

Proposed Residential Development
Manchester College Site | Northenden | Manchester

MILLER HOMES

Transport Assessment

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REPORT

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1 INTRODUCTION

1.1 Introduction

- 1.1.1 Croft have been instructed by Miller Homes to advise on the traffic and transportation matters relating to proposals to redevelop the Northenden Campus site on Sale Road in Manchester for residential purposes.
- 1.1.2 The report provides information on the traffic and transport planning aspects of the development proposals to assist the local planning authority in the positive determination of a forthcoming planning application.
- 1.1.3 The Local Highway Authority (LHA) responsible for Northenden is Manchester City Council (MCC), who are also the Local Planning Authority (LPA).

1.2 Scope of Report

- 1.2.1 This Transport Assessment (TA) has been prepared to consider the development in transport and highways terms in order to provide the local highway authority with the necessary reassurance that the proposals can be accommodated by the local transport network.
- 1.2.2 The scope of this Transport Assessment conforms to the guidance provided in the Ministry of Housing, Communities and Local Government (MHCLG) Planning Practice Guidance 'Transport Evidence Bases in Plan Making'.

1.2.3 The guidance covers the following issues;

- Reducing the need to travel, especially by car – ensure at the outset that thought is given to reducing the need to travel; consider the types of uses (or mix of uses) and the scale of development in order to promote multipurpose or linked trips;
- Sustainable accessibility – promote accessibility by all modes of travel, in particular public transport, cycling and walking; assess the likely travel behaviour or travel pattern to and from the proposed site; and develop appropriate measures to influence travel behaviour;
- Dealing with residual trips – provide accurate quantitative and qualitative analyses of the predicted impacts of residual trips from the proposed development and ensure that suitable measures are proposed to manage these impacts; and
- Mitigation measures – ensure as much as possible that the proposed mitigation measures avoid unnecessary physical improvements to highways and promote innovative and sustainable transport solutions.

1.2.4 Furthermore, this document has been developed with consideration to the Transport Feasibility Study prepared by SK Transport (dated 25/07/17), which considered the suitability of the site for residential development comprising up to 250 dwellings. A copy of the report is contained within **Appendix 1**.

1.2.5 As a Travel Plan has also been prepared, reference has also been made to guidance presented in the DfT documents entitled 'Making Residential Travel Plans Work' published in June 2007 and 'Good Practice Guidelines: Delivering Travel Plans through the Planning Process' published in August 2009.



1.3 Structure of Report

- 1.3.1 Following this introduction, Section 2 will provide a description of the existing site and local highway network, while Section 3 will detail the development proposals.
- 1.3.2 Section 4 will consider the accessibility of the site by non-car modes, including walking, cycling and public transport.
- 1.3.3 Section 5 will consider the trip generation and the traffic impact of the proposals on the local highway network, when compared to the existing college use.
- 1.3.4 A review of road safety in the vicinity of the site over the last 5 years will be detailed in Section 6, while Section 7 will contain details of the Travel Plan Framework.
- 1.3.5 Section 8 will draw together the Report's findings and conclusions.

2 EXISTING CONDITIONS

2.1 Introduction

- 2.1.1 This section will detail the existing site and surroundings and provide details about the existing highway network and travel patterns.

2.2 Existing Site

- 2.2.1 The site is located on Sale Road, adjacent to Princess Parkway in the Northenden area of Manchester, approximately 8 kilometres to the south of the city centre.
- 2.2.2 The location of the site in relation to the surrounding local area is presented in **Plan 1**.
- 2.2.3 The site extends to approximately 7.35 hectares (18.20 acres), lies within a predominantly residential area and is within walking distance of Wythenshawe Park.
- 2.2.4 The main vehicular access to the site is currently is provided from a priority controlled arrangement formed with Sale Road and Shevington Gardens. A further gated access is provided to the rear of the site onto Hollyhey Drive.
- 2.2.5 The college site is served by a large car park with capacity for up to approximately 371 cars.
- 2.2.6 It is understood that the site provides education facilities for approximately 1,704 students and around 149 staff.

2.3 Local Highway Network

- 2.3.1 Access to the site is provided from Moss Hey Drive, a short section of road which extends into the site from the B5166 Sale Road. Moss Hey Drive is approximately 6.4 metres in width, with good standard, wide footways on both sides. It is noted that Traffic Regulation Orders (TRO's) in the form of double yellow lines are present on both sides, which continue around the corner radii onto Sale Road to prevent parking on street at all times.
- 2.3.2 The B5166 Sale Road is a local distributor road that extends north-east to south-west between the A5103 Princess Parkway and the A56 Washway Road. Sale Road provides access to the M60 either north-east of the site via Princess Parkway or north-west via Old Hall Road. No parking restrictions are in place along Sale Road, but on site observations show that it is not currently subject to on-street parking in the vicinity of the site access.
- 2.3.3 Sale Road, along the site frontage is characterised by driveways to properties. It is subject to a 30mph speed limit and benefits from street lighting. In the vicinity of the site access, Sale Road has red central hatched markings that act as a traffic calming measure and also provides a right-turn pocket into the site.
- 2.3.4 To the south-east of the site, Sale Road joins Wythenshawe Road and forms a signalised junction arrangement. Continuing east, Wythenshawe Road provides access to Princess Parkway, a large grade-separated junction arrangement with signalised slip roads either side of the mainline carriageway. Princess Parkway provides access to Manchester city centre, the M56 and the M60.

- 2.3.5 To the north (rear) of the site, a gated access is provided onto Hollyhey Drive, a residential road that serves a cluster of existing houses. Hollyhey Drive joins Yewtree Lane at a priority junction.
- 2.3.6 To the east of Hollyhey Drive, Yewtree Lane provides access to residential properties fronting the street and minor roads serving further houses. Yewtree Lane passes under Princess Parkway, but movements are restricted to pedestrians and cyclists, with no vehicular access permitted.
- 2.3.7 To the west of Hollyhey Drive, Yewtree Lane retains its residential character and serves fronting properties and minor road accesses. Yewtree Lane joins Sale Road at a signalised junction.
- 2.3.8 It is therefore considered that the site is well connected to the local highway network and also to the wider strategic road network, including the M56 and M60 motorways.

2.4 Existing Travel Patterns

- 2.4.1 As well as detailing the existing road network in the vicinity of the site, consideration has also been given to existing travel habits in the area, such as the level of car ownership and how people currently travel to work.

Car Ownership Statistics

- 2.4.2 In order to establish existing car ownership in the area, reference has been made to the 2011 Census data in the ward within which the site is located (Northenden) and this is summarised in **Table 2.1** below.

Car Ownership	%
No car	35%
1 car	46%
2 cars	16%
3 cars	3%
4 cars	1%

Table 2.1 – Car Ownership

- 2.4.3 As can be seen above, the number of households in the area that do not own a car is 35%, while just under half of households (46%) have just 1 vehicle. The proportion of two car households equates to around 16%, while households with 3 or 4 cars amounts to just 4% of the current population.

Local Area Modal Split

- 2.4.4 The 2011 Census data has also been used to establish commuter mode share for the ward, by reference to the Method of Travel to Work statistics, as summarised in **Table 2.2** below.

Mode	%
Homeworker	3%
Public Transport	21%
Car/Motorcycle	57%
Car Passenger	6%
Cycle	3%
Walk	9%

Table 2.2 – Local Mode Share

- 2.4.5 As can be seen above, a high proportion (33%) of residents in the area currently travel to work by non-car modes, which indicates good potential for travel by sustainable modes for residents at the development.

3 DEVELOPMENT PROPOSALS

3.1 Introduction

- 3.1.1 The following paragraphs will describe the development proposals and report on the proposed access arrangements and servicing.

3.2 Proposed Development

- 3.2.1 The applicant is seeking planning permission to develop the site for up to 224 residential dwellings, with associated car parking and landscaping.
- 3.2.2 The proposed internal layout is provided at **Plan 2**.
- 3.2.3 Car and cycle parking provision will comply to the Council's current standards.
- 3.2.4 The introduction of a 20mph zone within the development will be considered to promote walking and cycling and create a pedestrian friendly environment. This will often negate the need for segregated cycle facilities within residential areas.
- 3.2.5 Vehicular access to the site is proposed from the existing college entrance on Sale Road, via Moss Hey Drive, which is a short section of highway serving a small number of residential properties and the college campus.
- 3.2.6 Access into the development will tie into existing infrastructure on Moss Hey Drive and be constructed to current adoptable standards to ensure that the access to the site is suitable and appropriate to serve the proposed development. The proposed site access is shown in **Plan 3**.

- 3.2.7 An emergency access is proposed to the north of the site onto Hollyhey Drive, which will be controlled by bollards to prevent general vehicle use, as shown in Plan 3.
- 3.2.8 All of the land required for the vehicular and emergency access points is on land controlled by Miller Homes or on currently adopted highway.

3.3 Sustainable Access Strategy & Travel Plan Measures

- 3.3.1 The proposal is located in a sustainable location and the redevelopment of the site offers opportunities to integrate well with the surrounding community.
- 3.3.2 To ensure that residents can meet their daily travel needs without being dependent on their cars, the following measures have been included in the proposal:
- A permeable site that provides pedestrian and cycle access at both the main and emergency access points.
 - Roadways designed to encourage low vehicle speeds, prioritise non-car movement and deter cut through movements.
 - Retention of existing access to the east of the site to link to cycle routes and bus stops on eastern boundary.

3.4 Waste Collection & Servicing

- 3.4.1 To demonstrate that the site can be serviced in a safe and efficient manner, a swept path analysis for an 11.5m refuse vehicle (as requested by MCC) has been undertaken at the site access, as shown in **Plan 4**.



- 3.4.2 The internal access road has been designed to accommodate waste and delivery vehicles so that they can enter the site, turn around and exit in a forward gear.
- 3.4.3 This will ensure there is no detrimental impact to the public highway and confirm that the site can be serviced without giving rise to any road safety issues.

3.5 Construction Access

- 3.5.1 In their pre-application correspondence, MCC stated that '*An assessment of the likely environmental/traffic impacts of HGVs during the construction process should be provided*'.
- 3.5.2 It is understood that a Construction Management Plan (CMP) has been submitted as part of the application package.
- 3.5.3 The CMP includes the following elements:
- Size of HGV to be used in the construction period.
 - Timing of deliveries during construction, to avoid peak periods for example.
 - Control noise to specified levels and duration.
 - Procedures related to dust suppression measures.
 - Routing of HGVs to and from the site.
- 3.5.4 The CMP will be implemented throughout the construction period of the development.

4 ACCESSIBILITY BY NON CAR MODES

4.1 Introduction

- 4.1.1 In order to accord with the aspirations of the NPPF, any new proposals should extend the choice in transport and secure mobility in a way that supports sustainable development.
- 4.1.2 New proposals should attempt to influence the mode of travel to the development in terms of gaining a shift in modal split towards non-car modes, thus assisting in meeting the aspirations of current national and local planning policy.
- 4.1.3 The accessibility of the proposed site has been considered by the following modes of transport:
- Accessibility on foot;
 - Accessibility by cycle;
 - Accessibility by bus; and
 - Accessibility by rail/Metrolink.

4.2 Accessibility on Foot

- 4.2.1 It is important to create a choice of direct, safe and attractive routes between where people live and where they need to travel in their day-to-day life.
- 4.2.2 This philosophy clearly encourages the opportunity to walk whatever the journey purpose and helps to create more active streets and a more vibrant neighbourhood.



- 4.2.3 The site is well connected to key destinations by a comprehensive network of pedestrian routes, typical of its urban location. Pedestrian provision in the area is in good condition, with standard footways, dropped kerb crossings and tactile paving present on Moss Hey Drive, Sale Road and Hollyhey Drive.
- 4.2.4 These footways provide links to a comprehensive network of routes within the local area, supplemented by a number of crossing points which facilitate access to the nearby day to day amenities within the area.
- 4.2.5 A pedestrian refuse crossing is provided at the main site access junction and signalised crossing facilities are present at the junction of Sale Road/Rackhouse Road and Sale Road/Wythenshawe Road to the north and south of the site respectively.
- 4.2.6 Pedestrian access to the site via Yewtree Lane also provides a good standard of infrastructure. A footbridge over Princess Parkway is present at the eastern end of Yewtree Lane, which provides a connection to areas south and east of the site. A segregated route is provided under the M60 providing connections to the north. A pedestrian link is also provided into the site from the bus stop on the Princess Parkway (northbound) on-slip.
- 4.2.7 South of the site, access can be gained easily to segregated routes through Wythenshawe Park and as already mentioned, the retention of existing non-vehicular access to the east of the site provides a link to cycle routes and bus stops on eastern boundary.
- 4.2.8 The CIHT document 'Planning for Walking' from 2015 states, in paragraph 2.1, that in 2015 that 79% of all journeys made in the UK of less than a mile (1.6 kilometres) are carried out on foot.

- 4.2.9 Within the Institution of Highways and Transportation (IHT) document, entitled “Guidelines for Providing for Journeys on Foot”, Table 2.2 suggests distances for desirable, acceptable and preferred maximum walks to ‘town centres’, ‘commuting/schools’ and ‘elsewhere’. The ‘preferred maximum’ distances are shown below in **Table 4.1**.

Suggested Preferred Maximum Walk		
Town Centre	Commuting/School	Elsewhere
800m	2,000m	1,200m

Table 4.1 – IHT ‘Providing for Journeys on Foot’ Walk Distances

- 4.2.10 Reference to the 2,000 metres walk distance is also made in the now superseded Planning Policy Guidance (PPG) Note 13 which advised that ‘walking is the most important mode of travel at the local level and offers the greatest potential to replace short car trips, particularly under 2km’.
- 4.2.11 Manual for Streets (MfS) continues the theme of the acceptability of the 2,000-metre distance in paragraph 4.4.1. This states that ‘walkable neighbourhoods are typically characterised by having a range of facilities within 10 minutes’ (up to about 800m) walking distance of residential areas which residents may access comfortably on foot. However, this is not an upper limit and PPS13 states that walking offers the greatest potential to replace short car trips, particularly those under 2 km’.
- 4.2.12 **Table 4.2** below summarises this guidance in tabular form.

'Comfortable' Walk	'Preferred Maximum' Walk
800m	2,000m

Table 4.2 – Manual for Streets Walk Distances

- 4.2.13 More specific guidance on the distances that children will walk to school is found in the July 2014 document published by the Department for Education (DfE) entitled 'Home to School Travel and Transport' statutory guidance document. This suggests that the maximum walking distance to schools is 2 miles (3.2 kilometres) for children under 8 and 3 miles (4.8 kilometres) for children over the age of 8. This is summarised below in **Table 4.3**.

Children under 8 Walk Distance	Children over 8 Walk Distance
3,200m	4,800m

Table 4.3 – DfE Walk Distances to Schools

- 4.2.14 Further evidence that people will walk further than the suggested 'preferred maximum' distances in the IHT 'Providing for Journeys on Foot' is contained in a WYG Report entitled 'Accessibility – How Far do People Walk and Cycle'. This report refers to National Travel Survey (NTS) data for the UK as a whole, excluding London, and confirms that the 85th percentile walk distance for:

- All journey purposes – 1,930 metres;
- Commuting – 2,400 metres;

- Shopping – 1,600 metres;
- Education – 3,200 or 4,800 metres; and
- Personal business – 1,600 metres.

4.2.15 Overall, in Table 5.1, the document states that 1,950 metres is the 85th percentile distance for walking as the main mode of travel. **Table 4.4** below summarises the various 85th percentile walk distances suggested as guidelines in the WYG Study.

All Journeys	85 th Percentile Walk Distances				Overall Recommended Preferred Max
	Commuting	Shopping	Education	Personal	
1,950m	2,100m	1,600m	3,200/4,800m	1,600m	1,950m

Table 4.4 – WYG Report/NTS Data Walk Distances

4.2.16 In summary, it is considered that the distance of 1,950 metres, or around 2 kilometres, represents an acceptable maximum walking distance for the majority of land uses although clearly the DfE guidance for walking to school is up to 4.8 kilometres.

4.2.17 Section 3.1 of the CIHT guidance 'Planning for Walking' mentioned earlier in this report provides a useful reminder of the health benefits of walking. This states that:

'A brisk 20 minute walk each day could be enough to reduce an individual's risk of an early death'.

4.2.18 A 20-minute walk equates to a walking distance of around 1,600 metres.

- 4.2.19 In light of the above review, pedestrian catchments of 800 metres and 2 kilometres from the centre of the site, using all available pedestrian routes, has been prepared in **Plan 5**. It provides an illustrative indication of the areas that can be reached based on a leisurely walk from the site.
- 4.2.20 In addition, to the pedestrian catchment plan, a review of the proximity of local facilities such as local shops/retail outlets and leisure facilities has been undertaken and the location of these is also shown in Plan 5.
- 4.2.21 The 2,000-metre pedestrian catchment illustrates that the majority of Northenden can be accessed, such as, Rowland's Pharmacy, Post Office, Nisa Local, Shrek's Pizza, St. Aidans RC School, Rack House Primary School, Kenworthy Lane Woods, Tesco Metro, Subway, Church Road Chippy, The Crown Inn.
- 4.2.22 **Table 4.5** below, shows the walking distance from the centre of the site to the local amenities in the vicinity of the site. The table also confirms whether the amenity is within the 'preferred maximum' walk distances using the above guideline criteria.

Local Amenity	Distance	Guidance Criteria	Meets with Guidance?
Rowland's Pharmacy	412m	1,600m	YES
Nisa Local	430m	1,600m	YES
Post Office	444m	1,600m	YES
Shrek's Pizza	444m	1,600m	YES
Kenworthy Lane Woods	595m	1,600m	YES
St. Aidans RC School	676m	3,200m	YES
Tesco Metro	1,230m	1,600m	YES
Rack House Primary School	1,234m	3,200m	YES
Church Road Chippy	1,466m	1,600m	YES
Subway	1,490m	1,600m	YES
The Crown Inn	1,540m	1,600m	YES

Table 4.5 - Distance from Site to Local Facilities

- 4.2.23 As can be seen in the above table, the site is located within proximity to a number of local amenities including primary services as well as leisure facilities.
- 4.2.24 All of the day to day amenities are well within the 'preferred maximum' walk distances described earlier in this section and indeed many, including the nearest food store, pharmacy and nearest primary school are within the 800 metres 'comfortable walk' from the site as contained within MfS guidance.

- 4.2.25 It is therefore considered that the existing pedestrian infrastructure will facilitate safe and direct pedestrian linkages between the site and local destinations.

4.3 Access by Cycle

- 4.3.1 An alternative mode of travel to the site could be achieved by bicycle.
- 4.3.2 A distance of 5 kilometres is generally accepted as a distance where cycling has the potential to replace short car journeys.
- 4.3.3 This distance equates to a journey of around 25 minutes based on a leisurely cycle speed of 12 kilometres per hour and would encompass parts of Sale, Wythenshawe, Altrincham and Cheadle.
- 4.3.4 A 5 kilometre cycle catchment is presented in **Plan 6**.
- 4.3.5 The site relates well to both utility and leisure cycle routes. Access can be gained directly onto Route 85 of the strategic cycle network from the northern site access junction.
- 4.3.6 Route 85 connects the site to areas to the north and south, and facilities are in place on the route to allow safe passage under the M60 and under Princess Parkway. To the west of the site, a toucan crossing is provided, which allows pedestrians and cyclists to cross safely at the same time.
- 4.3.7 **Figure 4.1** below shows the existing cycle network in the vicinity of the site.

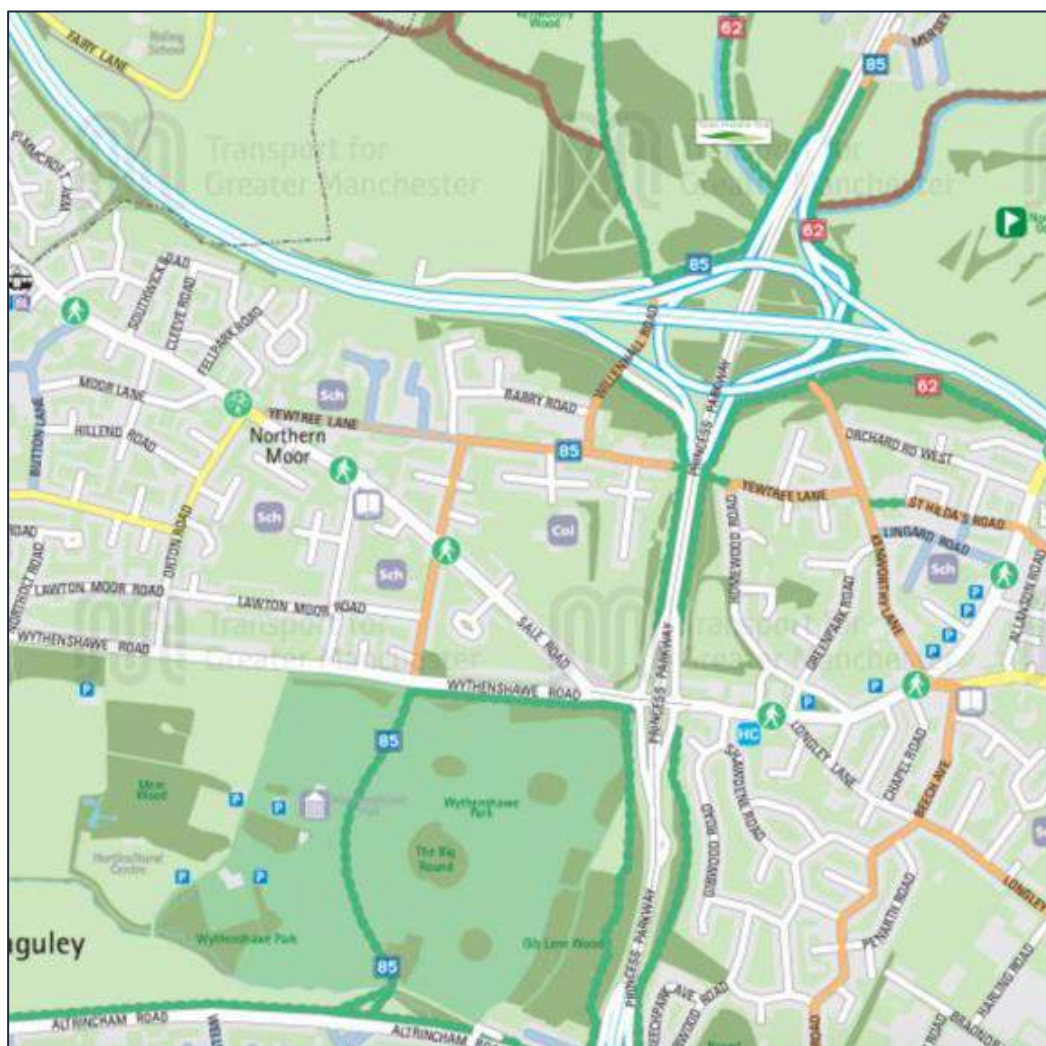


Figure 4.1 – Existing Cycle Network

- 4.3.8 National cycle route 85 is both an on and off-road route which starts to the north of the site in Chorlton-cum-Hardy and extends to the south, past the site towards Manchester Airport.
- 4.3.9 The site can therefore be considered as being accessible by cycle.

4.4 Access by Bus

- 4.4.1 An effective public transport system is essential in providing good accessibility for large parts of the population to opportunities for work, education, shopping, leisure and healthcare in the local area and beyond.
- 4.4.2 The nearest bus stops are located outside the site on Sale Road and Princess Parkway, to the south-east corner of the site. All the nearest bus stops to the site are shown on Plan 5.
- 4.4.3 A summary of the services available from the nearest bus stops from the development site is provided in **Table 4.6** below.

Servic No	Route	Monday – Friday (per hour)				Sat	Sun
		AM Peak	Midday	PM Peak	Eve		
11A	Altrincham – Stockport Bus Station	2	2	2	1	2	1
103	Manchester Airport – Piccadilly Gardens	2	2	2	1	2	1
217	Ashton-under - Lyne - Wythenshawe	1	1	1	0	0.5	0
288	East Didsbury - Manchester Airport	1	0	0	0	0	0
41	Sale - Middleton	3	3	3	1	3	2
X5	Sale - Stockport	1	0	1	0	0	0

Table 4.6 - Existing Bus Services

- 4.4.4 As can be seen from Table 4.6, the nearest bus stops to the site provide various services throughout the day to destinations such as Piccadilly, Stockport and Altrincham.
- 4.4.5 The above services operate from around 4:45am to around 23:30pm, making travel by public transport a real alternative to travelling by car for commuting trips.
- 4.4.6 In order to demonstrate the level of accessibility, some example journey times by bus are presented below **Table 4.7** below.

Destination	Duration
Piccadilly	25 minutes
Stockport	30 minutes
Altrincham	31 minutes

Table 4.7 - Example Bus Journey Times from the Site

- 4.4.7 The above table demonstrates that Manchester Piccadilly is an approximate 25-minute bus journey from the site and Stockport is a 30-minute bus journey.
- 4.4.8 It is therefore concluded that employment, health and retail centres are highly accessible by bus from the proposed development site.

4.5 Accessibility by Rail/Metrolink

- 4.5.1 The nearest Metrolink stop to the site is Northern Moor, located a 17 minute walk from the site.
- 4.5.2 Access can also be gained to East Didsbury train station using existing bus services on Sale Road. Cycle parking is also provided at the station.

4.6 Accessibility Summary

- 4.6.1 The proposals have been considered in terms of accessibility by non-car modes, so that sustainable travel can be encouraged.

- 4.6.2 The above section has demonstrated that the development can be accessed by a variety of travel modes and as such would accord with local and national planning policy guidance.
- 4.6.3 The following conclusions can be drawn from this section of the report:
- It has been demonstrated that there are numerous amenities within a short walk of the development.
 - Pedestrian and cycle access to the site can be considered as being good with extensive existing infrastructure located in the vicinity.
 - The services from the nearest bus stops connect the site with retail, employment and leisure facilities in Piccadilly, Stockport and Altrincham.
 - The site is located close to Northern Moor Metrolink station, thus increasing the choice of sustainable travel options.
- 4.6.4 In light of the above, it is considered the site is highly accessible by non-car modes and will cater for needs of the development's residents and assist in promoting a choice of travel modes other than the private car.

5 TRAFFIC IMPACT ANALYSIS

5.1 Introduction

5.1.1 Having established that the proposed development site is accessible by modes of travel other than the private car, the following section considers the traffic impact of the development proposals on the local highway network.

5.2 Existing Site Traffic

5.2.1 The submitted SK Transport report included consideration of the existing traffic levels associated with the college site. A summary of these trip rates and the likely level of daily trips associated with its educational use are shown in **Table 5.1**.

Period	Trip Rate		Trips	
	Arr	Dep	Arr	Dep
Daily	4.045	4.096	500	506

Table 5.1 Existing Site Traffic (Daily)

5.2.2 As can be seen, the level of traffic associated with the college site is approximately 1006 two-way trips per day.

5.3 Proposed Development

5.3.1 The development proposals are likely to consist of up to 224 new residential dwellings.

- 5.3.2 In order to establish the number of trips that the proposed residential development is forecast to generate, the same trip rates as those contained within the SK Transport report have again been utilised.
- 5.3.3 A summary of these trip rates and the likely level of daily trips that would occur as a result of the proposed development comprising 224 units are shown in **Table 5.2**.

Period	Trip Rate		Trips	
	Arr	Dep	Arr	Dep
Daily	2.158	2.274	483	509

Table 5.2 Proposed Development Trip Rates and Trips (Daily)

- 5.3.4 As can be seen, the proposed residential development is forecast to generate a total of 1006 daily two-way trips, which is highly comparable to the existing college use. The proposals therefore will generate fewer trips (13) than the college use, thus demonstrating that there will be no material difference in terms of highway impact on the existing network.
- 5.3.5 It is therefore considered that the traffic conditions surrounding the site will remain very similar to those already taking place on the site and its educational use.

5.4 Assessment Criteria

- 5.4.1 Notwithstanding the above, given the proposed residential land use, further analysis has been undertaken to establish the levels of traffic in the AM and PM weekday peak hours, as these are likely to have the greatest impact on the local highway network.

5.5 Traffic Survey Data

5.5.1 It has not been possible to conduct traffic surveys which could be regarded as representative of 'typical' traffic conditions due to the effects of Covid-19 on commuting in particular and general travel.

5.5.2 As such, the traffic data collected as part of the Transport Feasibility Study prepared by SK Transport has been utilised.

5.5.3 The following traffic surveys were undertaken on Wednesday 15th March 2017:

- Site access/Sale road/Shevington Gardens
- Hollyhey Drive/Yewtree Lane
- Sale Road/Wythenshawe Road.

5.5.4 The surveys showed that the network peak hours are 7.45 to 8.45 in the morning and 16.30 to 17.30 in the evening, as detailed in the SK Transport report.

5.5.5 The SK Transport report provided 2022 baseline flows for the peak hours converted into Passenger Car Units (PCU's) and these are shown in **Figures 1** and **2** for the AM and PM peak hours respectively.

5.6 Growthed Traffic Flows

5.6.1 For the purpose of this Report, assessments have been undertaken for a design horizon of 2026, representing five years after the application registration.

5.6.2 This can be considered to be a robust approach.

5.6.3 To derive the baseline 2026 flows, the 2022 baseline flows have been growthed to 2026 using National Traffic Model (NTM) factors adjusted by using the Trip End Model Program (TEMPro) local growth factors.

5.6.4 The growth factors are shown below:

- 2022 to 2026 AM Peak - 1.0572
- 2022 to 2026 PM Peak - 1.0624

5.6.5 The resultant 2026 growthed traffic flows are shown in **Figures 3** and **4** for the AM and PM peak periods.

5.7 Committed Development

5.7.1 Croft are not aware of any committed developments in the area that would need to be considered in this report.

5.8 Base Flows

5.8.1 As there are no known committed development to take into account, the 2026 growthed traffic flows presented in Figures 3 and 4 form the 2026 'Without Development' traffic flows for the assessments.

5.9 Trip Distribution

5.9.1 The development traffic has been distributed onto the highway network based on surveyed patterns of movement.

5.9.2 The northern access junction (Hollyhey Drive) is to be retained as an emergency access only and will provide pedestrian/cyclist permeability of the site.

- 5.9.3 For robustness, all the development traffic is assumed to access/egress the site from the main access junction on Sale Road.
- 5.9.4 This is reflected in the distribution, which is considered to present a reasonable approach.
- 5.9.5 The trip distribution for the AM peak period is shown in **Figure 5** whilst the distribution for the PM peak traffic is shown in **Figure 6**.

5.10 Proposed Development

- 5.10.1 The development proposals consist of up to 224 new residential dwellings.
- 5.10.2 In order to establish the number of trips which the proposed development is forecast to generate the same trip rates as contained in the SK Transport report have been used. A summary of these trip rates and the likely level of trips that would occur as a result of the proposed development comprising 224 units is included in **Table 5.3**.

Period	Trip Rate		Trips	
	Arr	Dep	Arr	Dep
AM Peak Hour	0.151	0.359	34	80
PM Peak Hour	0.320	0.194	72	43

Table 5.3 Proposed Development Trip Rates and Trips (224 Units)

- 5.10.3 As can be seen, the proposed residential development is forecast to generate a total of approximately 114 two-way trips in the AM peak hour and around 115 two-way trips in the PM peak hour.

- 5.10.4 The resulting assignment of traffic flows based on the distribution shown in Figures 5 and 6 are shown in **Figure 7** for the AM peak and **Figure 8** for the PM peak.
- 5.10.5 While the average trip rates set out above are considered to provide a representative indication of likely trips associated with the proposals, for comparison purposes, consideration has also been given to the likely trip generation based on person trips, with a reduction of 57% in line with the existing mode share for the area (shown in Table 2.2). The resulting trip generation based on the person trip methodology (with no reduction) is summarised in **Table 5.4** below.

Period	Trip Rate		Trips	
	Arr	Dep	Arr	Dep
AM Peak Hour	0.241	0.723	54	162
PM Peak Hour	0.565	0.305	127	68

Table 5.4 Proposed Development Person Trip Rates and Person Trips (224 Units)

- 5.10.6 As can be seen above, based on the person trip rates the development proposals could result in approximately 216 person trips in the AM peak and around 195 person trips in the PM peak.
- 5.10.7 **Table 5.5** below summarises the person trips with the modal share of car drivers (57%) for the area applied.

Period	Person Trip Volume		Vehicular Trip Volume (57%)	
	Arr	Dep	Arr	Dep
AM Peak Hour	54	162	31	92
PM Peak Hour	127	68	72	39

Table 5.5 Proposed Development Person Trip Rates with Mode Share Applied (224 Units)

- 5.10.8 As can be seen above, based on the person trip rates with mode share for the area applied shows a total of 123 two-way trips in the AM peak hour and around 111 two-trips in the PM peak hour.

5.11 Trip Generation Comparison

- 5.11.1 In order to demonstrate the appropriateness of the average trip rates, they have been directly compared to those generated based on person trip rates with mode share applied, as presented in Table 5.6 below for the AM and PM peak hours.

Scenario	AM Peak		PM Peak	
	Arr	Dep	Arr	Dep
Average Trip Rates	34	80	72	43
Person Trip Rates (with mode share applied)	31	92	72	39
Difference	-3	+12	0	-5

Table 5.6 – Comparison of Average and Person Trips (224 units)

- 5.11.2 The assessment shows that the average trip rates compare well to those derived from the person trip rates, however for robustness, the following assessments assume the person trip rates, with the 57% mode share applied.

5.12 With Development Flows

- 5.12.1 In order to calculate the 2026 'With Development' flows, the development flows contained within Figures 7 and 8 have been added to the 2026 'Without Development' flows contained within Figures 3 and 4.
- 5.12.2 The resulting 2026 'With Development' Flows are presented in **Figures 9 and 10** respectively for the AM and PM peak hours.

5.13 Capacity Assessments

- 5.13.1 To demonstrate that the existing access to the site on Sale Road is appropriate to accommodate the proposed residential development, a capacity assessment has been undertaken.

Site Access/Sale Road

- 5.13.2 The existing access is a priority controlled junction and so has been assessed using PICADY.
- 5.13.3 The results for the 2026 'With Development' flow scenario are summarised within **Table 5.7** with the full results contained within **Appendix 2**.

Arm	2026 'With Development'			
	AM Peak		PM Peak	
	Max RFC	Q	Max RFC	Q
Shevington Gardens	0.11	0	0.06	0
Sale Road (se)	0.04	0	0.09	0
Moss Hey Drive	0.31	0	0.13	0
Sale Road (sw)	0.96	0	0.01	0

Table 5.7 - Summary of PICADY Results for Site Access/Sale Road

- 5.13.4 As can be seen above, the results show the site access junction serving the development will operate efficiently in both the AM and PM peak hours in the 'With Development' 2026 flow scenarios.
- 5.13.5 The above demonstrates that the existing access is suitable in terms of its geometric layout and design and will provide a safe point of access into the site.

5.14 Potential Impact on Wider Network

- 5.14.1 The impact of the proposals on the wider road network has also been considered, including the potential impact on the A5103 Princess Parkway, as summarised in **Table 5.8** below;

Location	AM Peak	PM Peak
A5103 nb (on-slip)	27	11
A5103 sb (off-slip)	9	20
A5103 sb (on-slip)	27	11
A5103 nb (off-slip)	9	20

Table 5.8 – Potential Impact on A5103 Princess Parkway (Slip Roads)

- 5.14.2 As can be seen above, the potential impact on the wider road network will be minimal and therefore is unlikely to give rise to any highway capacity issues.

5.15 Capacity Assessments Summary

- 5.15.1 This section of the Report has considered the impact of the proposal in transport terms.
- 5.15.2 The results of the above assessments have demonstrated that the proposals will not have a material impact or give rise to any highway capacity issues.
- 5.15.3 The assessment has demonstrated that traffic flows will remain at a similar level to the current college use and it is therefore considered that the predicted level of traffic can be accommodated onto the local highway network.
- 5.15.4 On that basis, it can be assumed that the impact of the proposals on the local highway network would be minimal and, in any event, could not be considered to be severe, as is the test set out within paragraph 111 of the NPPF.

6 ACCIDENT ANALYSIS

- 6.1.1 In order to consider the potential impact of the development on road safety, a review of the Crashmap website (www.crashmap.co.uk) has been undertaken.
- 6.1.2 The information provided on the website covered the five-year period 2016 to 2020 in the vicinity of the development site, as requested by MCC.
- 6.1.3 According to the data provided there have only been 4 recorded accidents within the study area, which in this instance extends to approximately 200 metres to the north and south of the site access on Sale Road, as shown in **Figure 6.1** below. The accident records are included **Appendix 4**.

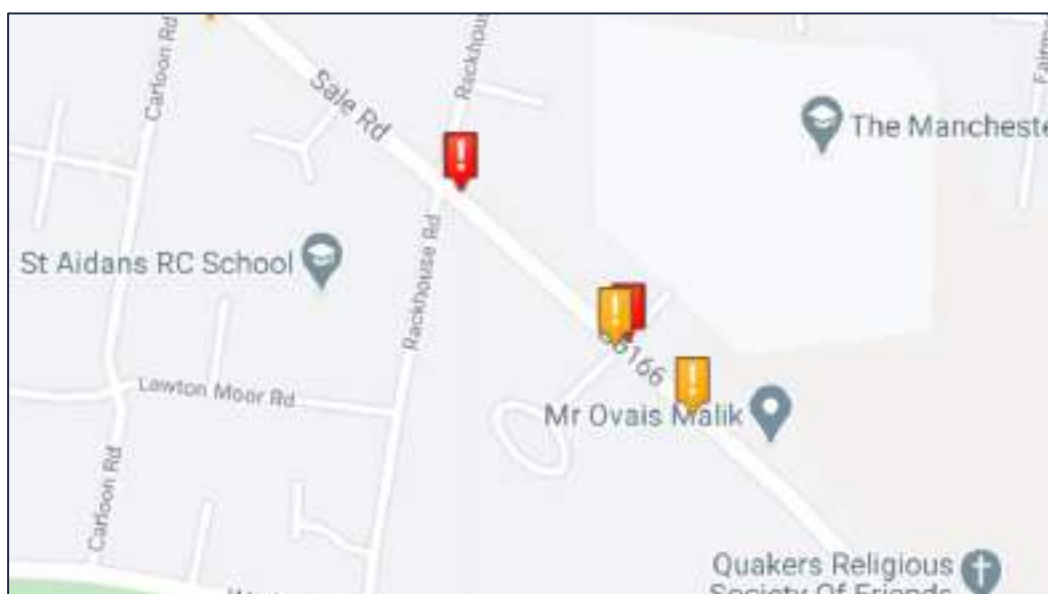


Figure 6.1 - CrashMap Accident Plot (Sale Road)

- 6.1.4 All recorded accidents identified in the data are detailed below in **Table 6.1**.

Date	Severity	Light Conditions	Weather	Road Conditions	Manoeuvre
10/09/2016	Slight	Daylight	Fine	Wet/Damp	Collision
14/11/2017	Slight	Daylight	Fine	Dry	Collision
10/09/2016	Slight	Daylight	Fine	Wet/Damp	Shunt
03/10/2018	Serious	Daylight	Fine	Wet/Damp	Collision

Table 6.1 - Accident Summary

6.1.5 While it is not anticipated that vehicular traffic at the development would utilise the northern access, for completeness, an additional review has been undertaken for Hollyhey Drive and Yewtree Lane. The data shows there have only been 2 accidents on Yewtree Lane in the last 5 years as shown in **Figure 6.2** below.

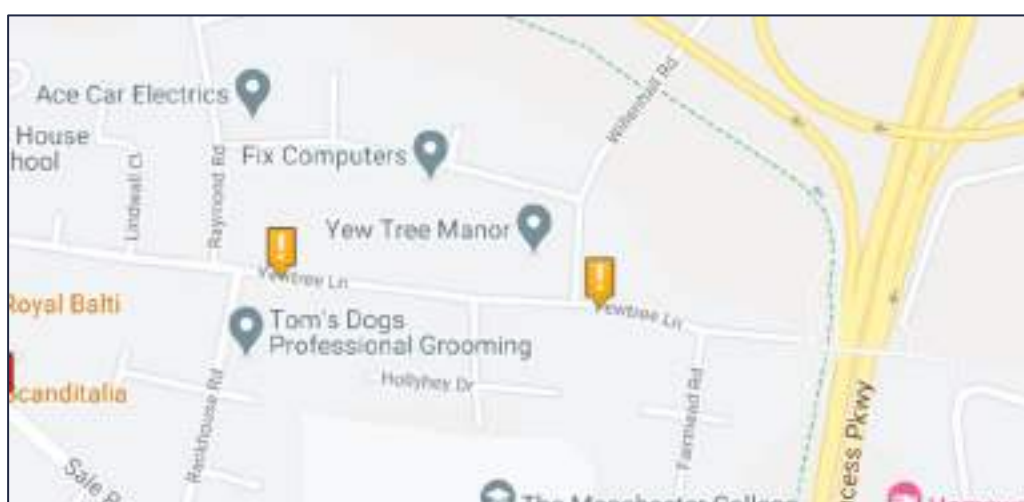


Figure 6.2 - CrashMap Accident Plot (Yewtree Lane)

6.1.6 The accidents recorded on Yewtree Lane are detailed below in **Table 6.2** below.

Date	Severity	Light Conditions	Weather	Road Conditions	Manoeuvre
21/11/2016	Slight	Darkness	Rain	Wet/Damp	Collision
11/07/2017	Slight	Daylight	Fine	Dry	Car struck cyclist

Table 6.2 - Accident Summary (Yewtree Lane)

- 6.1.7 The data reviewed has not identified any untypical accidents.
- 6.1.8 The evidence shows that there are no particular engineering issues or problems with the road network or junction layouts.
- 6.1.9 It is not considered that the proposals for a residential development will unduly change the characteristics or nature of the surrounding highway network and as such will not have a detrimental impact on overall road safety.
- 6.1.10 In view of this information, it can be concluded that the local highway network in the vicinity of the site does not have an unduly poor safety record and it is highly unlikely that this situation should be materially worsened as a consequence of the development proposals.

7 PROMOTING SMARTER CHOICES VIA TRAVEL PLANS

7.1 Introduction

7.1.1 In order to manage the travel by residents at the new development, the applicant wishes to offer a Travel Plan to encourage travel to the site by non-car modes.

7.1.2 It includes a range of measures and incentives to reduce and mitigate impact and enhance the accessibility of the site by non-car modes.

7.2 Travel Planning Guidance

7.2.1 The preparation and adoption of a Travel Plan is an important element of managing the demand for travel to all modern developments. The Department for Transport (DfT) have produced guidance on the preparation of Travel Plans. The document, entitled '*Good Practice Guidelines: Delivering Travel Plans through the Planning Process*' was published in August 2009.

7.2.2 The guidance explains how *"we often need to meet the demands of population and economic growth whilst simultaneously reducing our impact on the environment"* and identifies that *"The benefits of increases in sustainable travel, in particular cycling and walking, can extend beyond reduction in CO₂ emissions and climate impacts, and include tackling congestion, tackling obesity and health issues, reducing social exclusion and improving quality of life"*.

7.2.3 The document sets out an overview of the process and delivery of Travel Plans and states that *"A Travel Plan is a long-term management strategy for an occupier or site that seeks to deliver sustainable transport objectives through positive action and is articulated in a document that is regularly reviewed."*

- 7.2.4 The Guidance states that *"Travel Plans should involve the development of agreed explicit outcomes linked to an appropriate package of measures aimed at encouraging more sustainable travel, with an emphasis on reducing single occupancy car use..."* and;
- "A Travel Plan should seek to establish clear outcomes to be achieved in relation to access and set out all the measures to be implemented in detail, including an action plan, timescales, targets and responsibilities for implementation, monitoring and review".*
- 7.2.5 It is made clear in the document that Travel Plans should focus on achieving the lowest practical level of single occupancy vehicle trips to or from a site and widening the use of other travel modes and assist in the wider aims of encouraging sustainable travel, improving health, reducing congestion, energy consumption and pollution. The Travel Plan, it advises *"needs to address all the journeys that may be made to and from a site"*.
- 7.2.6 The guidance also specifies that *"It is important to note that Travel Planning should be developed as one of the means of delivering an area's sustainable transport strategy. Travel Planning should feature in the policy framework and implementation programmes of Regional Spatial Strategies and Local Development Frameworks"*.
- 7.2.7 Further guidance relating specifically to residential Travel Plans is presented in the DfT document entitled "Making Residential Travel Plans Work" published in June 2007.
- 7.2.8 The document states that:
- "Travel Planning is one of a range of measures known as smarter choices which have been found to be effective on reducing traffic and improving accessibility in residential areas"*.



- 7.2.9 A Residential Travel Plan is a package of measures designed to reduce car use originating from new housing by supporting alternative forms of transport and reducing the need to travel in the first place.
- 7.2.10 A Residential Travel Plan Framework is contained within **Appendix 3**.

8 CONCLUSIONS

8.1.1 Croft have been instructed by Miller Homes to advise on the traffic and transportation issues relating to proposals to redevelop the Northenden Campus site in Manchester for residential purposes.

8.1.2 The following conclusions have been drawn with regard to the proposed development:

- The site is located close to numerous day to day amenities within Northenden and provides good opportunities for walking and cycling.
- The site benefits from being located within easy walking distance of the bus stops on Sale Road and Princess Parkway which provide a wide range of local services.
- The site can be accessed by Metrolink stop with the Northern Moor stop being located just a 17 minute walk from the site.
- The proposed development can be adequately accessed and serviced in a safe and efficient manner.
- The proposed development is forecast to generate a very similar level of traffic when compared to the existing educational use on the site.
- It is therefore considered that the proposals will not have a material impact on the operation of the local highway network.
- There is no evidence to suggest that the proposals would have an adverse effect on road safety or the number of accidents in the vicinity.

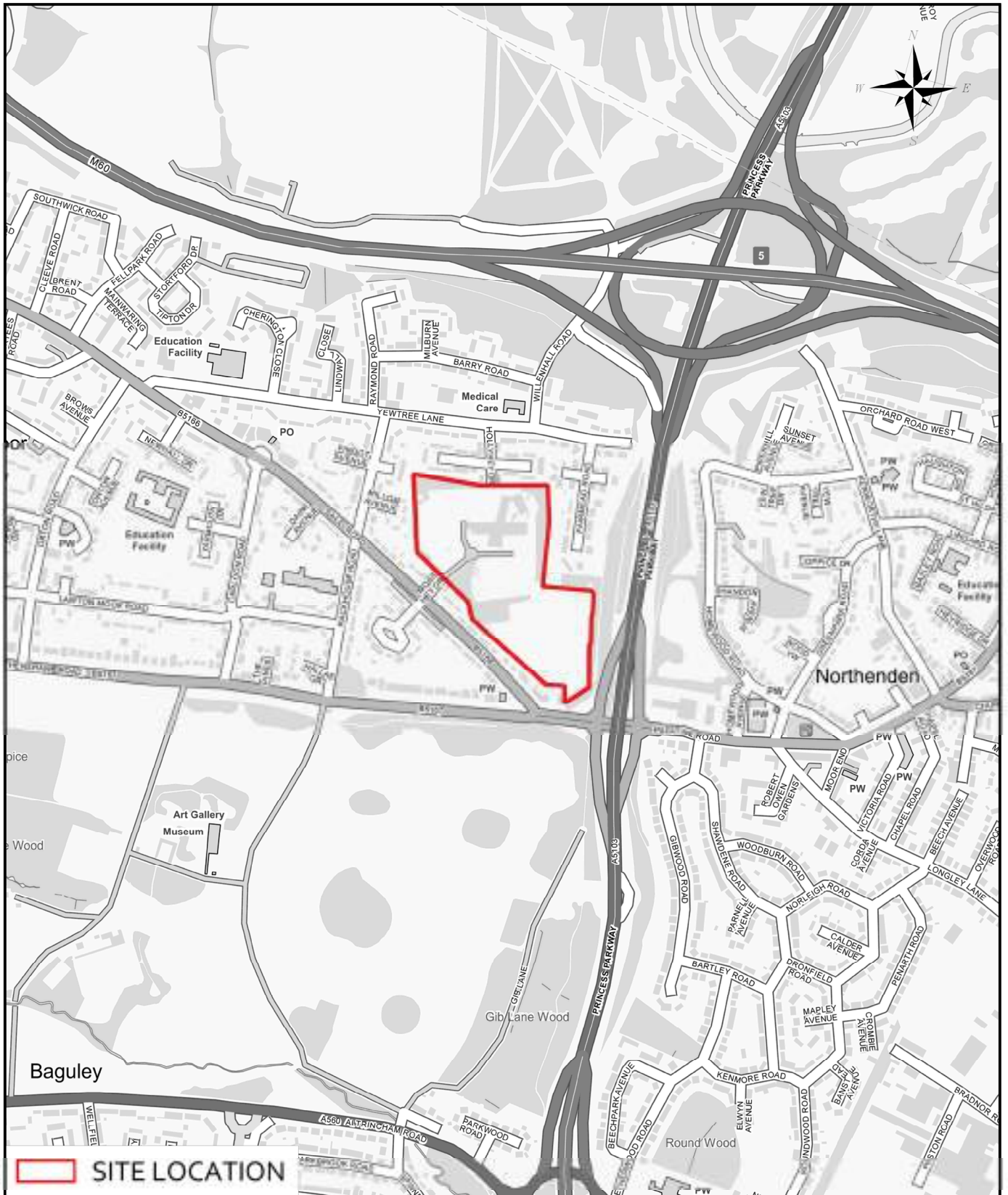


- The provision of a Travel Plan for the site will assist in reducing impact and help to create a wider choice of travel to residents and visitors.

8.1.3 Based on the above it is the conclusion of this Report that there are no material reasons why the proposed development should not be granted planning consent on highways or transportation grounds.

FIGURES

PLANS



CLIENT:					Croft Transport Planning & Design 340 Deansgate Manchester M3 4LY Email: info@crofts.co.uk Tel: 0161 837 7380 Web: www.eddisons.com/services/transport-planning	
DRAWING TITLE:						
FORMER MANCHESTER COLLEGE, NORTHERN MOOR SITE LOCATION						
					DRAWING NUMBER.	REVISION.
					3225-01	-
DRAWN	DATE	CHECKED	DATE	SCALES	Eddisons Incorporating Croft	
LG	05.02.21	PJW	05.02.21	NTS @ A4		

Accommodation schedule Moss Hey Drive, Northenden						
FREE SALE						
House type	Description	Sq.ft.	Number	Total Sq.ft.	% of Mix	Total
The Turing	3 Bed Semi	937	29	27173	16.2	29.1
The Parkhurst	3 Bed Semi	942	11	10362	6.1	
The Dalton	3 Bed Semi	1044	12	12528	6.7	
The Wilson	3 Bed Semi	1,042	24	25008	13.4	32.4
The Burnatt	3 Bed Semi	1,166	27	31482	15.1	
The Burgess	3 Bed Semi	1,272	7	8904	3.0	
The McKellen	4 Bed Semi/ Mews	1,148	12	13752	6.7	15.1
The Joule	4 Bed Semi/ Mews	1,158	15	17370	8.4	
The Winterson	4 Bed Detached	1,180	22	26180	12.3	23.5
The Lowry	4 Bed Detached	1,269	20	25380	11.2	
Sub total			179	198139	100.0	100.0
AFFORDABLE						
House type	Description	Sq.ft.	Number	Total Sq.ft.	% of Mix	Total
The Castwell	2 Bed Semi	704	23	17592	10.3	20.1
The Turing	3 Bed Semi	937	22	20814	9.8	
Sub total			45	38188	20.1	
Grand Total			224	236325		

H	Cycle store positions added, near access granted to plot 65	TS	13.10.21
G	Parking corrected to plots 16-20 to introduce some landscaping	NB	12.10.21
F	General revision to layout to reduce up front drive lane dedicated footway and increase interface distances with neighbouring properties around plots 54-55 and 95. Plots 178-189 block position corrected for parking	NB	04.10.21
E	Parking to plots 187, 206 and adjacent. Plots 176-189 block position corrected for parking. Gas and electric mains shown to west boundary and easements.	NB	13.09.21
D	Emergency access increased to 3.7m. Cycle store added.	BMS	18.06.21
C	Rear boundaries amended to 1.8m close boarded fence following recommendations in the crime impact statement/secure by design.	BMS	14.06.21
B	Plots 26-30 amended to show pump station, minor amend to boundary and path lines following boundary treatment plan	TS	02.06.21
A	Mix adjustment to restate the new tree corridor along primary route to PCOB	NB	01.06.21
Rev	Description	Drawn	Date

millerhomes
 Miller Homes Limited - North West Region
 103 Dalton Avenue
 Birchwood Park
 Warrington
 WA3 6YF
 Telephone 0870 336 4700
 Fax 01925 228570
 www.millerhomes.co.uk

Project Title
**Former Manchester College
 Moss Hey Drive
 Northenden**

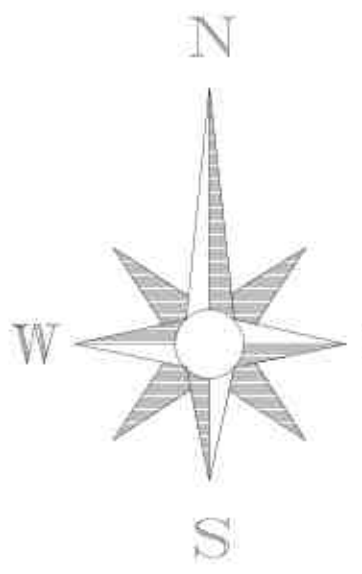
Drawing Title
Proposed Overall Site Layout

Scale	Drawn By	Checked By	Authorised By
1:500	STEN		
Date	28.05.21	Date	
Job No.	Drawing No.	Revision	
	2131 / SL / 01		H

Original Sheet Size A3 On Not Scale From This Drawing

DRAWING LEGEND: -

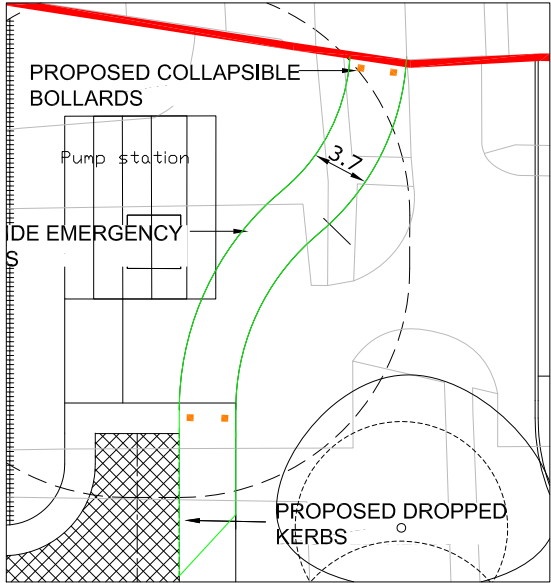
- Denotes Development Boundary
- Boundary fences - please refer to boundary treatment plan for additional details
- Boundary walls - please refer to boundary treatment plan for additional details
- Boundary railings - please refer to boundary treatment plan for additional details
- Denotes 1.8m Garden Gates
- Denotes CAT A tree and RPA to be retained
- Denotes CAT B tree and RPA to be retained
- Denotes CAT C tree and RPA to be retained
- Denotes Speed hump
- Denotes ramp and raised table
- Denotes secure cycle store



Scaled @ 1:500



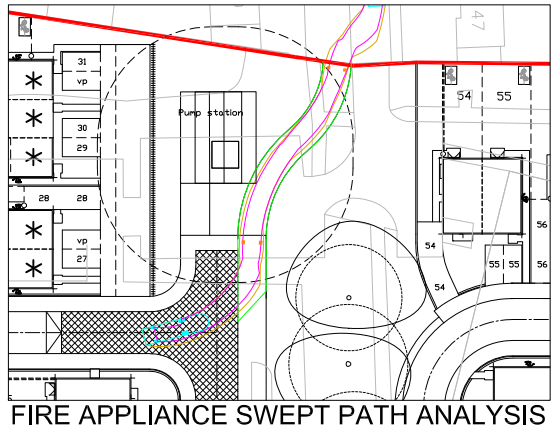
NORTH SOUTH AERIAL VIEW



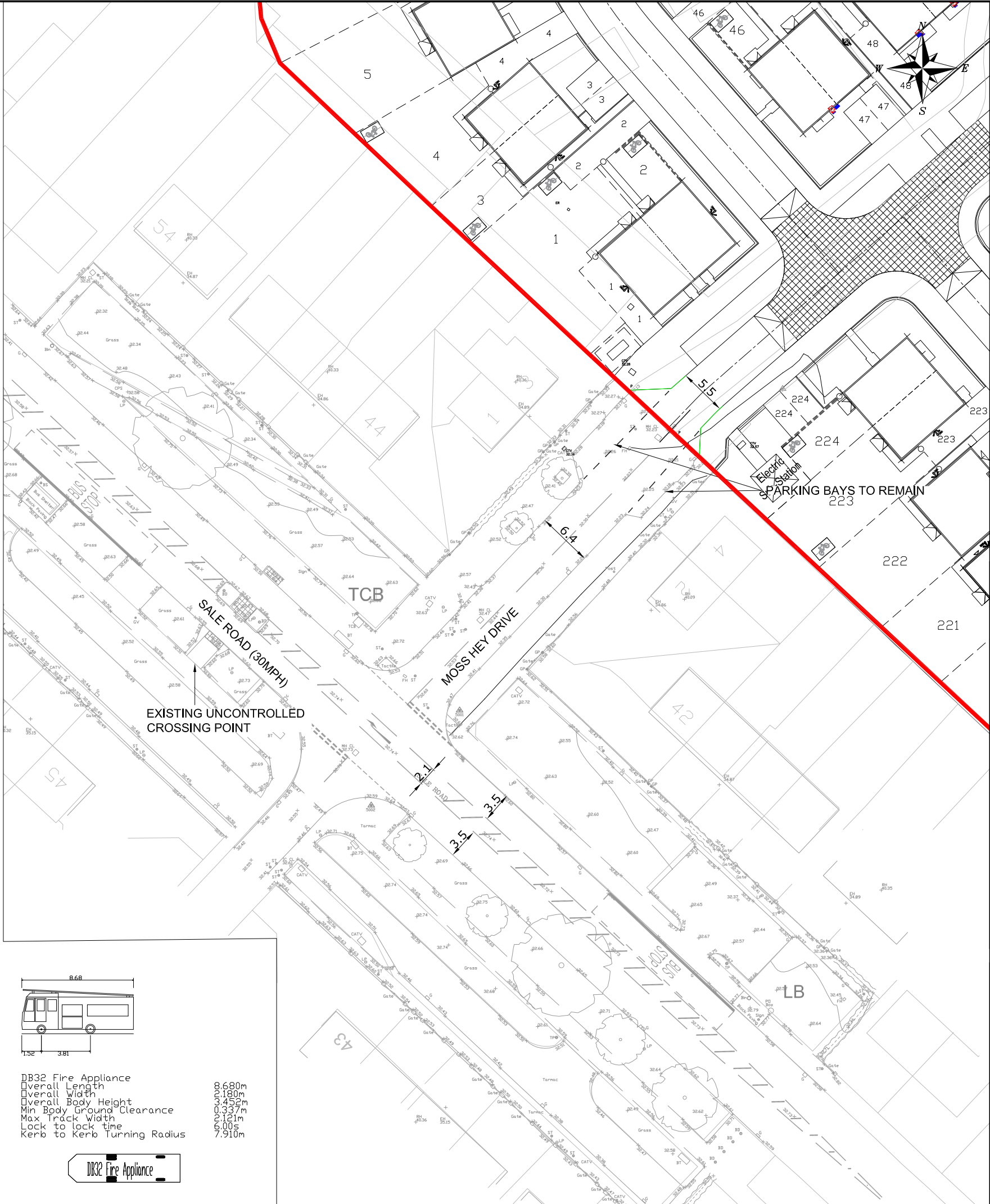
PROPOSED EMERGENCY ACCESS



NORTH SOUTH AERIAL VIEW OF HOLLYHEY DRIVE



FIRE APPLIANCE SWEEP PATH ANALYSIS
SCALE: 1:1000:A3



NOTES

THIS IS NOT A CONSTRUCTION DRAWING AND IS FOR INDICATIVE PURPOSES ONLY.
THE DRAWING WILL BE SUBJECT TO CHANGE FOLLOWING LOCAL AUTHORITY REVIEW AND CONFIRMATION OF PUBLIC HIGHWAY AND THIRD PARTY LAND BOUNDARIES.

— DENOTES NEW KERBS
— INDICATIVE SITE BOUNDARY

LOCAL AUTHORITY: MANCHESTER CITY COUNCIL
TOTAL AREA OF SITE: 7.3Ha



SITE LAYOUT NTS

REV	DESCRIPTION	LB	MR	DATE
A	SITE LAYOUT ADDED			JUN 21
	DETAILS	DRAWN	CHECKED	

CLIENT:
MILLER HOMES

PROJECT:
**FORMER MANCHESTER COLLEGE SITE,
NORTHERN MOOR**

DRAWING TITLE:
**POTENTIAL SITE ACCESS
ARRANGEMENT**

SCALES:
1:500 @ A3

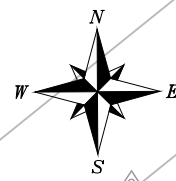
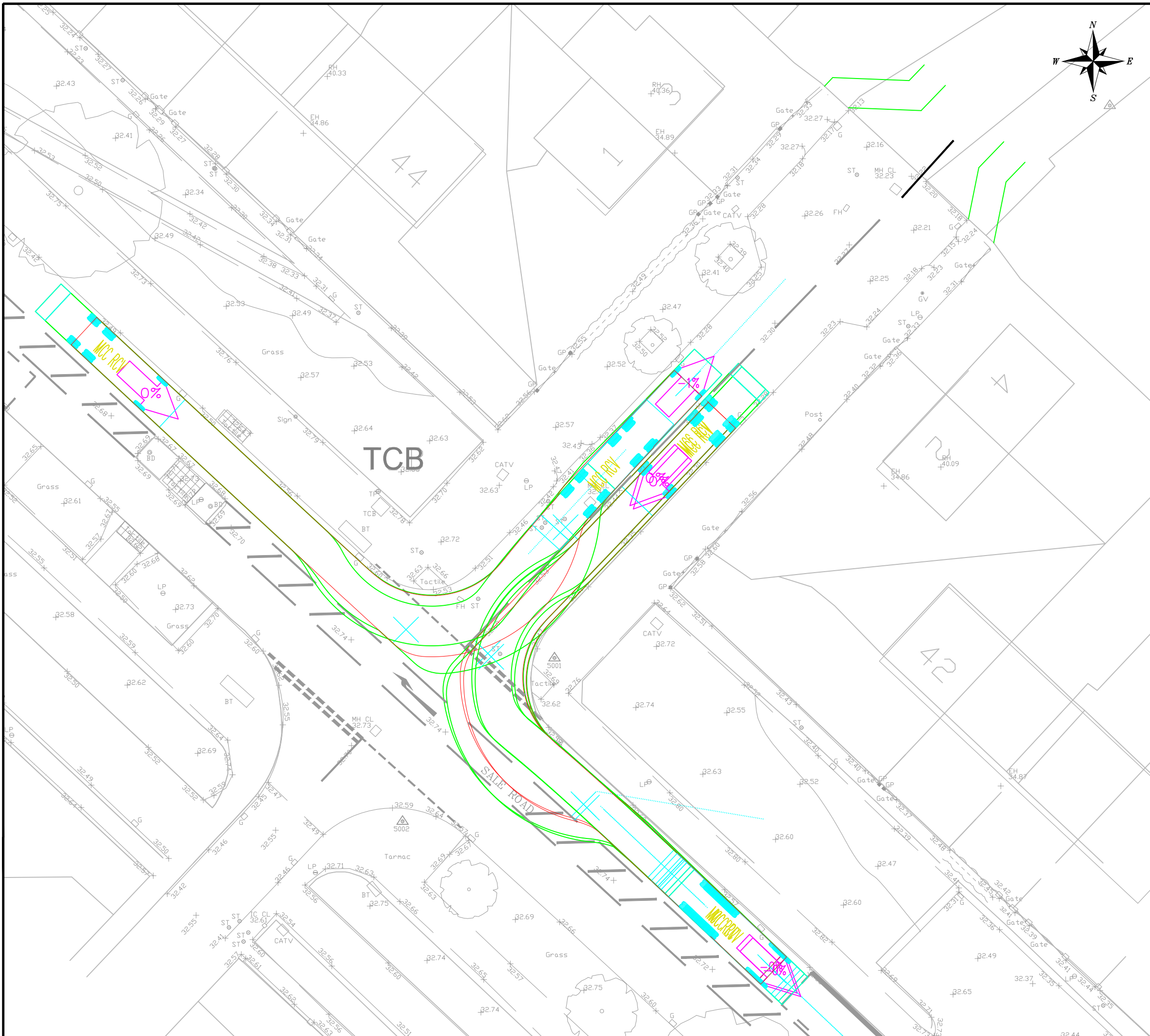
DRAWN:	LB	CHECKED:	MR	DATE:	APR 20
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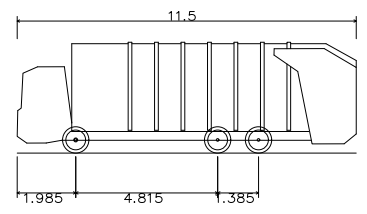
DRAWING NUMBER:	3225-F01	REVISION:	B
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Z:\projects\3225 Former Manchester College Site, Northern Moor\CAD\Croft Drawings\3225-SP01.dwg



NOTES



MCC RCV	
Overall Length	11.500m
Overall Width	2.550m
Overall Body Height	3.760m
Min Body Ground Clearance	0.312m
Track Width	2.550m
Lock to Lock Time	4.00 sec
Wall to Wall Turning Radius	9.700m

REV	DETAILS	DRAWN	CHECKED	DATE
-	-	-	-	-

CLIENT:
MILLER HOMES

PROJECT:
**FORMER MANCHESTER COLLEGE SITE,
NORTHERN MOOR**

DRAWING TITLE:
SWEPT PATH ANALYSIS

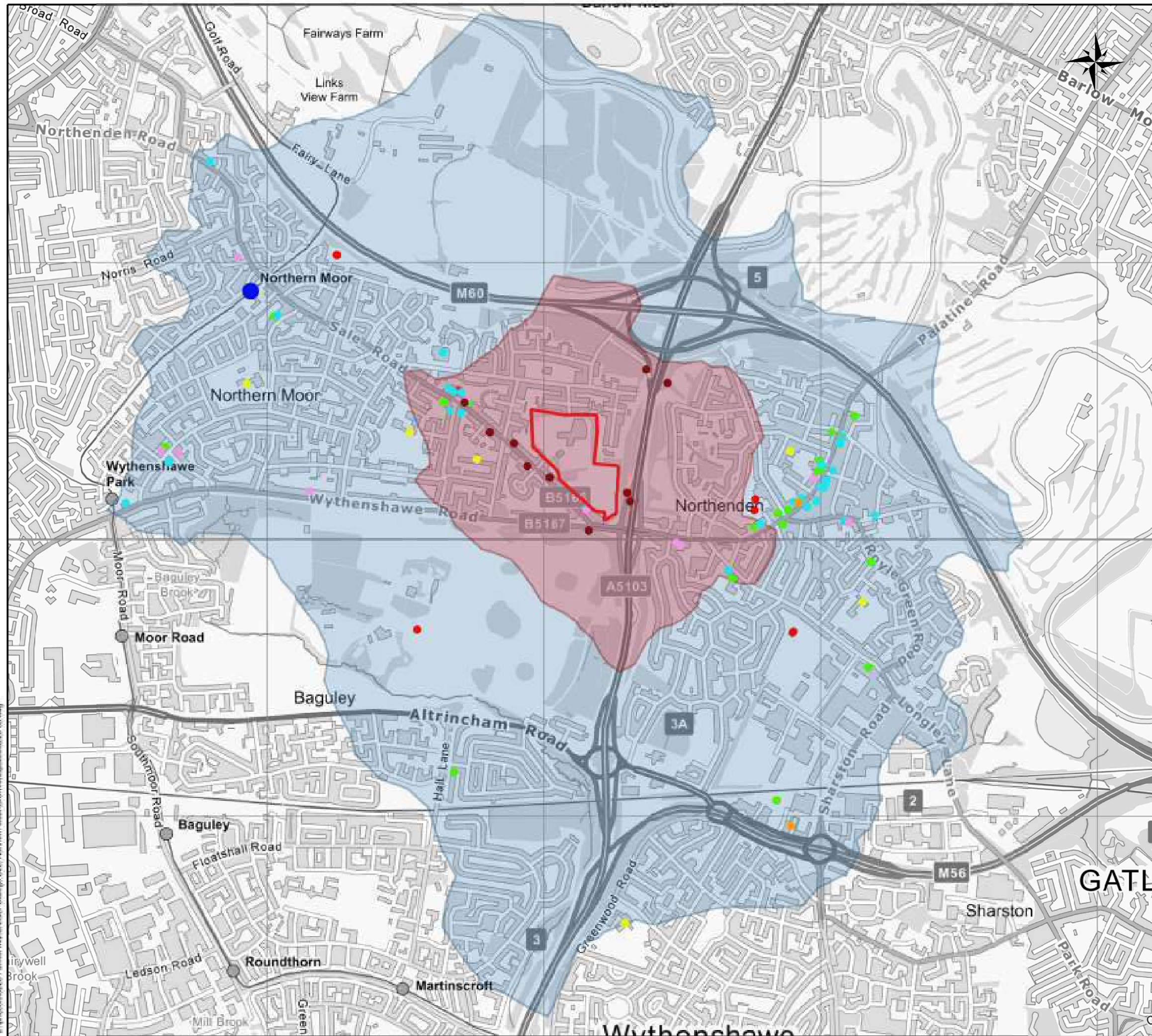
SCALES:	1:250 @ A3		
DRAWN:	LB	CHECKED:	MR
DATE:	APR 20		

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Web: www.eddisons.com/services/transport-planning

DRAWING NUMBER:	3225-SP01	REVISION:	-
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NOTES

- Site Location
- 800m Pedestrian Catchment
- 2km Pedestrian Catchment
- Metrolink
- Nearest Bus Stops
- Cafe/Takeaway/Public House
- Education
- Healthcare/Medical
- Post Office
- Retail
- Sport/Leisure

REV	DETAILS	DRAWN	CHECKED	DATE

CLIENT:

MILLER HOMES

PROJECT:

FORMER MANCHESTER COLLEGE, NORTHERN MOOR

DRAWING TITLE:

800M & 2KM PEDESTRIAN CATCHMENT WITH AMENITIES

SCALE:

NTS @ A3

DRAWN	CHECKED	DATE
LG	PJW	FEB 21

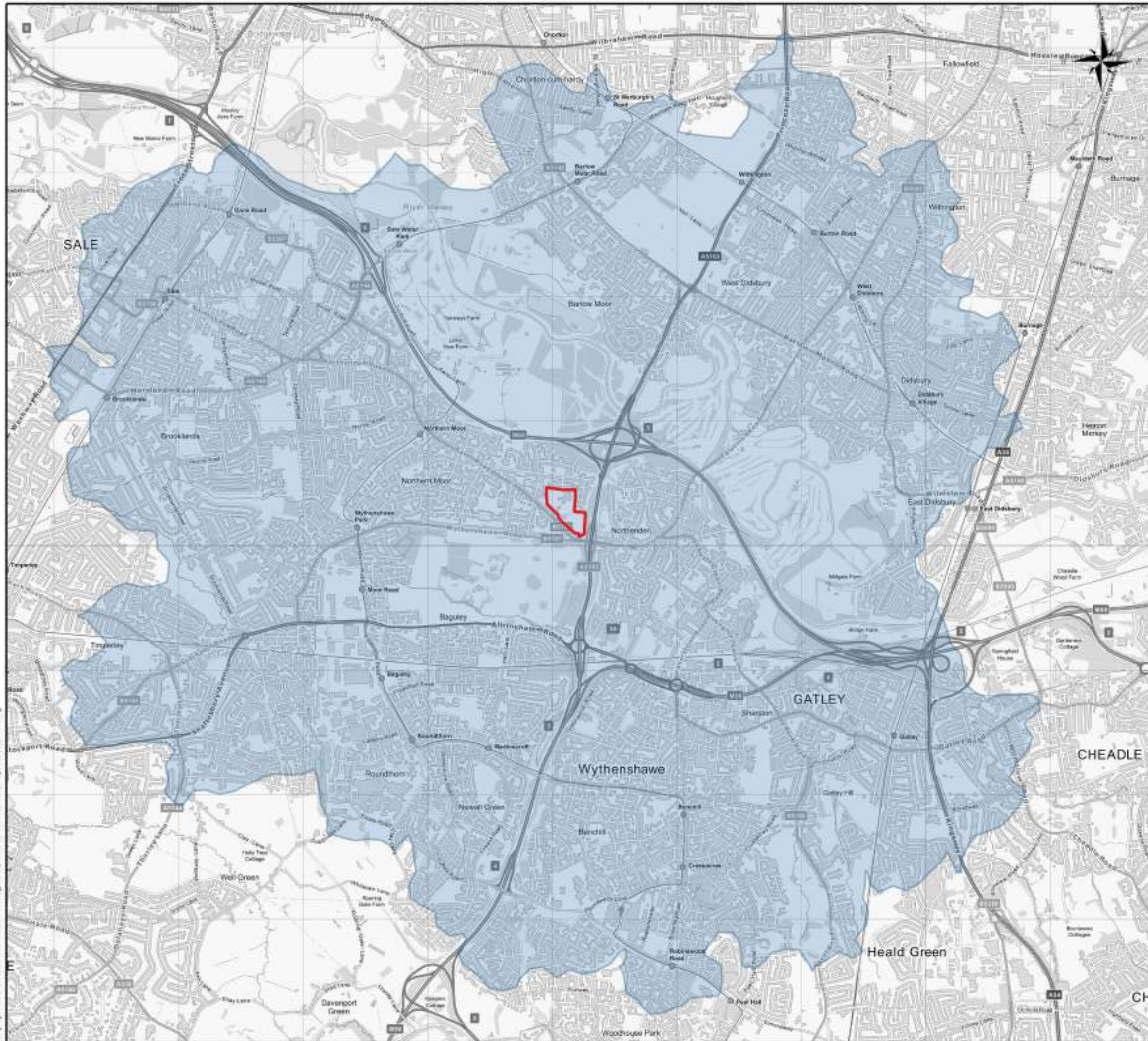
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Web: www.eddisons.com/services/transport-planning

DRAWING NUMBER	REVISION
3225-03	

Eddisons

Incorporating Croft



NOTES

-  Site Location
-  5km Cycle Catchment

REV	DETAILS	DRAWN	CHECKED	DATE

CLIENT:
MILLER HOMES

PROJECT:
**FORMER MANCHESTER COLLEGE,
NORTHERN MOOR**

DRAWING TITLE:
5KM CYCLE CATCHMENT

SCALE:
NTS @ A3

DRAWN	LG	CHECKED	MR	DATE	APR 21
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DRAWING NUMBER	3225-04	REVISION	-
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Eddisons | Incorporating
Croft

APPENDICES

FIGURE	DESCRIPTION	SCENARIO	CALC
FIGURE A	2022 BASELINE FLOWS	AM PEAK	See TA
FIGURE B	2022 BASELINE FLOWS	PM PEAK	See TA
FIGURE 1	2022 BASELINE FLOWS with 10% uplift	AM PEAK	See TA
FIGURE 2	2022 BASELINE FLOWS with 10% uplift	PM PEAK	See TA
FIGURE 3	2026 BASE FLOWS	AM PEAK	FIG1xNTM
FIGURE 4	2026 BASE FLOWS	PM PEAK	FIG2xNTM
FIGURE 5	TRIP DISTRIBUTION	AM PEAK	See TA
FIGURE 6	TRIP DISTRIBUTION	PM PEAK	See TA
FIGURE 7	DEVELOPMENT FLOWS	AM PEAK	See TA
FIGURE 8	DEVELOPMENT FLOWS	PM PEAK	See TA
FIGURE 9	2026 ASSESSMENT FLOWS	AM PEAK	F3+F7
FIGURE 10	2026 ASSESSMENT FLOWS	PM PEAK	F4+F8

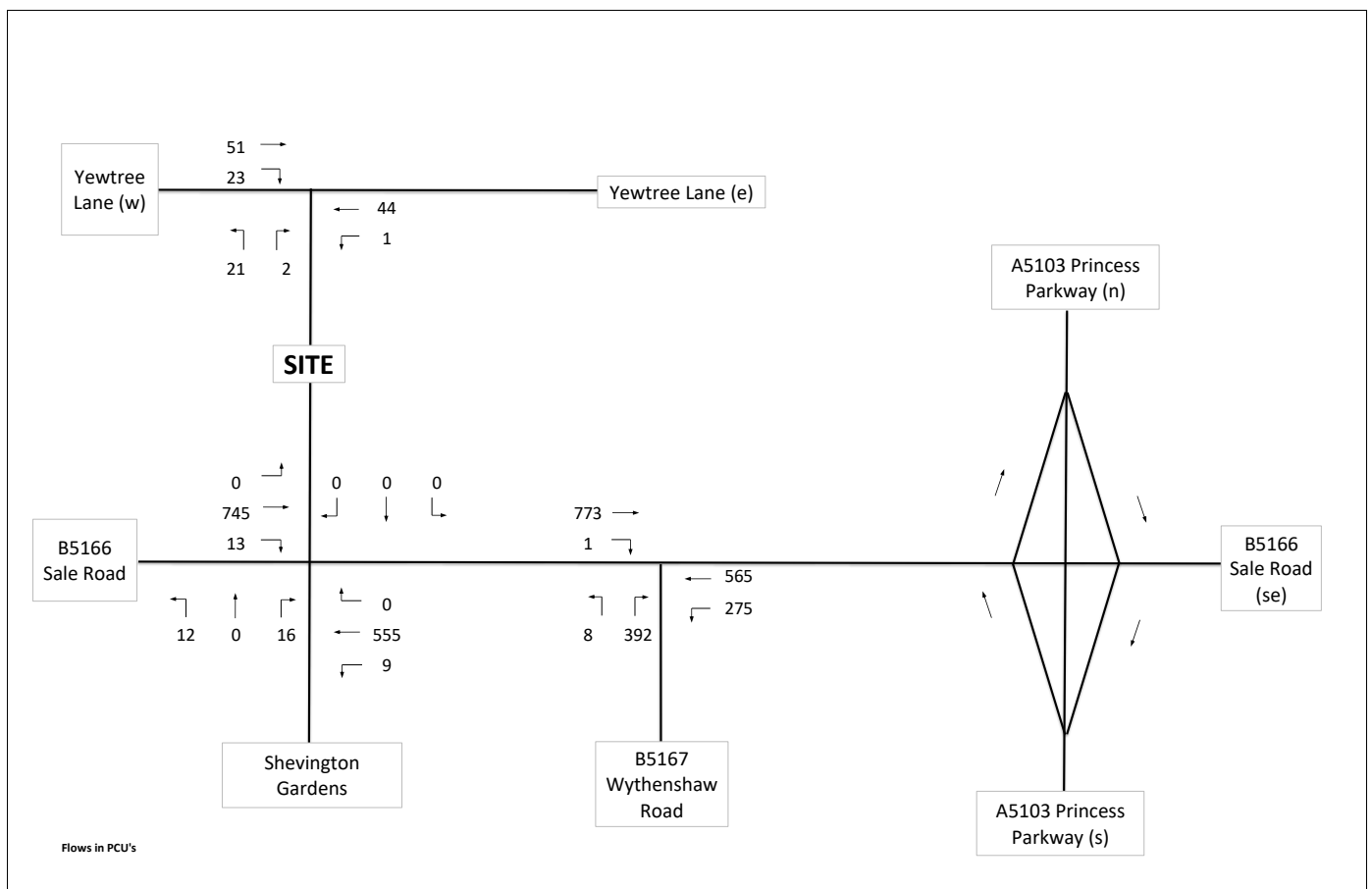


Figure A 2022 Permanent Count Site Data - AM Peak (0745-0845 hours)

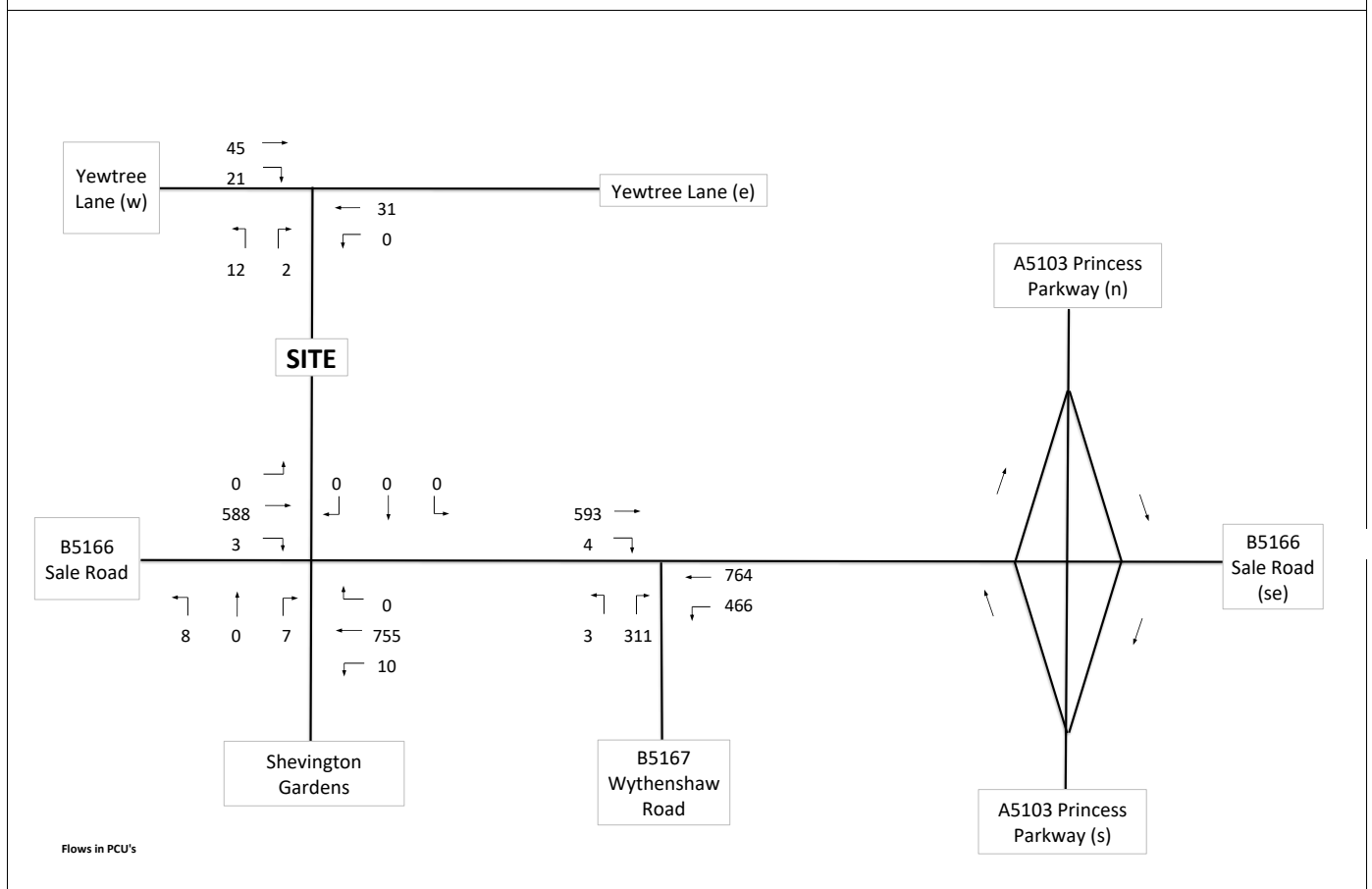


Figure B 2022 Permanent Count Site Data - PM Peak (1630-1730 hours)



Uplift factor= 0.10

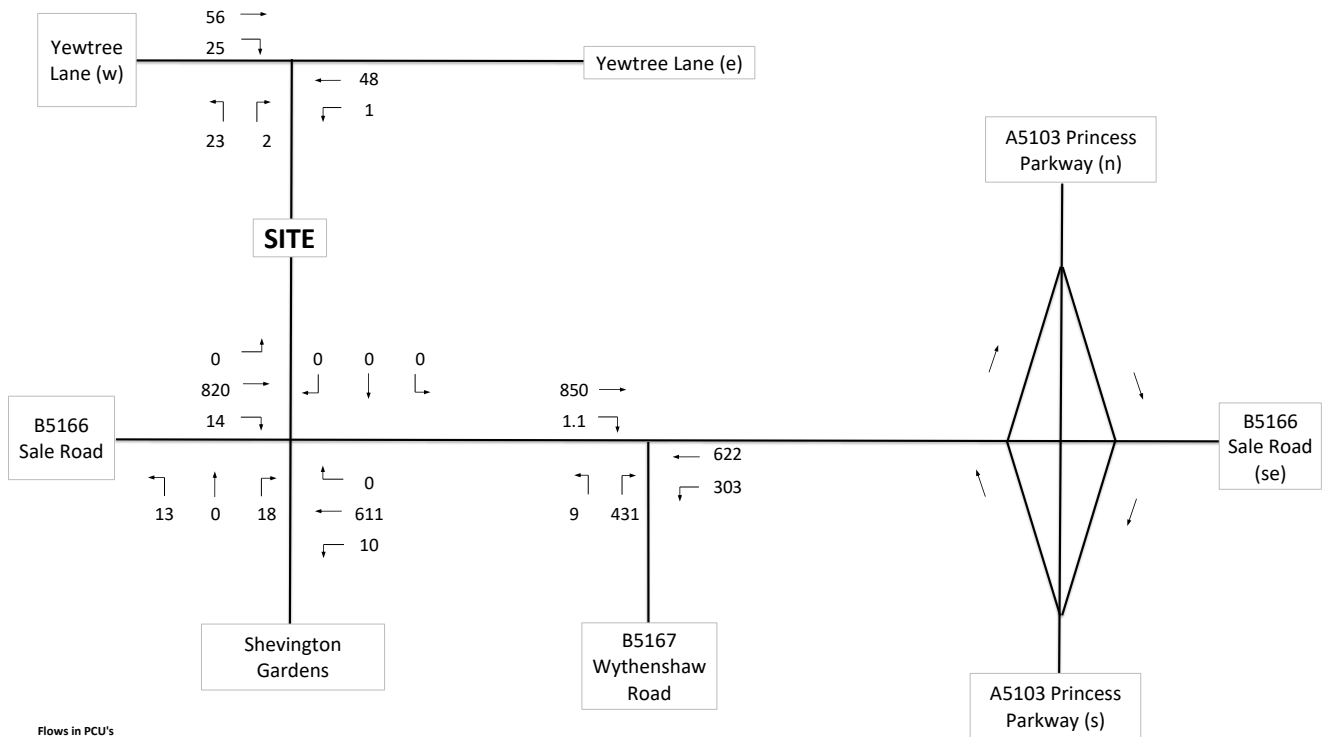


Figure 1 2022 Baseline Flows - AM Peak (0745-0845 hours)

Uplift factor= 0.10

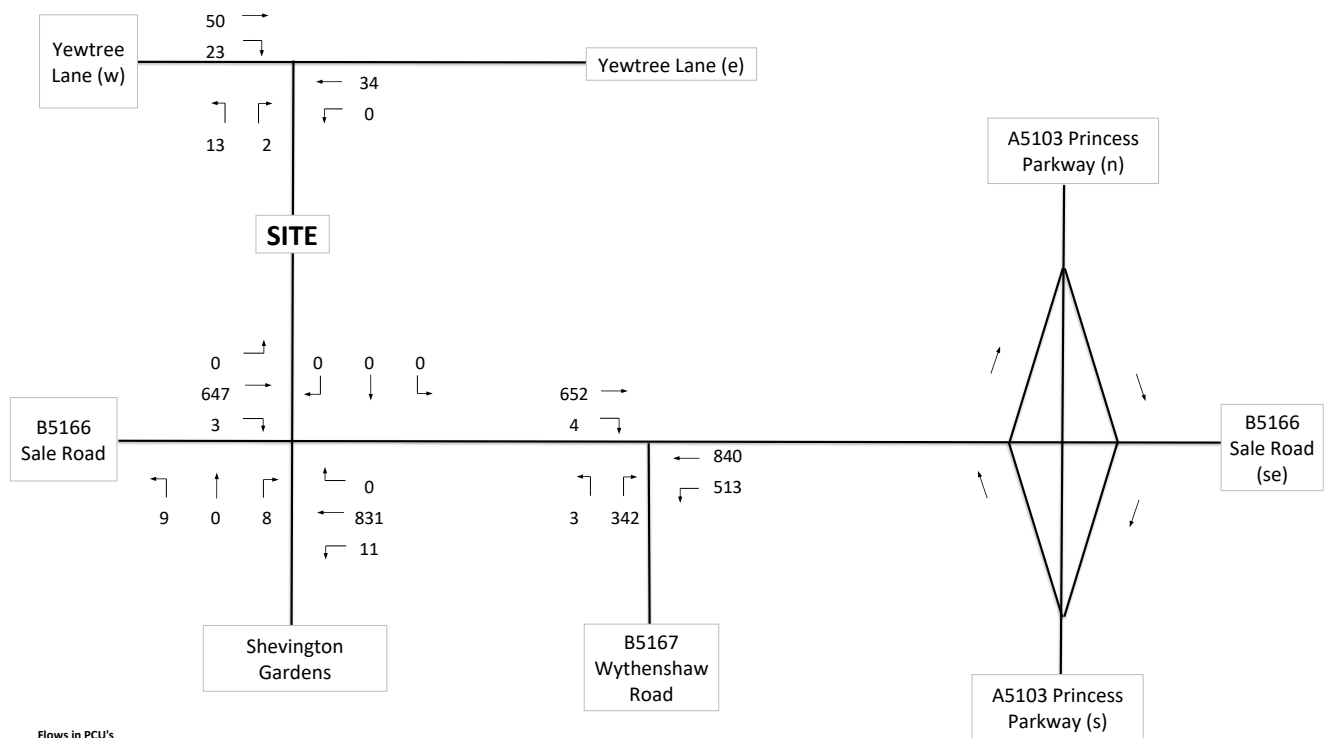


Figure 2 2022 Baseline Flows - PM Peak (1630-1730 hours)



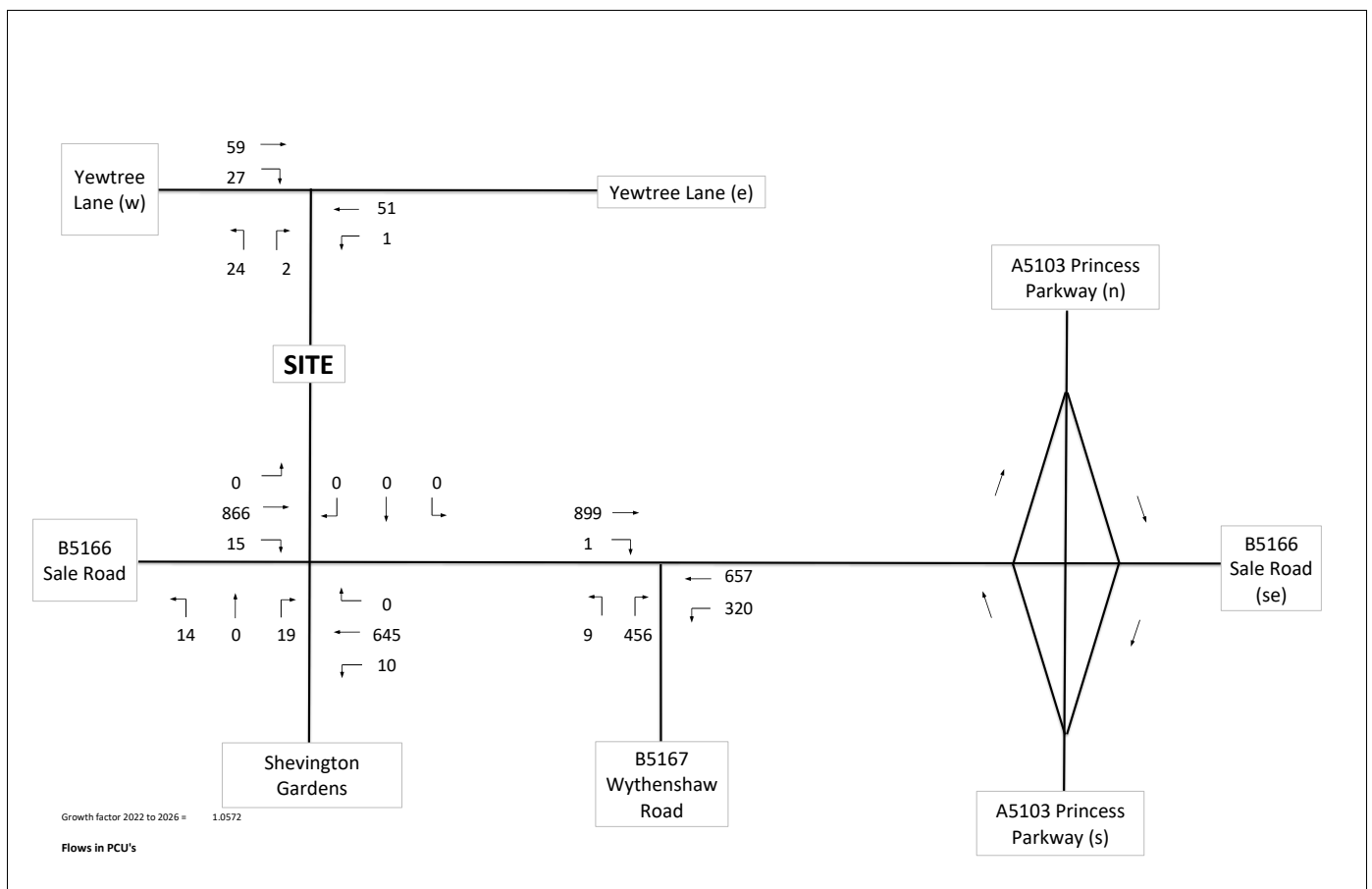


Figure 3 2026 Base Flows - AM Peak (0745-0845 hours)

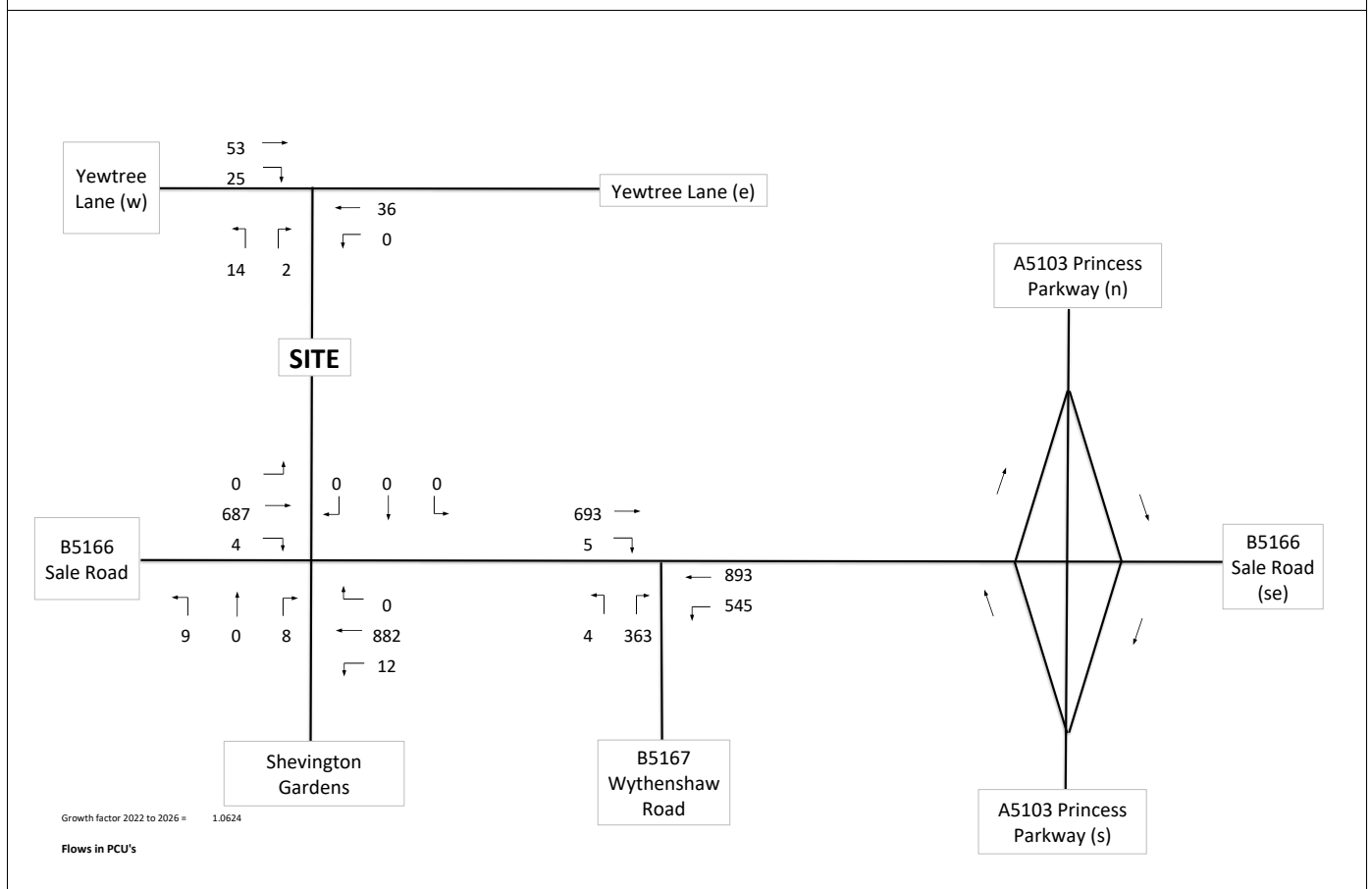


Figure 4 2026 Base Flows - PM Peak (1630-1730 hours)



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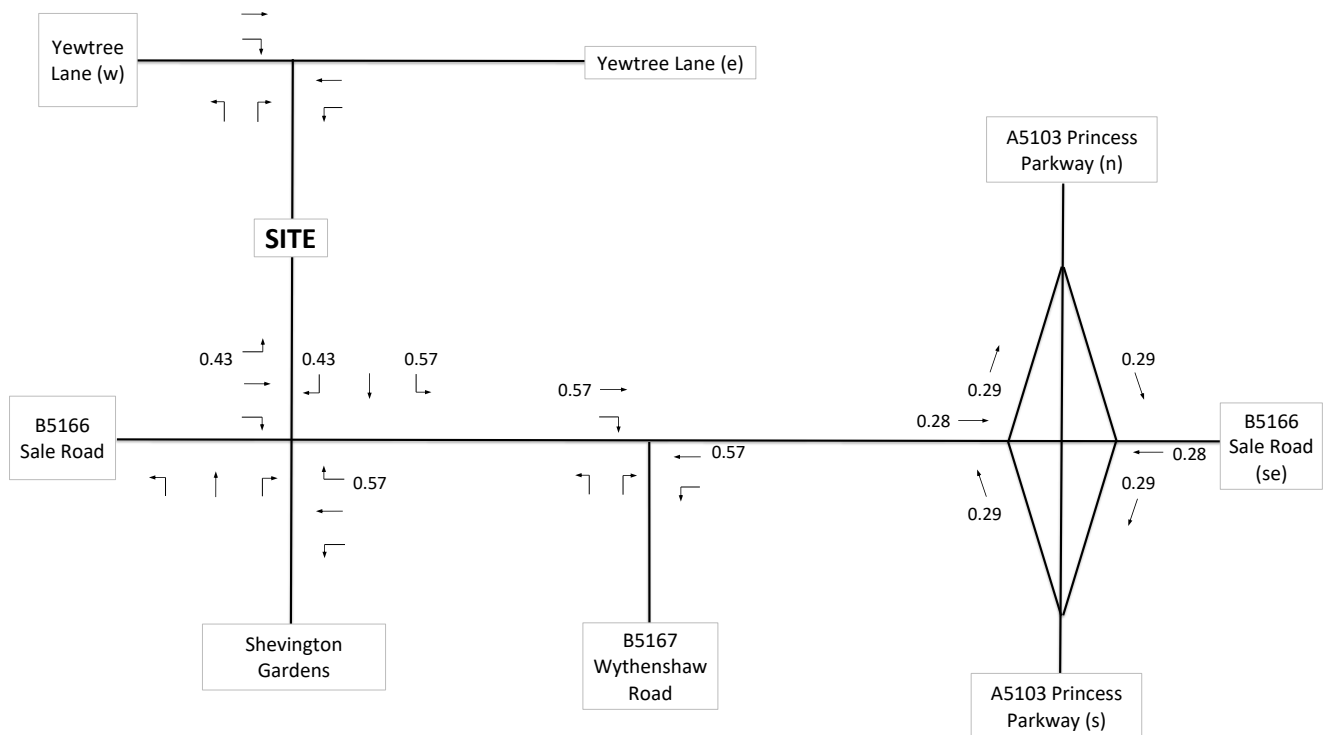


Figure 5 Trip Distribution - AM Peak (0745-0845 hours)

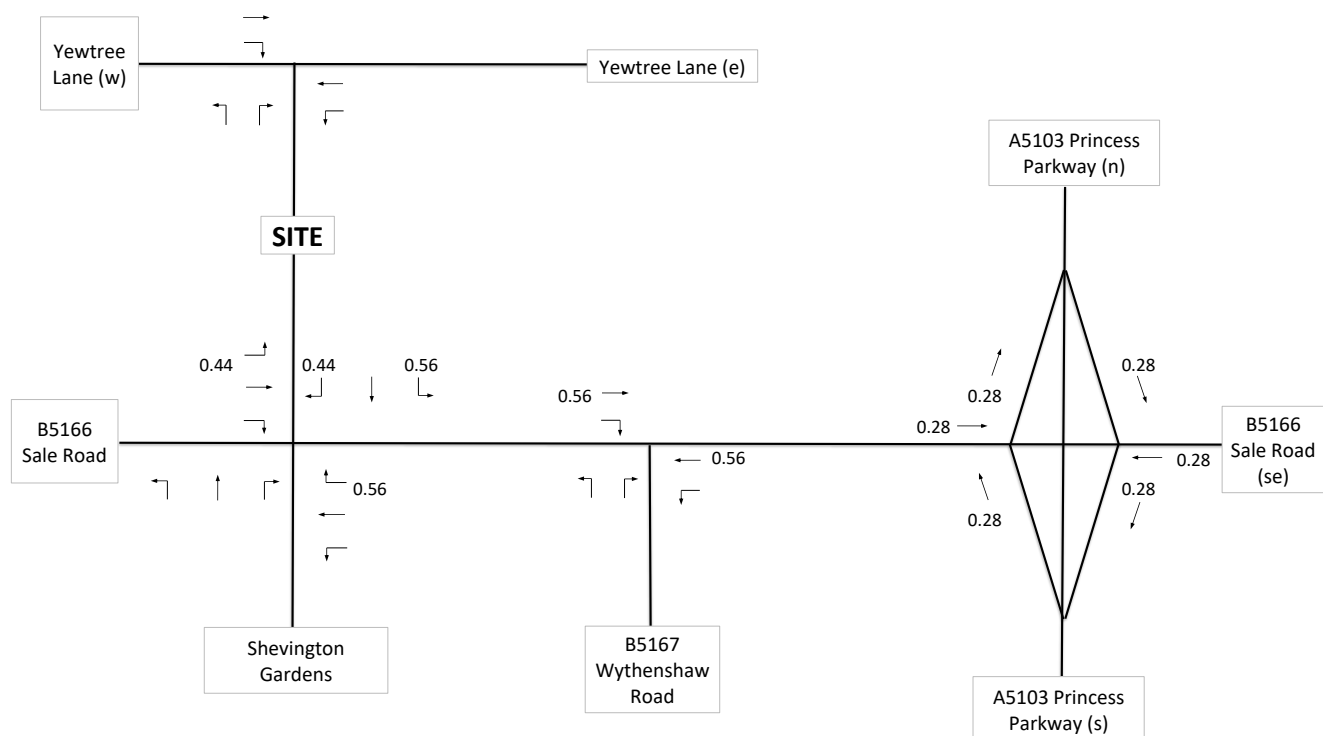


Figure 6 Trip Distribution - PM Peak (1630-1730 hours)

IN	31
OUT	92

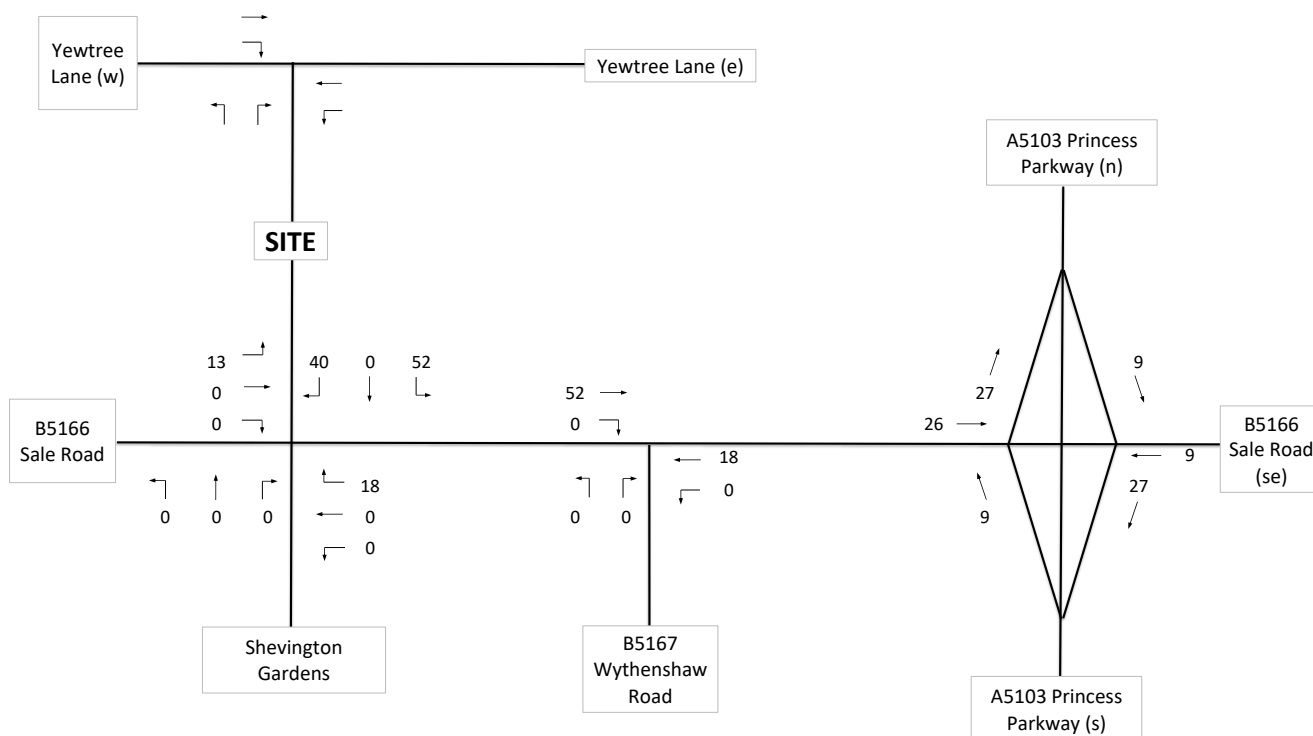


Figure 7 Development Flows - AM Peak (0745-0845 hours)

IN	72
OUT	39

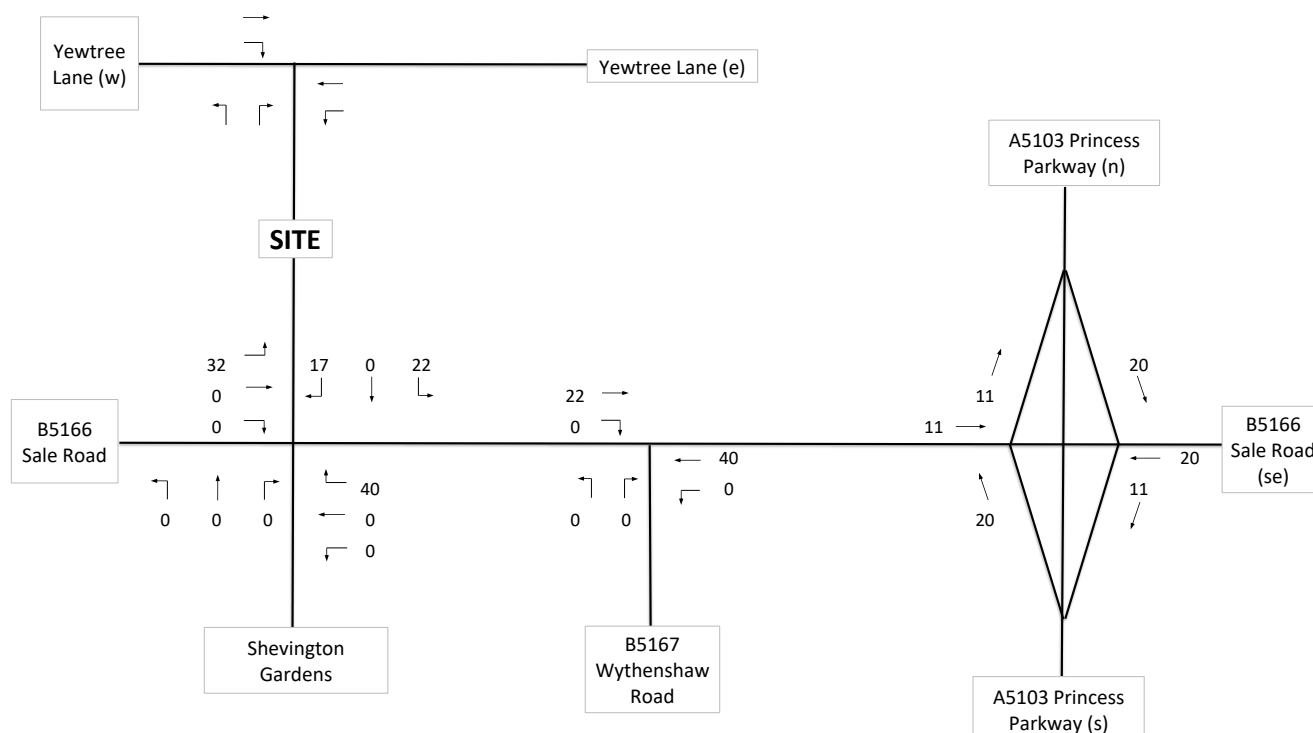


Figure 8 Development Flows - PM Peak (1630-1730 hours)



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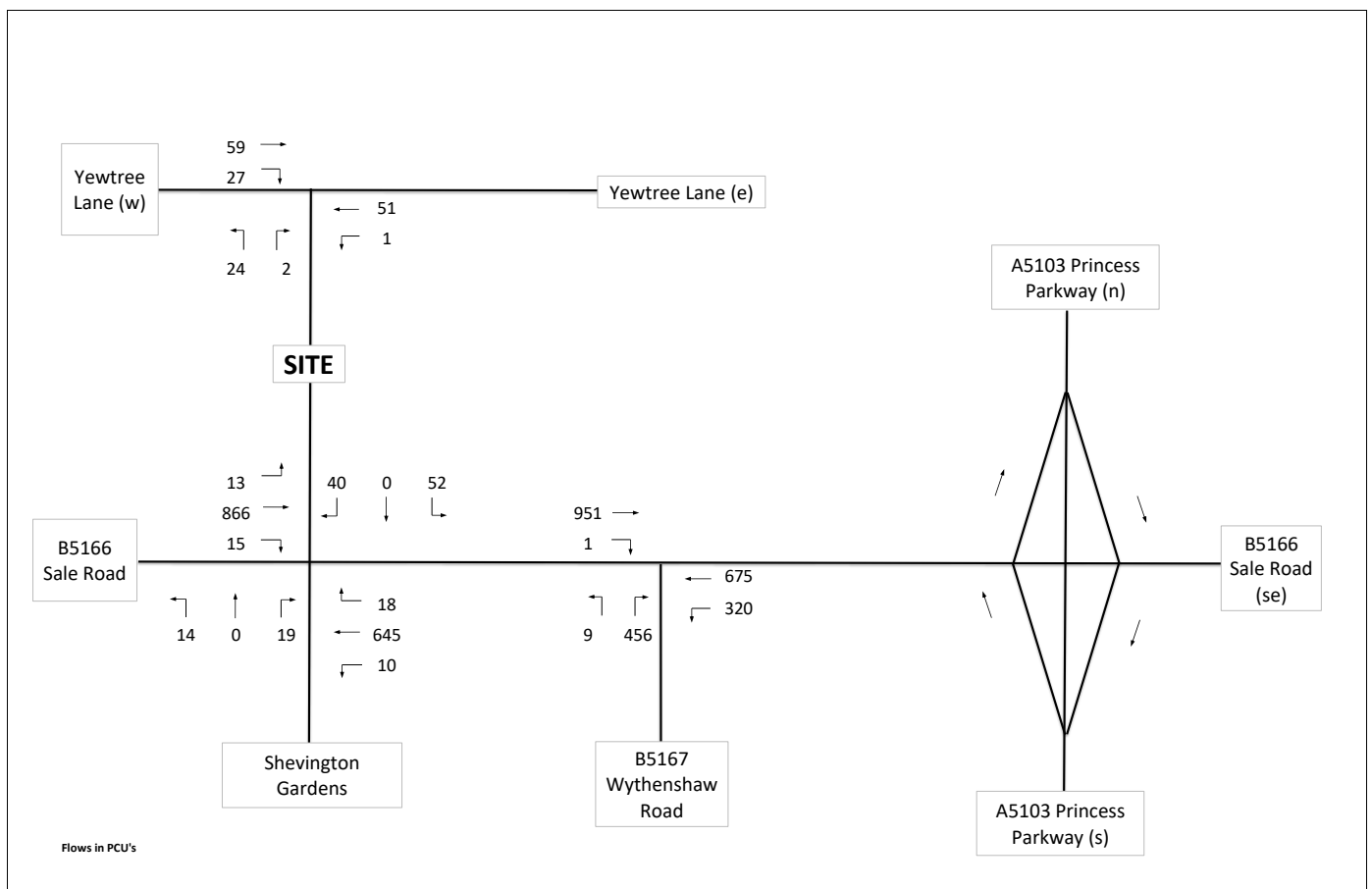


Figure 9 2026 Assessment Flows - AM Peak (0745-0845 hours)

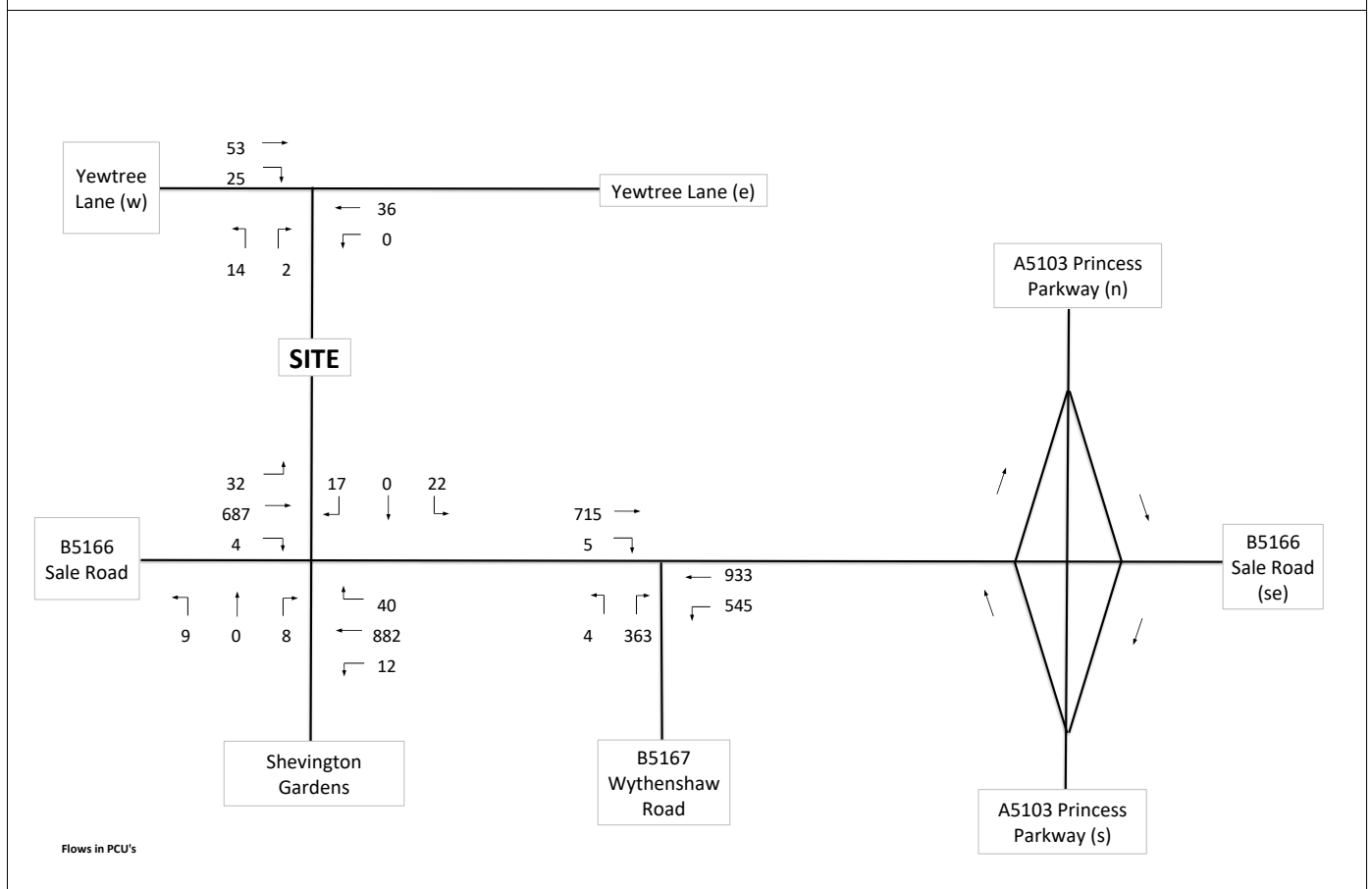


Figure 10 2026 Assessment Flows - PM Peak (1630-1730 hours)

APPENDIX 1

Transport Feasibility Study (SK Transport)



The Manchester College
Northenden Campus
Transport Feasibility Study
170725/SK21701N/TA01(-01)

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- F TRICS Output - Development
- G Junction Assessment – Site Access
- H Junction Assessment – Site Access Signals Option
- I Junction Assessment – Sale Road/Wythenshawe Road

Project	Document	Rev	Description	Authorised by	Signed	Date
SK21701N	T01	-00	Draft text only issue	L Speers	LGS	20/04/2017
SK21701N	T01	-01	Final bound version	L Speers	LGS	25/07/2017

1 INTRODUCTION

- 1.1 SK Transport Planning Ltd (SK) has been appointed by The Manchester College to assess the traffic and transport implications of redeveloping the Northenden Campus on Sale Road in Manchester to provide residential accommodation.
- 1.2 The feasibility study has been prepared to a Transport Assessment (TA) standard and assesses the existing traffic, transport, parking and accessibility characteristics of the site and examines opportunities and constraints to redevelopment. The assessment has been prepared in line with guidance as set out in Manchester City Council (MCC) SPD 'Guide to Development in Manchester', 'Local Development Framework Core Strategy', and the endorsed 'Residential Quality Guidance'. The assessment is also mindful of Transport for Greater Manchester's (TfGM) guidance and policy as outlined in 'Transport for Sustainable Communities' and 'GM Transport Strategy 2040' (LTP4), and national guidance as detailed in the National Planning Policy Framework (NPPF) and National Planning Practice Guidance (NPPG).
- 1.3 The scope of the assessment and the emerging transport strategy for the site have been discussed and agreed with MCC highway officers.

2 EXISTING SITUATION

Site Location

- 2.1 Figure 2.1 shows that site is sustainably located on Sale Road, adjacent to Princess Parkway, in the Northenden area of Manchester. The site is in a predominantly residential area and is within walking distance of Wythenshawe Park.



Figure 2.1: Site Location

- 2.2 The site is 18.20 acres (7.35 hectares) in size and comprises a single large building constructed in 2003, with two outbuildings. The building has a total floor area of 12,353sqm. The site also includes large playing field areas that cover half of the site.
- 2.3 The main vehicular access to the site is currently provided from a priority arrangement formed with Sale Road and Shevington Gardens. A further gated vehicle access is provided to the rear of the site onto Hollyhey Drive.
- 2.4 The site is served by a large car park with capacity for 371 cars.
- 2.5 Pedestrian access is provided from the two vehicular access points.

Existing Campus Demographics

- 2.6 The site currently provides education facilities for 1,704 students and 149 staff. The College has advised that the number of students on site is lower than the design capacity of the building and historically more students were educated at the campus.

Local Highway Network

- 2.7 Access to the site is provided from the B5166 Sale Road, a local distributor road that routes northeast-southwest between the A5103 Princess Parkway and the A56 Washway Road. Sale Road provides access to the M60 either northeast of the site via Princess Parkway or northwest via Old Hall Road.
- 2.8 Sale Road along the site frontage is characterised by driveways to properties and has no parking restrictions. The road is subject to a 30mph speed limit and street lighting is present. Near the site the road has red central hatched markings that act as a traffic calming measure and also provide a right-turn pocket into the site.
- 2.9 Sale Road is a bus route and has good standard footways on either carriageway edge, with dropped kerbs and tactile paving present.
- 2.10 To the southeast of the site Sale Road meets Wythenshawe Road at a signalised junction arrangement. Continuing east on Wythenshawe Road provides access to Princess Parkway, a large grade-separated junction arrangement with signalised slip roads either side of the mainline carriageway. Princess Parkway provides access to Manchester city centre, the M56 and M60.
- 2.11 To the north of the site a gated access is provided onto Hollyhey Drive, a residential street that serves a pocket of existing houses. Hollyhey Drive meets Yew Tree Lane at a priority junction. To the east of Hollyhey Drive, Yew Tree Lane provides access to houses fronting the street and minor roads serving further houses. Yew Tree Lane undercuts Princess Parkway, but movements are restricted to pedestrians and cyclists and no vehicles are permitted.
- 2.12 To the west of Hollyhey Drive, Yew Tree Lane retains its residential character and serves fronting properties and minor road accesses. Yew Tree Lane meets Sale Road at a signalised junction.

Existing Highway Junction Flows

- 2.13 To establish the traffic conditions on the surrounding area manual classified turning count surveys were undertaken on Wednesday 15th March 2017 at the following locations:
- Site Access/Sale Road/Shevington Gardens
 - Hollyhey Drive/Yew Tree Lane
 - Sale Road/Wythenshawe Road
- 2.14 The surveys show that the network peak hours are 7.45 to 8.45 and 16.30 to 17.30. The peak hour surveys are shown in appendix a. The following PCU conversion factors have been used.
- Cycle: 0.2
 - Motorcycle: 0.4
 - Car/LGV: 1.0
 - OGV1: 1.5
 - OGV2: 2.3
 - Bus: 2.0

Existing Highway Link Flows

- 2.15 Daily traffic data has been taken from the DfT database to allow an understanding of the link flows on the A5103 Princess Parkway (N) and A5103 Princess Parkway (S)/M56. Table 2.1 shows the daily data.

	Daily Flows
A5103 (N)	110,608
A5103 (S)/M56	116,437

Table 2.1: Daily Strategic Link Flows

Existing Campus Traffic Flows

- 2.16 The surveys have been used to establish the existing campus traffic flows. It is assumed that all of the traffic turning to and from Sale Road at the junction with the site access is associated with campus activity. For robustness, it has been assumed that all of the vehicles surveyed at the junction of Hollyhey Drive and Yew Tree Lane are associated entirely with the residential properties served from this access. Table 2.2 provides a summary of the campus traffic flows based on these assumptions.

	IN	OUT	TOTAL
AM	74	37	111
PM	24	82	106

Table 2.2: Existing Campus Flows

- 2.17 The College has advised that the campus is not currently operating at its full design capacity and consequently traffic flows are lower than would have been found in the past. Consequently the use of the surveyed flows provides a conservative estimate when tested against the future development proposals.
- 2.18 To establish the daily traffic flows associated with the campus the TRICS database has been used. The TRICS forecast has been undertaken in line with good practice guidance and locational parameters have been set to replicate site characteristics. The TRICS output is attached as appendix b, with a summary provided in table 2.3.

	Vehicle Trip Rate (per unit)			Traffic Flows (in vehs)		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Daily	4.045	4.096	8.141	500	506	1006

Table 2.3: Daily Campus Flows

Road Safety Record

- 2.19 The GMTU accident database has been reviewed to establish accident patterns in the study area for the past three years.

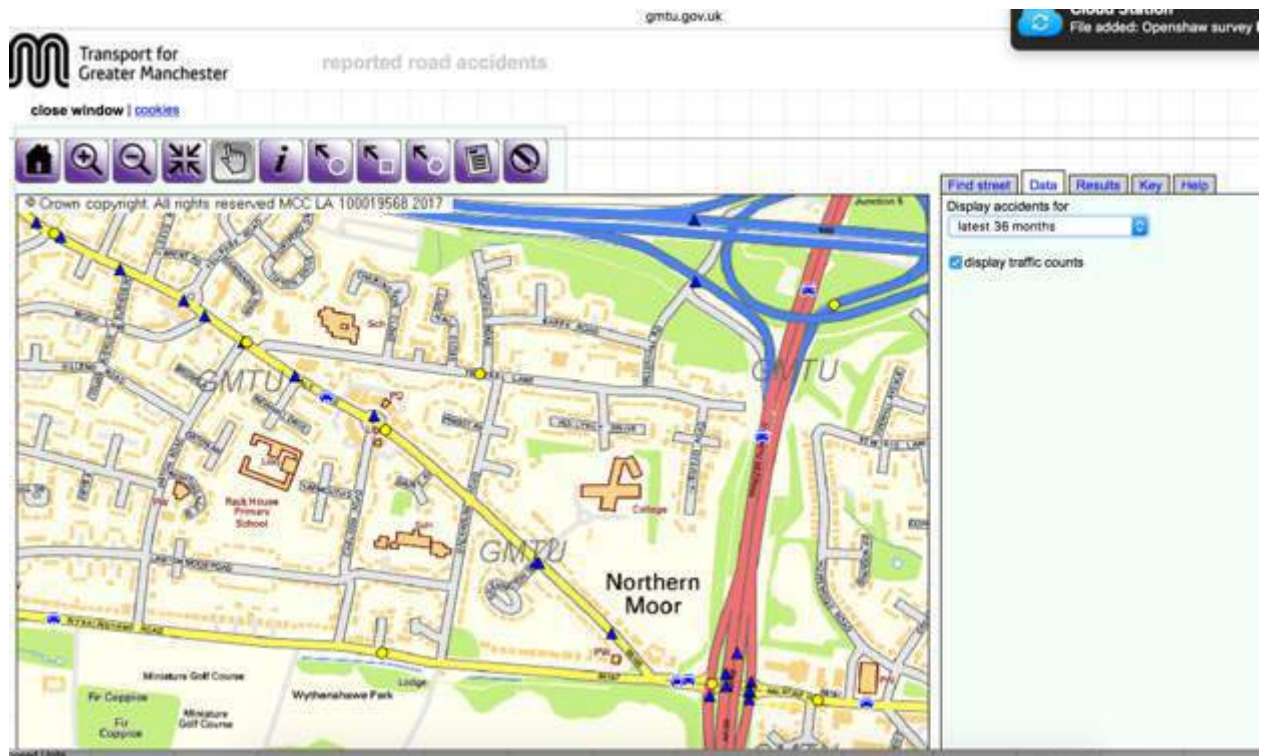


Figure 2.2: Accident Record

- 2.20 Figure 2.2 shows that there have been two slight accidents at the site access junction during the three-year period assessed. Sale Road is used by over 14,000 vehicles per day and it can be seen from the data that there are occasional accidents at many of the junctions along the road. The level and severity of accidents is in line with prevailing traffic conditions and does not appear to indicate a particular safety issue at the junction.

Local Car Ownership Levels

- 2.21 The 2011 Census has been used to establish existing car ownership levels in the ward within which the site sits (Northenden). Table 2.4 shows the car ownership levels.

No Car	35%
1 Car	46%
2 Cars	16%
3 Cars	3%
4 Cars	1%

Table 2.4: Local Car Ownership Levels

Local Area Mode Share

- 2.22 The 2011 Census has been used to establish commuter mode share for the ward in which the site sits. The mode share is shown in table 2.4.

Homeworker	3%
Public Transport	21%
Car/Motorcycle	57%
Car Passenger	6%
Bike	3%
Walk	9%

Table 2.5: Local Mode Share

- 2.23 The mode share shows that a high proportion (33%) of residents currently travel to work by non-car modes.

3 ACCESSIBILITY

Walking

- 3.1 The site is connected to key destinations by a comprehensive network of pedestrian routes, typical of its urban location. Pedestrian provision is of good condition, with standard width footways, dropped kerb crossings and tactile paving present.
- 3.2 A pedestrian refuge crossing is provided at the main site access junction and signalised crossing facilities are present at the junctions of Sale Road/Wythenshawe Road and Sale Road/Rackhouse Road to the north and south of the site.
- 3.3 Pedestrian access to the site via Yew Tree Lane also provides a good standard of infrastructure. A footbridge over Princess Parkway is present at the eastern end of Yew Tree Lane that provides a connection to areas south and east of the site. A segregated route is also provided under the M60 providing connections to the north. A direct pedestrian link is also provided into the site from the bus stop on the Princess Parkway (Northbound) on-slip.
- 3.4 South of the site access can be gained easily to segregated routes through Wythenshawe Park.
- 3.5 Two-thirds of all journeys in the UK are under-five miles and short distance trips offer the greatest opportunity for changes in travel behaviour. DfT best practice guidance states that walking has the potential to substitute for car trips at a local level for journeys under 2km. Further guidance is provided by the IHT on suitable walking distances.
- 3.6 Figure 3.1 shows a 2km walking catchment from the site representing a walk time of 25 minutes, based on an average walking speed of 80 m/min. The walking catchment has been derived using the interactive walkit.com tool, a pedestrian journey planning system promoted by both Manchester City Council and TfGM.

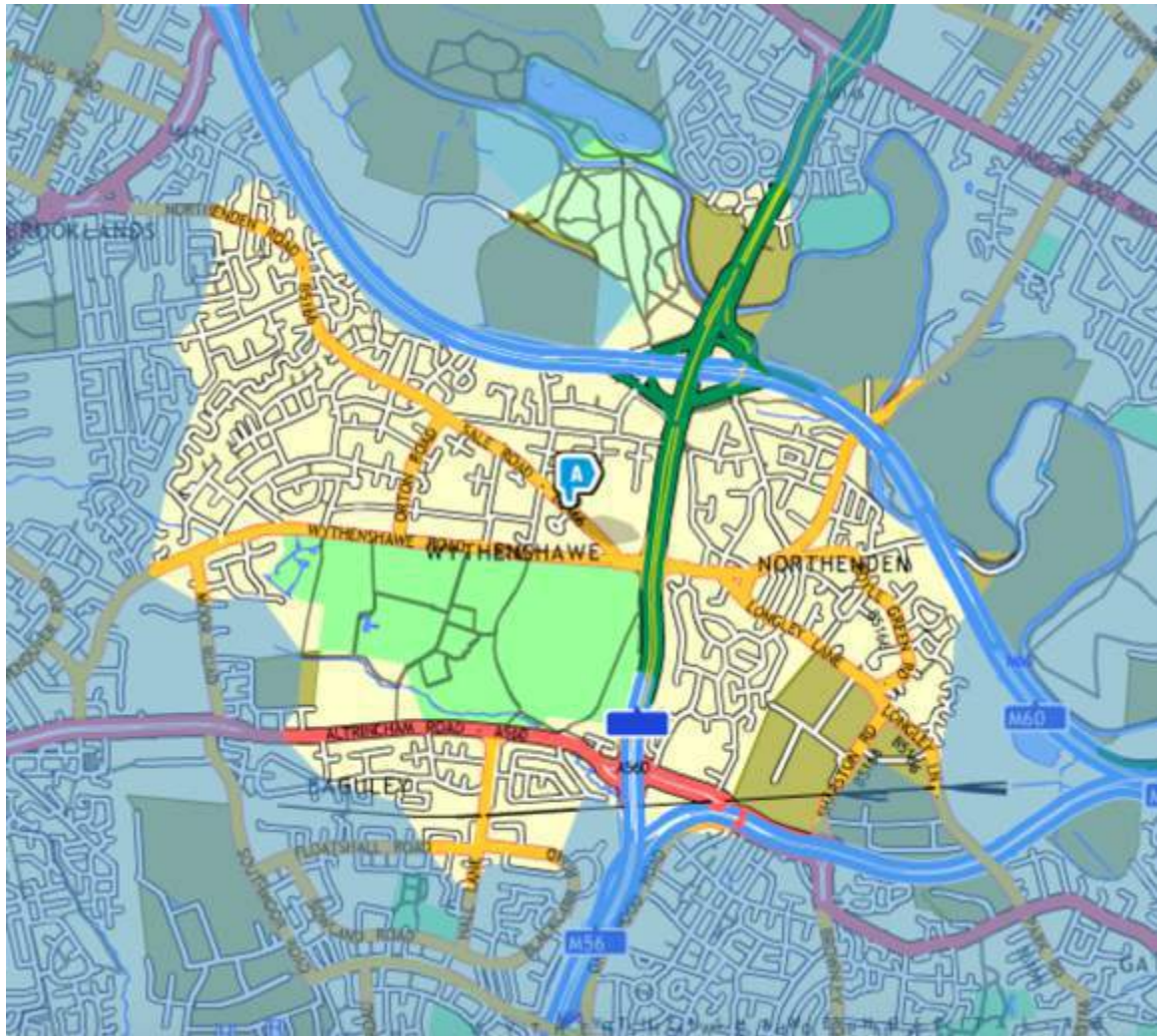


Figure 3.1: 1.2km Walking Catchment

- 3.7 Figure 3.1 show that the site is located within acceptable walking distance of local centre facilities in Northenden, local schools and Wythenshawe Park. Figure 3.1 also shows that areas of Sale, Baguley and Wythenshawe can be accessed on foot 25 minutes.
- 3.8 The existing pedestrian infrastructure surrounding the site provides a good basis for future trips by residents to local destinations.

Cycling

- 3.9 Figure 3.2 shows that access can be gained from the site to the Greater Manchester Cycle Network.

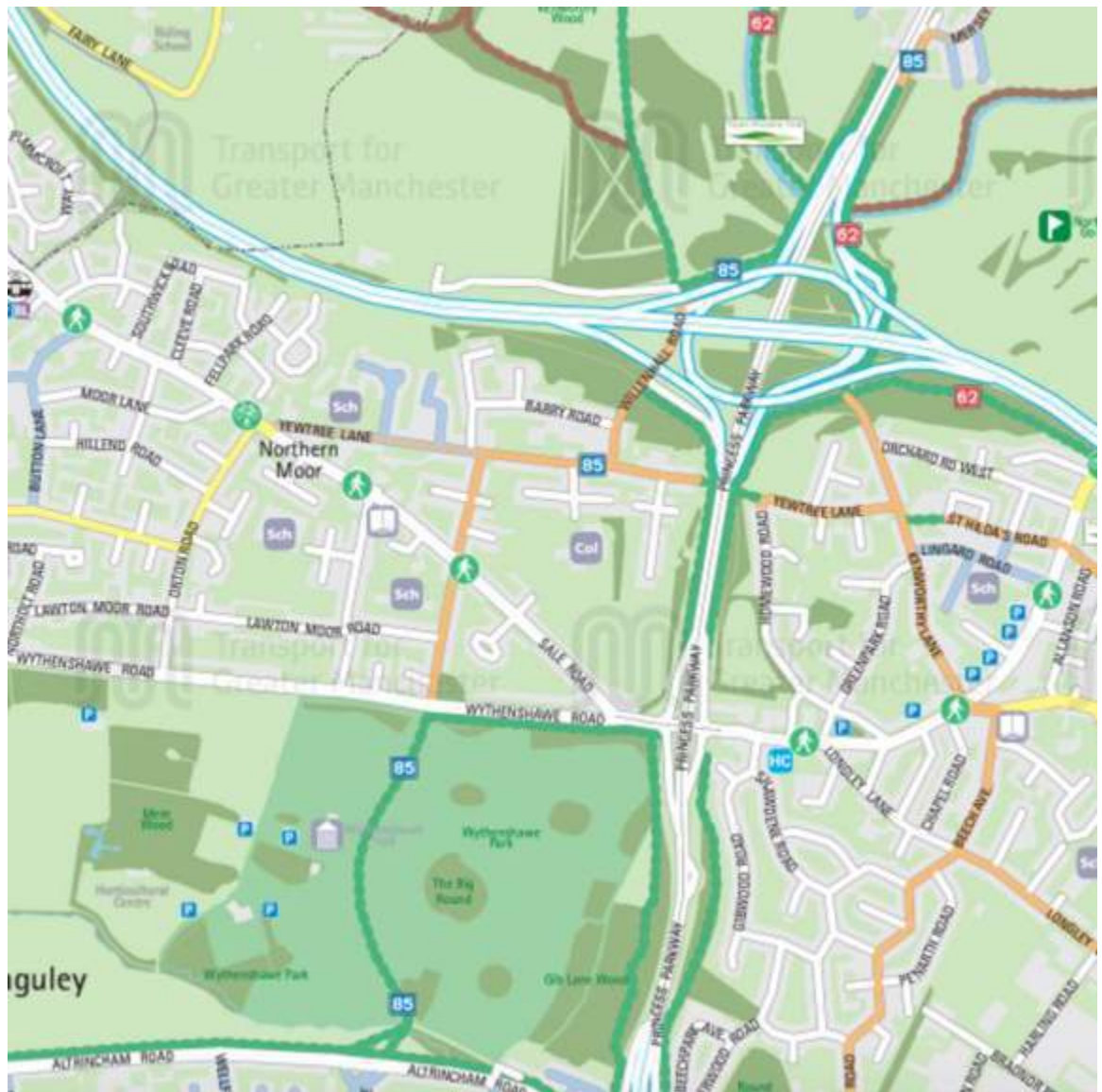


Figure 3.2: Existing Cycle Network

- 3.10 Figure 3.2 shows that the site relates well to both utility and leisure cycle routes. Access can be gained directly onto the Route 85 of the strategic network from the northern site access junction. Route 85 connects the site to areas to the north and south, and facilities are in place on the route to allow safe passage under the M60 and under Princess Parkway. To the west of the site a toucan crossing is provided.
- 3.11 The site benefits from a good level of cycle access and opportunities for cyclists of all abilities to safely access the site by this mode.

Public Transport

- 3.12 Figure 3.3 shows the public transport network serving the site.



Figure 3.3: Public Transport Network

3.13 The nearest bus stops are located outside the site on Sale Road. Table 3.1 shows a summary of the buses routing on Barlow Moor Road.

Service	Route	Frequency (one-way buses per hour)					
		AM	Daytime	PM	Evening	Saturday	Sunday
41	Sale – Northenden – West Didsbury – Manchester	5	6	6	1	6	3
108/109	Timperley – Manchester	2	2	2	1	2	1
143	Sale – West Didsbury – Fallowfield – Manchester	6	6	6	6	6	4
X5	Trafford Centre – Stretford – Sale – Northenden – Stockport	2	1	1	1	1	0
		15	15	15	9	15	8

Table 3.1: Existing Bus Services

- 3.14 Table 3.1 shows that the site is served by a number of buses that provide good coverage of local, regional and city centre destinations throughout the day. Services are also available in the evening.
- 3.15 The nearest Metrolink stop to the site is Northern Moor, located a 17 minute walk from the site. Access can also be gained to the Metrolink station using existing bus services on Sale Road. Cycle parking is also provided at the station.
- 3.16 A Greater Manchester Accessibility Level (GMAL) calculation has been undertaken for the site. A GMAL is calculated using the interactive tool managed and maintained by TfGM. This tool measures AM Peak accessibility by public transport of a point of interest and provides a score between 1 and 8, where 1 is a low level of accessibility and 8 is the highest level of accessibility.
- 3.17 Figure 3.4 shows the GMAL analysis for the site.

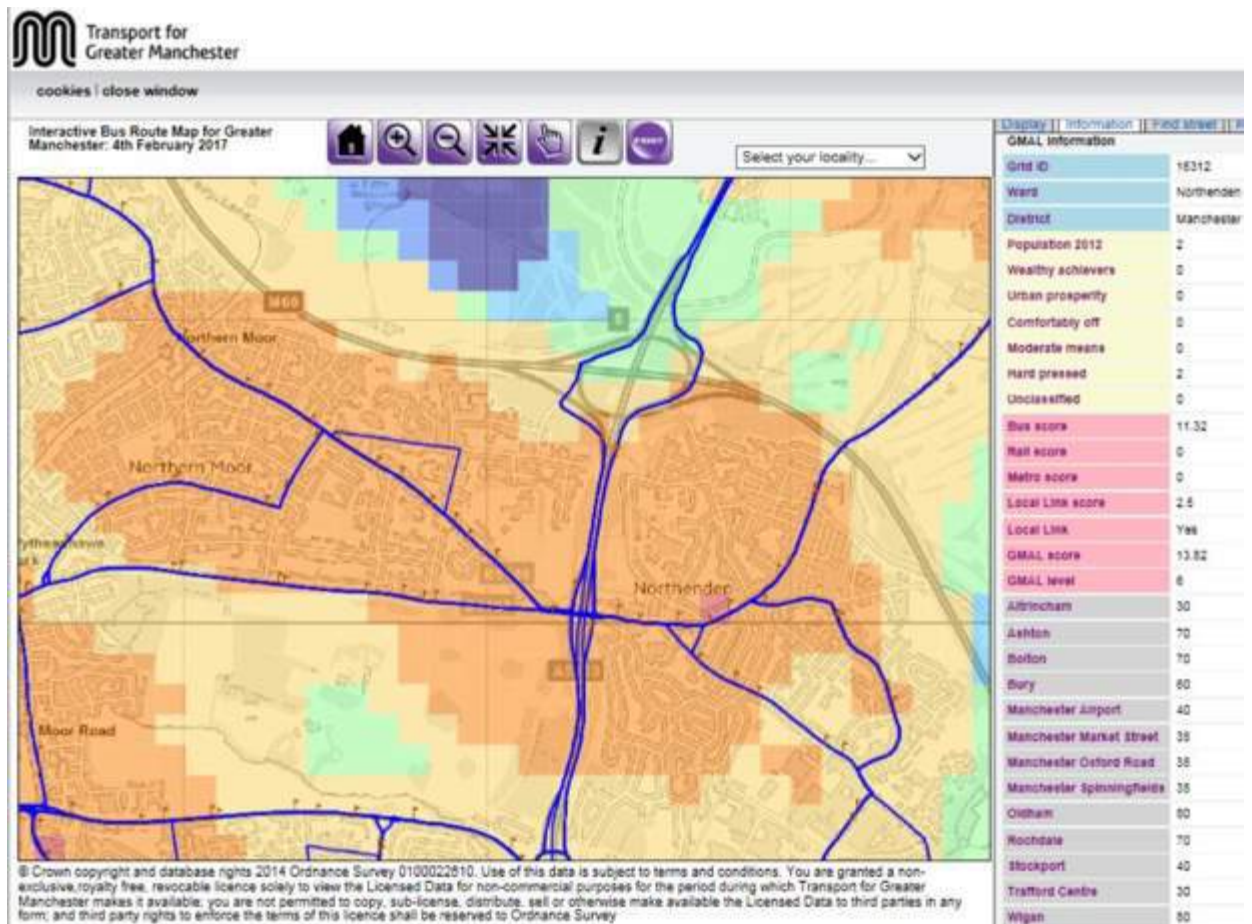


Figure 3.5: Greater Manchester Accessibility Level

- 3.18 The site has a GMAL of 6, indicating that the site benefits from a good level of accessibility.

4 POLICY CONTEXT

National Policy

- 4.1 The National Planning Policy Framework (NPPF), published in 2012, consolidates previous national planning policy guidance into one document. At the heart of the policy is the presumption in favour of sustainable development that supports economic growth and vibrant communities. NPPF supports development that balances economic, social and environmental gains, while considering local circumstances and opportunities. NPPF states that local authorities should:

'...actively manage patterns of growth to make the fullest possible use of public transport, walking and cycling, and focus significant development in locations which are or can be made sustainable.'

- 4.2 NPPF requires all developments that generate significant amounts of movement to be supported by a Transport Statement or Transport Assessment, and states at paragraph 32 that 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
 - safe and suitable access to the site can be achieved for all people
 - improvements are proposed to limit significant impacts of development

- 4.3 Paragraph 32 of NPPF also states that:

'Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.'

- 4.4 NPPF does not provide development scale thresholds for the assessment of transport impact or significance. Best practice has typically supported the use of DfT 'Guidance on Transport Assessment'. The DfT document was withdrawn in 2014 and replaced with the advice in National Planning Practice Guidance (NPPG). However, TfGM TA guidance still references the DfT guidance and it is still pertinent to the assessment of development impacts in Manchester. DfT guidance sets a threshold of impact significance of 30 vehicles per hour and/or 100 vehicles per day.
- 4.5 When considering appropriate levels of parking at a development, NPPF states that consideration should be given to the following criteria:
 - The accessibility of the development
 - The type, mix and use of the development
 - The availability of and opportunities for public transport trips
 - Local car ownership levels
 - An overall need to reduce the use of high-emission vehicles

Local Policy

- 4.6 'The Manchester Strategy: Our Manchester' states that the city is the best place to live, outside London, without having to rely on a car due to its broad base of jobs, good-quality housing, and good public transport systems. The strategy outlines a commitment to creating a low carbon and liveable city.
- 4.7 MCC's Core Strategy sets out transport policy against which development impacts are considered. Policy SP1 (Spatial Principles) sets out a requirement for future development where the potential for access by walking, cycling and public transport can be maximised, emissions can be minimised, and the need to travel to can be reduced. This is supported by Policy T1 and T2.
- 4.8 Policy T1 (Sustainable Transport) seeks to encourage modal shift from car travel by supporting developments that are in accessible locations, enable active and equitable travel, reduce congestion, and can assist in meeting air quality policy objectives.
- 4.9 Policy T2 (Accessible Areas and Opportunities) supports development that is located to ensure good accessibility to the regional centre, the airport and national/international connections. The policy also requires developments to be accessible by walking, cycling and public transport.
- 4.10 Policy T2 also outlines a requirement for developments to provide the appropriate level of parking that meets the realistic requirements of the users of the development. MCC's parking standards are outlined in appendix b of the Core Strategy. Paragraph 11.17 of this document states that:

'The Council recognises that parking is an essential facility for many developments, but will ensure that the level of parking complements its commitment to sustainable transport, through reducing emissions and congestion.'

- 4.11 There are no defined residential parking standards included in the Core Strategy. Notwithstanding this, the Core Strategy supports a reduction in parking levels when consideration is given to accessibility and characteristics of a particular site. This is further supported by the endorsed 'Manchester Residential Quality Guidance'.
- 4.12 The 'Manchester Residential Quality Guidance' states that Manchester is highly accessible and, after London, is the easiest city to get around by non-car modes of transport. The guidance recognises that approaches to parking will be different for each site and will be dependent on a number of factors. No standard is provided for houses. In both cases, the guidance supports parking levels that meet the operational needs of the proposal, do not encourage excess car use, and fit with the prevailing accessibility levels of a site.
- 4.13 The guidance also requires consideration be given to servicing requirements of new developments and that suitable provision is given for the temporary stopping of large vehicles.

This is underpinned by MCC's 'Waste Storage and Collection Guidance', which states that service and refuse vehicles are not permitted to reverse off major roads and must enter major roads in a forward gear.

- 4.14 Further assessment guidance is provided in Transport for Greater Manchester's 'Transport for Sustainable Communities: A Guide for Developers' (2014). The TfGM policy document supports developments that:

- Maximise accessibility
- Reduce the need to travel by car
- Make the best use of existing infrastructure
- Encourage active travel

- 4.15 TfGM's guidance also states that developments should be located in and have:

'...areas with good public transport links and most accessible locations... good pedestrian and cycle links to key local facilities... to provide low carbon access for short local journeys'

- 4.16 TfGM guidance also supports the introduction of restricted parking at new developments and identifies this as the most important method of influencing future travel behaviour. The TfGM document was produced post-NPPF and supports the underlying principles therein.

5 EMERGING SITE TRANSPORT STRATEGY

Scale & Accommodation Type

- 5.1 OPEN has advised that the gross developable area of the site is 7.29ha. The net developable area of the site is approximately 5.83ha (80%).
- 5.2 OPEN has advised that a density of between 30dph and 40dph is appropriate and that the site is suitable for a more conventional residential site that will appeal to national providers, with some provision for apartment dwellings.
- 5.3 For the purposes of this assessment it is assumed that the site will provide 250 private houses. This has been assumed to allow a robust estimate of the maximum traffic generating potential of the site.

Site Access Arrangements

- 5.4 The assessment considers the suitability of the existing vehicle access arrangements to serve the future development proposals. The existing layout of the main site access junction is shown on appendix c.
- 5.5 The main access to the currently forms a priority crossroads with Sale Road and Shevington Gardens. Right turn pockets are provided on Sale Road for movements into the minor roads, though these are not standard widths and merely formalise the manoeuvre, rather than fully accommodating the vehicles waiting in them.
- 5.6 MCC asked that a signalised junction arrangement be tested as the main access to the site. This was mainly to allow the removal of the uncontrolled crossroad arrangement and also to allow opportunities to improve pedestrian/cyclist crossing facilities. It was agreed with MCC that it was probably unlikely that this level of control would be required at this location and that a signalised arrangement could end up being an overdesigned and over-controlled solution, when considered against the site's traffic flows. Notwithstanding this a signalised junction improvement has been considered at this location and is attached as appendix d.
- 5.7 Details of the impact of the proposed redevelopment of the site on the existing and improved main access junction are provided in section 6.
- 5.8 A secondary access is provided to the north of the site providing a connection to properties in the north. MCC has advised that it would like to see this access retained as a minimum to provide a

sustainable and emergency access to the site. MCC was not opposed to the access being retained as existing to provide a secondary means of access to the site and to provide integration with the residential community to the north. It was considered that it wouldn't offer any rat-running benefits to future site residents as it only links to a limited area of residential property. It was also agreed that it would not significantly change from the existing arrangements the opportunity for existing residents to use the site as a cut through.

- 5.9 The assessments show that the secondary access is not required to relieve capacity at the main entrance. On this basis, it would be possible to restrict the access to pedestrians, cyclists and emergency vehicles, if this was desired. The access connects directly with Hollyhey Drive and via this routes meets Yewtree Lane. Both of these routes are residential character roads that provide a suitable environment for pedestrians and cyclists. No improvements are required to enable access by these modes to the redeveloped site.
- 5.10 Section 6 also considers the impact of the proposal at other junctions and links in the study area.

Parking Levels

- 5.11 MCC has no residential parking standards in the Core Strategy and each site is considered on its own merits. The parking provision for the site will need to consider operational requirements (including resident and visitor needs). To establish a suitable level of parking for the site a review has been made to local planning authorities with similar demographics and suburban house types to the site. This assessment is detailed in section 6.

Servicing & Refuse Collection

- 5.12 The site is currently serviced from within curtilage and it is proposed that this arrangement is retained to serve the future development. Swept path analysis has been undertaken of the site access and is attached at appendix c.

Sustainable Access Strategy & Travel Plan Measures

- 5.13 The proposal is located in a sustainable location and the redevelopment of the site offers the opportunities to integrate well with the surrounding community.
- 5.14 To ensure that residents can meet their daily travel needs without being dependent on their cars the following measures should be considered for inclusion in the proposal:
- Space to store bikes within housing curtilages
 - Uncovered cycle stands within the landscape strategy for use by visitors
 - A permeable site that provides pedestrian and cycle access at both vehicle access points
 - Roadways designed to encourage low vehicle speeds, prioritise non-car movement and deter cut-through movements
 - Retain existing access to the east of the site to link to cycle routes and bus stops on eastern boundary of the site
- 5.15 The scale of the proposal will trigger a requirement for the preparation of a Travel Plan. The following measures should be considered for adoption as part of the Travel Plan.
- Appointment of a site Travel Plan Co-ordinator
 - Production of a travel welcome pack for each household that contains route mapping, links to journey planning software and service details
 - Promotion of local and national sustainable travel events
 - Promotion of CarShareGM
 - Promotion of WalkBUDI
 - Promotion of TfGM free adult cycle training
 - Commitment to regularly survey the plan and update the measures

6 IMPACT ASSESSMENT

2022 Base Traffic Forecast

- 6.1 The existing campus traffic flows have been removed from the surveyed traffic flows to create the background traffic forecast.
- 6.2 The background traffic flows have been growthed to 2022 conditions using the following TEMPRO adjusted NTM growth factors. Growth factors for Manchester Main have been used as these represent the highest growth levels in the Manchester authority.
- AM Peak: 1.1151
 - PM Peak: 1.1149
 - Daily: 1.1150
- 6.3 The growth factors allow consideration in the assessments of both background traffic growth and growth associated with future housing and employment development in local areas.
- 6.4 To form the 2022 base forecast situation the campus flows have been reapplied to the 2022 background traffic flows. The 2022 baseline forecast flows are attached as appendix e.

Development Traffic Forecast

- 6.5 The TRICS database has been used to forecast traffic associated with the introduction of residential uses on site. In line with good practice, the locational qualities of the site are acknowledged in the assessment. To allow a robust assessment private accommodation has been used and the trip rates have not been adjusted to acknowledge the sustainable location of the site or the measures that will be introduced as part of the development to reduce car use.
- 6.6 The TRICS output is attached as appendix f, with a summary provided in table 6.1.

	Vehicle Trip Rate (per unit)			Traffic Flows (in vehs)		
	IN	OUT	TOTAL	IN	OUT	TOTAL
AM	0.151	0.359	0.51	38	90	128
PM	0.32	0.194	0.514	80	49	129
Daily	2.158	2.274	4.432	540	569	1108

Table 6.1: Private Housing Traffic Flows

- 6.7 The TRICS data shows that the forecast provides a car mode share of 56%. This fits well with the local area Census car mode share of 57%.
- 6.8 The development traffic has been distributed onto the highway network based on surveyed patterns of movement. The northern access junction is retained in the proposal to allow permeability of the site by non-car modes and provide an emergency route. There are only residential areas to the north of the site and it is considered that this junction will not be used to any large extent by future residents of the site. For robustness, all the development traffic is assumed to access/egress the site from the main access junction. This is reflected in the distribution.
- 6.9 The distributed development traffic flows are shown in appendix e.

2022 Base & Development Traffic Forecast

- 6.10 The development traffic flows have then been added to the background flows to form the 2022 base and development assessment flows. The flows are shown in appendix e.

Net Impact

- 6.11 Table 6.2 compares the existing site traffic flows with the forecast development traffic flows.

	Existing Traffic Flows			Development Traffic Flows			Net Traffic Impact		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
AM	74	37	111	38	90	128	-36	53	17
PM	24	82	106	80	49	129	56	-34	23
Daily	500	506	1006	540	569	1108	40	63	102

Table 6.2: Net Traffic Impact

- 6.12 The assessment shows that the proposal will result in an increase in traffic flows when compared to the existing activity on the site. However, the level of increase is insignificant when tested against DfT thresholds.

Site Access Operation – Existing Layout

- 6.13 Notwithstanding the fact that the proposal will result in an insignificant change in traffic flows when compared to existing activity on site, an assessment has been undertaken of the operation of the site access for both the base and base with development scenarios. The PICADY output is attached as appendix g, with a summary provided in table 6.3.

Movement	2022 Base				2022 with Development			
	AM Peak		PM Peak		AM Peak		PM Peak	
	RFC	Queue	RFC	Queue	RFC	Queue	RFC	Queue
From Moss Hey Drive	0.223	0	0.194	0	0.277	0	0.145	0
Right turn to Moss Hey Dr	0.038	0	0.032	0	0.049	0	0.093	0
From Shevington Gardens	0.094	0	0.053	0	0.096	0	0.053	0
Right turn to Shev'n Gdns	0.026	0	0.007	0	0.026	0	0.007	0

Table 6.3: Site Access Junction Operation

- 6.14 Table 6.3 shows that the existing junction is expected to operate well within capacity in the future year scenario and this will continue to be the case in the proposed development scenario. The demand levels on the side road movements are relatively low, with very little traffic moving to and from Shevington Gardens and the interaction levels between side road movements is therefore very low.

Site Access Operation – Signalised Layout Option

- 6.15 A signalised arrangement has been developed for the main site access on to Sale Road. This has been tested using LINSIG. The output is attached as appendix h with a summary provided in table 6.4.

Approach	2022 with Development			
	AM Peak		PM Peak	
	DoS	Queue	DoS	Queue
Sale Road (E)	61.9%	9	85.8%	17
Shevington Gardens	15.1%	1	8.1%	0
Sale Road (W)	80.1%	14	65.2%	10
Moss Hey Drive	47.0%	2	25.3%	1

Table 6.4: Site Access Junction Operation - Signals Option

- 6.16 Table 6.4 shows that a traffic signal junction would provide sufficient capacity to accommodate the forecast levels of traffic demand. However, this would inevitably introduce delays to the majority movements along Sale Road as a result of vehicles having to wait at a red signal at regular periods within the signal cycle. In the context of the analysis of the operation of the existing junction, which demonstrated ample capacity to accommodate the predicted demand levels, this is seen as an unnecessary encumbrance to the movement of traffic along the route.

Sale Road/Wythenshawe Road Operation

- 6.17 The level of change in traffic flows at this location is below DfT significance thresholds and there is a clear argument for not including the junction in a formal assessment of the impact of the proposal. Notwithstanding this, and to provide the project team with an indication of impact should it be required in the future and assessment has been undertaken.
- 6.18 An assessment has been undertaken of the operation of the site access for both the base and base with development scenarios at the Wythenshawe junction, despite the fact the proposal will not significantly change traffic characteristics at this location. The LINSIG output is attached as appendix i, with a summary provided in table 6.5.

Approach	2022 Base				2022 with Development			
	AM Peak		PM Peak		AM Peak		PM Peak	
	DoS	Queue	DoS	Queue	DoS	Queue	DoS	Queue
From Sale Road (E)	80.5%	18	93.4%	34	74.3%	15	95.3%	38
From Wythenshawe Road	84.8%	11	90.9%	12	87.0%	12	94.0%	13
From Sale Road (W)	85.2%	21	61.6%	13	86.2%	22	57.2%	12

Table 6.5: Sale Road/Wythenshawe Road Operation

- 6.19 Table 6.5 shows that the junction is forecast to operate within capacity in the future year base scenario, albeit at around 90% of capacity. The results indicate a level of queuing on the Sale Road approach from the east that will extend to the Princess Parkway slip road junctions. This is shown to be the case whether or not the site is redeveloped, but changes in pattern of flow arising from the proposed change in use has a slight adverse effect on the key movement through the junction in the PM peak hour.
- 6.20 It is anticipated that measures will be required to manage the interaction of queuing traffic between the junctions whether or not the redevelopment of the site takes place, likely to include measures to co-ordinate signal controllers and the provision of yellow box markings. However, should arguments about the net change in traffic flows be accepted at a later stage then no mitigation will be required as part of the proposal. This argument could be strengthened if the College could provide evidence (in terms of historic maximum staff and student numbers) that the campus is currently operating under actual capacity.

Princess Parkway Net Impact

- 6.21 Appendix d shows that the AM, PM and daily that the proposal will generate less traffic onto the Princess Parkway than currently accesses the campus using this route.

Parking Requirements

- 6.22 MCC does not have adopted parking standards for residential developments. MCC has advised that a sensible approach to parking should be taken for the site.
- 6.23 In the absence of local guidance to this end, reference has been made to adopted standards in similar suburban locations (Trafford MBC and Knowsley MBC). Table 6.6 shows the maximum parking standards adopted in these areas.

Bedrooms	Parking Standard (per unit)
1	1
2-3	2
4+	3

Table 6.6: Other Local Authority Parking Standards

- 6.24 The London Plan guidance also sets maximum standards by bedroom number and accessibility score (measured using WebCAT/PTAL). This is based on research that shows that as accessibility increases car ownership levels decrease, particularly in terms of owning multiple cars. The London Plan maximum parking standards are shown in table 6.7.

Bedrooms	Parking Standard (per unit)
1	<1
2-3	1.5
4+	2

Table 6.7: London Plan Parking Standards

- 6.25 The accessibility of the site lends itself to a reduced level of parking. However, higher parking levels (as shown in table 6.6) could also be defended based on the site providing conventional family housing.

Road Safety Impact

- 6.26 The assessment shows that the redevelopment of the site will reduce traffic flows currently associated with education activity at the campus. This will result in general benefits to the surrounding network, including at the site access junction.

7 CONCLUSIONS

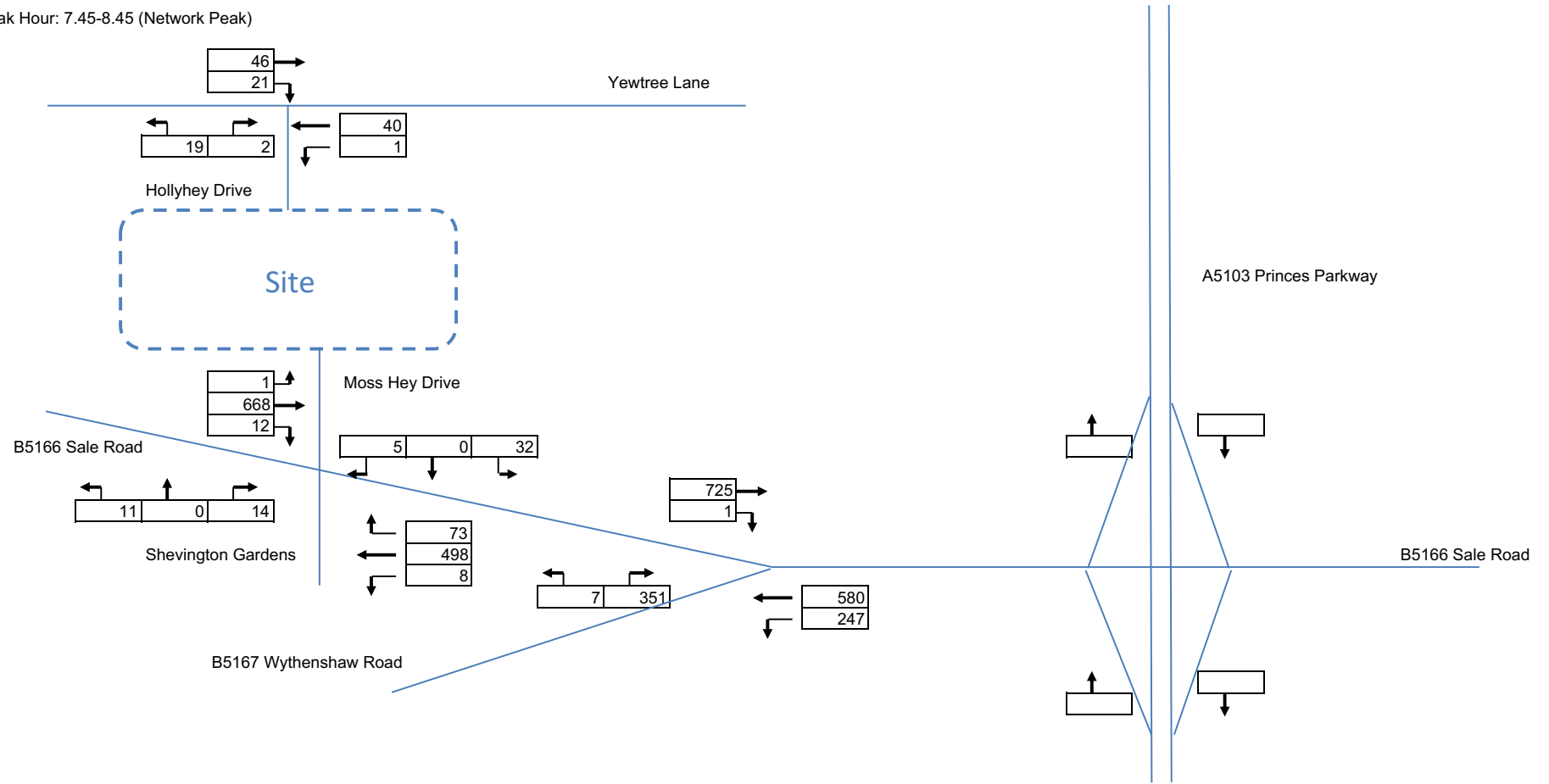
- 7.1 The site benefits from a good level of accessibility by a range of modes of travel; local centre facilities, local schools and Wythenshawe Park are accessible on foot, the site is well placed for access to the established network of cycle routes and bus service provision is good. The site has a GMAL assessment level of 6, indicating a good level of accessibility.
- 7.2 The site is very permeable for journeys on foot and by cycle. It is recommended that all of the existing pedestrian access points are retained to serve the development. Dwellings should be designed to allow bikes to be stored within curtilage and cycle parking should be provided for visitors to the site.
- 7.3 Two points of vehicle access are available to the site at present, from Sale Road via Moss Hey Drive and from Yew Tree Lane via Hollyhey Drive. Access to a proposed redevelopment is expected to focus on the Sale Road access which affords better geometry and more direct access to the wider road network. It is recommended that on-site roadways are designed to promote low vehicle speeds, prioritise non-car movements and deter cut-through movements.
- 7.4 The operation of the existing junction on Sale Road has been tested for a future year scenario with and without site redevelopment. The assessments demonstrate that the existing junction will operate well within capacity. An option to provide traffic signals at the junction has been developed and tested at the request of MCC Highways. This shows that signals could be introduced at the junction but would incur unnecessary delays to the major traffic movements along Sale Road. The preferred option will be to retain the existing junction form and perhaps refresh the road marking as part of the proposal. Crossing facilities are already provided to the east and west of the site, and these are considered to provide suitable provision to serve the redeveloped site.
- 7.5 The junction of Sale Road with Wythenshawe Road to the south-east of the site is predicted to be approaching capacity in the future year assessments. While the junction will continue to be able to accommodate the future levels of traffic demand, the assessments indicate potential for queuing traffic at the junction to interfere with the operation of the adjacent slip road junctions at Princess Parkway. This is the case whether or not the site is redeveloped but changes in the pattern of flow arising from the proposed change from education to residential use have a slight adverse effect on the key movement through the junction during the PM peak hour.
- 7.6 It is anticipated that measures will be required to manage the interaction of queuing traffic between the junctions whether or not redevelopment of the site takes place, likely to include measures to co-ordinate the signal controllers and provision of yellow box markings. However there is a clear argument that technically the future operation of this junction should not be included in any formal assessment of redevelopment proposals for the site as the actual change in flows is at a level that would be considered insignificant when tested against DfT thresholds. Should this argument be accepted then no mitigation would be required in relation to redevelopment proposals. This argument could be strengthened further if evidence is provided by

the College with regard the historic operation of the Campus having greater student and staff numbers than currently on site at present.

Appendix A

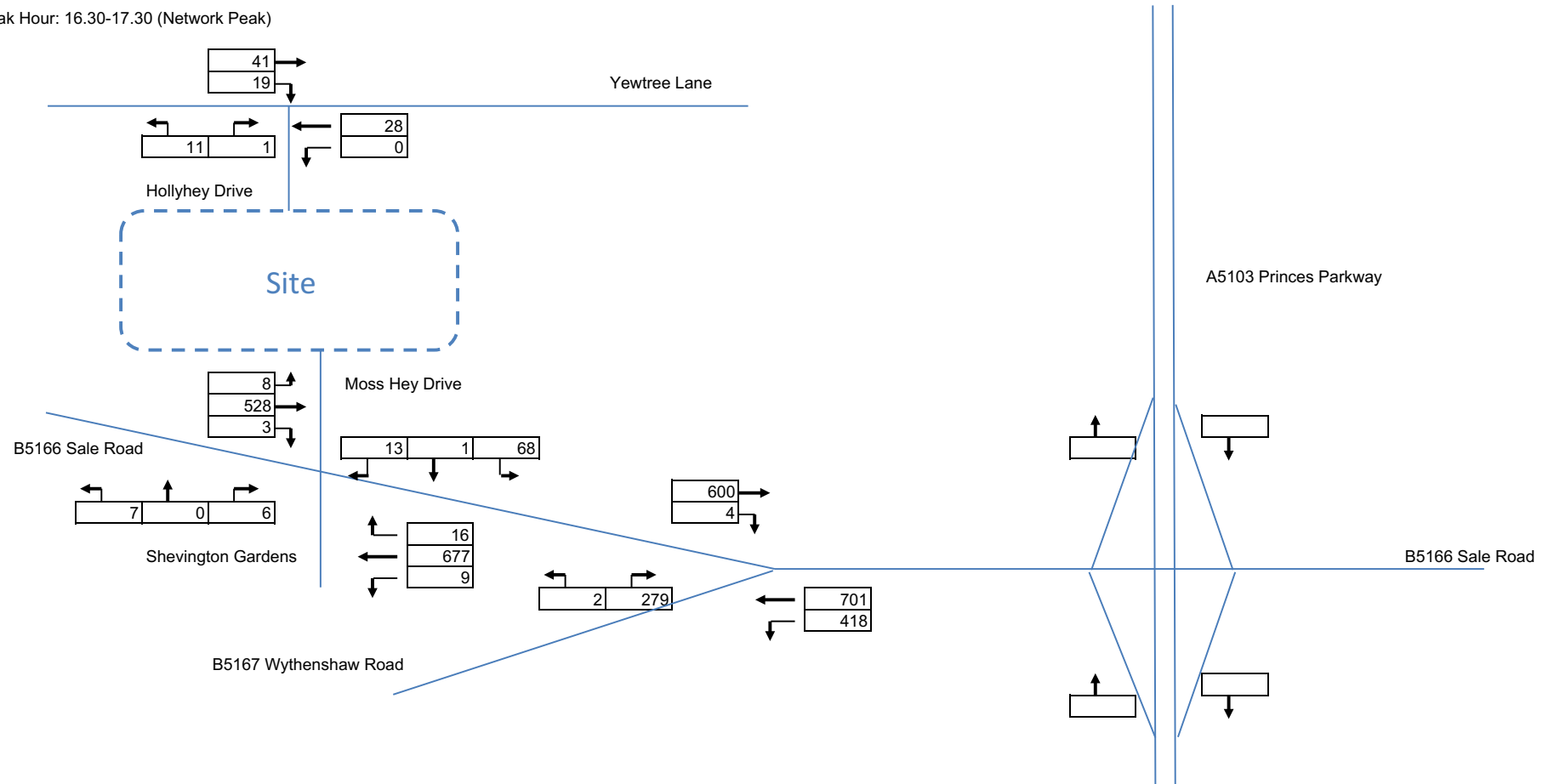
Northenden Campus: 2022 Base & Development Flows (pcu)

AM Peak Hour: 7.45-8.45 (Network Peak)



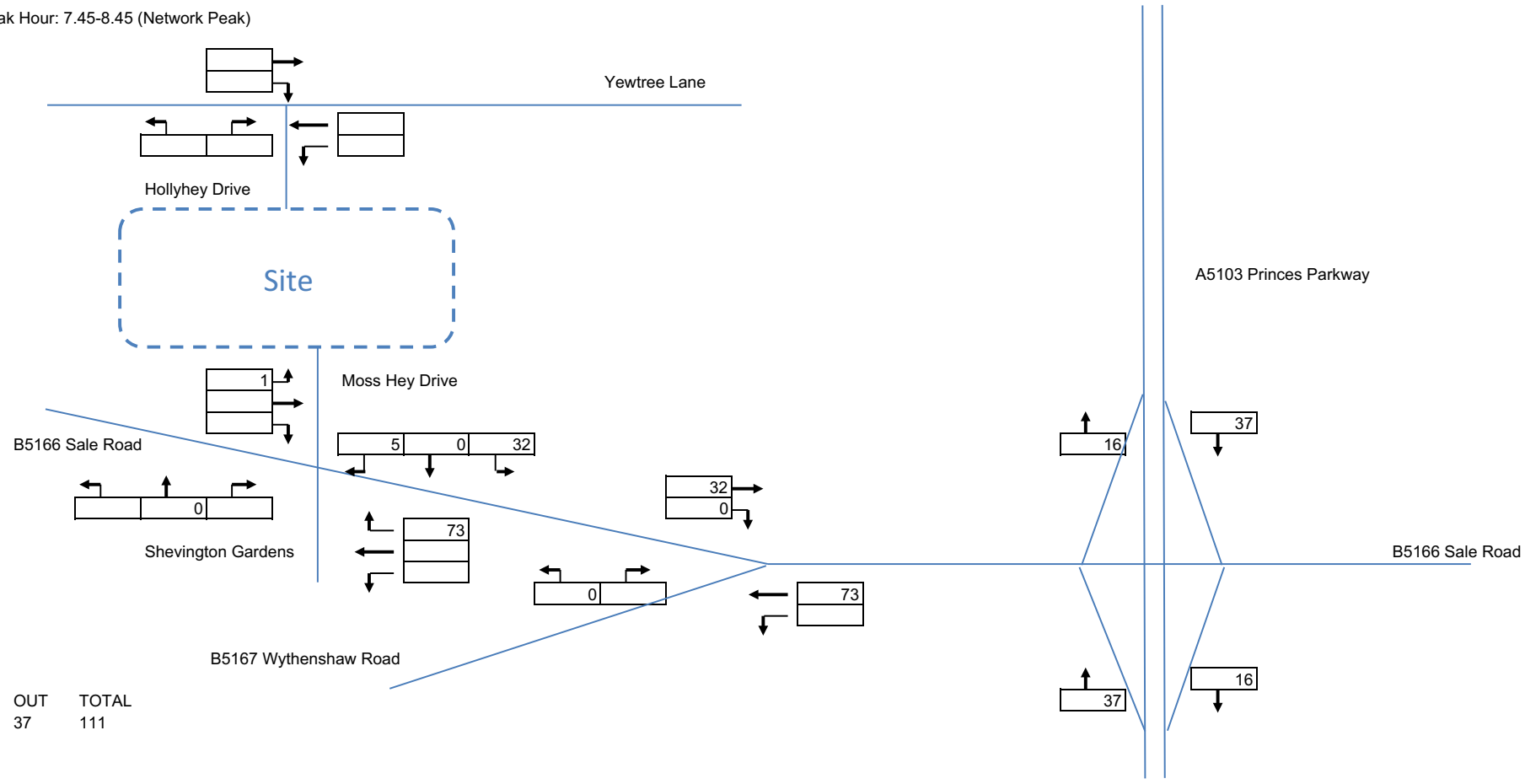
Northenden Campus: 2022 Base & Development Flows (pcu)

PM Peak Hour: 16.30-17.30 (Network Peak)



Northenden Campus: Existing Campus Flows (pcu)

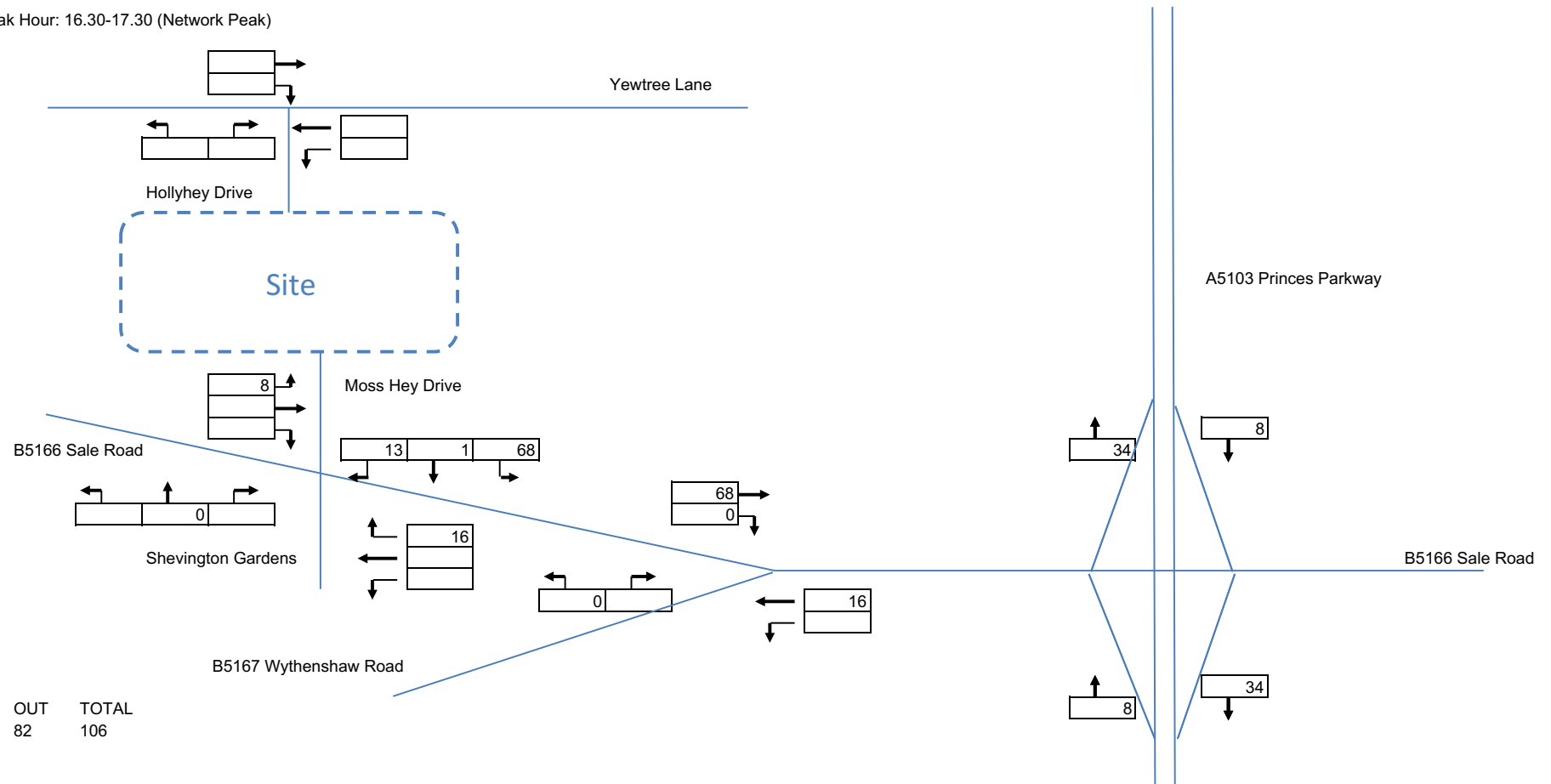
AM Peak Hour: 7.45-8.45 (Network Peak)



IN	OUT	TOTAL
74	37	111

Northenden Campus: 2022 Base & Development Flows (pcu)

PM Peak Hour: 16.30-17.30 (Network Peak)



IN	OUT	TOTAL
24	82	106

Appendix B

Calculation Reference: AUDIT-443201-170226-0207

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 04 - EDUCATION
Category : C - COLLEGE/UNIVERSITY

VEHICLES

Selected regions and areas:

02 SOUTH EAST	
ES EAST SUSSEX	2 days
EX ESSEX	1 days
03 SOUTH WEST	
GS GLOUCESTERSHIRE	2 days
06 WEST MIDLANDS	
WO WORCESTERSHIRE	1 days
08 NORTH WEST	
CH CHESHIRE	1 days
09 NORTH	
TW TYNE & WEAR	1 days
10 WALES	
SW SWANSEA	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: Gross floor area
Actual Range: 2099 to 80000 (units: sqm)
Range Selected by User: 2099 to 162000 (units: sqm)

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/08 to 22/10/15

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	3 days
Wednesday	2 days
Thursday	3 days

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

Selected survey types:

Manual count	9 days
Directional ATC Count	0 days

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

Selected Locations:

Suburban Area (PPS6 Out of Centre)	7
Neighbourhood Centre (PPS6 Local Centre)	2

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	6
Built-Up Zone	1
Village	1
No Sub Category	1

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:

C2	1 days
D1	8 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:

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

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

Population within 5 miles:

25,001 to 50,000	1 days
75,001 to 100,000	1 days
100,001 to 125,000	3 days
125,001 to 250,000	4 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	6 days

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

Travel Plan:

Yes	2 days
No	7 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	9 days
-----------------	--------

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

LIST OF SITES relevant to selection parameters

1	CH-04-C-01	LAW COLLEGE	CHESHIRE
	PEPPER STREET		
	CHRISTLETON		
	CHESTER		
	Neighbourhood Centre (PPS6 Local Centre)		
	Village		
	Total Gross floor area:	4500 sqm	
	Survey date: WEDNESDAY	15/10/08	Survey Type: MANUAL
2	ES-04-C-05	COLLEGE	EAST SUSSEX
	PENLAND ROAD		
	BEXHILL ON SEA		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Gross floor area:	10125 sqm	
	Survey date: THURSDAY	03/11/11	Survey Type: MANUAL
3	ES-04-C-07	COLLEGE	EAST SUSSEX
	PARKER ROAD		
	ORE		
	HASTINGS		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Gross floor area:	8402 sqm	
	Survey date: WEDNESDAY	30/05/12	Survey Type: MANUAL
4	EX-04-C-02	COLLEGE	ESSEX
	PRINCES ROAD		
	CHELMSFORD		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Gross floor area:	11000 sqm	
	Survey date: TUESDAY	15/10/13	Survey Type: MANUAL
5	GS-04-C-01	COLLEGE	GLOUCESTERSHIRE
	PRINCESS ELIZABETH WAY		
	CHELTENHAM		
	Neighbourhood Centre (PPS6 Local Centre)		
	No Sub Category		
	Total Gross floor area:	12500 sqm	
	Survey date: TUESDAY	27/04/10	Survey Type: MANUAL
6	GS-04-C-02	COLLEGE	GLOUCESTERSHIRE
	HORTON ROAD		
	GLOUCESTER		
	Suburban Area (PPS6 Out of Centre)		
	Built-Up Zone		
	Total Gross floor area:	13204 sqm	
	Survey date: THURSDAY	28/11/13	Survey Type: MANUAL
7	SW-04-C-02	COLLEGE	SWANSEA
	WALTER ROAD		
	SWANSEA		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Gross floor area:	3900 sqm	
	Survey date: MONDAY	21/10/13	Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

8	TW-04-C-01	COLLEGE	TYNE & WEAR
	HAWKEY'S LANE		
	CHIRTON		
	NORTH SHIELDS		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Gross floor area:	10505 sqm	
	Survey date: THURSDAY	04/11/10	Survey Type: MANUAL
9	WO-04-C-01	UNIVERSITY	WORCESTERSHIRE
	HENWICK GROVE		
	WORCESTER		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Gross floor area:	80000 sqm	
	Survey date: TUESDAY	06/10/09	Survey Type: MANUAL

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

TRIP RATE for Land Use 04 - EDUCATION/C - COLLEGE/UNIVERSITY

VEHICLES**Calculation factor: 100 sqm****BOLD print indicates peak (busiest) period**

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	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	9	15755	0.199	9	15755	0.049	9	15755	0.248
08:00 - 09:00	9	15755	0.878	9	15755	0.190	9	15755	1.068
09:00 - 10:00	9	15755	0.590	9	15755	0.179	9	15755	0.769
10:00 - 11:00	9	15755	0.221	9	15755	0.165	9	15755	0.386
11:00 - 12:00	9	15755	0.240	9	15755	0.254	9	15755	0.494
12:00 - 13:00	9	15755	0.257	9	15755	0.310	9	15755	0.567
13:00 - 14:00	9	15755	0.299	9	15755	0.273	9	15755	0.572
14:00 - 15:00	9	15755	0.210	9	15755	0.310	9	15755	0.520
15:00 - 16:00	9	15755	0.199	9	15755	0.386	9	15755	0.585
16:00 - 17:00	9	15755	0.231	9	15755	0.614	9	15755	0.845
17:00 - 18:00	9	15755	0.239	9	15755	0.468	9	15755	0.707
18:00 - 19:00	8	16829	0.298	8	16829	0.267	8	16829	0.565
19:00 - 20:00	7	17786	0.097	7	17786	0.168	7	17786	0.265
20:00 - 21:00	5	23581	0.073	5	23581	0.250	5	23581	0.323
21:00 - 22:00	5	23581	0.014	5	23581	0.213	5	23581	0.227
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			4.045			4.096			8.141

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

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

Parameter summary

Trip rate parameter range selected:	2099 - 80000 (units: sqm)
Survey date range:	01/01/08 - 22/10/15
Number of weekdays (Monday-Friday):	9
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	2
Surveys manually removed from selection:	0

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

TRIP RATE for Land Use 04 - EDUCATION/C - COLLEGE/UNIVERSITY

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	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	9	15755	0.004	9	15755	0.004	9	15755	0.008
08:00 - 09:00	9	15755	0.003	9	15755	0.002	9	15755	0.005
09:00 - 10:00	9	15755	0.003	9	15755	0.004	9	15755	0.007
10:00 - 11:00	9	15755	0.004	9	15755	0.002	9	15755	0.006
11:00 - 12:00	9	15755	0.006	9	15755	0.007	9	15755	0.013
12:00 - 13:00	9	15755	0.006	9	15755	0.001	9	15755	0.007
13:00 - 14:00	9	15755	0.003	9	15755	0.004	9	15755	0.007
14:00 - 15:00	9	15755	0.002	9	15755	0.002	9	15755	0.004
15:00 - 16:00	9	15755	0.002	9	15755	0.003	9	15755	0.005
16:00 - 17:00	9	15755	0.001	9	15755	0.003	9	15755	0.004
17:00 - 18:00	9	15755	0.000	9	15755	0.001	9	15755	0.001
18:00 - 19:00	8	16829	0.001	8	16829	0.001	8	16829	0.002
19:00 - 20:00	7	17786	0.000	7	17786	0.001	7	17786	0.001
20:00 - 21:00	5	23581	0.000	5	23581	0.000	5	23581	0.000
21:00 - 22:00	5	23581	0.000	5	23581	0.000	5	23581	0.000
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.035			0.035			0.070

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

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

Parameter summary

Trip rate parameter range selected: 2099 - 80000 (units: sqm)
 Survey date range: 01/01/08 - 22/10/15
 Number of weekdays (Monday-Friday): 9
 Number of Saturdays: 0
 Number of Sundays: 0
 Surveys automatically removed from selection: 2
 Surveys manually removed from selection: 0

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

Appendix C



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED

NOTES

Revision Details	By	Date	Suffix
	Check		

Drawing Number

SK221701-NC-001

Northenden Campus

Drawing Title

Existing Access Junction
Arrangement
Sale Road

Scale at A3

1:500

Drawn	Approved
JAT	LGS
Check	Date
LGS	12.04.17

SK

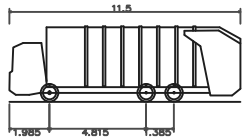
SK Transport Planning Ltd
Albion Wharf | Manchester | M1 5LN
www.sktransport.co.uk
0161 234 6509



THIS DRAWING MAY BE USED ONLY FOR
THE PURPOSE INTENDED AND ONLY
WRITTEN DIMENSIONS SHALL BE USED

NOTES

Vehicle Profile



MCC RCV	11.500m
Overall Length	11.500m
Overall Width	2.550m
Overall Body Height	3.750m
Min Body Ground Clearance	0.312m
Track Width	2.550m
Lock to Lock Time	4.00 sec
Wall to Wall Turning Radius	9.700m

Revision Details	By	Date	Suffix
	Check		

Drawing Number
SK221701-NC-003

Northenden Campus

Drawing Title
Existing Access Junction Swept Path Analysis Refuse Collection Vehicle

Scale at A3
1:500

Drawn	Approved
JAT	LGS

Check	Date
LGS	13.04.17

Appendix D



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED

NOTES

Revision Details	By	Date	Suffix
	Check		

Drawing Number

SK221701-NC-002

Northenden Campus

Drawing Title

Possible Traffic Signal Improvement Scheme
Sale Road / Moss Hey Lane

Scale at A3

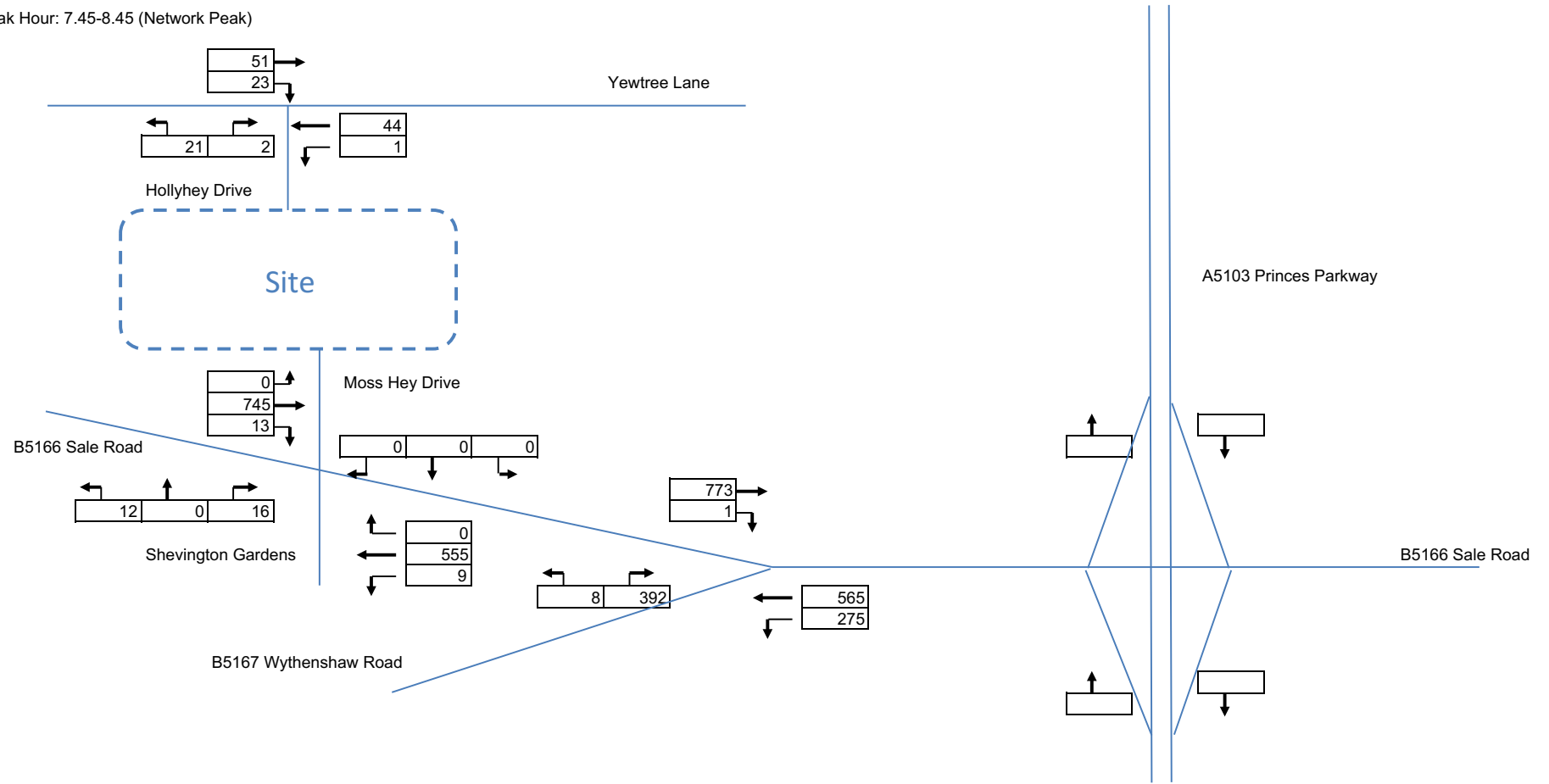
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Drawn	Approved
JAT	LGS
Check	Date
LGS	13.04.17

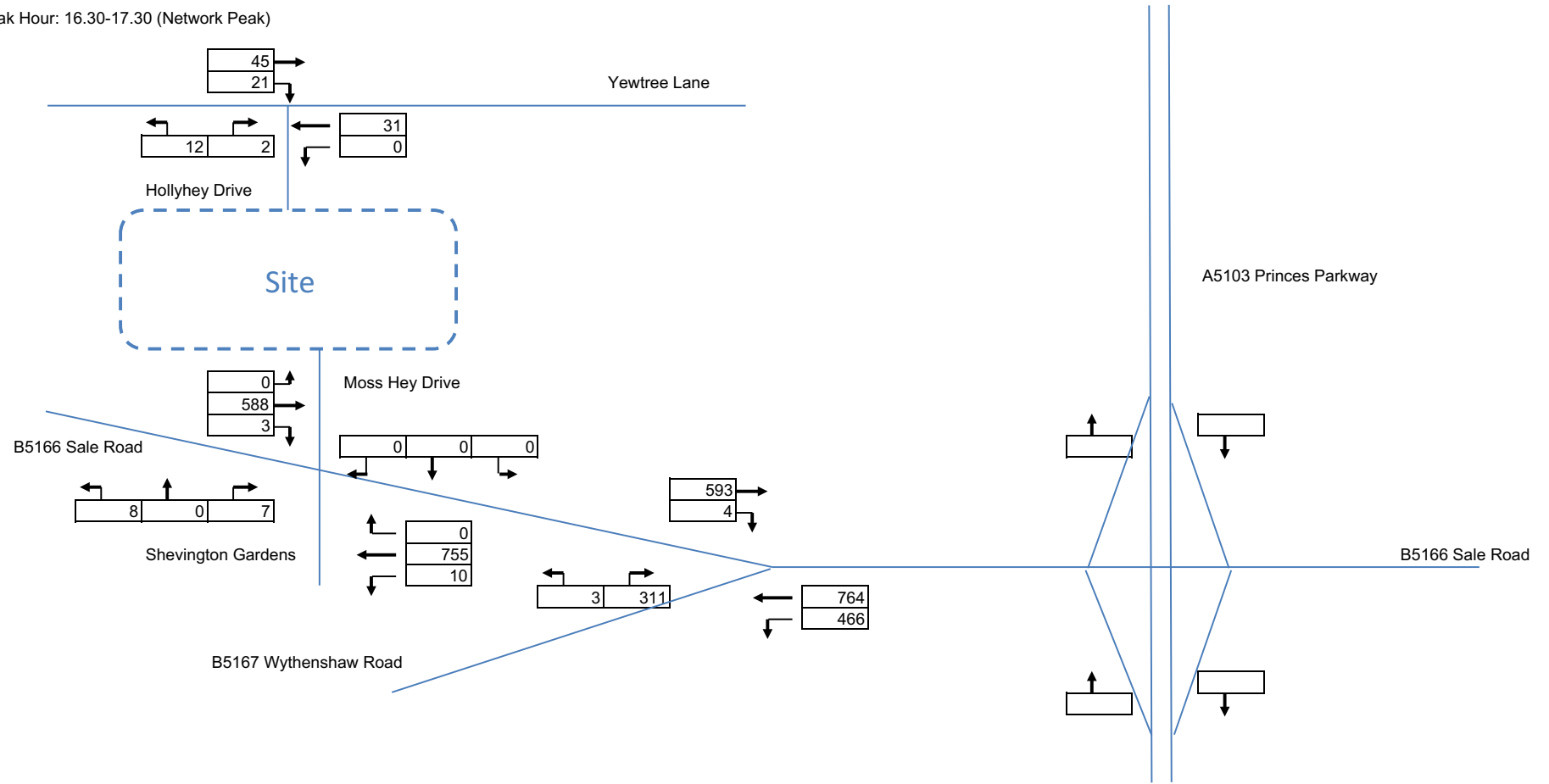
SK Transport Planning Ltd
Albion Wharf | Manchester | M1 5LN
www.sktransport.co.uk
0161 234 6509

Appendix E

AM Peak Hour: 7.45-8.45 (Network Peak)

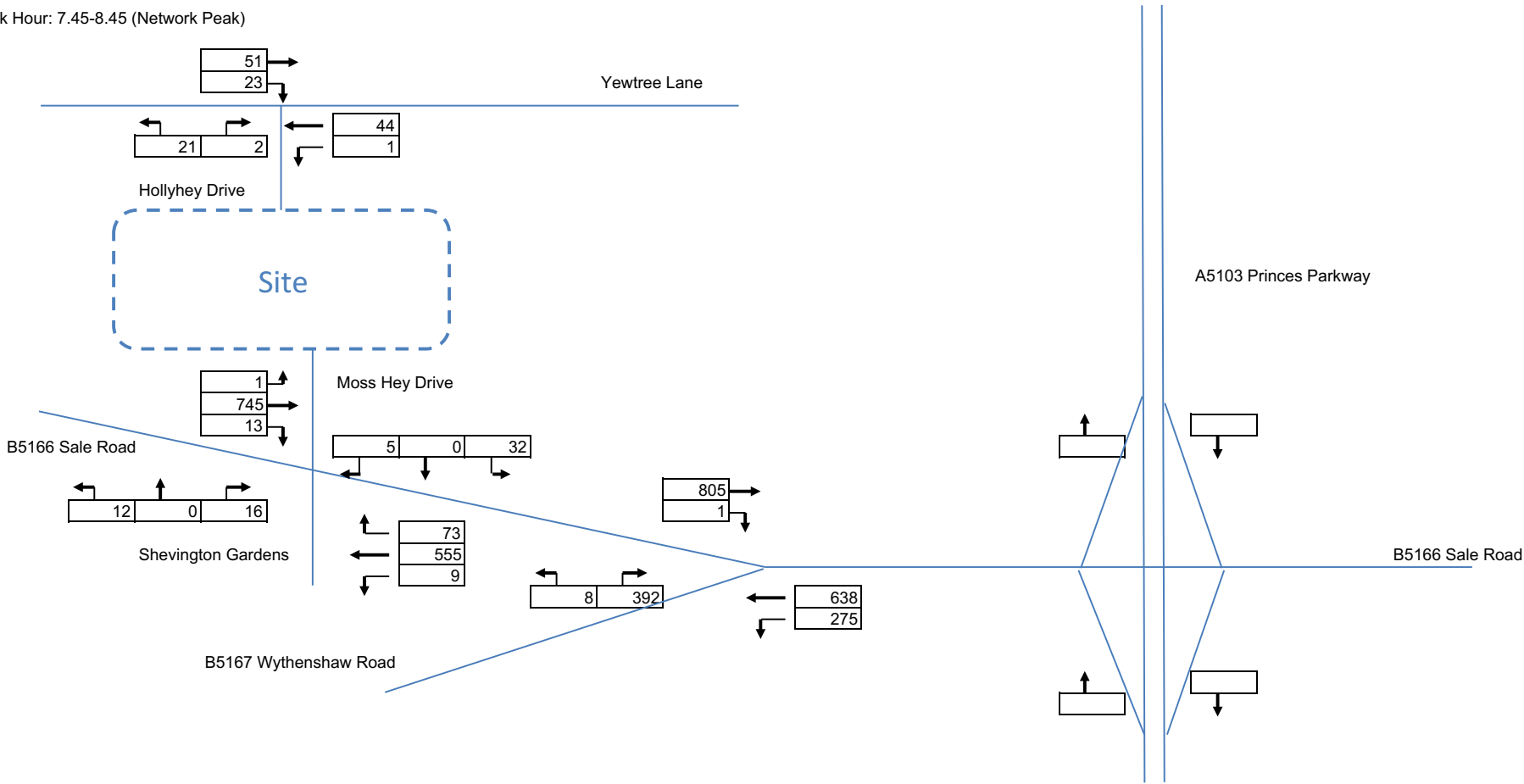


PM Peak Hour: 16.30-17.30 (Network Peak)



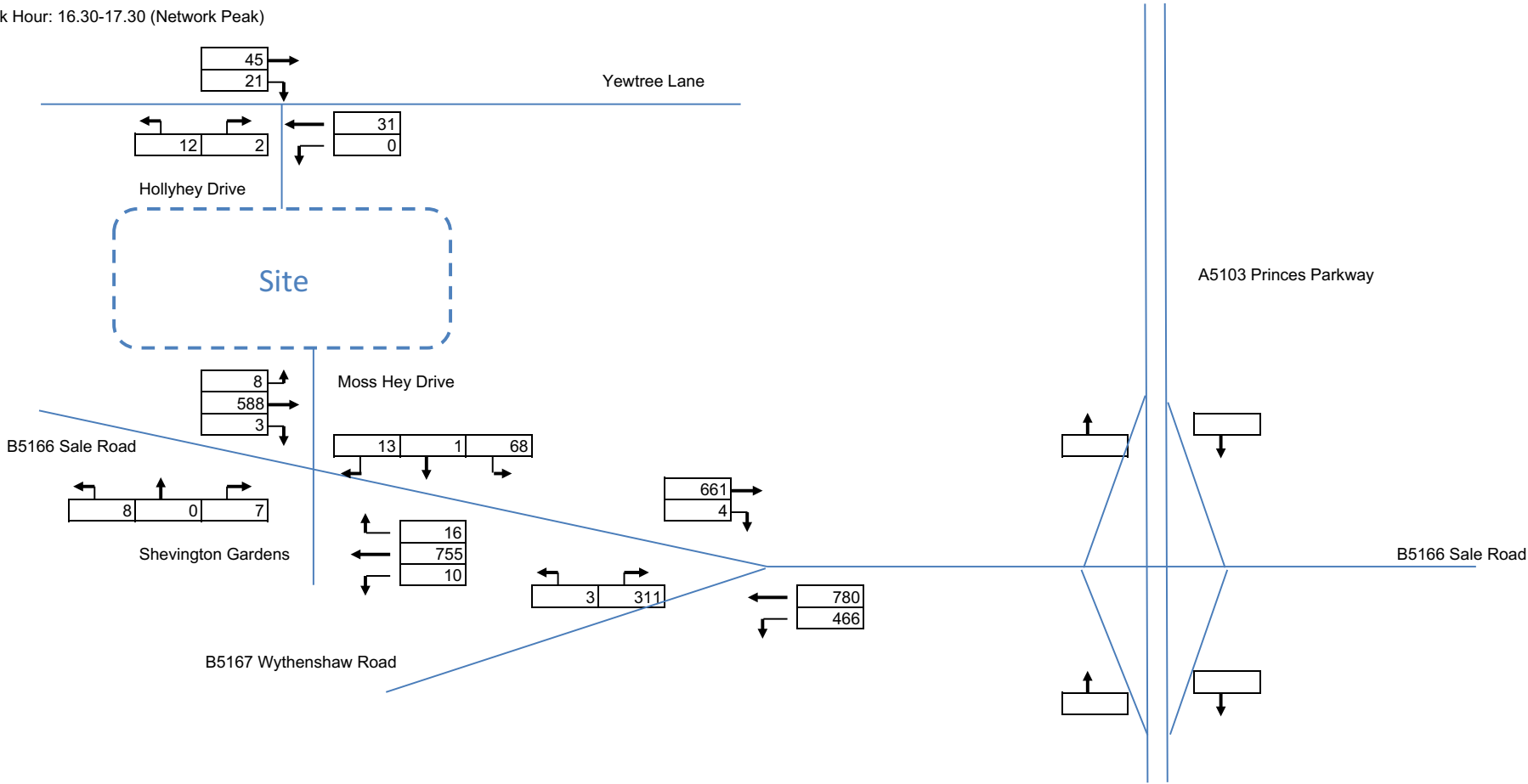
Northenden Campus: 2022 Base Flows (pcu)

AM Peak Hour: 7.45-8.45 (Network Peak)



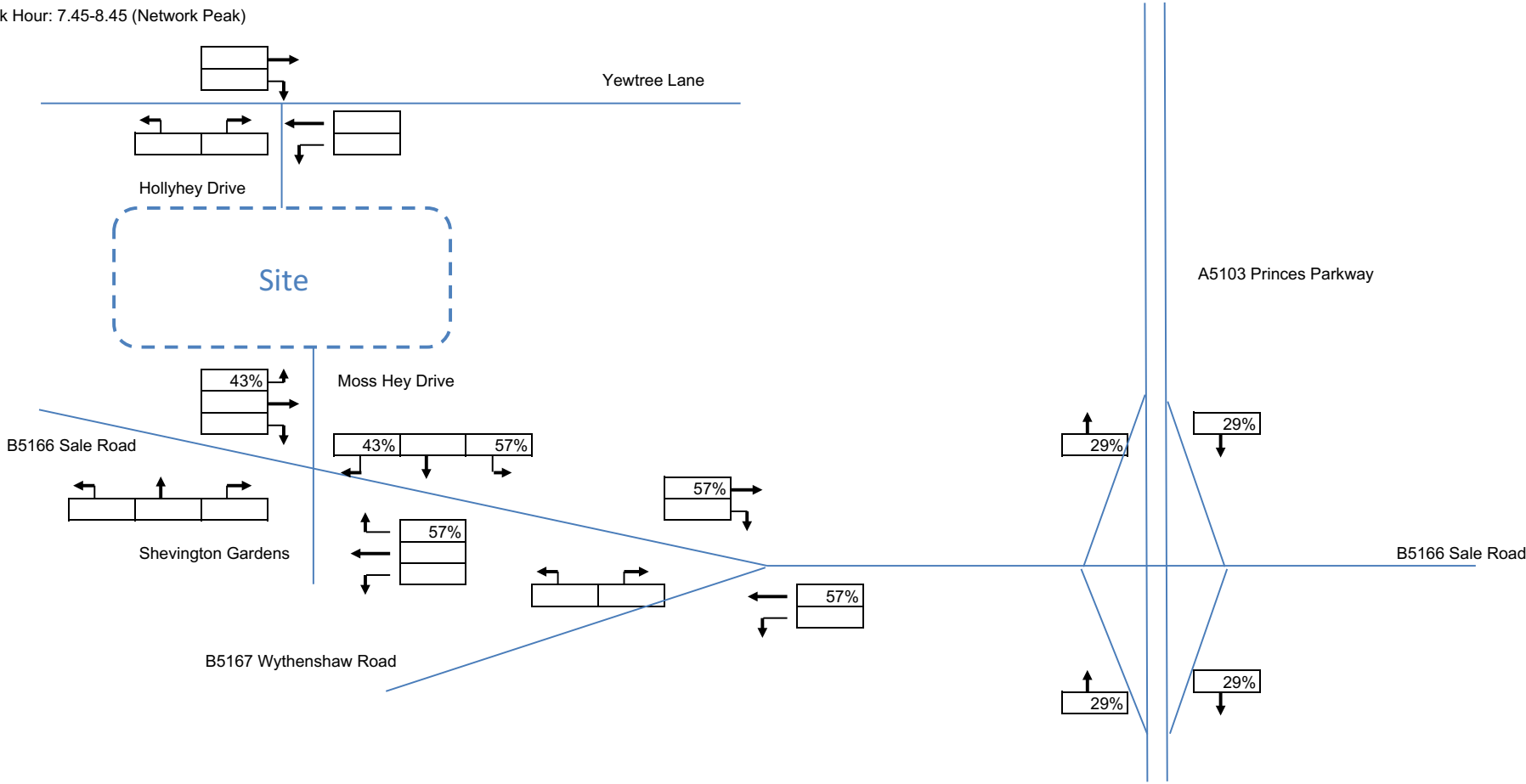
Northenden Campus: 2022 Base Flows (pcu)

PM Peak Hour: 16.30-17.30 (Network Peak)



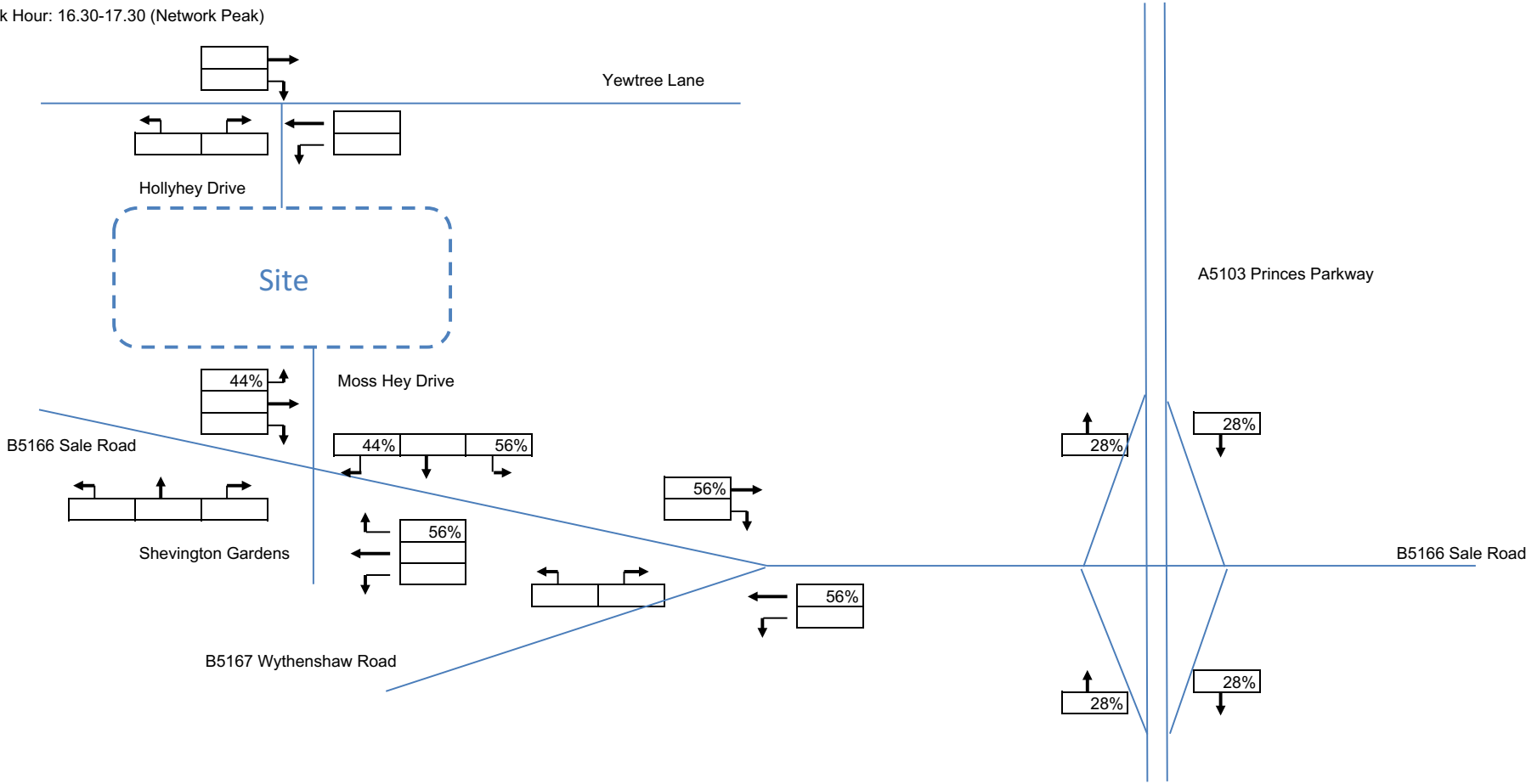
Northenden Campus: Distribution

AM Peak Hour: 7.45-8.45 (Network Peak)



Northenden Campus: Distribution

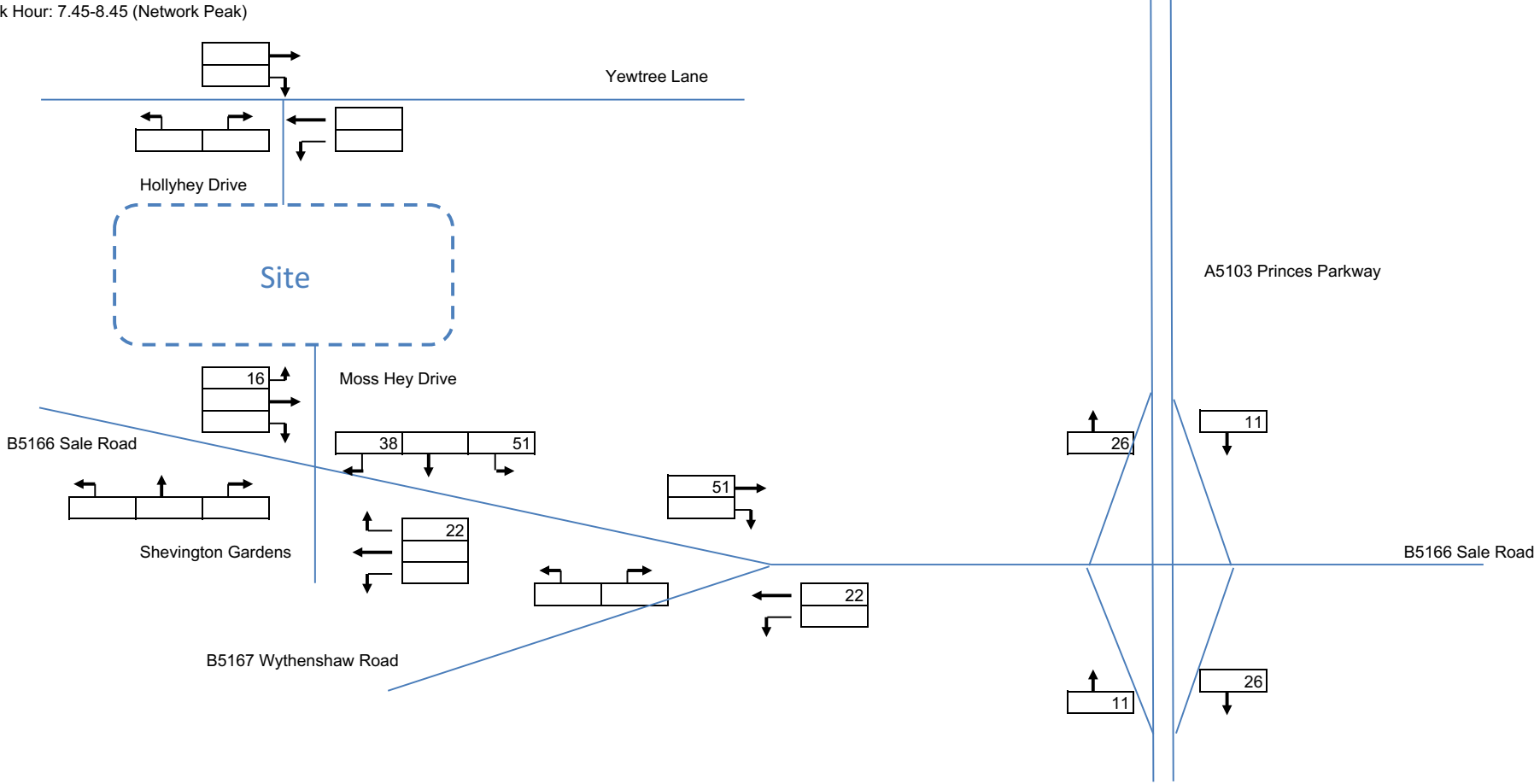
PM Peak Hour: 16.30-17.30 (Network Peak)



Northenden Campus: Development Trips

AM Peak Hour: 7.45-8.45 (Network Peak)

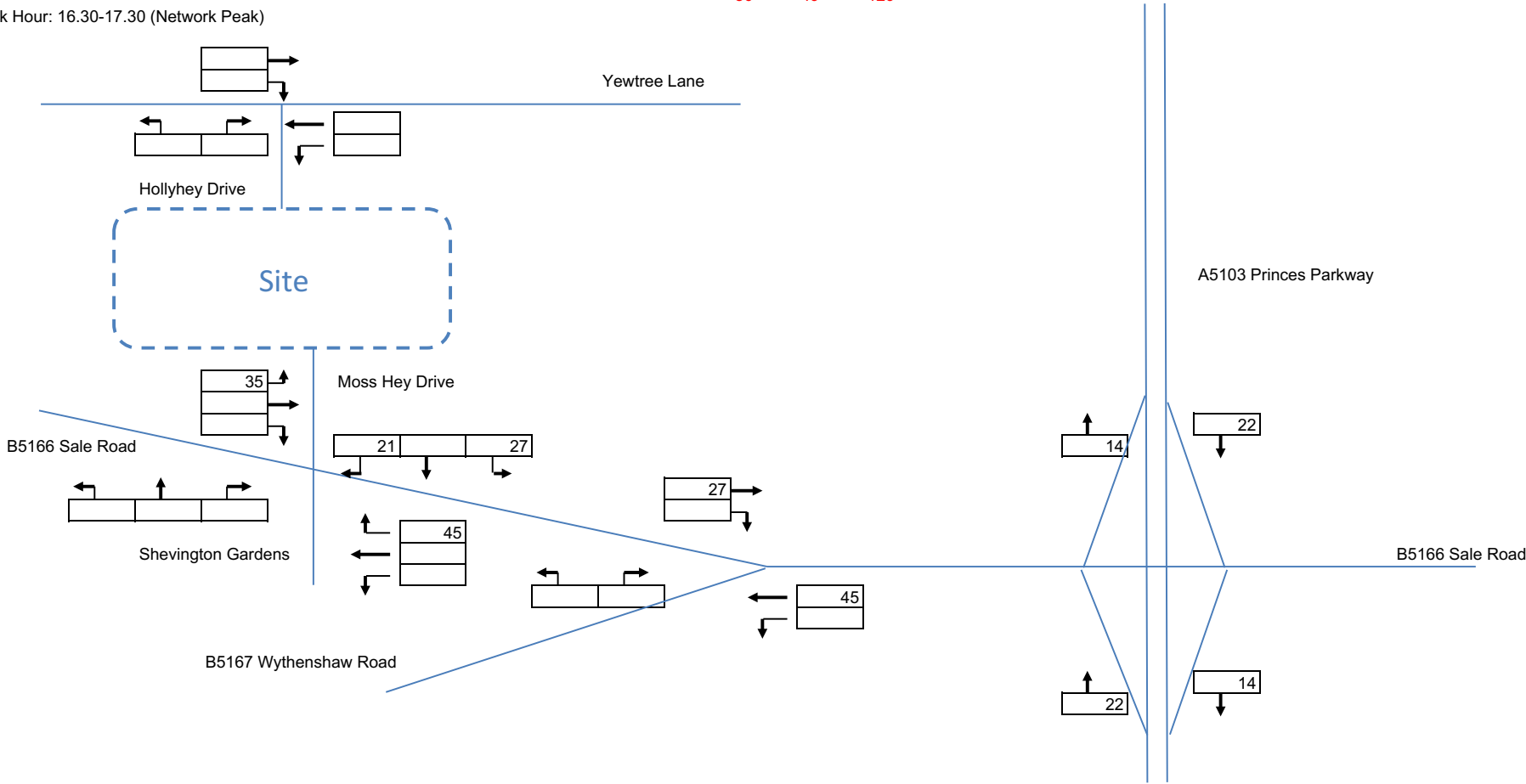
IN	OUT	TOTAL
38	90	128



Northenden Campus: Development Trips

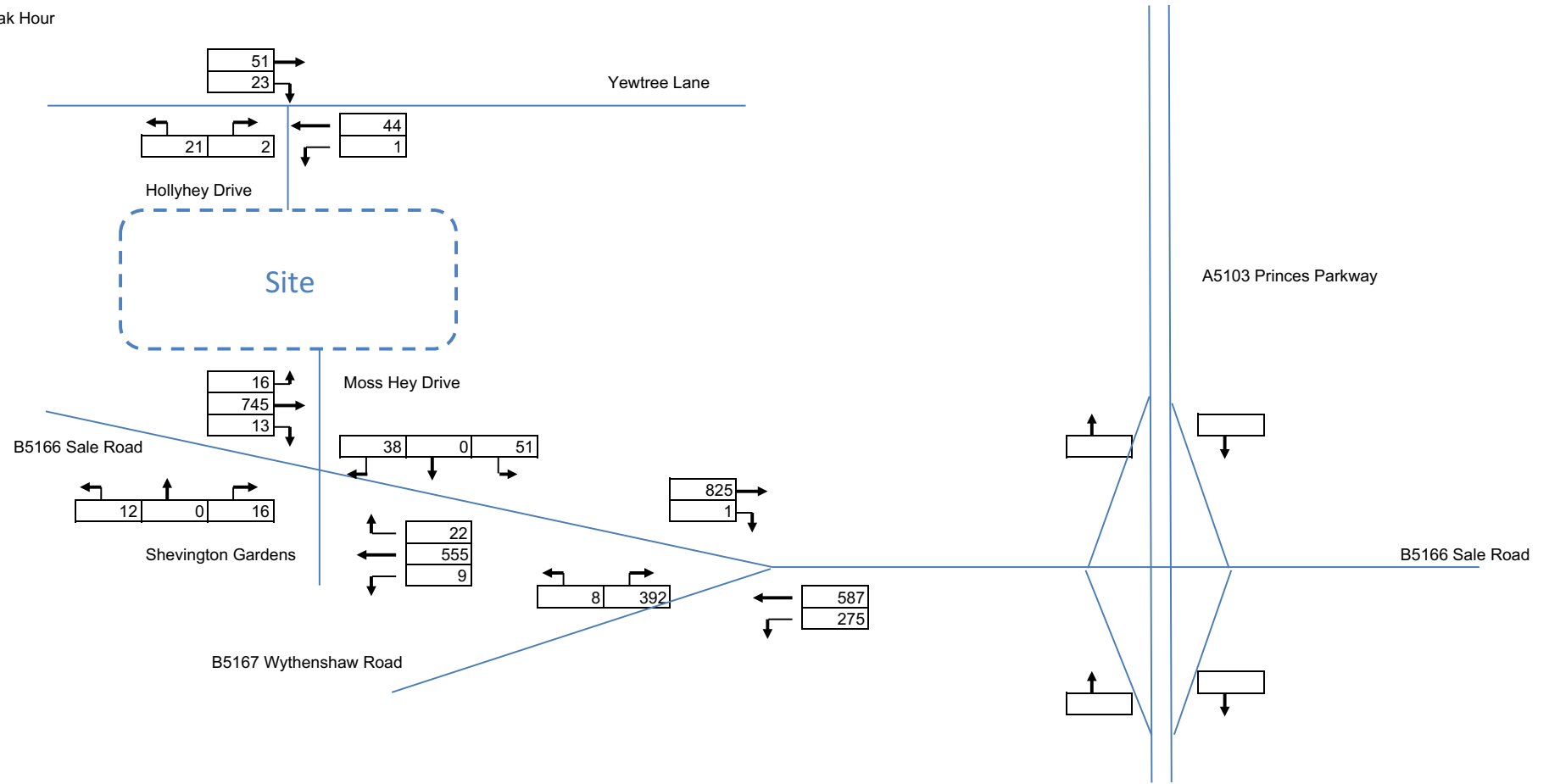
IN	OUT	TOTAL
80	49	129

PM Peak Hour: 16.30-17.30 (Network Peak)



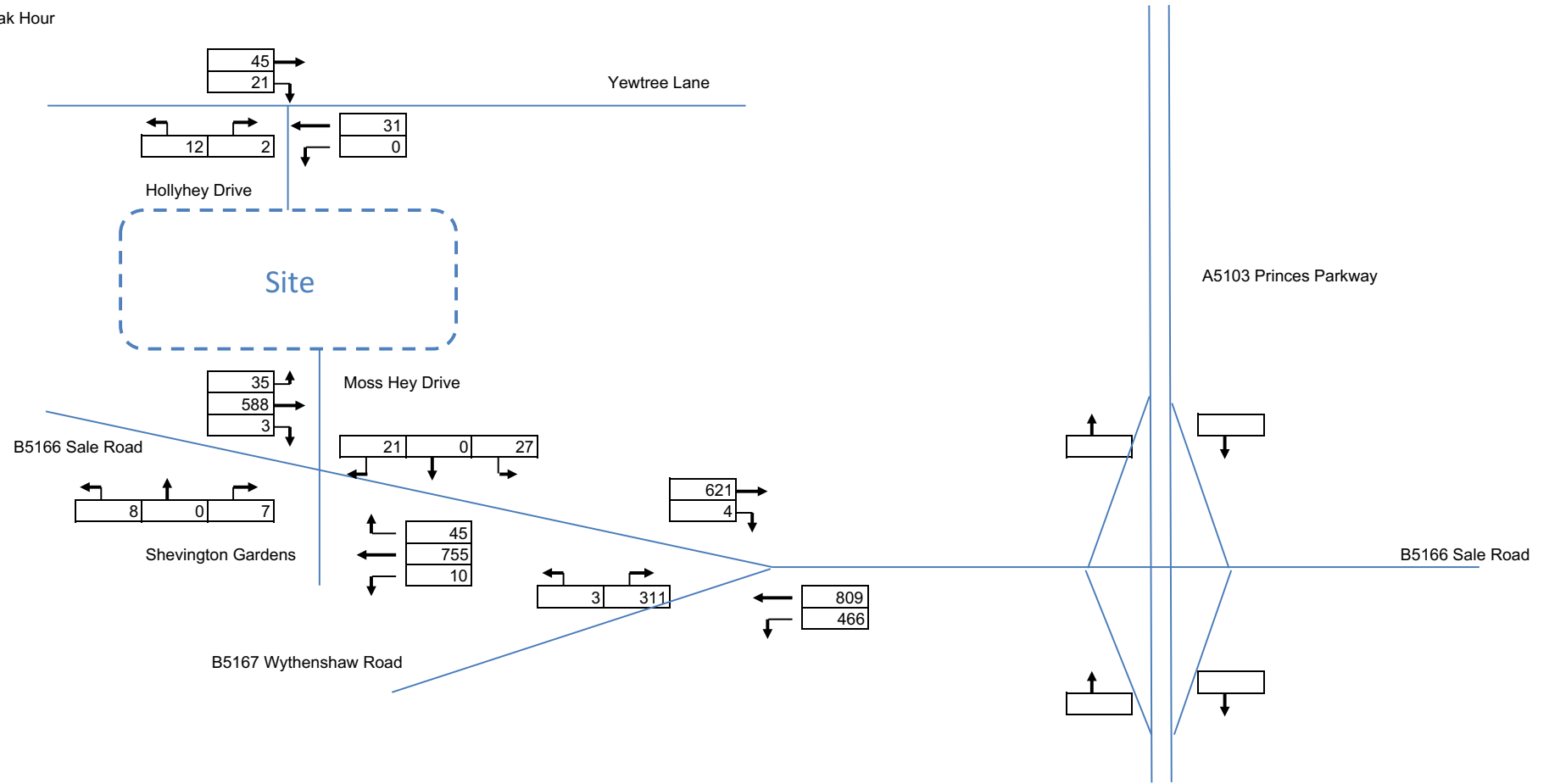
Northenden Campus: 2022 Base & Development Flows (pcu)

AM Peak Hour



Northenden Campus: 2022 Base & Development Flows (pcu)

PM Peak Hour



Appendix F

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : A - HOUSES PRIVATELY OWNED

MULTI-MODAL VEHICLES

Selected regions and areas:

02 SOUTH EAST	
HC HAMPSHIRE	1 days
WS WEST SUSSEX	1 days
03 SOUTH WEST	
DV DEVON	3 days
04 EAST ANGLIA	
CA CAMBRIDGESHIRE	1 days
NF NORFOLK	2 days
SF SUFFOLK	1 days
05 EAST MIDLANDS	
LN LINCOLNSHIRE	1 days
06 WEST MIDLANDS	
SH SHROPSHIRE	1 days
ST STAFFORDSHIRE	1 days
WK WARWICKSHIRE	1 days
07 YORKSHIRE & NORTH LINCOLNSHIRE	
NY NORTH YORKSHIRE	3 days
SY SOUTH YORKSHIRE	1 days
08 NORTH WEST	
CH CHESHIRE	2 days
MS MERSEYSIDE	1 days
09 NORTH	
TW TYNE & WEAR	1 days
10 WALES	
PS POWYS	1 days
11 SCOTLAND	
AG ANGUS	1 days
FA FALKIRK	2 days
PK PERTH & KINROSS	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: 6 to 161 (units:)
 Range Selected by User: 6 to 491 (units:)

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/08 to 12/11/15

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	6 days
Tuesday	7 days
Wednesday	6 days
Thursday	3 days
Friday	4 days

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

Selected survey types:

Manual count	26 days
Directional ATC Count	0 days

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

Selected Locations:

Suburban Area (PPS6 Out of Centre)	26
------------------------------------	----

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	24
No Sub Category	2

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	25 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	3 days
5,001 to 10,000	5 days
10,001 to 15,000	4 days
15,001 to 20,000	6 days
20,001 to 25,000	5 days
25,001 to 50,000	3 days

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

Secondary Filtering selection (Cont.):Population within 5 miles:

5,001 to 25,000	4 days
25,001 to 50,000	3 days
50,001 to 75,000	1 days
75,001 to 100,000	5 days
100,001 to 125,000	3 days
125,001 to 250,000	6 days
250,001 to 500,000	4 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	9 days
1.1 to 1.5	17 days

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

Travel Plan:

Yes	2 days
No	24 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	26 days
-----------------	---------

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

LIST OF SITES relevant to selection parameters

1	AG-03-A-01	BUNGALOWS/DET.	ANGUS
	KEPTIE ROAD		
	ARBROATH		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	7	
	Survey date: TUESDAY	22/05/12	Survey Type: MANUAL
2	CA-03-A-04	DETACHED	CAMBRIDGESHIRE
	THORPE PARK ROAD		
	PETERBOROUGH		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	9	
	Survey date: TUESDAY	18/10/11	Survey Type: MANUAL
3	CH-03-A-06	SEMI-DET./BUNGALOWS	CHESHIRE
	CREWE ROAD		
	CREWE		
	Suburban Area (PPS6 Out of Centre)		
	No Sub Category		
	Total Number of dwellings:	129	
	Survey date: TUESDAY	14/10/08	Survey Type: MANUAL
4	CH-03-A-08	DETACHED	CHESHIRE
	WHITCHURCH ROAD		
	BOUGHTON HEATH		
	CHESTER		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	11	
	Survey date: TUESDAY	22/05/12	Survey Type: MANUAL
5	DV-03-A-01	TERRACED HOUSES	DEVON
	BRONSHILL ROAD		
	TORQUAY		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	37	
	Survey date: WEDNESDAY	30/09/15	Survey Type: MANUAL
6	DV-03-A-02	HOUSES & BUNGALOWS	DEVON
	MILLHEAD ROAD		
	HONITON		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	116	
	Survey date: FRIDAY	25/09/15	Survey Type: MANUAL
7	DV-03-A-03	TERRACED & SEMI DETACHED	DEVON
	LOWER BRAND LANE		
	HONITON		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	70	
	Survey date: MONDAY	28/09/15	Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

8	FA-03-A-01	SEMI-DETACHED/TERRACED	FALKIRK
	MANDELA AVENUE		
	FALKIRK		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	37	
	Survey date: THURSDAY	30/05/13	Survey Type: MANUAL
9	FA-03-A-02	MIXED HOUSES	FALKIRK
	ROSEBANK AVENUE & SPRINGFIELD DRIVE		
	FALKIRK		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	161	
	Survey date: WEDNESDAY	29/05/13	Survey Type: MANUAL
10	HC-03-A-17	HOUSES & FLATS	HAMPSHIRE
	CANADA WAY		
	LIPHOOK		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	36	
	Survey date: THURSDAY	12/11/15	Survey Type: MANUAL
11	LN-03-A-03	SEMI DETACHED	LINCOLNSHIRE
	ROOKERY LANE		
	BOULTHAM		
	LINCOLN		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	22	
	Survey date: TUESDAY	18/09/12	Survey Type: MANUAL
12	MS-03-A-03	DETACHED	MERSEYSIDE
	BEMPTON ROAD		
	OTTERSPOOL		
	LIVERPOOL		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	15	
	Survey date: FRIDAY	21/06/13	Survey Type: MANUAL
13	NF-03-A-01	SEMI DET. & BUNGALOWS	NORFOLK
	YARMOUTH ROAD		
	CAISTER-ON-SEA		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	27	
	Survey date: TUESDAY	16/10/12	Survey Type: MANUAL
14	NF-03-A-02	HOUSES & FLATS	NORFOLK
	DEREHAM ROAD		
	NORWICH		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	98	
	Survey date: MONDAY	22/10/12	Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

15	NY-03-A-06	BUNGALOWS & SEMI DET.	NORTH YORKSHIRE
	HORSEFAIR		
	BOROUGHBRIDGE		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	115	
	Survey date: FRIDAY	14/10/11	Survey Type: MANUAL
16	NY-03-A-08	TERRACED HOUSES	NORTH YORKSHIRE
	NICHOLAS STREET		
	YORK		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	21	
	Survey date: MONDAY	16/09/13	Survey Type: MANUAL
17	NY-03-A-09	MIXED HOUSING	NORTH YORKSHIRE
	GRAMMAR SCHOOL LANE		
	NORTHALLERTON		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	52	
	Survey date: MONDAY	16/09/13	Survey Type: MANUAL
18	PK-03-A-01	DETAC. & BUNGALOWS	PERTH & KINROSS
	TULLYLUMB TERRACE		
	GORNHILL		
	PERTH		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	36	
	Survey date: WEDNESDAY	11/05/11	Survey Type: MANUAL
19	PS-03-A-02	DETACHED/SEMI-DETACHED	POWYS
	GUNROG ROAD		
	WELSHPOOL		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	28	
	Survey date: MONDAY	11/05/15	Survey Type: MANUAL
20	SF-03-A-04	DETACHED & BUNGALOWS	SUFFOLK
	NORMANSTON DRIVE		
	LOWESTOFT		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	7	
	Survey date: TUESDAY	23/10/12	Survey Type: MANUAL
21	SH-03-A-04	TERRACED	SHROPSHIRE
	ST MICHAEL'S STREET		
	SHREWSBURY		
	Suburban Area (PPS6 Out of Centre)		
	No Sub Category		
	Total Number of dwellings:	108	
	Survey date: THURSDAY	11/06/09	Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

22	ST-03-A-05	TERRACED & DETACHED	STAFFORDSHIRE
	WATERMEET GROVE		
	ETRURIA		
	STOKE-ON-TRENT		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	14	
	Survey date: WEDNESDAY	26/11/08	Survey Type: MANUAL
23	SY-03-A-01	SEMI DETACHED HOUSES	SOUTH YORKSHIRE
	A19 BENTLEY ROAD		
	BENTLEY RISE		
	DONCASTER		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	54	
	Survey date: WEDNESDAY	18/09/13	Survey Type: MANUAL
24	TW-03-A-02	SEMI-DETACHED	TYNE & WEAR
	WEST PARK ROAD		
	GATESHEAD		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	16	
	Survey date: MONDAY	07/10/13	Survey Type: MANUAL
25	WK-03-A-01	TERRACED/SEMI/DET.	WARWICKSHIRE
	ARLINGTON AVENUE		
	LEAMINGTON SPA		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	6	
	Survey date: FRIDAY	21/10/11	Survey Type: MANUAL
26	WS-03-A-05	TERRACED & FLATS	WEST SUSSEX
	UPPER SHOREHAM ROAD		
	SHOREHAM BY SEA		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	48	
	Survey date: WEDNESDAY	18/04/12	Survey Type: MANUAL

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

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

MULTI-MODAL VEHICLES**Calculation factor: 1 DWELLS****BOLD print indicates peak (busiest) period**

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	26	49	0.061	26	49	0.252	26	49	0.313
08:00 - 09:00	26	49	0.151	26	49	0.359	26	49	0.510
09:00 - 10:00	26	49	0.157	26	49	0.173	26	49	0.330
10:00 - 11:00	26	49	0.140	26	49	0.152	26	49	0.292
11:00 - 12:00	26	49	0.151	26	49	0.154	26	49	0.305
12:00 - 13:00	26	49	0.175	26	49	0.157	26	49	0.332
13:00 - 14:00	26	49	0.170	26	49	0.177	26	49	0.347
14:00 - 15:00	26	49	0.138	26	49	0.179	26	49	0.317
15:00 - 16:00	26	49	0.228	26	49	0.159	26	49	0.387
16:00 - 17:00	26	49	0.272	26	49	0.170	26	49	0.442
17:00 - 18:00	26	49	0.320	26	49	0.194	26	49	0.514
18:00 - 19:00	26	49	0.195	26	49	0.148	26	49	0.343
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.158			2.274			4.432

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

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

Parameter summary

Trip rate parameter range selected:	6 - 161 (units:)
Survey date range:	01/01/08 - 12/11/15
Number of weekdays (Monday-Friday):	26
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

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

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

MULTI-MODAL OGVS**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	26	49	0.000	26	49	0.000	26	49	0.000
08:00 - 09:00	26	49	0.005	26	49	0.003	26	49	0.008
09:00 - 10:00	26	49	0.004	26	49	0.004	26	49	0.008
10:00 - 11:00	26	49	0.002	26	49	0.002	26	49	0.004
11:00 - 12:00	26	49	0.005	26	49	0.004	26	49	0.009
12:00 - 13:00	26	49	0.004	26	49	0.003	26	49	0.007
13:00 - 14:00	26	49	0.002	26	49	0.004	26	49	0.006
14:00 - 15:00	26	49	0.002	26	49	0.003	26	49	0.005
15:00 - 16:00	26	49	0.001	26	49	0.002	26	49	0.003
16:00 - 17:00	26	49	0.001	26	49	0.001	26	49	0.002
17:00 - 18:00	26	49	0.001	26	49	0.001	26	49	0.002
18:00 - 19:00	26	49	0.001	26	49	0.001	26	49	0.002
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.028			0.028			0.056

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

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

Parameter summary

Trip rate parameter range selected:	6 - 161 (units:)
Survey date date range:	01/01/08 - 12/11/15
Number of weekdays (Monday-Friday):	26
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

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

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

MULTI-MODAL TOTAL PEOPLE**Calculation factor: 1 DWELLS****BOLD print indicates peak (busiest) period**

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	26	49	0.108	26	49	0.412	26	49	0.520
08:00 - 09:00	26	49	0.241	26	49	0.723	26	49	0.964
09:00 - 10:00	26	49	0.247	26	49	0.308	26	49	0.555
10:00 - 11:00	26	49	0.242	26	49	0.289	26	49	0.531
11:00 - 12:00	26	49	0.247	26	49	0.255	26	49	0.502
12:00 - 13:00	26	49	0.295	26	49	0.260	26	49	0.555
13:00 - 14:00	26	49	0.259	26	49	0.289	26	49	0.548
14:00 - 15:00	26	49	0.230	26	49	0.308	26	49	0.538
15:00 - 16:00	26	49	0.531	26	49	0.304	26	49	0.835
16:00 - 17:00	26	49	0.522	26	49	0.314	26	49	0.836
17:00 - 18:00	26	49	0.565	26	49	0.305	26	49	0.870
18:00 - 19:00	26	49	0.348	26	49	0.259	26	49	0.607
19:00 - 20:00	1	7	0.000	1	7	0.000	1	7	0.000
20:00 - 21:00	1	7	0.000	1	7	0.000	1	7	0.000
21:00 - 22:00	1	7	0.000	1	7	0.000	1	7	0.000
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			3.835			4.026			7.861

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

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

Parameter summary

Trip rate parameter range selected:	6 - 161 (units:)
Survey date range:	01/01/08 - 12/11/15
Number of weekdays (Monday-Friday):	26
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

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

Appendix G

TRL LIMITED

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 5.1 ANALYSIS PROGRAM
RELEASE 5.0 (JUNE 2010)

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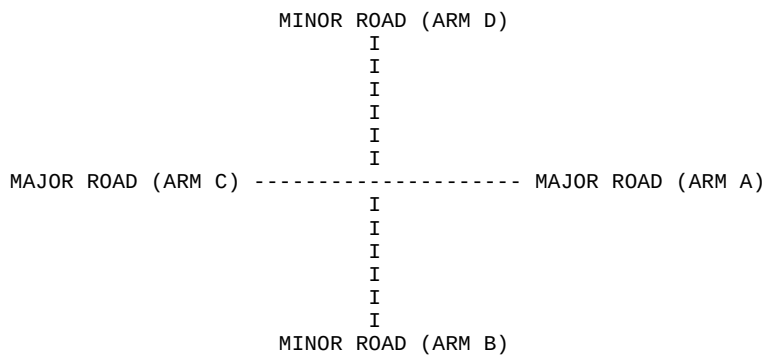
Run with file:-
"S:\Projects\SK21701 Manchester College\Junction Assessments\Northenden\Sale Road - Moss Hey Drive.vpi"
(drive-on-the-left) at 13:41:11 on Wednesday, 19 April 2017

RUN INFORMATION

RUN TITLE : Sale Road / Moss Hey Drive
LOCATION : Northenden
DATE : 13/04/17
CLIENT : Manchester College
ENUMERATOR :
JOB NUMBER : SK21701
STATUS :
DESCRIPTION :

MAJOR/MINOR JUNCTION CAPACITY AND DELAY

INPUT DATA



ARM A IS B5166 Sale Road (SE)
ARM B IS Shevington Gardens
ARM C IS B5166 Sale Road (NW)
ARM D IS Moss Hey Drive

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B
STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C
ETC.

GEOMETRIC DATA

I	DATA ITEM	I	MINOR ROAD B	I	MINOR ROAD D	I
I	TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	I	(W) 7.00 M.	I	(W) 7.00 M.	I
I	CENTRAL RESERVE WIDTH	I	(WCR) 0.00 M.	I	(WCR) 0.00 M.	I
I		I		I		I
I	MAJOR ROAD RIGHT TURN - WIDTH	I	(WC-B) 2.20 M.	I	(WA-D) 2.20 M.	I
I	- VISIBILITY	I	(VC-B) 250.00 M.	I	(VA-D) 250.00 M.	I
I	- BLOCKS TRAFFIC (SPACES)	I	NO (0)	I	NO (0)	I
I		I		I		I
I	MINOR ROAD - VISIBILITY TO LEFT	I	(VB-C) 150.0 M.	I	(VD-A) 105.0 M.	I
I	- VISIBILITY TO RIGHT	I	(VB-A) 125.0 M.	I	(VD-C) 120.0 M.	I
I	- LANE 1 WIDTH	I	(WB-C) 2.50 M.	I	(WD-A) 3.25 M.	I
I	- LANE 2 WIDTH	I	(WB-A) 0.00 M.	I	(WD-C) 0.00 M.	I

.SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

STREAM B-C

I	Intercept For	Slope For Opposing	Slope For Opposing	I
I	STREAM B-C	STREAM A-C	STREAM A-B	I
I	667.46	0.25	0.10	I

STREAM D-A

I	Intercept For	Slope For Opposing	Slope For Opposing	I
I	STREAM D-A	STREAM C-A	STREAM C-D	I
I	716.99	0.27	0.11	I

STREAM B-A

I	Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM B-A	STREAM A-C	STREAM A-D	STREAM D-A	STREAM D-B	I
I	561.74	0.25	0.25	0.25	0.25	I

I		Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I		STREAM A-B	STREAM C-A	STREAM C-B	STREAM D-C	I
I		0.10	0.16	0.35	0.12	I

STREAM D-C

I	Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM D-C	STREAM C-A	STREAM C-B	STREAM B-C	STREAM B-D	I
I	587.13	0.26	0.26	0.26	0.26	I

I		Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I		STREAM C-D	STREAM A-C	STREAM A-D	STREAM B-A	I
I		0.10	0.16	0.37	0.13	I

STREAM C-B

I	Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM C-B	STREAM A-B	STREAM A-C	STREAM A-D	I
I	718.74	0.27	0.27	0.38	I

STREAM A-D

I	Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM A-D	STREAM C-A	STREAM C-B	STREAM C-D	I
I	718.74	0.27	0.38	0.27	I

B-D Stream From Left Hand Lane

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM B-D	STREAM	A-C	STREAM	A-D	STREAM	A-B	STREAM	C-B	I
I	561.74		0.25		0.25		0.10		0.35	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	C-A	STREAM	C-D	STREAM	A-B	STREAM	C-B	I
I			0.16		0.16					I

B-D Stream From Right Hand Lane

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM B-D	STREAM	A-C	STREAM	A-D	STREAM	A-B	STREAM	C-B	I
I	561.74		0.25		0.25		0.10		0.35	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	C-A	STREAM	C-D	STREAM	A-B	STREAM	C-B	I
I			0.16		0.16					I

D-B Stream From Left Hand Lane

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM D-B	STREAM	C-A	STREAM	C-B	STREAM	C-D	STREAM	A-D	I
I	587.13		0.26		0.26		0.10		0.37	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	A-C	STREAM	A-B	STREAM	C-D	STREAM	A-D	I
I			0.16		0.16					I

D-B Stream From Right Hand Lane

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM B-D	STREAM	C-A	STREAM	C-B	STREAM	C-D	STREAM	A-D	I
I	587.13		0.26		0.26		0.10		0.37	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	A-C	STREAM	A-B	STREAM	C-D	STREAM	A-D	I
I			0.16		0.16					I

TRAFFIC DEMAND DATA

I	ARM	I	FLOW	SCALE(%)	I
I	A	I	100		I
I	B	I	100		I
I	C	I	100		I
I	D	I	100		I

Demand set: 2017 AM Peak Observed

TIME PERIOD BEGINS 07.30 AND ENDS 09.00

LENGTH OF TIME PERIOD - 90 MIN.
LENGTH OF TIME SEGMENT - 15 MIN.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

		NUMBER OF MINUTES FROM START WHEN			RATE OF FLOW (VEH/MIN)									
	ARM	I	FLOW STARTS	I	TOP OF PEAK	I	FLOW STOPS	I	BEFORE	I	AT TOP	I	AFTER	
		I	TO RISE	I	IS REACHED	I	FALLING	I	PEAK	I	OF PEAK	I	PEAK	
		I		I		I		I		I		I		
I	ARM A	I	15.00	I	45.00	I	75.00	I	7.24	I	10.86	I	7.24	I
I	ARM B	I	15.00	I	45.00	I	75.00	I	0.31	I	0.47	I	0.31	I
I	ARM C	I	15.00	I	45.00	I	75.00	I	8.51	I	12.77	I	8.51	I
I	ARM D	I	15.00	I	45.00	I	75.00	I	0.46	I	0.69	I	0.46	I

Demand set: 2017 AM Peak Observed

	TIME	TURNING PROPORTIONS											
		TURNING COUNTS											
		(PERCENTAGE OF H.V.S)											
		FROM/TO	ARM	A	ARM	B	ARM	C	ARM	D			
07.30	-	09.00											
		ARM	A	0.000		0.014		0.860		0.126			
				0.0		8.0		498.0		73.0			
				(0.0)		(0.0)		(0.0)		(0.0)			
		ARM	B	0.560		0.000		0.440		0.000			
				14.0		0.0		11.0		0.0			
				(0.0)		(0.0)		(0.0)		(0.0)			
		ARM	C	0.981		0.018		0.000		0.001			
				668.0		12.0		0.0		1.0			
				(0.0)		(0.0)		(0.0)		(0.0)			
		ARM	D	0.865		0.000		0.135		0.000			
				32.0		0.0		5.0		0.0			
				(0.0)		(0.0)		(0.0)		(0.0)			

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET 2017 AM Peak Observed
AND FOR TIME PERIOD 1

I	TIME	DEMAND	CAPACITY	DEMAND/	PEDESTRIAN	START	END	DELAY	GEOMETRIC DELAY	AVERAGE DELAY	I
I		(VEH/MIN)	(VEH/MIN)	CAPACITY	FLOW	QUEUE	QUEUE	(VEH.MIN/	(VEH.MIN/	PER ARRIVING	I
I				(RFC)	(PEDS/MIN)	(VEHS)	(VEHS)	TIME SEGMENT)	TIME SEGMENT)	VEHICLE (MIN)	I
I	07.30-07.45										I
I	B-ACD	0.31	7.27	0.043		0.00	0.04	0.6		0.14	I
I	A-B	0.10									I
I	A-C	6.25									I
I	A-D	0.92	9.69	0.095		0.00	0.10	1.5		0.11	I
I	D-ABC	0.46	9.02	0.051		0.00	0.05	0.8		0.12	I
I	C-D	0.01									I
I	C-A	8.38									I
I	C-B	0.15	9.94	0.015		0.00	0.02	0.2		0.10	I

I	TIME	DEMAND	CAPACITY	DEMAND/	PEDESTRIAN	START	END	DELAY	GEOMETRIC DELAY	AVERAGE DELAY	I
I		(VEH/MIN)	(VEH/MIN)	CAPACITY	FLOW	QUEUE	QUEUE	(VEH.MIN/	(VEH.MIN/	PER ARRIVING	I
I				(RFC)	(PEDS/MIN)	(VEHS)	(VEHS)	TIME SEGMENT)	TIME SEGMENT)	VEHICLE (MIN)	I
I	07.45-08.00										I
I	B-ACD	0.37	6.68	0.056		0.04	0.06	0.9		0.16	I
I	A-B	0.12									I
I	A-C	7.46									I
I	A-D	1.09	9.24	0.118		0.10	0.13	2.0		0.12	I
I	D-ABC	0.55	8.48	0.065		0.05	0.07	1.0		0.13	I
I	C-D	0.01									I
I	C-A	10.01									I
I	C-B	0.18	9.54	0.019		0.02	0.02	0.3		0.11	I

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.00-08.15									
B-ACD	0.46	5.84	0.079		0.06	0.08	1.2		0.19
A-B	0.15								
A-C	9.14								
A-D	1.34	8.62	0.155		0.13	0.18	2.7		0.14
D-ABC	0.68	7.71	0.088		0.07	0.10	1.4		0.14
C-D	0.02								
C-A	12.26								
C-B	0.22	8.99	0.024		0.02	0.02	0.4		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.15-08.30									
B-ACD	0.46	5.84	0.079		0.08	0.08	1.3		0.19
A-B	0.15								
A-C	9.14								
A-D	1.34	8.62	0.155		0.18	0.18	2.7		0.14
D-ABC	0.68	7.71	0.088		0.10	0.10	1.4		0.14
C-D	0.02								
C-A	12.26								
C-B	0.22	8.99	0.024		0.02	0.03	0.4		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
B-ACD	0.37	6.68	0.056		0.08	0.06	0.9		0.16
A-B	0.12								
A-C	7.46								
A-D	1.09	9.24	0.118		0.18	0.14	2.1		0.12
D-ABC	0.55	8.48	0.065		0.10	0.07	1.1		0.13
C-D	0.01								
C-A	10.01								
C-B	0.18	9.54	0.019		0.03	0.02	0.3		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.45-09.00									
B-ACD	0.31	7.27	0.043		0.06	0.05	0.7		0.14
A-B	0.10								
A-C	6.25								
A-D	0.92	9.69	0.095		0.14	0.11	1.6		0.11
D-ABC	0.46	9.02	0.051		0.07	0.05	0.8		0.12
C-D	0.01								
C-A	8.38								
C-B	0.15	9.94	0.015		0.02	0.02	0.2		0.10

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.45	0.0
08.00	0.1
08.15	0.1
08.30	0.1
08.45	0.1
09.00	0.0

QUEUE FOR STREAM A-D	
TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.45	0.1
08.00	0.1
08.15	0.2
08.30	0.2
08.45	0.1
09.00	0.1

QUEUE FOR STREAM D-ABC	
TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.45	0.1
08.00	0.1
08.15	0.1
08.30	0.1
08.45	0.1
09.00	0.1

QUEUE FOR STREAM C-B	
TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.45	0.0
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	STREAM	I	TOTAL	I	DEMAND	I	* QUEUEING *	I	* INCLUSIVE QUEUEING *	I
I		I		I		I	* DELAY *	I	* DELAY *	I
I		I	(VEH)	I	(VEH/H)	I	(MIN)	I	(MIN)	I
I		I		I		I	(MIN/VEH)	I	(MIN/VEH)	I
I	B-ACD	I	34.4	I	22.9	I	5.6	I	0.16	I
I	A-B	I	11.0	I	7.3	I		I		I
I	A-C	I	685.5	I	457.0	I		I		I
I	A-D	I	100.5	I	67.0	I	12.6	I	0.12	I
I	D-ABC	I	50.9	I	34.0	I	6.6	I	0.13	I
I	C-D	I	1.4	I	0.9	I		I		I
I	C-A	I	919.5	I	613.0	I		I		I
I	C-B	I	16.5	I	11.0	I	1.8	I	0.11	I
I	ALL	I	1819.6	I	1213.1	I	26.5	I	0.01	I

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD
 * INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES
 WHICH ARE STILL QUEUEING 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.

*****END OF RUN*****

.SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

STREAM B-C

I	Intercept For	Slope For	Opposing	Slope For	Opposing	I
I	STREAM B-C	STREAM	A-C	STREAM	A-B	I
I	667.46		0.25		0.10	I

STREAM D-A

I	Intercept For	Slope For	Opposing	Slope For	Opposing	I
I	STREAM D-A	STREAM	C-A	STREAM	C-D	I
I	716.99		0.27		0.11	I

STREAM B-A

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM B-A	STREAM	A-C	STREAM	A-D	STREAM	D-A	I
I	561.74		0.25		0.25		0.25	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	A-B	STREAM	C-A	STREAM	C-B	I
I			0.10		0.16		0.35	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	C-D	STREAM	A-C	STREAM	A-D	I
I			0.10		0.16		0.37	I

STREAM D-C

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM D-C	STREAM	C-A	STREAM	C-B	STREAM	B-C	I
I	587.13		0.26		0.26		0.26	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	C-D	STREAM	A-C	STREAM	A-D	I
I			0.10		0.16		0.37	I

STREAM C-B

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM C-B	STREAM	A-B	STREAM	A-C	STREAM	A-D	I
I	718.74		0.27		0.27		0.38	I

STREAM A-D				
I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM A-D	STREAM C-A	STREAM C-B	STREAM C-D	I
I 718.74	0.27	0.38	0.27	I

B-D Stream From Left Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM A-C	STREAM A-D	STREAM A-B	STREAM C-B	I
I 561.74	0.25	0.25	0.10	0.35	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM C-A	STREAM C-D			I
I	0.16	0.16			I

B-D Stream From Right Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM A-C	STREAM A-D	STREAM A-B	STREAM C-B	I
I 561.74	0.25	0.25	0.10	0.35	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM C-A	STREAM C-D			I
I	0.16	0.16			I

D-B Stream From Left Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM D-B	STREAM C-A	STREAM C-B	STREAM C-D	STREAM A-D	I
I 587.13	0.26	0.26	0.10	0.37	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM A-C	STREAM A-B			I
I	0.16	0.16			I

D-B Stream From Right Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM C-A	STREAM C-B	STREAM C-D	STREAM A-D	I
I 587.13	0.26	0.26	0.10	0.37	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM A-C	STREAM A-B			I
I	0.16	0.16			I

TRAFFIC DEMAND DATA

I ARM	I	I FLOW	I SCALE(%)	I
I A	I	100		I
I B	I	100		I
I C	I	100		I
I D	I	100		I

Demand set: 2017 PM Peak Observed

TIME PERIOD BEGINS 16.15 AND ENDS 17.45

LENGTH OF TIME PERIOD - 90 MIN.
LENGTH OF TIME SEGMENT - 15 MIN.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

I	I	NUMBER OF MINUTES FROM START WHEN				RATE OF FLOW (VEH/MIN)			I						
		I	I	I	I	I	I	I							
										I	I	I			
													I	I	I
ARM	FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK									
I	ARM	A	I	15.00	I	45.00	I	75.00	I	8.77	I	13.16	I	8.77	I
I	ARM	B	I	15.00	I	45.00	I	75.00	I	0.16	I	0.24	I	0.16	I
I	ARM	C	I	15.00	I	45.00	I	75.00	I	6.74	I	10.11	I	6.74	I
I	ARM	D	I	15.00	I	45.00	I	75.00	I	1.02	I	1.54	I	1.02	I

Demand set: 2017 PM Peak Observed

I I I I I	I I I I I	TURNING PROPORTIONS										I I I I I				
		TURNING COUNTS														
		(PERCENTAGE OF H.V.S)														
TIME		I	FROM/TO	I	ARM	A	I	ARM	B	I	ARM	C	I	ARM	D	I
I	16.15 - 17.45	I		I		I		I		I		I		I		I
I		I	ARM	A	I	0.000	I	0.013	I	0.964	I	0.023	I			
I		I			I	0.0	I	9.0	I	677.0	I	16.0	I			
I		I			I	(0.0)	I	(0.0)	I	(0.0)	I	(0.0)	I			
I		I			I		I		I		I		I			
I		I	ARM	B	I	0.462	I	0.000	I	0.538	I	0.000	I			
I		I			I	6.0	I	0.0	I	7.0	I	0.0	I			
I		I			I	(0.0)	I	(0.0)	I	(0.0)	I	(0.0)	I			
I		I			I		I		I		I		I			
I		I	ARM	C	I	0.980	I	0.006	I	0.000	I	0.015	I			
I		I			I	528.0	I	3.0	I	0.0	I	8.0	I			
I		I			I	(0.0)	I	(0.0)	I	(0.0)	I	(0.0)	I			
I		I			I		I		I		I		I			
I		I	ARM	D	I	0.829	I	0.012	I	0.159	I	0.000	I			
I		I			I	68.0	I	1.0	I	13.0	I	0.0	I			
I		I			I	(0.0)	I	(0.0)	I	(0.0)	I	(0.0)	I			
I		I			I		I		I		I		I			

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET 2017 PM Peak Observed
AND FOR TIME PERIOD 2

I I I I I I I I I I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)	I I I I I I I I I I
	16.15-16.30										
	B-ACD	0.16	7.26	0.022		0.00	0.02	0.3		0.14	
	A-B	0.11									
	A-C	8.49									
	A-D	0.20	10.17	0.020		0.00	0.02	0.3		0.10	
	D-ABC	1.03	9.30	0.111		0.00	0.12	1.8		0.12	
	C-D	0.10									
	C-A	6.63									
	C-B	0.04	9.61	0.004		0.00	0.00	0.1		0.10	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.30-16.45									
B-ACD	0.19	6.65	0.029		0.02	0.03	0.4		0.15
A-B	0.13								
A-C	10.14								
A-D	0.24	9.82	0.024		0.02	0.02	0.4		0.10
D-ABC	1.23	8.84	0.139		0.12	0.16	2.3		0.13
C-D	0.12								
C-A	7.91								
C-B	0.04	9.15	0.005		0.00	0.00	0.1		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
B-ACD	0.24	5.76	0.041		0.03	0.04	0.6		0.18
A-B	0.17								
A-C	12.42								
A-D	0.29	9.34	0.031		0.02	0.03	0.5		0.11
D-ABC	1.50	8.18	0.184		0.16	0.22	3.2		0.15
C-D	0.15								
C-A	9.69								
C-B	0.06	8.51	0.006		0.00	0.01	0.1		0.12

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
B-ACD	0.24	5.76	0.041		0.04	0.04	0.6		0.18
A-B	0.17								
A-C	12.42								
A-D	0.29	9.34	0.031		0.03	0.03	0.5		0.11
D-ABC	1.50	8.18	0.184		0.22	0.22	3.4		0.15
C-D	0.15								
C-A	9.69								
C-B	0.06	8.51	0.006		0.01	0.01	0.1		0.12

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.15-17.30									
B-ACD	0.19	6.64	0.029		0.04	0.03	0.5		0.16
A-B	0.13								
A-C	10.14								
A-D	0.24	9.82	0.024		0.03	0.03	0.4		0.10
D-ABC	1.23	8.84	0.139		0.22	0.16	2.5		0.13
C-D	0.12								
C-A	7.91								
C-B	0.04	9.15	0.005		0.01	0.00	0.1		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.30-17.45									
B-ACD	0.16	7.26	0.022		0.03	0.02	0.4		0.14
A-B	0.11								
A-C	8.49								
A-D	0.20	10.17	0.020		0.03	0.02	0.3		0.10
D-ABC	1.03	9.30	0.111		0.16	0.13	1.9		0.12
C-D	0.10								
C-A	6.63								
C-B	0.04	9.61	0.004		0.00	0.00	0.1		0.10

QUEUE FOR STREAM B-ACD	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
16.30	0.0
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0

QUEUE FOR STREAM A-D	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
16.30	0.0
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0

QUEUE FOR STREAM D-ABC	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
16.30	0.1
16.45	0.2
17.00	0.2
17.15	0.2
17.30	0.2
17.45	0.1

QUEUE FOR STREAM C-B	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
16.30	0.0
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	STREAM	I	TOTAL	I	* QUEUEING *	I	* INCLUSIVE QUEUEING *	I
I	I	I	DEMAND	I	* DELAY *	I	* DELAY *	I
I	I	I	(VEH)	I	(MIN)	I	(MIN)	I
I	I	I	(VEH/H)	I	(MIN/VEH)	I	(MIN/VEH)	I
I	B-ACD	I	17.9	I	2.9	I	2.9	I
I	A-B	I	12.4	I	I	I	I	I
I	A-C	I	931.8	I	I	I	I	I
I	A-D	I	22.0	I	2.3	I	2.3	I
I	D-ABC	I	112.9	I	15.2	I	15.2	I
I	C-D	I	11.0	I	I	I	I	I
I	C-A	I	726.8	I	I	I	I	I
I	C-B	I	4.1	I	0.5	I	0.5	I
I	ALL	I	1838.9	I	20.8	I	20.8	I

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD
 * INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES
 WHICH ARE STILL QUEUEING 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.

*****END OF RUN*****

.SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

STREAM B-C

I	Intercept For	Slope For Opposing	Slope For Opposing	I
I	STREAM B-C	STREAM A-C	STREAM A-B	I
I	667.46	0.25	0.10	I

STREAM D-A

I	Intercept For	Slope For Opposing	Slope For Opposing	I
I	STREAM D-A	STREAM C-A	STREAM C-D	I
I	716.99	0.27	0.11	I

STREAM B-A

I	Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM B-A	STREAM A-C	STREAM A-D	STREAM D-A	STREAM D-B	I
I	561.74	0.25	0.25	0.25	0.25	I
I		Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I		STREAM A-B	STREAM C-A	STREAM C-B	STREAM D-C	I
I		0.10	0.16	0.35	0.12	I

STREAM D-C

I	Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM D-C	STREAM C-A	STREAM C-B	STREAM B-C	STREAM B-D	I
I	587.13	0.26	0.26	0.26	0.26	I
I		Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I		STREAM C-D	STREAM A-C	STREAM A-D	STREAM B-A	I
I		0.10	0.16	0.37	0.13	I

STREAM C-B

I	Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM C-B	STREAM A-B	STREAM A-C	STREAM A-D	I
I	718.74	0.27	0.27	0.38	I

STREAM A-D				
I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM A-D	STREAM C-A	STREAM C-B	STREAM C-D	I
I 718.74	0.27	0.38	0.27	I

B-D Stream From Left Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM A-C	STREAM A-D	STREAM A-B	STREAM C-B	I
I 561.74	0.25	0.25	0.10	0.35	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM C-A	STREAM C-D			I
I	0.16	0.16			I

B-D Stream From Right Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM A-C	STREAM A-D	STREAM A-B	STREAM C-B	I
I 561.74	0.25	0.25	0.10	0.35	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM C-A	STREAM C-D			I
I	0.16	0.16			I

D-B Stream From Left Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM D-B	STREAM C-A	STREAM C-B	STREAM C-D	STREAM A-D	I
I 587.13	0.26	0.26	0.10	0.37	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM A-C	STREAM A-B			I
I	0.16	0.16			I

D-B Stream From Right Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM C-A	STREAM C-B	STREAM C-D	STREAM A-D	I
I 587.13	0.26	0.26	0.10	0.37	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM A-C	STREAM A-B			I
I	0.16	0.16			I

TRAFFIC DEMAND DATA

I ARM	I	I FLOW	I SCALE(%)	I
I A	I	100		I
I B	I	100		I
I C	I	100		I
I D	I	100		I

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.45-08.00									
B-ACD	0.42	6.37	0.066		0.05	0.07	1.0		0.17
A-B	0.13								
A-C	8.32								
A-D	0.25	8.88	0.029		0.02	0.03	0.4		0.12
D-ABC	1.08	6.91	0.156		0.13	0.18	2.7		0.17
C-D	0.19								
C-A	11.16								
C-B	0.19	9.63	0.020		0.02	0.02	0.3		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.00-08.15									
B-ACD	0.51	5.45	0.094		0.07	0.10	1.5		0.20
A-B	0.17								
A-C	10.18								
A-D	0.31	8.18	0.038		0.03	0.04	0.6		0.13
D-ABC	1.32	5.92	0.223		0.18	0.28	4.1		0.22
C-D	0.24								
C-A	13.67								
C-B	0.24	9.10	0.026		0.02	0.03	0.4		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.15-08.30									
B-ACD	0.51	5.45	0.094		0.10	0.10	1.5		0.20
A-B	0.17								
A-C	10.18								
A-D	0.31	8.18	0.038		0.04	0.04	0.6		0.13
D-ABC	1.32	5.92	0.223		0.28	0.28	4.3		0.22
C-D	0.24								
C-A	13.67								
C-B	0.24	9.10	0.026		0.03	0.03	0.4		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
B-ACD	0.42	6.37	0.066		0.10	0.07	1.1		0.17
A-B	0.13								
A-C	8.32								
A-D	0.25	8.88	0.029		0.04	0.03	0.5		0.12
D-ABC	1.08	6.91	0.156		0.28	0.19	2.9		0.17
C-D	0.19								
C-A	11.16								
C-B	0.19	9.63	0.020		0.03	0.02	0.3		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.45-09.00									
B-ACD	0.35	7.01	0.050		0.07	0.05	0.8		0.15
A-B	0.11								
A-C	6.96								
A-D	0.21	9.38	0.023		0.03	0.02	0.4		0.11
D-ABC	0.90	7.60	0.119		0.19	0.14	2.1		0.15
C-D	0.16								
C-A	9.35								
C-B	0.16	10.01	0.016		0.02	0.02	0.3		0.10

QUEUE FOR STREAM B-ACD	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
07.45	0.1
08.00	0.1
08.15	0.1
08.30	0.1
08.45	0.1
09.00	0.1

QUEUE FOR STREAM A-D	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
07.45	0.0
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0

QUEUE FOR STREAM D-ABC	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
07.45	0.1
08.00	0.2
08.15	0.3
08.30	0.3
08.45	0.2
09.00	0.1

QUEUE FOR STREAM C-B	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
07.45	0.0
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	STREAM	I	TOTAL	I	DEMAND	I	* QUEUEING *	I	* INCLUSIVE QUEUEING *	I
I		I		I		I	* DELAY *	I	* DELAY *	I
I		I	(VEH)	I	(VEH/H)	I	(MIN)	I	(MIN)	I
I		I		I		I	(MIN/VEH)	I	(MIN/VEH)	I
I	B-ACD	I	38.5	I	25.7	I	6.7	I	0.17	I
I	A-B	I	12.4	I	8.3	I		I		I
I	A-C	I	763.9	I	509.3	I		I		I
I	A-D	I	23.4	I	15.6	I	2.7	I	0.12	I
I	D-ABC	I	99.1	I	66.1	I	17.9	I	0.18	I
I	C-D	I	17.9	I	11.9	I		I		I
I	C-A	I	1025.4	I	683.6	I		I		I
I	C-B	I	17.9	I	11.9	I	1.9	I	0.11	I
I	ALL	I	1998.6	I	1332.4	I	29.3	I	0.01	I

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD
 * INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES
 WHICH ARE STILL QUEUEING 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.

*****END OF RUN*****

.SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

STREAM B-C

I	Intercept For	Slope For	Opposing	Slope For	Opposing	I
I	STREAM B-C	STREAM	A-C	STREAM	A-B	I
I	667.46		0.25		0.10	I

STREAM D-A

I	Intercept For	Slope For	Opposing	Slope For	Opposing	I
I	STREAM D-A	STREAM	C-A	STREAM	C-D	I
I	716.99		0.27		0.11	I

STREAM B-A

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM B-A	STREAM	A-C	STREAM	A-D	STREAM	D-A	I
I	561.74		0.25		0.25		0.25	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	A-B	STREAM	C-A	STREAM	C-B	I
I			0.10		0.16		0.35	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	C-D	STREAM	A-C	STREAM	A-D	I
I			0.10		0.16		0.37	I

STREAM D-C

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM D-C	STREAM	C-A	STREAM	C-B	STREAM	B-C	I
I	587.13		0.26		0.26		0.26	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	C-D	STREAM	A-C	STREAM	A-D	I
I			0.10		0.16		0.37	I

STREAM C-B

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM C-B	STREAM	A-B	STREAM	A-C	STREAM	A-D	I
I	718.74		0.27		0.27		0.38	I

STREAM A-D				
I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM A-D	STREAM C-A	STREAM C-B	STREAM C-D	I
I 718.74	0.27	0.38	0.27	I

B-D Stream From Left Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM A-C	STREAM A-D	STREAM A-B	STREAM C-B	I
I 561.74	0.25	0.25	0.10	0.35	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM C-A	STREAM C-D			I
I	0.16	0.16			I

B-D Stream From Right Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM A-C	STREAM A-D	STREAM A-B	STREAM C-B	I
I 561.74	0.25	0.25	0.10	0.35	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM C-A	STREAM C-D			I
I	0.16	0.16			I

D-B Stream From Left Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM D-B	STREAM C-A	STREAM C-B	STREAM C-D	STREAM A-D	I
I 587.13	0.26	0.26	0.10	0.37	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM A-C	STREAM A-B			I
I	0.16	0.16			I

D-B Stream From Right Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM C-A	STREAM C-B	STREAM C-D	STREAM A-D	I
I 587.13	0.26	0.26	0.10	0.37	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM A-C	STREAM A-B			I
I	0.16	0.16			I

TRAFFIC DEMAND DATA

I ARM	I	I FLOW	I SCALE(%)	I
I A	I	100		I
I B	I	100		I
I C	I	100		I
I D	I	100		I

Demand set: 2022 PM Peak Base

TIME PERIOD BEGINS 16.15 AND ENDS 17.45

LENGTH OF TIME PERIOD - 90 MIN.
LENGTH OF TIME SEGMENT - 15 MIN.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

I	I	I	NUMBER OF MINUTES FROM START WHEN			RATE OF FLOW (VEH/MIN)			I			
			I	I	I	I	I	I				
										I	I	I
ARM	FLOW STARTS	TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK					
A	15.00		45.00	75.00	9.76	14.64	9.76					
B	15.00		45.00	75.00	0.19	0.28	0.19					
C	15.00		45.00	75.00	7.49	11.23	7.49					
D	15.00		45.00	75.00	1.02	1.54	1.02					

Demand set: 2022 PM Peak Base

I I I I I	TIME	TURNING PROPORTIONS										I I I I I			
		TURNING COUNTS													
		(PERCENTAGE OF H.V.S)													
		FROM/TO	I	ARM	A	I	ARM	B	I	ARM	C		I	ARM	D
I	16.15 - 17.45	I		I		I		I		I		I		I	
I		I	ARM	A	I	0.000	I	0.013	I	0.967	I	0.020	I	I	
I		I		I	0.0	I	10.0	I	755.0	I	16.0	I	I		
I		I		I	(0.0)	I	(0.0)	I	(0.0)	I	(0.0)	I	I		
I		I		I		I		I		I		I	I		
I		I	I	ARM	B	I	0.467	I	0.000	I	0.533	I	0.000	I	
I		I	I		I	7.0	I	0.0	I	8.0	I	0.0	I	I	
I		I	I		I	(0.0)	I	(0.0)	I	(0.0)	I	(0.0)	I	I	
I		I	I		I		I		I		I		I	I	
I		I	I	I	ARM	C	I	0.982	I	0.005	I	0.000	I	0.013	I
I		I	I		I	588.0	I	3.0	I	0.0	I	8.0	I	I	
I		I	I		I	(0.0)	I	(0.0)	I	(0.0)	I	(0.0)	I	I	
I		I	I		I		I		I		I		I	I	
I		I	I	I	ARM	D	I	0.829	I	0.012	I	0.159	I	0.000	I
I		I	I		I	68.0	I	1.0	I	13.0	I	0.0	I	I	
I		I	I		I	(0.0)	I	(0.0)	I	(0.0)	I	(0.0)	I	I	
I	I	I		I		I		I		I		I	I		

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET 2022 PM Peak Base
AND FOR TIME PERIOD 2

I I I I I I I I I I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)	I I I I I I I I I I
16.15-16.30											
B-ACD		0.19	6.91	0.027		0.00	0.03	0.4		0.15	
A-B		0.13									
A-C		9.47									
A-D		0.20	9.97	0.020		0.00	0.02	0.3		0.10	
D-ABC		1.03	9.04	0.114		0.00	0.13	1.8		0.12	
C-D		0.10									
C-A		7.38									
C-B		0.04	9.35	0.004		0.00	0.00	0.1		0.11	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.30-16.45									
B-ACD	0.22	6.21	0.036		0.03	0.04	0.5		0.17
A-B	0.15								
A-C	11.31								
A-D	0.24	9.58	0.025		0.02	0.03	0.4		0.11
D-ABC	1.23	8.52	0.144		0.13	0.17	2.4		0.14
C-D	0.12								
C-A	8.81								
C-B	0.04	8.83	0.005		0.00	0.01	0.1		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
B-ACD	0.28	5.20	0.053		0.04	0.06	0.8		0.20
A-B	0.18								
A-C	13.85								
A-D	0.29	9.04	0.032		0.03	0.03	0.5		0.11
D-ABC	1.50	7.75	0.194		0.17	0.24	3.5		0.16
C-D	0.15								
C-A	10.79								
C-B	0.06	8.13	0.007		0.01	0.01	0.1		0.12

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
B-ACD	0.28	5.20	0.053		0.06	0.06	0.8		0.20
A-B	0.18								
A-C	13.85								
A-D	0.29	9.04	0.032		0.03	0.03	0.5		0.11
D-ABC	1.50	7.75	0.194		0.24	0.24	3.6		0.16
C-D	0.15								
C-A	10.79								
C-B	0.06	8.13	0.007		0.01	0.01	0.1		0.12

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.15-17.30									
B-ACD	0.22	6.21	0.036		0.06	0.04	0.6		0.17
A-B	0.15								
A-C	11.31								
A-D	0.24	9.58	0.025		0.03	0.03	0.4		0.11
D-ABC	1.23	8.52	0.144		0.24	0.17	2.6		0.14
C-D	0.12								
C-A	8.81								
C-B	0.04	8.83	0.005		0.01	0.01	0.1		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.30-17.45									
B-ACD	0.19	6.91	0.027		0.04	0.03	0.4		0.15
A-B	0.13								
A-C	9.47								
A-D	0.20	9.97	0.020		0.03	0.02	0.3		0.10
D-ABC	1.03	9.04	0.114		0.17	0.13	2.0		0.12
C-D	0.10								
C-A	7.38								
C-B	0.04	9.35	0.004		0.01	0.00	0.1		0.11

QUEUE FOR STREAM B-ACD	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
16.30	0.0
16.45	0.0
17.00	0.1
17.15	0.1
17.30	0.0
17.45	0.0

QUEUE FOR STREAM A-D	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
16.30	0.0
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0

QUEUE FOR STREAM D-ABC	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
16.30	0.1
16.45	0.2
17.00	0.2
17.15	0.2
17.30	0.2
17.45	0.1

QUEUE FOR STREAM C-B	
TIME	NO. OF
SEGMENT	VEHICLES
ENDING	IN QUEUE
16.30	0.0
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	STREAM	I	TOTAL DEMAND	I	* QUEUEING *	I	* INCLUSIVE QUEUEING *	I	
I	I	I	I	I	* DELAY *	I	* DELAY *	I	
I	I	I	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)	
I	B-ACD	I	20.6	I	13.8	I	3.6	I	0.17
I	A-B	I	13.8	I	9.2	I		I	
I	A-C	I	1039.2	I	692.8	I		I	
I	A-D	I	22.0	I	14.7	I	2.4	I	0.11
I	D-ABC	I	112.9	I	75.2	I	15.9	I	0.14
I	C-D	I	11.0	I	7.3	I		I	
I	C-A	I	809.3	I	539.6	I		I	
I	C-B	I	4.1	I	2.8	I	0.5	I	0.12
I	ALL	I	2033.0	I	1355.3	I	22.4	I	0.01

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD
 * INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES
 WHICH ARE STILL QUEUEING 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.

*****END OF RUN*****

.SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

STREAM B-C

I	Intercept For	Slope For Opposing	Slope For Opposing	I
I	STREAM B-C	STREAM A-C	STREAM A-B	I
I	667.46	0.25	0.10	I

STREAM D-A

I	Intercept For	Slope For Opposing	Slope For Opposing	I
I	STREAM D-A	STREAM C-A	STREAM C-D	I
I	716.99	0.27	0.11	I

STREAM B-A

I	Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM B-A	STREAM A-C	STREAM A-D	STREAM D-A	STREAM D-B	I
I	561.74	0.25	0.25	0.25	0.25	I
I		Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I		STREAM A-B	STREAM C-A	STREAM C-B	STREAM D-C	I
I		0.10	0.16	0.35	0.12	I

STREAM D-C

I	Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM D-C	STREAM C-A	STREAM C-B	STREAM B-C	STREAM B-D	I
I	587.13	0.26	0.26	0.26	0.26	I
I		Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I		STREAM C-D	STREAM A-C	STREAM A-D	STREAM B-A	I
I		0.10	0.16	0.37	0.13	I

STREAM C-B

I	Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM C-B	STREAM A-B	STREAM A-C	STREAM A-D	I
I	718.74	0.27	0.27	0.38	I

STREAM A-D				
I Intercept For I STREAM A-D	Slope For Opposing STREAM C-A	Slope For Opposing STREAM C-B	Slope For Opposing STREAM C-D	I
I 718.74	0.27	0.38	0.27	I

B-D Stream From Left Hand Lane

I Intercept For I STREAM B-D	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-D	Slope For Opposing STREAM A-B	Slope For Opposing STREAM C-B	I
I 561.74	0.25	0.25	0.10	0.35	I
I	Slope For Opposing STREAM C-A	Slope For Opposing STREAM C-D	Slope For Opposing	Slope For Opposing	I
I	0.16	0.16			I

B-D Stream From Right Hand Lane

I Intercept For I STREAM B-D	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-D	Slope For Opposing STREAM A-B	Slope For Opposing STREAM C-B	I
I 561.74	0.25	0.25	0.10	0.35	I
I	Slope For Opposing STREAM C-A	Slope For Opposing STREAM C-D	Slope For Opposing	Slope For Opposing	I
I	0.16	0.16			I

D-B Stream From Left Hand Lane

I Intercept For I STREAM D-B	Slope For Opposing STREAM C-A	Slope For Opposing STREAM C-B	Slope For Opposing STREAM C-D	Slope For Opposing STREAM A-D	I
I 587.13	0.26	0.26	0.10	0.37	I
I	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B	Slope For Opposing	Slope For Opposing	I
I	0.16	0.16			I

D-B Stream From Right Hand Lane

I Intercept For I STREAM B-D	Slope For Opposing STREAM C-A	Slope For Opposing STREAM C-B	Slope For Opposing STREAM C-D	Slope For Opposing STREAM A-D	I
I 587.13	0.26	0.26	0.10	0.37	I
I	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B	Slope For Opposing	Slope For Opposing	I
I	0.16	0.16			I

TRAFFIC DEMAND DATA

I ARM	I	I FLOW	I SCALE(%)	I
I A	I	100		I
I B	I	100		I
I C	I	100		I
I D	I	100		I

Demand set: 2022 AM Peak with Development

TIME PERIOD BEGINS 07.30 AND ENDS 09.00

LENGTH OF TIME PERIOD - 90 MIN.
LENGTH OF TIME SEGMENT - 15 MIN.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

I	I	NUMBER OF MINUTES FROM START WHEN			RATE OF FLOW (VEH/MIN)			I
		I FLOW STARTS	I TOP OF PEAK	I FLOW STOPS	I BEFORE	I AT TOP	I AFTER	
I	I	I TO RISE	I IS REACHED	I FALLING	I PEAK	I OF PEAK	I PEAK	I
I	I	I	I	I	I	I	I	I
I ARM A	I	15.00	I 45.00	I 75.00	I 7.32	I 10.99	I 7.32	I
I ARM B	I	15.00	I 45.00	I 75.00	I 0.35	I 0.52	I 0.35	I
I ARM C	I	15.00	I 45.00	I 75.00	I 9.68	I 14.51	I 9.68	I
I ARM D	I	15.00	I 45.00	I 75.00	I 1.11	I 1.67	I 1.11	I

Demand set: 2022 AM Peak with Development

I I I I I	TIME	TURNING PROPORTIONS										I I I
		TURNING COUNTS										
		(PERCENTAGE OF H.V.S)										
		FROM/TO	ARM	A	ARM	B	ARM	C	ARM	D		
I	07.30 - 09.00											
I		ARM	A	0.000		0.015		0.947		0.038		
I				0.0		9.0		555.0		22.0		
I				(0.0)		(0.0)		(0.0)		(0.0)		
I												
I		ARM	B	0.571		0.000		0.429		0.000		
I				16.0		0.0		12.0		0.0		
I				(0.0)		(0.0)		(0.0)		(0.0)		
I												
I		ARM	C	0.963		0.017		0.000		0.021		
I				745.0		13.0		0.0		16.0		
I				(0.0)		(0.0)		(0.0)		(0.0)		
I												
I		ARM	D	0.573		0.000		0.427		0.000		
I				51.0		0.0		38.0		0.0		
I				(0.0)		(0.0)		(0.0)		(0.0)		
I												

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET 2022 AM Peak with Development
AND FOR TIME PERIOD 1

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)	I
I	07.30-07.45										I
I	B-ACD	0.35	6.96	0.050		0.00	0.05	0.8		0.15	I
I	A-B	0.11									I
I	A-C	6.96									I
I	A-D	0.28	9.37	0.029		0.00	0.03	0.4		0.11	I
I	D-ABC	1.12	7.59	0.147		0.00	0.17	2.5		0.15	I
I	C-D	0.20									I
I	C-A	9.35									I
I	C-B	0.16	9.99	0.016		0.00	0.02	0.2		0.10	I

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.45-08.00									
B-ACD	0.42	6.31	0.066		0.05	0.07	1.0		0.17
A-B	0.13								
A-C	8.32								
A-D	0.33	8.87	0.037		0.03	0.04	0.6		0.12
D-ABC	1.33	6.90	0.193		0.17	0.24	3.4		0.18
C-D	0.24								
C-A	11.16								
C-B	0.19	9.60	0.020		0.02	0.02	0.3		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.00-08.15									
B-ACD	0.51	5.37	0.096		0.07	0.10	1.5		0.21
A-B	0.17								
A-C	10.18								
A-D	0.40	8.17	0.049		0.04	0.05	0.8		0.13
D-ABC	1.63	5.90	0.277		0.24	0.37	5.4		0.23
C-D	0.29								
C-A	13.67								
C-B	0.24	9.07	0.026		0.02	0.03	0.4		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.15-08.30									
B-ACD	0.51	5.37	0.096		0.10	0.11	1.6		0.21
A-B	0.17								
A-C	10.18								
A-D	0.40	8.17	0.049		0.05	0.05	0.8		0.13
D-ABC	1.63	5.90	0.277		0.37	0.38	5.7		0.23
C-D	0.29								
C-A	13.67								
C-B	0.24	9.07	0.026		0.03	0.03	0.4		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
B-ACD	0.42	6.31	0.067		0.11	0.07	1.1		0.17
A-B	0.13								
A-C	8.32								
A-D	0.33	8.87	0.037		0.05	0.04	0.6		0.12
D-ABC	1.33	6.90	0.193		0.38	0.24	3.8		0.18
C-D	0.24								
C-A	11.16								
C-B	0.19	9.60	0.020		0.03	0.02	0.3		0.11

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.45-09.00									
B-ACD	0.35	6.96	0.050		0.07	0.05	0.8		0.15
A-B	0.11								
A-C	6.96								
A-D	0.28	9.37	0.029		0.04	0.03	0.5		0.11
D-ABC	1.12	7.59	0.147		0.24	0.17	2.7		0.15
C-D	0.20								
C-A	9.35								
C-B	0.16	9.99	0.016		0.02	0.02	0.3		0.10

QUEUE FOR STREAM	B-ACD
TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.45	0.1
08.00	0.1
08.15	0.1
08.30	0.1
08.45	0.1
09.00	0.1

QUEUE FOR STREAM	A-D
TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.45	0.0
08.00	0.0
08.15	0.1
08.30	0.1
08.45	0.0
09.00	0.0

QUEUE FOR STREAM	D-ABC
TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.45	0.2
08.00	0.2
08.15	0.4
08.30	0.4
08.45	0.2
09.00	0.2

QUEUE FOR STREAM	C-B
TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.45	0.0
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	STREAM	I	TOTAL	I	DEMAND	I	* QUEUEING *	I	* INCLUSIVE QUEUEING *	I
I		I		I		I	* DELAY *	I	* DELAY *	I
I		I	(VEH)	I	(VEH/H)	I	(MIN)	I	(MIN)	I
I		I		I		I	(MIN/VEH)	I	(MIN/VEH)	I
I	B-ACD	I	38.5	I	25.7	I	6.8	I	6.8	I
I	A-B	I	12.4	I	8.3	I		I		I
I	A-C	I	763.9	I	509.3	I		I		I
I	A-D	I	30.3	I	20.2	I	3.6	I	3.6	I
I	D-ABC	I	122.5	I	81.7	I	23.4	I	23.4	I
I	C-D	I	22.0	I	14.7	I		I		I
I	C-A	I	1025.4	I	683.6	I		I		I
I	C-B	I	17.9	I	11.9	I	1.9	I	1.9	I
I	ALL	I	2033.0	I	1355.3	I	35.7	I	35.7	I

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD
 * INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES
 WHICH ARE STILL QUEUEING 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.

*****END OF RUN*****

.SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

STREAM B-C

I	Intercept For	Slope For	Opposing	Slope For	Opposing	I
I	STREAM B-C	STREAM	A-C	STREAM	A-B	I
I	667.46		0.25		0.10	I

STREAM D-A

I	Intercept For	Slope For	Opposing	Slope For	Opposing	I
I	STREAM D-A	STREAM	C-A	STREAM	C-D	I
I	716.99		0.27		0.11	I

STREAM B-A

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM B-A	STREAM	A-C	STREAM	A-D	STREAM	D-A	I
I	561.74		0.25		0.25		0.25	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	A-B	STREAM	C-A	STREAM	C-B	I
I			0.10		0.16		0.35	I

STREAM D-C

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM D-C	STREAM	C-A	STREAM	C-B	STREAM	B-C	I
I	587.13		0.26		0.26		0.26	I
I		Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I		STREAM	C-D	STREAM	A-C	STREAM	A-D	I
I			0.10		0.16		0.37	I

STREAM C-B

I	Intercept For	Slope For	Opposing	Slope For	Opposing	Slope For	Opposing	I
I	STREAM C-B	STREAM	A-B	STREAM	A-C	STREAM	A-D	I
I	718.74		0.27		0.27		0.38	I

STREAM A-D				
I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM A-D	STREAM C-A	STREAM C-B	STREAM C-D	I
I 718.74	0.27	0.38	0.27	I

B-D Stream From Left Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM A-C	STREAM A-D	STREAM A-B	STREAM C-B	I
I 561.74	0.25	0.25	0.10	0.35	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM C-A	STREAM C-D			I
I	0.16	0.16			I

B-D Stream From Right Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM A-C	STREAM A-D	STREAM A-B	STREAM C-B	I
I 561.74	0.25	0.25	0.10	0.35	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM C-A	STREAM C-D			I
I	0.16	0.16			I

D-B Stream From Left Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM D-B	STREAM C-A	STREAM C-B	STREAM C-D	STREAM A-D	I
I 587.13	0.26	0.26	0.10	0.37	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM A-C	STREAM A-B			I
I	0.16	0.16			I

D-B Stream From Right Hand Lane

I Intercept For	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I STREAM B-D	STREAM C-A	STREAM C-B	STREAM C-D	STREAM A-D	I
I 587.13	0.26	0.26	0.10	0.37	I
I	Slope For Opposing	Slope For Opposing	Slope For Opposing	Slope For Opposing	I
I	STREAM A-C	STREAM A-B			I
I	0.16	0.16			I

TRAFFIC DEMAND DATA

I ARM	I	I FLOW	I SCALE(%)	I
I A	I	100		I
I B	I	100		I
I C	I	100		I
I D	I	100		I

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.30-16.45									
B-ACD	0.22	6.24	0.036		0.03	0.04	0.5		0.17
A-B	0.15								
A-C	11.31								
A-D	0.67	9.48	0.071		0.06	0.08	1.1		0.11
D-ABC	0.72	7.08	0.102		0.08	0.11	1.6		0.16
C-D	0.52								
C-A	8.81								
C-B	0.04	8.67	0.005		0.00	0.01	0.1		0.12

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
B-ACD	0.28	5.24	0.053		0.04	0.05	0.8		0.20
A-B	0.18								
A-C	13.85								
A-D	0.83	8.91	0.093		0.08	0.10	1.5		0.12
D-ABC	0.88	6.09	0.145		0.11	0.17	2.4		0.19
C-D	0.64								
C-A	10.79								
C-B	0.06	7.92	0.007		0.01	0.01	0.1		0.13

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
B-ACD	0.28	5.24	0.053		0.05	0.06	0.8		0.20
A-B	0.18								
A-C	13.85								
A-D	0.83	8.91	0.093		0.10	0.10	1.5		0.12
D-ABC	0.88	6.09	0.145		0.17	0.17	2.5		0.19
C-D	0.64								
C-A	10.79								
C-B	0.06	7.92	0.007		0.01	0.01	0.1		0.13

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.15-17.30									
B-ACD	0.22	6.24	0.036		0.06	0.04	0.6		0.17
A-B	0.15								
A-C	11.31								
A-D	0.67	9.48	0.071		0.10	0.08	1.2		0.11
D-ABC	0.72	7.08	0.102		0.17	0.11	1.8		0.16
C-D	0.52								
C-A	8.81								
C-B	0.04	8.67	0.005		0.01	0.01	0.1		0.12

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.30-17.45									
B-ACD	0.19	6.93	0.027		0.04	0.03	0.4		0.15
A-B	0.13								
A-C	9.47								
A-D	0.56	9.88	0.057		0.08	0.06	0.9		0.11
D-ABC	0.60	7.75	0.078		0.11	0.09	1.3		0.14
C-D	0.44								
C-A	7.38								
C-B	0.04	9.21	0.004		0.01	0.00	0.1		0.11

QUEUE FOR STREAM B-ACD	
TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.30	0.0
16.45	0.0
17.00	0.1
17.15	0.1
17.30	0.0
17.45	0.0

QUEUE FOR STREAM A-D	
TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.30	0.1
16.45	0.1
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1

QUEUE FOR STREAM D-ABC	
TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.30	0.1
16.45	0.1
17.00	0.2
17.15	0.2
17.30	0.1
17.45	0.1

QUEUE FOR STREAM C-B	
TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.30	0.0
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	STREAM	I	TOTAL DEMAND	I	* QUEUEING *	I	* INCLUSIVE QUEUEING *	I
I	I	I	I	I	* DELAY *	I	* DELAY *	I
I	I	I	I	I	I	I	I	I
I	I	I	(VEH)	I	(VEH/H)	I	(MIN)	I
I	I	I	(VEH/H)	I	(MIN)	I	(MIN/VEH)	I
I	B-ACD	I	20.6	I	13.8	I	3.6	I
I	A-B	I	13.8	I	9.2	I	0.17	I
I	A-C	I	1039.2	I	692.8	I	3.6	I
I	A-D	I	61.9	I	41.3	I	0.17	I
I	D-ABC	I	66.1	I	44.0	I	7.1	I
I	C-D	I	48.2	I	32.1	I	0.11	I
I	C-A	I	809.3	I	539.6	I	0.16	I
I	C-B	I	4.1	I	2.8	I	10.8	I
I	ALL	I	2063.3	I	1375.5	I	0.16	I
I		I		I		I	0.11	I
I		I		I		I	0.16	I
I		I		I		I	0.12	I
I		I		I		I	0.12	I
I		I		I		I	0.01	I
I		I		I		I	0.01	I

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD
 * INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES
 WHICH ARE STILL QUEUEING 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.

*****END OF RUN*****

===== end of file =====

Appendix H

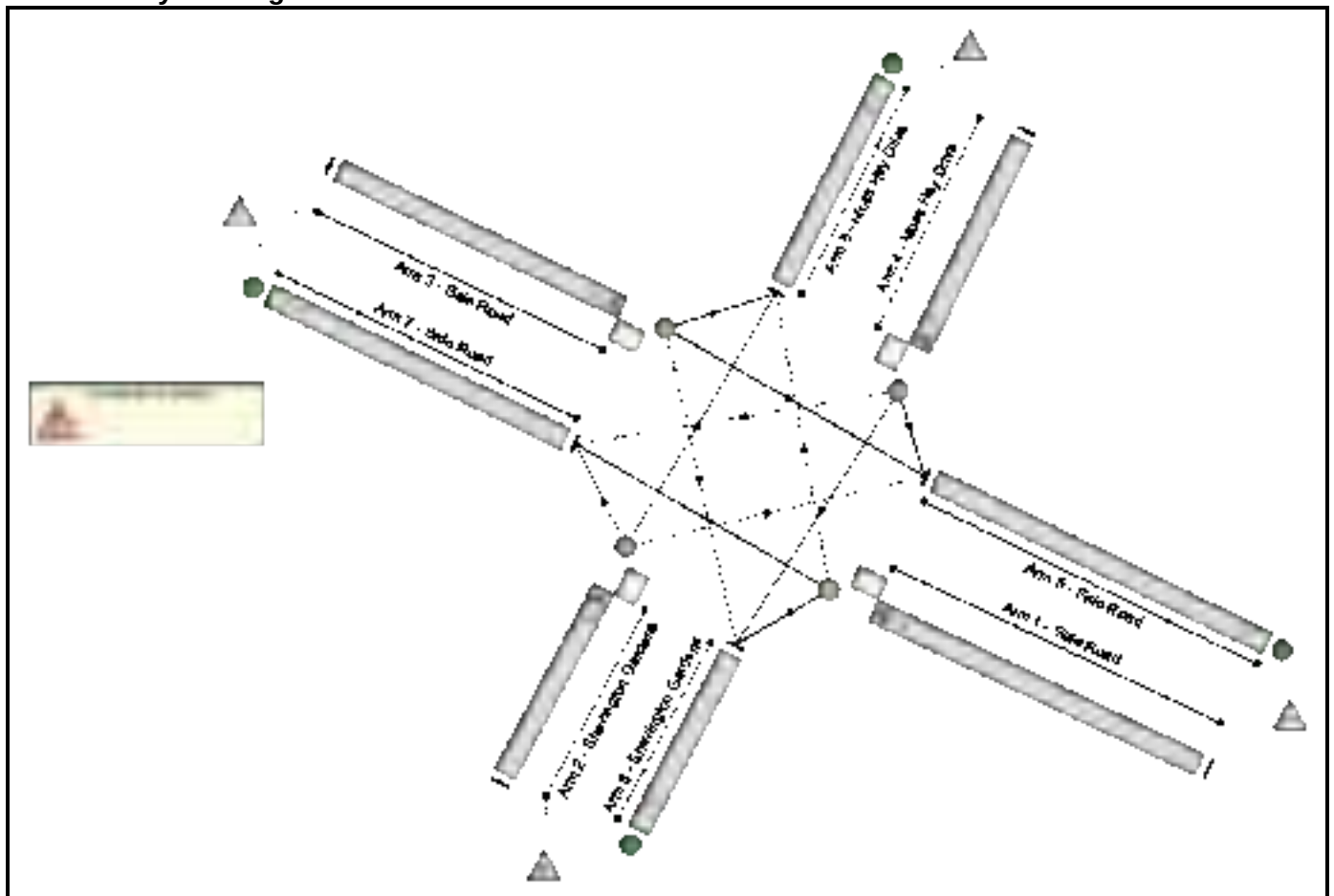
Full Input Data And Results

Full Input Data And Results

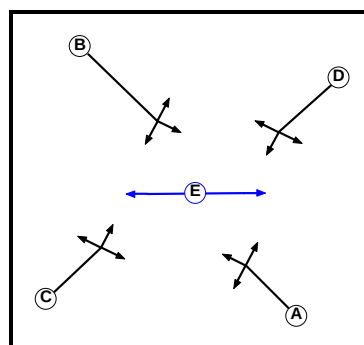
User and Project Details

Project:	Manchester College Northenden Campus
Title:	Sale Road / Moss Hey Drive
Location:	
Company:	SK
Address:	
Notes:	Traffic Signal Option

Junction Layout Diagram



Phase Diagram



Phase Input Data

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

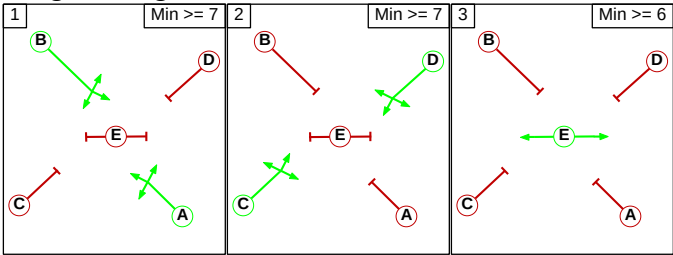
Phase Intergreens Matrix

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

Phases in Stage

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

Stages Diagram



Phase Delays

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

Prohibited Stage Changes

From Stage	To Stage		
	1	2	3
	1	6	8
	2	5	8

Give-Way Link Input Data

Junction: Unnamed Junction											
Lane	Movement	Max Flow when Giving Way (PCU/Hr)	Min Flow when Giving Way (PCU/Hr)	Opposing Lane	Opp. Lane Coeff.	Opp. Mvmnts.	Right Turn Storage (PCU)	Non-Blocking Storage (PCU)	RTF	Right Turn Move up (s)	Max Turns in Intergreen (PCU)
1/1 (Sale Road)	8/1 (Right)	1439	0	3/1	1.09	To 5/1 (Ahead) To 8/1 (Left)	2.00	2.00	0.50	2	2.00
2/1 (Shevington Gardens)	5/1 (Right)	1439	0	4/1	1.09	To 5/1 (Left) To 6/1 (Ahead)	2.00	2.00	0.50	2	2.00
3/1 (Sale Road)	6/1 (Right)	1439	0	1/1	1.09	To 6/1 (Left) To 7/1 (Ahead)	2.00	2.00	0.50	2	2.00
4/1 (Moss Hey Drive)	7/1 (Right)	1439	0	2/1	1.09	To 7/1 (Left) To 8/1 (Ahead)	2.00	2.00	0.50	2	2.00

Lane Input Data

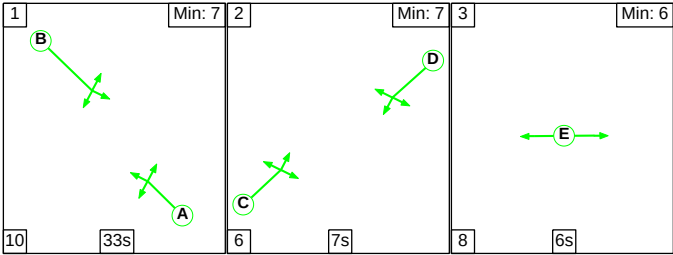
Junction: Unnamed Junction												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Sale Road)	O	A	2	3	60.0	Geom	-	3.50	0.00	Y	Arm 6 Left	8.00
											Arm 7 Ahead	Inf
											Arm 8 Right	10.00
											Arm 5 Right	10.00
2/1 (Shevington Gardens)	O	C	2	3	60.0	Geom	-	2.50	0.00	Y	Arm 7 Left	10.00
											Arm 8 Ahead	Inf
											Arm 5 Ahead	Inf
											Arm 6 Right	10.00
3/1 (Sale Road)	O	B	2	3	60.0	Geom	-	3.90	0.00	Y	Arm 8 Left	6.00
											Arm 5 Left	8.00
											Arm 6 Ahead	Inf
											Arm 7 Right	10.00
4/1 (Moss Hey Drive)	O	D	2	3	60.0	Geom	-	3.25	0.00	Y		
5/1 (Sale Road)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (Shevington Gardens)	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1 (Sale Road)	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1 (Moss Hey Drive)	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2022 AM Peak Base'	07:45	08:45	01:00	

Scenario 1: '2022 AM Peak Base' (FG1: '2022 AM Peak Base', Plan 1: 'Network Control Plan 1')

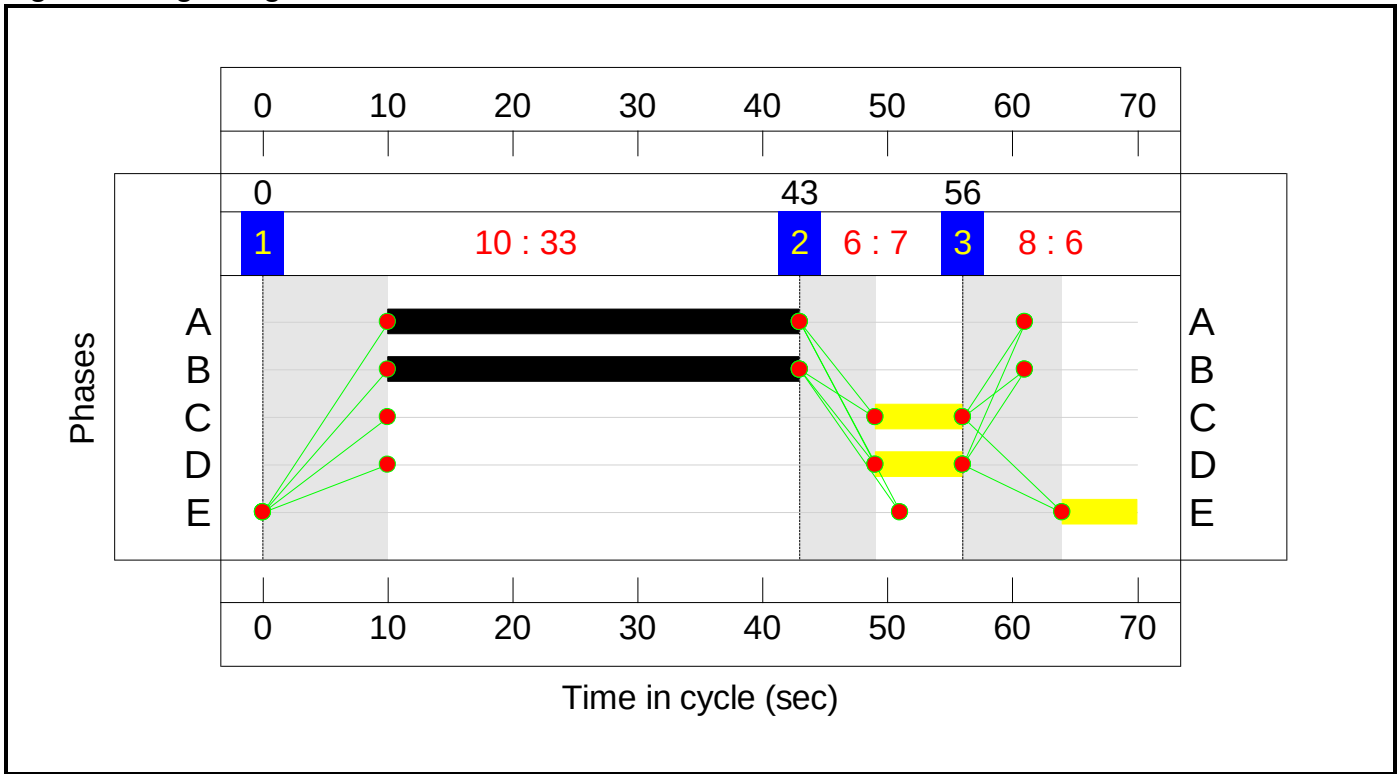
Staging Plan Diagram



Stage Timings

Stage	1	2	3
Duration	33	7	6
Change Point	0	43	56

Signal Timings Diagram



Link Results

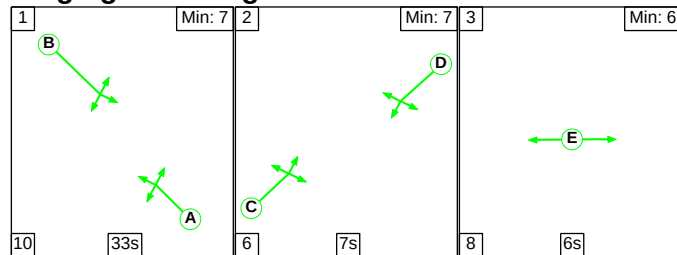
Full Input Data And Results

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
2: '2022 PM Peak Base'	16:30	17:30	01:00	

Scenario 2: '2022 PM Peak Base' (FG2: '2022 PM Peak Base', Plan 1: 'Network Control Plan 1')

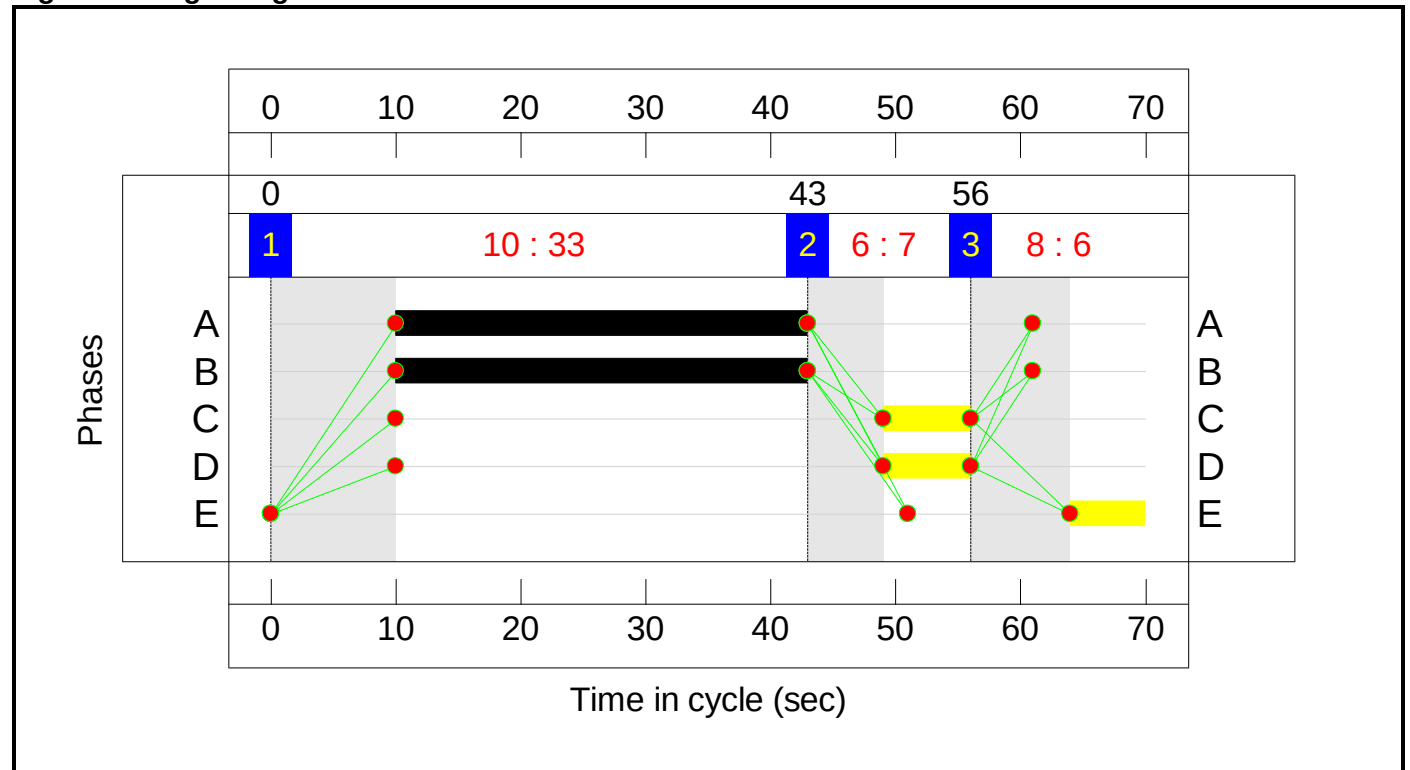
Staging Plan Diagram



Stage Timings

Stage	1	2	3
Duration	33	7	6
Change Point	0	43	56

Signal Timings Diagram



Link Results

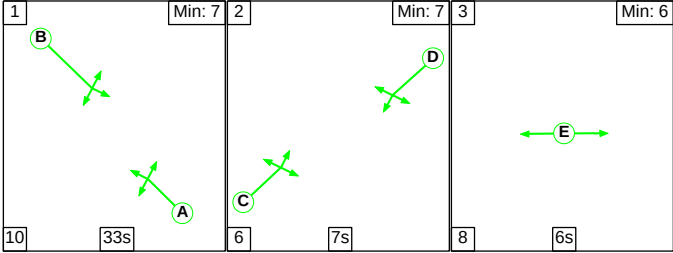
Full Input Data And Results

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
3: '2022 AM Peak with Development'	07:45	08:45	01:00	

Scenario 3: '2022 AM Peak with Development' (FG3: '2022 AM Peak with Development', Plan 1: 'Network Control Plan 1')

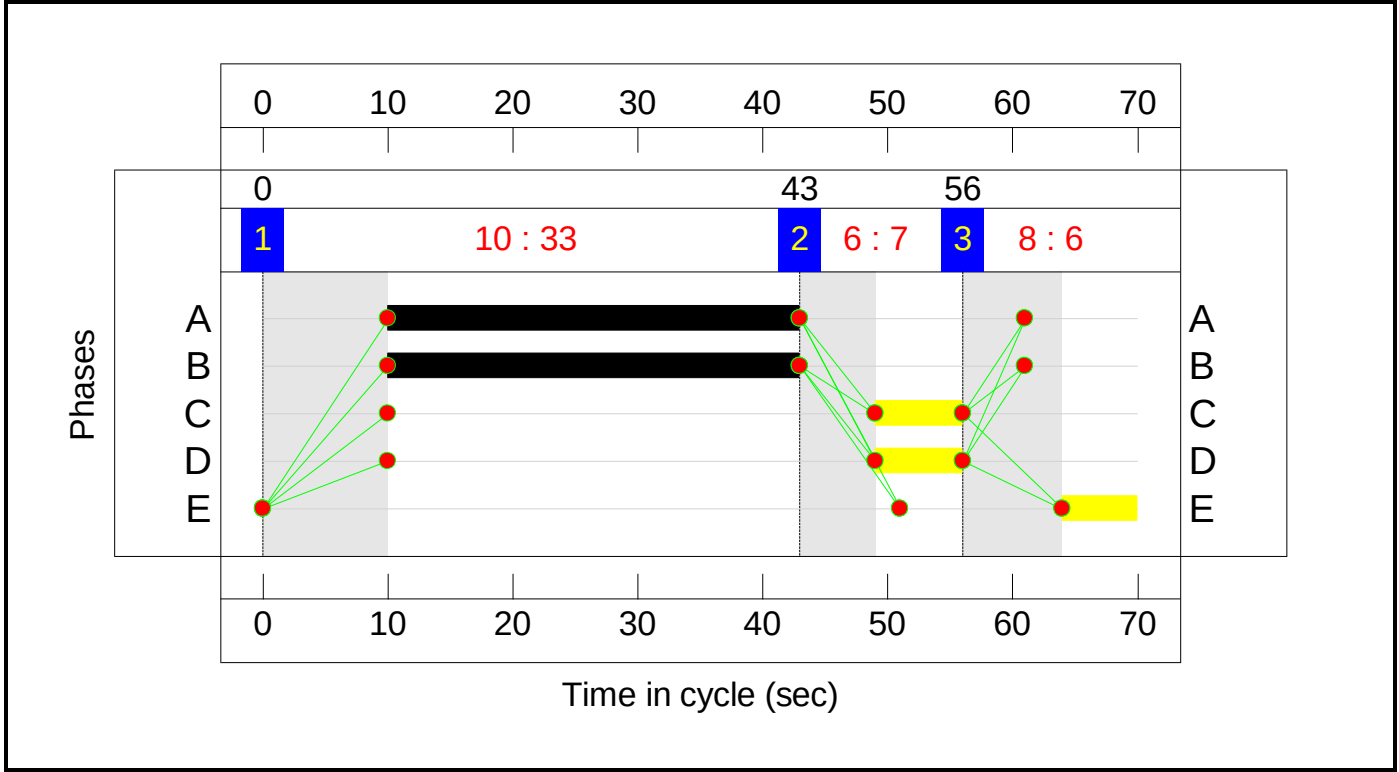
Staging Plan Diagram



Stage Timings

Stage	1	2	3
Duration	33	7	6
Change Point	0	43	56

Signal Timings Diagram



Link Results

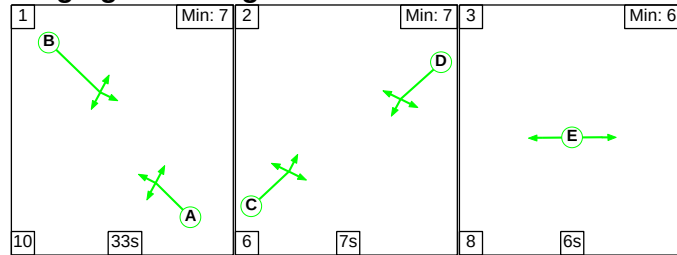
Full Input Data And Results

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
4: '2022 PM Peak with Development'	16:30	17:30	01:00	

Scenario 4: '2022 PM Peak with Development' (FG4: '2022 PM Peak with Development', Plan 1: 'Network Control Plan 1')

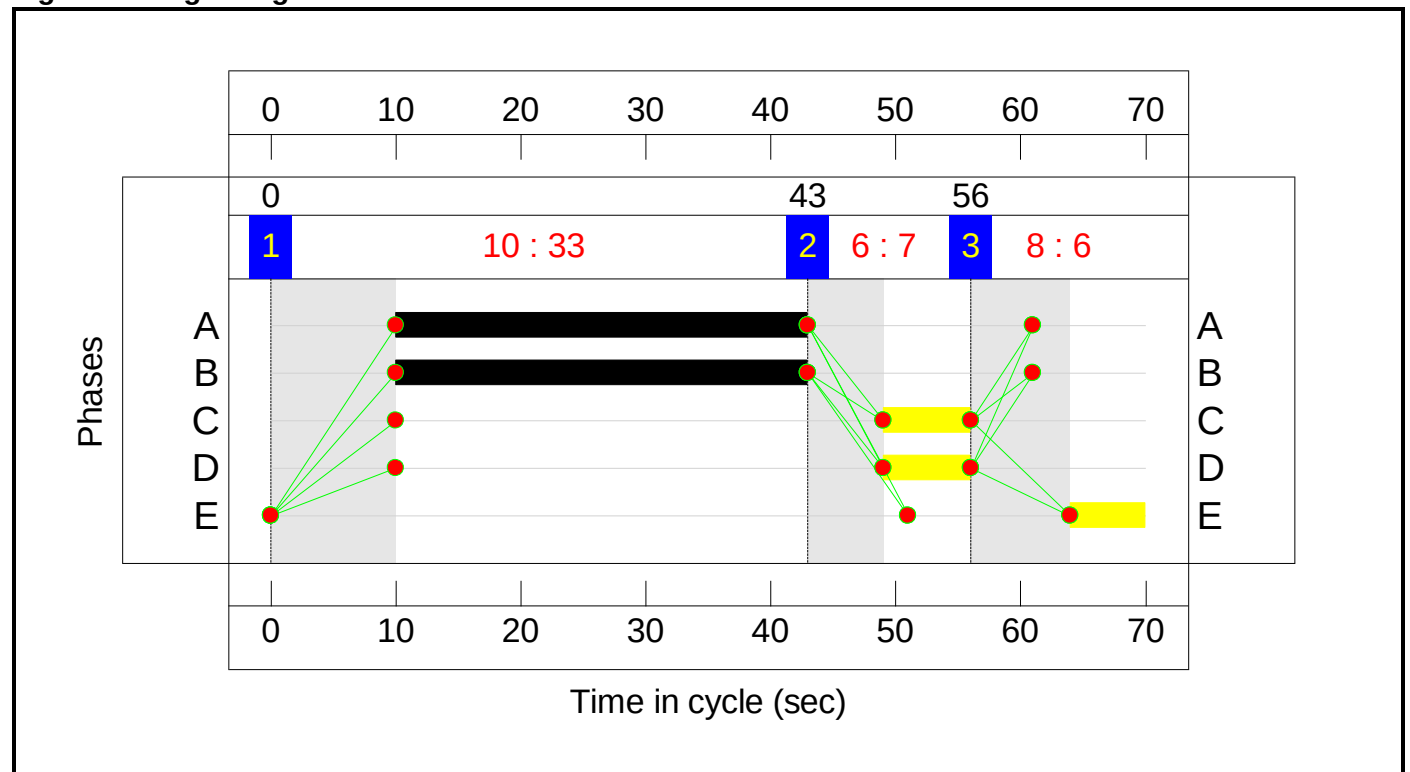
Staging Plan Diagram



Stage Timings

Stage	1	2	3
Duration	33	7	6
Change Point	0	43	56

Signal Timings Diagram



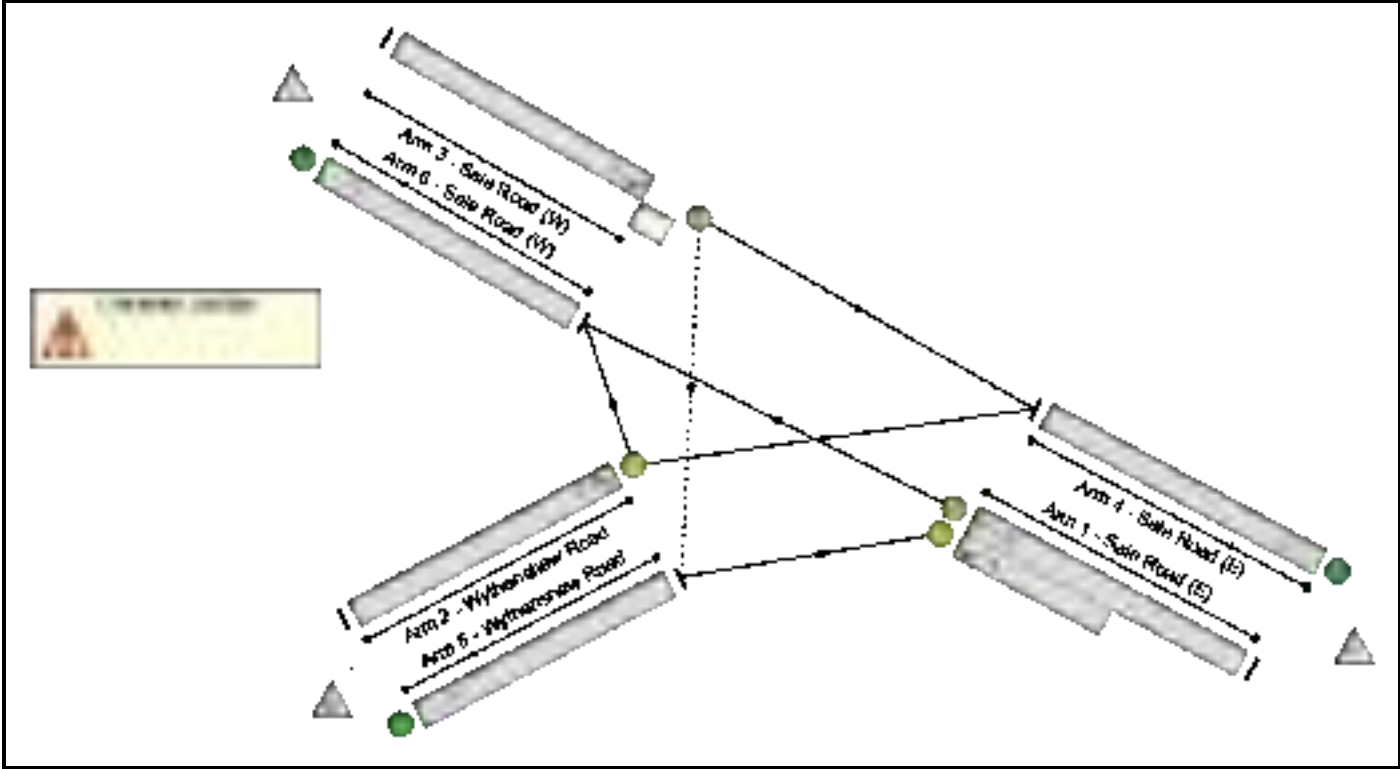
Link Results

Appendix I

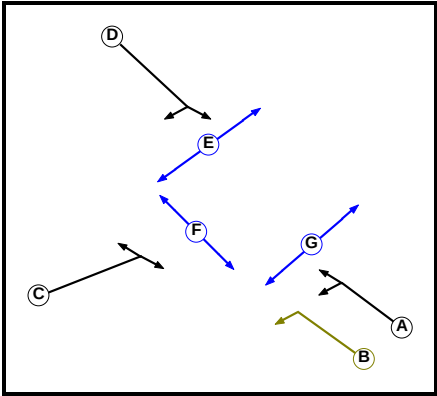
User and Project Details

Project:	Manchester College - Northendedn Campus
Title:	Sale Road / Wythenshaw Road
Location:	
Company:	SK
Address:	
Notes:	Existing Junction - GMUTC Settings

Junction Layout Diagram



Phase Diagram



Full Input Data And Results

Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Filter	A	0	0
C	Traffic		7	7
D	Traffic		7	7
E	Pedestrian		5	5
F	Pedestrian		8	8
G	Pedestrian		7	7

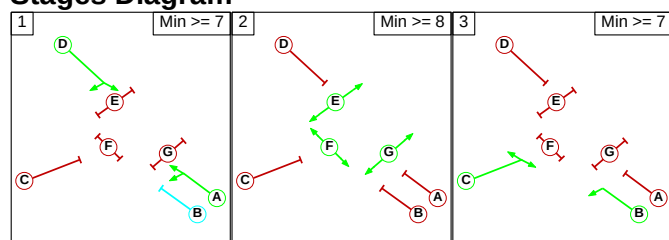
Phase Intergreens Matrix

Terminating Phase	Starting Phase							
		A	B	C	D	E	F	G
	A		-	5	-	8	8	5
	B	-		-	-	8	8	5
	C	6	-		5	8	5	7
	D	-	-	6		5	10	8
	E	5	5	5	5		-	-
	F	9	9	9	9	-		-
	G	12	12	12	12	-	-	

Phases in Stage

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

Stages Diagram



Phase Delays

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

Prohibited Stage Changes

		To Stage		
From Stage		1	2	3
	1		10	6
	2	12		12
	3	6	X	

Give-Way Link Input Data

Junction: Unnamed Junction											
Lane	Movement	Max Flow when Giving Way (PCU/Hr)	Min Flow when Giving Way (PCU/Hr)	Opposing Lane	Opp. Lane Coeff.	Opp. Mvmnts.	Right Turn Storage (PCU)	Non-Blocking Storage (PCU)	RTF	Right Turn Move up (s)	Max Turns in Intergreen (PCU)
3/1 (Sale Road (W))	5/1 (Right)	1439	0	1/1	1.09	All	2.00	2.00	0.50	2	2.00
				1/2	1.09	All					

Lane Input Data

Junction: Unnamed Junction												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Sale Road (E))	U	A B	2	3	8.7	Geom	-	3.50	0.00	Y	Arm 5 Left	45.00
1/2 (Sale Road (E))	U	A	2	3	60.0	Geom	-	3.00	0.00	N	Arm 6 Ahead	Inf
2/1 (Wythenshaw Road)	U	C	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 4 Right	40.00
											Arm 6 Left	7.50
3/1 (Sale Road (W))	O	D	2	3	60.0	Geom	-	3.50	0.00	Y	Arm 4 Ahead	Inf
											Arm 5 Right	8.00
4/1 (Sale Road (E))	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1 (Wythenshaw Road)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (Sale Road (W))	U		2	3	60.0	Inf	-	-	-	-	-	-

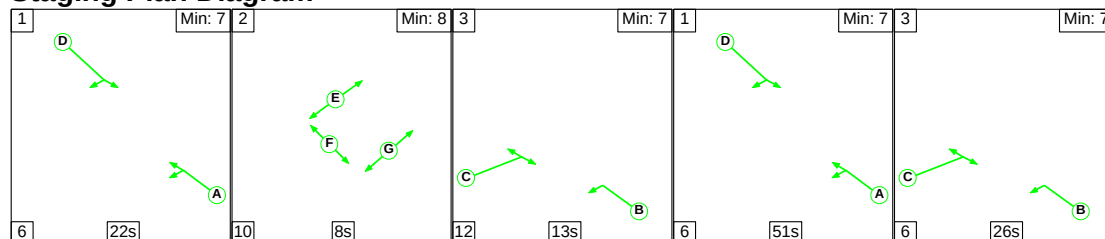
Full Input Data And Results

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2017 AM Peak Observed'	07:45	08:45	01:00	

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

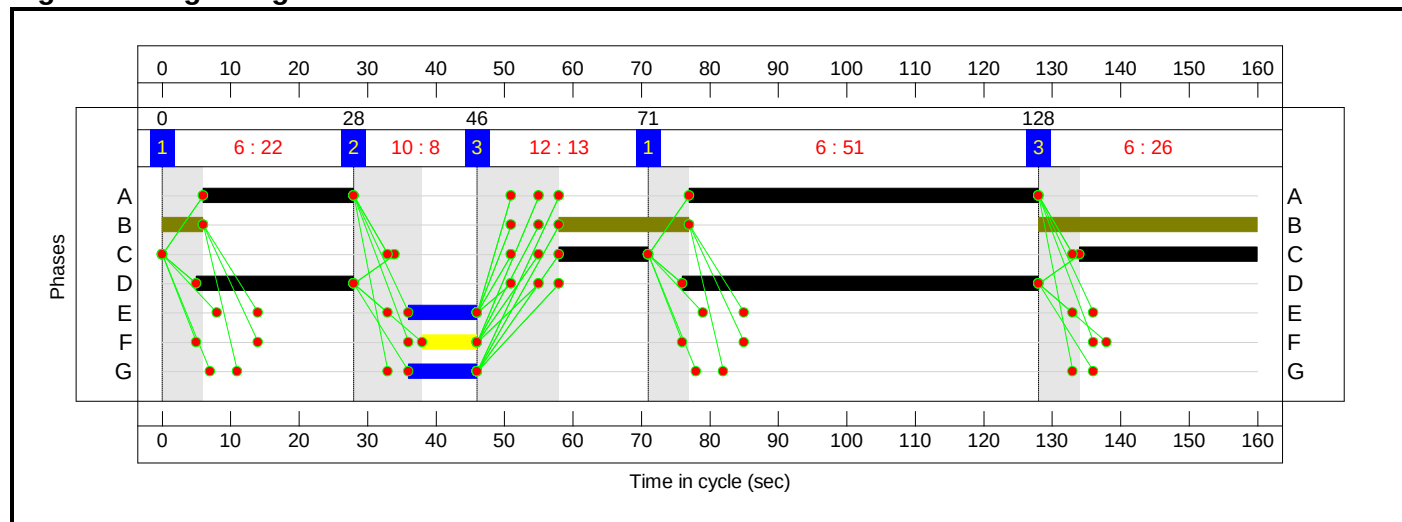
Staging Plan Diagram



Stage Timings

Stage	1	2	3	1	3
Duration	22	8	13	51	26
Change Point	0	28	46	71	128

Signal Timings Diagram



Full Input Data And Results

Link Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Sale Road / Wythenshaw Road	-	-	N/A	-	-		-	-	-	-	-	-	76.8%
Unnamed Junction	-	-	N/A	-	-		-	-	-	-	-	-	76.8%
1/2+1/1	Sale Road (E) Left Ahead	U	N/A	N/A	A	B	2	73:130	57	827	2055:1902	794+338	73.0 : 73.0%
2/1	Wythenshaw Road Right Left	U	N/A	N/A	C		2	39	-	358	1840	471	75.9%
3/1	Sale Road (W) Ahead Right	O	N/A	N/A	D		2	75	-	726	1964	945	76.8%
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Sale Road / Wythenshaw Road	-	-	1	0	0	9.1	4.5	0.0	13.6	-	-	-	-
Unnamed Junction	-	-	1	0	0	9.1	4.5	0.0	13.6	-	-	-	-
1/2+1/1	827	827	-	-	-	2.8	1.3	-	4.2	18.1	12.1	1.3	13.5
2/1	358	358	-	-	-	2.7	1.5	-	4.3	43.0	7.6	1.5	9.1
3/1	726	726	1	0	0	3.5	1.6	0.0	5.1	25.5	14.9	1.6	16.6
C1													

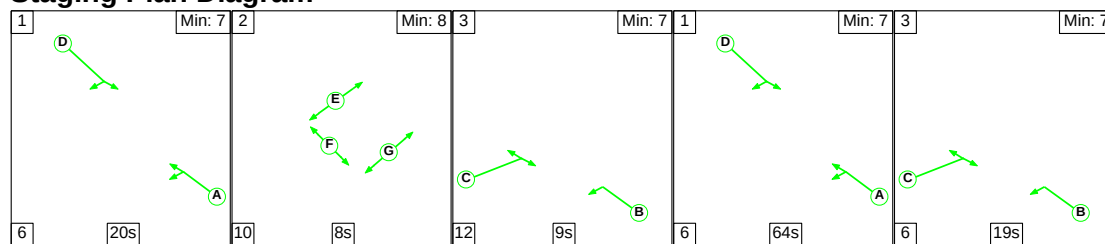
Full Input Data And Results

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
2: '2017 PM Peak Observed'	16:30	17:30	01:00	

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

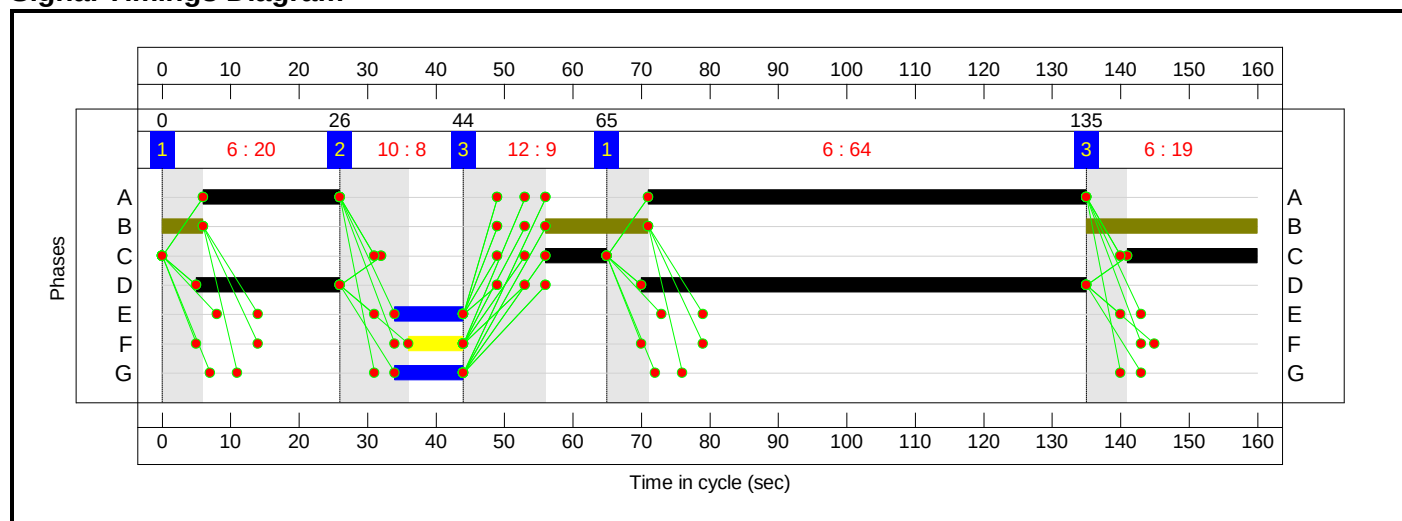
Staging Plan Diagram



Stage Timings

Stage	1	2	3	1	3
Duration	20	8	9	64	19
Change Point	0	26	44	65	135

Signal Timings Diagram



Full Input Data And Results

Link Results

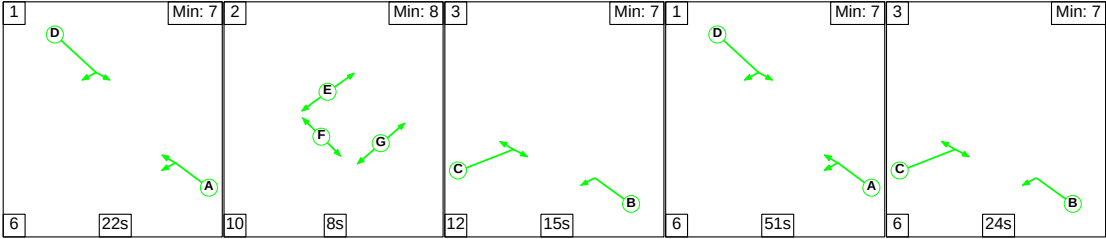
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Sale Road / Wythenshaw Road	-	-	N/A	-	-		-	-	-	-	-	-	83.9%
Unnamed Junction	-	-	N/A	-	-		-	-	-	-	-	-	83.9%
1/2+1/1	Sale Road (E) Left Ahead	U	N/A	N/A	A	B	2	84:130	46	1119	2055:1902	835+498	83.9 : 83.9%
2/1	Wythenshaw Road Right Left	U	N/A	N/A	C		2	28	-	281	1844	346	81.3%
3/1	Sale Road (W) Ahead Right	O	N/A	N/A	D		2	86	-	604	1963	1080	55.9%
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Sale Road / Wythenshaw Road	-	-	4	0	0	7.8	5.2	0.0	13.0	-	-	-	-
Unnamed Junction	-	-	4	0	0	7.8	5.2	0.0	13.0	-	-	-	-
1/2+1/1	1119	1119	-	-	-	3.2	2.5	-	5.8	18.6	18.6	2.5	21.2
2/1	281	281	-	-	-	2.5	2.0	-	4.5	58.0	6.9	2.0	8.9
3/1	604	604	4	0	0	2.0	0.6	0.0	2.7	16.0	10.4	0.6	11.0
C1													
PRC for Signalled Lanes (%):					7.3	Total Delay for Signalled Lanes (pcuHr):			13.01	Cycle Time (s): 160			
PRC Over All Lanes (%):					7.3	Total Delay Over All Lanes(pcuHr):			13.01				

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
3: '2022 AM Peak Base'	07:45	08:45	01:00	

Scenario 3: '2022 AM Peak Base' (FG3: '2022 AM Peak Base', Plan 1: 'Network Control Plan 1')

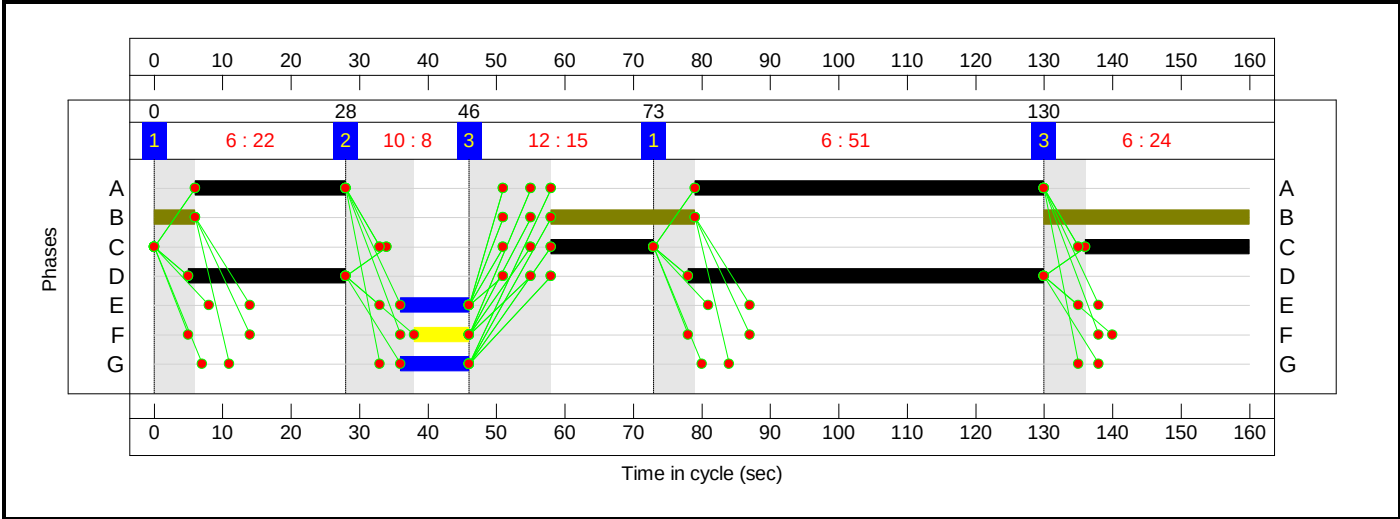
Staging Plan Diagram



Stage Timings

Stage	1	2	3	1	3
Duration	22	8	15	51	24
Change Point	0	28	46	73	130

Signal Timings Diagram



Full Input Data And Results

Link Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Sale Road / Wythenshaw Road	-	-	N/A	-	-		-	-	-	-	-	-	85.2%
Unnamed Junction	-	-	N/A	-	-		-	-	-	-	-	-	85.2%
1/2+1/1	Sale Road (E) Left Ahead	U	N/A	N/A	A	B	2	73:130	57	913	2055:1902	793+342	80.5 : 80.5%
2/1	Wythenshaw Road Right Left	U	N/A	N/A	C		2	39	-	400	1840	471	84.8%
3/1	Sale Road (W) Ahead Right	O	N/A	N/A	D		2	75	-	806	1965	946	85.2%
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Sale Road / Wythenshaw Road	-	-	1	0	0	10.7	7.4	0.0	18.1	-	-	-	-
Unnamed Junction	-	-	1	0	0	10.7	7.4	0.0	18.1	-	-	-	-
1/2+1/1	913	913	-	-	-	3.4	2.0	-	5.4	21.3	16.1	2.0	18.1
2/1	400	400	-	-	-	3.1	2.6	-	5.8	51.8	8.8	2.6	11.4
3/1	806	806	1	0	0	4.2	2.8	0.0	7.0	31.3	18.6	2.8	21.4
C1													
PRC for Signalled Lanes (%):					5.6	Total Delay for Signalled Lanes (pcuHr):			18.15	Cycle Time (s): 160			
PRC Over All Lanes (%):					5.6	Total Delay Over All Lanes(pcuHr):			18.15				

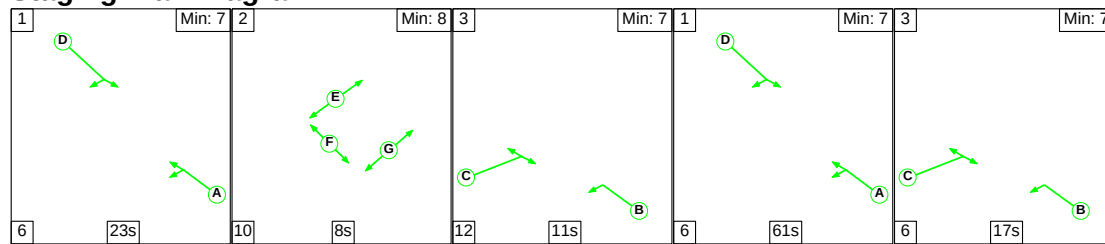
Full Input Data And Results

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
4: '2022 PM Peak Base'	16:30	17:30	01:00	

Scenario 4: '2022 PM Peak Base' (FG4: '2022 PM Peak Base', Plan 1: 'Network Control Plan 1')

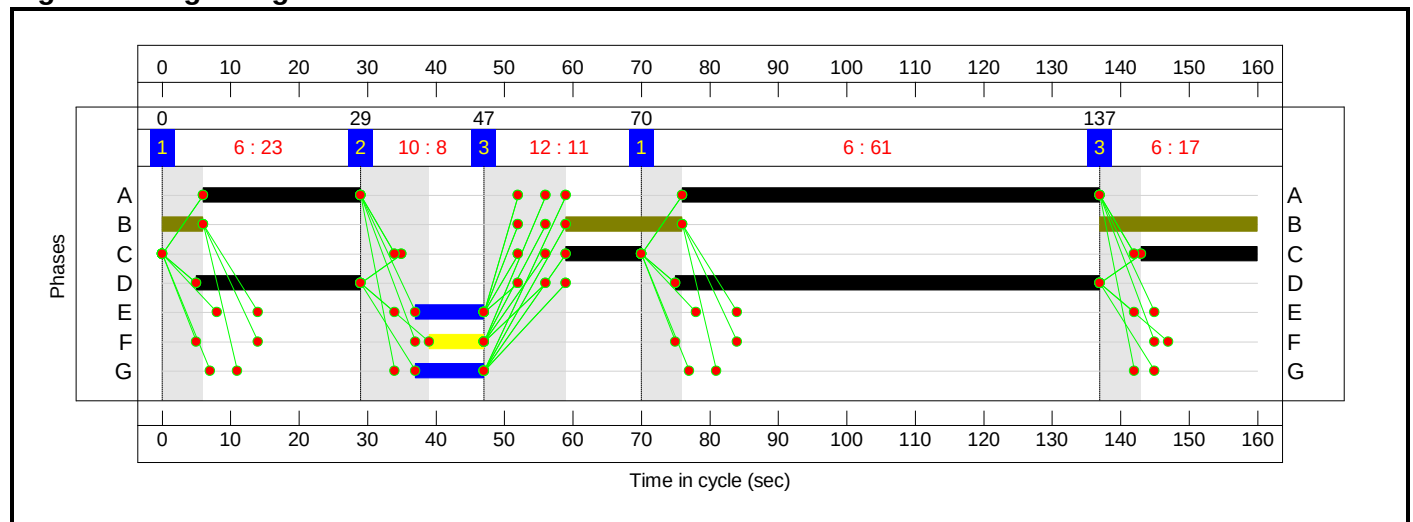
Staging Plan Diagram



Stage Timings

Stage	1	2	3	1	3
Duration	23	8	11	61	17
Change Point	0	29	47	70	137

Signal Timings Diagram



Full Input Data And Results

Link Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Sale Road / Wythenshaw Road	-	-	N/A	-	-		-	-	-	-	-	-	93.4%
Unnamed Junction	-	-	N/A	-	-		-	-	-	-	-	-	93.4%
1/2+1/1	Sale Road (E) Left Ahead	U	N/A	N/A	A	B	2	84:130	46	1246	2055:1902	835+499	93.4 : 93.4%
2/1	Wythenshaw Road Right Left	U	N/A	N/A	C		2	28	-	314	1843	346	90.9%
3/1	Sale Road (W) Ahead Right	O	N/A	N/A	D		2	86	-	665	1963	1080	61.6%
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Sale Road / Wythenshaw Road	-	-	4	0	0	9.6	11.0	0.0	20.6	-	-	-	-
Unnamed Junction	-	-	4	0	0	9.6	11.0	0.0	20.6	-	-	-	-
1/2+1/1	1246	1246	-	-	-	4.3	6.2	-	10.5	30.5	27.7	6.2	33.9
2/1	314	314	-	-	-	2.8	4.0	-	6.8	77.8	7.5	4.0	11.5
3/1	665	665	4	0	0	2.4	0.8	0.0	3.2	17.5	12.6	0.8	13.4
C1													
PRC for Signalled Lanes (%):					-3.8	Total Delay for Signalled Lanes (pcuHr):			20.56	Cycle Time (s): 160			
PRC Over All Lanes (%):					-3.8	Total Delay Over All Lanes(pcuHr):			20.56				

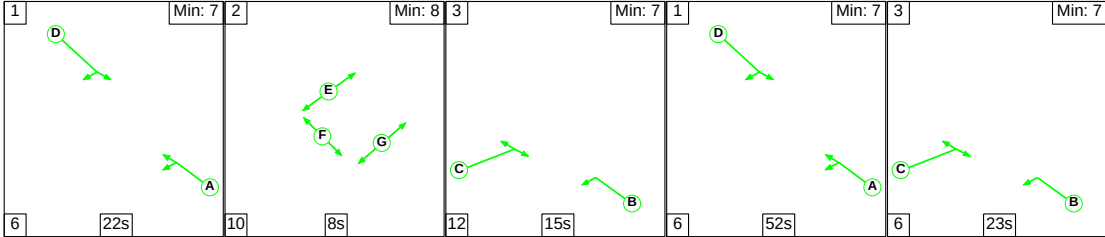
Full Input Data And Results

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
5: '2022 AM Peak with Development'	07:45	08:45	01:00	

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

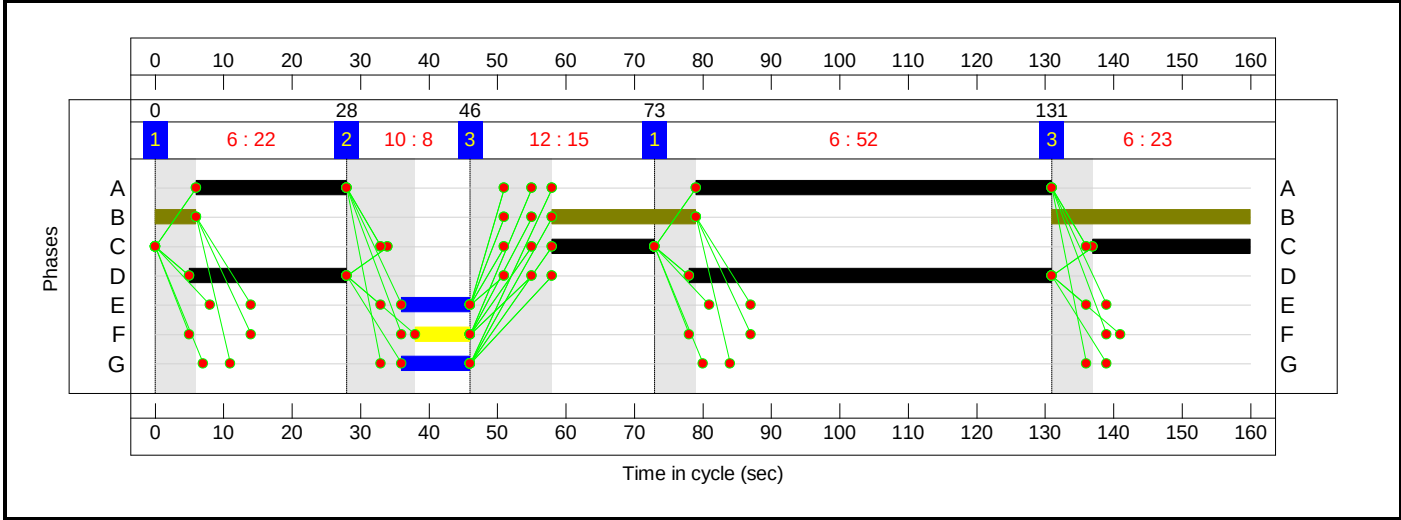
Staging Plan Diagram



Stage Timings

Stage	1	2	3	1	3
Duration	22	8	15	52	23
Change Point	0	28	46	73	131

Signal Timings Diagram



Full Input Data And Results

Link Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Sale Road / Wythenshaw Road	-	-	N/A	-	-		-	-	-	-	-	-	87.0%
Unnamed Junction	-	-	N/A	-	-		-	-	-	-	-	-	87.0%
1/2+1/1	Sale Road (E) Left Ahead	U	N/A	N/A	A	B	2	74:130	56	862	2055:1902	790+370	74.3 : 74.3%
2/1	Wythenshaw Road Right Left	U	N/A	N/A	C		2	38	-	400	1840	460	87.0%
3/1	Sale Road (W) Ahead Right	O	N/A	N/A	D		2	76	-	826	1965	958	86.2%
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Sale Road / Wythenshaw Road	-	-	1	0	0	10.4	7.5	0.0	17.9	-	-	-	-
Unnamed Junction	-	-	1	0	0	10.4	7.5	0.0	17.9	-	-	-	-
1/2+1/1	862	862	-	-	-	2.9	1.4	-	4.3	18.1	13.5	1.4	14.9
2/1	400	400	-	-	-	3.2	3.0	-	6.2	56.1	8.9	3.0	11.9
3/1	826	826	1	0	0	4.3	3.0	0.0	7.3	31.9	19.3	3.0	22.3
C1													

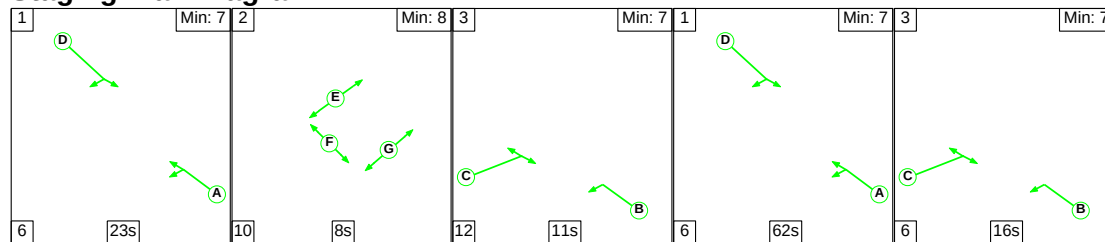
Full Input Data And Results

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
6: '2022 PM Peak with Development'	16:30	17:30	01:00	

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

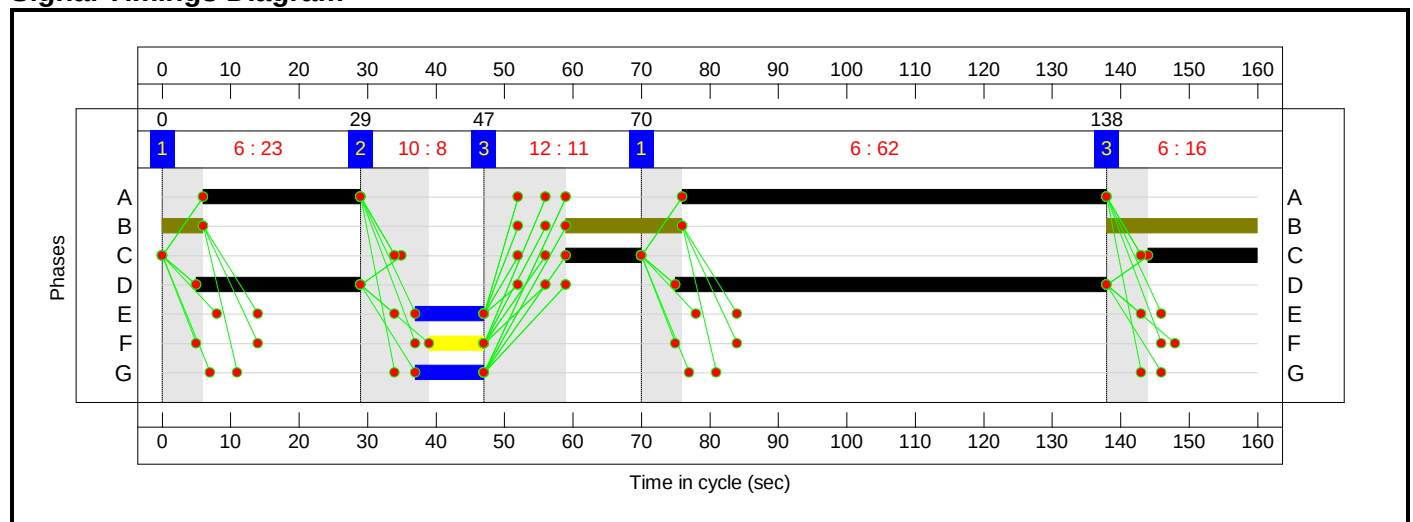
Staging Plan Diagram



Stage Timings

Stage	1	2	3	1	3
Duration	23	8	11	62	16
Change Point	0	29	47	70	138

Signal Timings Diagram



Full Input Data And Results

Link Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Sale Road / Wythenshaw Road	-	-	N/A	-	-		-	-	-	-	-	-	95.3%
Unnamed Junction	-	-	N/A	-	-		-	-	-	-	-	-	95.3%
1/2+1/1	Sale Road (E) Left Ahead	U	N/A	N/A	A	B	2	85:130	45	1275	2055:1902	849+489	95.3 : 95.3%
2/1	Wythenshaw Road Right Left	U	N/A	N/A	C		2	27	-	314	1843	334	94.0%
3/1	Sale Road (W) Ahead Right	O	N/A	N/A	D		2	87	-	625	1963	1092	57.2%
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Sale Road / Wythenshaw Road	-	-	4	0	0	9.6	13.9	0.0	23.5	-	-	-	-
Unnamed Junction	-	-	4	0	0	9.6	13.9	0.0	23.5	-	-	-	-
1/2+1/1	1275	1275	-	-	-	4.6	8.0	-	12.7	35.7	30.3	8.0	38.3
2/1	314	314	-	-	-	2.9	5.2	-	8.0	92.0	7.6	5.2	12.8
3/1	625	625	4	0	0	2.2	0.7	0.0	2.8	16.4	11.5	0.7	12.1
C1													
PRC for Signalled Lanes (%):					-5.8	Total Delay for Signalled Lanes (pcuHr):			23.53	Cycle Time (s): 160			
PRC Over All Lanes (%):					-5.8	Total Delay Over All Lanes(pcuHr):			23.53				

APPENDIX 2

PICADY Output for Sale Road/Site Access

Junctions 9							
PICADY 9 - Priority Intersection Module							
Version: 9.5.1.7462 © Copyright TRL Limited, 2019							
For sales and distribution information, program advice and maintenance, contact TRL: +44 (0)1344 379777 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: Sale Road_Shevington Gardens_Moss Hey Drive.j9
Path: Z:\projects\3225 Manchester College Site, Northern Moor\Picady
Report generation date: 11/10/2021 10:40:03

»2026 With Development, AM
 »2026 With Development, PM

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
2026 With Development								
Stream B-ACD	0.2	15.16	0.13	C	0.1	15.81	0.08	C
Stream A-D	0.1	8.36	0.05	A	0.1	7.85	0.09	A
Stream D-ABC	0.5	17.64	0.31	C	0.2	13.74	0.16	B
Stream C-ABD	0.1	3.61	0.07	A	0.0	3.99	0.02	A

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

File summary

File Description

Title	Former Manchester College Site
Location	
Site number	3225
Date	08/04/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	EDD\George.Monks
Description	

Units

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

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				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)	Run automatically
D1	2026 With Development	AM	ONE HOUR	08:00	09:30	15	✓
D2	2026 With Development	PM	ONE HOUR	17:00	18:30	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

2026 With Development, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	Crossroads	Two-way		1.41	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	B5166 Sale Road (SE)		Major
B	Shevington Gardens		Minor
C	B5166 Sale Road (NW)		Major
D	Moss Hey Drive		Minor

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
A	7.00			250.0		-
C	7.00			250.0	✓	0.00

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

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	2.50	150	125
D	One lane	3.25	105	120

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for A-D	Slope for B-A	Slope for B-C	Slope for B-D	Slope for C-A	Slope for C-B	Slope for C-D	Slope for D-A	Slope for D-B	Slope for D-C
A-D	719	-	-	-	-	-	-	0.266	0.381	0.266	-	-	-
B-A	562	0.098	0.247	0.247	-	-	-	0.156	0.353	-	0.247	0.247	0.124
B-C	667	0.098	0.247	-	-	-	-	-	-	-	-	-	-
B-D, nearside lane	562	0.098	0.247	0.247	-	-	-	0.156	0.353	0.156	-	-	-
B-D, offside lane	562	0.098	0.247	0.247	-	-	-	0.156	0.353	0.156	-	-	-
C-B	719	0.266	0.266	0.381	-	-	-	-	-	-	-	-	-
D-A	717	-	-	-	-	-	-	0.266	-	0.105	-	-	-
D-B, nearside lane	587	0.163	0.163	0.369	-	-	-	0.259	0.259	0.102	-	-	-
D-B, offside lane	587	0.163	0.163	0.369	-	-	-	0.259	0.259	0.102	-	-	-
D-C	587	-	0.163	0.369	0.129	0.259	0.259	0.259	0.259	0.102	-	-	-

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

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

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2026 With Development	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	676	100.000
B		ONE HOUR	✓	33	100.000
C		ONE HOUR	✓	896	100.000
D		ONE HOUR	✓	85	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
	A	B	C	D	
From	A	0	10	645	21
	B	19	0	14	0
	C	866	15	0	15
	D	48	0	37	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
	A	B	C	D	
From	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	D	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-ACD	0.13	15.16	0.2	C	30	45
A-B					9	14
A-C					592	888
A-D	0.05	8.36	0.1	A	19	29
D-ABC	0.31	17.64	0.5	C	78	117
C-ABD	0.07	3.61	0.1	A	55	82
C-D					13	20
C-A					755	1132

Main Results for each time segment

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	25	6	388	0.064	25	0.0	0.1	9.910	A
A-B	8	2			8				
A-C	486	121			486				
A-D	16	4	538	0.029	16	0.0	0.0	6.893	A
D-ABC	64	16	420	0.152	63	0.0	0.2	10.063	B
C-ABD	32	8	1030	0.031	32	0.0	0.0	3.603	A
C-D	11	3			11				
C-A	632	158			632				

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	30	7	341	0.087	30	0.1	0.1	11.539	B
A-B	9	2			9				
A-C	580	145			580				
A-D	19	5	503	0.038	19	0.0	0.0	7.441	A
D-ABC	76	19	371	0.206	76	0.2	0.3	12.209	B
C-ABD	48	12	1103	0.044	48	0.0	0.1	3.412	A
C-D	13	3			13				
C-A	745	186			745				

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	36	9	274	0.133	36	0.1	0.2	15.123	C
A-B	11	3			11				
A-C	710	178			710				
A-D	23	6	454	0.051	23	0.0	0.1	8.352	A
D-ABC	94	23	298	0.314	93	0.3	0.4	17.507	C
C-ABD	84	21	1209	0.069	84	0.1	0.1	3.199	A
C-D	15	4			15				
C-A	887	222			887				

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	36	9	274	0.133	36	0.2	0.2	15.163	C
A-B	11	3			11				
A-C	710	178			710				
A-D	23	6	454	0.051	23	0.1	0.1	8.355	A
D-ABC	94	23	298	0.315	94	0.4	0.5	17.642	C
C-ABD	84	21	1209	0.070	84	0.1	0.1	3.200	A
C-D	15	4			15				
C-A	887	222			887				

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	30	7	341	0.087	30	0.2	0.1	11.574	B
A-B	9	2			9				
A-C	580	145			580				
A-D	19	5	503	0.038	19	0.1	0.0	7.447	A
D-ABC	76	19	370	0.206	77	0.5	0.3	12.304	B
C-ABD	48	12	1103	0.044	48	0.1	0.1	3.416	A
C-D	13	3			13				
C-A	744	186			744				

09:15 - 09:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	25	6	387	0.064	25	0.1	0.1	9.939	A
A-B	8	2			8				
A-C	486	121			486				
A-D	16	4	538	0.029	16	0.0	0.0	6.898	A
D-ABC	64	16	420	0.152	64	0.3	0.2	10.130	B
C-ABD	32	8	1031	0.031	32	0.1	0.0	3.607	A
C-D	11	3			11				
C-A	632	158			632				

2026 With Development, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	Crossroads	Two-way		0.75	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2026 With Development	PM	ONE HOUR	17:00	18:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	937	100.000
B		ONE HOUR	✓	17	100.000
C		ONE HOUR	✓	724	100.000
D		ONE HOUR	✓	46	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
	A	B	C	D	
From	A	0	12	882	43
	B	9	0	8	0
	C	687	4	0	33
	D	26	0	20	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
	A	B	C	D	
From	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	D	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-ACD	0.08	15.81	0.1	C	16	23
A-B					11	17
A-C					809	1214
A-D	0.09	7.85	0.1	A	39	59
D-ABC	0.16	13.74	0.2	B	42	63
C-ABD	0.02	3.99	0.0	A	12	19
C-D					30	45
C-A					622	933

Main Results for each time segment

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	13	3	370	0.035	13	0.0	0.0	10.054	B
A-B	9	2			9				
A-C	664	166			664				
A-D	32	8	573	0.056	32	0.0	0.1	6.650	A
D-ABC	35	9	434	0.080	34	0.0	0.1	9.009	A
C-ABD	7	2	910	0.008	7	0.0	0.0	3.986	A
C-D	25	6			25				
C-A	513	128			513				

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	15	4	320	0.048	15	0.0	0.0	11.803	B
A-B	11	3			11				
A-C	793	198			793				
A-D	39	10	545	0.071	39	0.1	0.1	7.109	A
D-ABC	41	10	385	0.107	41	0.1	0.1	10.468	B
C-ABD	11	3	961	0.011	11	0.0	0.0	3.788	A
C-D	29	7			29				
C-A	610	153			610				

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	19	5	246	0.076	19	0.0	0.1	15.791	C
A-B	13	3			13				
A-C	971	243			971				
A-D	47	12	506	0.094	47	0.1	0.1	7.847	A
D-ABC	51	13	313	0.162	50	0.1	0.2	13.709	B
C-ABD	19	5	1038	0.018	19	0.0	0.0	3.530	A
C-D	36	9			36				
C-A	743	186			743				

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	19	5	246	0.076	19	0.1	0.1	15.814	C
A-B	13	3			13				
A-C	971	243			971				
A-D	47	12	506	0.094	47	0.1	0.1	7.850	A
D-ABC	51	13	313	0.162	51	0.2	0.2	13.742	B
C-ABD	19	5	1038	0.018	19	0.0	0.0	3.530	A
C-D	36	9			36				
C-A	743	186			743				

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	15	4	320	0.048	15	0.1	0.1	11.821	B
A-B	11	3			11				
A-C	793	198			793				
A-D	39	10	545	0.071	39	0.1	0.1	7.115	A
D-ABC	41	10	385	0.107	42	0.2	0.1	10.493	B
C-ABD	11	3	961	0.012	11	0.0	0.0	3.792	A
C-D	29	7			29				
C-A	610	153			610				

18:15 - 18:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-ACD	13	3	370	0.035	13	0.1	0.0	10.074	B
A-B	9	2			9				
A-C	664	166			664				
A-D	32	8	573	0.056	32	0.1	0.1	6.659	A
D-ABC	35	9	433	0.080	35	0.1	0.1	9.034	A
C-ABD	7	2	910	0.008	7	0.0	0.0	3.988	A
C-D	25	6			25				
C-A	513	128			513				

APPENDIX 3

Personal Injury Accident Data



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Validated Data

Crash Date: Saturday, September 10, 2016 **Time of Crash:** 7:43:00 AM **Crash Reference:** 201606E020503

Highest Injury Severity: Slight
Highway Authority: Manchester
Local Authority: Manchester City
Weather Description: Fine without high winds
Road Surface Description: Wet or Damp
Speed Limit: 30
Light Conditions: Daylight: regardless of presence of streetlights
Carriageway Hazards: None
Junction Detail: Crossroads
Junction Pedestrian Crossing: No physical crossing facility within 50 metres
Road Type: Single carriageway
Junction Control: Give way or uncontrolled

Road Number: B5166

Number of Casualties: 2

Number of Vehicles: 2

OS Grid Reference: 381969 390251



For more information about the data please visit: www.crashmap.co.uk/home/Faq

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Validated Data

Vehicles involved

Vehicle Ref	Vehicle Type	Vehicle Age	Driver Gender	Driver Age Band	Vehicle Manoeuvre	First Point of Impact	Journey Purpose	Hit Object - On Carriageway	Hit Object - Off Carriageway
1	Car (excluding private hire)	-1	Male	16 - 20	Vehicle is in the act of turning right	Offside	Journey as part of work	None	None
2	Car (excluding private hire)	-1	Male	56 - 65	Vehicle proceeding normally along the carriageway, not on a bend	Front	Journey as part of work	None	None

Casualties

Vehicle Ref	Casualty Ref	Injury Severity	Casualty Class	Gender	Age Band	Pedestrian Location	Pedestrian Movement
1	1	Slight	Driver or rider	Male	16 - 20	Unknown or other	Unknown or other
2	2	Slight	Driver or rider	Male	56 - 65	Unknown or other	Unknown or other

For more information about the data please visit: www.crashmap.co.uk/home/Faq

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Validated Data

Crash Date: Monday, April 03, 2017

Time of Crash: 7:45:00 AM

Crash Reference: 201706E029433

Highest Injury Severity: Serious

Road Number: B5166

Number of Casualties: 1

Highway Authority: Manchester

Number of Vehicles: 2

Local Authority: Manchester City

OS Grid Reference: 381977 390253

Weather Description: Fine without high winds

Road Surface Description: Dry

Speed Limit: 30

Light Conditions: Daylight: regardless of presence of streetlights

Carriageway Hazards: None

Junction Detail: Crossroads

Junction Pedestrian Crossing: No physical crossing facility within 50 metres

Road Type: Single carriageway

Junction Control: Stop sign



For more information about the data please visit: www.crashmap.co.uk/home/Faq

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Validated Data

Vehicles involved

Vehicle Ref	Vehicle Type	Vehicle Age	Driver Gender	Driver Age Band	Vehicle Manoeuvre	First Point of Impact	Journey Purpose	Hit Object - On Carriageway	Hit Object - Off Carriageway
1	Car (excluding private hire)	-1	Male	26 - 35	Vehicle is in the act of turning left	Front	Other	None	None
2	Pedal cycle	-1	Male	36 - 45	Vehicle proceeding normally along the carriageway, not on a bend	Offside	Commuting to/from work	None	None

Casualties

Vehicle Ref	Casualty Ref	Injury Severity	Casualty Class	Gender	Age Band	Pedestrian Location	Pedestrian Movement
2	1	Serious	Driver or rider	Male	36 - 45	Unknown or other	Unknown or other

For more information about the data please visit: www.crashmap.co.uk/home/Faq

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Validated Data

Crash Date: Tuesday, November 14, 2017 **Time of Crash:** 9:05:00 AM **Crash Reference:** 201706E037241

Highest Injury Severity: Slight
Highway Authority: Manchester
Local Authority: Manchester City
Weather Description: Other
Road Surface Description: Dry
Speed Limit: 30
Light Conditions: Daylight: regardless of presence of streetlights
Carriageway Hazards: None
Junction Detail: Using private drive or entrance
Junction Pedestrian Crossing: No physical crossing facility within 50 metres
Road Type: Single carriageway
Junction Control: Give way or uncontrolled

Road Number: B5166

Number of Casualties: 1

Number of Vehicles: 2

OS Grid Reference: 382020 390204



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Validated Data

Vehicles involved

Vehicle Ref	Vehicle Type	Vehicle Age	Driver Gender	Driver Age Band	Vehicle Manoeuvre	First Point of Impact	Journey Purpose	Hit Object - On Carriageway	Hit Object - Off Carriageway
1	Car (excluding private hire)	-1	Male	26 - 35	Vehicle is slowing down or stopping	Back	Journey as part of work	None	None
2	Car (excluding private hire)	10	Female	46 - 55	Vehicle is slowing down or stopping	Front	Other	None	None

Casualties

Vehicle Ref	Casualty Ref	Injury Severity	Casualty Class	Gender	Age Band	Pedestrian Location	Pedestrian Movement
2	1	Slight	Driver or rider	Female	46 - 55	Unknown or other	Unknown or other

For more information about the data please visit: www.crashmap.co.uk/home/Faq

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Crash Date: Wednesday, October 03, 2018 **Time of Crash:** 8:30:00 AM **Crash Reference:** 201806E448781

Highest Injury Severity: Serious
Highway Authority: Manchester
Local Authority: Manchester City
Weather Description: Fine without high winds
Road Surface Description: Wet or Damp
Speed Limit: 30
Light Conditions: Daylight: regardless of presence of streetlights
Carriageway Hazards: None
Junction Detail: T or staggered junction
Junction Pedestrian Crossing: No physical crossing facility within 50 metres
Road Type: Single carriageway
Junction Control: Give way or uncontrolled

Road Number: B5166

Number of Casualties: 2

Number of Vehicles: 2

OS Grid Reference: 381867 390352



For more information about the data please visit: www.crashmap.co.uk/home/Faq

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Vehicles involved

Vehicle Ref	Vehicle Type	Vehicle Age	Driver Gender	Driver Age Band	Vehicle Manoeuvre	First Point of Impact	Journey Purpose	Hit Object - On Carriageway	Hit Object - Off Carriageway
1	Van or goods vehicle 3.5 tonnes mgw and under	6	Male	21 - 25	Vehicle is performing a U turn	Offside	Journey as part of work	None	None
2	Motorcycle over 500cc	-1	Male	26 - 35	Vehicle proceeding normally along the carriageway, not on a bend	Nearside	Journey as part of work	None	Lamp post

Casualties

Vehicle Ref	Casualty Ref	Injury Severity	Casualty Class	Gender	Age Band	Pedestrian Location	Pedestrian Movement
1	1	Slight	Driver or rider	Male	21 - 25	Unknown or other	Unknown or other
2	2	Serious	Driver or rider	Male	26 - 35	Unknown or other	Unknown or other

For more information about the data please visit: www.crashmap.co.uk/home/Faq

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Validated Data

Crash Date: Monday, November 21, 2016 **Time of Crash:** 10:56:00 PM **Crash Reference:** 201606E023299

Highest Injury Severity: Slight
Highway Authority: Manchester
Local Authority: Manchester City
Weather Description: Raining without high winds
Road Surface Description: Wet or Damp
Speed Limit: 30
Light Conditions: Darkness: street lights present and lit
Carriageway Hazards: None
Junction Detail: Not at or within 20 metres of junction
Junction Pedestrian Crossing: No physical crossing facility within 50 metres
Road Type: Single carriageway
Junction Control: Not Applicable

Road Number: U0

Number of Casualties: 3

Number of Vehicles: 2

OS Grid Reference: 381938 390575



For more information about the data please visit: www.crashmap.co.uk/home/Faq

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Validated Data

Vehicles Involved

Vehicle Ref	Vehicle Type	Vehicle Age	Driver Gender	Driver Age Band	Vehicle Maneuvre	First Point of Impact	Journey Purpose	Hit Object - On Carriageway	Hit Object - Off Carriageway
1	Car (excluding private hire)	-1	Male	26 - 35	Vehicle proceeding normally along the carriageway, not on a bend	Front	Journey as part of work	None	None
2	Car (excluding private hire)	8	Female	26 - 35	Vehicle proceeding normally along the carriageway, not on a bend	Front	Other	None	None

Casualties

Vehicle Ref	Casualty Ref	Injury Severity	Casualty Class	Gender	Age Band	Pedestrian Location	Pedestrian Movement
1	1	Slight	Driver or rider	Male	26 - 35	Unknown or other	Unknown or other
2	2	Slight	Driver or rider	Female	26 - 35	Unknown or other	Unknown or other
2	3	Slight	Vehicle or pillion passenger	Male	36 - 45	Unknown or other	Unknown or other

For more information about the data please visit: www.crashmap.co.uk/home/Faq

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Validated Data

Crash Date: Tuesday, July 11, 2017 **Time of Crash:** 8:40:00 AM **Crash Reference:** 201706E032684

Highest Injury Severity: Slight
Highway Authority: Manchester
Local Authority: Manchester City
Weather Description: Fine without high winds
Road Surface Description: Dry
Speed Limit: 30
Light Conditions: Daylight: regardless of presence of streetlights
Carriageway Hazards: None
Junction Detail: Using private drive or entrance
Junction Pedestrian Crossing: No physical crossing facility within 50 metres
Road Type: Single carriageway
Junction Control: Give way or uncontrolled

Road Number: U0

Number of Casualties: 1

Number of Vehicles: 2

OS Grid Reference: 382187 390548



For more information about the data please visit: www.crashmap.co.uk/home/Faq

To subscribe to unlimited reports using CrashMap Pro visit www.crashmap.co.uk/Home/Premium_Services



Validated Data

Vehicles involved

Vehicle Ref	Vehicle Type	Vehicle Age	Driver Gender	Driver Age Band	Vehicle Maneouvre	First Point of Impact	Journey Purpose	Hit Object - On Carriageway	Hit Object - Off Carriageway
1	Car (excluding private hire)	13	Male	56 - 65	Vehicle proceeding normally along the carriageway, not on a bend	Front	Other	None	None
2	Pedal cycle	-1	Female	6 - 10	Vehicle proceeding normally along the carriageway, not on a bend	Front	Pupil riding to/from school	None	None

Casualties

Vehicle Ref	Casualty Ref	Injury Severity	Casualty Class	Gender	Age Band	Pedestrian Location	Pedestrian Movement
2	1	Slight	Driver or rider	Female	6 - 10	Unknown or other	Unknown or other

For more information about the data please visit: www.crashmap.co.uk/home/Faq

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APPENDIX 4

Residential Travel Plan Framework

Proposed Residential Development
Manchester College Site | Northenden | Manchester

MILLER HOMES

Residential Travel Plan Framework
October 2021





REPORT

Document: Residential Travel Plan Framework

Project:	Proposed Residential Development, Manchester College Site, Northenden, Manchester
Client:	Miller Homes
Job Number:	3225
File Origin:	Z:\projects\3225 Manchester College Site, Northern Moor\Docs\Reports\3225TP.01.docx

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Contents

PLANS

(See Transport Assessment)



1 INTRODUCTION

1.1 Introduction

1.1.1 Croft have been instructed by Miller Homes to advise on the traffic and transportation matters relating to proposals to redevelop the Northenden Campus site on Sale Road in Manchester for residential purposes.

1.1.2 This Travel Plan Framework will set out the principal strategies that will be put in place once the development is open and residents are occupying the dwellings, to encourage sustainable travel to the development.

1.1.3 The Department for Transport has issued two separate guides on the preparation of travel plans which are of relevance to this proposed development, these documents are as follows;

- Making Residential Travel Plans Work - Published in September 2005.
- Good Practice Guidelines: Delivering Travel Plans through the Planning Process - Published in April 2009.

1.2 Structure of the Travel Plan

1.2.1 Following this introduction, Section 2 sets out the aims and benefits of Travel Plans. Section 3 details Travel Plan Policy and guidance and presents the 'Travel Plan Pyramid'.

1.2.2 Section 4 of the Travel Plan considers the accessibility of the site by non-car modes, including walking, cycling and public transport. Section 5 sets out a series of management measures that will be implemented as part of the Travel Plan.



1.2.3 Section 6 discusses targets for reducing trips by the private car, while Section 7 details the monitoring of the Travel Plan.

1.2.4 Section 8 draws together the findings and conclusions.

1.3 The Travel Plan

1.3.1 The aim of the Travel Plan is as follows:

- To encourage residents and visitors to use alternatives to the private car;
- To increase the awareness of the advantages and potential for travel by more environmentally friendly modes, and
- To introduce a package of management measures that will facilitate travel by modes of transport other than the private car.

1.4 Residents Travel Pack

1.4.1 The principal Travel Plan measure will consist of a Residents Travel Pack containing relevant material to promote non-car modes of travel and the provision of certain physical measures. This will be discussed further in Section 5.

1.5 Site Location and Development

1.5.1 The site is located on Sale Road, adjacent to Princess Parkway in the Northenden area of Manchester, approximately 8 kilometres to the south of the city centre. It lies within a predominantly residential area and is within walking distance of Wythenshawe Park.

1.5.2 The location of the site in relation to the surrounding local area is presented in **Plan 1**.



1.6 Development Proposals

- 1.6.1 The applicant is seeking planning permission to develop the site for up to 224 residential dwellings, with associated car parking and landscaping.
- 1.6.2 The proposed internal layout is provided at **Plan 2**.
- 1.6.3 Vehicular access to the site is proposed from the existing college entrance on Sale Road, via Moss Hey Drive, which is a short section of highway serving a small number of residential properties and the college campus.

2 TRAVEL PLAN AIMS AND BENEFITS

2.1.1 The overall aim of the Travel Plan is to ensure residents are aware of all their travel choices and encourage them to use sustainable modes, where possible, in order to reduce travel by the private car. The aims include;

- Reductions in car usage (particularly single occupancy journeys) and increased use of public transport, walking and cycling.
- Reduced traffic speeds and improved road safety and personal security particularly for pedestrians and cyclists.
- More environmentally friendly delivery and freight movements, including home delivery services (where applicable).

2.1.2 The guidance identifies a number of benefits that Travel Plans can bring to new development, not only to the developer, but to the local authority and ultimately the end-users of the site.

2.1.3 Some of these include;

- Less congestion and therefore improved safety on local roads by promoting alternatives to the car.
- Reduced highway capacity problems by promoting sustainable travel choices.
- Local environmental improvements from reduced congestion, carbon emissions, pollution and noise.
- Making the site more attractive to potential occupiers/users.



- Increased opportunities for active healthy travel, such as walking and cycling.
- Improved travel choice, quality and affordable access to services for all users.

3 TRAVEL PLANNING POLICY AND GUIDANCE

3.1 Travel Planning Policy

- 3.1.1 The need to manage transport in new developments is included within national and local policy. The need to reduce car dependency, increase travel choices and encourage sustainable distribution is supported by the National Planning Policy Framework (NPPF) which states that all developments which generate significant amounts of movement should be required to provide a Travel Plan.
- 3.1.2 The NPPF further reinforces the importance of travel plans in the planning context and states *"Travel Plans should be considered in parallel to development proposals and readily integrated into the design and occupation of a new site"*.

3.2 Travel Planning Guidance

- 3.2.1 The preparation and adoption of a Travel Plan is an important element of managing the demand for travel to all modern developments.
- 3.2.2 The document, entitled *'Good Practice Guidelines: Delivering Travel Plans through the Planning Process'* sets out an overview of the process and delivery of Travel Plans and states that *"A Travel Plan is a long-term management strategy for an occupier or site that seeks to deliver sustainable transport objectives through positive action and is articulated in a document that is regularly reviewed."*
- 3.2.3 The DfT document entitled *"Making Residential Travel Plans Work"* states that *Travel Planning is one of a range of measures known as smarter choices which have been found to be effective on reducing traffic and improving accessibility in residential areas"* and goes on to say:

"Travel Planning is one of a range of measures known as smarter choices which have been found to be effective on reducing traffic and improving accessibility in residential areas".

- 3.2.4 The DfT's 'Making Residential Travel Plans Work' also introduces the concept of a 'Travel Plan Pyramid'. This helps demonstrate how successful plans are built on the firm foundations of a good location and site design. The pyramid is presented in **Figure 3.1** below;

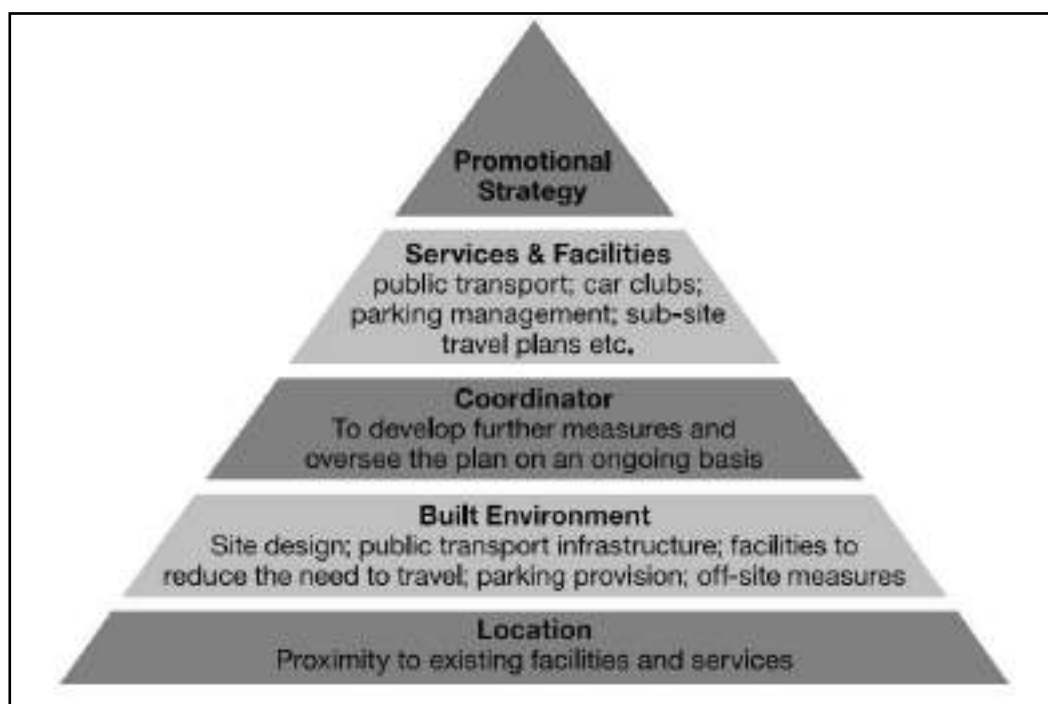


Figure 3.1 – The Travel Plan Pyramid

- 3.2.5 The hierarchy of 5 tiers of measures and criteria are well illustrated in pyramid form since the concept presented within that "good practice" is that each higher layer builds upon the more important foundations of the criteria and initiatives below it.



- 3.2.6 The most important layer of the pyramid is considered to be the base, this shows the key to making Travel Plans work is the actual location of the development and its proximity to local facilities and services essential to everyday life.
- 3.2.7 The second layer of the pyramid refers to how the layout of the site can assist in reducing the need to travel, which in this instance is again linked to the existing level of provision to facilitate sustainable travel.
- 3.2.8 As indicated in level 3 of the pyramid, the Travel Plan co-ordinator will be free to develop further measures to maximise the sustainability of the site.
- 3.2.9 The fourth layer of the pyramid looks at how parking management and public transport can influence travel choice, while the top layer of the pyramid relates to how the Travel Plan will be marketed and how the measures within are to be promoted.

4 ACCESSIBILITY BY NON CAR MODES

4.1 Introduction

- 4.1.1 In order to accord with the aspirations of the NPPF, any new proposals should extend the choice in transport and secure mobility in a way that supports sustainable development.
- 4.1.2 New proposals should attempt to influence the mode of travel to the development in terms of gaining a shift in modal split towards non-car modes, thus assisting in meeting the aspirations of current national and local planning policy.
- 4.1.3 The accessibility of the proposed site has been considered by the following modes of transport:
- Accessibility on foot;
 - Accessibility by cycle;
 - Accessibility by bus; and
 - Accessibility by rail/Metrolink.

4.2 Accessibility on Foot

- 4.2.1 It is important to create a choice of direct, safe and attractive routes between where people live and where they need to travel in their day-to-day life.
- 4.2.2 This philosophy clearly encourages the opportunity to walk whatever the journey purpose and helps to create more active streets and a more vibrant neighbourhood.



- 4.2.3 The site is well connected to key destinations by a comprehensive network of pedestrian routes, typical of its urban location. Pedestrian provision in the area is in good condition, with standard footways, dropped kerb crossings and tactile paving present on Moss Hey Drive, Sale Road and Hollyhey Drive.
- 4.2.4 These footways provide links to a comprehensive network of routes within the local area, supplemented by a number of crossing points which facilitate access to the nearby day to day amenities within the area.
- 4.2.5 A pedestrian refuse crossing is provided at the main site access junction and signalised crossing facilities are present at the junction of Sale Road/Rackhouse Road and Sale Road/Wythenshawe Road to the north and south of the site respectively.
- 4.2.6 Pedestrian access to the site via Yewtree Lane also provides a good standard of infrastructure. A footbridge over Princess Parkway is present at the eastern end of Yewtree Lane, which provides a connection to areas south and east of the site. A segregated route is provided under the M60 providing connections to the north. A pedestrian link is also provided into the site from the bus stop on the Princess Parkway (northbound) on-slip.
- 4.2.7 South of the site, access can be gained easily to segregated routes through Wythenshawe Park and the retention of existing non-vehicular access to the east of the site provides a link to cycle routes and bus stops on eastern boundary.
- 4.2.8 The CIHT document 'Planning for Walking' from 2015 states, in paragraph 2.1, that in 2015 that 79% of all journeys made in the UK of less than a mile (1.6 kilometres) are carried out on foot.

- 4.2.9 Within the Institution of Highways and Transportation (IHT) document, entitled “Guidelines for Providing for Journeys on Foot”, Table 2.2 suggests distances for desirable, acceptable and preferred maximum walks to ‘town centres’, ‘commuting/schools’ and ‘elsewhere’. The ‘preferred maximum’ distances are shown below in **Table 4.1**.

Suggested Preferred Maximum Walk		
Town Centre	Commuting/School	Elsewhere
800m	2,000m	1,200m

Table 4.1 – IHT ‘Providing for Journeys on Foot’ Walk Distances

- 4.2.10 Reference to the 2,000 metres walk distance is also made in the now superseded Planning Policy Guidance (PPG) Note 13 which advised that ‘walking is the most important mode of travel at the local level and offers the greatest potential to replace short car trips, particularly under 2km’.
- 4.2.11 Manual for Streets (MfS) continues the theme of the acceptability of the 2,000-metre distance in paragraph 4.4.1. This states that ‘walkable neighbourhoods are typically characterised by having a range of facilities within 10 minutes’ (up to about 800m) walking distance of residential areas which residents may access comfortably on foot. However, this is not an upper limit and PPS13 states that walking offers the greatest potential to replace short car trips, particularly those under 2 km’.
- 4.2.12 **Table 4.2** below summarises this guidance in tabular form.

'Comfortable' Walk	'Preferred Maximum' Walk
800m	2,000m

Table 4.2 – Manual for Streets Walk Distances

- 4.2.13 More specific guidance on the distances that children will walk to school is found in the July 2014 document published by the Department for Education (DfE) entitled 'Home to School Travel and Transport' statutory guidance document.
- 4.2.14 This suggests that the maximum walking distance to schools is 2 miles (3.2 kilometres) for children under 8 and 3 miles (4.8 kilometres) for children over the age of 8. This is summarised below in **Table 4.3**.

Children under 8 Walk Distance	Children over 8 Walk Distance
3,200m	4,800m

Table 4.3 – DfE Walk Distances to Schools

- 4.2.15 Further evidence that people will walk further than the suggested 'preferred maximum' distances in the IHT 'Providing for Journeys on Foot' is contained in a WYG Report entitled 'Accessibility – How Far do People Walk and Cycle'. This report refers to National Travel Survey (NTS) data for the UK as a whole, excluding London, and confirms that the 85th percentile walk distance for:
- All journey purposes – 1,930 metres;
 - Commuting – 2,400 metres;

- Shopping – 1,600 metres;
- Education – 3,200 or 4,800 metres; and
- Personal business – 1,600 metres.

4.2.16 Overall, in Table 5.1, the document states that 1,950 metres is the 85th percentile distance for walking as the main mode of travel. **Table 4.4** below summarises the various 85th percentile walk distances suggested as guidelines in the WYG Study.

85 th Percentile Walk Distances					Overall Recommended Preferred Max
All Journeys	Commuting	Shopping	Education	Personal	
1,950m	2,100m	1,600m	3,200/4,800m	1,600m	1,950m

Table 4.4 – WYG Report/NTS Data Walk Distances

4.2.17 In summary, it is considered that the distance of 1,950 metres, or around 2 kilometres, represents an acceptable maximum walking distance for the majority of land uses although clearly the DfE guidance for walking to school is up to 4.8 kilometres.

4.2.18 Section 3.1 of the CIHT guidance 'Planning for Walking' mentioned earlier in this report provides a useful reminder of the health benefits of walking. This states that:

'A brisk 20 minute walk each day could be enough to reduce an individual's risk of an early death'.

4.2.19 A 20-minute walk equates to a walking distance of around 1,600 metres.

4.2.20 In light of the above review, pedestrian catchments of 800 metres and 2 kilometres from the centre of the site, using all available pedestrian routes, has been prepared in **Plan 5**.



- 4.2.21 It provides an illustrative indication of the areas that can be reached based on a leisurely walk from the site.
- 4.2.22 In addition, to the pedestrian catchment plan, a review of the proximity of local facilities such as local shops/retail outlets and leisure facilities has been undertaken and the location of these is also shown in Plan 5.
- 4.2.23 The 2,000-metre pedestrian catchment illustrates that the majority of Northenden can be accessed, such as, Rowland's Pharmacy, Post Office, Nisa Local, Shrek's Pizza, St. Aidans RC School, Rack House Primary School, Kenworthy Lane Woods, Tesco Metro, Subway, Church Road Chippy, The Crown Inn.
- 4.2.24 **Table 4.5** below, shows the walking distance from the centre of the site to the local amenities in the vicinity of the site. The table also confirms whether the amenity is within the 'preferred maximum' walk distances using the above guideline criteria.

Local Amenity	Distance	Guidance Criteria	Meets with Guidance?
Rowland's Pharmacy	412m	1,600m	YES
Nisa Local	430m	1,600m	YES
Post Office	444m	1,600m	YES
Shrek's Pizza	444m	1,600m	YES
Kenworthy Lane Woods	595m	1,600m	YES
St. Aidans RC School	676m	3,200m	YES
Tesco Metro	1,230m	1,600m	YES
Rack House Primary School	1,234m	3,200m	YES
Church Road Chippy	1,466m	1,600m	YES
Subway	1,490m	1,600m	YES
The Crown Inn	1,540m	1,600m	YES

Table 4.5 - Distance from Site to Local Facilities

- 4.2.25 As can be seen in the above table, the site is located within proximity to a number of local amenities including primary services as well as leisure facilities.
- 4.2.26 All of the day to day amenities are well within the 'preferred maximum' walk distances described earlier in this section and indeed many, including the nearest food store, pharmacy and nearest primary school are within the 800 metres 'comfortable walk' from the site as contained within MfS guidance.
- 4.2.27 It is therefore considered that the existing pedestrian infrastructure will facilitate safe and direct pedestrian linkages between the site and local destinations.



4.3 Access by Cycle

- 4.3.1 An alternative mode of travel to the site could be achieved by bicycle.
- 4.3.2 A distance of 5 kilometres is generally accepted as a distance where cycling has the potential to replace short car journeys.
- 4.3.3 This distance equates to a journey of around 25 minutes based on a leisurely cycle speed of 12 kilometres per hour and would encompass parts of Sale, Wythenshawe, Altrincham and Cheadle.
- 4.3.4 A 5 kilometre cycle catchment is presented in **Plan 6**.
- 4.3.5 The site relates well to both utility and leisure cycle routes. Access can be gained directly onto Route 85 of the strategic cycle network from the northern site access junction.
- 4.3.6 Route 85 connects the site to areas to the north and south and facilities are in place on the route to allow safe passage under the M60 and under Princess Parkway. To the west of the site, a toucan crossing is provided, which allows pedestrians and cyclists to cross safely at the same time.
- 4.3.7 **Figure 4.1** below shows the existing cycle network in the vicinity of the site.

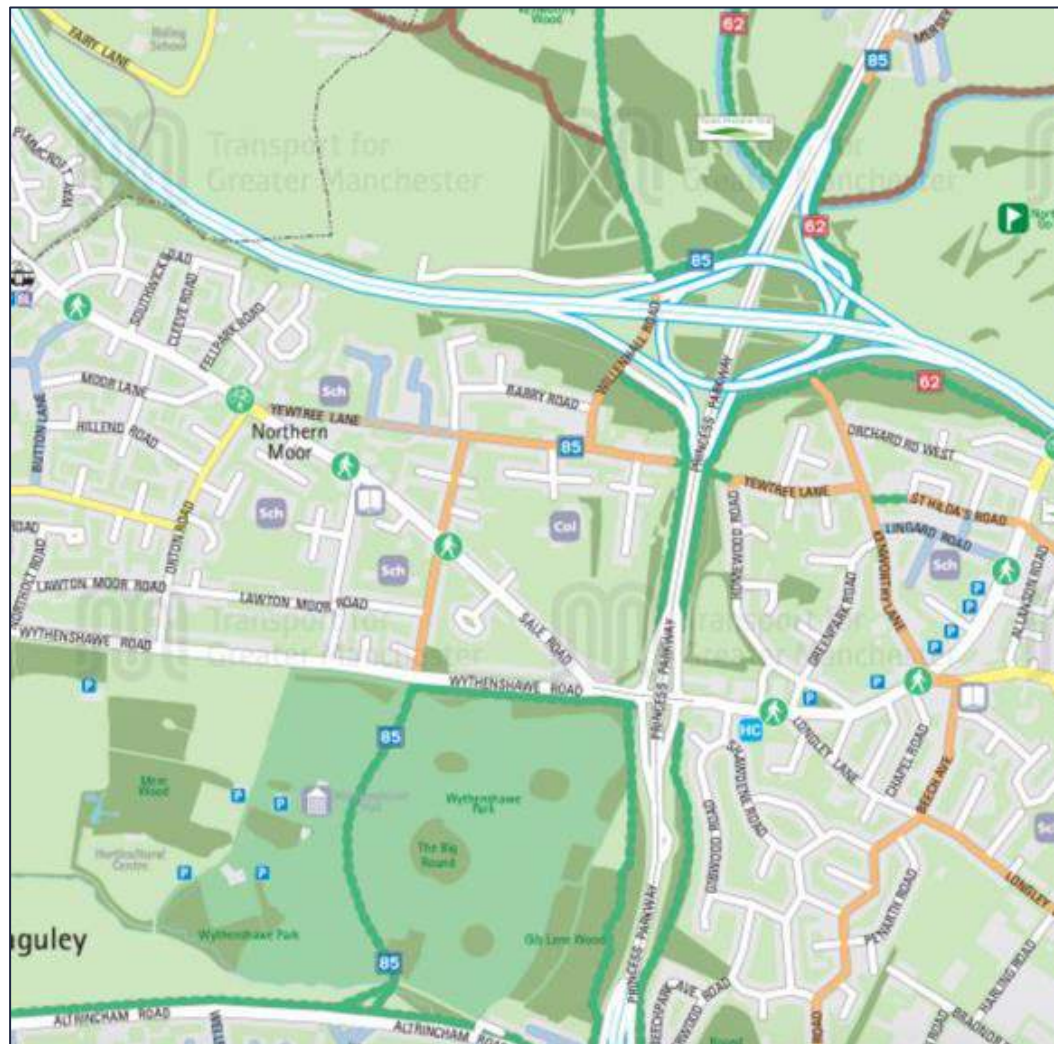


Figure 4.1 – Existing Cycle Network

- 4.3.8 National cycle route 85 is both an on and off-road route which starts to the north of the site in Chorlton-cum-Hardy and extends to the south, past the site towards Manchester Airport.
- 4.3.9 The site can therefore be considered as being accessible by cycle.

4.4 Access by Bus

- 4.4.1 An effective public transport system is essential in providing good accessibility for large parts of the population to opportunities for work, education, shopping, leisure and healthcare in the area and beyond.
- 4.4.2 The nearest bus stops are located outside the site on Sale Road and Princess Parkway, to the south-east corner of the site. All the nearest bus stops to the site are shown on Plan 5.
- 4.4.3 A summary of the services available from the nearest bus stops to the development site is provided in **Table 4.6** below.

Servic No	Route	Monday – Friday (per hour)				Sat	Sun
		AM Peak	Midday	PM Peak	Eve		
11A	Altrincham – Stockport Bus Station	2	2	2	1	2	1
103	Manchester Airport – Piccadilly Gardens	2	2	2	1	2	1
217	Ashton-under - Lyne - Wythenshawe	1	1	1	0	0.5	0
288	East Didsbury - Manchester Airport	1	0	0	0	0	0
41	Sale - Middleton	3	3	3	1	3	2
X5	Sale - Stockport	1	0	1	0	0	0

Table 4.6 - Existing Bus Services

- 4.4.4 As can be seen from Table 4.6, the nearest bus stops to the site provide various services throughout the day to destinations such as Piccadilly, Stockport and Altrincham.
- 4.4.5 The above services operate from around 4:45am to around 23:30pm, making travel by public transport a real alternative to travelling by car for commuting trips.
- 4.4.6 In order to demonstrate the level of accessibility, some example journey times by bus are presented below **Table 4.7** below.

Destination	Duration
Piccadilly	25 minutes
Stockport	30 minutes
Altrincham	31 minutes

Table 4.7 - Example Bus Journey Times from the Site

4.4.7 The above table demonstrates that Manchester Piccadilly is an approximate 25 minute bus journey from the site and Stockport is around a 30-minute bus journey.

4.4.8 It is therefore concluded that employment, health and retail centres are highly accessible by bus from the proposed development site.

4.5 Accessibility by Rail/Metrolink

4.5.1 The nearest Metrolink stop to the site is Northern Moor, located a 17 minute walk from the site.

4.5.2 Access can also be gained to East Didsbury train station using existing bus services on Sale Road. Cycle parking is provided at the station.

4.6 Accessibility Summary

4.6.1 The proposals have been considered in terms of accessibility by non-car modes, so that sustainable travel can be encouraged.

4.6.2 The above section has demonstrated that the development can be accessed by a variety of travel modes and as such would accord with local and national planning policy guidance.



4.6.3 The following conclusions can be drawn from this section of the report:

- It has been demonstrated that there are numerous amenities within a short walk of the development.
- Pedestrian and cycle access to the site can be considered as being good with extensive existing infrastructure located in the vicinity.
- The services from the nearest bus stops connect the site with retail, employment and leisure facilities in Piccadilly, Stockport and Altrincham.
- The site is located close to Northern Moor Metrolink station, thus increasing the choice of sustainable travel options.

4.6.4 In light of the above, it is considered the site is highly accessible by non-car modes and will cater for needs of the development's residents and assist in promoting a choice of travel modes other than the private car.

5 MANAGEMENT MEASURES

5.1 Introduction

5.1.1 The following Travel Plan measures will be implemented:

- i) Appointment of Travel Plan Co-ordinator
- ii) Resident's Travel Pack
- iii) Travel Awareness and Information
- iv) Promotion of Lift Share Scheme
- v) Encouraging Walking/Cycling
- vi) Encouraging Home Working and Delivery Services
- vii) Encouraging Travel by Public Transport
- viii) Marketing and Promotion

5.2 Appointment of Travel Co-ordinator

5.2.1 A Travel Plan Co-ordinator (TPC) is to be appointed by the housebuilder or developer at least one month before the first properties being occupied.

5.2.2 The TPC will be responsible for all aspects of the Travel Plan.

5.2.3 Their primary functions will be as follows;

- Liaison with the local planning and highways authorities;

- Provision of a Residents Travel Pack containing information for residents;
- Promotion of the sustainable transport options available to residents, including public transport, cycle, walking and car sharing schemes; and
- Maintenance of all necessary systems, data and paperwork.

5.2.4 The role of the TPC will also be to develop and manage the Travel Plan for the site.

5.2.5 The duties will include monitoring, reviewing targets and forming action plans to remedy areas where the Travel Plan is not performing. Annual progress reports will be prepared and submitted to the Council.

5.2.6 Details of the nominated TPC will be submitted to the Planning and Highway Authority and the appropriate local bus companies at least one month prior to first occupation at the site. Similarly, the TPC will be advised of appropriate contact personnel at the Council.

5.3 Resident's Travel Pack

5.3.1 It is an important and emerging principle in residential developments that where appropriate, the implementation of travel plan type measures can establish a pattern of travel behaviour favouring sustainable modes from the inception of the development.

5.3.2 The proposed development is very well placed for encouraging access on foot or by cycle to a wide range of facilities. Similarly, the existence of a local bus and rail services will encourage choice of public transport as a primary means of travel for the development.

5.3.3 However, in order to build on these locational advantages, it is recommended that a Residents' Travel Pack is provided for the occupants of each new dwelling.

- 5.3.4 The contents of such a travel pack would include information relating to walking and cycling routes in the area and the provision of up to date bus and rail timetable information, as well as identification of the location of nearby amenity facilities as part of the information supplied to prospective purchasers.
- 5.3.1 The contents of the packs will vary depending upon the information available on sources such as the internet or local bus stops.
- 5.3.2 However, the Travel Packs will include:
- Information about the local area, e.g. location, distance and directions to local shops, schools, Post Offices, Doctor Surgeries, Hospitals, Banks, Libraries, Parks, attractions and other local amenities.
 - Copies of the most recently published public transport information.
 - Details of web sites and other sources of information which can be accessed in the future such as:
 - o Public Transport - Links to timetable information e.g. www.traveline.org.uk and www.nationalrail.co.uk
 - o Car Sharing - Links to websites that co-ordinate car sharing such as www.carshare.com, www.liftshare.org.uk and www.nationalcarshare.co.uk to encourage car sharing.
 - o Cycling - Link to the UK's National Cyclists Organisation website www.ctc.org.uk and Sustrans www.sustrans.org.uk
 - o Local Amenities - local supermarkets offering internet shopping would reduce the need for car travel.

- 5.3.3 The adoption of such travel packs is recognised as being an important element in ensuring that access by non-car modes is promoted from the earliest occupation of a residential development. Within the Resident's Travel Pack, residents will be encouraged to consider ways in which to reduce their need to travel such as home delivery for shopping and working from home.
- 5.3.4 The first issue of the Resident's Travel Pack will be the responsibility of the house builder.
- 5.3.5 The provision of a Resident's Travel Pack will form part of the terms of the sale or occupancy of the dwellings and therefore they are aware in advance of what is required of them within the Travel Plan.

5.4 Travel Awareness and Information

- 5.4.1 Residents will be made aware of the existence of the Travel Plan and its aims.
- 5.4.2 As mentioned previously, Resident's Travel Packs will be issued for new residents moving into the development and prospective buyers will be made aware of the Travel Plan when viewing properties.

5.5 Promotion of Lift Share Scheme

- 5.5.1 The Travel Plan Co-ordinator will promote the use of car sharing via registering on the Liftshare website. It allows users to register their details, where they are travelling to, if they are offering a lift or need a lift to their destination.
- 5.5.2 The website can be found at the following location www.liftshare.com

5.6 Encouraging Walking/Cycling

5.6.1 It is also worth noting that residents will be provided with information and advice concerning safe pedestrian and cycle routes to the site through the Greater Manchester cycle and walking schemes, as part of the Travel Plan initiatives.

5.6.2 Information on these schemes is available on the following websites:

<https://tfgm.co/cycling-and-walking/> - which has further information about walking and cycling in Greater Manchester.

<https://gmwalking.co.uk/walking-locations/>

<https://mappinggm.org.uk/bee-network/>

5.6.3 The Bee Network is a cycling and walking infrastructure proposal for Greater Manchester which can be viewed on Transport for Greater Manchester's website. The Bee Network proposal is a vision for Greater Manchester to become the very first city region in the UK to have a fully joined up cycling and walking network; the most comprehensive in Britain, covering 1000 miles.

5.7 Encouraging Home Working and Delivery Services

5.7.1 All new properties will have the ability to have broadband internet connection points, enabling the residents to obtain the internet.

5.7.2 Therefore, encouraging home working and shopping, reducing the need to travel especially during peak times.

5.8 Encouraging Travel by Public Transport

- 5.8.1 The TPC will liaise with the local bus operators to promote the use of bus and rail services and ensure that up to date timetable information is readily available to residents.
- 5.8.2 Travel by public transport will be promoted and residents will be encouraged to access the public transport information provided on relevant websites, as well as utilising the Journey Planning tools available.

5.9 Marketing and Promotion

- 5.9.1 To ensure that potential residents of the site are informed about the Travel Plan and its goals from the earliest stage, the Travel Plan will have a significant presence within the sales suite of the development which will include a display outlining the sustainable travel measures being implemented and details of access by sustainable travel modes.
- 5.9.2 The sales staff will be given training to promote the Travel Plan as an asset and selling point of the development and key concepts relating to accessibility included in marketing/sales particulars.

6 TRAVEL PLAN TARGETS

6.1 Introduction

- 6.1.1 This section of the Travel Plan deals with the post development scenario i.e. once the development is complete, occupied and the Travel Plan has been implemented and relates to targets against which the success of the Plan in achieving its objectives will be measured.
- 6.1.2 The targets are designed to be quantifiable, be relevant to both measures and objectives identified in the Plan and to include timescale.
- 6.1.3 In order to set the targets, further information (e.g. through a travel survey) may have to be obtained in order to establish against which to set the targets. This information will be related to existing patterns of movement (i.e. the proportion of residents who travel to their workplace by non-car mode) and may be obtained from sources such as the National Travel Survey and the National Census.
- 6.1.4 More accurate information to establish the baseline targets however, will be obtained from a Residents Travel Survey which will be undertaken within one month of the development being 50% occupied.
- 6.1.5 Following the granting planning consent, suitable targets for reducing the need to travel by private car will be set against the baseline targets and agreed with the Council and included in the final Residential Travel Plan for the whole development.

6.2 Potential Targets

- 6.2.1 The targets are designed to be quantifiable, be relevant to both measures and objectives identified in the Plan and to include timescale.

6.2.2 Targets which according to the DfT may potentially be included in the Travel Plan include the following:

- Car trips per household - targets set on the basis of predicted trip rates for the development.
- Uptake of alternatives - targets for bus patronage, registration and participation in the Liftshare car share scheme, cycle counts and pedestrian counts.
- Car ownership and mode of travel - trip based targets may be supplemented by targets related to car ownership, travel to work by mode and travel to school by mode.
- Travel Plan awareness targets - for example, a target can be established to ensure a significant percentage of residents are aware of the Travel Plan and its purpose.

6.3 Action Plan

6.3.1 **Table 6.1** below provides an Action Plan and timescales to assist the Travel Plan Co-ordinator (TPC) to implement the obligations of the Travel Plan;

Action	Target Date	Indicator/Measured by	Responsibility
Appointment of TPC	TPC appointed one month prior to first occupation of site	Appointment of TPC by target date	Housebuilder
Production of Residents Travel Pack	Upon Occupation	Resident travel survey	Housebuilder
Undertake initial travel surveys	Within 1 month of reaching 50% occupation of development	Receipt of survey results	TPC
Agree Travel Plan Targets	1 month after initial travel survey undertaken	Receipt of written agreements of targets	TPC
Achieve target car driver travel to work mode split	5 years after initial travel survey	Residents travel surveys conducted in years 1, 3 and 5	TPC

Table 6.1 – Travel Plan Action Plan and Timescales

- 6.3.2 The table above sets out the key tasks that will need to be undertaken by the Travel Plan Co-ordinator as part of the Travel Plan including guidance as to timescales for the tasks to be undertaken.

7 PLAN MONITORING AND ASSESSMENT

7.1.1 DfT best practice guidelines state that monitoring of the Travel Plan should normally take place on the following basis:

- Early on in the occupation period of the site - for example, triggered by 50% occupancy to provide the information base for the review of the plan;
- Annually or at least every two years thereafter to provide on-going information on the impact of the plan;
- Monitoring should take place over a wide range of time periods to reflect the different pattern of journeys that can be generated by residential development.

7.1.2 The monitoring could include items such as:

- Full residential surveys to be completed in year 1, year 3 and year 5 and snap shot surveys to be completed every 6 to 12 months.
- Feedback from bus operators to establish demand for local bus services.

7.1.3 Once planning consent is granted, consideration will be given on how best to monitor and measure the success of the Travel Plan measures when preparing the final Travel Plan for the development. Appropriate monitoring arrangements will be discussed and agreed with the Council.

7.1.4 The monitoring and assessment of the Travel Plan will include the submission of annual progress reports detailing the results of the travel surveys with regards to targets, budgets, general effectiveness and current initiatives.



- 7.1.5 An annual report is to be submitted to the local authority no later than one month following the anniversary of the approval of the Travel Plan.
- 7.1.6 This will allow effective measures to be promoted and increased while ineffective measures can be revised and rectified. New initiatives for the coming year will also be contained within the report and submitted to officers at the Council.

8 CONCLUSIONS

- 8.1.1 This Travel Plan has considered the sites sustainable accessibility credentials in order to promote sustainable modes of travel and reduce the dependency of the private car.
- 8.1.2 The information contained within the Travel Plan and details of sustainable modes of transport in the vicinity of the site will be accessible to residents and visitors to the development.
- 8.1.3 The aim of the Residential Travel Plan is:
- to encourage residents to use sustainable modes of transport to access the site;
 - reduce the reliance on single car occupancy journeys; and
 - generally reduce traffic related pollution and noise.
- 8.1.4 A wide range of measures and actions will be used to encourage car sharing, public transport use, cycling and walking.
- 8.1.5 The Travel Plan Co-ordinator will ensure the Travel Plan is implemented and is operating effectively.
- 8.1.6 A detailed Resident Travel Survey will be undertaken to establish travel modes of residents and following this, specific targets will be set and agreed with the Travel Plan team at the Council.
- 8.1.7 The site has been demonstrated to benefit from excellent non-car accessibility and it should, therefore, be expected that the adoption of a Travel Plan would be particularly effective.



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