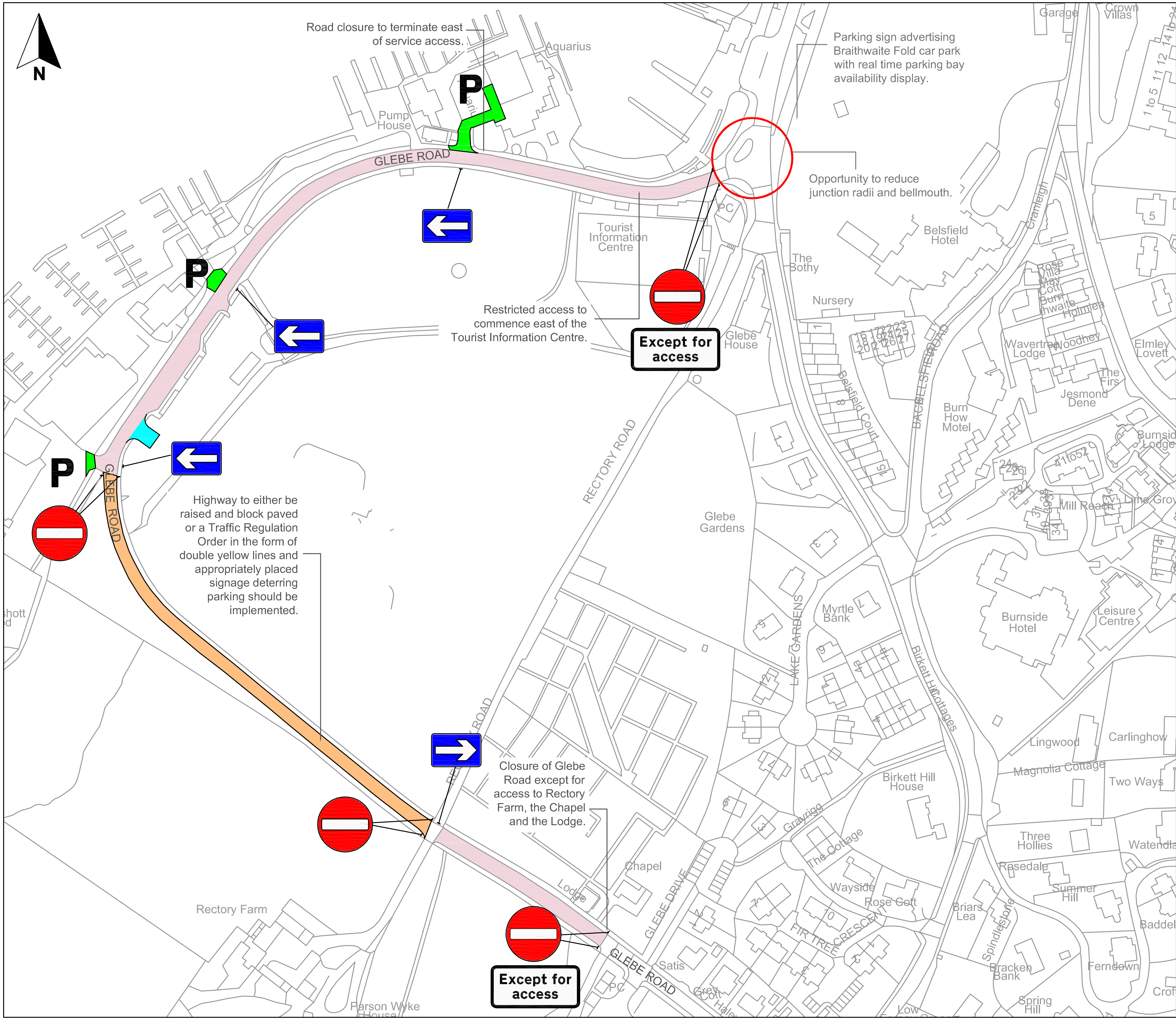
Scale 1:2000 @ A3

Lake District National Park Authority
Bowness Bay Traffic Assessment

Figure 5.3
Option 2: Indicative Road Closure Scheme

Aug 2012
32588-07 Fig 5.3 Option 2.dwg
geffv

amec


N
Road closure to terminate east of service access.
Parking sign advertising Braithwaite Fold car park with real time parking bay availability display.
Opportunity to reduce junction radii and bellmouth.
Restricted access to commence east of the Tourist Information Centre.
Except for access
Highway to either be raised and block paved or a Traffic Regulation Order in the form of double yellow lines and appropriately placed signage deterring parking should be implemented.
Closure of Glebe Road except for access to Rectory Farm, the Chapel and the Lodge.
Except for access
GLEBE ROAD
RECTORY ROAD
Tourist Information Centre
Glebe Gardens
Belsfield Hotel
Burnside Hotel
Rectory Farm
Aquarius
Pump House
Chapel
Lodge
LAKE GARDENS
GLEBE DRIVE
FIR TREE CRESCENT
Birkett Hill House
Leisure Centre

Key

- Road closure - pedestrian area
- Existing businesses: Service access points
- P Existing businesses: employee parking areas
- Service vehicles and access only - two-way traffic
- Potential turning head

0 m — 100 m

Scale 1:2000 @ A3

Lake District National Park Authority
Bowness Bay Traffic Assessment

Figure 5.4
Option 3: Indicative Road Closure Scheme

Aug 2012
32588-08 Fig 5.4 Option 3.dwg
geffv

amec

6. Hotel Development Potential Appraisal

6.1 Introduction

At the inception meeting it was identified that consideration should be given to the traffic generation of the potential hotel development as part of the Bowness Bay regeneration. A study into comparable survey sites in the industry standard TRICS database has identified that there are no weekend surveys available that match the characteristics of the potential hotel's location within a tourist 'hotspot' nor are there any surveys conducted over a bank holiday weekend.

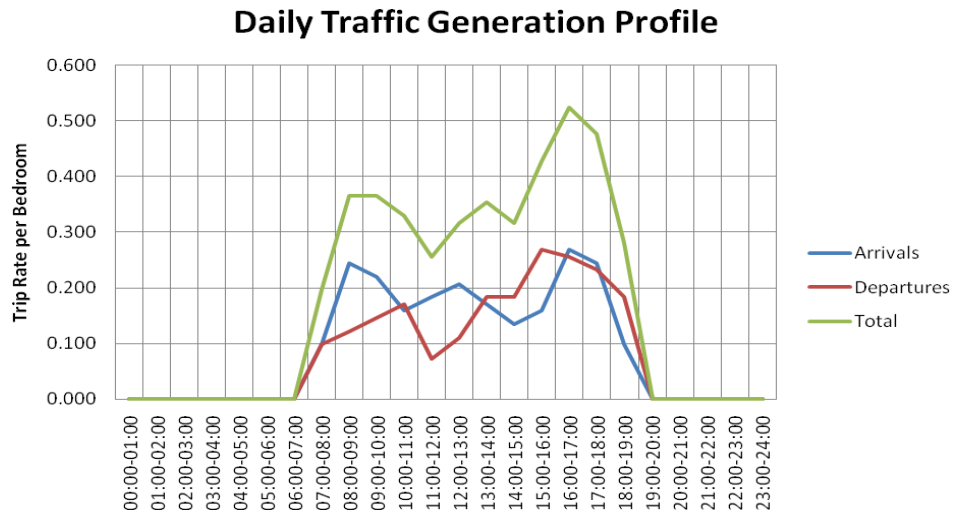
Ideally, a survey should be undertaken of the McDonald Hotel which is located to the north of Bowness Bay during the peak season to establish a local trip rate. However, in the interests of providing some guidance as to the potential scale of hotel development that could be accommodated, the most comparable data sets have been obtained and utilised.

As part of the TRICS interrogation process, only surveys conducted in England and Wales, excluding Greater London, have been included. Only surveys conducted in Town Centres, Edge of Town Centres and Free Standing have been included and from the sub-category location characteristics options only 'No Sub Category' has been included.

Data was obtained for both a Saturday and Sunday to ensure the most onerous weekend trip rates were selected. From the comparison exercise, the Sunday trip rates are shown to be the most onerous and have been used within this assessment.

From the interrogation and day selection exercises, two surveys were obtained. Chart 6.1 provides a daily trip rate profile for typical bedroom. The chart displays arrival, departure and two way trips.

Chart 6.1 Daily Traffic Generation Profile for a Sunday



As can be seen from Chart 6.1, the two-way trip rate has three noticeable peaks which occur between 08:00- 10:00, 12:00 – 13:00 and 16:00 – 17:00. As can be seen from the data, no trip rates are available before 07:00 and after 19:00 which is part of the standard survey practice adopted by the TRICS consortium.

To assess the impact of a proposed hotel development on junction capacity, trip rate data for the established Sunday peak period (13:15-14:15) has been considered. Since the TRICS data is only available in whole hours, a comparison between the two-way trip rate for 13:00 – 14:00 and 14:00 – 15:00 has been undertaken. The outcome of the assessment has revealed that the trip rates for 13:00 – 14:00 are the most onerous and have been used as part of this assessment.

A full copy of the trip rates are contained within Appendix G and a summary of the trip rates and potential traffic generation for a 100 bed hotel (as an example), is provided in Table 6.1.

Table 6.1 Daily Traffic Trip Rates and Resultant Traffic Generation for a 100 Bedroom Hotel

Time	Arrival		Departure		Two-Way	
	Trip Rate	Traffic Generation	Trip Rate	Traffic Generation	Trip Rate	Traffic Generation
07:00 – 08:00	0.098	10	0.098	10	0.196	20
08:00 – 09:00	0.244	24	0.122	12	0.366	37
09:00 – 10:00	0.220	22	0.146	15	0.366	37
10:00 - 11:00	0.159	16	0.171	17	0.330	33
11:00 – 12:00	0.183	18	0.073	7	0.256	26
12:00 – 13:00	0.207	21	0.110	11	0.317	32
13:00 – 14:00	0.171	17	0.183	18	0.354	35
14:00 – 15:00	0.134	13	0.183	18	0.317	32
15:00 – 16:00	0.159	16	0.268	27	0.427	43
16:00 – 17:00	0.268	27	0.256	26	0.524	52
17:00 – 18:00	0.244	24	0.232	23	0.476	48
18:00 – 19:00	0.098	10	0.183	18	0.281	28

6.2 Scenario Tests

Scenario testing has been undertaken for all potential Glebe Road closure options, since each closure has varying restrictions that impact on access to the potential hotel site. Closure Options 1A/B involve the permanent closure of Glebe Road to the north and would thus require any hotel traffic to enter/exit the site via the southern Glebe Road junction. As a result capacity testing will apply to the southern ARCADY junction model only.

Option 2 would maintain the existing one-way system and therefore all arrival traffic would access the hotel from the northern junction and all departing traffic would exit the hotel from the southern junction. As a result both the northern junction PICADY model and the southern junction ARCADY model have been subjected to capacity testing.

Option 3 would provide a closure midway along Glebe Road and thus permit two-way access to the hotel site from the northern Glebe Road junction. As a result only the northern junction PICADY model has been subjected to capacity testing.

To ensure the capacity testing is robust, only the traffic flows for the 2025 design horizon have been considered. Hotel trip generations have been applied in 50 room intervals and all results are presented to the nearest 50 rooms. As referenced within Section 6.2, the junction is considered to be over capacity when any of the junction arms exceeds an RFC threshold of 0.900. This value has also been used within this assessment to establish the maximum number of hotel rooms which could be accommodated for each of the Glebe Road closure options.

The following sets out the results for each of the closure options.

Options 1A/B

Following the incremental increase in hotel room numbers, the maximum permissible development size has been established as a 350 room hotel. A full copy of the modelling results is contained within Appendix H and Table 6.2 provides a summary of the results for the southern Glebe Road junction:

Table 6.2 A592/Glebe Road Southern Junction – ARCADY Results Option 1A/B with Hotel Development, 2025

Closure Option	Movement	Max RFC Value	Start Queue (Veh)	End Queue (Veh)
Option 1A/B (350 Rooms)	Arm 1	0.900	6.73	7.57
	Arm 2	0.648	1.75	1.80
	Arm 3	0.769	3.08	3.20

Option 2

Following the incremental increase in hotel room numbers, the maximum permissible development size has been established as a 950 room hotel. A full copy of the modelling results is contained within Appendix I and Table 6.3 and 6.4 provide a summary of the results for the northern and southern Glebe Road junction respectively:

Table 6.3 A592/Glebe Road Northern Junction – PICADY Results Option 2 with Hotel Development, 2025

Closure Option	Movement	Max RFC Value	Start Queue (Veh)	End Queue (Veh)
Option 2 (950 Rooms)	B-AC	0.000	0.00	0.00
	C-AB	0.196	0.17	0.24

Table 6.4 A592/Glebe Road Southern Junction – ARCADY Results Option 2 with Hotel Development, 2025

Closure Option	Movement	Max RFC Value	Start Queue (Veh)	End Queue (Veh)
Option 2 (950 Rooms)	Arm 1	0.877	5.66	6.26
	Arm 2	0.683	2.05	2.10
	Arm 3	0.905	6.94	7.87

Option 3

Following the incremental increase in hotel room numbers, the maximum permissible development size has been established as a 1,500 room hotel. A full copy of the modelling results is contained within Appendix J and Table 6.5 provides a summary of the results for the northern Glebe Road junction:

Table 6.5 A592/Glebe Road Northern Junction – PICADY Results Option 3 with Hotel Development, 2025

Closure Option	Movement	Max RFC Value	Start Queue (Veh)	End Queue (Veh)
Option 3 (1500 Rooms)	B-AC	0.898	5.21	6.24
	C-AB	0.330	0.49	0.49

Options Summary

Each of the road closure options has been critically appraised both in terms of their design limitations and ability to accommodate a potential hotel development.

Options 1A/B provides a road closure scheme that closely accords with the notional designs discussed during the inception meeting. The permanent closed section of highway is located adjacent to the tourist information centre and ensures a traffic free link between the pier/bus interchange and the Glebe recreational area. The extent of the closure is however restricted due to local business access points situated along Glebe Road. To facilitate access two-way 'access only' traffic flow would occur along the remaining section of Glebe Road. Although traffic would be relatively minimal, it would impinge upon pedestrian safety and as such pedestrians would remain cautious whilst traversing or crossing Glebe Road.

With reference to the potential hotel development, the road closure requires that all potential hotel traffic access the site via the southern Glebe Road / A592 junction, thus reducing the maximum potential hotel development to 350 rooms.

Option 2 provides an 'access only' solution that maintains the existing one-way system arrangement. Although this option does not provide a permanent section of closed highway, the restriction would significantly reduce the level of traffic using Glebe Road. With the exception of the hotel, the majority of service and employee traffic accessing local businesses would do so prior to and after peak visiting times thus minimising the overall traffic impact. Furthermore the proposed removal of on-street parking along Glebe Road would facilitate carriageway narrowing, thus increasing the overall area available to pedestrians along the entire length of Glebe Road, and thus enhancing the overall area.

With regard to the potential hotel development, the restricted access would facilitate entry from the northern Glebe Road junction and thus reduce the level of impact experienced on the more critical southern Glebe Road junction. As a result a hotel containing 950 rooms could be accommodated with this option.

Option 3 provides a road closure scheme towards the south western side of Glebe Road. The closure would provide a larger area of traffic free access for pedestrians but located away from the key link between the pier/bus interchange and the Glebe's main recreational activities i.e. tennis, golf. Traffic flow either side of the closure would be two-way but as referenced within the Option 2 description, would be limited to 'access only' traffic, which is anticipated to be relatively minimal. The main advantages associated with Option 3 are the segregation of car park traffic and business traffic. All car park traffic would use the southern Glebe Road junction whilst all business orientated traffic would utilise the northern Glebe Road junction. Since two-way traffic would require the entire Glebe Road carriageway width, there would be no scope to widen the adjacent footways and pedestrians would traverse and cross the road with extra caution due to the presence of two-way traffic.

With regard to the hotel development, the sole use of the northern Glebe Road junction would facilitate a hotel development containing 1,500 rooms. It should be noted that this assessment assumes no access by other traffic generators during the peak hour period i.e. employee/service vehicle access to the existing Glebe Road businesses. These flows have been omitted on the basis that no accurate data is available, although from the results of the modelling some capacity is still remaining i.e. maximum RFC value with a 1,500 room hotel is 0.898, the absolute maximum RFC value is 0.900, therefore 0.002 remaining capacity.

7. Summary and Conclusions

7.1 Summary

Bowness Bay and The Glebe are located to the south-west of Bowness-on-Windermere town centre and form part of the town's main tourist attraction. Bowness Bay, which is situated to the north of The Glebe accommodates a series of local shops, restaurants, a marina and ferry port which offers cruises between Bowness Bay and a number of destinations located to the north and south of the town. The Glebe is a large recreational area, bound by Glebe Road, and comprises tennis courts, a pitch and put, a picnic area and managed parkland.

The LDNPA has identified Bowness Bay and The Glebe as a strategic regeneration location and is seeking to develop the areas as a world class visitor destination. Research has found that the area has deteriorated, in particular the public realm, despite it being a popular destination for visitors. Bowness Bay and The Glebe is the busiest destination in the National Park and is part of the Windermere Waterfront Programme. The focus of LDNPA is to maintain visitor numbers to Bowness Bay and The Glebe and ensure its continued economic contribution to the local area. Moving and parked cars are a dominant feature of the area, which detracts from the visitor experience. A key part of improving this is to make the area more user-friendly for pedestrians and cyclists, through reducing the numbers of moving and parked cars along Glebe Road. LDNPA appointed AMEC E&I UK to assess a potential closure of Glebe Road and the implications this would have on local parking demand and the immediate local highway network.

Traffic survey data was obtained over the course of the June bank holiday weekend on 02 June and 03 June 2012 in order to assess parking demand and local highway capacity during a period of peak seasonal demand. Several types of data were collected, including parking beat surveys, queue surveys and turning count surveys. In addition, ATC data was collected over a seven day period between the 30 May and the 02 June 2012.

The data analysis found that Sunday was the most onerous in terms of car park occupancy, duration of stay and impact on the local highway. Parking demand within the Glebe Road car park and the Braithwaite Fold car were at their most consistent over the Sunday period, with high, steady occupancy rates between the late morning and the late afternoon. On-street parking occupancy fluctuated on both days, but with a clear increase in occupancy during the Sunday period. This observation is also coupled with a change in duration of stay which increased from a maximum of 1.5 hours to 2 hours.

Parking and junction capacity assessments were undertaken of future year scenarios, 2015, 2020 and 2025 and looked at the implication of the closure of Glebe Road to circulating traffic and traffic accessing the on-street and off-street parking.

It was found that during the peak time period surveyed which was between 13:15 and 13:30, there were 578 vehicles parked in the area, which equates to an occupancy level of 90.9% of the possible 646 parking spaces. The closure of Glebe Road car park and removal of the Glebe Road on-street parking would necessitate an increase in capacity at Braithwaite Fold car park of approximately 187 spaces to facilitate current demand, i.e. an increase from 400 to 587 spaces. An assessment of potential future parking demand based on predicted traffic growth

figures for the Windermere area found that the increase in traffic would necessitate an increase in parking provision of 264 parking bays.

Capacity assessments have been undertaken for both the northern and southern Glebe Road junctions for two scenarios, a 'Do Nothing' scenario which considers no road closure and a 'Do Something' scenario, which considers the road closure. For the 'Do Nothing' scenario the southern Glebe Road junction is anticipated to reach operational capacity (0.900) by 2025 with queue lengths along Glebe Road of 6.84 vehicles (approximately 38m).

For the 'Do Something' scenario, which assumes that the turning movements into the northern Glebe Road junction are transferred to the southern junction, the junction is anticipated to exceed operational capacity in both 2020 and 2025 with queue lengths in 2025 at a maximum of 20.82 vehicles (approximately 115m) along the A592 northern approach.

A design solution was identified to increase the operational capacity of the junction comprising a mini-roundabout junction providing two approach lanes on each arm to accommodate stacking space for all movements. This would necessitate a slight realignment of the junction and the use of the existing verge and footway located on the southern junction radii. The mitigation scheme was found to have adequate capacity in the 2025 scenario with a maximum RFC value of 0.840.

Following the capacity assessment, a number of road closure options were formulated, these were:

- Option 1A - Road Closure towards the northern section of Glebe Road and Restricted Access ;
- Option 1B – An extension of the Road Closure and Restricted Access ;
- Option 2 - Restricted Access and a continued use of the existing one-way stem; and
- Option 3 – Road Closure towards the south-west of Glebe Road and Restricted Access.

Option 1 A/B would necessitate all vehicles to utilise the southern Glebe Road junction, Option 2 would maintain the existing one-way system and would allow 'access only' traffic to enter Glebe Road from the northern junction. Option 3 would provide two-way access at both the northern and southern Glebe Road junctions, the former would accommodate 'access only' traffic and the latter would accommodate 'access only' and car park traffic.

Further capacity assessments were undertaken to assess the potential implication of a hotel development. For Options 1A/B, the maximum hotel size that could be accommodated, assuming the southern junction roundabout mitigation measures are implemented is a 350 room hotel. Option 2 could accommodate a 950 room hotel and Option 3 could accommodate a 1,500 room hotel.

The results of the capacity modelling demonstrate that a sizable hotel development could be accommodated within each of the road closure options.

7.2 Conclusions

In conclusion it has been found that should there be no change to the existing situation, the southern Glebe Road junction would be at capacity by 2025, with queues of 38m and there would be a requirement for an additional 33 parking spaces, although noting that this does not take into account suppressed demand and an increase in visitors to the area. The junction modelling has concluded that there are no queuing or capacity issues at the northern entry only junction.

The study has found that a total of 187 cars would be displaced by the closure of Glebe Road and Glebe Road car park to parking based on the surveyed parking data, which would rise to 264 cars in the 2025 scenario based on general traffic growth rates for the Windermere area. Again, this does not take into account suppressed demand and an increase in visitors to the area. It is appreciated from the LDNPA 'Preferred Options Consultation Report' (September 2011) that SLDC have aspiration to increase parking at Braithwaite Fold car park to 821 spaces. It is therefore considered that any future demand could be accommodated at Braithwaite Fold car park.

Closure of the northern Glebe Road junction to general traffic and transfer of the turning entry traffic to the southern junction would result in significant queuing and capacity issues, and therefore a mitigation solution is required. It has been concluded that should Glebe Road be closed, the provision of a mini-roundabout would be required to facilitate the predicted impact on the local highway. Based on the traffic data used, the trigger point for this would be between 2015 and 2020.

Four options have been identified for the Glebe Road closure, which would entail either road closure and access restrictions or access restrictions only. Each of the closure options has been capacity tested for a potential hotel development, the results of which demonstrate that a sizable hotel development could be accommodated following any of the road closure options.

Appendix A
Client Brief

Bowness Bay and The Glebe – Traffic assessment brief

Background

We are currently working to allocate Bowness Bay and The Glebe as a strategic regeneration location, through our Allocations of Land Development Plan document (DPD). The purpose of the allocation is to develop Bowness Bay and The Glebe as a world class visitor destination, and to enable us to deliver public benefits through private sector contributions or other opportunities from commercial development. The overall boundary includes sites for a hotel, an improved car park at Braithwaite Fold, a visitor attraction, a retail and visitor centre, and public realm enhancements. Appendix 1 is a map of our Preferred Option for the Bowness Bay regeneration location, showing the site boundary and individual sites within the wider location.

Evidence highlights that the area has deteriorated, in particular the public realm, despite it being a popular destination for visitors. Our focus is to maintain visitor numbers to the Bowness Bay and The Glebe, as we recognise that an unsatisfactory visitor experience may lead to a fall in visitor numbers and subsequent economic impacts on Bowness-in-Windermere.

Bowness Bay and The Glebe is the only experience of the Lake District National Park for many visitors, and the first stop for others. It is the busiest destination in the National Park. It is part of the Windermere Waterfront Programme, a coordinated series of visitor attractions around Windermere Lake. A critical feature of the programme is to reduce vehicle movements by encouraging people to travel between attractions and their accommodation by boat, bus, walking or bicycle. Our aspiration is for Bowness Bay and The Glebe to be a major gateway for the Windermere Waterfront Programme.

Moving and parked cars are a dominant feature of the area, particularly between the Tourist Information Centre and the site of the proposed hotel. We know that the majority of visitors arrive by car, travelling either from Windermere through Bowness, or from the Crook Road. The majority of visitors then enter Glebe Road by the Tourist Information Centre and search for a free on-road car parking space. Cars often travel around Glebe Road several times, passing Braithwaite Fold, as their drivers search for an empty space.

Purpose of the study

A key part of improving the visitor experience is to make the area more user-friendly for pedestrians and cyclists, and to improve Bowness Bay and The Glebe as a visitor destination by reducing the numbers of moving and parked cars along Glebe Road. We are exploring the potential closure (permanent or seasonal and time limited) of a section of Glebe Road. This would require displaced car parking to be accommodated at Braithwaite Fold car park. There may also be a displacement of car parking from Glebe Road car park to Braithwaite Fold, as a result of the hotel development. South Lakeland District Council own Braithwaite Fold and we are working with them to develop this car park to accommodate more cars and so it can be used year-round.

We would like to establish the implications of displacing vehicles and parking on Glebe Rd, and establish the approximate extra capacity of the highway network. We can then use this information when making future decisions about the scale and nature of any development within the allocation, ensuring that any development will avoid vehicle movements and/or car parking over approximate thresholds.

Following advice from the Highways team at Cumbria County Council, we want to be confident that the highways network can accommodate the anticipated development and road closure at Bowness Bay and the Glebe. We are unable to confirm the precise scale, nature or timescales for delivery of any commercial development, as this will depend on private businesses putting forward planning proposals. We are therefore unable to undertake a detailed transport assessment or travel plan.

Key tasks for the study

The study should provide data and information on:

- The current capacity of the A592 between the Glebe Rd entrance at the Tourist Information Centre and the other entrance/exit at the Braithwaite Fold car park end of Glebe Road.
- Whether there are there queues on the A592 on busy days, between the traffic lights next to the Bowness Bay piers and the Braithwaite Fold end of Glebe Road.
- The number of additional cars that are likely to use the section of the A592 (between the two Glebe Road entrances) if the closure of Glebe Road displaces traffic from Glebe Road onto that section of the A592. We want to establish what additional capacity exists. We would also like to know whether there are any necessary highway and/or junction improvements to accommodate displacement during busy periods.
- The majority of traffic is visitor traffic, and peak times are bank holiday weekends and weekends in the summer school holidays.
- Options and recommendation on which is the most appropriate section of Glebe Rd to close. Options should have regard for the need to provide an enjoyable experience for pedestrians, public realm improvements, the need to improve the visitor experience by making the lake more accessible from The Green Glebe (by removing parked cars), and the need for delivery and service vehicles to access businesses along Glebe Road.

We do not require the study to consider how any parking provision for future development would be accommodated. Applications for development proposals will need to demonstrate how they will achieve this within the thresholds and parameters established in this study.

Reporting

The final report must include the results of the above tasks. It should conclude with recommendations on:

- what the remaining capacity of the A592 will be with the closure of Glebe Road
- whether the A592 has capacity for the displaced traffic from Glebe Road
- necessary (if any) highway and/or junction improvements to reduce possible effects of increased traffic on the A592; and
- recommendations on which is the most appropriate section of Glebe Road to close.

Timetable

- Provide quote – w/c 14 May 2012
- Agree fee and scope of study – w/c 21 May 2012
- Traffic counts and any on-site monitoring - Saturday and/or Sunday of the early June bank holiday weekend (2 and/or 3 June 2012)
- Final report – 22 June 2012

Appendix B
Minutes of Inception Meeting

Meeting Minutes

Client	Lake District National Park (LDNP) Authority	Client Ref	
Our Ref	32588/01	Issued By	
Issue Number		Issue Date	
Meeting Date	24/05/2012	Location	LDNP Kendal
Present at Meeting	Alistair Kirkbride (**AK**) LDNP Chris Warren (**CW**) LDNP Bev Coupe (**BC**) AMEC James McGavin (**JM**) AMEC		
Apologies for Absence			
Additional Distribution			
Project Name	Bowness Bay Traffic Assessment		
Subject	**PRELIMINARY PROJECT MEETING**		

Actions

CW/AK Discussed the importance of Bowness Bay as a tourist hub and the proposed investment in sustainable travel throughout the area, which will be subsidised by DfT (£4.9 – £6.9million).

Bowness Bay will be one of many tourist hubs which will interlink with others through public transport and cycling links.

It is a goal of the LDNP Authority and its partners to improve Bowness Bay for existing visitors and enhance the user experience.

As part of this, a redevelopment of LDNP land around Bowness Bay is proposed. The purpose of which is to increase tourist dwell times and attract private investment to the area.

At present, Glebe Road, which circulates around LDNP land and along the shore line of Bowness Bay, is heavily trafficked due to the current availability of free parking. It is the intent of LDNP to close of this road to traffic (except for access only) in order to create a more pedestrian friendly zone and promote the under utilised Braithwaite Fold car park located to the south of Bowness Bay.

AK Confirms that parking studies were undertaken at the Braithwaite Fold Car Park approximately 3 years ago, copies of which will be made available to AMEC.

BC Outlined AMEC's proposal and the proposed traffic survey data which would be obtained.

PRELIMINARY PROJECT MEETING

		Actions
CW/AK	Confirmed that they would be interested in circulating traffic along Glebe Road and in particular those drivers that exit Glebe Road from the south and re-enter from the north.	
CW/AK	Require confirmation of the type/extent of closure along Glebe Road but not necessarily any design aspects. Junction modelling of the southern Glebe Road / A592 junction will be required for 2015, 2020 and 2025.	
CW/AK	Terms and Conditions were discussed, LDNP uncapped liability will be reduced in line with AMEC standard provision.	
BC	Requested OS of the area	CW to confirm
AK	Indicated AADT is available for a site south of Bowness, AK/CW have requested some analysis is presented which considers seasonality and traffic flow fluctuation.	

Appendix C
Survey Data

Appendix D
Junction Capacity Assessments – Do Nothing Scenario

PICADY
GUI Version: 5.1 AE Analysis Program Release: 5.0 (MAY 2010)
For sales and distribution information, program advice and maintenance, contact:
TRL Limited Crowthorne House Nine Mile Ride Wokingham, Berks. RG40 3GA, UK Tel: +44 (0)1344 770758 Fax:+44 (0)1344 770864 E-mail: software@trl.co.uk Web: www.trlsoftware.co.uk
The user of this computer program for the solution of an engineering problem is in no way relieved of their responsibility for the correctness of the solution

Run Analysis

Parameter	Values
File Run	H:\..\Southern Glebe Road Junction\Site 2.vpi
Date Run	29 June 2012
Time Run	08:22:42
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	A592 (South)	100
Arm B	Glebe Road	100
Arm C	A592 (North)	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	Glebe Road / A592 Junction (Site 2)
Location	Bowness-on-Windermere
Date	26 June 2012
Enumerator	mcgaj [WE703147]
Job Number	32588-01
Status	TIA
Client	Lake District National Park
Description	Peak Weekend Hour at Site 2 is 13:15 - 14:15 on Sunday 3rd June 2012

Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

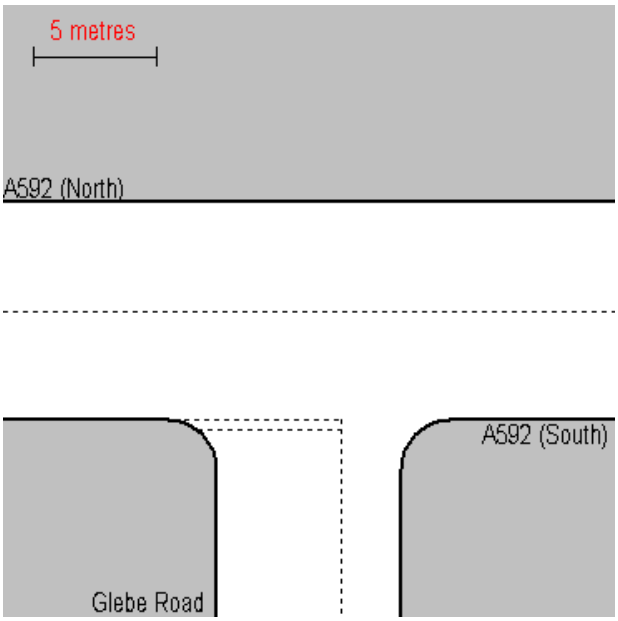
Parameter	Minor Arm B
Major Road Carriageway Width (m)	6.65
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	2.20
Minor Road First Lane Width (m)	2.50
Minor Road Second Lane Width (m)	2.50
Minor Road Visibility To Right (m)	160
Minor Road Visibility To Left (m)	33
Major Road Right Turn Visibility (m)	75
Major Road Right Turn Blocks Traffic	Yes (if over 0 veh)

Slope and Intercept Values

Stream	Intercept for Stream	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	538.683	0.095	0.241	0.152	0.344
B-C	688.386	0.103	0.259	-	-
C-B	617.396	0.232	0.232	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	13:00-14:30	90	15

ODTAB Turning Counts

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	39.0	393.0
Arm B	140.0	0.0	349.0
Arm C	320.0	36.0	0.0

Demand Set: Peak Hour 2015
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	39.0	395.0
Arm B	141.0	0.0	351.0
Arm C	322.0	36.0	0.0

Demand Set: Peak Hour 2020
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	42.0	420.0
Arm B	150.0	0.0	373.0
Arm C	342.0	38.0	0.0

Demand Set: Peak Hour 2025
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	44.0	444.0
Arm B	158.0	0.0	395.0
Arm C	362.0	41.0	0.0

ODTAB Synthesised Flows

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30

Arm	Rising Time	Rising Flow (veh/min)	Peak Time	Peak Flow (veh/min)	Falling Time	Falling Flow (veh/min)
Arm A	13:15	5.400	13:45	8.100	14:15	5.400
Arm B	13:15	6.113	13:45	9.169	14:15	6.113
Arm C	13:15	4.450	13:45	6.675	14:15	4.450

Heavy Vehicles Percentages

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.9
Arm C	0.3	0.0	-

Demand Set: Peak Hour 2015
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.9	-	0.0
Arm C	0.3	0.0	-

Demand Set: Peak Hour 2020
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.9	-	0.0
Arm C	0.3	0.0	-

Demand Set: Peak Hour 2025
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.9	-	0.0
Arm C	0.3	0.0	-

Queues & Delays

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-A	1.76	6.98	0.252	-	0.00	0.33	-	4.7	0.19
	B-C	4.38	9.42	0.465	-	0.00	0.85	-	11.9	0.19
	C-AB	0.67	11.79	0.057	-	0.00	0.09	-	1.3	0.09
	C-A	3.80	-	-	-	-	-	-	-	-
	A-B	0.49	-	-	-	-	-	-	-	-
	A-C	4.93	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-A	2.10	6.59	0.318	-	0.33	0.46	-	6.6	0.22
	B-C	5.23	9.01	0.580	-	0.85	1.33	-	18.7	0.26
	C-AB	0.86	12.10	0.071	-	0.09	0.12	-	1.9	0.09
	C-A	4.47	-	-	-	-	-	-	-	-
	A-B	0.58	-	-	-	-	-	-	-	-
	A-C	5.89	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-A	2.57	6.05	0.425	-	0.46	0.72	-	10.2	0.28
	B-C	6.40	8.43	0.760	-	1.33	2.82	-	37.2	0.45
	C-AB	1.22	12.64	0.097	-	0.12	0.20	-	3.0	0.09
	C-A	5.31	-	-	-	-	-	-	-	-
	A-B	0.72	-	-	-	-	-	-	-	-
	A-C	7.21	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-A	2.57	6.05	0.425	-	0.72	0.73	-	10.8	0.29
	B-C	6.40	8.42	0.760	-	2.82	2.98	-	43.7	0.49
	C-AB	1.23	12.64	0.097	-	0.20	0.20	-	3.0	0.09
	C-A	5.31	-	-	-	-	-	-	-	-
	A-B	0.72	-	-	-	-	-	-	-	-
	A-C	7.21	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-A	2.10	6.59	0.319	-	0.73	0.48	-	7.5	0.22
	B-C	5.23	9.00	0.581	-	2.98	1.44	-	23.6	0.28
	C-AB	0.87	12.10	0.072	-	0.20	0.13	-	1.9	0.09
	C-A	4.47	-	-	-	-	-	-	-	-
	A-B	0.58	-	-	-	-	-	-	-	-
	A-C	5.89	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:15-14:30	B-A	1.76	6.97	0.252	-	0.48	0.34	-	5.3	0.19
	B-C	4.38	9.41	0.465	-	1.44	0.89	-	14.1	0.20
	C-AB	0.67	11.79	0.057	-	0.13	0.09	-	1.4	0.09
	C-A	3.80	-	-	-	-	-	-	-	-
	A-B	0.49	-	-	-	-	-	-	-	-
	A-C	4.93	-	-	-	-	-	-	-	-

Demand Set: Peak Hour 2015
Modelling Period: 13:00-14:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-A	1.77	6.91	0.256	-	0.00	0.34	-	4.8	0.19
	B-C	4.40	9.49	0.464	-	0.00	0.85	-	11.9	0.19
	C-AB	0.67	11.80	0.057	-	0.00	0.09	-	1.3	0.09
	C-A	3.82	-	-	-	-	-	-	-	-
	A-B	0.49	-	-	-	-	-	-	-	-
	A-C	4.96	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-A	2.11	6.52	0.324	-	0.34	0.47	-	6.8	0.23
	B-C	5.26	9.07	0.580	-	0.85	1.33	-	18.7	0.26
	C-AB	0.87	12.11	0.072	-	0.09	0.12	-	1.9	0.09
	C-A	4.50	-	-	-	-	-	-	-	-
	A-B	0.58	-	-	-	-	-	-	-	-
	A-C	5.92	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-A	2.59	5.98	0.433	-	0.47	0.74	-	10.5	0.29
	B-C	6.44	8.48	0.760	-	1.33	2.83	-	37.2	0.45
	C-AB	1.23	12.66	0.097	-	0.12	0.20	-	3.0	0.09
	C-A	5.34	-	-	-	-	-	-	-	-
	A-B	0.72	-	-	-	-	-	-	-	-
	A-C	7.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-A	2.59	5.98	0.433	-	0.74	0.75	-	11.2	0.29
	B-C	6.44	8.47	0.760	-	2.83	2.98	-	43.8	0.48
	C-AB	1.23	12.66	0.097	-	0.20	0.20	-	3.0	0.09
	C-A	5.34	-	-	-	-	-	-	-	-
	A-B	0.72	-	-	-	-	-	-	-	-
	A-C	7.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-A	2.11	6.51	0.324	-	0.75	0.49	-	7.7	0.23
	B-C	5.26	9.06	0.581	-	2.98	1.44	-	23.5	0.28
	C-AB	0.89	12.18	0.073	-	0.20	0.13	-	2.0	0.09
	C-A	4.47	-	-	-	-	-	-	-	-
	A-B	0.58	-	-	-	-	-	-	-	-
	A-C	5.92	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:15-14:30	B-A	1.77	6.90	0.256	-	0.49	0.35	-	5.5	0.20
	B-C	4.40	9.48	0.465	-	1.44	0.89	-	14.1	0.20
	C-AB	0.67	11.80	0.057	-	0.13	0.09	-	1.4	0.09
	C-A	3.82	-	-	-	-	-	-	-	-
	A-B	0.49	-	-	-	-	-	-	-	-
	A-C	4.96	-	-	-	-	-	-	-	-

Demand Set: Peak Hour 2020
Modelling Period: 13:00-14:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-A	1.88	6.78	0.278	-	0.00	0.38	-	5.3	0.20
	B-C	4.68	9.36	0.500	-	0.00	0.97	-	13.6	0.21
	C-AB	0.73	11.90	0.061	-	0.00	0.10	-	1.5	0.09
	C-A	4.04	-	-	-	-	-	-	-	-
	A-B	0.53	-	-	-	-	-	-	-	-
	A-C	5.27	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-A	2.25	6.37	0.353	-	0.38	0.53	-	7.7	0.24
	B-C	5.59	8.91	0.628	-	0.97	1.61	-	22.4	0.29
	C-AB	0.97	12.30	0.079	-	0.10	0.14	-	2.2	0.09
	C-A	4.72	-	-	-	-	-	-	-	-
	A-B	0.63	-	-	-	-	-	-	-	-
	A-C	6.29	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-A	2.75	5.80	0.475	-	0.53	0.87	-	12.2	0.32
	B-C	6.84	8.27	0.828	-	1.61	3.95	-	49.7	0.58
	C-AB	1.35	12.82	0.105	-	0.14	0.23	-	3.4	0.09
	C-A	5.62	-	-	-	-	-	-	-	-
	A-B	0.77	-	-	-	-	-	-	-	-
	A-C	7.71	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-A	2.75	5.80	0.475	-	0.87	0.89	-	13.2	0.33
	B-C	6.84	8.26	0.829	-	3.95	4.31	-	62.4	0.67
	C-AB	1.35	12.82	0.106	-	0.23	0.23	-	3.5	0.09
	C-A	5.62	-	-	-	-	-	-	-	-
	A-B	0.77	-	-	-	-	-	-	-	-
	A-C	7.71	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-A	2.25	6.37	0.353	-	0.89	0.56	-	8.8	0.25
	B-C	5.59	8.89	0.629	-	4.31	1.78	-	30.3	0.33
	C-AB	0.97	12.31	0.079	-	0.23	0.15	-	2.2	0.09
	C-A	4.72	-	-	-	-	-	-	-	-
	A-B	0.63	-	-	-	-	-	-	-	-
	A-C	6.29	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:15-14:30	B-A	1.88	6.78	0.278	-	0.56	0.39	-	6.1	0.21
	B-C	4.68	9.34	0.501	-	1.78	1.03	-	16.4	0.22
	C-AB	0.73	11.90	0.061	-	0.15	0.10	-	1.5	0.09
	C-A	4.04	-	-	-	-	-	-	-	-
	A-B	0.53	-	-	-	-	-	-	-	-
	A-C	5.27	-	-	-	-	-	-	-	-

Demand Set: Peak Hour 2025
Modelling Period: 13:00-14:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-A	1.98	6.66	0.298	-	0.00	0.42	-	5.9	0.21
	B-C	4.96	9.23	0.537	-	0.00	1.12	-	15.5	0.23
	C-AB	0.80	12.00	0.067	-	0.00	0.11	-	1.7	0.09
	C-A	4.25	-	-	-	-	-	-	-	-
	A-B	0.55	-	-	-	-	-	-	-	-
	A-C	5.57	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-A	2.37	6.22	0.381	-	0.42	0.60	-	8.6	0.26
	B-C	5.92	8.75	0.676	-	1.12	1.96	-	26.9	0.34
	C-AB	1.08	12.44	0.087	-	0.11	0.17	-	2.5	0.09
	C-A	4.95	-	-	-	-	-	-	-	-
	A-B	0.66	-	-	-	-	-	-	-	-
	A-C	6.65	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-A	2.90	5.62	0.516	-	0.60	1.02	-	14.2	0.36
	B-C	7.25	8.06	**0.899**	-	1.96	5.83	-	68.7	0.79
	C-AB	1.52	12.99	0.117	-	0.17	0.26	-	4.0	0.09
	C-A	5.88	-	-	-	-	-	-	-	-
	A-B	0.81	-	-	-	-	-	-	-	-
	A-C	8.15	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-A	2.90	5.61	0.516	-	1.02	1.04	-	15.5	0.37
	B-C	7.25	8.05	**0.900**	-	5.83	6.84	-	96.1	1.02
	C-AB	1.52	12.99	0.117	-	0.26	0.27	-	4.0	0.09
	C-A	5.87	-	-	-	-	-	-	-	-
	A-B	0.81	-	-	-	-	-	-	-	-
	A-C	8.15	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-A	2.37	6.22	0.381	-	1.04	0.63	-	10.0	0.26
	B-C	5.92	8.73	0.678	-	6.84	2.26	-	42.1	0.44
	C-AB	1.09	12.44	0.087	-	0.27	0.17	-	2.6	0.09
	C-A	4.95	-	-	-	-	-	-	-	-
	A-B	0.66	-	-	-	-	-	-	-	-
	A-C	6.65	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:15-14:30	B-A	1.98	6.65	0.298	-	0.63	0.43	-	6.8	0.22
	B-C	4.96	9.21	0.538	-	2.26	1.20	-	19.3	0.24
	C-AB	0.81	12.00	0.067	-	0.17	0.12	-	1.8	0.09
	C-A	4.25	-	-	-	-	-	-	-	-
	A-B	0.55	-	-	-	-	-	-	-	-
	A-C	5.57	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	192.7	128.5	45.1	0.2	45.1	0.2
B-C	480.4	320.2	149.3	0.3	149.3	0.3
C-AB	82.8	55.2	12.5	0.2	12.5	0.2
C-A	407.2	271.5	-	-	-	-
A-B	53.7	35.8	-	-	-	-
A-C	540.9	360.6	-	-	-	-
All	**1757.7**	**1171.8**	**206.9**	**0.1**	**207.0**	**0.1**

Demand Set: Peak Hour 2015
Modelling Period: 13:00-14:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	194.1	129.4	46.4	0.2	46.4	0.2
B-C	483.1	322.1	149.2	0.3	149.2	0.3
C-AB	83.5	55.6	12.6	0.2	12.6	0.2
C-A	409.3	272.9	-	-	-	-
A-B	53.7	35.8	-	-	-	-
A-C	543.7	362.5	-	-	-	-
All	**1767.3**	**1178.2**	**208.2**	**0.1**	**208.2**	**0.1**

Demand Set: Peak Hour 2020
Modelling Period: 13:00-14:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	206.5	137.6	53.4	0.3	53.4	0.3
B-C	513.4	342.3	194.8	0.4	194.9	0.4
C-AB	91.6	61.1	14.3	0.2	14.3	0.2
C-A	431.4	287.6	-	-	-	-
A-B	57.8	38.5	-	-	-	-
A-C	578.1	385.4	-	-	-	-
All	**1878.8**	**1252.5**	**262.5**	**0.1**	**262.5**	**0.1**

Demand Set: Peak Hour 2025
Modelling Period: 13:00-14:30

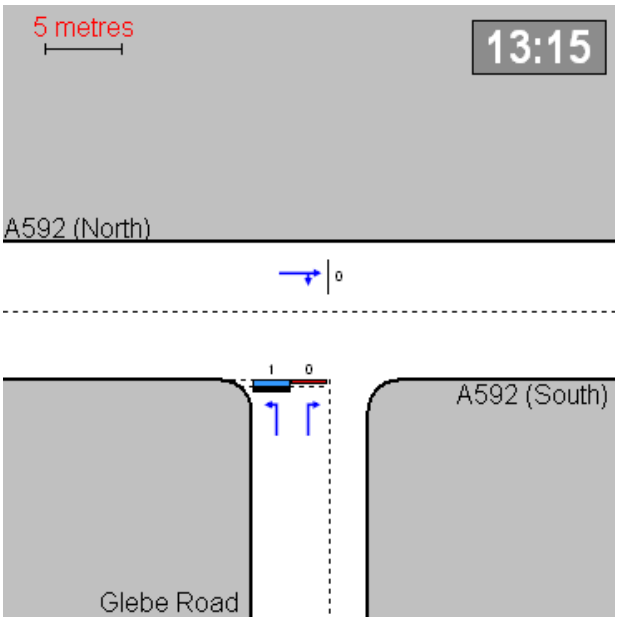
Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	217.5	145.0	61.0	0.3	61.0	0.3
B-C	543.7	362.5	268.7	0.5	268.7	0.5
C-AB	102.3	68.2	16.6	0.2	16.6	0.2
C-A	452.4	301.6	-	-	-	-
A-B	60.6	40.4	-	-	-	-
A-C	611.1	407.4	-	-	-	-
All	**1987.6**	**1325.0**	**346.2**	**0.2**	**346.3**	**0.2**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

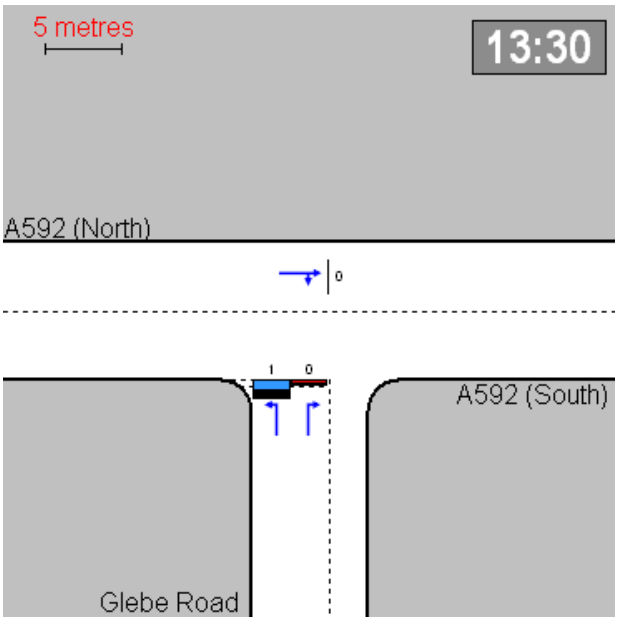
Queue Diagrams

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30
View Extent: 40m

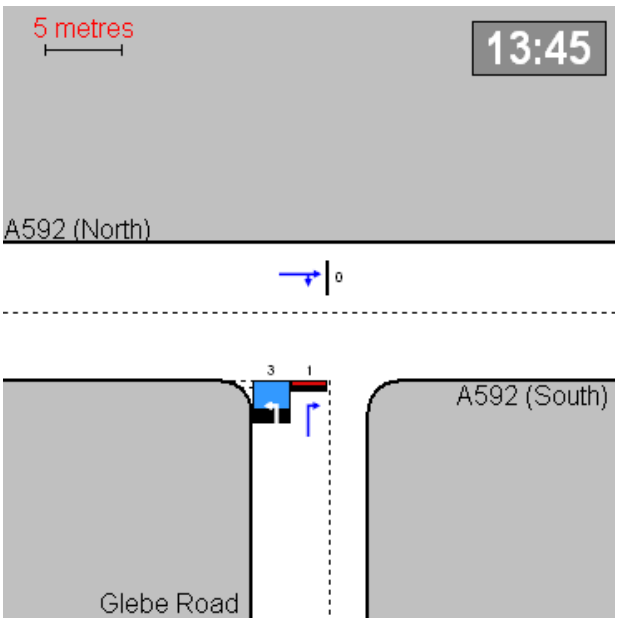
Queue Interval 1: 13:00-13:15



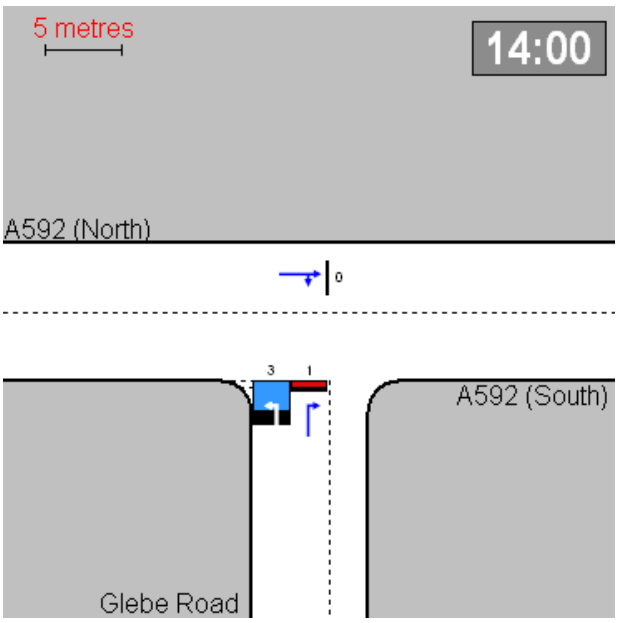
Queue Interval 2: 13:15-13:30



Queue Interval 3: 13:30-13:45

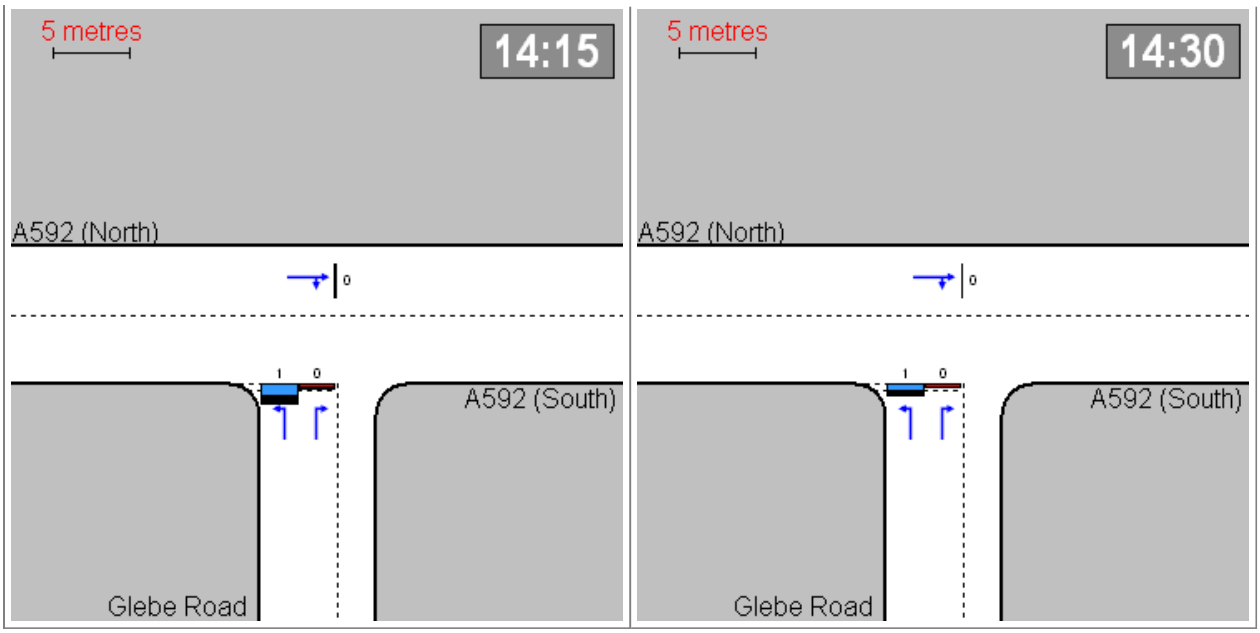


Queue Interval 4: 13:45-14:00



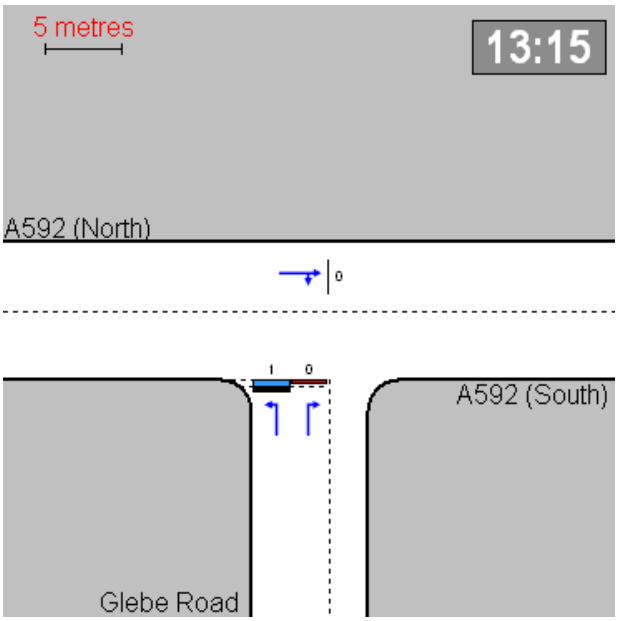
Queue Interval 5: 14:00-14:15

Queue Interval 6: 14:15-14:30

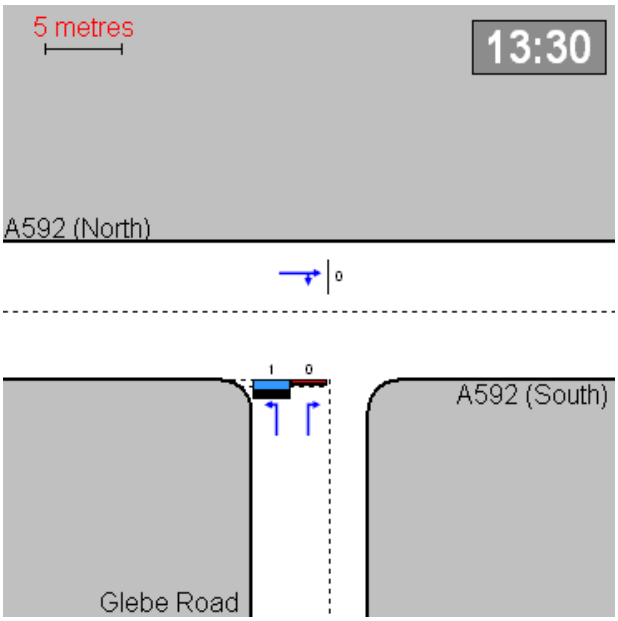

5 metres
14:15
A592 (North)
A592 (South)
Glebe Road
5 metres
14:30
A592 (North)
A592 (South)
Glebe Road

Demand Set: Peak Hour 2015
Modelling Period: 13:00-14:30
View Extent: 40m

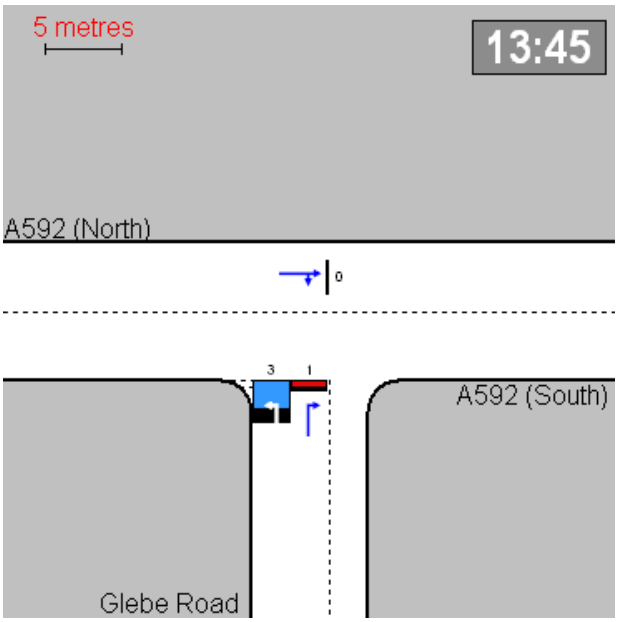
Queue Interval 1: 13:00-13:15



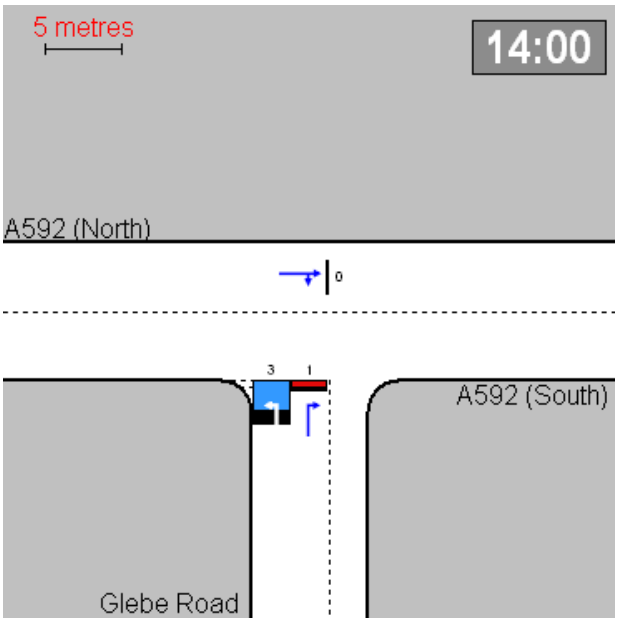
Queue Interval 2: 13:15-13:30



Queue Interval 3: 13:30-13:45

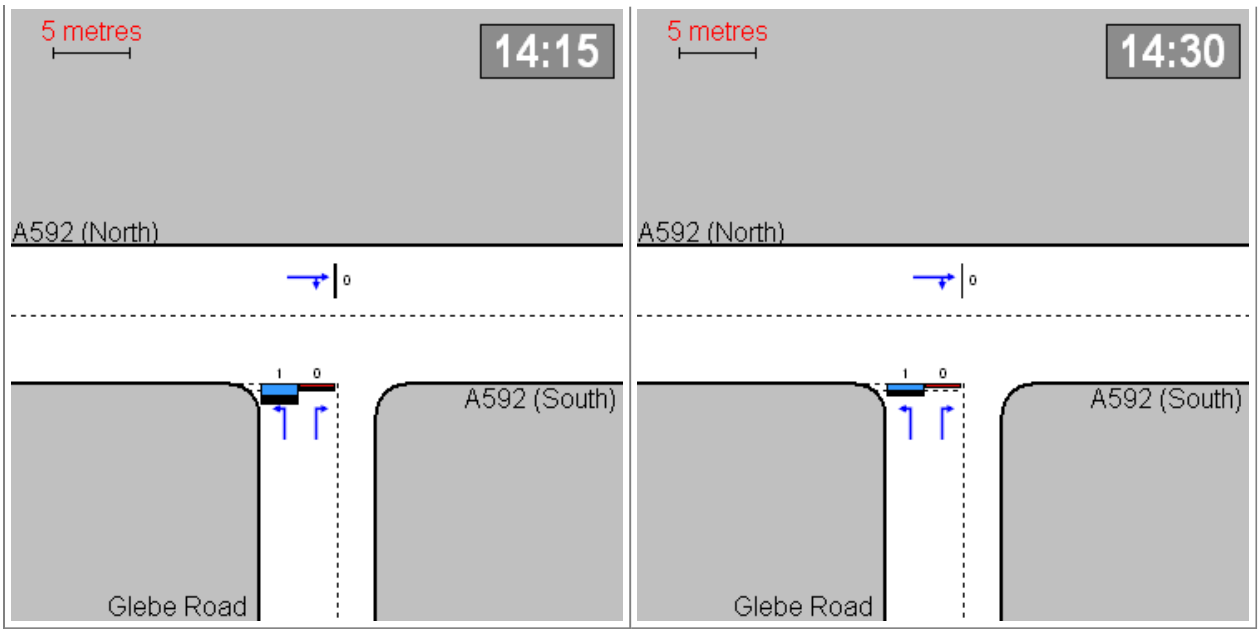


Queue Interval 4: 13:45-14:00



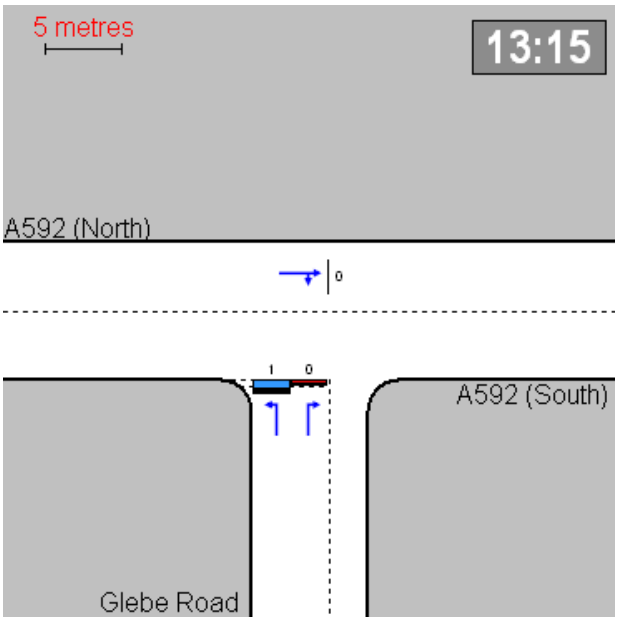
Queue Interval 5: 14:00-14:15

Queue Interval 6: 14:15-14:30

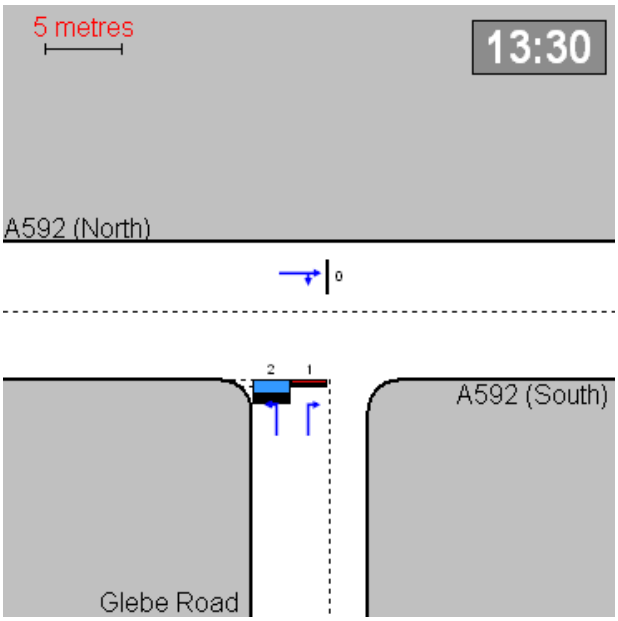

5 metres
14:15
A592 (North)
A592 (South)
Glebe Road
5 metres
14:30
A592 (North)
A592 (South)
Glebe Road

Demand Set: Peak Hour 2020
Modelling Period: 13:00-14:30
View Extent: 40m

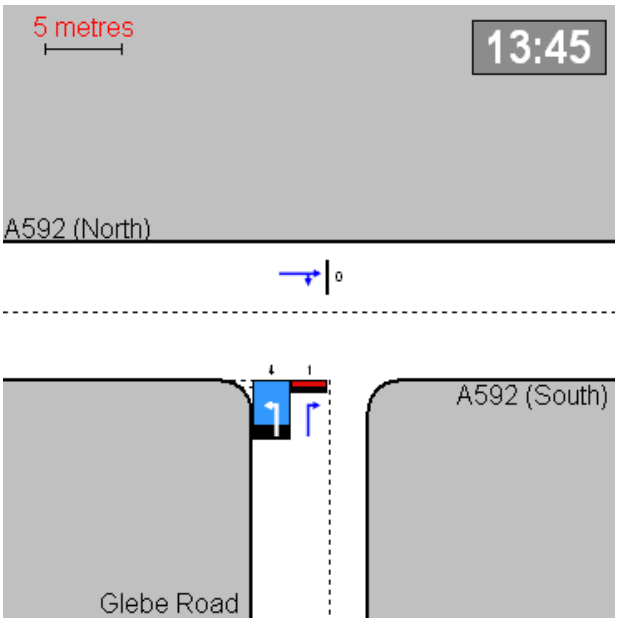
Queue Interval 1: 13:00-13:15



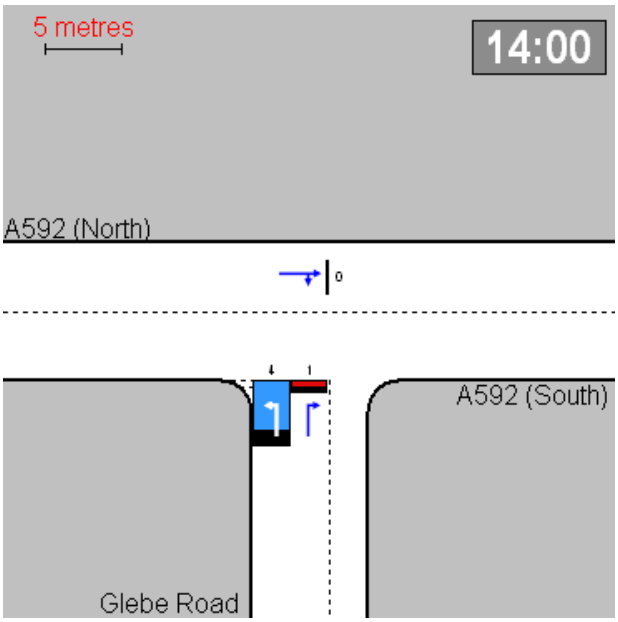
Queue Interval 2: 13:15-13:30



Queue Interval 3: 13:30-13:45

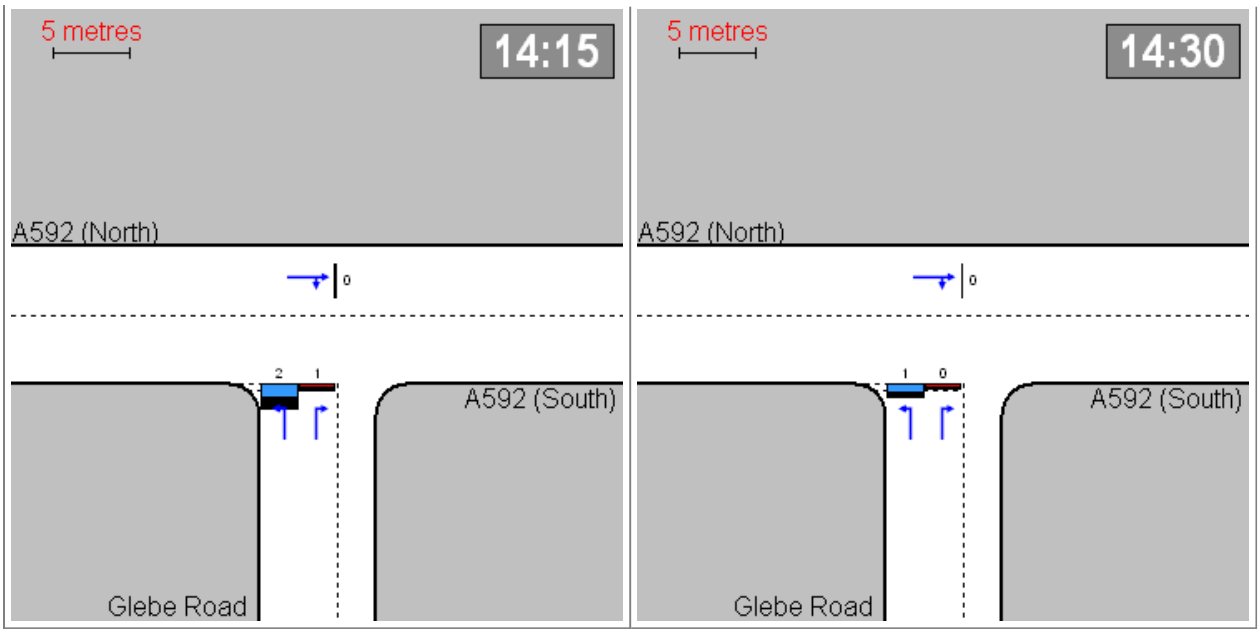


Queue Interval 4: 13:45-14:00



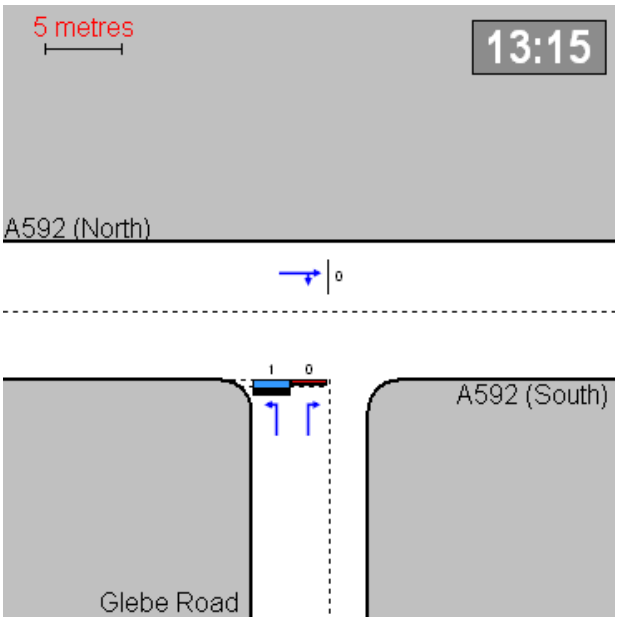
Queue Interval 5: 14:00-14:15

Queue Interval 6: 14:15-14:30

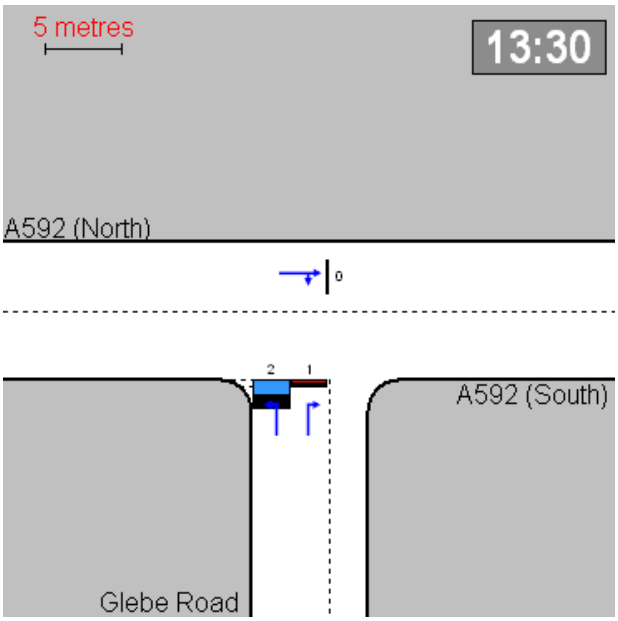

5 metres
14:15
A592 (North)
A592 (South)
Glebe Road
5 metres
14:30
A592 (North)
A592 (South)
Glebe Road

Demand Set: Peak Hour 2025
Modelling Period: 13:00-14:30
View Extent: 40m

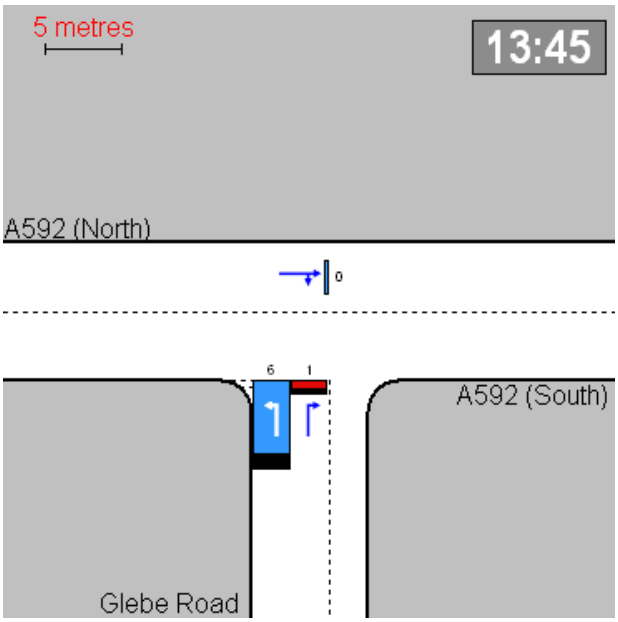
Queue Interval 1: 13:00-13:15



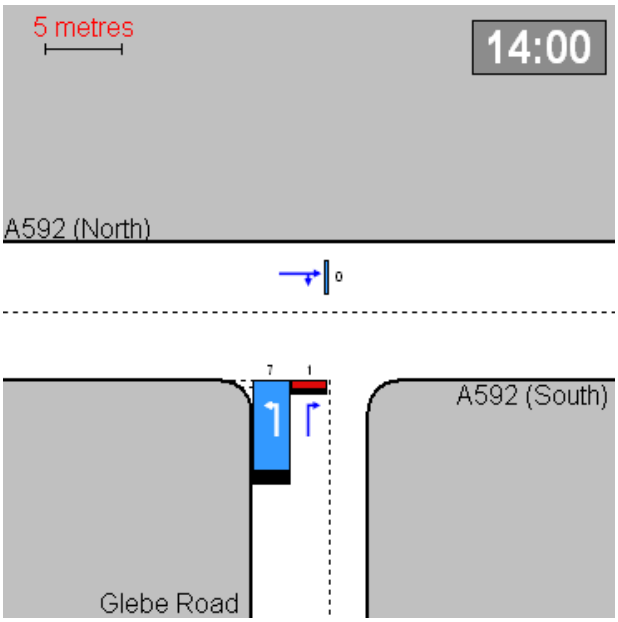
Queue Interval 2: 13:15-13:30



Queue Interval 3: 13:30-13:45

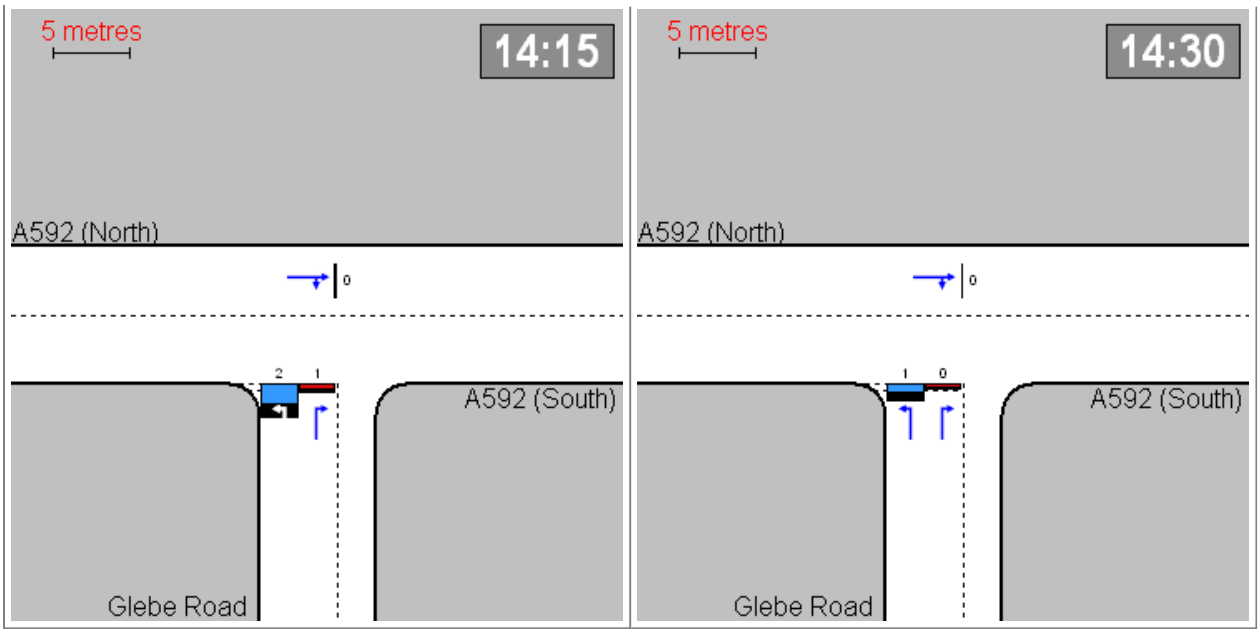


Queue Interval 4: 13:45-14:00



Queue Interval 5: 14:00-14:15

Queue Interval 6: 14:15-14:30



PICADY 5 Run Successful

PICADY
GUI Version: 5.1 AE Analysis Program Release: 5.0 (MAY 2010) © Copyright TRL Limited, 2010 Adapted from PICADY/3 which is Crown Copyright by permission of the controller of HMSO
For sales and distribution information, program advice and maintenance, contact:
TRL Limited Crowthorne House Nine Mile Ride Wokingham, Berks. RG40 3GA, UK Tel: +44 (0)1344 770758 Fax:+44 (0)1344 770864 E-mail: software@trl.co.uk Web: www.trlsoftware.co.uk
The user of this computer program for the solution of an engineering problem is in no way relieved of their responsibility for the correctness of the solution

Run Analysis

Parameter	Values
File Run	H:\..\Northern Glebe Road Junction\Site 1.vpi
Date Run	29 June 2012
Time Run	08:19:40
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	A592 (South)	100
Arm B	Glebe Road	100
Arm C	A592 (North)	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	Glebe Road / A592 Junction (Site 1)
Location	Bowness-on-Windermere
Date	25 June 2012
Enumerator	mcgaj [WE703147]
Job Number	32588-01
Status	TIA
Client	Lake District National Park
Description	Peak Weekend Hour at Site 1 is 13:00 - 14:00 on Sunday 3rd June 2012

Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

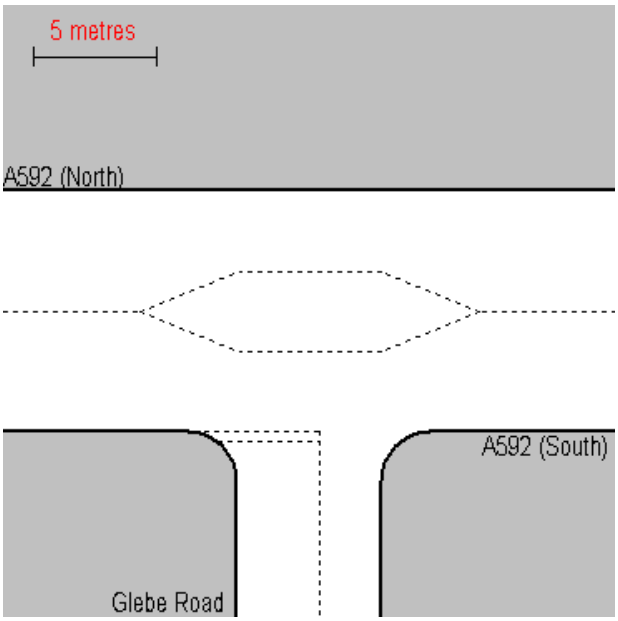
Parameter	Minor Arm B
Major Road Carriageway Width (m)	6.50
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	3.30
Minor Road First Lane Width (m)	3.35
Minor Road Visibility To Right (m)	0
Minor Road Visibility To Left (m)	0
Major Road Right Turn Visibility (m)	120
Major Road Right Turn Blocks Traffic	Yes (if over 6 veh)

Slope and Intercept Values

Stream	Intercept for Stream	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	494.596	0.088	0.223	0.140	0.318
B-C	645.800	0.097	0.245	-	-
C-B	720.490	0.273	0.273	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	12:45-14:15	90	15

ODTAB Turning Counts

Demand Set: Peak Hour 2012
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	208.0	563.0
Arm B	0.0	0.0	0.0
Arm C	406.0	258.0	0.0

Demand Set: Peak Hour 2015
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	209.0	566.0
Arm B	0.0	0.0	0.0
Arm C	408.0	260.0	0.0

Demand Set: Peak Hour 2020
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	222.0	601.0
Arm B	0.0	0.0	0.0
Arm C	434.0	276.0	0.0

Demand Set: Peak Hour 2025
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	235.0	637.0
Arm B	0.0	0.0	0.0
Arm C	459.0	292.0	0.0

ODTAB Synthesised Flows

Demand Set: Peak Hour 2012
Modelling Period: 12:45-14:15

Arm	Rising Time	Rising Flow (veh/min)	Peak Time	Peak Flow (veh/min)	Falling Time	Falling Flow (veh/min)
Arm A	13:00	9.637	13:30	14.456	14:00	9.637
Arm B	13:00	0.000	13:30	0.000	14:00	0.000
Arm C	13:00	8.300	13:30	12.450	14:00	8.300

Heavy Vehicles Percentages

Demand Set: Peak Hour 2012
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	-	2.4	1.1
Arm B	0.0	-	0.0
Arm C	0.7	0.0	-

Demand Set: Peak Hour 2015
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	-	2.4	1.1
Arm B	0.0	-	0.0
Arm C	0.7	0.0	-

Demand Set: Peak Hour 2020
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	-	2.4	1.1
Arm B	0.0	-	0.0
Arm C	0.7	0.0	-

Demand Set: Peak Hour 2025
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	-	2.4	1.1
Arm B	0.0	-	0.0
Arm C	0.7	0.0	-

Queues & Delays

Demand Set: Peak Hour 2012
Modelling Period: 12:45-14:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
12:45-13:00	B-AC	0.00	5.54	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.24	9.33	0.347	-	0.00	0.52	-	7.7	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.61	-	-	-	-	-	-	-	-
	A-C	7.06	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-AC	0.00	4.89	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.87	8.81	0.439	-	0.52	0.77	-	11.5	0.20
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.12	-	-	-	-	-	-	-	-
	A-C	8.44	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-AC	0.00	3.94	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	4.73	8.09	0.585	-	0.77	1.39	-	20.5	0.29
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.82	-	-	-	-	-	-	-	-
	A-C	10.33	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-AC	0.00	3.93	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	4.73	8.09	0.585	-	1.39	1.43	-	21.8	0.30
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.82	-	-	-	-	-	-	-	-
	A-C	10.33	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-AC	0.00	4.87	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.87	8.81	0.439	-	1.43	0.80	-	12.3	0.21
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.12	-	-	-	-	-	-	-	-
	A-C	8.44	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-AC	0.00	5.52	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.24	9.33	0.347	-	0.80	0.54	-	8.2	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.61	-	-	-	-	-	-	-	-
	A-C	7.06	-	-	-	-	-	-	-	-

Demand Set: Peak Hour 2015
Modelling Period: 12:45-14:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
12:45-13:00	B-AC	0.00	5.52	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.26	9.31	0.350	-	0.00	0.53	-	7.8	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.62	-	-	-	-	-	-	-	-
	A-C	7.10	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-AC	0.00	4.87	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.90	8.79	0.443	-	0.53	0.78	-	11.7	0.20
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.13	-	-	-	-	-	-	-	-
	A-C	8.48	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-AC	0.00	3.91	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	4.77	8.07	0.591	-	0.78	1.43	-	21.0	0.30
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.84	-	-	-	-	-	-	-	-
	A-C	10.39	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-AC	0.00	3.90	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	4.77	8.07	0.591	-	1.43	1.46	-	22.4	0.30
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.84	-	-	-	-	-	-	-	-
	A-C	10.39	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-AC	0.00	4.85	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.90	8.79	0.443	-	1.46	0.82	-	12.5	0.21
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.13	-	-	-	-	-	-	-	-
	A-C	8.48	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-AC	0.00	5.50	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.26	9.31	0.350	-	0.82	0.55	-	8.3	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.62	-	-	-	-	-	-	-	-
	A-C	7.10	-	-	-	-	-	-	-	-

Demand Set: Peak Hour 2020
Modelling Period: 12:45-14:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
12:45-13:00	B-AC	0.00	5.32	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.46	9.15	0.379	-	0.00	0.60	-	8.8	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.79	-	-	-	-	-	-	-	-
	A-C	7.54	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-AC	0.00	4.61	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	4.14	8.59	0.481	-	0.60	0.91	-	13.6	0.22
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.33	-	-	-	-	-	-	-	-
	A-C	9.00	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-AC	0.00	3.56	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	5.06	7.82	0.647	-	0.91	1.83	-	26.5	0.35
	C-A	-	-	-	-	-	-	-	-	-
	A-B	4.07	-	-	-	-	-	-	-	-
	A-C	11.03	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-AC	0.00	3.54	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	5.06	7.82	0.647	-	1.83	1.90	-	29.1	0.36
	C-A	-	-	-	-	-	-	-	-	-
	A-B	4.07	-	-	-	-	-	-	-	-
	A-C	11.03	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-AC	0.00	4.59	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	4.14	8.59	0.481	-	1.90	0.96	-	14.8	0.23
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.33	-	-	-	-	-	-	-	-
	A-C	9.00	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-AC	0.00	5.30	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.46	9.15	0.379	-	0.96	0.62	-	9.4	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.79	-	-	-	-	-	-	-	-
	A-C	7.54	-	-	-	-	-	-	-	-

Demand Set: Peak Hour 2025
Modelling Period: 12:45-14:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
12:45-13:00	B-AC	0.00	5.11	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.66	8.98	0.408	-	0.00	0.68	-	10.0	0.19
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.95	-	-	-	-	-	-	-	-
	A-C	7.99	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-AC	0.00	4.35	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	4.38	8.39	0.522	-	0.68	1.07	-	15.9	0.25
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.52	-	-	-	-	-	-	-	-
	A-C	9.54	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-AC	0.00	3.20	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	5.36	7.58	0.707	-	1.07	2.44	-	34.4	0.42
	C-A	-	-	-	-	-	-	-	-	-
	A-B	4.31	-	-	-	-	-	-	-	-
	A-C	11.69	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-AC	0.00	3.17	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	5.36	7.58	0.707	-	2.44	2.58	-	39.9	0.45
	C-A	-	-	-	-	-	-	-	-	-
	A-B	4.31	-	-	-	-	-	-	-	-
	A-C	11.69	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-AC	0.00	4.31	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	4.38	8.39	0.522	-	2.58	1.15	-	17.8	0.26
	C-A	-	-	-	-	-	-	-	-	-
	A-B	3.52	-	-	-	-	-	-	-	-
	A-C	9.54	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-AC	0.00	5.09	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	3.66	8.98	0.408	-	1.15	0.71	-	10.7	0.19
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.95	-	-	-	-	-	-	-	-
	A-C	7.99	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Peak Hour 2012
Modelling Period: 12:45-14:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	0.0	0.0	0.0	0.0	0.0	0.0
C-AB	355.1	236.7	81.9	0.2	81.9	0.2
C-A	-	-	-	-	-	-
A-B	286.3	190.9	-	-	-	-
A-C	774.9	516.6	-	-	-	-
All	**1975.2**	**1316.8**	**81.9**	**0.0**	**81.9**	**0.0**

Demand Set: Peak Hour 2015
Modelling Period: 12:45-14:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	0.0	0.0	0.0	0.0	0.0	0.0
C-AB	357.9	238.6	83.7	0.2	83.7	0.2
C-A	-	-	-	-	-	-
A-B	287.7	191.8	-	-	-	-
A-C	779.1	519.4	-	-	-	-
All	**1986.2**	**1324.1**	**83.7**	**0.0**	**83.7**	**0.0**

Demand Set: Peak Hour 2020
Modelling Period: 12:45-14:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	0.0	0.0	0.0	0.0	0.0	0.0
C-AB	379.9	253.3	102.2	0.3	102.3	0.3
C-A	-	-	-	-	-	-
A-B	305.6	203.7	-	-	-	-
A-C	827.2	551.5	-	-	-	-
All	**2110.1**	**1406.7**	**102.2**	**0.0**	**102.3**	**0.0**

Demand Set: Peak Hour 2025
Modelling Period: 12:45-14:15

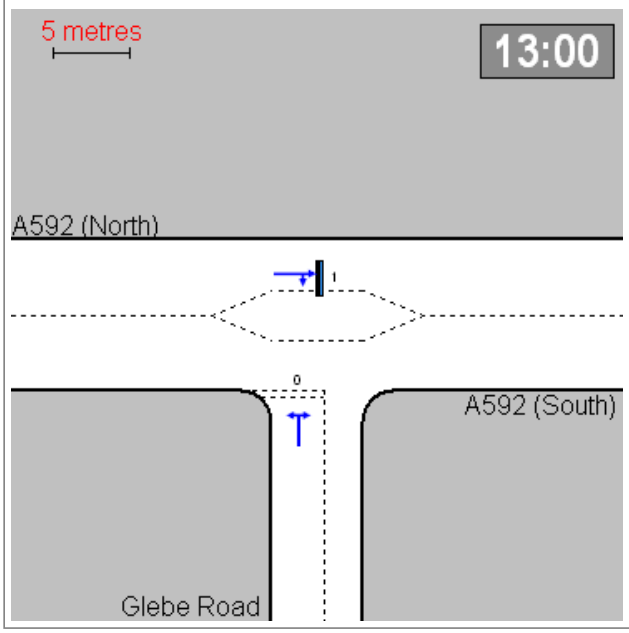
Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	0.0	0.0	0.0	0.0	0.0	0.0
C-AB	401.9	267.9	128.7	0.3	128.8	0.3
C-A	-	-	-	-	-	-
A-B	323.5	215.6	-	-	-	-
A-C	876.8	584.5	-	-	-	-
All	**2233.9**	**1489.3**	**128.7**	**0.1**	**128.8**	**0.1**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

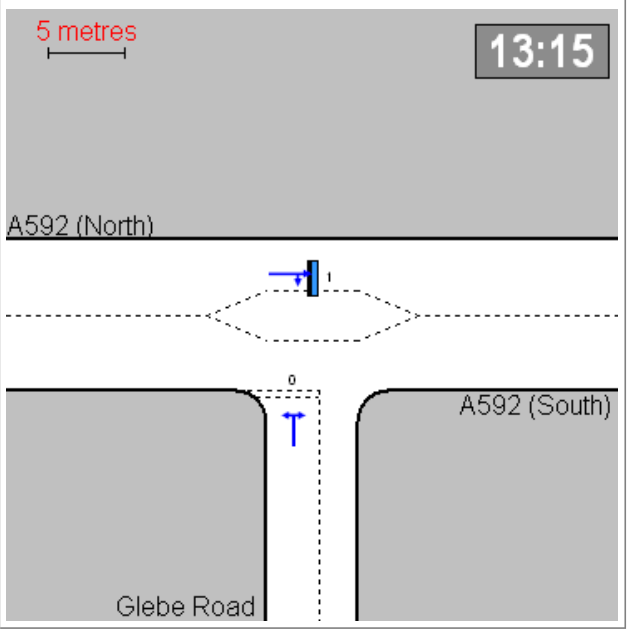
Queue Diagrams

Demand Set: Peak Hour 2012
Modelling Period: 12:45-14:15
View Extent: 40m

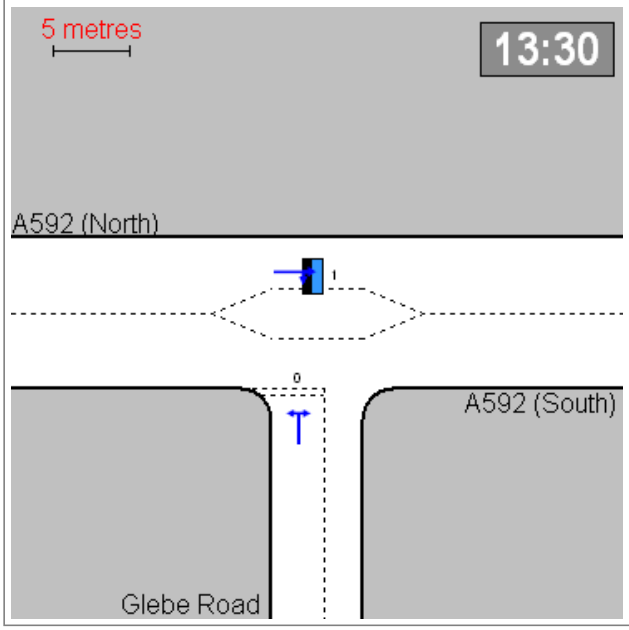
Queue Interval 1: 12:45-13:00



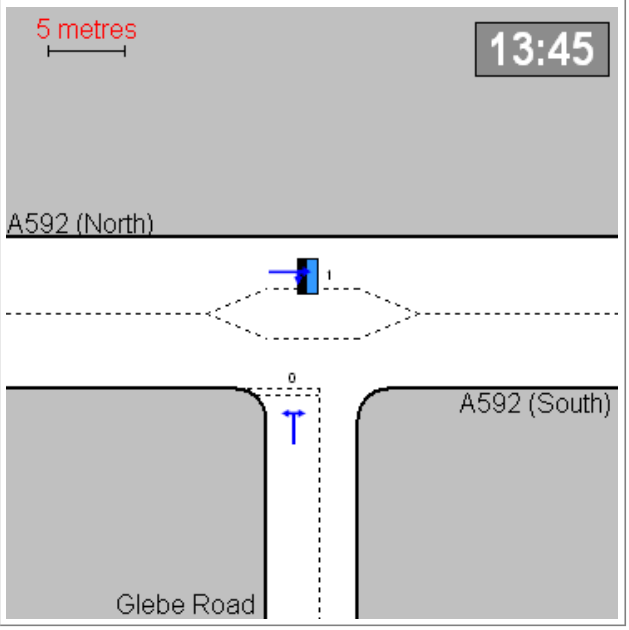
Queue Interval 2: 13:00-13:15



Queue Interval 3: 13:15-13:30

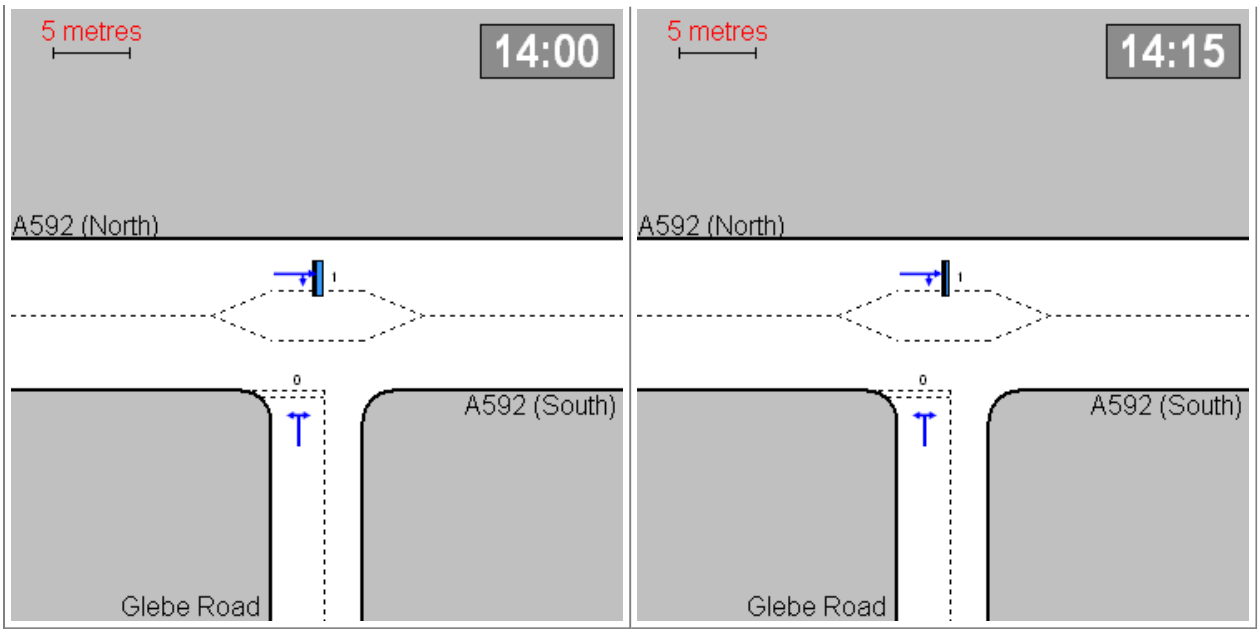


Queue Interval 4: 13:30-13:45



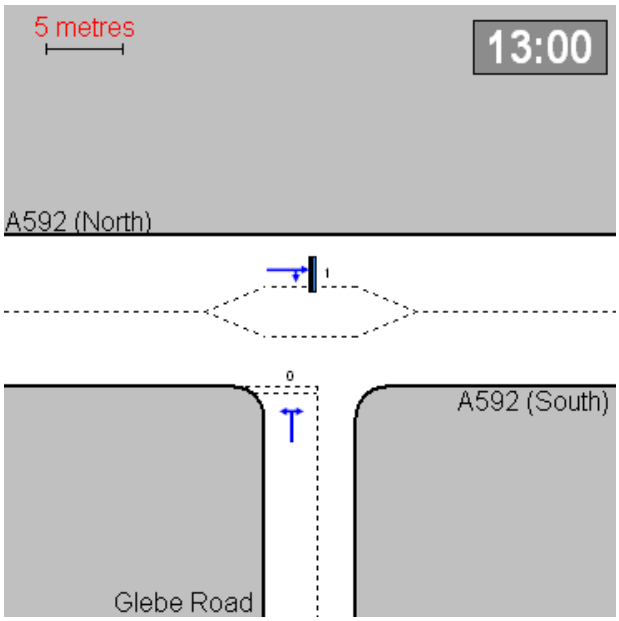
Queue Interval 5: 13:45-14:00

Queue Interval 6: 14:00-14:15

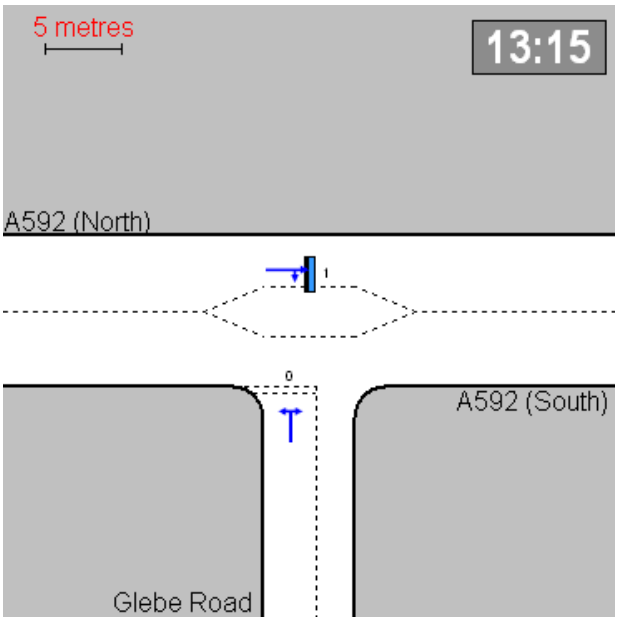

5 metres
14:00
A592 (North)
A592 (South)
Glebe Road
5 metres
14:15
A592 (North)
A592 (South)
Glebe Road

Demand Set: Peak Hour 2015
Modelling Period: 12:45-14:15
View Extent: 40m

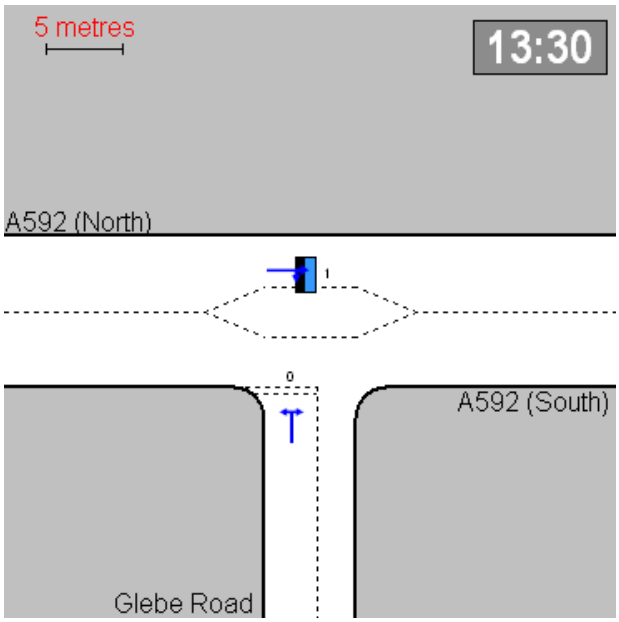
Queue Interval 1: 12:45-13:00



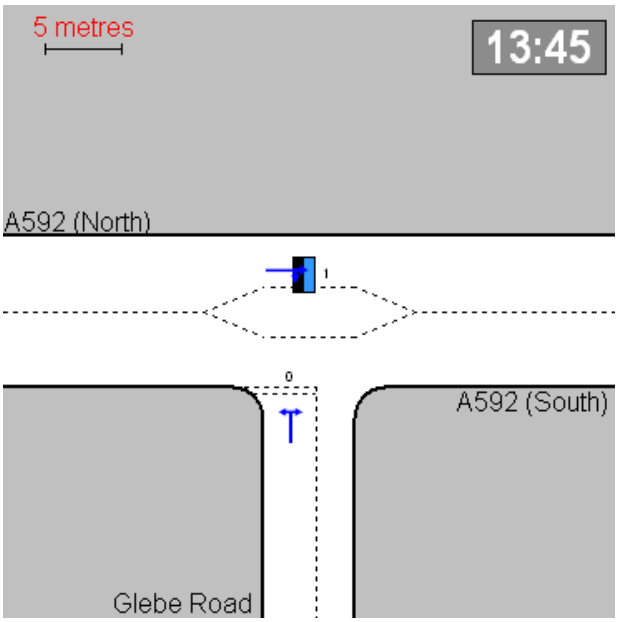
Queue Interval 2: 13:00-13:15



Queue Interval 3: 13:15-13:30

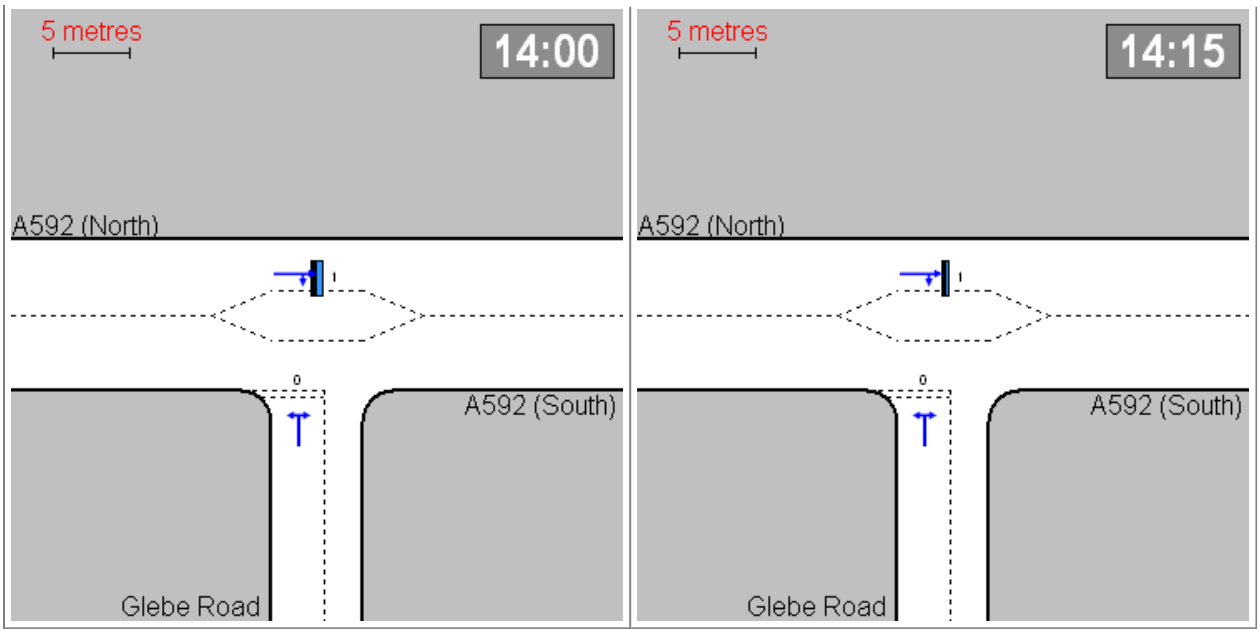


Queue Interval 4: 13:30-13:45



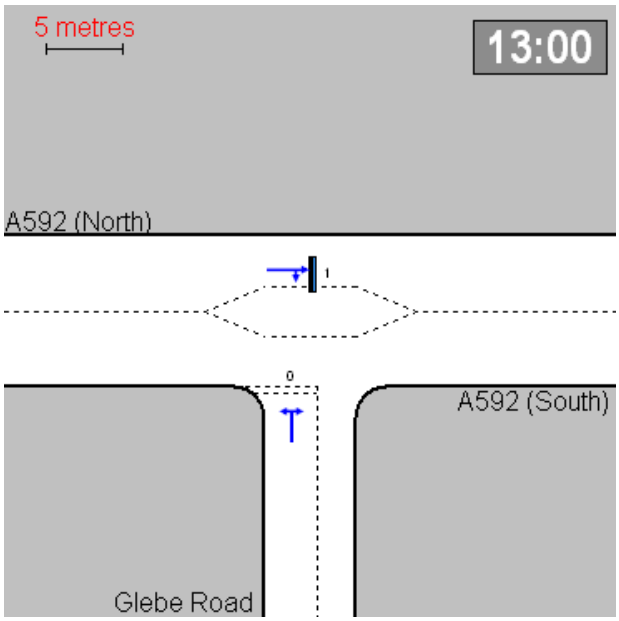
Queue Interval 5: 13:45-14:00

Queue Interval 6: 14:00-14:15

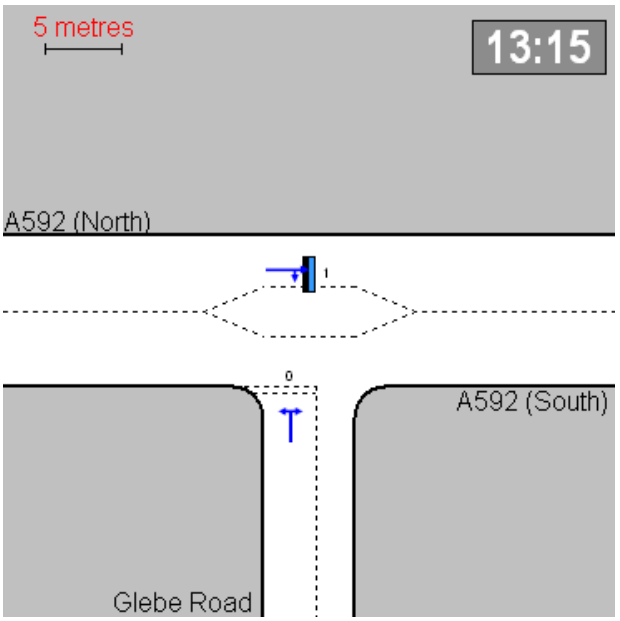

5 metres
14:00
A592 (North)
A592 (South)
Glebe Road
5 metres
14:15
A592 (North)
A592 (South)
Glebe Road

Demand Set: Peak Hour 2020
Modelling Period: 12:45-14:15
View Extent: 40m

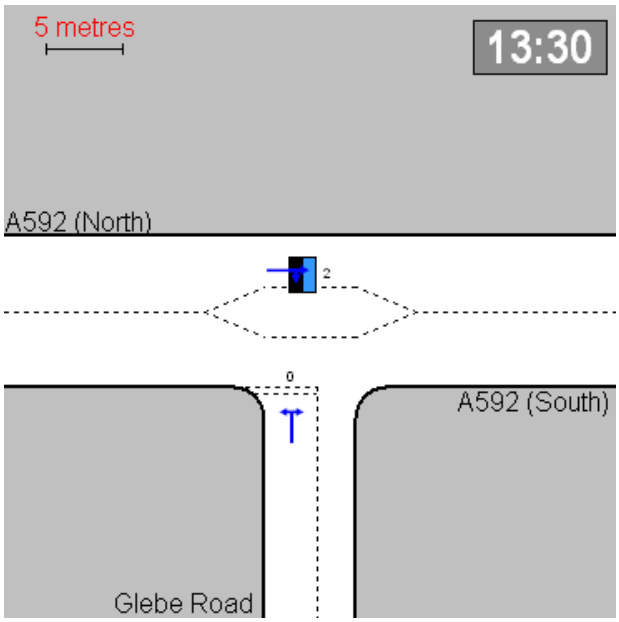
Queue Interval 1: 12:45-13:00



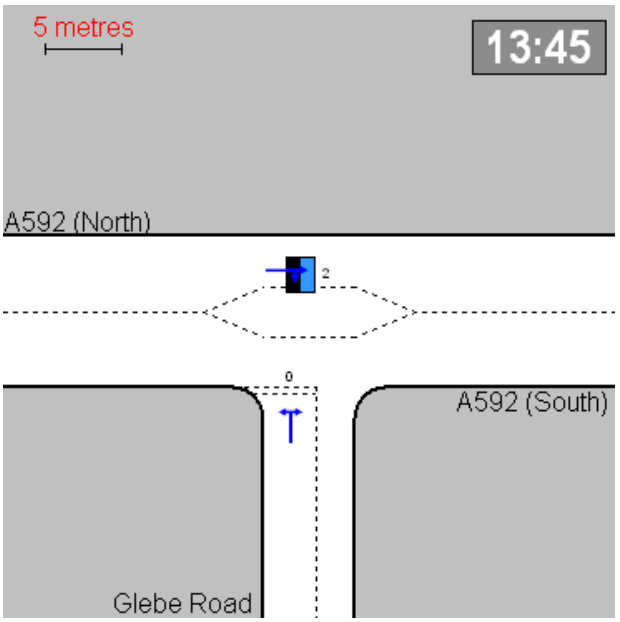
Queue Interval 2: 13:00-13:15



Queue Interval 3: 13:15-13:30

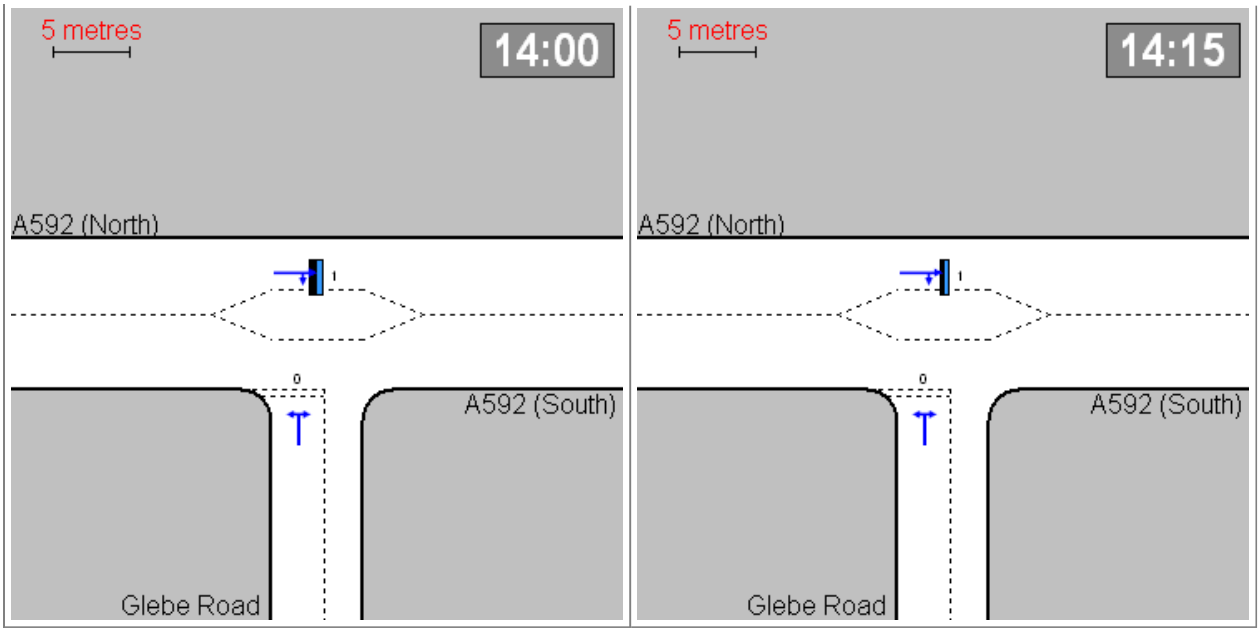


Queue Interval 4: 13:30-13:45



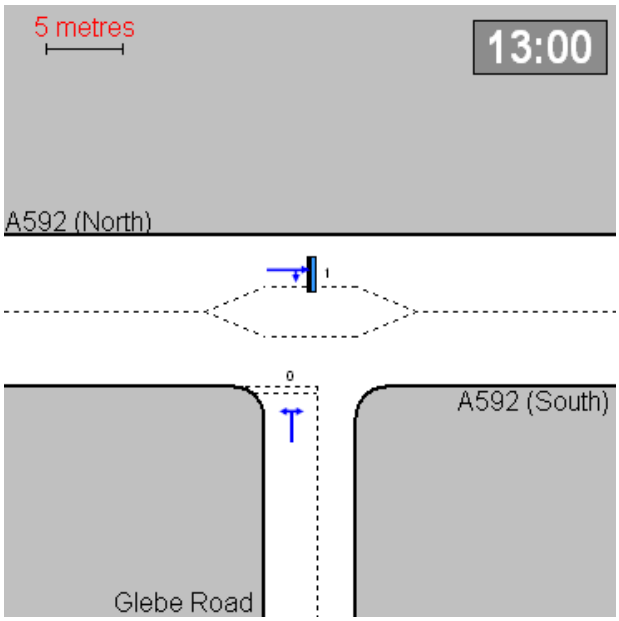
Queue Interval 5: 13:45-14:00

Queue Interval 6: 14:00-14:15

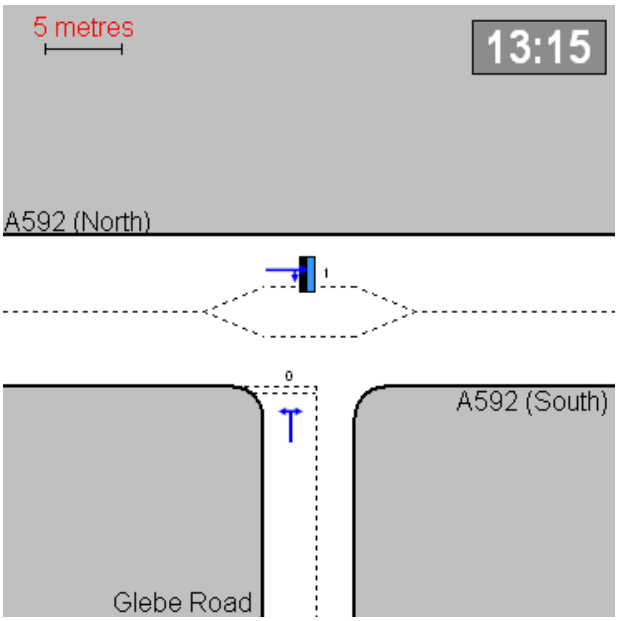

5 metres
14:00
A592 (North)
A592 (South)
Glebe Road
5 metres
14:15
A592 (North)
A592 (South)
Glebe Road

Demand Set: Peak Hour 2025
Modelling Period: 12:45-14:15
View Extent: 40m

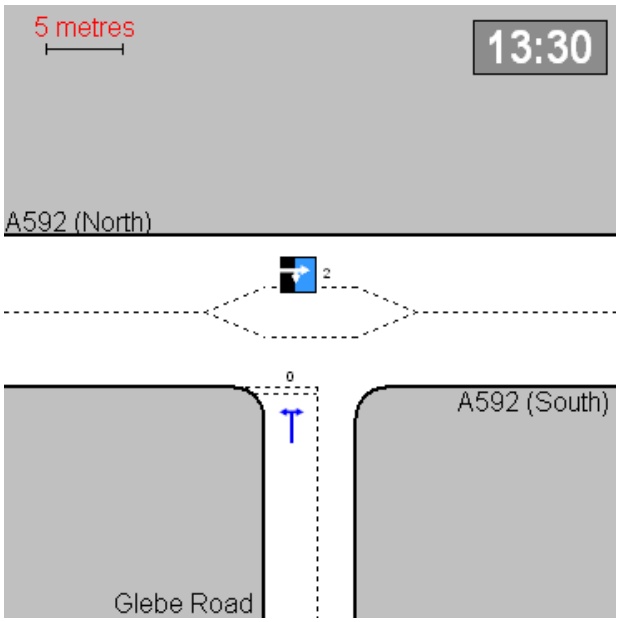
Queue Interval 1: 12:45-13:00



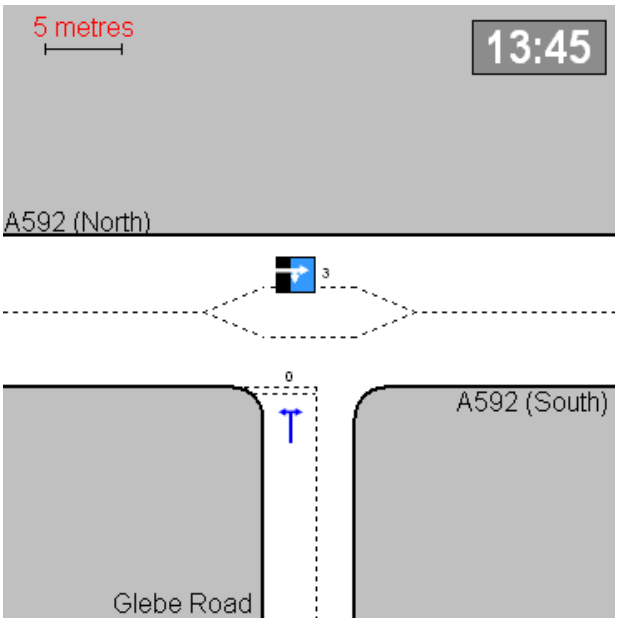
Queue Interval 2: 13:00-13:15



Queue Interval 3: 13:15-13:30

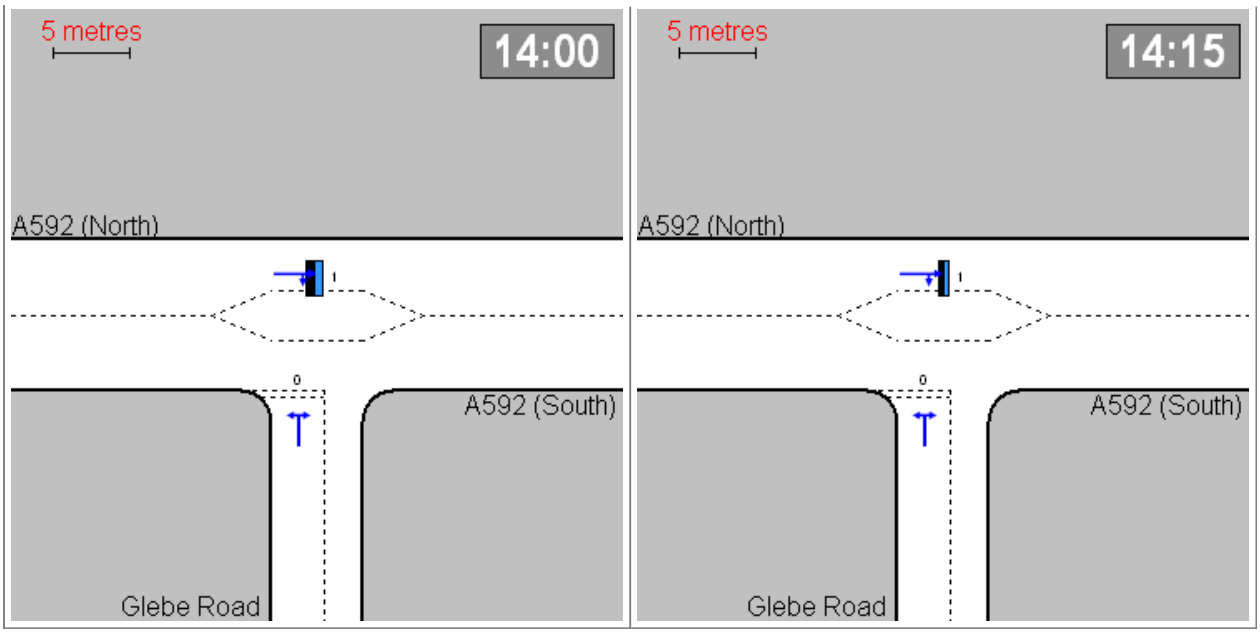


Queue Interval 4: 13:30-13:45



Queue Interval 5: 13:45-14:00

Queue Interval 6: 14:00-14:15



PICADY 5 Run Successful

Appendix E
Junction Capacity Assessments – Do Something Scenario

PICADY
GUI Version: 5.1 AE Analysis Program Release: 5.0 (MAY 2010)
For sales and distribution information, program advice and maintenance, contact:
TRL Limited Crowthorne House Nine Mile Ride Wokingham, Berks. RG40 3GA, UK Tel: +44 (0)1344 770758 Fax:+44 (0)1344 770864 E-mail: software@trl.co.uk Web: www.trlsoftware.co.uk
The user of this computer program for the solution of an engineering problem is in no way relieved of their responsibility for the correctness of the solution

Run Analysis

Parameter	Values
File Run	H:\..\Southern Glebe Road Junction\Site 2 with Displaced Site 1 Traffic.vpi
Date Run	29 June 2012
Time Run	08:48:51
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	A592 (South)	100
Arm B	Glebe Road	100
Arm C	A592 (North)	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	Glebe Road / A592 Junction (Site 2)
Location	Bowness-on-Windermere
Date	26 June 2012
Enumerator	mcgaj [WE703147]
Job Number	32588-01
Status	TIA
Client	Lake District National Park
Description	Peak Weekend Hour at Site 2 is 13:15 - 14:15 on Sunday 3rd June 2012

Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

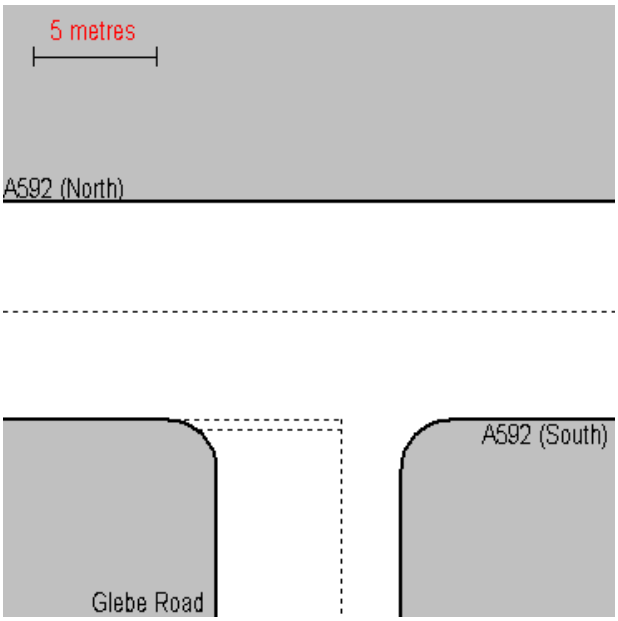
Parameter	Minor Arm B
Major Road Carriageway Width (m)	6.65
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	2.20
Minor Road First Lane Width (m)	2.50
Minor Road Second Lane Width (m)	2.50
Minor Road Visibility To Right (m)	160
Minor Road Visibility To Left (m)	33
Major Road Right Turn Visibility (m)	75
Major Road Right Turn Blocks Traffic	Yes (if over 0 veh)

Slope and Intercept Values

Stream	Intercept for Stream	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	538.683	0.095	0.241	0.152	0.344
B-C	688.386	0.103	0.259	-	-
C-B	617.396	0.232	0.232	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	13:00-14:30	90	15

ODTAB Turning Counts

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	216.0	216.0
Arm B	140.0	0.0	349.0
Arm C	320.0	297.0	0.0

Demand Set: Peak Hour 2015
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	217.0	217.0
Arm B	141.0	0.0	351.0
Arm C	322.0	299.0	0.0

Demand Set: Peak Hour 2020
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	231.0	231.0
Arm B	150.0	0.0	373.0
Arm C	342.0	317.0	0.0

Demand Set: Peak Hour 2025
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	244.0	244.0
Arm B	158.0	0.0	395.0
Arm C	362.0	336.0	0.0

ODTAB Synthesised Flows

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30

Arm	Rising Time	Rising Flow (veh/min)	Peak Time	Peak Flow (veh/min)	Falling Time	Falling Flow (veh/min)
Arm A	13:15	5.400	13:45	8.100	14:15	5.400
Arm B	13:15	6.113	13:45	9.169	14:15	6.113
Arm C	13:15	7.713	13:45	11.569	14:15	7.713

Heavy Vehicles Percentages

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	-	2.0	0.0
Arm B	0.0	-	0.9
Arm C	0.3	0.0	-

Demand Set: Peak Hour 2015
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	-	2.0	0.0
Arm B	0.9	-	0.0
Arm C	0.3	0.0	-

Demand Set: Peak Hour 2020
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.9	-	0.0
Arm C	0.3	2.0	-

Demand Set: Peak Hour 2025
Modelling Period: 13:00-14:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.9	-	0.0
Arm C	0.3	2.0	-

Queues & Delays

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-A	1.76	6.17	0.285	-	0.00	0.39	-	5.5	0.22
	B-C	4.38	9.65	0.454	-	0.00	0.81	-	11.4	0.19
	C-AB	5.63	11.82	0.476	-	0.00	1.15	-	16.8	0.16
	C-A	2.11	-	-	-	-	-	-	-	-
	A-B	2.71	-	-	-	-	-	-	-	-
	A-C	2.71	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-A	2.10	5.60	0.375	-	0.39	0.58	-	8.3	0.28
	B-C	5.23	9.24	0.566	-	0.81	1.26	-	17.8	0.25
	C-AB	7.38	12.18	0.606	-	1.15	1.97	-	29.7	0.21
	C-A	1.87	-	-	-	-	-	-	-	-
	A-B	3.24	-	-	-	-	-	-	-	-
	A-C	3.24	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-A	2.57	4.83	0.532	-	0.58	1.07	-	14.8	0.43
	B-C	6.40	8.60	0.745	-	1.26	2.64	-	35.0	0.42
	C-AB	10.23	12.68	0.807	-	1.97	4.98	-	72.4	0.37
	C-A	1.09	-	-	-	-	-	-	-	-
	A-B	3.96	-	-	-	-	-	-	-	-
	A-C	3.96	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-A	2.57	4.78	0.537	-	1.07	1.12	-	16.5	0.45
	B-C	6.40	8.57	0.747	-	2.64	2.79	-	40.9	0.45
	C-AB	10.34	12.75	0.811	-	4.98	5.42	-	85.2	0.43
	C-A	0.98	-	-	-	-	-	-	-	-
	A-B	3.96	-	-	-	-	-	-	-	-
	A-C	3.96	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-A	2.10	5.53	0.379	-	1.12	0.63	-	10.1	0.30
	B-C	5.23	9.20	0.568	-	2.79	1.36	-	22.2	0.26
	C-AB	7.48	12.28	0.610	-	5.42	2.20	-	36.5	0.23
	C-A	1.76	-	-	-	-	-	-	-	-
	A-B	3.24	-	-	-	-	-	-	-	-
	A-C	3.24	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:15-14:30	B-A	1.76	6.13	0.287	-	0.63	0.41	-	6.4	0.23
	B-C	4.38	9.63	0.455	-	1.36	0.85	-	13.5	0.19
	C-AB	5.67	11.86	0.479	-	2.20	1.23	-	18.8	0.17
	C-A	2.07	-	-	-	-	-	-	-	-
	A-B	2.71	-	-	-	-	-	-	-	-
	A-C	2.71	-	-	-	-	-	-	-	-

Demand Set: Peak Hour 2015
Modelling Period: 13:00-14:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-A	1.77	6.10	0.290	-	0.00	0.40	-	5.6	0.23
	B-C	4.40	9.72	0.453	-	0.00	0.81	-	11.4	0.18
	C-AB	5.68	11.83	0.480	-	0.00	1.17	-	17.1	0.16
	C-A	2.11	-	-	-	-	-	-	-	-
	A-B	2.72	-	-	-	-	-	-	-	-
	A-C	2.72	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-A	2.11	5.53	0.382	-	0.40	0.60	-	8.5	0.29
	B-C	5.26	9.30	0.566	-	0.81	1.26	-	17.8	0.24
	C-AB	7.45	12.19	0.611	-	1.17	2.02	-	30.4	0.21
	C-A	1.85	-	-	-	-	-	-	-	-
	A-B	3.25	-	-	-	-	-	-	-	-
	A-C	3.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-A	2.59	4.77	0.543	-	0.60	1.12	-	15.3	0.44
	B-C	6.44	8.64	0.745	-	1.26	2.65	-	35.2	0.42
	C-AB	10.35	12.70	0.815	-	2.02	5.18	-	75.1	0.38
	C-A	1.05	-	-	-	-	-	-	-	-
	A-B	3.98	-	-	-	-	-	-	-	-
	A-C	3.98	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-A	2.59	4.71	0.549	-	1.12	1.17	-	17.3	0.47
	B-C	6.44	8.61	0.748	-	2.65	2.80	-	41.1	0.45
	C-AB	10.46	12.78	0.818	-	5.18	5.66	-	89.3	0.44
	C-A	0.94	-	-	-	-	-	-	-	-
	A-B	3.98	-	-	-	-	-	-	-	-
	A-C	3.98	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-A	2.11	5.46	0.387	-	1.17	0.65	-	10.5	0.30
	B-C	5.26	9.26	0.568	-	2.80	1.36	-	22.2	0.26
	C-AB	7.57	12.30	0.615	-	5.66	2.25	-	37.8	0.24
	C-A	1.74	-	-	-	-	-	-	-	-
	A-B	3.25	-	-	-	-	-	-	-	-
	A-C	3.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:15-14:30	B-A	1.77	6.06	0.292	-	0.65	0.42	-	6.6	0.23
	B-C	4.40	9.70	0.454	-	1.36	0.85	-	13.4	0.19
	C-AB	5.73	11.87	0.483	-	2.25	1.25	-	19.2	0.17
	C-A	2.06	-	-	-	-	-	-	-	-
	A-B	2.72	-	-	-	-	-	-	-	-
	A-C	2.72	-	-	-	-	-	-	-	-

Demand Set: Peak Hour 2020
Modelling Period: 13:00-14:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-A	1.88	5.90	0.319	-	0.00	0.46	-	6.4	0.25
	B-C	4.68	9.59	0.488	-	0.00	0.93	-	13.0	0.20
	C-AB	6.23	11.79	0.528	-	0.00	1.42	-	20.7	0.18
	C-A	2.04	-	-	-	-	-	-	-	-
	A-B	2.90	-	-	-	-	-	-	-	-
	A-C	2.90	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-A	2.25	5.29	0.425	-	0.46	0.71	-	10.1	0.33
	B-C	5.59	9.12	0.613	-	0.93	1.51	-	21.2	0.28
	C-AB	8.24	12.20	0.676	-	1.42	2.64	-	39.7	0.25
	C-A	1.63	-	-	-	-	-	-	-	-
	A-B	3.46	-	-	-	-	-	-	-	-
	A-C	3.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-A	2.75	4.47	0.616	-	0.71	1.47	-	19.7	0.55
	B-C	6.84	8.38	0.817	-	1.51	3.73	-	47.3	0.55
	C-AB	11.57	12.77	**0.906**	-	2.64	8.77	-	118.8	0.58
	C-A	0.52	-	-	-	-	-	-	-	-
	A-B	4.24	-	-	-	-	-	-	-	-
	A-C	4.24	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-A	2.75	4.37	0.630	-	1.47	1.60	-	23.3	0.61
	B-C	6.84	8.32	0.823	-	3.73	4.13	-	59.5	0.64
	C-AB	11.81	12.92	**0.914**	-	8.77	10.69	-	167.5	0.82
	C-A	0.29	-	-	-	-	-	-	-	-
	A-B	4.24	-	-	-	-	-	-	-	-
	A-C	4.24	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-A	2.25	5.14	0.437	-	1.60	0.81	-	13.1	0.36
	B-C	5.59	9.05	0.617	-	4.13	1.69	-	28.6	0.32
	C-AB	8.50	12.43	0.684	-	10.69	3.15	-	63.3	0.34
	C-A	1.38	-	-	-	-	-	-	-	-
	A-B	3.46	-	-	-	-	-	-	-	-
	A-C	3.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:15-14:30	B-A	1.88	5.85	0.322	-	0.81	0.49	-	7.7	0.25
	B-C	4.68	9.56	0.489	-	1.69	0.98	-	15.6	0.21
	C-AB	6.32	11.86	0.533	-	3.15	1.55	-	24.3	0.19
	C-A	1.95	-	-	-	-	-	-	-	-
	A-B	2.90	-	-	-	-	-	-	-	-
	A-C	2.90	-	-	-	-	-	-	-	-

Demand Set: Peak Hour 2025
Modelling Period: 13:00-14:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-A	1.98	5.73	0.346	-	0.00	0.52	-	7.2	0.26
	B-C	4.96	9.47	0.523	-	0.00	1.07	-	14.8	0.21
	C-AB	6.81	11.91	0.572	-	0.00	1.70	-	24.5	0.19
	C-A	1.95	-	-	-	-	-	-	-	-
	A-B	3.06	-	-	-	-	-	-	-	-
	A-C	3.06	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-A	2.37	5.08	0.466	-	0.52	0.84	-	11.7	0.36
	B-C	5.92	8.95	0.661	-	1.07	1.84	-	25.4	0.32
	C-AB	9.04	12.35	0.733	-	1.70	3.42	-	51.1	0.29
	C-A	1.41	-	-	-	-	-	-	-	-
	A-B	3.66	-	-	-	-	-	-	-	-
	A-C	3.66	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-A	2.90	4.20	0.690	-	0.84	1.95	-	25.3	0.69
	B-C	7.25	8.12	**0.893**	-	1.84	5.63	-	66.5	0.76
	C-AB	12.80	12.94	**0.989**	-	3.42	15.21	-	184.0	0.90
	C-A	0.01	-	-	-	-	-	-	-	-
	A-B	4.48	-	-	-	-	-	-	-	-
	A-C	4.48	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-A	2.90	4.01	0.723	-	1.95	2.31	-	32.7	0.85
	B-C	7.25	7.99	**0.907**	-	5.63	6.99	-	96.1	1.04
	C-AB	12.81	12.96	**0.988**	-	15.21	20.82	-	305.1	1.54
	C-A	0.00	-	-	-	-	-	-	-	-
	A-B	4.48	-	-	-	-	-	-	-	-
	A-C	4.48	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-A	2.37	4.77	0.496	-	2.31	1.04	-	17.4	0.45
	B-C	5.92	8.81	0.672	-	6.99	2.19	-	41.4	0.43
	C-AB	9.63	12.83	0.751	-	20.82	4.68	-	141.1	0.69
	C-A	0.82	-	-	-	-	-	-	-	-
	A-B	3.66	-	-	-	-	-	-	-	-
	A-C	3.66	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:15-14:30	B-A	1.98	5.65	0.351	-	1.04	0.56	-	8.9	0.28
	B-C	4.96	9.42	0.526	-	2.19	1.14	-	18.3	0.23
	C-AB	6.92	12.02	0.576	-	4.68	1.88	-	30.8	0.21
	C-A	1.83	-	-	-	-	-	-	-	-
	A-B	3.06	-	-	-	-	-	-	-	-
	A-C	3.06	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	192.7	128.5	61.6	0.3	61.6	0.3
B-C	480.4	320.2	140.9	0.3	140.9	0.3
C-AB	701.0	467.3	259.5	0.4	259.6	0.4
C-A	148.2	98.8	-	-	-	-
A-B	297.3	198.2	-	-	-	-
A-C	297.3	198.2	-	-	-	-
All	**2116.9**	**1411.3**	**462.0**	**0.2**	**462.1**	**0.2**

Demand Set: Peak Hour 2015
Modelling Period: 13:00-14:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	194.1	129.4	63.9	0.3	63.9	0.3
B-C	483.1	322.1	141.0	0.3	141.1	0.3
C-AB	708.4	472.3	268.8	0.4	268.8	0.4
C-A	146.4	97.6	-	-	-	-
A-B	298.7	199.1	-	-	-	-
A-C	298.7	199.1	-	-	-	-
All	**2129.3**	**1419.6**	**473.7**	**0.2**	**473.8**	**0.2**

Demand Set: Peak Hour 2020
Modelling Period: 13:00-14:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	206.5	137.6	80.3	0.4	80.3	0.4
B-C	513.4	342.3	185.2	0.4	185.3	0.4
C-AB	789.9	526.6	434.3	0.5	434.4	0.5
C-A	117.1	78.1	-	-	-	-
A-B	318.0	212.0	-	-	-	-
A-C	318.0	212.0	-	-	-	-
All	**2262.8**	**1508.6**	**699.8**	**0.3**	**700.0**	**0.3**

Demand Set: Peak Hour 2025
Modelling Period: 13:00-14:30

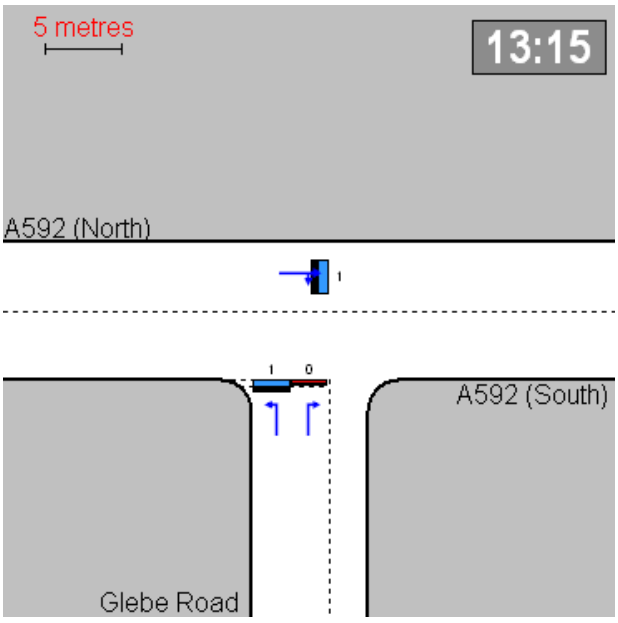
Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	217.5	145.0	103.1	0.5	103.2	0.5
B-C	543.7	362.5	262.6	0.5	262.6	0.5
C-AB	870.3	580.2	736.7	0.8	736.8	0.8
C-A	90.4	60.3	-	-	-	-
A-B	335.8	223.9	-	-	-	-
A-C	335.8	223.9	-	-	-	-
All	**2393.6**	**1595.7**	**1102.4**	**0.5**	**1102.6**	**0.5**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

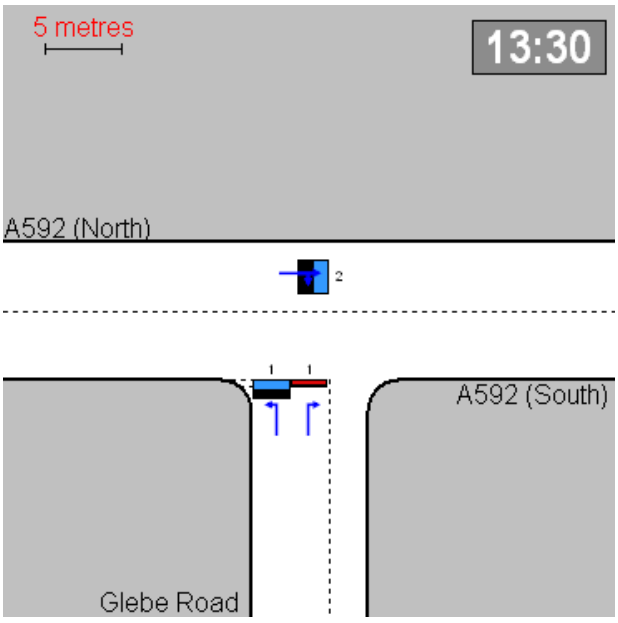
Queue Diagrams

Demand Set: Peak Hour 2012
Modelling Period: 13:00-14:30
View Extent: 40m

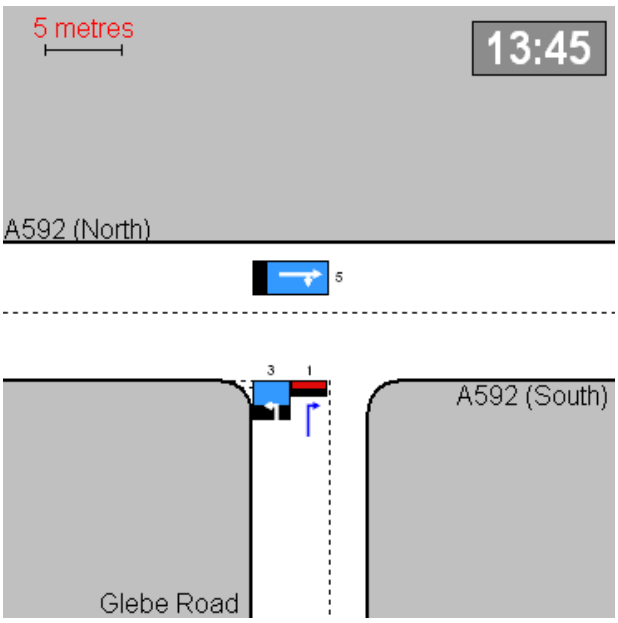
Queue Interval 1: 13:00-13:15



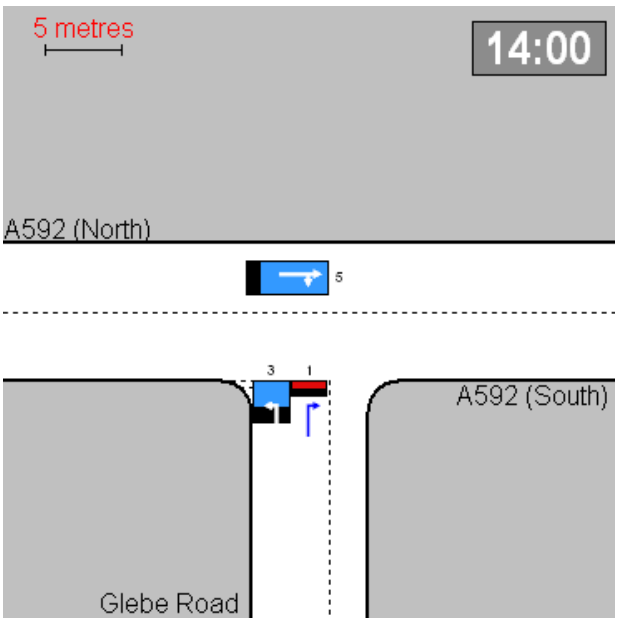
Queue Interval 2: 13:15-13:30



Queue Interval 3: 13:30-13:45

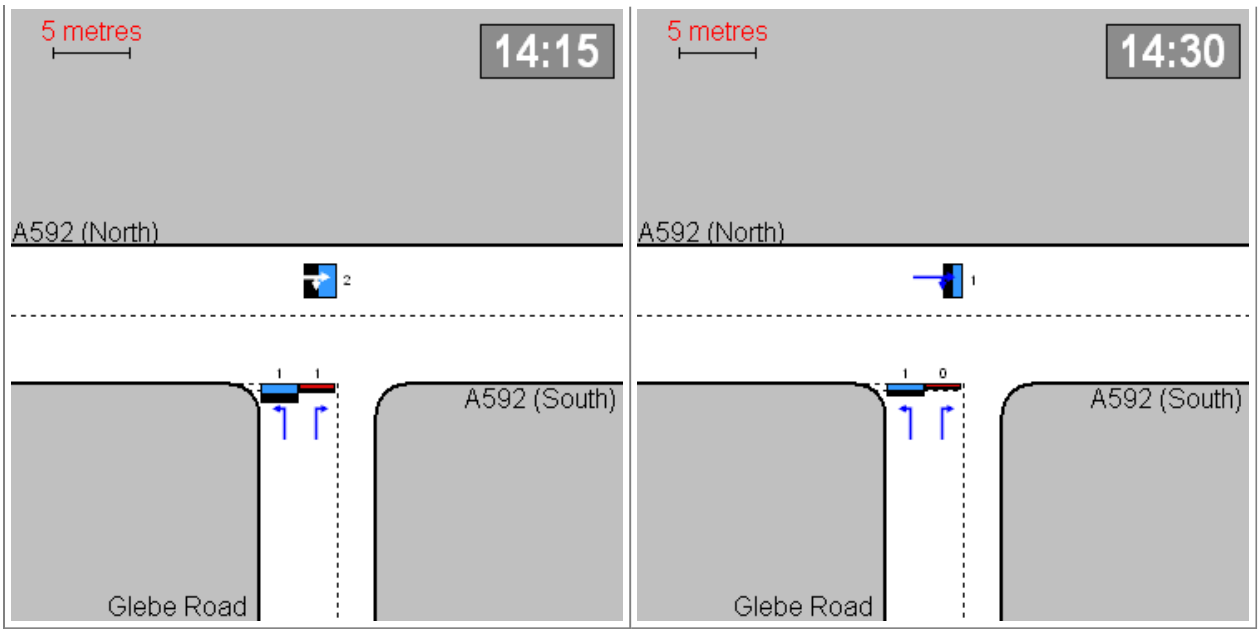


Queue Interval 4: 13:45-14:00



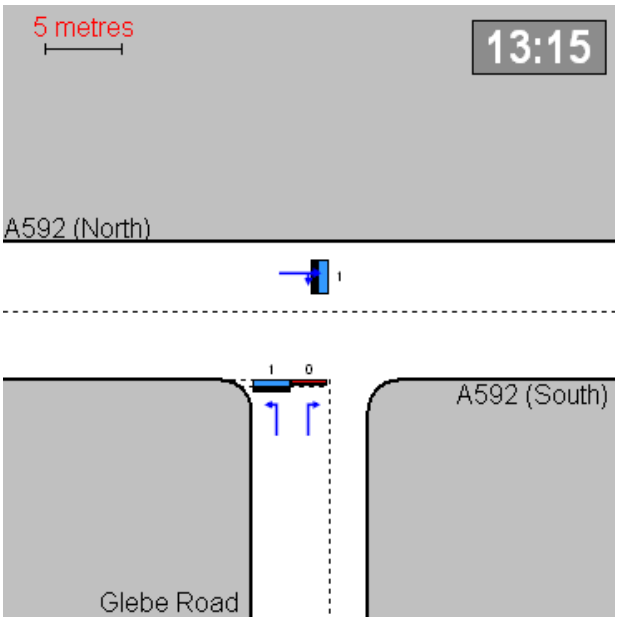
Queue Interval 5: 14:00-14:15

Queue Interval 6: 14:15-14:30

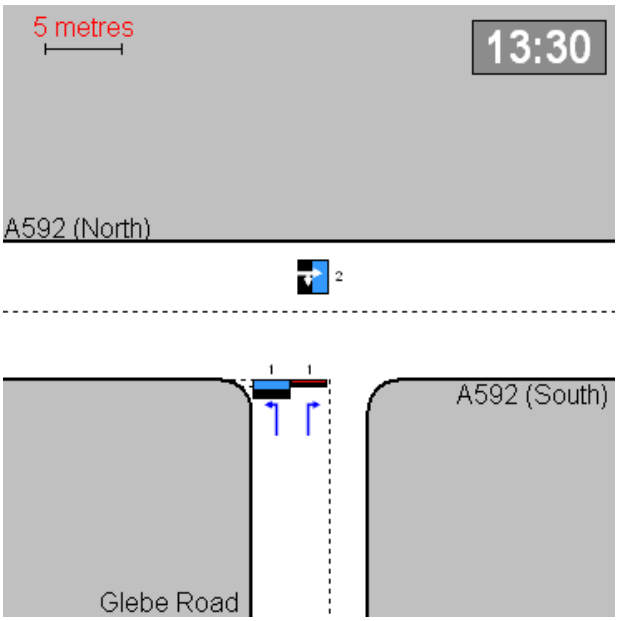

5 metres
14:15
A592 (North)
A592 (South)
Glebe Road
5 metres
14:30
A592 (North)
A592 (South)
Glebe Road

Demand Set: Peak Hour 2015
Modelling Period: 13:00-14:30
View Extent: 40m

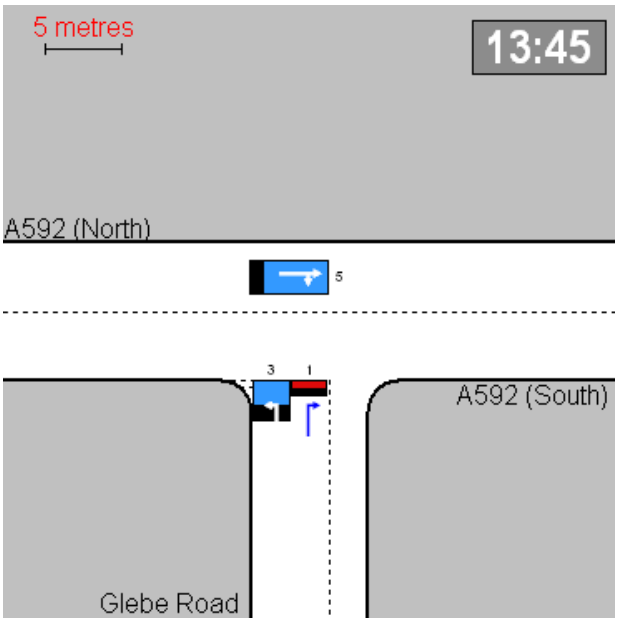
Queue Interval 1: 13:00-13:15



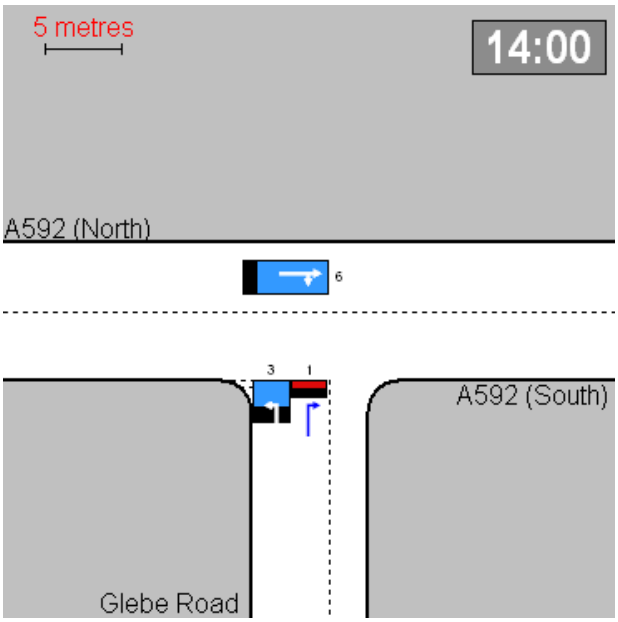
Queue Interval 2: 13:15-13:30



Queue Interval 3: 13:30-13:45

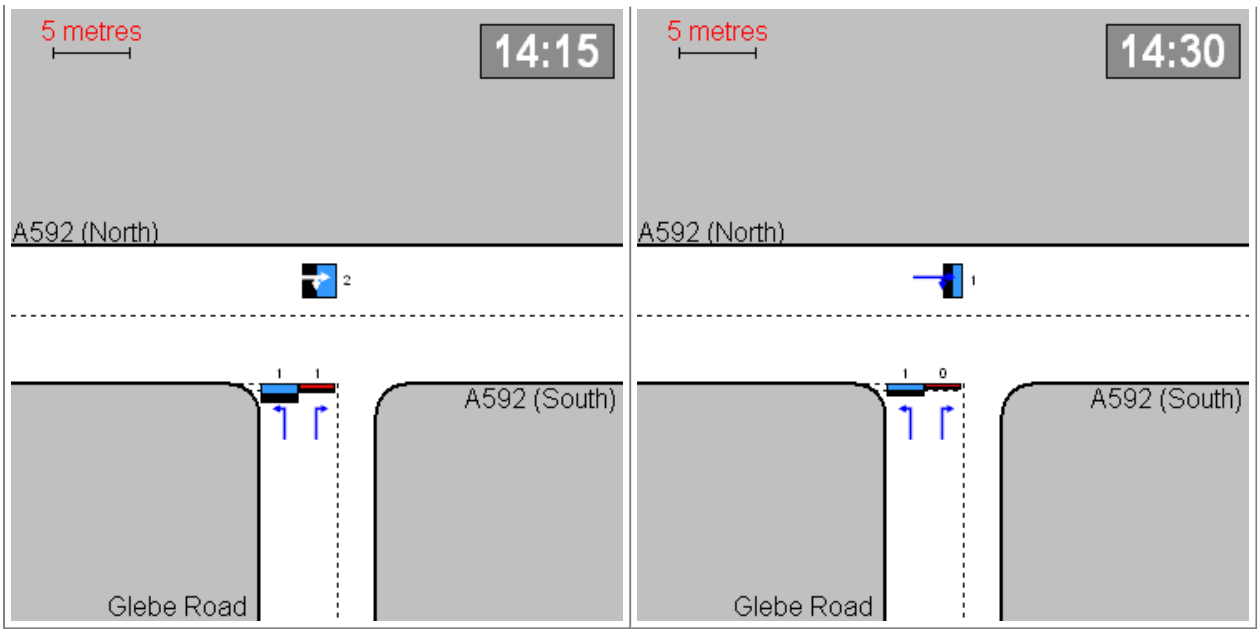


Queue Interval 4: 13:45-14:00



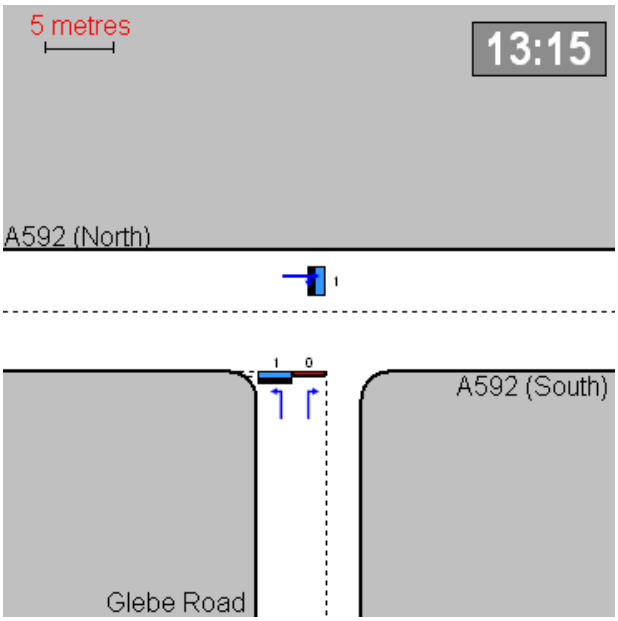
Queue Interval 5: 14:00-14:15

Queue Interval 6: 14:15-14:30

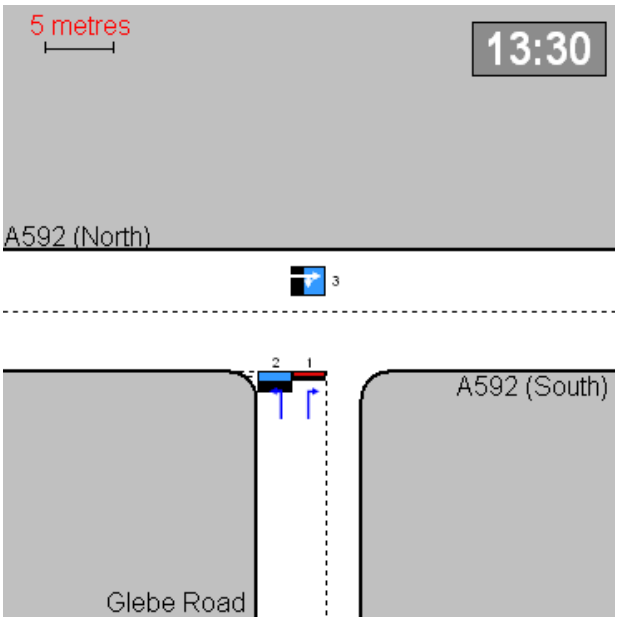

5 metres
14:15
A592 (North)
2
A592 (South)
Glebe Road
5 metres
14:30
A592 (North)
1
A592 (South)
Glebe Road

Demand Set: Peak Hour 2020
Modelling Period: 13:00-14:30
View Extent: 45m

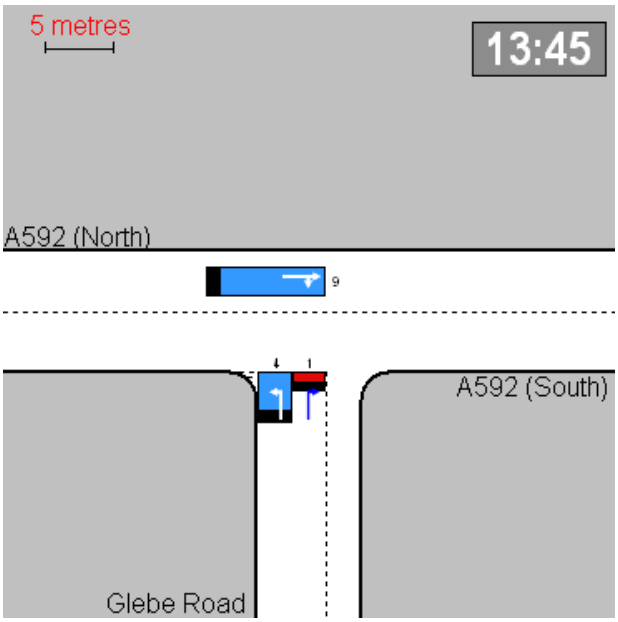
Queue Interval 1: 13:00-13:15



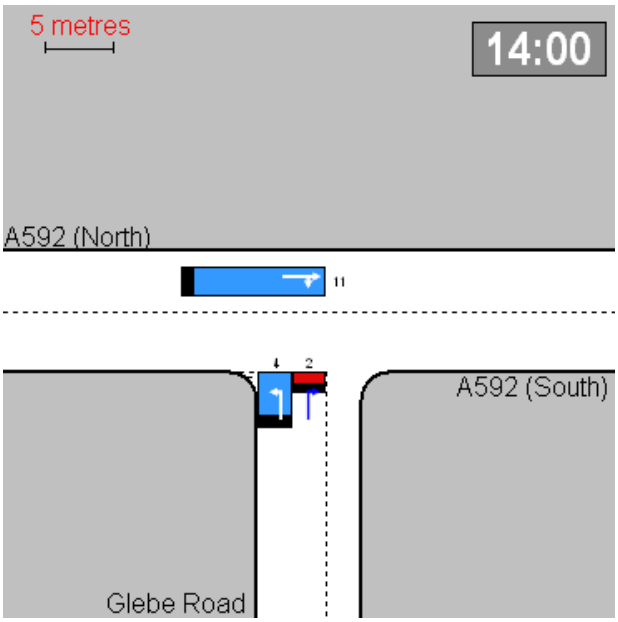
Queue Interval 2: 13:15-13:30



Queue Interval 3: 13:30-13:45

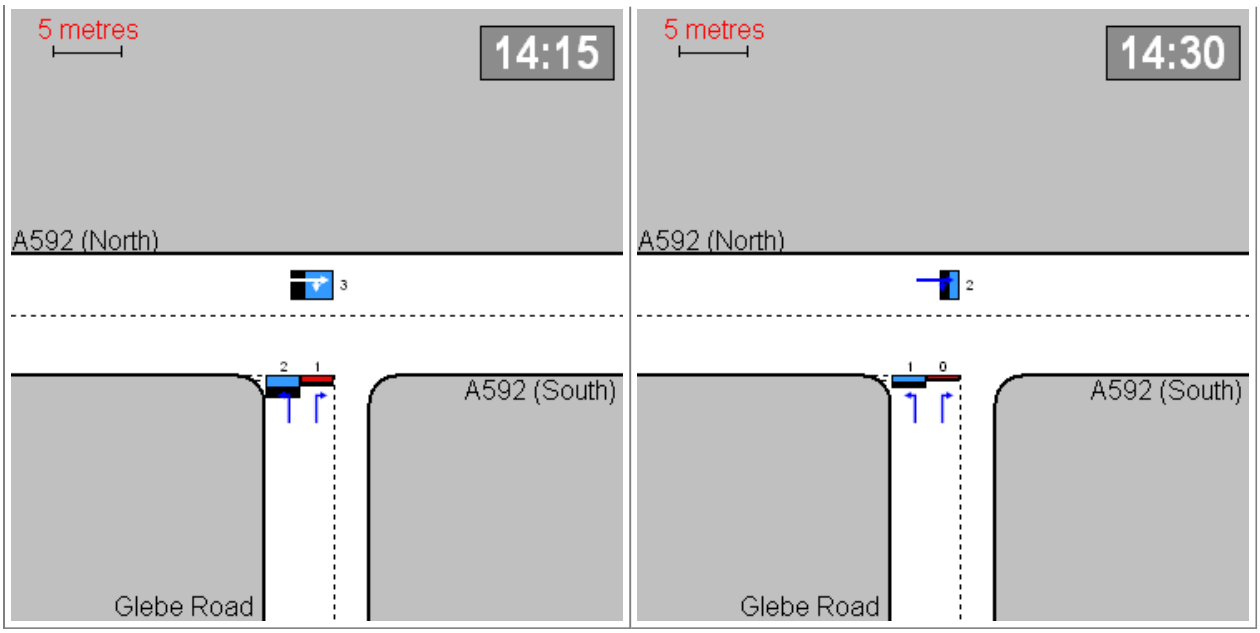


Queue Interval 4: 13:45-14:00



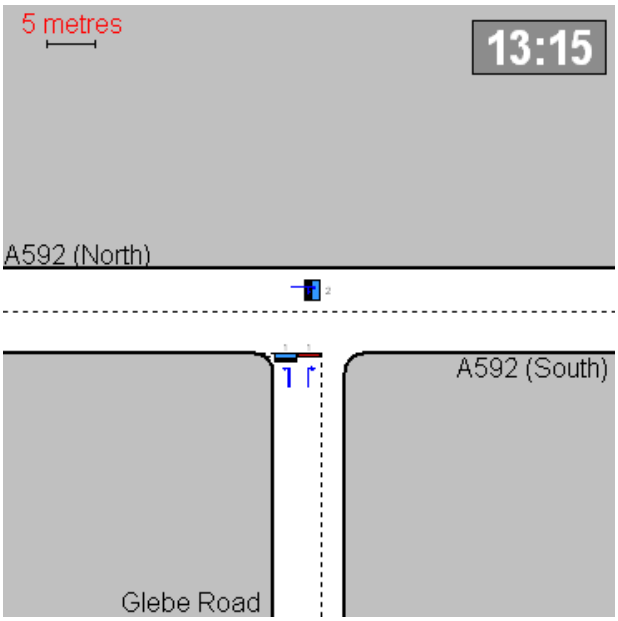
Queue Interval 5: 14:00-14:15

Queue Interval 6: 14:15-14:30

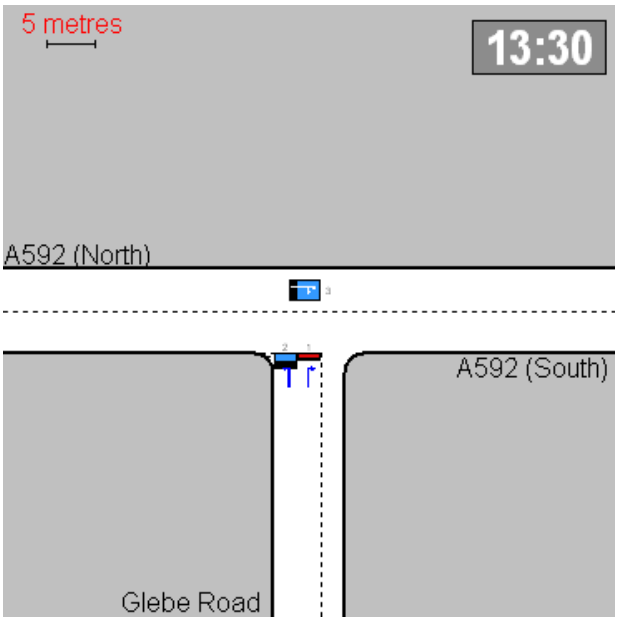

5 metres
14:15
A592 (North)
3
2
1
A592 (South)
Glebe Road
5 metres
14:30
A592 (North)
2
1
0
A592 (South)
Glebe Road

Demand Set: Peak Hour 2025
Modelling Period: 13:00-14:30
View Extent: 65m

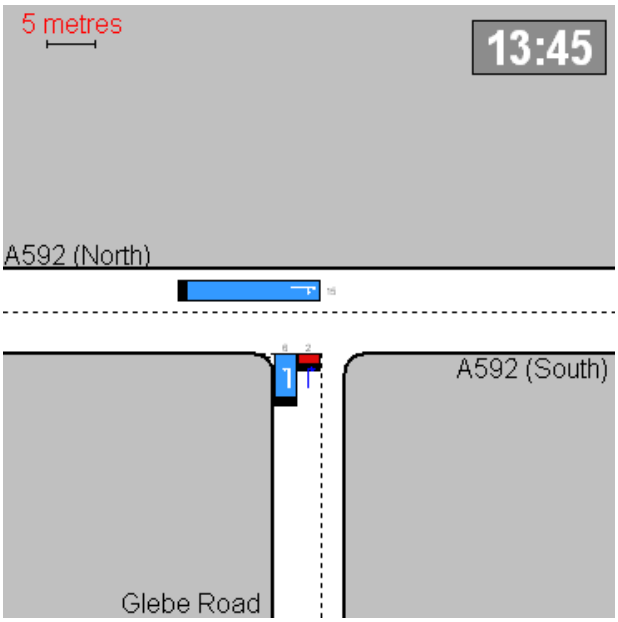
Queue Interval 1: 13:00-13:15



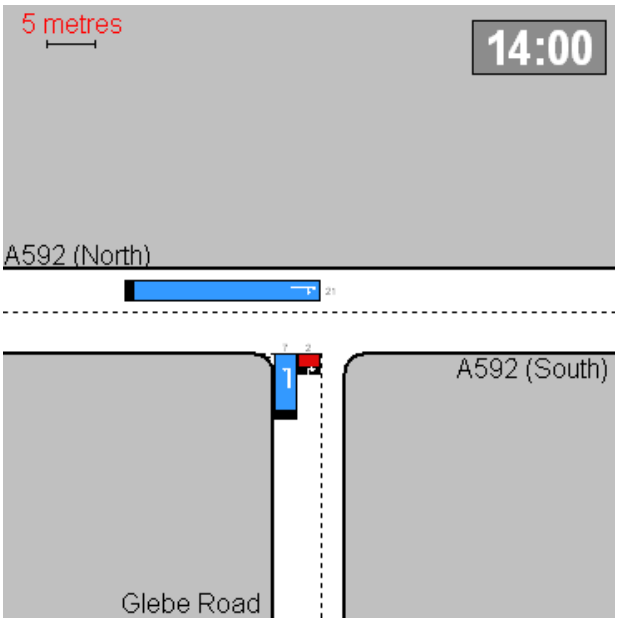
Queue Interval 2: 13:15-13:30



Queue Interval 3: 13:30-13:45

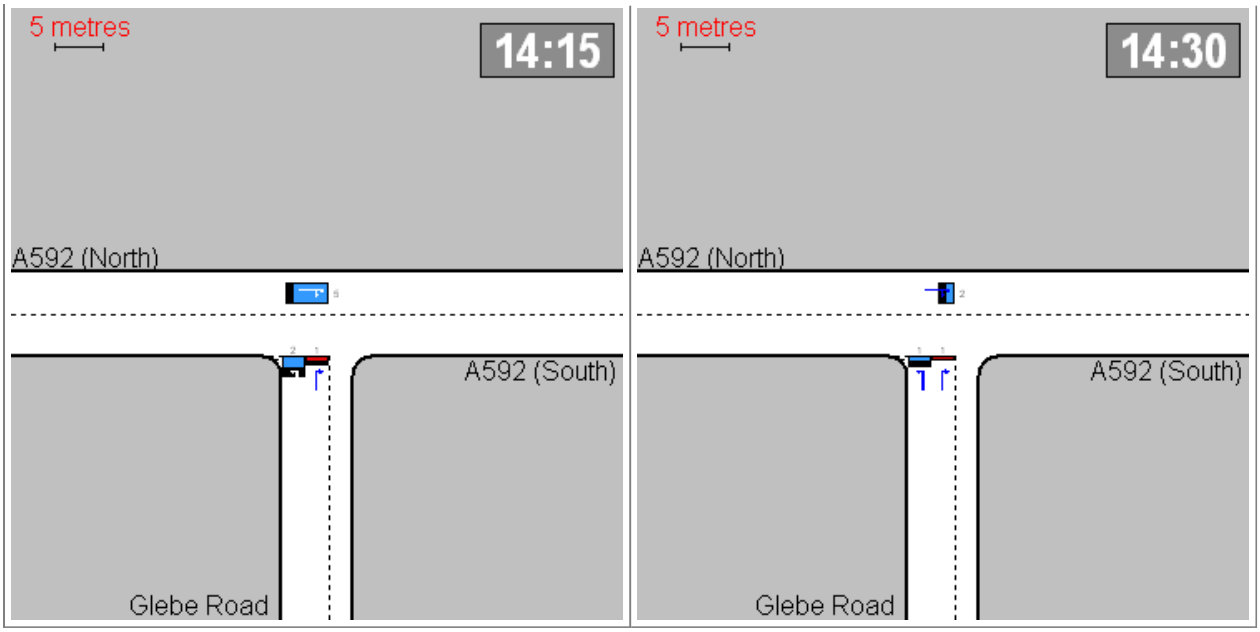


Queue Interval 4: 13:45-14:00



Queue Interval 5: 14:00-14:15

Queue Interval 6: 14:15-14:30



PICADY 5 Run Successful

Appendix F
Junction Capacity Assessments – Mitigation

ARCADY 7

Version: 7.0.1.130 [12 March 2010]

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

File: H:\Projects\32588 Bowness Bay Traffic Assessments (Sub file)\5 Design\Data\ARCADY\ARCADY 2025\50 Bedroom Hotel\Glebe Road A592 - Southern Junction.arc7
Report generation date: 29/08/2012 15:27:59

Summary of roundabout performance

	IP			
	Queue (Veh)	**Delay (min)**	**RFC**	**LOS**
	Proposed Layout - 2025 - Option 1			
Arm 1	5.32	0.43	0.85	D
Arm 2	1.52	0.17	0.61	B
Arm 3	2.28	0.23	0.70	B
	Proposed Layout - 2025 - Option 2			
Arm 1	5.10	0.42	0.85	D
Arm 2	1.51	0.17	0.60	B
Arm 3	2.28	0.23	0.70	B
	Proposed Layout - 2025 - Option 3			
Arm 1	5.04	0.41	0.85	C
Arm 2	1.48	0.17	0.60	B
Arm 3	2.17	0.22	0.69	B
	Proposed Layout - 2025 - Sunday Peak			
Arm 1	5.04	0.41	0.85	C
Arm 2	1.48	0.17	0.60	B
Arm 3	2.17	0.22	0.69	B

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

2025 - Sunday Peak - IP runs from 13:00:00 to 14:30:00
2025 - Option 1 - IP runs from 13:00:00 to 14:30:00
2025 - Option 2 - IP runs from 13:00:00 to 14:30:00
2025 - Option 3 - IP runs from 13:00:00 to 14:30:00

File summary

File Description

Title	Bowness
Location	Bowness - Glebe Road/A592
Site Number	1
Date	27/06/2012
Version	1
Status	New Design
Client	Lake District Natioanl Park Authority
Jobnumber	32588
Enumerator	GLOBAL\glyn.price
Description	This is a test design of a new mini roundabout on the A592 and Glebe Road jucntion.
Results Upto Date	True

Analysis Options

RFC Threshold	Vehicle Length (m)	Do Queue Variations
0.85	5.75	

Sorting and Display

Show Arm Names	Arm Grouping	Sorting Direction	Sorting Type	Data Matrix Style	Time Style
	Order	Ascending	Numerical	By Destination	Absolute Time

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	Veh	Veh	perHour	min	-Min	perMin

A1 - Proposed Layout - D3 - 2025 - Sunday Peak, IP

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Description	Include In Report	Use Specific Demand Set	Demand Set	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Proposed Layout	Proposed Layout	Yes		(D1)		100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Locked	Run Automatically	Use Relationship	Relationship	Start Time (HH:mm)	Finish Time (HH:mm)	Time Period Length (min)	Time Segment Length (min)	Traffic Profile Type
2025 - Sunday Peak, IP	2025 - Sunday Peak	IP	2025 Sunday Peak		Yes			13:00	14:30	90	15	ONE HOUR

Roundabout Network

Roundabout Type(s)

ID	Name	Arm Order	Roundabout Type	Grade Separated	Large Roundabout	Do Geometric Delay
1	Glebe Road/A592	1,2,3	Mini-roundabout			

Roundabout Network Options

Driving Side	Lighting	Road Surface	In London
Left	Normal/unknown	Normal/unknown	

Arms

Arms

ID	Name	Description
1	A592 North	
2	A592 South	
3	Glebe Road	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1	3.20	3.20	5.60	15.00	14.00	12.00	0.00	
2	3.25	3.25	5.60	25.00	15.00	14.00	0.00	
3	3.40	3.40	5.50	20.00	13.00	9.00	0.00	

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None

Arm Slope/ Intercept and Capacity

Slope and Intercept used in model

Arm	Enter Directly	Slope	Intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		((calculated))	((calculated))	0.604	1015.565
2		((calculated))	((calculated))	0.636	1130.458
3		((calculated))	((calculated))	0.605	1051.535

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

Traffic Flows

Demand Set Data Options

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

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)	PHF
1	ONE HOUR	Yes	698.00	100.000	N/A
2	ONE HOUR	Yes	488.00	100.000	N/A
3	ONE HOUR	Yes	553.00	100.000	N/A

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (Veh/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (Veh/hr)	Direct Demand Pedestrian Flow (Ped/hr)
13:00-13:15	1	525.49	526.31	N/A	N/A
13:00-13:15	2	367.39	367.39	N/A	N/A
13:00-13:15	3	416.33	419.00	N/A	N/A
13:15-13:30	1	627.49	628.46	N/A	N/A
13:15-13:30	2	438.70	438.70	N/A	N/A
13:15-13:30	3	497.14	500.33	N/A	N/A
13:30-13:45	1	768.51	769.71	N/A	N/A
13:30-13:45	2	537.30	537.30	N/A	N/A
13:30-13:45	3	608.86	612.78	N/A	N/A
13:45-14:00	1	768.51	769.71	N/A	N/A
13:45-14:00	2	537.30	537.30	N/A	N/A

13:45-14:00	**3**	608.86	612.78	N/A	N/A
14:00-14:15	**1**	627.49	628.46	N/A	N/A
14:00-14:15	**2**	438.70	438.70	N/A	N/A
14:00-14:15	**3**	497.14	500.33	N/A	N/A
14:15-14:30	**1**	525.49	526.31	N/A	N/A
14:15-14:30	**2**	367.39	367.39	N/A	N/A
14:15-14:30	**3**	416.33	419.00	N/A	N/A

Turning Proportions

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

		To		
		1	**2**	**3**
From	**1**	0.00	362.00	336.00
	2	244.00	0.00	244.00
	3	395.00	158.00	0.00

Turning Proportions (Veh) - Roundabout 1 (for whole period)

		To		
		1	**2**	**3**
From	**1**	0.00	0.52	0.48
	2	0.50	0.00	0.50
	3	0.71	0.29	0.00

Vehicle Mix

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

		To		
		1	**2**	**3**
From	**1**	1.00	1.00	1.00
	2	1.00	1.00	1.00
	3	1.01	1.00	1.00

Heavy Vehicle Percentages - Roundabout 1 (for whole period)

		To		
		1	**2**	**3**
From	**1**	0.00	0.30	0.00
	2	0.00	0.00	0.00
	3	0.90	0.00	0.00

Results

Results Summary

Arm	Max RFC	Max Delay (min)	Max Queue (Veh)	Max LOS	Total Demand (Veh/hr)	Total Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (min)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Queueing Total Delay (Veh-min)	Inclusive Queueing Average Delay (min)	Slope	Intercept (PCU/hr)
1	0.85	0.41	5.04	C	640.49	960.74	236.45	0.25	2.63	236.51	0.25	0.604	1015.565
2	0.60	0.17	1.48	B	447.80	671.70	87.39	0.13	0.97	87.41	0.13	0.636	1130.458
3	0.69	0.22	2.17	B	507.44	761.16	121.97	0.16	1.36	121.99	0.16	0.605	1051.535

Main Results

Main results: (13:00-13:15)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)

1	525.49	131.37	520.56	477.61	118.05	0.00	942.80	878.59	0.557	0.00	1.23
2	367.39	91.85	364.98	388.02	250.58	0.00	971.20	861.66	0.378	0.00	0.60
3	416.33	104.08	413.16	433.08	182.49	0.00	935.12	785.85	0.445	0.00	0.79

Main results: (13:15-13:30)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	627.49	156.87	624.39	572.84	141.61	0.00	928.60	878.59	0.676	1.23	2.01
2	438.70	109.68	437.66	465.43	300.57	0.00	939.43	861.66	0.467	0.60	0.86
3	497.13	124.28	495.62	519.39	218.83	0.00	913.28	785.85	0.544	0.79	1.17

Main results: (13:30-13:45)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	768.51	192.13	757.68	699.67	172.88	0.00	909.74	878.59	0.845	2.01	4.71
2	537.30	134.32	534.96	565.83	364.73	0.00	898.65	861.66	0.598	0.86	1.45
3	608.86	152.22	605.07	632.21	267.48	0.00	884.04	785.85	0.689	1.17	2.12

Main results: (13:45-14:00)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	768.51	192.13	767.22	703.36	173.91	0.00	909.12	878.59	0.845	4.71	5.04
2	537.30	134.32	537.19	571.81	369.32	0.00	895.73	861.66	0.600	1.45	1.48
3	608.86	152.22	608.67	637.92	268.59	0.00	883.37	785.85	0.689	2.12	2.17

Main results: (14:00-14:15)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	627.49	156.87	638.94	578.31	143.12	0.00	927.68	878.59	0.676	5.04	2.17
2	438.70	109.68	441.02	474.49	307.57	0.00	934.98	861.66	0.469	1.48	0.90
3	497.13	124.28	500.92	528.08	220.51	0.00	912.27	785.85	0.545	2.17	1.22

Main results: (14:15-14:30)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	525.49	131.37	529.03	482.79	119.42	0.00	941.98	878.59	0.558	2.17	1.29
2	367.39	91.85	368.51	393.78	254.66	0.00	968.60	861.66	0.379	0.90	0.62
3	416.33	104.08	417.95	438.92	184.26	0.00	934.06	785.85	0.446	1.22	0.82

Queueing Delay Results

Queueing Delay results: (13:00-13:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	17.42	1.16	0.141	A	A
2	8.70	0.58	0.099	A	A
3	11.36	0.76	0.114	A	A

Queueing Delay results: (13:15-13:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	28.25	1.88	0.195	B	B
2	12.54	0.84	0.119	A	A
3	16.86	1.12	0.143	A	A

Queueing Delay results: (13:30-13:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service

1	60.89	4.06	0.370	C	C
2	20.62	1.37	0.164	A	A
3	29.56	1.97	0.212	B	B

Queueing Delay results: (13:45-14:00)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	73.59	4.91	0.414	C	C
2	21.99	1.47	0.167	B	B
3	32.23	2.15	0.218	B	B

Queueing Delay results: (14:00-14:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	35.98	2.40	0.215	B	B
2	14.01	0.93	0.122	A	A
3	19.29	1.29	0.147	A	A

Queueing Delay results: (14:15-14:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	20.32	1.35	0.147	A	A
2	9.54	0.64	0.100	A	A
3	12.67	0.84	0.117	A	A

Overview: Mini-roundabout Geometry

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Entry width (m)	Effective flare length (m)	Minimum approach road half-width (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island	Final Slope	Final Intercept (PCU/hr)
1	3.20	5.60	15.00	3.20	14.00	12.00	0.00		0.604	1015.565
2	3.25	5.60	25.00	3.25	15.00	14.00	0.00		0.636	1130.458
3	3.40	5.50	20.00	3.40	13.00	9.00	0.00		0.605	1051.535

Overview: Time Segment Results

Time Segment Results

Time Segment	Arm	Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Pedestrian Demand (Ped/hr)	Start Queue (Veh)	End Queue (Veh)	Queueing Total Delay (Veh-min)	Geometric Total Delay (Veh-min)	Average Delay Per Arriving Vehicle (min)
13:00-13:15	1	525.49	942.80	0.557	0.00	0.00	1.23	17.42	(0.00)	0.141
13:00-13:15	2	367.39	971.20	0.378	0.00	0.00	0.60	8.70	(0.00)	0.099
13:00-13:15	3	416.33	935.12	0.445	0.00	0.00	0.79	11.36	(0.00)	0.114
13:15-13:30	1	627.49	928.60	0.676	0.00	1.23	2.01	28.25	(0.00)	0.195
13:15-13:30	2	438.70	939.43	0.467	0.00	0.60	0.86	12.54	(0.00)	0.119
13:15-13:30	3	497.13	913.28	0.544	0.00	0.79	1.17	16.86	(0.00)	0.143
13:30-13:45	1	768.51	909.74	0.845	0.00	2.01	4.71	60.89	(0.00)	0.370
13:30-13:45	2	537.30	898.65	0.598	0.00	0.86	1.45	20.62	(0.00)	0.164
13:30-13:45	3	608.86	884.04	0.689	0.00	1.17	2.12	29.56	(0.00)	0.212
13:45-14:00	1	768.51	909.12	0.845	0.00	4.71	5.04	73.59	(0.00)	0.414
13:45-14:00	2	537.30	895.73	0.600	0.00	1.45	1.48	21.99	(0.00)	0.167
13:45-14:00	3	608.86	883.37	0.689	0.00	2.12	2.17	32.23	(0.00)	0.218
14:00-14:15	1	627.49	927.68	0.676	0.00	5.04	2.17	35.98	(0.00)	0.215
14:00-14:15	2	438.70	934.98	0.469	0.00	1.48	0.90	14.01	(0.00)	0.122
14:00-14:15	3	497.13	912.27	0.545	0.00	2.17	1.22	19.29	(0.00)	0.147
14:15-14:30	1	525.49	941.98	0.558	0.00	2.17	1.29	20.32	(0.00)	0.147
14:15-14:30	2	367.39	968.60	0.379	0.00	0.90	0.62	9.54	(0.00)	0.100
14:15-14:30	3	416.33	934.06	0.446	0.00	1.22	0.82	12.67	(0.00)	0.117

Appendix G
TRICS Output - Hotel

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 06 - HOTEL, FOOD & DRINK
Category : A - HOTELS
VEHICLES

Selected regions and areas:

03	SOUTH WEST		
	DC	DORSET	1 days
10	WALES		
	WR	WREXHAM	1 days

Filtering Stage 2 selection:

Parameter:	Number of bedrooms
Actual Range:	15 to 67 (units:)
Range Selected by User:	15 to 380 (units:)

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/00 to 21/10/11

Selected survey days:

Sunday	2 days

Selected survey types:

Manual count	2 days
Directional ATC Count	0 days

Selected Locations:

Town Centre	1
Free Standing (PPS6 Out of Town)	1

Selected Location Sub Categories:

No Sub Category	2

Filtering Stage 3 selection:

Use Class:

Not Known	1 days
C1	1 days

Population within 1 mile:

1,000 or Less	1 days
15,001 to 20,000	1 days

Population within 5 miles:

5,001 to 25,000	1 days
125,001 to 250,000	1 days

Car ownership within 5 miles:

0.6 to 1.0	1 days
1.1 to 1.5	1 days

Travel Plan:

Not Known	1 days
No	1 days

LIST OF SITES relevant to selection parameters

1 DC-06-A-03 HOTEL, NEAR WAREHAM DORSET
EAST STOKE
BINNEGAR
NEAR WAREHAM
Free Standing (PPS6 Out of Town)
No Sub Category
Total Number of bedrooms: 15
Survey date: SUNDAY 15/09/02 Survey Type: MANUAL

2 WR-06-A-01 HOTEL, WREXHAM WREXHAM
YORKE STREET

WREXHAM
Town Centre
No Sub Category
Total Number of bedrooms: 67
Survey date: SUNDAY 04/07/04 Survey Type: MANUAL

TRIP RATE for Land Use 06 - HOTEL, FOOD & DRINK/A - HOTELS
VEHICLES
Calculation factor: 1 BEDRMS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate	No. Days	Ave. BEDRMS	Trip Rate
00:00 - 01:00	0	0	0.000	0	0	0.000	0	0	0.000
01:00 - 02:00	0	0	0.000	0	0	0.000	0	0	0.000
02:00 - 03:00	0	0	0.000	0	0	0.000	0	0	0.000
03:00 - 04:00	0	0	0.000	0	0	0.000	0	0	0.000
04:00 - 05:00	0	0	0.000	0	0	0.000	0	0	0.000
05:00 - 06:00	0	0	0.000	0	0	0.000	0	0	0.000
06:00 - 07:00	0	0	0.000	0	0	0.000	0	0	0.000
07:00 - 08:00	2	41	0.098	2	41	0.098	2	41	0.196
08:00 - 09:00	2	41	0.244	2	41	0.122	2	41	0.366
09:00 - 10:00	2	41	0.220	2	41	0.146	2	41	0.366
10:00 - 11:00	2	41	0.159	2	41	0.171	2	41	0.330
11:00 - 12:00	2	41	0.183	2	41	0.073	2	41	0.256
12:00 - 13:00	2	41	0.207	2	41	0.110	2	41	0.317
13:00 - 14:00	2	41	0.171	2	41	0.183	2	41	0.354
14:00 - 15:00	2	41	0.134	2	41	0.183	2	41	0.317
15:00 - 16:00	2	41	0.159	2	41	0.268	2	41	0.427
16:00 - 17:00	2	41	0.268	2	41	0.256	2	41	0.524
17:00 - 18:00	2	41	0.244	2	41	0.232	2	41	0.476
18:00 - 19:00	2	41	0.098	2	41	0.183	2	41	0.281
19:00 - 20:00	0	0	0.000	0	0	0.000	0	0	0.000
20:00 - 21:00	0	0	0.000	0	0	0.000	0	0	0.000
21:00 - 22:00	0	0	0.000	0	0	0.000	0	0	0.000
22:00 - 23:00	0	0	0.000	0	0	0.000	0	0	0.000
23:00 - 24:00	0	0	0.000	0	0	0.000	0	0	0.000
Total Rates:			2.185			2.025			4.210

Parameter summary

Trip rate parameter range selected:	15 - 67 (units:)
Survey date date range:	01/01/00 - 21/10/11
Number of weekdays (Monday-Friday):	0
Number of Saturdays:	0
Number of Sundays:	2
Surveys manually removed from selection:	0

Appendix H
Junction Capacity Assessments – Option 1A/B and Hotel Development (350 Rooms)

ARCADY 7

File: H:\Projects\32588 Bowness Bay Traffic Assessments (Sub file)\5 Design\Data\ARCADY\ARCADY 2025\350 Bedroom Hotel\Glebe Road A592 - Southern Junction.arc7
Report generation date: 29/08/2012 15:29:29

Summary of roundabout performance

	IP			
	Queue (Veh)	**Delay (min)**	**RFC**	**LOS**
	Proposed Layout - 2025 - Option 1			
Arm 1	7.57	0.60	0.90	E
Arm 2	1.80	0.19	0.65	B
Arm 3	3.20	0.29	0.77	C
	Proposed Layout - 2025 - Option 2			
Arm 1	5.45	0.45	0.86	D
Arm 2	1.68	0.18	0.63	B
Arm 3	3.20	0.29	0.77	C
	Proposed Layout - 2025 - Option 3			
Arm 1	5.04	0.41	0.85	C
Arm 2	1.48	0.17	0.60	B
Arm 3	2.17	0.22	0.69	B
	Proposed Layout - 2025 - Sunday Peak			
Arm 1	5.04	0.41	0.85	C
Arm 2	1.48	0.17	0.60	B
Arm 3	2.17	0.22	0.69	B

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

2025 - Sunday Peak - IP runs from 13:00:00 to 14:30:00
2025 - Option 1 - IP runs from 13:00:00 to 14:30:00
2025 - Option 2 - IP runs from 13:00:00 to 14:30:00
2025 - Option 3 - IP runs from 13:00:00 to 14:30:00

File summary

File Description

Title	Bowness
Location	Bowness - Glebe Road/A592
Site Number	1
Date	27/06/2012
Version	1
Status	New Design
Client	Lake District Natioanl Park Authority
Jobnumber	32588
Enumerator	GLOBAL\glyn.price
Description	This is a test design of a new mini roundabout on the A592 and Glebe Road jucntion.
Results Upto Date	True

Analysis Options

RFC Threshold	Vehicle Length (m)	Do Queue Variations
0.85	5.75	

Sorting and Display

Show Arm Names	Arm Grouping	Sorting Direction	Sorting Type	Data Matrix Style	Time Style
	Order	Ascending	Numerical	By Destination	Absolute Time

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	Veh	Veh	perHour	min	-Min	perMin

A1 - Proposed Layout - D4 - 2025 - Option 1, IP

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Description	Include In Report	Use Specific Demand Set	Demand Set	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Proposed Layout	Proposed Layout	Yes		(D1)		100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Locked	Run Automatically	Use Relationship	Relationship	Start Time (HH:mm)	Finish Time (HH:mm)	Time Period Length (min)	Time Segment Length (min)	Traffic Profile Type
2025 - Option 1, IP	2025 - Option 1	IP	2025 Sunday Peak + Option 1		Yes			13:00	14:30	90	15	ONE HOUR

Roundabout Network

Roundabout Type(s)

ID	Name	Arm Order	Roundabout Type	Grade Separated	Large Roundabout	Do Geometric Delay
1	Glebe Road/A592	1,2,3	Mini-roundabout			

Roundabout Network Options

Driving Side	Lighting	Road Surface	In London
Left	Normal/unknown	Normal/unknown	

Arms

Arms

ID	Name	Description
1	A592 North	
2	A592 South	
3	Glebe Road	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1	3.20	3.20	5.60	15.00	14.00	12.00	0.00	
2	3.25	3.25	5.60	25.00	15.00	14.00	0.00	
3	3.40	3.40	5.50	20.00	13.00	9.00	0.00	

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None

Arm Slope/ Intercept and Capacity

Slope and Intercept used in model

Arm	Enter Directly	Slope	Intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		((calculated))	((calculated))	0.604	1015.565
2		((calculated))	((calculated))	0.636	1130.458
3		((calculated))	((calculated))	0.605	1051.535

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

Traffic Flows

Demand Set Data Options

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

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)	PHF
1	ONE HOUR	Yes	733.00	100.000	N/A
2	ONE HOUR	Yes	513.00	100.000	N/A
3	ONE HOUR	Yes	617.00	100.000	N/A

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (Veh/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (Veh/hr)	Direct Demand Pedestrian Flow (Ped/hr)
13:00-13:15	1	551.84	552.66	N/A	N/A
13:00-13:15	2	386.21	386.21	N/A	N/A
13:00-13:15	3	464.51	467.49	N/A	N/A
13:15-13:30	1	658.95	659.93	N/A	N/A
13:15-13:30	2	461.18	461.18	N/A	N/A
13:15-13:30	3	554.67	558.23	N/A	N/A
13:30-13:45	1	807.05	808.24	N/A	N/A
13:30-13:45	2	564.82	564.82	N/A	N/A
13:30-13:45	3	679.33	683.69	N/A	N/A
13:45-14:00	1	807.05	808.24	N/A	N/A
13:45-14:00	2	564.82	564.82	N/A	N/A
13:45-14:00	3	679.33	683.69	N/A	N/A

14:00-14:15	**1**	658.95	659.93	N/A	N/A
14:00-14:15	**2**	461.18	461.18	N/A	N/A
14:00-14:15	**3**	554.67	558.23	N/A	N/A
14:15-14:30	**1**	551.84	552.66	N/A	N/A
14:15-14:30	**2**	386.21	386.21	N/A	N/A
14:15-14:30	**3**	464.51	467.49	N/A	N/A

Turning Proportions

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

		To		
		1	**2**	**3**
From	**1**	0.00	362.00	371.00
	2	244.00	0.00	269.00
	3	440.00	177.00	0.00

Turning Proportions (Veh) - Roundabout 1 (for whole period)

		To		
		1	**2**	**3**
From	**1**	0.00	0.49	0.51
	2	0.48	0.00	0.52
	3	0.71	0.29	0.00

Vehicle Mix

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

		To		
		1	**2**	**3**
From	**1**	1.00	1.00	1.00
	2	1.00	1.00	1.00
	3	1.01	1.00	1.00

Heavy Vehicle Percentages - Roundabout 1 (for whole period)

		To		
		1	**2**	**3**
From	**1**	0.00	0.30	0.00
	2	0.00	0.00	0.00
	3	0.90	0.00	0.00

Results

Results Summary

Arm	Max RFC	Max Delay (min)	Max Queue (Veh)	Max LOS	Total Demand (Veh/hr)	Total Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (min)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Queueing Total Delay (Veh-min)	Inclusive Queueing Average Delay (min)	Slope	Intercept (PCU/hr)
1	0.90	0.60	7.57	E	672.61	1008.92	314.78	0.31	3.50	314.85	0.31	0.604	1015.565
2	0.65	0.19	1.80	B	470.74	706.11	102.46	0.15	1.14	102.48	0.15	0.636	1130.458
3	0.77	0.29	3.20	C	566.17	849.25	165.49	0.19	1.84	165.53	0.19	0.605	1051.535

Main Results

Main results: (13:00-13:15)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	551.84	137.96	546.21	510.90	132.14	0.00	934.38	875.30	0.591	0.00	1.41

2	386.21	96.55	383.53	401.90	276.46	0.00	954.75	848.89	0.405	0.00	0.67
3	464.51	116.13	460.63	477.57	182.42	0.00	935.18	802.13	0.497	0.00	0.97

Main results: (13:15-13:30)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	658.95	164.74	654.91	612.77	158.51	0.00	918.48	875.30	0.717	1.41	2.42
2	461.18	115.29	459.91	481.94	331.48	0.00	919.78	848.89	0.501	0.67	0.99
3	554.67	138.67	552.53	572.64	218.75	0.00	913.34	802.13	0.607	0.97	1.51

Main results: (13:30-13:45)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	807.05	201.76	789.79	747.16	193.07	0.00	897.63	875.30	0.899	2.42	6.73
2	564.82	141.21	561.77	583.12	399.74	0.00	876.40	848.89	0.644	0.99	1.75
3	679.33	169.83	673.03	694.31	267.20	0.00	884.22	802.13	0.768	1.51	3.08

Main results: (13:45-14:00)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	807.05	201.76	803.68	752.67	194.75	0.00	896.62	875.30	0.900	6.73	7.57
2	564.82	141.21	564.63	591.65	406.77	0.00	871.93	848.89	0.648	1.75	1.80
3	679.33	169.83	678.86	702.85	268.56	0.00	883.40	802.13	0.769	3.08	3.20

Main results: (14:00-14:15)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	658.95	164.74	678.49	620.92	160.96	0.00	917.00	875.30	0.719	7.57	2.69
2	461.18	115.29	464.22	496.04	343.41	0.00	912.20	848.89	0.506	1.80	1.04
3	554.67	138.67	561.08	586.83	220.80	0.00	912.11	802.13	0.608	3.20	1.59

Main results: (14:15-14:30)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	551.84	137.96	556.67	517.30	133.93	0.00	933.30	875.30	0.591	2.69	1.48
2	386.21	96.55	387.61	408.85	281.75	0.00	951.39	848.89	0.406	1.04	0.69
3	464.51	116.13	466.86	485.00	184.36	0.00	934.01	802.13	0.497	1.59	1.01

Queueing Delay Results

Queueing Delay results: (13:00-13:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	19.75	1.32	0.152	A	A
2	9.68	0.65	0.105	A	A
3	13.84	0.92	0.125	A	A

Queueing Delay results: (13:15-13:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	33.60	2.24	0.224	B	B
2	14.30	0.95	0.130	A	A
3	21.48	1.43	0.165	A	A

Queueing Delay results: (13:30-13:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	82.13	5.48	0.492	D	C

2	24.69	1.65	0.189	B	B
3	41.66	2.78	0.276	C	B

Queueing Delay results: (13:45-14:00)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	108.31	7.22	0.602	E	D
2	26.75	1.78	0.195	B	B
3	47.26	3.15	0.292	C	B

Queueing Delay results: (14:00-14:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	47.43	3.16	0.270	C	B
2	16.34	1.09	0.135	A	A
3	25.53	1.70	0.174	B	B

Queueing Delay results: (14:15-14:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	23.56	1.57	0.161	A	A
2	10.71	0.71	0.107	A	A
3	15.73	1.05	0.129	A	A

Overview: Mini-roundabout Geometry

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Entry width (m)	Effective flare length (m)	Minimum approach road half-width (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island	Final Slope	Final Intercept (PCU/hr)
1	3.20	5.60	15.00	3.20	14.00	12.00	0.00		0.604	1015.565
2	3.25	5.60	25.00	3.25	15.00	14.00	0.00		0.636	1130.458
3	3.40	5.50	20.00	3.40	13.00	9.00	0.00		0.605	1051.535

Overview: Time Segment Results

Time Segment Results

Time Segment	Arm	Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Pedestrian Demand (Ped/hr)	Start Queue (Veh)	End Queue (Veh)	Queueing Total Delay (Veh-min)	Geometric Total Delay (Veh-min)	Average Delay Per Arriving Vehicle (min)
13:00-13:15	**1**	551.84	934.38	0.591	0.00	0.00	1.41	19.75	(0.00)	0.152
13:00-13:15	**2**	386.21	954.75	0.405	0.00	0.00	0.67	9.68	(0.00)	0.105
13:00-13:15	**3**	464.51	935.18	0.497	0.00	0.00	0.97	13.84	(0.00)	0.125
13:15-13:30	**1**	658.95	918.48	0.717	0.00	1.41	2.42	33.60	(0.00)	0.224
13:15-13:30	**2**	461.18	919.78	0.501	0.00	0.67	0.99	14.30	(0.00)	0.130
13:15-13:30	**3**	554.67	913.34	0.607	0.00	0.97	1.51	21.48	(0.00)	0.165
13:30-13:45	**1**	807.05	897.63	0.899	0.00	2.42	6.73	82.13	(0.00)	0.492
13:30-13:45	**2**	564.82	876.40	0.644	0.00	0.99	1.75	24.69	(0.00)	0.189
13:30-13:45	**3**	679.33	884.22	0.768	0.00	1.51	3.08	41.66	(0.00)	0.276
13:45-14:00	**1**	807.05	896.62	0.900	0.00	6.73	7.57	108.31	(0.00)	0.602
13:45-14:00	**2**	564.82	871.93	0.648	0.00	1.75	1.80	26.75	(0.00)	0.195
13:45-14:00	**3**	679.33	883.40	0.769	0.00	3.08	3.20	47.26	(0.00)	0.292
14:00-14:15	**1**	658.95	917.00	0.719	0.00	7.57	2.69	47.43	(0.00)	0.270
14:00-14:15	**2**	461.18	912.20	0.506	0.00	1.80	1.04	16.34	(0.00)	0.135
14:00-14:15	**3**	554.67	912.11	0.608	0.00	3.20	1.59	25.53	(0.00)	0.174
14:15-14:30	**1**	551.84	933.30	0.591	0.00	2.69	1.48	23.56	(0.00)	0.161
14:15-14:30	**2**	386.21	951.39	0.406	0.00	1.04	0.69	10.71	(0.00)	0.107
14:15-14:30	**3**	464.51	934.01	0.497	0.00	1.59	1.01	15.73	(0.00)	0.129

Appendix I
Junction Capacity Assessments – Option 2 and Hotel Development (950 Rooms)

PICADY

GUI Version: 5.1 AE
Analysis Program Release: 5.0 (MAY 2010)

For sales and distribution information, program advice and maintenance, contact:

TRL Limited
Crowthorne House
Nine Mile Ride
Wokingham, Berks.
RG40 3GA, UK

Tel: +44 (0)1344 770758
Fax:+44 (0)1344 770864
E-mail: software@trl.co.uk
Web: www.trlsoftware.co.uk

Run Analysis

Parameter	Values
File Run	H:\..\950 Hotel Rooms\Site 1 2025 Scenarios.vpi
Date Run	29 August 2012
Time Run	15:32:03
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	A592 (South)	100
Arm B	Glebe Road	100
Arm C	A592 (North)	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	Glebe Road / A592 Junction (Site 1)
Location	Bowness-on-Windermere
Date	25 June 2012
Enumerator	mcgaj [WE703147]
Job Number	32588-01
Status	TIA
Client	Lake District National Park
Description	Peak Weekend Hour at Site 1 is 13:00 - 14:00 on Sunday 3rd June 2012

Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

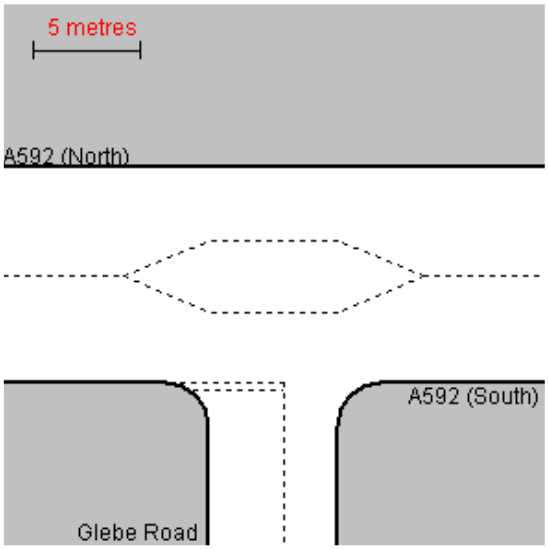
Parameter	Minor Arm B
Major Road Carriageway Width (m)	6.50
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	3.30
Minor Road First Lane Width (m)	3.35
Minor Road Visibility To Right (m)	80
Minor Road Visibility To Left (m)	140
Major Road Right Turn Visibility (m)	120
Major Road Right Turn Blocks Traffic	Yes (if over 6 veh)

Slope and Intercept Values

Stream	Intercept for Stream	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	583.859	0.104	0.263	0.165	0.376
B-C	697.927	0.105	0.265	-	-
C-B	720.490	0.273	0.273	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	12:45-14:15	90	15

ODTAB Turning Counts

Demand Set: Peak Hour 2025 Option 2
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	0.0	637.0
Arm B	0.0	0.0	0.0
Arm C	751.0	94.0	0.0

ODTAB Synthesised Flows

Demand Set: Peak Hour 2025 Option 2
Modelling Period: 12:45-14:15

Arm	Rising Time	Rising Flow (veh/min)	Peak Time	Peak Flow (veh/min)	Falling Time	Falling Flow (veh/min)
Arm A	13:00	7.963	13:30	11.944	14:00	7.963
Arm B	13:00	0.000	13:30	0.000	14:00	0.000
Arm C	13:00	10.563	13:30	15.844	14:00	10.563

Heavy Vehicles Percentages

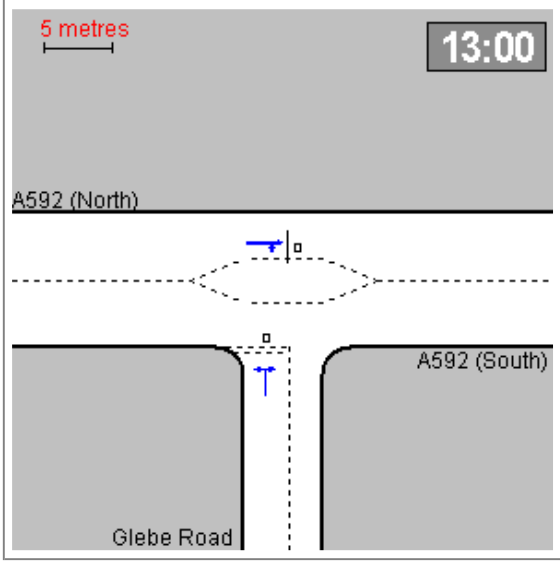
Demand Set: Peak Hour 2025 Option 2
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.0
Arm C	0.0	0.0	-

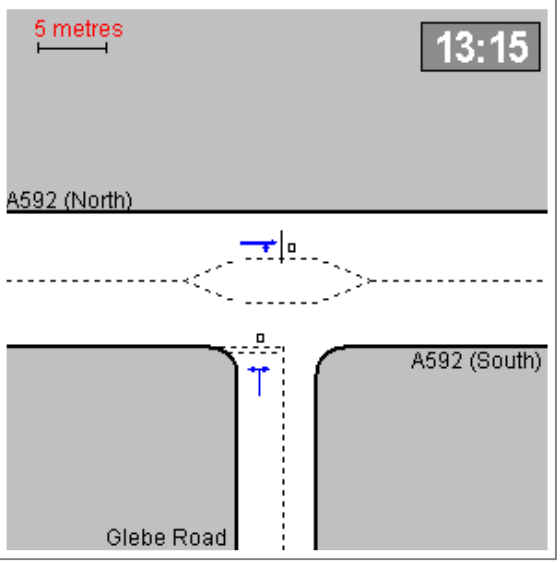
Queue Diagrams

Demand Set: Peak Hour 2025 Option 2
Modelling Period: 12:45-14:15
View Extent: 40m

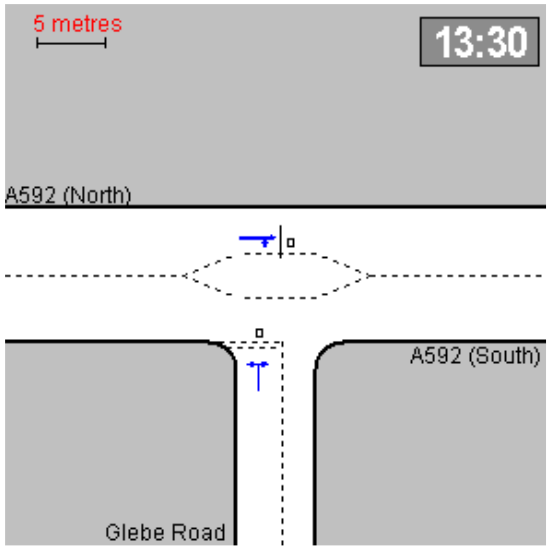
Queue Interval 1: 12:45-13:00



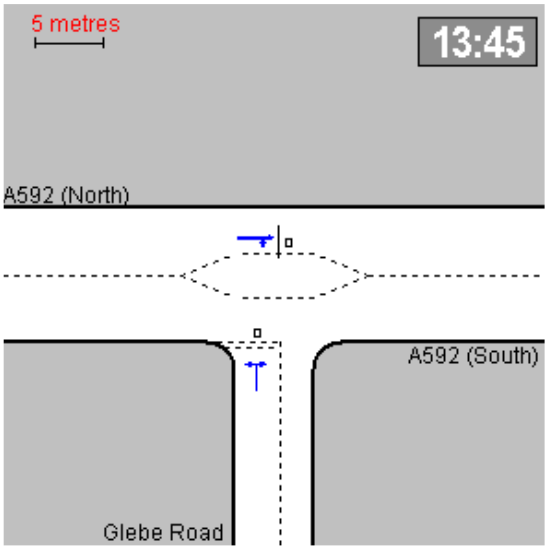
Queue Interval 2: 13:00-13:15



Queue Interval 3: 13:15-13:30

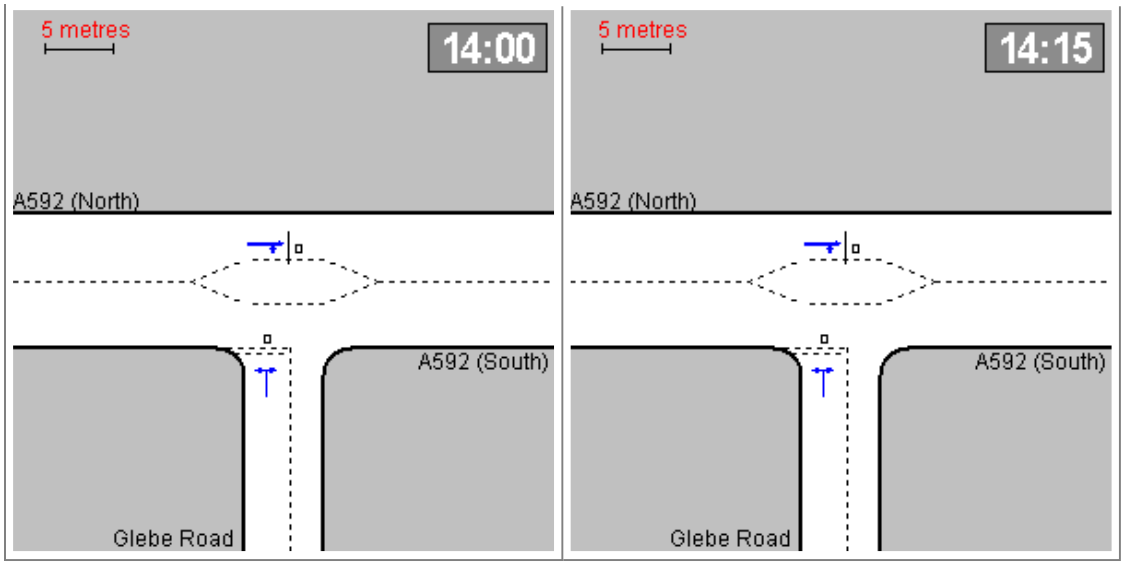


Queue Interval 4: 13:30-13:45



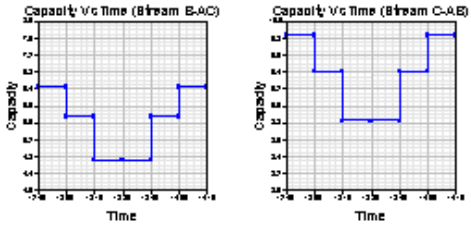
Queue Interval 5: 13:45-14:00

Queue Interval 6: 14:00-14:15


5 metres
14:00
A592 (North)
A592 (South)
Glebe Road
5 metres
14:15
A592 (North)
A592 (South)
Glebe Road

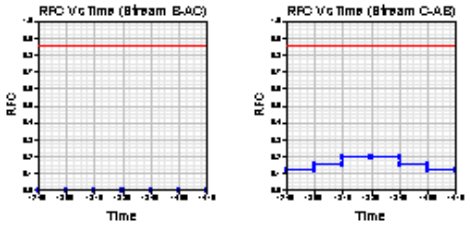
Capacity Graph

Demand Set: Peak Hour 2025 Option 2
Modelling Period: 12:45-14:15



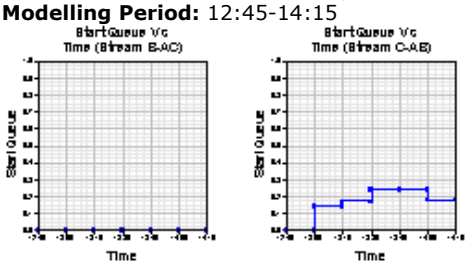
RFC Graph

Demand Set: Peak Hour 2025 Option 2
Modelling Period: 12:45-14:15



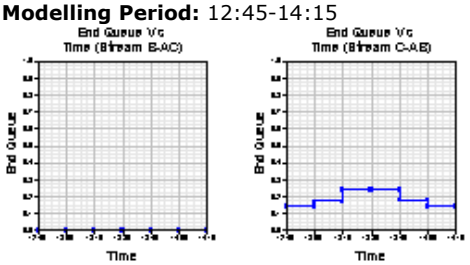
Start Queue Graph

Demand Set: Peak Hour 2025 Option 2
Modelling Period: 12:45-14:15



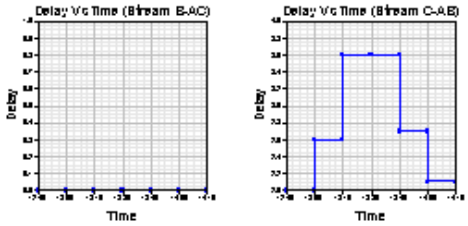
End Queue Graph

Demand Set: Peak Hour 2025 Option 2
Modelling Period: 12:45-14:15



Delay Graph

Demand Set: Peak Hour 2025 Option 2
Modelling Period: 12:45-14:15



Queues & Delays

Demand Set: Peak Hour 2025 Option 2
Modelling Period: 12:45-14:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
12:45-13:00	B-AC	0.00	6.43	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	1.18	9.83	0.120	-	0.00	0.14	-	2.0	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	7.99	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-AC	0.00	5.74	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	1.41	9.40	0.150	-	0.14	0.17	-	2.6	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	9.54	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-AC	0.00	4.72	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	1.72	8.82	0.196	-	0.17	0.24	-	3.6	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	11.69	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-AC	0.00	4.71	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	1.72	8.82	0.196	-	0.24	0.24	-	3.6	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	11.69	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-AC	0.00	5.73	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	1.41	9.40	0.150	-	0.24	0.18	-	2.7	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	9.54	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-AC	0.00	6.43	0.000	-	0.00	0.00	-	0.0	0.00
	C-AB	1.18	9.83	0.120	-	0.18	0.14	-	2.1	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	7.99	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Peak Hour 2025 Option 2
Modelling Period: 12:45-14:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	0.0	0.0	0.0	0.0	0.0	0.0
C-AB	129.4	86.3	16.6	0.1	16.6	0.1
C-A	-	-	-	-	-	-
A-B	0.0	0.0	-	-	-	-
A-C	876.8	584.5	-	-	-	-
All	**2039.9**	**1359.9**	**16.6**	**0.0**	**16.6**	**0.0**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful

ARCADY 7

File: H:\Projects\32588 Bowness Bay Traffic Assessments (Sub file)\5 Design\Data\ARCADY\ARCADY 2025\950 Bedroom Hotel\Glebe Road A592 - Southern Junction.arc7
Report generation date: 29/08/2012 15:30:05

Summary of roundabout performance

	IP			
	Queue (Veh)	**Delay (min)**	**RFC**	**LOS**
	Proposed Layout - 2025 - Option 2			
Arm 1	6.26	0.52	0.88	D
Arm 2	2.10	0.21	0.68	B
Arm 3	7.87	0.63	0.90	E
	Proposed Layout - 2025 - Sunday Peak			
Arm 1	5.04	0.41	0.85	C
Arm 2	1.48	0.17	0.60	B
Arm 3	2.17	0.22	0.69	B

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

2025 - Sunday Peak - IP runs from 13:00:00 to 14:30:00
2025 - Option 2 - IP runs from 13:00:00 to 14:30:00

File summary

File Description

Title	Bowness
Location	Bowness - Glebe Road/A592
Site Number	1
Date	27/06/2012
Version	1
Status	New Design
Client	Lake District Natioanl Park Authority
Jobnumber	32588
Enumerator	GLOBAL\glyn.price
Description	This is a test design of a new mini roundabout on the A592 and Glebe Road jucntion.
Results Upto Date	False

Analysis Options

RFC Threshold	Vehicle Length (m)	Do Queue Variations
0.85	5.75	

Sorting and Display

Show Arm Names	Arm Grouping	Sorting Direction	Sorting Type	Data Matrix Style	Time Style
	Order	Ascending	Numerical	By Destination	Absolute Time

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	Veh	Veh	perHour	min	-Min	perMin

A1 - Proposed Layout - D5 - 2025 - Option 2, IP

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Description	Include In Report	Use Specific Demand Set	Demand Set	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Proposed Layout	Proposed Layout	Yes		(D1)		100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Locked	Run Automatically	Use Relationship	Relationship	Start Time (HH:mm)	Finish Time (HH:mm)	Time Period Length (min)	Time Segment Length (min)	Traffic Profile Type
2025 - Option 2, IP	2025 - Option 2	IP	2025 Sunday Peak + Option 2		Yes			13:00	14:30	90	15	ONE HOUR

Roundabout Network

Roundabout Type(s)

ID	Name	Arm Order	Roundabout Type	Grade Separated	Large Roundabout	Do Geometric Delay
1	Glebe Road/A592	1,2,3	Mini-roundabout			

Roundabout Network Options

Driving Side	Lighting	Road Surface	In London
Left	Normal/unknown	Normal/unknown	

Arms

Arms

ID	Name	Description
1	A592 North	
2	A592 South	
3	Glebe Road	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1	3.20	3.20	5.60	15.00	14.00	12.00	0.00	
2	3.25	3.25	5.60	25.00	15.00	14.00	0.00	
3	3.40	3.40	5.50	20.00	13.00	9.00	0.00	

Pedestrian Crossings

Arm	Crossing Type

1	None
2	None
3	None

Arm Slope/ Intercept and Capacity

Slope and Intercept used in model

Arm	Enter Directly	Slope	Intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		((calculated))	((calculated))	0.604	1015.565
2		((calculated))	((calculated))	0.636	1130.458
3		((calculated))	((calculated))	0.605	1051.535

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

Traffic Flows

Demand Set Data Options

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

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)	PHF
1	ONE HOUR	Yes	698.00	100.000	N/A
2	ONE HOUR	Yes	556.00	100.000	N/A
3	ONE HOUR	Yes	726.00	100.000	N/A

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (Veh/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (Veh/hr)	Direct Demand Pedestrian Flow (Ped/hr)
13:00-13:15	1	525.49	526.31	N/A	N/A
13:00-13:15	2	418.59	418.59	N/A	N/A
13:00-13:15	3	546.57	550.08	N/A	N/A
13:15-13:30	1	627.49	628.46	N/A	N/A
13:15-13:30	2	499.83	499.83	N/A	N/A
13:15-13:30	3	652.66	656.85	N/A	N/A
13:30-13:45	1	768.51	769.71	N/A	N/A
13:30-13:45	2	612.17	612.17	N/A	N/A
13:30-13:45	3	799.34	804.47	N/A	N/A
13:45-14:00	1	768.51	769.71	N/A	N/A
13:45-14:00	2	612.17	612.17	N/A	N/A
13:45-14:00	3	799.34	804.47	N/A	N/A
14:00-14:15	1	627.49	628.46	N/A	N/A
14:00-14:15	2	499.83	499.83	N/A	N/A
14:00-14:15	3	652.66	656.85	N/A	N/A
14:15-14:30	1	525.49	526.31	N/A	N/A
14:15-14:30	2	418.59	418.59	N/A	N/A
14:15-14:30	3	546.57	550.08	N/A	N/A

Turning Proportions

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

		To		
		1	2	3
From	1	0.00	362.00	336.00
	2	244.00	0.00	312.00
	3	518.00	208.00	0.00

Turning Proportions (Veh) - Roundabout 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.52	0.48
	2	0.44	0.00	0.56
	3	0.71	0.29	0.00

Vehicle Mix

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

		To		
		1	2	3
From	1	1.00	1.00	1.00
	2	1.00	1.00	1.00
	3	1.01	1.00	1.00

Heavy Vehicle Percentages - Roundabout 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.30	0.00
	2	0.00	0.00	0.00
	3	0.90	0.00	0.00

Results

Results Summary

Arm	Max RFC	Max Delay (min)	Max Queue (Veh)	Max LOS	Total Demand (Veh/hr)	Total Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (min)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Queueing Total Delay (Veh-min)	Inclusive Queueing Average Delay (min)	Slope	Intercept (PCU/hr)
1	0.88	0.52	6.26	D	640.49	960.74	273.15	0.28	3.03	273.21	0.28	0.604	1015.565
2	0.68	0.21	2.10	B	510.20	765.29	117.15	0.15	1.30	117.16	0.15	0.636	1130.458
3	0.90	0.63	7.87	E	666.19	999.29	318.79	0.32	3.54	318.85	0.32	0.605	1051.535

Main Results

Main results: (13:00-13:15)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	525.49	131.37	520.29	568.44	155.02	0.00	920.51	872.83	0.571	0.00	1.30
2	418.59	104.65	415.59	424.85	250.46	0.00	971.28	863.42	0.431	0.00	0.75
3	546.57	136.64	541.08	483.67	182.38	0.00	935.20	817.07	0.584	0.00	1.37

Main results: (13:15-13:30)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	627.49	156.87	623.93	681.49	185.83	0.00	901.93	872.83	0.696	1.30	2.19

2	499.83	124.96	498.36	509.41	300.35	0.00	939.57	863.42	0.532	0.75	1.12
3	652.66	163.17	648.61	580.00	218.71	0.00	913.37	817.07	0.715	1.37	2.38

Main results: (13:30-13:45)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	768.51	192.13	754.63	824.34	223.79	0.00	879.04	872.83	0.874	2.19	5.66
2	612.17	153.04	608.45	615.16	363.26	0.00	899.58	863.42	0.681	1.12	2.05
3	799.34	199.84	781.11	704.69	267.02	0.00	884.33	817.07	0.904	2.38	6.94

Main results: (13:45-14:00)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	768.51	192.13	766.12	836.24	227.95	0.00	876.53	872.83	0.877	5.66	6.26
2	612.17	153.04	611.93	625.28	368.79	0.00	896.07	863.42	0.683	2.05	2.10
3	799.34	199.84	795.64	712.18	268.55	0.00	883.41	817.07	0.905	6.94	7.87

Main results: (14:00-14:15)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	627.49	156.87	642.78	701.54	192.97	0.00	897.63	872.83	0.699	6.26	2.43
2	499.83	124.96	503.56	526.33	309.42	0.00	933.80	863.42	0.535	2.10	1.17
3	652.66	163.17	673.53	591.99	220.99	0.00	911.99	817.07	0.716	7.87	2.65

Main results: (14:15-14:30)

Arm	Demand (Veh/hr)	Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)
1	525.49	131.37	529.75	577.82	157.98	0.00	918.73	872.83	0.572	2.43	1.37
2	418.59	104.65	420.20	432.72	255.01	0.00	968.38	863.42	0.432	1.17	0.77
3	546.57	136.64	551.40	490.81	184.40	0.00	933.98	817.07	0.585	2.65	1.44

Queueing Delay Results

Queueing Delay results: (13:00-13:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	18.31	1.22	0.148	A	A
2	10.76	0.72	0.107	A	A
3	19.30	1.29	0.150	A	A

Queueing Delay results: (13:15-13:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	30.60	2.04	0.213	B	B
2	16.09	1.07	0.136	A	A
3	33.15	2.21	0.223	B	B

Queueing Delay results: (13:30-13:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	70.89	4.73	0.439	D	C
2	28.59	1.91	0.203	B	B
3	83.95	5.60	0.509	D	C

Queueing Delay results: (13:45-14:00)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	90.16	6.01	0.520	D	C
2	31.24	2.08	0.211	B	B

3	112.15	7.48	0.632	E	D

Queueing Delay results: (14:00-14:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	41.53	2.77	0.248	B	B
2	18.50	1.23	0.141	A	A
3	47.30	3.15	0.271	C	B

Queueing Delay results: (14:15-14:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
1	21.66	1.44	0.156	A	A
2	11.96	0.80	0.110	A	A
3	22.94	1.53	0.159	A	A

Overview: Mini-roundabout Geometry

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Entry width (m)	Effective flare length (m)	Minimum approach road half-width (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island	Final Slope	Final Intercept (PCU/hr)
1	3.20	5.60	15.00	3.20	14.00	12.00	0.00		0.604	1015.565
2	3.25	5.60	25.00	3.25	15.00	14.00	0.00		0.636	1130.458
3	3.40	5.50	20.00	3.40	13.00	9.00	0.00		0.605	1051.535

Overview: Time Segment Results

Time Segment Results

Time Segment	Arm	Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Pedestrian Demand (Ped/hr)	Start Queue (Veh)	End Queue (Veh)	Queueing Total Delay (Veh-min)	Geometric Total Delay (Veh-min)	Average Delay Per Arriving Vehicle (min)
13:00-13:15	1	525.49	920.51	0.571	0.00	0.00	1.30	18.31	(0.00)	0.148
13:00-13:15	2	418.59	971.28	0.431	0.00	0.00	0.75	10.76	(0.00)	0.107
13:00-13:15	3	546.57	935.20	0.584	0.00	0.00	1.37	19.30	(0.00)	0.150
13:15-13:30	1	627.49	901.93	0.696	0.00	1.30	2.19	30.60	(0.00)	0.213
13:15-13:30	2	499.83	939.57	0.532	0.00	0.75	1.12	16.09	(0.00)	0.136
13:15-13:30	3	652.66	913.37	0.715	0.00	1.37	2.38	33.15	(0.00)	0.223
13:30-13:45	1	768.51	879.04	0.874	0.00	2.19	5.66	70.89	(0.00)	0.439
13:30-13:45	2	612.17	899.58	0.681	0.00	1.12	2.05	28.59	(0.00)	0.203
13:30-13:45	3	799.34	884.33	0.904	0.00	2.38	6.94	83.95	(0.00)	0.509
13:45-14:00	1	768.51	876.53	0.877	0.00	5.66	6.26	90.16	(0.00)	0.520
13:45-14:00	2	612.17	896.07	0.683	0.00	2.05	2.10	31.24	(0.00)	0.211
13:45-14:00	3	799.34	883.41	0.905	0.00	6.94	7.87	112.15	(0.00)	0.632
14:00-14:15	1	627.49	897.63	0.699	0.00	6.26	2.43	41.53	(0.00)	0.248
14:00-14:15	2	499.83	933.80	0.535	0.00	2.10	1.17	18.50	(0.00)	0.141
14:00-14:15	3	652.66	911.99	0.716	0.00	7.87	2.65	47.30	(0.00)	0.271
14:15-14:30	1	525.49	918.73	0.572	0.00	2.43	1.37	21.66	(0.00)	0.156
14:15-14:30	2	418.59	968.38	0.432	0.00	1.17	0.77	11.96	(0.00)	0.110
14:15-14:30	3	546.57	933.98	0.585	0.00	2.65	1.44	22.94	(0.00)	0.159

Appendix J
Junction Capacity Assessments – Option 3 and Hotel Development (1500 Rooms)

PICADY

GUI Version: 5.1 AE
Analysis Program Release: 5.0 (MAY 2010)

For sales and distribution information, program advice and maintenance, contact:

TRL Limited
Crowthorne House
Nine Mile Ride
Wokingham, Berks.
RG40 3GA, UK

Tel: +44 (0)1344 770758
Fax:+44 (0)1344 770864
E-mail: software@trl.co.uk
Web: www.trlsoftware.co.uk

Run Analysis

Parameter	Values
File Run	H:\..\1500 Hotel Rooms\Site 1 2025 Scenarios.vpi
Date Run	29 August 2012
Time Run	15:33:05
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	A592 (South)	100
Arm B	Glebe Road	100
Arm C	A592 (North)	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	Glebe Road / A592 Junction (Site 1)
Location	Bowness-on-Windermere
Date	25 June 2012
Enumerator	mcgaj [WE703147]
Job Number	32588-01
Status	TIA
Client	Lake District National Park
Description	Peak Weekend Hour at Site 1 is 13:00 - 14:00 on Sunday 3rd June 2012

Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

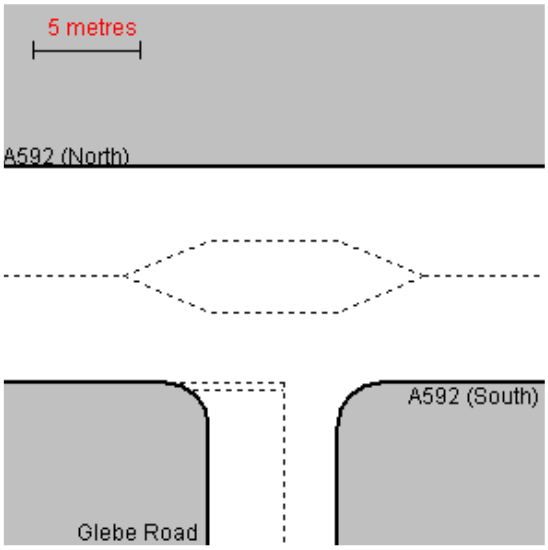
Parameter	Minor Arm B
Major Road Carriageway Width (m)	6.50
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	3.30
Minor Road First Lane Width (m)	3.35
Minor Road Visibility To Right (m)	80
Minor Road Visibility To Left (m)	140
Major Road Right Turn Visibility (m)	120
Major Road Right Turn Blocks Traffic	Yes (if over 6 veh)

Slope and Intercept Values

Stream	Intercept for Stream	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	583.859	0.104	0.263	0.165	0.376
B-C	697.927	0.105	0.265	-	-
C-B	720.490	0.273	0.273	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	12:45-14:15	90	15

ODTAB Turning Counts

Demand Set: Peak Hour 2025 Option 3
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	108.0	637.0
Arm B	80.0	0.0	195.0
Arm C	751.0	149.0	0.0

ODTAB Synthesised Flows

Demand Set: Peak Hour 2025 Option 3
Modelling Period: 12:45-14:15

Arm	Rising Time	Rising Flow (veh/min)	Peak Time	Peak Flow (veh/min)	Falling Time	Falling Flow (veh/min)
Arm A	13:00	9.313	13:30	13.969	14:00	9.313
Arm B	13:00	3.438	13:30	5.156	14:00	3.438
Arm C	13:00	11.250	13:30	16.875	14:00	11.250

Heavy Vehicles Percentages

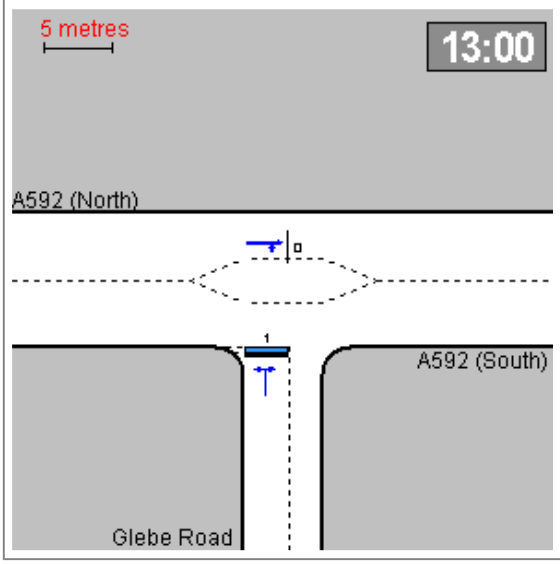
Demand Set: Peak Hour 2025 Option 3
Modelling Period: 12:45-14:15

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.0
Arm C	0.0	0.0	-

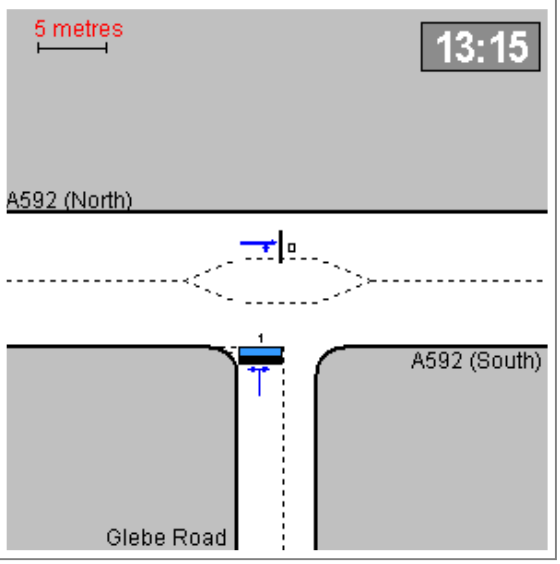
Queue Diagrams

Demand Set: Peak Hour 2025 Option 3
Modelling Period: 12:45-14:15
View Extent: 40m

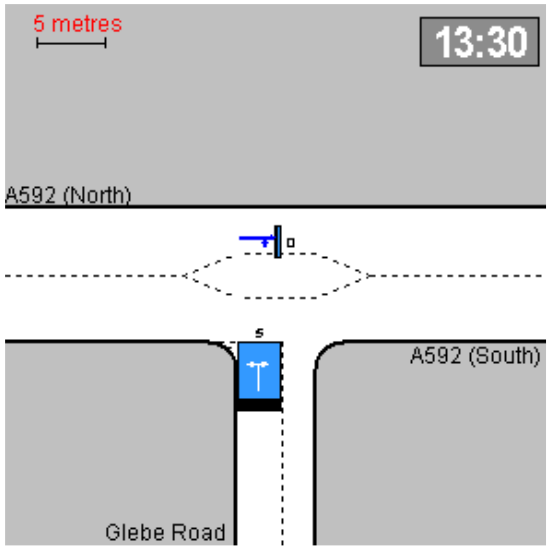
Queue Interval 1: 12:45-13:00



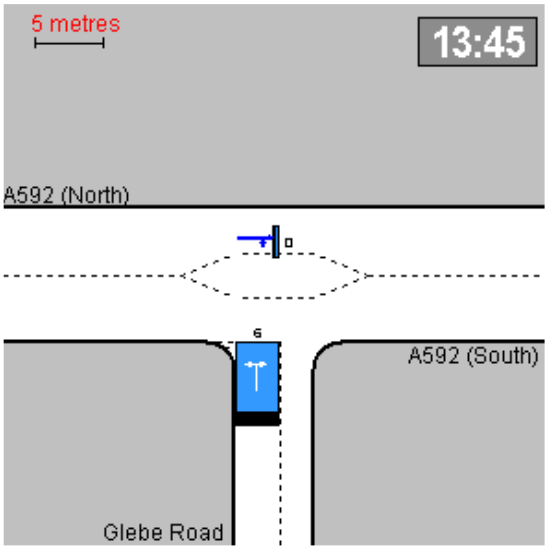
Queue Interval 2: 13:00-13:15



Queue Interval 3: 13:15-13:30

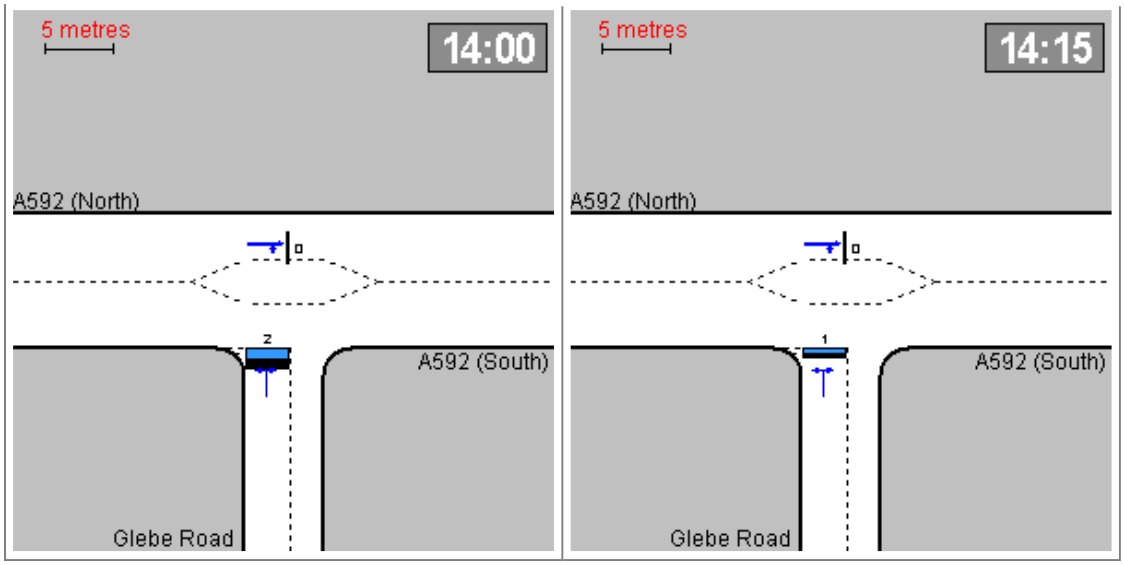


Queue Interval 4: 13:30-13:45



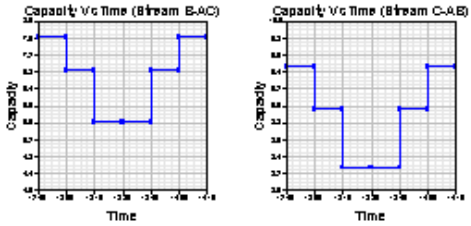
Queue Interval 5: 13:45-14:00

Queue Interval 6: 14:00-14:15


5 metres
14:00
A592 (North)
A592 (South)
Glebe Road
5 metres
14:15
A592 (North)
A592 (South)
Glebe Road

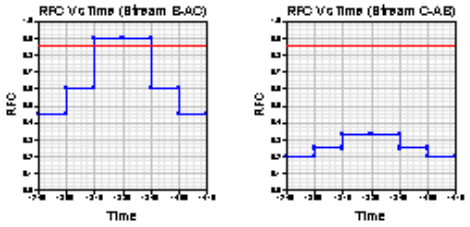
Capacity Graph

Demand Set: Peak Hour 2025 Option 3
Modelling Period: 12:45-14:15



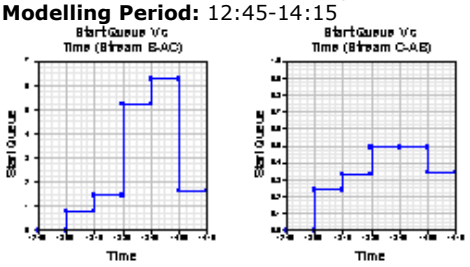
RFC Graph

Demand Set: Peak Hour 2025 Option 3
Modelling Period: 12:45-14:15



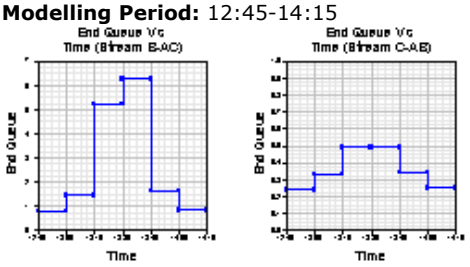
Start Queue Graph

Demand Set: Peak Hour 2025 Option 3
Modelling Period: 12:45-14:15



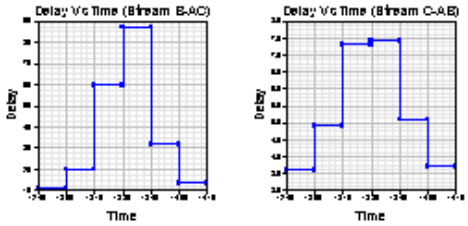
End Queue Graph

Demand Set: Peak Hour 2025 Option 3
Modelling Period: 12:45-14:15



Delay Graph

Demand Set: Peak Hour 2025 Option 3
Modelling Period: 12:45-14:15



Queues & Delays

Demand Set: Peak Hour 2025 Option 3
Modelling Period: 12:45-14:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
12:45-13:00	B-AC	3.45	7.62	0.453	-	0.00	0.80	-	11.2	0.23
	C-AB	1.87	9.46	0.198	-	0.00	0.24	-	3.6	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.36	-	-	-	-	-	-	-	-
	A-C	7.99	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:00-13:15	B-AC	4.12	6.84	0.603	-	0.80	1.43	-	19.8	0.36
	C-AB	2.23	8.96	0.249	-	0.24	0.33	-	4.9	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.62	-	-	-	-	-	-	-	-
	A-C	9.54	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:15-13:30	B-AC	5.05	5.62	**0.898**	-	1.43	5.21	-	59.5	1.00
	C-AB	2.73	8.27	0.330	-	0.33	0.49	-	7.3	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.98	-	-	-	-	-	-	-	-
	A-C	11.69	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:30-13:45	B-AC	5.05	5.62	**0.898**	-	5.21	6.24	-	86.9	1.34
	C-AB	2.73	8.27	0.330	-	0.49	0.49	-	7.4	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.98	-	-	-	-	-	-	-	-
	A-C	11.69	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
13:45-14:00	B-AC	4.12	6.83	0.603	-	6.24	1.62	-	31.9	0.46
	C-AB	2.23	8.96	0.249	-	0.49	0.34	-	5.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.62	-	-	-	-	-	-	-	-
	A-C	9.54	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
14:00-14:15	B-AC	3.45	7.61	0.453	-	1.62	0.85	-	13.6	0.25
	C-AB	1.87	9.46	0.198	-	0.34	0.25	-	3.7	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.36	-	-	-	-	-	-	-	-
	A-C	7.99	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Peak Hour 2025 Option 3
Modelling Period: 12:45-14:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	378.5	252.3	222.9	0.6	223.0	0.6
C-AB	205.1	136.7	32.0	0.2	32.0	0.2
C-A	-	-	-	-	-	-
A-B	148.7	99.1	-	-	-	-
A-C	876.8	584.5	-	-	-	-
All	**2642.7**	**1761.8**	**254.9**	**0.1**	**255.0**	**0.1**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful