



Brunswick Quay

Transport Assessment

July 2018

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1 Introduction

This Transport Assessment has been commissioned by Maro Developments Limited in support of the proposed 'Brunswick Quay' development. Brunswick Quay is a mixed use residential development located at Brunswick Dock to the south of Liverpool City Centre.

For planning purposes, the development is described as follows: Erection of four interlinked blocks on the Brunswick Quay site, comprising a total of 552 mixed apartments and 669 sqm (gross) ground floor commercial falling within any combination of Class A1, A2, A3, A4 and/or D2, 307 car parking spaces, 552 cycle parking spaces, private communal piazzas / terraces and associated landscaping / boundary treatment and public realm works, all accessed via Atlantic Way.

The main aims of this Transport Assessment are to:

- Assess travel demand for the development;
- Demonstrate safe and effective multi-modal accessibility to the proposed application site; and
- Identify, evaluate, and propose mitigation measures (if required) for any net-transport-related impacts likely to arise from the proposed development.

1.1 Scope of Assessment

The scope of the Transport Assessment has been agreed with Liverpool City Council through the formal pre-application scoping process (letter from LCC dated 6th October and subsequent meeting 23rd March 2018). The key assessments and reviews Liverpool City Council identified in scoping were:

- A review of the existing baseline transport conditions within the vicinity of the proposed development and review of accessibility via sustainable modes;
- Assessment of development impact on local 'on street' parking;
- Assessment of impact at Sefton Street / Brunswick Way roundabout;
- Assessment work to take account of the committed development 17F/1974 for 240 residential units.

This document is presented in the following sections:

- Section 2 Planning Policy Context;
- Section 3 Site Location and Accessibility;
- Section 4 Baseline Traffic and Parking Conditions;
- Section 5 Proposed Development and Travel Behaviour;
- Section 6 Junction Modelling;
- Section 7 Conclusions

2 Planning Policy Context

2.1 National Planning Policy Framework (NPPF, 2012)

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and details how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

The NPPF sets out the following guidelines regarding transport:

'All developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment. Plans and decisions should take account of whether:

- *The opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;*
- *Safe and suitable access to the site can be achieved for all people; and*
- *Improvements can be undertaken within the transport network that cost effectively limits the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.*

Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people. Therefore, developments should be located and designed where practical to:

- *Accommodate the efficient delivery of goods and supplies;*
- *Give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;*
- *Create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians, avoiding street clutter and where appropriate establishing home zones;*
- *Incorporate facilities for charging plug-in and other ultra-low emission vehicles; and*
- *Consider the needs of people with disabilities by all modes of transport.'*

This Transport Assessment supports the planning application for the proposed development in accordance with the recommendations set out within the NPPF. The Transport Assessment examines travel to the site by a range of modes, proposals for vehicle and servicing access and personal injury accidents occurring near the development site.

2.2 Merseyside Local Transport Plan 3 (LTP3)

The Merseyside Local Transport Plan 3 (LTP3) became active on 1st April 2011 and has a vision to provide "a city region committed to a low carbon future, which has a transport network and mobility culture that positively contributes to a thriving economy and the health and wellbeing of its citizens and where sustainable travel is the option of choice." (LTP3, Paragraph 2.2)

To achieve the vision, six goals have been set which include “3) the transport system promotes and enables improved health and wellbeing and road safety” and “4) equality of travel opportunity for all, through a transport system that allows people to connect easily with employment, education, healthcare, other essential services and leisure and recreational opportunities.” (LTP3 2.12).

2.3 “A Plan for Liverpool” – Liverpool’s Unitary Development Plan

The UDP was adopted in November 2002 and is a statutory document which provides the planning framework for the city.

The aims of the plan, with respect to transportation issues, are covered under General Policy 6 (GEN6). These are to provide a balanced transport infrastructure which is accessible to everyone, specifically one that *“meets the transport needs of people who are economically and socially disadvantaged... protects and enhances the environment through reducing the reliance on the private car... promotes investment in the public transport network... improves facilities for cyclists and pedestrians and reduces the availability of car parking facilities which would attract car borne commuters”*. (UDP, Paragraph 11.2)

In Chapter 11 of the plan, it is recognised that the promotion of transport modes other than the private car is paramount given the relatively low level of car ownership in the city. This would provide environmental benefits through reducing congestion and vehicle exhaust emissions. Policy T12 states that *“All new developments including changes of use, which generate a demand for car parking will be required to make provision for car parking on site, to meet the minimum operational needs of the development. Additional space for non-operational car parking will be permitted up to a maximum standard. This will be determined by:*

- the nature and type of use;
- whether off-site car parking would result in a danger to highway and pedestrian safety;
- whether the locality in which the proposed development is located is served by public car parking facilities;
- whether off-site parking would result in demonstrable harm to residential amenity; and
- the relative accessibility of the development site by public transport services.”

The new draft Liverpool Local Plan will replace the saved policies in the UDP documents was published for public consultation between 15th September and 23rd October 2016. The plan is some way off adoption and can only be afforded limited weight.

2.4 Ensuring a Choice of Travel Supplementary Planning Document (SPD)

This SPD was developed by a collaboration of the Merseyside local authorities and Merseytravel and was adopted in December 2008. It provides guidance on the access and transport requirements for new developments across Merseyside.

The SPD Objectives are to:

- *Ensure a reasonable choice of access by all modes of transport to new development;*
- *Reduce the environmental impact of travel choices by reducing pollution and improving the local environment;*
- *Improve road safety;*
- *Promote healthier lifestyles by providing opportunities for people to walk or cycle for work or leisure purposes;*

- *Reduce the level of traffic growth and congestion on the strategic and local road network; and*
- *Encourage opportunities to improve the quality of development proposals by better use of space through the provision of less car parking spaces where appropriate.*

It recognises that good design can contribute to sustainable modes of travel and enhance the environmental quality of a scheme, something which is reinforced through the Transport Strategy in this Transport Statement.

3 Site Location and Site Accessibility

In this section: following a description of site location, a review of the accessibility of the site is undertaken by bus, rail, walking and cycling.

3.1 Location

The proposed development site is located within Brunswick Dock to the south of the City Centre, adjacent to Brunswick Business Park. The land within the development boundary is currently vacant and occasionally used for car storage for a nearby car dealership. Its location in relation to key destinations and transport hubs is illustrated in Figure 1. The red line boundary plan for the application is provided as Figure 2.

Figure 1: Local Context to Liverpool City Centre



Source: Mott MacDonald

Figure 2: Application Boundary Plan



Source: Fletcher Rae

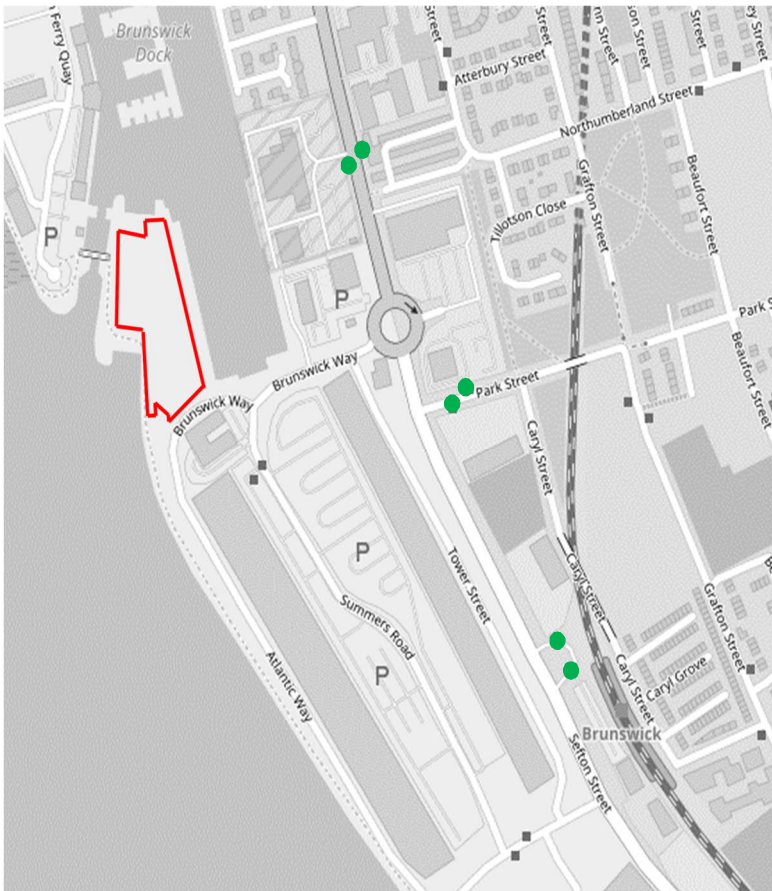
The site is well placed to benefit from the excellent public transport, walking and cycling connections which surround it. It is located on one of the most well used and popular cycle routes in the city along the River Mersey. Sefton Street is a key bus corridor and Brunswick train station is a 5-minute walk away.

The site is highly accessible by public transport and offers a good level of connectivity to the City Centre as well as Liverpool John Lennon Airport and Liverpool South Parkway, offering links to locations further afield and key employment centres such as Speke.

3.2 Accessibility by Bus

The closest bus stops to the development are located on and around Sefton Street within 5 minutes walking distance (450m) from the site, and offer connectivity to the City Centre as well as Liverpool John Lennon Airport. The location of these stops is shown in Figure 3.

Figure 3: Location of bus stops in proximity to the site



Source: Mott MacDonald

Figure 4: Bus stops in proximity to the site



Sefton Street



Park Street



Brunswick Rail Station

Source: Mott MacDonald

A summary of services available from these stops and average journey times to key locations is set out in the table below. This shows a good level of connectivity to the city centre, with stops in proximity to the site providing connectivity to Liverpool One Bus Station which can be reached in less than 15 minutes.

Table 1: Summary of bus services operating in the vicinity of the site

Service No.	Route	Frequency	Approximate Journey Times	Operator	Stop in vicinity of site
4	Liverpool ONE Dingle/ Sefton Park circular	1 bph	11 minutes (to Liverpool One)	Merseytravel	Park Street Navigation Wharf, Sefton Street
82A	Liverpool - Halton Hospital	2 bph	9 minutes (to Liverpool One from Rail Station) 7 minutes (to Liverpool One from Navigation Wharf)	Arriva	Brunswick Rail Station Stop A and Navigation Wharf, Sefton Street
500	Liverpool - Liverpool John Lennon Airport	2 bph	40 minutes (to Liverpool John Lennon Airport from Navigation Wharf)	Arriva	Navigation Wharf, Sefton Street

Source: Mott MacDonald

3.3 Rail

The site benefits from being located about an 8-minute walk away (600m) from Brunswick Rail Station which is located on the Northern Line of the Merseyrail network.

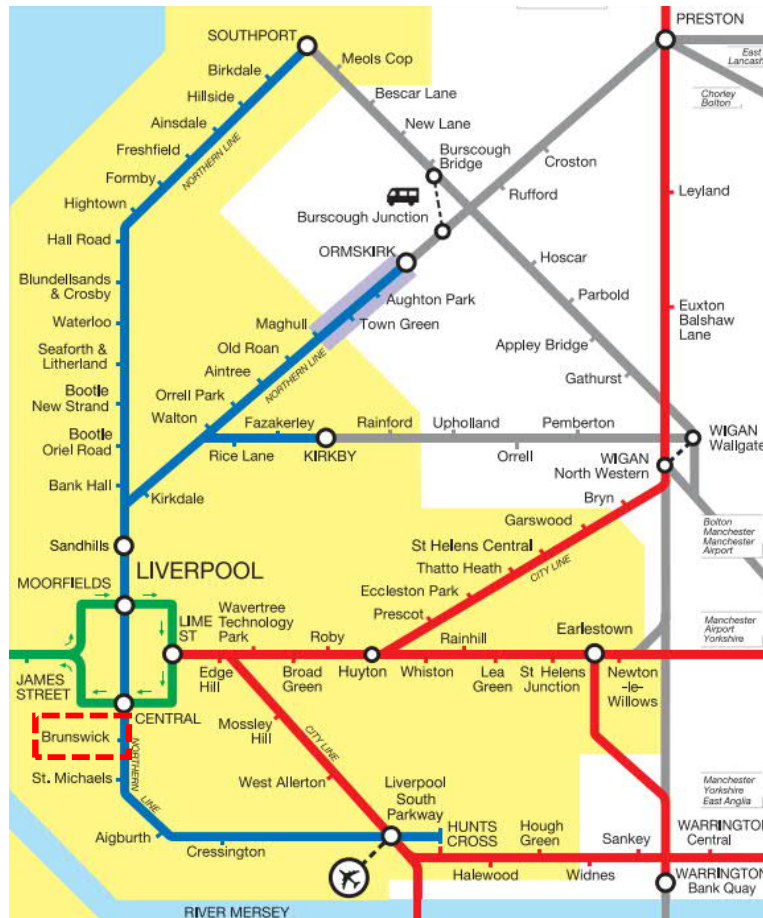
Figure 5: Brunswick Rail Station



Source: Mott MacDonald

This station provides excellent connectivity to the City Centre with direct services to Liverpool Central available every 15 minutes. The location of the station in relation to the wider rail network is demonstrated in Figure 6.

Figure 6: Rail Network



Source: Merseyrail

A summary of available services from Brunswick rail station is provided in the table below. In addition to facilitating City Centre connectivity, this rail station provides direct and frequent services to Hunts Cross and Liverpool South Parkway, therefore supporting access to employment opportunities and key locations further afield.

Table 2: Summary of rail services operating in the vicinity of the site

Destination	Frequency	Journey Time	Off-peak single
Liverpool Central	4 tph	4 mins	£1.95
Moorfields	4 tph	6 mins	£1.95
Liverpool Lime Street	4 tph	19 mins via Moorfields	£1.95
Hamilton Square	4 tph	21 mins via Liverpool Central	£3.10
Southport	4 tph	51 mins	£6.60
Hunts Cross	4 tph	15 mins	£3.55
Liverpool South Parkway	4 tph	10 mins	£3.20
Manchester Piccadilly	2 tph	1hr 7mins (via Liverpool South Parkway)	£13.60

Source: National Rail

A bus interchange facility is also provided at the station served by the 82A Arriva service offering half hourly buses to the City Centre (Liverpool ONE Bus Station). Bike and go facilities are also provided at the station, as well as free cycle and car parking facilities for station users.

Figure 7: Bike hire facilities at Brunswick Rail Station



Source: Mott MacDonald

3.4 Highway Network

Vehicular access is provided to the site from the local road network via the roundabout junction of Sefton Street / Brunswick Way. From here Brunswick Way connects to Atlantic Way. There are at present three junctions from Atlantic Way which lead into the site which is currently gated. Alternative access is provided from the south Via Harrison Way.

The internal road network of Brunswick Business Park including footways are not part of the adopted Liverpool City Council highway network and are managed privately. Accordingly, both Brunswick Way, Atlantic Way Harrison Way are private roads and are not the responsibility of Liverpool City Council.

3.4.1 National Trail / Recreational Route

An area of public open space immediately to the west of the site boundary of the development and to the east of the River Mersey. This area forms part of the Sustrans 'Trans Pennine Trail' in Figure 8. The area is currently separated from the development site by a fence. The land does not form part of the Liverpool City Council adopted highway and is in private (third party) ownership. The route is classed as a nations trail / recreational route on OS mapping. A photograph of the area is shown as Figure 9.

Figure 8: Trans Pennine Route Plan



Source: www.transpenninetrail.org

Figure 9: Open public area adjacent to site. Site boundary fence on left



Source: Mott MacDonald

As part of the development proposals this area will be greatly enhanced for both cyclists and pedestrians. More detail on this is provided in Section 5.

3.5 Walking and Cycling

Footways and pedestrian islands are located along Sefton Street to facilitate pedestrian movements towards key local facilities including local shops and transport hubs. Key locations around the City Centre are also within walking distance from the site, a summary of which is provided in Table 3.

Table 3: Walk times to key locations from the site

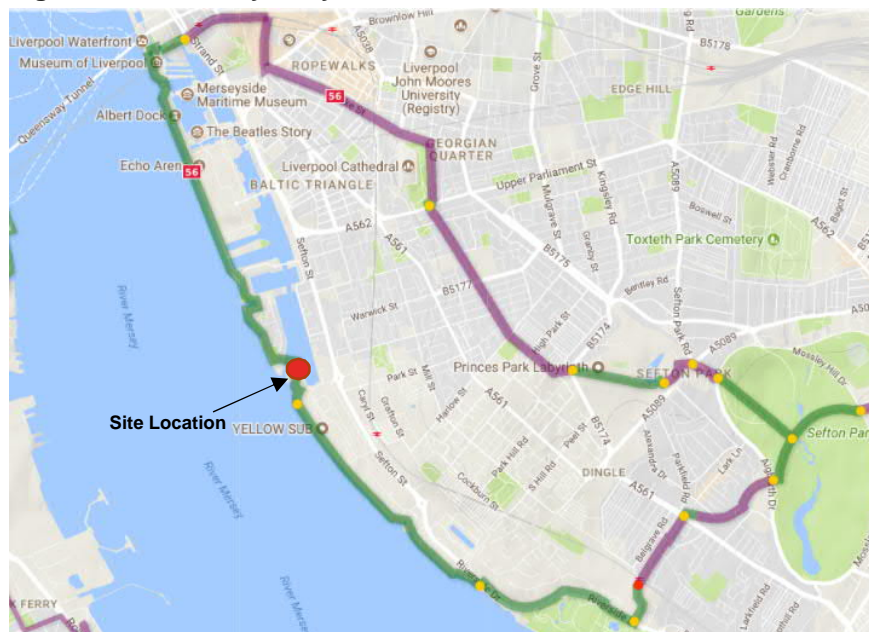
Destination	Walk Time
Royal Liver Building	36 mins
Liverpool One	33 mins
Albert Dock	32 mins
Liverpool Echo Arena	25 mins

Source: Google Maps

This provides opportunities for residents of the development working around these areas to commute to work on foot.

The site is also particularly well placed to offer cycling opportunities for residents of Brunswick Quay due to its location on National Route 56 of the National Cycle Network. This route runs between Chester Town Hall and Liverpool Town Hall offering connectivity to the city centre and nearby leisure facilities, such as Sefton Park, through a combination of traffic-free (indicated in green in the figure below) and on-road cycle routes indicated in purple in the figure below. The location of the site in relation to the National Cycle Network is shown in the image below.

Figure 10: Proximity to cycle routes



Source: Sustrans

The city centre is accessible by bicycle in around 10-15 minutes. This creates opportunities for people to travel into the City Centre from the development for employment or leisure purposes by modes of active travel along an attractive and well recognised cycle route. The key locations around the city centre accessible from the site by bike are outlined in the table below.

Table 4: Cycle times to key locations from the site

Destination	Cycle Time
Royal Liver Building	13 mins
Liverpool One	11 mins
Albert Dock	9 mins
Liverpool Echo Arena	8 mins
University of Liverpool	17 mins

Source: Google Maps

Figure 11: Riverside cycle and walk route past development site



Source: Mott MacDonald

3.5.1 Walking and Cycling Distances

Travel planning experience and evidence provided in reports by Chartered Institute of Highways and Transportation indicates that a threshold of 2km is a reasonable distance that pedestrians can be expected to walk to access employment, schools or health facilities. For access to similar facilities by bicycle published guidance states that a 5km threshold is a reasonable maximum cycle distance for commuting.

Figure 12: 2km Walking and 5km Cycling Isochrone Plan

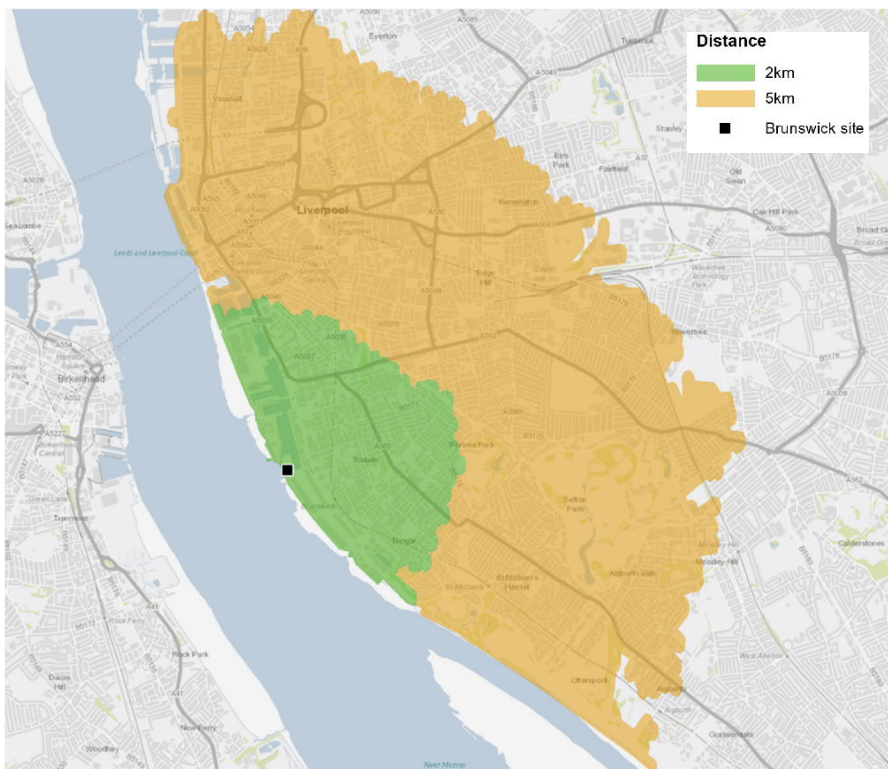


Figure 10 illustrates that much of the Liverpool City Centre is accessible within the 2km catchment. Within the 5km catchment all of the city centre and much of central and south

Liverpool is accessible. We consider that the development site is well located for access on foot and bicycle. These modes are therefore a realistic travel mode to future residents and employees at the site.

3.6 Sustainable Transport Accessibility Summary

Table 5 below provides a summary of the typical journey time for key destinations from the site by rail, bus, cycling and walking. In conclusion, we expect that future residents will have an attractive range of non-car travel choices for their daily commute or other journeys as highlighted in the table below. It should be noted that the area is covered by Uber and other on demand taxi services. On account of car parking charges in the city centre many car owners will be unlikely to drive there and will consider alternative modes.

Table 5: Summary of public transport, walking and cycling connectivity

Mode	Destination	Journey Time	Combined Frequency
Rail	Moorfields	6 mins	4 trains per hour
	Liverpool Central	4 mins	
	Liverpool Lime Street	19 mins via Moorfields	
	Hamilton Square	21 mins via Liverpool Central	
	Liverpool South Parkway	10 mins	
Bus	Liverpool One	10 mins (approx.)	5 buses per hour
	Liverpool South Parkway	40 mins	
Cycle	Royal Liver Building	13 mins	
	Liverpool One	11 mins	
	Albert Dock	9 mins	
	Liverpool Echo Arena	8 mins	
	University of Liverpool	17 mins	
Walk	Royal Liver Building	36 mins	
	Liverpool One	33 mins	
	Albert Dock	32 mins	
	Liverpool Echo Arena	25 mins	
	University of Liverpool	45 mins	

Source: Mott MacDonald

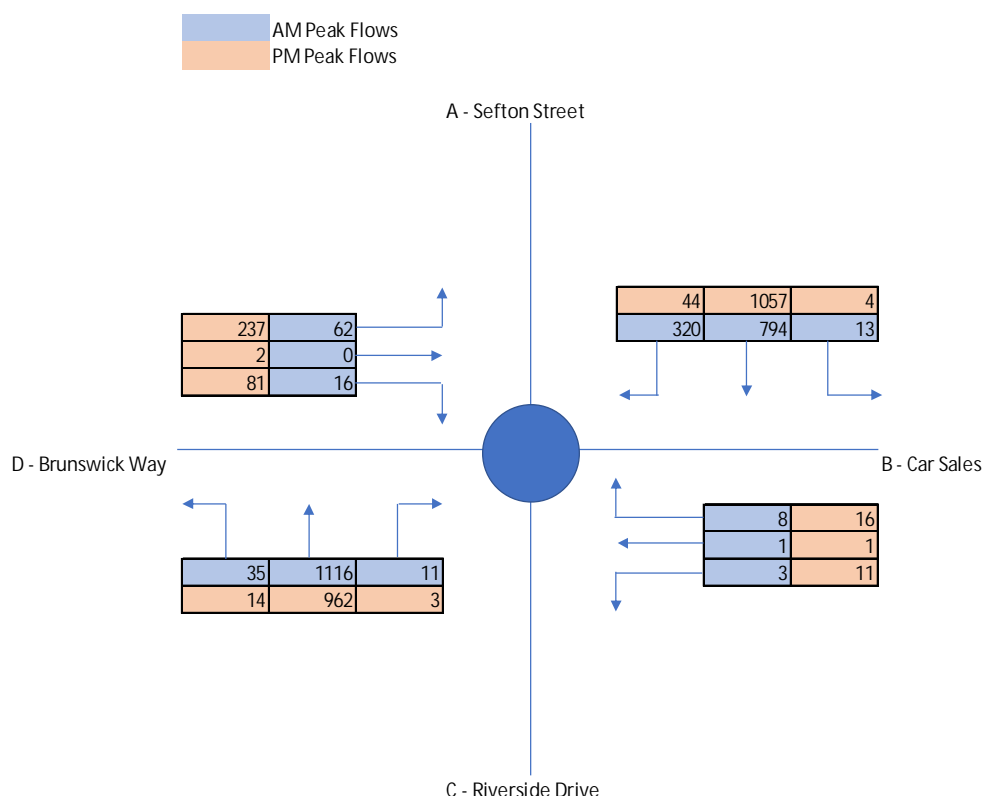
4 Baseline Traffic Conditions and Committed Development

To establish parking and traffic conditions in the vicinity of the site, surveys were undertaken by Streetwise Services during school term time on Thursday 12th April and Saturday 14th April 2018 between 07:00 and 19:00. This section provides a summary and analysis firstly of the traffic survey followed by a review of accident data, analysis of the parking survey and finally an overview of committed development.

4.1 Traffic Survey

A traffic survey was undertaken on Thursday 12th April at the Sefton Street / Brunswick Way roundabout. The survey took place between 07:00 – 10:00 and 16:00 – 19:00. Within the survey, period the peak traffic hours were determined to be 08:00 – 09:00 and 16:30 – 17:30. The turning movements at the junction within these peak hours are summarised in Figure 13 below.

Figure 13: Peak Hour Surveyed Traffic Flows



Source: Mott MacDonald/Streetwise

The traffic survey shows that during the morning peak hour the junction is trafficked by 2,377 traffic movements. In the morning peak the largest traffic flow is the northbound straight-ahead movement towards the City Centre from Sefton Street south with 1116 vehicles making this movement. Brunswick Way, which the proposed development will be accessed from is trafficked by 78 movements outbound and 356 inbound during this period.

In the evening peak hour, the junction is trafficked by 2,430 movements. The largest flow of traffic (1057 vehicles) is the southbound movement away from the city centre from Sefton Street north. Brunswick Way itself is trafficked by 319 movements outbound and 58 inbound.

4.2 Accident Data

Accident data has been reviewed using CrashMap. The location of accidents occurring over the 5 year period 2013 – 2017 inclusive are shown in Figure 14 below. No injury accidents have occurred in this period on Brunswick Way or Atlantic Way in the vicinity of the site. Two severe accidents have occurred on Sefton Street north of the roundabout with Brunswick Way. Considering the traffic levels that pass-through Sefton Street, this level of accident frequency does not point towards there being a significant safety issue at this location.

Figure 14: Accident Location Plan



Source: www.crashmap.co.uk

4.3 Parking Survey

A significant volume of on-street parking is available in proximity to the site along Sefton Street between Navigation Wharf to the north, Brunswick Rail Station to the south and Beaufort Street to the east.

The area surveyed represents an approximate 10-minute walk from the site and is illustrated in Figure 10 below.

Figure 15: Area of Parking Survey



Source: Streetwise Services

Please note only public roads were surveyed. The Brunswick Business Park streets and streets surrounding Brunswick Dock are private and subject to parking restrictions. The Streetwise parking survey estimated that there are in the region of 750 on street parking spaces available in the survey area, with around 100 of these being on Sefton Street, 170 on Caryl Street (where parking is available on both sides of this wide street), and 180 on Grafton Street (which has a similar layout to Caryl Street). Areas where parking restrictions apply were excluded from this capacity calculation.

Figure 16: Available on-street parking, Sefton Street (south of development)



4.4 On Street Parking Survey Results

During the weekday survey, maximum parking accumulation took place between 13:00 and 14:00 - when 20% of all parking spaces were occupied. On the weekend, maximum accumulation occurred between 12:00 and 13:00 - when 21% of all parking spaces were occupied. Tables 6 & 7 summarise the results during maximum accumulation:

Table 6: Weekday Peak Parking Accumulation

STREET NAME	13:00 - 14:00		
	CAP	TOT	%OCC
BEAUFORT STREET	75	7	9.3%
CARYL STREET	173	16	9.2%
GRAFTON STREET	184	19	10.3%
HORSFALL STREET	27	5	18.5%
NORTHUMBERLAND STREET	86	9	10.5%
PARK STREET	79	24	30.4%
SEFTON STREET	105	68	64.8%
WARWICK STREET	28	2	7.1%
TOTAL	757	150	19.8%

The survey demonstrates that Sefton Street is the most popular location for parking, although significant numbers of spaces remain during the peak accumulation hour. In this period, some 35% of spaces remained (37 spaces). The next busiest area is Park Street which, during the peak accumulation hour, had 69% capacity remaining or 55 spaces. All other streets surveyed have 80% or more capacity available during this peak time.

Table 7: Saturday Peak Parking Accumulation

STREET NAME	12:00 - 13:00		
	CAP	TOT	%OCC
BEAUFORT STREET	75	7	9.3%
CARYL STREET	173	33	19.1%
GRAFTON STREET	184	31	16.8%
HORSFALL STREET	27	1	3.7%
NORTHUMBERLAND STREET	86	7	8.1%
PARK STREET	79	13	16.5%
SEFTON ROAD	105	70	66.7%
WARWICK STREET	28	0	0.0%
TOTAL	757	162	21.4%

The survey demonstrates that during the peak accumulation period, Sefton Street was the most popular for parking with 70 vehicles parked and 35 spaces (32%) remaining. The next busiest location was Caryl Street, with 33 cars parked and 140 spaces (81%) remaining. All other locations surveyed had 82% or more capacity remaining during period of survey.

We consider that the survey demonstrates that there is on street parking capacity available on the streets surrounding the development site. Although the access strategy for the development site does not rely on, or require, on street parking space (see next section) we consider that the survey demonstrates there is not an on-street parking problem in the local area.

4.5 Committed Development

4.5.1 240 Dwellings Brunswick Business Park 17F/1974

In scoping, Liverpool City Council requested that a residential committed development for 240 dwellings in land currently occupied by car parking at Brunswick Business Park is taken account of in our assessment (planning ref:17F/1974). Mott MacDonald has reviewed the Transport Statement which accompanied the planning application. The Transport Statement concludes that the loss of parking within the Business Park can be absorbed within the overall parking capacity. Parking appears to be underused in the Business Park at the moment, and accordingly, the loss of parking will have minimal impact.

The statement reports that during the scoping discussions for the scheme it was agreed with LCC highways officers that there would be a low level of trip generation to and from the site due to its location and the nearby sustainable transport options available.

LCC agreed that the development would not result in any perceptible impact to the functioning of the nearby highway network.

Accordingly, as LCC has concluded that the development will not have a perceptible impact on traffic, it is therefore not necessary to adjust the surveyed traffic flows to take account of this committed development.

4.5.2 198 Dwellings Sefton Street 16F/2915

It should be noted that nearby residential planning application 16F/2915 for 198 dwellings, and 550m² of commercial space on Sefton Street was granted planning consent in 2018. The level of parking provision was 56% (110 spaces for residents) with no parking provided for the commercial aspect. The committee report for the development accepted that the site was located in an accessible area and that the parking provision for residents was acceptable.

The committee report noted that for the commercial element of the development the greater majority of customers are likely to be visiting the area as part of a linked trip, or be resident in the surrounding streets. As such, the existing on-street car parking provision was deemed to be sufficient to accommodate any demand associated with this portion of the development.

5 Proposed Development and Travel Behaviour

5.1 General Description

The development consists of 552 residential units and 669m² of commercial floorspace at ground floor level. The commercial floorspace will be split across three ground floor buildings, with any combination of uses A1, A2, A3, A4 and/or D2 applied for. The vehicular access to the site car park will be via an access junction on Atlantic Way. A plan of the development is shown as Figure 17. Floor Plans including the car park layout are included as Appendix B.

As previously noted there are currently three access junctions into the site from Atlantic Way. The central access will be amended to form the vehicular access into the site. The western and eastern site access junctions will be removed and stopped up. A service access will be provided to the east of the car park access.

Figure 17: Site Plan



Source: Fletcher Rae Architects

5.2 Parking

5.2.1 Car Parking

A total of 307 car parking spaces will be provided at the development. This will be provided at ground floor level and a mezzanine deck. As a percentage of the number of residential units, this represents 56% of dwellings having their own car parking space. 16 (5%) of the car parking spaces will be disabled accessible. In keeping with the sustainable location of the development, no parking will be provided for the commercial elements of the development. The greater majority of customers of the proposed commercial units are likely to be visiting the area as part of a linked trip, or be resident in the surrounding streets.

It is envisaged that residents will be able to purchase or hire an allocated car parking space within the development should they choose to do so. A car parking management plan will be implemented which ensures that only residents who have hired or purchased a space will be able to park within the development.

5.2.2 Car Parking Standards 'Ensuring a Choice of Travel' SPD

The car parking standard set out in the Liverpool City Council Supplementary Planning Document 'Ensuring a Choice of Travel' would require one car parking space per dwelling (for residential developments outside the city centre boundary).

The highly accessible nature of the development will encourage future residents, staff and visitors to use sustainable modes of transport

The SPD states that lower levels of parking than the maximum standards are appropriate when

- The development is in an accessible location; or
- Where there is good public transport access.

5.2.3 The evidence presented within Section 3 clearly demonstrates that the development location fulfils both these criteria. Pre-application scoping with Liverpool City Council revealed that their desired minimum for car parking is 60%. We consider that the provision of 307 spaces is only a small amount underneath the requested provision (24 spaces) and that this should not have a material impact given the sustainable travel options available to future residents. The level of parking proposed is also in keeping with recent planning approvals in the area (for 198 Dwellings Sefton Street 16F/2915 110 parking spaces were provided, 56%).

5.2.4 Cycle Parking

In line with the Liverpool City Council Supplementary Planning Document 'Ensuring a Choice of Travel' one cycle parking space is proposed per dwelling- accordingly 552 cycle parking spaces are proposed. This level of parking provision will help encourage cycling for future residents.

A cycle management plan will be implemented within the site, this is necessary so that the cycle parking is allocated in a sensible manner and that residents have access to their appropriate cycle storage area.

5.3 Access and Servicing

Access to the site will be taken from a new junction on Atlantic Way. Visibility splays appropriate to Manual for streets and swept paths of vehicles entering and exiting the site are shown in Appendix B. All servicing will take place from a new service road to the east of the site access. Tracking of service vehicles along this route are also shown in Appendix B.

5.4 Landscaping

A landscaping scheme will be implemented to the west of the proposed buildings. It should be noted that the landscaping scheme is on land largely beyond the applicant's ownership boundary, they are therefore subject to agreement with the adjacent landowners.

The landscaping proposals greatly enhance the public realm to the west of the site for pedestrians and cyclists. The scheme does not hinder pedestrians or cyclists on the Trans Pennine Trail. A grid of extra-large paving slabs and oversized street furniture elements are arranged to define a generous, wide pedestrian/cycle route along the riverside, and more enclosed seating and relaxation spaces, sheltered within the niches of the building form, but still with views out across the Mersey.

5.5 Minimum Accessibility Standard Assessment

In line with the 'Ensuring a Choice of Travel' SPD a Minimum Accessibility Standard Assessment (MASA) of the development has been undertaken, and shows that the development passes all accessibility criteria. Full details of the MASA are provided in Appendix A. A summary of the scores are provided below:

Table 8: MASA Breakdown

Criteria	Minimum Pass Score	Actual Score
Access on Foot	4	4
Access via Cycle	5	5
Access via Public Transport	5	5
Vehicular Access and Parking	1	2

Source: Mott MacDonald

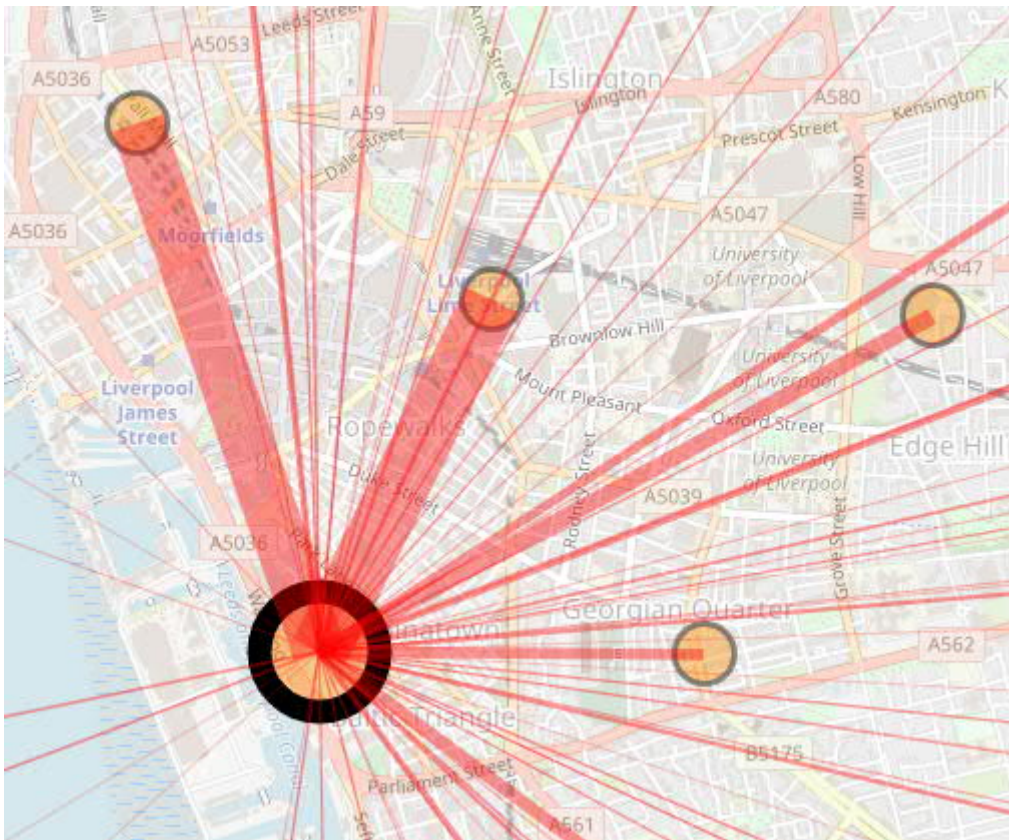
5.6 Resident Travel Behaviour

This section uses Census data to identify where residents of Brunswick Quay are likely to work and provides opportunities to maximise sustainable travel choices.

5.6.1 Travel to Work

Census 2011 data from the area around the site has been analysed to identify where the majority of people are travelling to work. As can be seen in **Figure 17** below, the majority of people living around Brunswick Quay are travelling to areas around the City Centre.

Figure 18: Key commuter destinations in the City Centre



Source: Datashine Commute

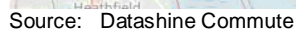
The data shows that up to 70% of Brunswick Quay residents could be travelling to work within or around the City Centre, presenting significant opportunities for public transport and active travel as a main mode of travel to work. Connectivity to key destinations around the City Centre, where people are likely to work, is summarised in the table below.

Table 9: Travel times to key commuter destinations in the City Centre

Destination/Area	Mode	Journey Time
Moorfields	Rail	6 mins
	Cycle	15 mins
	Walk	40 mins
Liverpool Lime Street	Rail	19 mins via Moorfields
	Cycle	15 mins
	Walk	42 mins
Royal Liver Building	Cycle	13 mins
	Walk	36 mins
Liverpool One	Cycle	11 mins
	Walk	33 mins
Albert Dock	Cycle	9 mins
	Walk	32 mins
Liverpool Echo Arena	Cycle	8 mins
	Walk	25 mins

Source: Google Maps/National Rail

Figure 19: Key commuter destinations



It should be noted that the proposed parking provision at the site of 56% is in keeping with the surveyed level of household car ownership in the area.

5.6.3 Travel Planning Opportunities

A Framework Travel Plan has been produced in support of this application. The document describes a range of measures that can be employed to publicise and encourage residents to travel sustainably. This includes:

- Car Sharing;
- City Car Club;
- Citybike Hub;
- Cycle promotions such as cycle training, police cycle tagging etc;
- Welcome Packs for residents containing cycle maps and public transport information; and
- Travel Plan Co-ordinator to oversee the implementation of the Travel Plan.

5.6.4 Travel Behaviour Conclusions

The evidence presented in this section clearly demonstrates that future residents will be able to travel sustainably to their place of work or other destinations should they choose. The evidence demonstrates that the level of residents parking provided is in keeping with local car ownership levels and will not lead to an adverse impact on the local road network.

6 Junction Modelling

Liverpool City Council has requested that assessment of development impact is undertaken for the Sefton Street / Brunswick Way roundabout.

6.1 Traffic Assessment

6.1.1 Trip Generation

Traffic to be generated by the development has been calculated using the TRICS database. The 'privately owned flats' use has been selected as it is considered that this will produce a robust assessment. It is highly unlikely that all flats within the development will be owner occupied. TRICS rates demonstrate that privately owned flats typically generate a higher vehicle trip rate than rented accommodation. Full TRICS output is included as Appendix C.

Table 10: Trip Rates per Dwelling for Privately Owned Flats and Trip Generation of 552 Dwellings

Use Class	AM Arrival	AM Dep	AM Total	PM Arrival	PM Dep	PM Total
Flats Trip Rate	0.057	0.182	0.239	0.174	0.096	0.270
Flats Trip Generation	31	100	131	96	53	149

It is estimated that the development will generate 131 two-way trips in the morning peak and 149 in the evening peak. Most of the sites in the TRICS database have higher parking provision than that proposed at the development site, which adds another level of robustness to our assessment.

6.1.2 Trip Distribution

Traffic has been distributed on the road network according to existing turning proportions at the junction. This is illustrated in Appendix D.

6.1.3 Traffic Growth

The assessment year of 2023 has been identified (five years after planning registration). To account for traffic growth in this period, TEMPRO has been used to adjust growth rates from the National Trip End Model. The traffic growth factors are summarised below:

- 2018 - 2023 Growth 1.08 AM Peak
- 2018 - 2023 Growth 1.08 PM Peak

This traffic growth has been applied to the 2018 surveyed traffic, and is illustrated in Appendix C. Additionally, development traffic has been added to this future baseline traffic and is also included in Appendix D.

6.1.4 ARCADY Junction Assessment

The Sefton Street roundabout has been modelled using ARCADY. Traffic flows have been inputted into an ARCADY model in order to assess the impact of the proposed development on

the adjacent road network. In Junctions 9, an RFC (ratio of flow to capacity) value of 0.85 or above indicates that the junction will experience queuing and congestion. The assessment demonstrates that the junction will operate well below the RFC threshold, and the results are as follows (Full output is provided in Appendix E):

Table 6: Summary of Junction Performance

Arm	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
Base Year (2018)						
Sefton Street (N)	1.0	2.75	0.49	1.0	2.84	0.49
Renault/ Nissan Access	0.0	4.55	0.02	0.0	4.92	0.04
Sefton Street (S)	1.2	3.31	0.54	0.7	2.38	0.42
Brunswick Way	0.1	4.25	0.09	0.5	5.29	0.34
Base (2023)						
Sefton Street (N)	1.0	2.86	0.51	1.1	2.96	0.52
Renault/ Nissan Access	0.0	4.71	0.02	0.0	5.12	0.04
Sefton Street (S)	1.4	3.57	0.58	0.8	2.46	0.44
Brunswick Way	0.1	4.48	0.10	0.5	5.49	0.35
Base + Development (2023)						
Sefton Street (N)	1.1	2.97	0.53	1.2	3.19	0.55
Renault/ Nissan Access	0.0	4.91	0.02	0.0	5.55	0.05
Sefton Street (S)	1.4	3.66	0.58	0.9	2.61	0.46
Brunswick Way	0.3	5.17	0.22	0.7	6.00	0.40

Source: Junctions 9

As illustrated by the table above, the highest RFC value in the AM (0.58) was recorded in the Base (2023) and Base + Development (2023) scenarios on the Sefton Street (S) arm. The highest RFC in the PM peak (0.55) was recorded in the Base + Development (2023) scenario on the Sefton Street (N) arm. Both of these values are well below the 0.85 RFC threshold, and indicates that there is enough capacity to accommodate more growth.

7 Conclusions

This Transport Assessment has been commissioned by Maro Developments Limited in support of the proposed 'Brunswick Quay' development. Brunswick Quay is proposed to be a mixed use development located at Brunswick Dock to the south of Liverpool City Centre. The development consists of 552 residential units with restaurant and commercial use on the ground floor.

A thorough analysis of accessibility by sustainable modes of transport has been undertaken. The assessment demonstrates that the development is situated in a highly accessible location with bus services, train services, cycle and walking routes close by. The proximity to Liverpool City Centre and the employment/amenity opportunities here will be a key selling point of the properties. A travel plan has been produced which accompanies this Transport Assessment which sets out sustainable transport measures which will encourage future residents to travel by other means than the private car.

When considering where residents are likely to commute to work, the majority of trips will be concentrated within or around the City Centre, which creates significant opportunities for residents to utilise these local public transport, walking and cycling facilities and reduce the need for residents to own a car.

We have demonstrated that the level of car parking proposed is in general keeping with car ownership rates in the local area and other developments recently permitted by Liverpool City Council. We have undertaken a parking capacity study on local surrounding streets with the conclusion that there is not currently a parking capacity problem in the local area. A review of traffic accident records has been undertaken for the immediate road network. The review demonstrates that there is not currently an accident problem on the local roads.

Swept path analysis of the servicing arrangements for the development have been undertaken and demonstrate that the development can be serviced in a satisfactory manner.

The potential traffic generation of the development has been calculated and the impact of this traffic on the operation of the Sefton Street / Brunswick Way roundabout has been assessed. The capacity assessment demonstrates that the development will not have a significant impact on the operation of this junction.

We conclude that the transport demand generated by this development can be accommodated on the local road, train, bus cycling and walking networks.

On the basis of this transport assessment, and through discussions with the City Highway Authority, no significant highways or access issues have been identified which would preclude approval of the development as is currently proposed.

A. MASA Assessment

Accessibility Checklist

Table 3.2 Accessibility Checklist

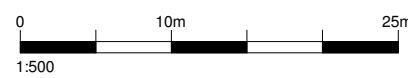
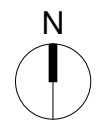
Proposal: <u>Brunswick Quay</u>				
Application Reference:				
Address: <u>Brunswick Way</u>				
Completed by: <u>Mott MacDonald</u>				
Access Diagram				
Has a diagram been submitted which shows how people move to and through the development and how this links to surrounding roads, footpaths and sight lines?				Yes/No
Access on foot			Points	Score
Safety	Is there safe pedestrian access to and within the site, and for pedestrians passing the site?		<u>Yes</u>	Yes/No
Location	<u>Housing Development</u> : Is the development within 800m of a district or local centre (see Accessibility Map 1 in Appendix F) <u>Other development</u> : Is the density of local housing (i.e. within 800m) more than 50 houses per hectare (see Accessibility Map 4 in Appendix F)	Yes	<u>(2)</u>	<u>2</u>
		No	0	
Internal Layout	Does 'circulation' and access inside the sites reflect direct, safe and easy to use pedestrian routes for all; with priority given to pedestrians when they have to cross roads or cycle routes?	Yes	<u>(1)</u>	<u>1</u>
		No	0	
External Layout	Are there barriers between site and local facilities or housing which restrict pedestrian access? (see Merseyside Code of Practice on Access and Mobility) e.g. <ul style="list-style-type: none"> No dropped kerbs at crossings or on desire lines Pavement less than 1.5m wide; A lack of a formal crossing where there is heavy traffic; Security concerns, e.g. lack of lighting. 	There are barriers	-1	<u>4</u>
		There are no barriers	<u>(1)</u>	
Other	Links to identified recreational walking network (see Accessibility Map 1)		<u>Yes</u>	
Total (B)				

Proposal:				
Summary	Box A: Target Score (From Table 2.1)	4		Comments or action needed to correct any shortfall
	Box B: Actual Score	4		
Access by Cycle			Points	Score
Safety	Are there safety issues for cyclists either turning into or out of the site or at road junctions within 400m of the site (e.g. dangerous turns for cyclists due to the level of traffic)?		No	Yes/No <input checked="" type="radio"/>
Cycle Parking	Does the development meet cycle parking standards (see standards in section 3)? Are there cycle parking facilities in a secure location with natural surveillance? Does the development where appropriate contribute to communal cycle parking facilities?		Yes	Yes/No <input checked="" type="radio"/>
Location	<u>Housing Development:</u> Is the development within 2 kilometres of a district or local centre (see Accessibility Map 1) <u>Other Development:</u> Is the density of local housing (e.g. within 2 kilometres) more than 50 houses per hectare (see Accessibility Map 4 in Appendix F)	Yes	<input checked="" type="radio"/> 2	2
		No	0	
Internal layout	Does 'circulation' and access inside the site reflect direct and safe cycle routes; with priority given to cyclists where they meet motor vehicles?	Yes	<input checked="" type="radio"/> 1	1
		No	0	
External Access	The development is within 400m of an existing or proposed cycle route (see Accessibility Map 1 in Appendix F). Are there proposals to create a link to a cycle route, or develop a route?	<input checked="" type="radio"/> 1	1	
	The development is not within 400m of an existing or proposed cycle route (see Accessibility Map 1 in Appendix F)	0		
Other	Development includes shower facilities and lockers for cyclists		<input checked="" type="radio"/> 1	1
Total (B)				

Proposal:				
Summary	Box A:		Comments or action needed to correct any shortfall	
	Target Score (From Table 2.1)	5		
	Box B:			
	Actual Score	5		
Access by Public Transport			Points	Score
Location and access to public transport	Is the site within a 200m safe and convenient walking distance of a bus stop, and/or within 400m of a rail station? (See Accessibility Map 2 in Appendix F).	Yes	2	2
		No	0	
	Are there barriers on direct and safe pedestrian routes to bus stops or rail stations i.e. <ul style="list-style-type: none"> A lack of dropped kerbs; Pavements less than 1.5m wide; A lack of formal crossings where there is heavy traffic; or Bus access kerbs. 	There are barriers	0	1
		There are no barriers	1	
Frequency	High (four or more bus services or trains an hour)		2	2
	Medium (two or three bus services or trains an hour)		1	
	Low (less than two bus services or trains an hour)		0	
Other	The proposal contributes to bus priority measures serving the site		1	NA
	The proposal contributes to bus stops, bus interchange or bus or rail stations in the vicinity and/or provides bus stops or bus interchange in the site		1	NA
	The proposal contributes to an existing or new bus service		1	NA
			Total (B):	
Summary	Box A:		Comments or action needed to correct any shortfall	
	Target Score (from Table 2.1)	5		
	Box B:			
	Total Score	5		

Proposal:			
Vehicle access and parking		Points	Score
Vehicle access and circulation	Is there safe access to and from the road?		Yes/No
	Can the site be adequately serviced?		Yes/No
	Is the safety and convenience of other users (pedestrians, cyclists and public transport) affected by the proposal?		Yes/No
	Has access for the emergency services been provided?		Yes/No
	For development which generates significant freight movements, is the site easily accessed from the road or rail freight route networks (See Accessibility Map 3 in Appendix F)		Yes/No NA
Parking	The off-street parking provided is more than advised in Section 3 for appropriate development type		Yes/No
	The off-street parking provided is as advised in Section 3 for that development type	1	
	The off-street parking provided is less than 75% of the amount advised in Section 4 for that development type (or shares parking provision with another development)	2	
	For development in controlled parking zones:		
	• Is it a car free development?	1	NO
	• Supports the control or removal of on-street parking spaces (inc provision of disabled spaces), or contributes to other identified measures in the local parking strategy (including car clubs)	1	NO
Summary	Box A Target Score (From Table 2.1)	1	Comments or action needed to correct any shortfall. If conditions are appropriate for the reduced level of parking (see section 3), but this has not been provided, please explain why
	Box B Actual Score	2	

B. Site Access and Servicing Tracks



00 SITE
1:500



LEVEL_01
1:500

General Notes

All site dimensions shall be verified by the Contractor on site prior to commencing any works.

Do not scale from this drawing.

Only work to written dimensions.

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Legend	
	1 Bed
	2 Bed
	3 Bed
	Circulation
	Ancillary
	Plant
	Retail

Works shown on land outside Applicant's ownership subject to agreement with third party. If such agreement cannot be reached, the extent of works will need to be adjusted to reflect Applicant's ownership



Piazza Area (1-2)
631.75 m²
6800.0 ft²

Piazza Area (2-3)
937.16 m²
10087.5 ft²

Piazza Area (3-4)
927.94 m²
9988.3 ft²

- Piazza to comprise:
- 45% Tarmacadam
 - 35% Concrete paving flags
 - 20% Timber Decking
- Refer to outline specification for material details.

4	Changes to application boundary	20180613
3	Additional parking, raised piazza + new duplex units	20180510
2	Relocation of refuse vehicle turning head, and realignment of service road	20180220
1	Scheme progress for QS appraisal	20180108

Scale	As indicated @ A1
Status	Sketch
Drawn By	Author
Checked By	Checker
Date	04/23/15

Client:

Maro Developments

Project:

Brunswick Quay

Sheet Name:

Level 00 and Level 01

Drawing Number:

16047_Site_Central_SK001

Revision:

4

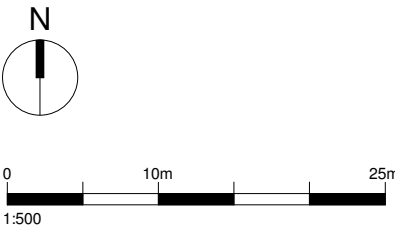
fletcher|rae
Architects | Master Planners | Designers

Hill Quays, 5 Jordan Street, Manchester, M15 4PY

t +44 (0) 161 242 1140
f +44 (0) 161 242 1141
w www.fletcher-rae.com
e info@fletcher-rae.com



LEVEL MEZZ.
1 : 500



General Notes

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Revision:

Scale 1 : 500 @ A1
Status Sketch
Drawn By BT/RT
Checked By AR
Date 05/10/18

Client:

Maro Developments

Project:

Brunswick Quay

Sheet Name:

Level Mezz

Drawing Number:

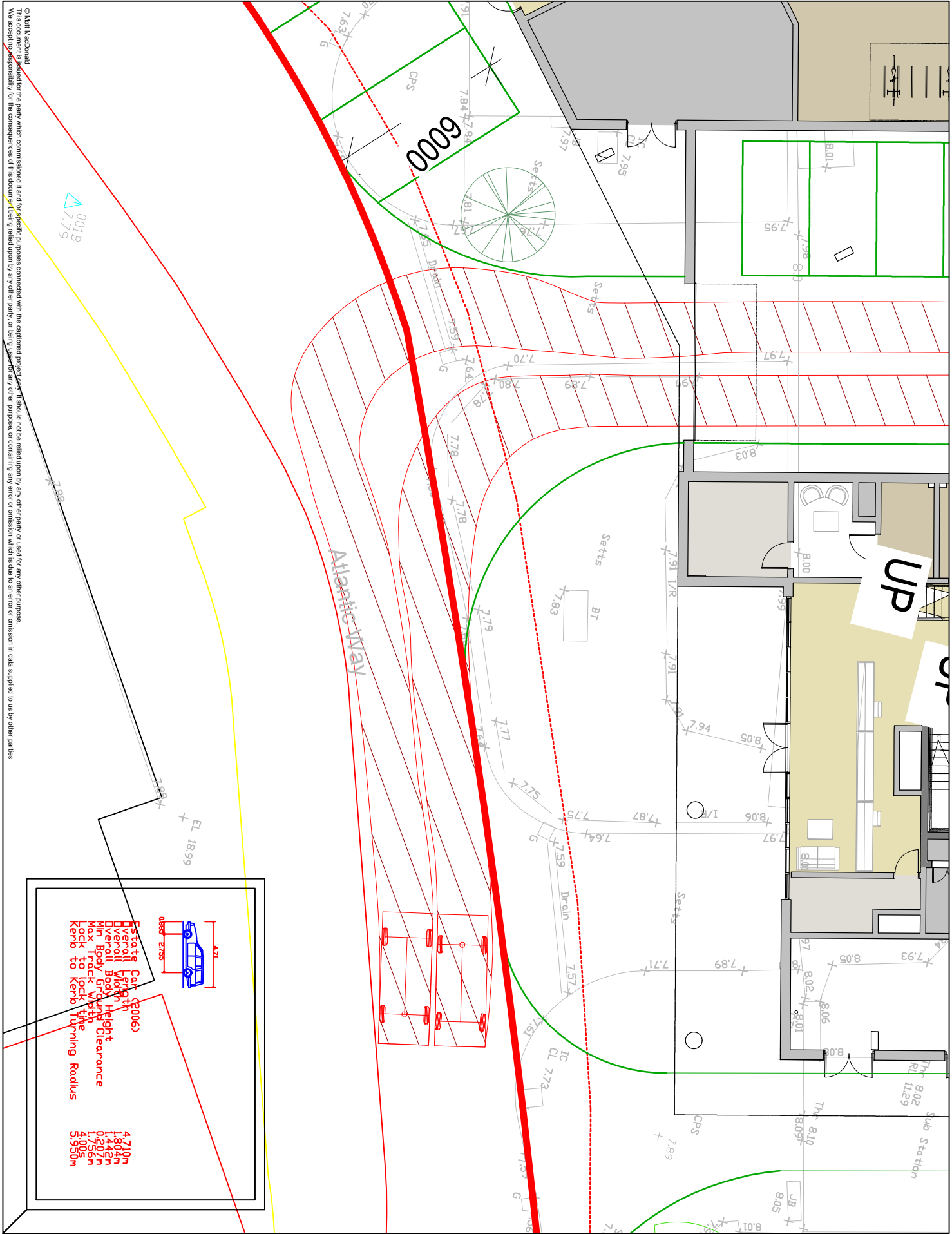
16047_Site_Central_SK020

Revision:

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C. TRICS Data

Calculation Reference: AUDIT-704103-180501-0503

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
 Category : C - FLATS PRIVATELY OWNED
 VEHICLES

Selected regions and areas:

02	SOUTH EAST	
	ES EAST SUSSEX	1 days
	EX ESSEX	1 days
04	EAST ANGLIA	
	CA CAMBRIDGESHIRE	1 days
	NF NORFOLK	1 days
	SF SUFFOLK	1 days
05	EAST MIDLANDS	
	NT NOTTINGHAMSHIRE	2 days
06	WEST MIDLANDS	
	WM WEST MIDLANDS	1 days
09	NORTH	
	TV TEES VALLEY	1 days
11	SCOTLAND	
	SA SOUTH AYRSHIRE	1 days
	SR STIRLING	1 days

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

Secondary Filtering selection:

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

Parameter: Number of dwellings
 Actual Range: 51 to 135 (units:)
 Range Selected by User: 50 to 215 (units:)

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/10 to 26/09/17

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

Selected survey days:

Monday	1 days
Tuesday	4 days
Wednesday	3 days
Thursday	2 days
Friday	1 days

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

Selected survey types:

Manual count	11 days
Directional ATC Count	0 days

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

Selected Locations:

Edge of Town Centre	6
Suburban Area (PPS6 Out of Centre)	5

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

Selected Location Sub Categories:

Residential Zone	5
Built-Up Zone	2
No Sub Category	4

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

Secondary Filtering selection:

Use Class:

C3 11 days

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

Population within 1 mile:

1,001 to 5,000	2 days
10,001 to 15,000	3 days
15,001 to 20,000	1 days
25,001 to 50,000	4 days
50,001 to 100,000	1 days

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

Population within 5 miles:

50,001 to 75,000	3 days
75,001 to 100,000	1 days
125,001 to 250,000	2 days
250,001 to 500,000	5 days

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

Car ownership within 5 miles:

0.6 to 1.0	3 days
1.1 to 1.5	8 days

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

Travel Plan:

No 11 days

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

PTAL Rating:

No PTAL Present 11 days

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

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
VEHICLES

Calculation factor: 1 DWELLS

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	11	77	0.054	11	77	0.118	11	77	0.172
08:00 - 09:00	11	77	0.057	11	77	0.182	11	77	0.239
09:00 - 10:00	11	77	0.072	11	77	0.109	11	77	0.181
10:00 - 11:00	11	77	0.086	11	77	0.098	11	77	0.184
11:00 - 12:00	11	77	0.086	11	77	0.097	11	77	0.183
12:00 - 13:00	11	77	0.111	11	77	0.077	11	77	0.188
13:00 - 14:00	11	77	0.089	11	77	0.111	11	77	0.200
14:00 - 15:00	11	77	0.105	11	77	0.103	11	77	0.208
15:00 - 16:00	11	77	0.095	11	77	0.075	11	77	0.170
16:00 - 17:00	11	77	0.111	11	77	0.095	11	77	0.206
17:00 - 18:00	11	77	0.174	11	77	0.096	11	77	0.270
18:00 - 19:00	11	77	0.129	11	77	0.084	11	77	0.213
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.169			1.245			2.414

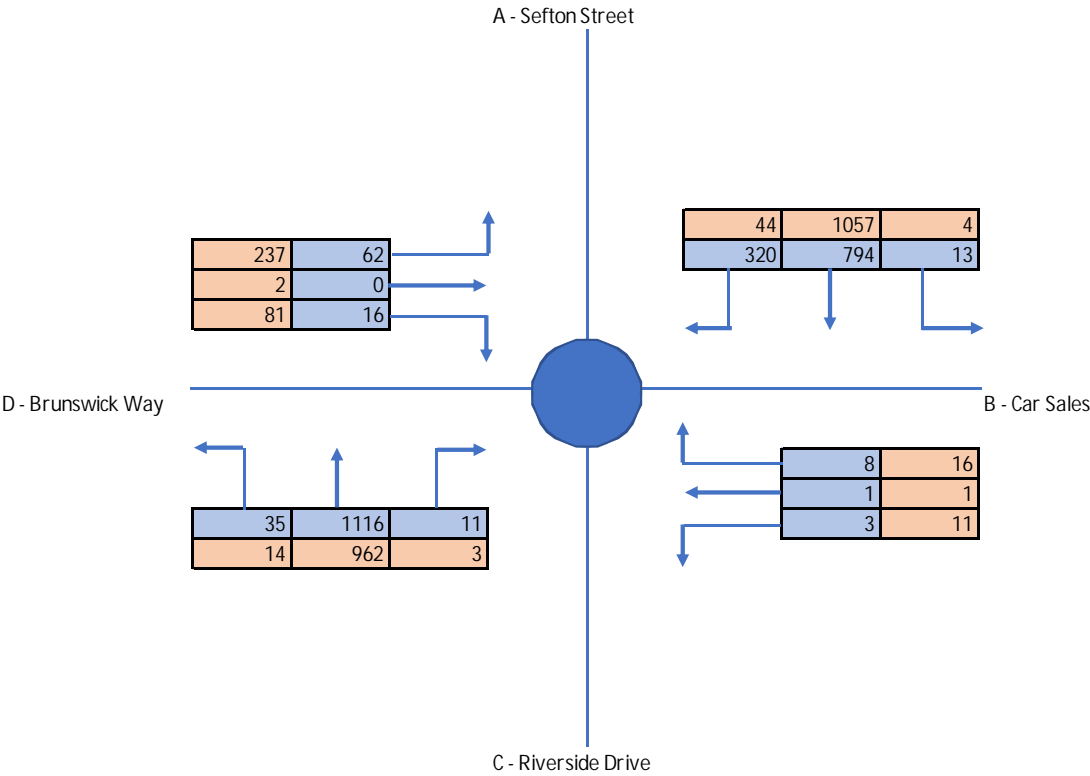
This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are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

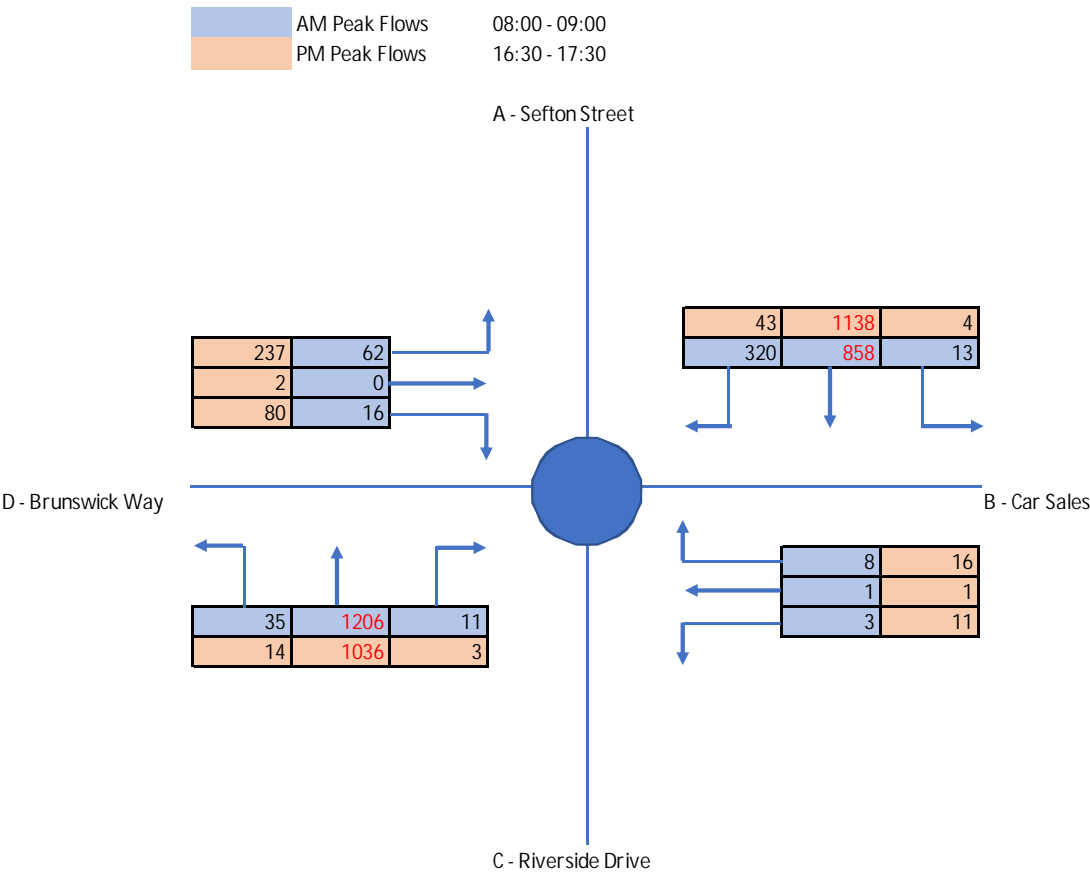
*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected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

D. Traffic Flow Data

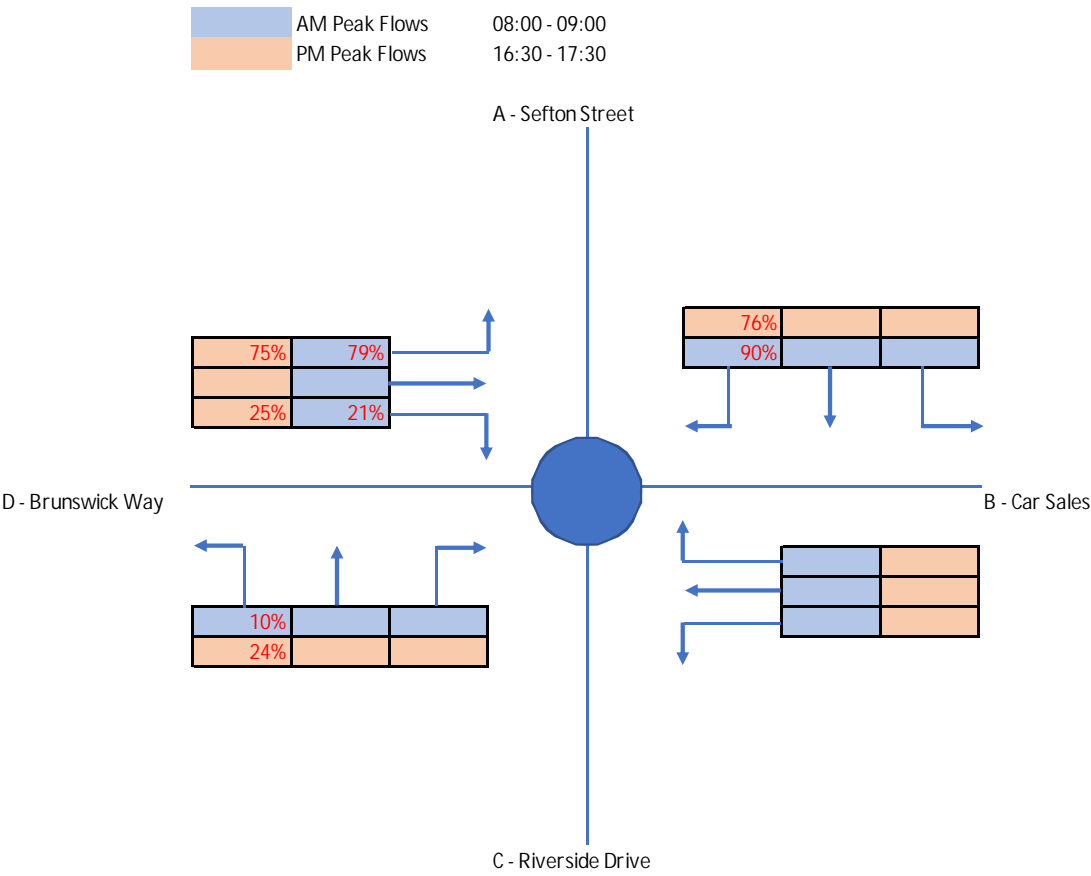
2018 Traffic Survey Data

	AM Peak Flows	08:00 - 09:00
	PM Peak Flows	16:30 - 17:30



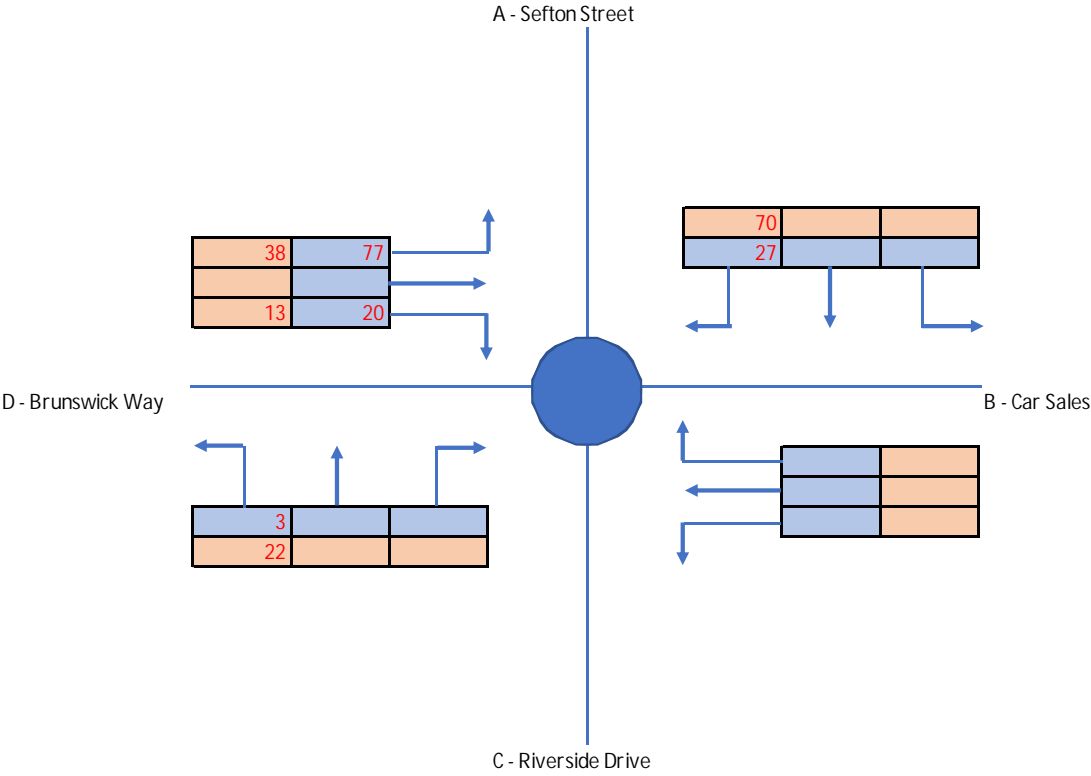


Trip Distribution

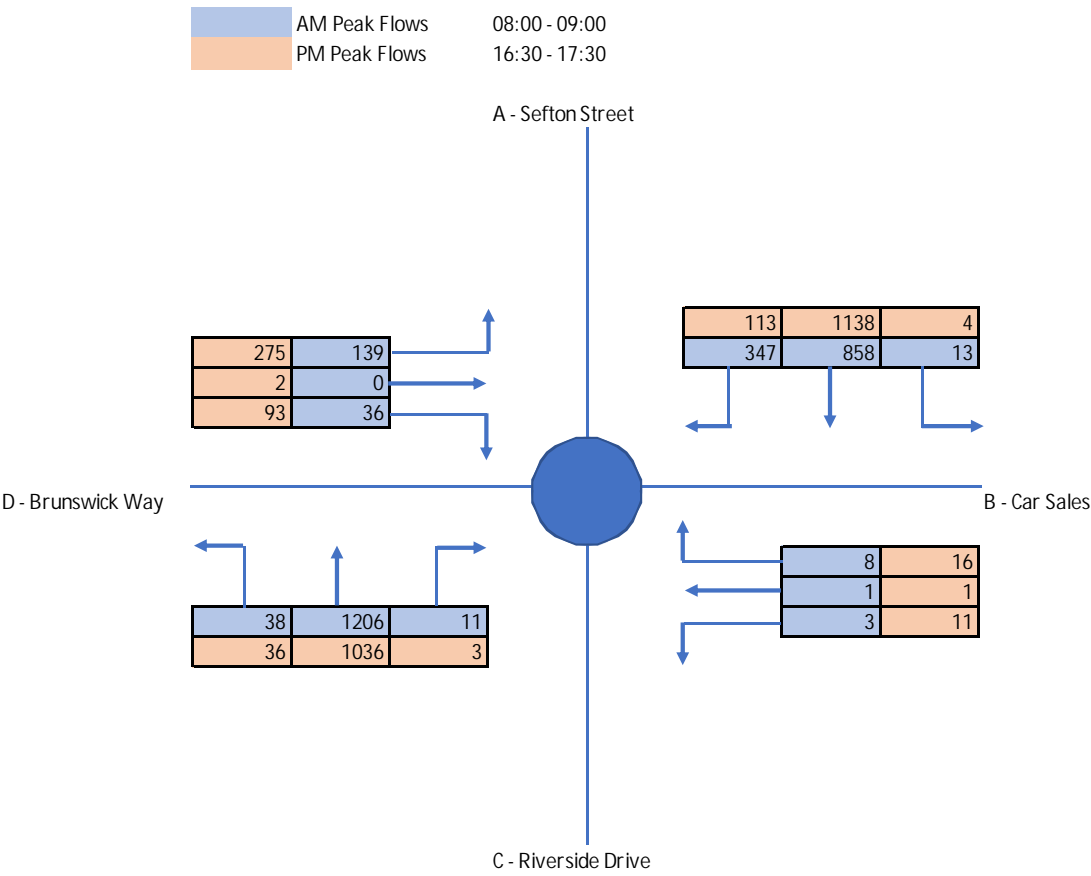


Development Traffic

Arrive	Dep	
30	97	AM Peak Flows
93	51	PM Peak Flows



2023 Base + Development



E. ARCADY Junction Assessment

Junctions 9			
ARCADY 9 - Roundabout Module			
Version: 9.0.2.5947 © Copyright TRL Limited, 2017			
For sales and distribution information, program advice and maintenance, contact TRL: +44 (0)1344 770558 software@trl.co.uk www.trlsoftware.co.uk			
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution			

Filename: Sefton Road Roundabout.j9

Path: P:\Liverpool\ITD\Projects\392094 Cronton Mercury\Brunswick\Junction Modelling

Report generation date: 10/05/2018 16:29:41

- »Base Year (2018) - 2018, AM
- »Base Year (2018) - 2018, PM
- »Base Year (2018) - 2023 Base, AM
- »Base Year (2018) - 2023 Base, PM
- »Base Year (2018) - 2023 Base + Development, AM
- »Base Year (2018) - 2023 Base + Development, PM

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
Base Year (2018) - 2018								
A - Sefton Street North	1.0	2.75	0.49	A	1.0	2.84	0.49	A
B - Renault/Nissan Access	0.0	4.55	0.02	A	0.0	4.92	0.04	A
C - Sefton Street South	1.2	3.31	0.54	A	0.7	2.38	0.42	A
D - Brunswick Way	0.1	4.24	0.09	A	0.5	5.29	0.34	A
Base Year (2018) - 2023 Base								
A - Sefton Street North	1.0	2.86	0.51	A	1.1	2.96	0.52	A
B - Renault/Nissan Access	0.0	4.71	0.02	A	0.0	5.12	0.04	A
C - Sefton Street South	1.4	3.57	0.58	A	0.8	2.46	0.44	A
D - Brunswick Way	0.1	4.48	0.10	A	0.5	5.49	0.35	A
Base Year (2018) - 2023 Base + Development								
A - Sefton Street North	1.1	2.97	0.53	A	1.2	3.19	0.55	A
B - Renault/Nissan Access	0.0	4.91	0.02	A	0.0	5.55	0.05	A
C - Sefton Street South	1.4	3.66	0.58	A	0.9	2.61	0.46	A
D - Brunswick Way	0.3	5.17	0.22	A	0.7	6.00	0.40	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

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

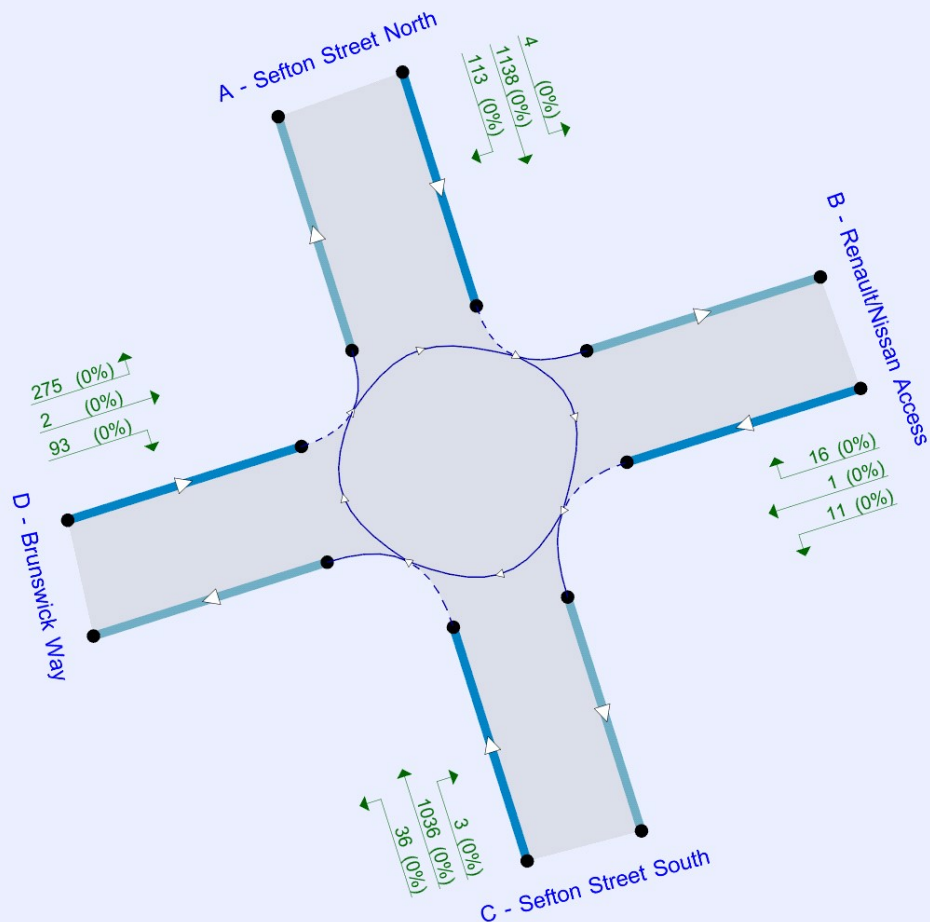
File summary

File Description

Title	Sefton Street/Royden Way Roundabout
Location	Brunswick, Liverpool
Site number	
Date	02/05/2018
Version	1
Status	(new file)
Identifier	
Client	Maro Developments
Jobnumber	392094
Enumerator	MOTTMAC\MCM80211
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin



Flows show original traffic demand (PCU/hr).

The junction diagram reflects the last run of Junctions.

Analysis Options

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

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2018	AM	ONE HOUR	08:00	09:30	15
D2	2018	PM	ONE HOUR	17:00	18:30	15
D3	2023 Base	AM	ONE HOUR	08:00	09:30	15
D4	2023 Base	PM	ONE HOUR	17:00	18:30	15
D5	2023 Base + Development	AM	ONE HOUR	08:00	09:30	15
D6	2023 Base + Development	PM	ONE HOUR	17:00	18:30	15

Analysis Set Details

ID	Name	Network flow scaling factor (%)
A1	Base Year (2018)	100.000

Base Year (2018) - 2018, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Sefton Street Roundabout	Standard Roundabout	A, B, C, D	3.08	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	Sefton Street North	
B	Renault/Nissan Access	
C	Sefton Street South	
D	Brunswick Way	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - Sefton Street North	7.38	9.00	11.0	30.0	50.0	32.0	
B - Renault/Nissan Access	3.31	6.20	12.0	42.0	50.0	26.0	
C - Sefton Street South	7.56	8.86	16.0	22.0	50.0	23.0	
D - Brunswick Way	3.80	6.25	17.0	51.0	50.0	25.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - Sefton Street North	0.780	2594
B - Renault/Nissan Access	0.593	1557
C - Sefton Street South	0.802	2678
D - Brunswick Way	0.629	1738

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2018	AM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Sefton Street North		✓	1145	100.000
B - Renault/Nissan Access		✓	12	100.000
C - Sefton Street South		✓	1164	100.000
D - Brunswick Way		✓	79	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
From	A - Sefton Street North	19	13	793	320
	B - Renault/Nissan Access	8	0	3	1
	C - Sefton Street South	1115	11	3	35
	D - Brunswick Way	62	0	16	1

Vehicle Mix

Heavy Vehicle Percentages

	To				
		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
From	A - Sefton Street North	0	0	0	0
	B - Renault/Nissan Access	0	0	0	0
	C - Sefton Street South	0	0	0	0
	D - Brunswick Way	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
A - Sefton Street North	0.49	2.75	1.0	A
B - Renault/Nissan Access	0.02	4.55	0.0	A
C - Sefton Street South	0.54	3.31	1.2	A
D - Brunswick Way	0.09	4.24	0.1	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	862	23	2576	0.335	860	0.5	2.097	A
B - Renault/Nissan Access	9	865	1044	0.009	9	0.0	3.478	A
C - Sefton Street South	876	262	2468	0.355	874	0.5	2.256	A
D - Brunswick Way	59	868	1191	0.050	59	0.1	3.179	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1029	28	2572	0.400	1029	0.7	2.331	A
B - Renault/Nissan Access	11	1035	943	0.011	11	0.0	3.860	A
C - Sefton Street South	1046	314	2427	0.431	1046	0.8	2.605	A
D - Brunswick Way	71	1038	1084	0.066	71	0.1	3.552	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1261	34	2567	0.491	1259	1.0	2.750	A
B - Renault/Nissan Access	13	1267	806	0.016	13	0.0	4.543	A
C - Sefton Street South	1282	384	2370	0.541	1280	1.2	3.298	A
D - Brunswick Way	87	1271	938	0.093	87	0.1	4.230	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1261	34	2567	0.491	1261	1.0	2.754	A
B - Renault/Nissan Access	13	1268	805	0.016	13	0.0	4.547	A
C - Sefton Street South	1282	384	2370	0.541	1282	1.2	3.306	A
D - Brunswick Way	87	1273	937	0.093	87	0.1	4.235	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1029	28	2572	0.400	1030	0.7	2.338	A
B - Renault/Nissan Access	11	1037	942	0.011	11	0.0	3.865	A
C - Sefton Street South	1046	314	2426	0.431	1048	0.8	2.616	A
D - Brunswick Way	71	1041	1083	0.066	71	0.1	3.558	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	862	23	2576	0.335	863	0.5	2.103	A
B - Renault/Nissan Access	9	868	1042	0.009	9	0.0	3.486	A
C - Sefton Street South	876	263	2467	0.355	877	0.6	2.266	A
D - Brunswick Way	59	871	1189	0.050	60	0.1	3.187	A

Base Year (2018) - 2018, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Sefton Street Roundabout	Standard Roundabout	A, B, C, D	2.99	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2018	PM	ONE HOUR	17:00	18:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Sefton Street North		✓	1124	100.000
B - Renault/Nissan Access		✓	28	100.000
C - Sefton Street South		✓	995	100.000
D - Brunswick Way		✓	320	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
From	A - Sefton Street North	20	4	1057	43
	B - Renault/Nissan Access	16	0	11	1
	C - Sefton Street South	962	3	16	14
	D - Brunswick Way	237	2	81	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
	A - Sefton Street North	0	0	0	0
	B - Renault/Nissan Access	0	0	0	0
	C - Sefton Street South	0	0	0	0
	D - Brunswick Way	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
A - Sefton Street North	0.49	2.84	1.0	A
B - Renault/Nissan Access	0.04	4.92	0.0	A
C - Sefton Street South	0.42	2.38	0.7	A
D - Brunswick Way	0.34	5.29	0.5	A

Main Results for each time segment

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	846	77	2534	0.334	844	0.5	2.127	A
B - Renault/Nissan Access	21	914	1015	0.021	21	0.0	3.621	A
C - Sefton Street South	749	60	2630	0.285	747	0.4	1.910	A
D - Brunswick Way	241	764	1257	0.192	240	0.2	3.536	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1010	92	2522	0.401	1010	0.7	2.378	A
B - Renault/Nissan Access	25	1093	909	0.028	25	0.0	4.074	A
C - Sefton Street South	894	72	2620	0.341	894	0.5	2.085	A
D - Brunswick Way	288	914	1163	0.247	287	0.3	4.110	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1238	112	2506	0.494	1236	1.0	2.832	A
B - Renault/Nissan Access	31	1339	763	0.040	31	0.0	4.914	A
C - Sefton Street South	1096	88	2608	0.420	1095	0.7	2.378	A
D - Brunswick Way	352	1119	1034	0.341	352	0.5	5.273	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1238	112	2506	0.494	1238	1.0	2.837	A
B - Renault/Nissan Access	31	1340	762	0.040	31	0.0	4.920	A
C - Sefton Street South	1096	88	2607	0.420	1096	0.7	2.380	A
D - Brunswick Way	352	1120	1033	0.341	352	0.5	5.287	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1010	92	2522	0.401	1012	0.7	2.386	A
B - Renault/Nissan Access	25	1095	907	0.028	25	0.0	4.081	A
C - Sefton Street South	894	72	2620	0.341	895	0.5	2.089	A
D - Brunswick Way	288	915	1162	0.248	288	0.3	4.126	A

18:15 - 18:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	846	77	2534	0.334	847	0.5	2.136	A
B - Renault/Nissan Access	21	917	1013	0.021	21	0.0	3.631	A
C - Sefton Street South	749	60	2630	0.285	750	0.4	1.917	A
D - Brunswick Way	241	766	1256	0.192	241	0.2	3.549	A

Base Year (2018) - 2023 Base, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Sefton Street Roundabout	Standard Roundabout	A, B, C, D	3.27	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2023 Base	AM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Sefton Street North		✓	1191	100.000
B - Renault/Nissan Access		✓	12	100.000
C - Sefton Street South		✓	1252	100.000
D - Brunswick Way		✓	78	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
From	A - Sefton Street North	0	13	858	320
	B - Renault/Nissan Access	8	0	3	1
	C - Sefton Street South	1206	11	0	35
	D - Brunswick Way	62	0	16	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
	A - Sefton Street North	0	0	0	0
	B - Renault/Nissan Access	0	0	0	0
	C - Sefton Street South	0	0	0	0
	D - Brunswick Way	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
A - Sefton Street North	0.51	2.86	1.0	A
B - Renault/Nissan Access	0.02	4.71	0.0	A
C - Sefton Street South	0.58	3.57	1.4	A
D - Brunswick Way	0.10	4.48	0.1	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	897	20	2578	0.348	895	0.5	2.135	A
B - Renault/Nissan Access	9	897	1025	0.009	9	0.0	3.542	A
C - Sefton Street South	943	247	2480	0.380	940	0.6	2.333	A
D - Brunswick Way	59	920	1159	0.051	59	0.1	3.271	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1071	24	2575	0.416	1070	0.7	2.390	A
B - Renault/Nissan Access	11	1073	921	0.012	11	0.0	3.955	A
C - Sefton Street South	1126	296	2441	0.461	1125	0.9	2.733	A
D - Brunswick Way	70	1100	1045	0.067	70	0.1	3.690	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1311	30	2571	0.510	1310	1.0	2.853	A
B - Renault/Nissan Access	13	1313	778	0.017	13	0.0	4.705	A
C - Sefton Street South	1378	362	2388	0.577	1376	1.4	3.551	A
D - Brunswick Way	86	1347	890	0.096	86	0.1	4.475	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1311	30	2571	0.510	1311	1.0	2.858	A
B - Renault/Nissan Access	13	1315	777	0.017	13	0.0	4.710	A
C - Sefton Street South	1378	362	2388	0.577	1378	1.4	3.566	A
D - Brunswick Way	86	1349	889	0.097	86	0.1	4.482	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1071	24	2575	0.416	1072	0.7	2.398	A
B - Renault/Nissan Access	11	1075	920	0.012	11	0.0	3.961	A
C - Sefton Street South	1126	296	2441	0.461	1128	0.9	2.747	A
D - Brunswick Way	70	1103	1043	0.067	70	0.1	3.698	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	897	20	2578	0.348	897	0.5	2.142	A
B - Renault/Nissan Access	9	900	1023	0.009	9	0.0	3.551	A
C - Sefton Street South	943	248	2479	0.380	944	0.6	2.347	A
D - Brunswick Way	59	923	1157	0.051	59	0.1	3.280	A

Base Year (2018) - 2023 Base, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Sefton Street Roundabout	Standard Roundabout	A, B, C, D	3.09	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2023 Base	PM	ONE HOUR	17:00	18:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Sefton Street North		✓	1185	100.000
B - Renault/Nissan Access		✓	28	100.000
C - Sefton Street South		✓	1053	100.000
D - Brunswick Way		✓	319	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
From	A - Sefton Street North	0	4	1138	43
	B - Renault/Nissan Access	16	0	11	1
	C - Sefton Street South	1036	3	0	14
	D - Brunswick Way	237	2	80	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
	A - Sefton Street North	0	0	0	0
	B - Renault/Nissan Access	0	0	0	0
	C - Sefton Street South	0	0	0	0
	D - Brunswick Way	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
A - Sefton Street North	0.52	2.96	1.1	A
B - Renault/Nissan Access	0.04	5.12	0.0	A
C - Sefton Street South	0.44	2.46	0.8	A
D - Brunswick Way	0.35	5.49	0.5	A

Main Results for each time segment

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	892	64	2544	0.351	890	0.5	2.173	A
B - Renault/Nissan Access	21	947	995	0.021	21	0.0	3.694	A
C - Sefton Street South	793	45	2642	0.300	791	0.4	1.943	A
D - Brunswick Way	240	793	1239	0.194	239	0.2	3.597	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1065	76	2534	0.420	1065	0.7	2.448	A
B - Renault/Nissan Access	25	1133	885	0.028	25	0.0	4.185	A
C - Sefton Street South	947	54	2635	0.359	946	0.6	2.132	A
D - Brunswick Way	287	948	1141	0.251	286	0.3	4.209	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1305	93	2521	0.518	1303	1.1	2.954	A
B - Renault/Nissan Access	31	1387	735	0.042	31	0.0	5.114	A
C - Sefton Street South	1159	66	2625	0.442	1158	0.8	2.453	A
D - Brunswick Way	351	1161	1007	0.349	350	0.5	5.473	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1305	94	2521	0.518	1305	1.1	2.959	A
B - Renault/Nissan Access	31	1388	734	0.042	31	0.0	5.121	A
C - Sefton Street South	1159	66	2625	0.442	1159	0.8	2.455	A
D - Brunswick Way	351	1162	1007	0.349	351	0.5	5.491	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1065	77	2534	0.420	1067	0.7	2.455	A
B - Renault/Nissan Access	25	1135	884	0.028	25	0.0	4.194	A
C - Sefton Street South	947	54	2635	0.359	948	0.6	2.136	A
D - Brunswick Way	287	949	1140	0.251	288	0.3	4.225	A

18:15 - 18:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	892	64	2544	0.351	893	0.5	2.182	A
B - Renault/Nissan Access	21	950	993	0.021	21	0.0	3.701	A
C - Sefton Street South	793	45	2642	0.300	793	0.4	1.949	A
D - Brunswick Way	240	795	1238	0.194	241	0.2	3.611	A

Base Year (2018) - 2023 Base + Development, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Sefton Street Roundabout	Standard Roundabout	A, B, C, D	3.45	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2023 Base + Development	AM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Sefton Street North		✓	1218	100.000
B - Renault/Nissan Access		✓	12	100.000
C - Sefton Street South		✓	1255	100.000
D - Brunswick Way		✓	175	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
From	A - Sefton Street North	0	13	858	347
	B - Renault/Nissan Access	8	0	3	1
	C - Sefton Street South	1206	11	0	38
	D - Brunswick Way	139	0	36	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
	A - Sefton Street North	0	0	0	0
	B - Renault/Nissan Access	0	0	0	0
	C - Sefton Street South	0	0	0	0
	D - Brunswick Way	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
A - Sefton Street North	0.53	2.97	1.1	A
B - Renault/Nissan Access	0.02	4.91	0.0	A
C - Sefton Street South	0.58	3.66	1.4	A
D - Brunswick Way	0.22	5.17	0.3	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	917	35	2566	0.357	915	0.6	2.177	A
B - Renault/Nissan Access	9	932	1004	0.009	9	0.0	3.616	A
C - Sefton Street South	945	267	2464	0.384	942	0.6	2.362	A
D - Brunswick Way	132	920	1159	0.114	131	0.1	3.501	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1095	42	2561	0.428	1094	0.7	2.453	A
B - Renault/Nissan Access	11	1115	896	0.012	11	0.0	4.067	A
C - Sefton Street South	1128	320	2422	0.466	1127	0.9	2.780	A
D - Brunswick Way	157	1100	1045	0.151	157	0.2	4.052	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1341	52	2554	0.525	1340	1.1	2.961	A
B - Renault/Nissan Access	13	1365	748	0.018	13	0.0	4.901	A
C - Sefton Street South	1382	392	2364	0.584	1380	1.4	3.649	A
D - Brunswick Way	193	1347	890	0.216	192	0.3	5.155	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1341	52	2553	0.525	1341	1.1	2.968	A
B - Renault/Nissan Access	13	1366	747	0.018	13	0.0	4.907	A
C - Sefton Street South	1382	392	2364	0.585	1382	1.4	3.665	A
D - Brunswick Way	193	1349	889	0.217	193	0.3	5.169	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1095	42	2561	0.428	1096	0.8	2.462	A
B - Renault/Nissan Access	11	1117	894	0.012	11	0.0	4.073	A
C - Sefton Street South	1128	320	2421	0.466	1130	0.9	2.795	A
D - Brunswick Way	157	1103	1043	0.151	158	0.2	4.065	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	917	35	2566	0.357	918	0.6	2.184	A
B - Renault/Nissan Access	9	935	1002	0.009	9	0.0	3.626	A
C - Sefton Street South	945	268	2463	0.384	946	0.6	2.374	A
D - Brunswick Way	132	923	1157	0.114	132	0.1	3.512	A

Base Year (2018) - 2023 Base + Development, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	Sefton Street Roundabout	Standard Roundabout	A, B, C, D	3.37	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2023 Base + Development	PM	ONE HOUR	17:00	18:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Sefton Street North		✓	1255	100.000
B - Renault/Nissan Access		✓	28	100.000
C - Sefton Street South		✓	1075	100.000
D - Brunswick Way		✓	370	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
	A - Sefton Street North	0	4	1138	113
	B - Renault/Nissan Access	16	0	11	1
	C - Sefton Street South	1036	3	0	36
	D - Brunswick Way	275	2	93	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		A - Sefton Street North	B - Renault/Nissan Access	C - Sefton Street South	D - Brunswick Way
	A - Sefton Street North	0	0	0	0
	B - Renault/Nissan Access	0	0	0	0
	C - Sefton Street South	0	0	0	0
	D - Brunswick Way	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
A - Sefton Street North	0.55	3.19	1.2	A
B - Renault/Nissan Access	0.05	5.55	0.0	A
C - Sefton Street South	0.46	2.61	0.9	A
D - Brunswick Way	0.40	6.00	0.7	A

Main Results for each time segment

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	945	73	2536	0.373	942	0.6	2.256	A
B - Renault/Nissan Access	21	1009	958	0.022	21	0.0	3.840	A
C - Sefton Street South	809	98	2600	0.311	808	0.5	2.007	A
D - Brunswick Way	279	792	1239	0.225	277	0.3	3.738	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1128	88	2525	0.447	1127	0.8	2.574	A
B - Renault/Nissan Access	25	1207	841	0.030	25	0.0	4.412	A
C - Sefton Street South	966	117	2584	0.374	966	0.6	2.224	A
D - Brunswick Way	333	948	1141	0.291	332	0.4	4.446	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1382	108	2510	0.551	1380	1.2	3.183	A
B - Renault/Nissan Access	31	1478	681	0.045	31	0.0	5.539	A
C - Sefton Street South	1184	143	2563	0.462	1183	0.9	2.606	A
D - Brunswick Way	407	1161	1007	0.404	406	0.7	5.980	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1382	108	2510	0.551	1382	1.2	3.191	A
B - Renault/Nissan Access	31	1480	680	0.045	31	0.0	5.548	A
C - Sefton Street South	1184	143	2563	0.462	1184	0.9	2.608	A
D - Brunswick Way	407	1162	1007	0.405	407	0.7	6.005	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	1128	88	2525	0.447	1130	0.8	2.585	A
B - Renault/Nissan Access	25	1210	839	0.030	25	0.0	4.423	A
C - Sefton Street South	966	117	2584	0.374	967	0.6	2.229	A
D - Brunswick Way	333	949	1140	0.292	334	0.4	4.468	A

18:15 - 18:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
A - Sefton Street North	945	74	2536	0.373	946	0.6	2.264	A
B - Renault/Nissan Access	21	1013	956	0.022	21	0.0	3.850	A
C - Sefton Street South	809	98	2600	0.311	810	0.5	2.013	A
D - Brunswick Way	279	795	1237	0.225	279	0.3	3.757	A

