Middlewick Ranges – Transport Overview

An overall report that compiles together the transport technical work undertaken in support of the proposed allocation of Middlewick Ranges in the Colchester Local Plan

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1.0 INTRODUCTION

This short format report amalgamates the content of two Technical Notes prepared by Stantec in respect of the transport issues arising from the potential allocation of the DIO's Middlewick Ranges site for predominantly residential development in the draft Colchester District Council Local Plan review. The previous technical notes dealt with strategic and local highway matters, respectively, and were referenced as follows:

- Middlewick Training Area, Colchester – Summary of modelled development impact; 27th February 2019
- Middlewick Training Area, Colchester – Local Highway Assessment and Sustainable Travel Opportunities; February 2020

1.1.1 Summary of modelled development impact

This note provided interpretation of strategic modelling work that DIO commissioned Essex County Highways (using Jacobs as their modelling consultant) to undertake using their strategic traffic model to consider the wider area effects of development at Middlewick, and particularly to test different potential configuration of development and housing numbers at the site.

This note is re-presented in Chapter 2 of this report.

1.1.2 Local Highway Assessment & Sustainable Travel Opportunities

This note considered the effects of the proposed allocation the local highway network – especially Abbot's Road, Mersea Road and Old Heath Road and the junctions between them, as well as the way that the access to the site could be configured to add greater permeability to the local network. This note, and the traffic surveys that underpinned it, was developed as a direct response to issues raised about the local highway network at the public consultation event that was held in the area of the site.

This note is re-presented in Chapter 3 of this report.

2.0 SUMMARY OF MODELLED DEVELOPMENT IMPACT

This section reports on a review of the modelling outputs presented in the *Middlewick Ranges Development Test Report (Jacobs - February 2019)*, which is included in **Appendix A** of this report, to provide a summary of the modelled impact of a proposed residential development allocation at Middlewick Ranges.

It considers the way that the strategic traffic model prepared for the Local Plan evidence base addresses the potential effects and impacts of the allocation at Middlewick. The strategic model has been run with a series of scenarios related to the site and provides outputs in respect of highway impacts and potential locations where mitigation may be required. It therefore utilises the model outputs as set out in the Jacobs report to consider the impact of the development on the highway network, in the context of the local plan aspirations, and provides recommendations with regards to vehicle access and movements at the site, and where the need for mitigation is significant at locations on the external transport network.

The section is structured as follows:

- Model scenarios
- Growth methodology
- Demand variation
- Key junctions
- Conclusions

2.1 MODEL SCENARIOS

The model scenarios used for this assessment are based on the original assessment commissioned by Essex County Council (ECC) in June 2015 for the purpose of supporting the emerging Local Plan. The scenarios used are:

- Do Nothing
- Do Minimum

The Do Nothing scenario relates to only accommodating the currently committed development, whereas the Do Minimum scenario incorporates both the current committed development and proposed Local Plan allocations. It should be noted that neither scenario includes any mitigation schemes and the only highway improvements includes are one that will be identified in the Local Plan. The Jacobs modelling should have taken account of any highway improvements from the Local Plan. The details of the Local Plan allocations are given in Table 8 of the Colchester Local Plan Traffic Modelling Technical Report, which is appended in **Appendix B**.

The development at Middlewick Ranges has been tested with two different assumptions of wider growth; sensitivity test one, which includes only committed development (Do Nothing), and sensitivity test two, which includes committed and local plan development (Do Minimum)

Summary of modelled development impact

Both scenarios have been tested with the assumption of no development at Middlewick Ranges and then tested with three different levels of development at Middlewick Ranges; 1,000 (DS1), 1,500 (DS2) and 2,000 (DS3) dwellings. It should be noted that this scale of development would give rise to the need for other ancillary and supporting land uses at the site – local retail and other facilities, but for the purposes of this assessment these are assumed to be only related to the needs of the predominantly residential allocation and hence will not give rise to any trip generation external to the site.

Trip numbers for each of these scenarios are shown in Table 3-2 of the *Middlewick Ranges Development Test Report (February 2019)* and are replicated in Table 2.1 below.

Table 2.1 – Trip Generation

No. of dwellings	AM		PM		AM (Total)	PM (Total)
	Arrivals	Departures	Arrivals	Departures		
1000 dwellings (DS1)	105	301	280	140	406	420
1500 dwellings (DS1)	157	452	420	209	609	629
2000 dwellings (DS1)	210	603	561	279	813	840

2.2 GROWTH METHODOLOGY

The growth in traffic for future years is based on increased demand calculations derived from the TEMPro NTEM v6.2 database. Background growth is adjusted to not double-count committed development and, in the Do Minimum scenario, the Local Plan allocations are added to the background growth.

This approach is in line with standard modelling growth methodology and, although the database used is older than the most current version, the correction for committed development will mean that the differences between forecast and actual growth to 2032 should be considered acceptable, given that any forecast is a prediction based on available information.

2.3 DEMAND VARIATION

The model incorporates a Variable Demand Model, which means that changes in journey times through network changes, or changes in traffic levels, can change the routing, timing and mode choice of a trip. This means that, as traffic is added to the network from developments, travel time tends to increase and this will impact on travel behaviour. Some trips may be made at a different time (“peak spreading” or “time of day shift”), be made using another mode (“mode shift”) or not be made at all.

This process is iterated until the variation between calculations (termed relative gap) converges and each model run is within a certain tolerance. This technique was used on the Do Something scenarios, which means that, in these scenarios, traffic congestion arising from development can divert or supress trips.

2.4 KEY JUNCTIONS

Volume over capacity is the metric used for the assessment of congestion at junctions, which considers the ratio of traffic volume to theoretical capacity for each turning movement. In this case, junctions were assessed based on the worst performing turning movement.

The junctions highlighted in the *Middlewick Ranges Development Test Report (February 2019)* as being the most affected by development at Middlewick Ranges are:

- Wimpole Road/ Brook Street/ A134
- Mersea Road/ Pownall Crescent
- Mersea Road/ Abbot's Road

These junctions are illustrated on Figure 5-13 of the *Middlewick Ranges Development Test Report (February 2019)* (see extract below).

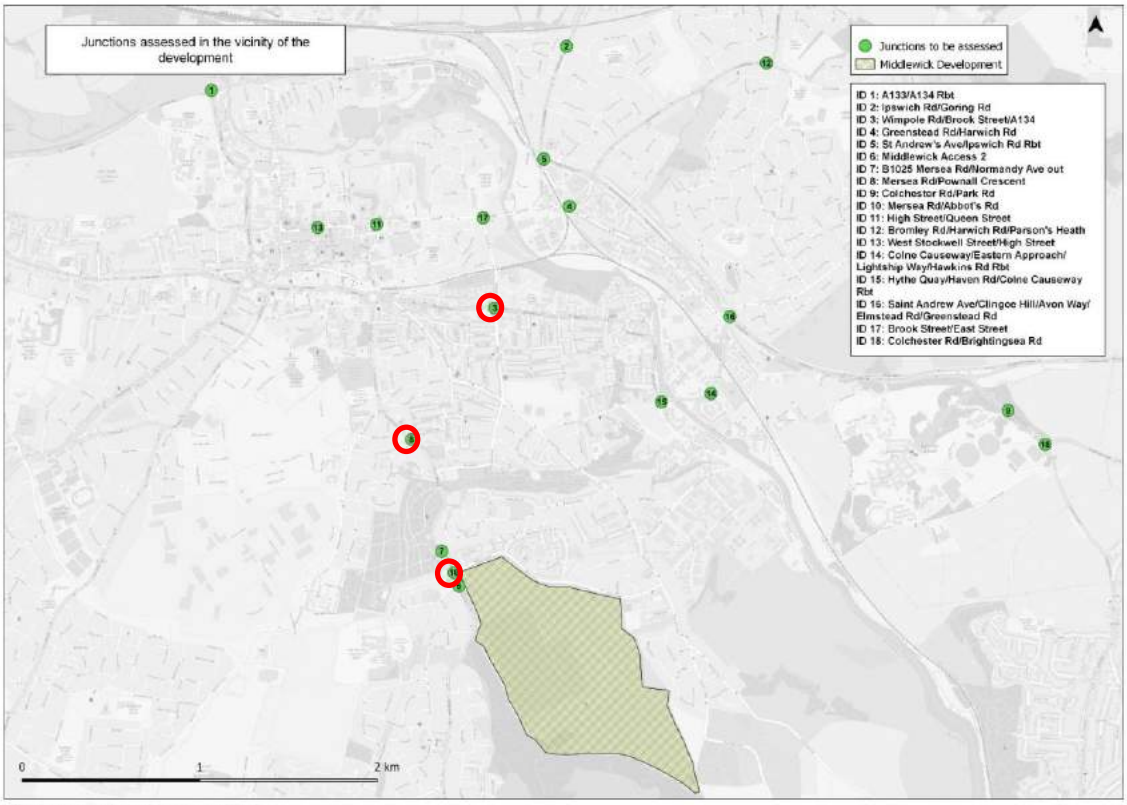

Figure 5-13: Junctions assessed

These junctions lie along the route from the site into Colchester and the A134 corridor and, from initial analysis of the results, the wider impact of development is limited through dispersal once traffic reaches the wider road network.

Diversions and changes in traffic flow are observed, but do not have a significant enough effect to require intervention or further detailed modelling. There are other junctions which exceed capacity, but these also exceed capacity in the scenarios without development.

The identified junctions are analysed as being within capacity (using the volume over capacity criteria from the strategic model, rather than from junction capacity assessments) with 1,000 dwellings, but are above capacity for scenarios with 1,500 and 2,000 dwellings. This applies in the Do Nothing and Do Something scenarios. Mitigation of these junctions (or a strategic routing approach to divert traffic away from these junctions) would be required for the higher development scenarios.

The Middlewick Ranges access off Mersea Road is also identified as approaching capacity in all development scenarios, although reconfiguration of the access and design for the appropriate level of development would be part of the masterplanning process as the site is taken forward.

2.5 CONCLUSIONS

The Do Something scenarios are the most representative of likely future traffic levels within Colchester. In this scenario, 1,000 dwellings can be accommodated on the site without the need for traffic interventions, although network-wide effects will occur and appropriate transport measures considered to mitigate these.

The site access can also be reconfigured to accommodate the forecast levels of development traffic as the site is taken forward.

3.0 LOCAL HIGHWAY ASSESSMENT & SUSTAINABLE TRAVEL OPPORTUNITIES

The allocation of the former MOD Firing Range at Middlewick as part of the emerging Colchester City Council draft Local Plan inevitably raises issues around transport and access into the existing predominantly residential area to the south of Colchester. Although the wider strategic modelling undertaken by the County Council as part of the Local Plan evidence base examines the effects of allocations across the City and on strategic routes, it is not intended to consider the impacts on the local road network.

The local road network around Middlewick is mature, with considerable existing frontage development and constrained junctions in places, and so it was considered important to be able to demonstrate that the allocation at Middlewick could be accommodated. As a result, this section considers the current operation of the local highway network and derives a local highway access strategy for the scheme.

Current best practice requires that transport assessment should highlight the opportunities for sustainable forms of movement and accessibility first and then deal with highway access once sustainable modes have been provided. This is certainly the approach that needs to be taken at Middlewick and will be the guiding principle of any future Transport Assessment, should the site come forward under a planning application.

However, this assessment is targeted at concerns regarding highway operation and access, and so concentrates on the highway aspects of the proposal rather than the sustainable transport approach. For clarity, this is not because Middlewick does not have a strong sustainable transport narrative – it does, but rather that this section addresses the highway issues that were raised as part of the public consultation that the DIO held in respect of the site proposals.

The assessment provides the necessary evidence to support the allocation at Middlewick. Therefore, it has a number of attached appendices and figures that underpin the reported analysis.

3.1 HIGHWAY & ACCESS PHILOSOPHY

The site at Middlewick is predominantly surrounded by existing residential development – to the north, east and west (to the south is the wider MOD land holding). This means that, although there are existing streets that front the site, and from which access could be taken, these streets are already used by through traffic and local traffic moving around the southern side of Colchester.

It is clear, both from observations on site and from feedback at the public consultation, that there are concerns about the operation of the local roads – especially Abbot's Road, that runs along the northern boundary of the site. This road is perceived to accommodate an amount of "switching" between the north-south routes in to the City Centre from the south, and so provides both for local traffic access and movement, but also a locally strategic function to allow drivers to select their route towards the City itself. This makes the route busier than it might otherwise be, as there are no alternatives to this route.

The traffic surveys undertaken as part of the assessment showed that during the twelve hour day that was surveyed, around a third of the trips on Mersea Road and Old Heath Road currently switch between the north-south routes into the City using Abbot's Road, and 4% from Mersea Road to Fingringhoe Road and 15% from Fingringhoe Road to Mersea Road. This is illustrated in drawing number **40472-5513-011** in **Appendix C**.

Therefore, as part of the Middlewick scheme, the opportunity exists to provide greater permeability to the local road network with a new link provided between Mersea Road and Abbot's Road. This will provide an alternative route for some of this switching traffic and spread traffic loads across the network.

The site access junctions, which would provide for this link to be provided through the site, are therefore proposed to be located as far to the south as practicable on Mersea Road, and as far to the east as practicable on Abbot's Road, to provide the maximum potential alternative to using the current road network.

As part of this proposal, the way that the junctions are configured into the site has been proposed to re-balance traffic movements, encourage the use of the new route and draw some traffic through the site and away from the western end of Abbot's Road and Mersea Road. This is achieved by changing the priority of Abbot's Road where it meets the site access, so that the eastern section of Abbot's Road turns into the site, as the through route, and becomes the site road. The remaining section of Abbot's Road then "tees" off this new route. At the other end, a new, small roundabout on Mersea Road allows each of the entry arms to have equal status and allows drivers to select either route.

Together, these junction configurations make it easier for traffic that wants to switch to use the new route through the site, rather than the existing section of Abbot's Road. It emphasises the new route and removes any difficult right turns to allow drivers to use the new route more easily than the current route.

Unfortunately, although the scheme provides useful additional permeability to the highway network, the easternmost section of Abbot's Road remains on its existing alignment. Therefore, over this section, a traffic management and calming scheme would be proposed. This would manage traffic speeds, whilst enhancing the environment – especially around the school. There is no formal pedestrian crossing on this section and it may be appropriate to provide this as part of a more comprehensive scheme for the assistance of the school children accessing the primary school close to the junction with Old Heath Road.

This highway and access philosophy is illustrated in **drawing number 40472-5513-010** in **Appendix C**.

3.2 DATA COLLECTION AND MANAGEMENT

Data was collected on the local road network at the end of November and early December 2019. This comprised Automated Number Plate Recognition (ANPR) surveys on 3rd December 2019, and Automatic Traffic Count (ATC) surveys placed in key locations over a week commencing on the 29th November 2019. The survey locations are illustrated in **Appendix D**.

The ANPR data allows matches between number plates across the local highway network to allow turning movements at junctions to be derived, but also to allow any switching movements to be detected and

quantified. The survey data collected was used to derive the Base 2019 flow diagrams, as set out in **Appendix E**. The ATC data was used to ensure that the ANPR data collected was representative of daily traffic patterns.

It is known that ANPR routing data can have some discrepancies between recorded origin and terminating journeys. This can cause an issue when the flows are combined that results in some trips being missed, or double-counted across ANPR locations. To remedy this, ATC flow data is used to factor the ANPR data to reflect the total flows recorded at each link. The ATC counts provide two weeks of 24-hour directional flow data. Hence, using both datasets together it is possible to derive a robust understanding of the volume of traffic in each direction on a link. Using the combined dataset ensures that the flow volumes reflect reality, and the turning movements reflect the journeys people are making at a given point on the network.

Growth factors were then applied to the baseline 2019 data to allow for increases in background traffic up to the end of the proposed Local Plan period in 2032. This analysis is set out in **Appendix E**, but suggested growth factors of a little over 12% should be applied in both the morning and evening peak periods to forecast the likely traffic flows in 2032. The growth factors used are particular to this part of Colchester and take account of all the planned Local Plan growth, as well as changes in traffic trends, over the period to 2032.

3.3 DEVELOPMENT TRAFFIC GENERATION

The rates used to calculate the vehicle trips forecast to be generated from the site when it is developed were taken from those used in the Colchester Local Plan Traffic Model. This is the highway authority's model, used to assess the effects of the Local Plan developments, and so represents the best available information to use for assessment.

On the basis that there would be up to 1,000 new dwellings at the Middlewick site, Table 3.1 summarises the volume of trips forecast to be generated.

Table 3.1 – Vehicle trip rates and trip generation

	AM Peak (8am to 9am)			PM Peak (5pm to 6pm)		
	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way
Vehicle Trip Rates	0.106	0.603	0.813	0.561	0.279	0.840
Vehicle Trips (1,000 dwellings)	105	603	813	561	279	840

Having established the overall volume of car trips that would be generated in the peak periods, these trips are then assigned to the highway network using "Journey to Work" data from the latest available census data (Census 2011). This is available in very localised areas, and so the data from this part of Colchester was used to direct trips from the development onto the local highway network.

In summary, this assessment showed that traffic would distribute to the highway network in the proportions shown in Table 3.2.

Table 3.2 – Development distribution

Direction	Destinations	Routes	Distribution
North West	Colchester, Braiswick	B1025 Northbound	51.2%
North East	Wivenhoe, Greenstead,	Old Heath Road Northbound	28.2%
South West	Tiptree, Layer-de-la-Haye, Barrow Hill	B1025 Southbound	7.8%
South East	Shrub End	Old Heath Road Southbound	12.8%

These proportions were used to calculate the way that development traffic would access the network – whether it would prefer to exit onto Mersea Road or Abbot's Road, depending on its ultimate destination. This was calculated based on the existing proportions of traffic on these two roads, as this is suitably representative for assessment in terms of Local Plan evidence. A more detailed appraisal allowing for journey times within the site to weight trips as being nearer or further from an access point may be appropriate as part of a future Transport Assessment – but the current proportions are suitable at this stage.

Applying these proportions suggested that 25% of development vehicle trips would seek to use the Abbot's Road access in the AM peak and 75% of development vehicle trips would use the Mersea Road access. In the PM peak the proportions were slightly different, with 32% of development vehicles trips using the Abbot's Road access and 68% using the Mersea Road access.

3.4 TESTING THE NETWORK

Having the 2019 Base data and forecast traffic data for the end of the Local Plan period in 2032 allows an assessment of the capacity of the network to be undertaken using industry standard modelling software.

3.4.1 2019 Baseline tests

The 2019 data was tested in the software. Although the conditions are known in terms of queues and delays for this data, it is important to also run this scenario in the software to ensure that it accurately replicates the conditions that are observed on the ground. Fine adjustments may be made to the model parameters to ensure that it is calibrated against the actual observed flows, before it is them used to consider theoretical future forecast flows.

3.4.1.1 Abbot's Road / Mersea Road Mini Roundabout

In the 2019 Base scenario, it showed that in the AM peak both Abbots Road and Mersea Road South have high levels of delay and are approaching capacity. However, Mersea Road North is performing well within capacity in the AM peak with low level and queuing and delays. In the PM peak, Abbot's Road is performing over capacity with high levels of queues and delays. In contrast, both Mersea Road North and South are performing well in the PM peak. The 2019 Base results are summarised in **Table 3.3** in the following section.

3.4.1.2 Abbot's Road / Old Heath Road Mini Roundabout

The 2019 Base results show the junction to operate with some spare capacity in the morning peak period with minimal queuing or delay. In the evening peak period, the Old Heath Road South and Abbot's Road arms operate with spare capacity and the Old Heath Road North arm operates over capacity with moderate queuing and delay. The 2019 Base results are summarised in **Table 3.5** in the following section.

3.4.2 The 2032 network

The network at the end of the Local Plan will be different to the current one. There will have been development in various locations around the District as part of the Local Plan delivery, and, in the area around Middlewick, development will have taken place. This will have the effect of both adding some development traffic to the local network, but also providing additional permeability to the network, through the link road through the site.

It is likely that travel patterns will have changed by 2032 as well. Car ownership trends may well have changed and support for sustainable transport (local buses, which may be demand responsive) will have changed travel choices as well. It would be expected that this would see an overall decline in reliance on the private car, consistent with currently emerging trends.

However, no allowance for these changes, which would be likely to be net beneficial to the operation of the network, has been included in this assessment. This is to ensure that this represents a realistic worst case, and because the derivation of these effects is beyond the scope of this Note and will need to be considered more comprehensively in a future Transport Assessment as part of a planning application.

Therefore, tests of the forecast network need to be undertaken, falling into two broad categories:

1. Tests of the existing network in 2032, to provide a "baseline" future case, if no development came forward at Middlewick; and
2. Test of the forecast network in 2032, with both the Middlewick development and link road, with its allowance for re-routing of traffic included.

3.4.3 Through traffic using the link road through the site

The diversion of traffic onto the link road through the site was calculated by considering the number of trips that were already shown to be switching routes along Abbot's Road, and then applying a factor for the attractiveness of the two routes (along Abbot's Road as currently, or through the site link road) based on an assessment of likely journey time between the two routes.

The effects of the link road are quantifiable at each location on the network, as two separate Development Scenarios have been tested:

3. DS 1 – assuming that no viable through route is provided across the site, and so all non-development related traffic continues to route as it does now;

4. DS2 – the proposed link road through the site is tested, including appropriate allowances for non-site related traffic to re-route through the site.

3.5 JUNCTION CAPACITY ASSESSMENTS

In order to determine how the local highway network would cope with the effects of the development, it is necessary to establish the performance of four key junctions in the forecast 2032 Local Plan completion year:

- Abbot's Road / Mersea Road mini roundabout
- Abbot's Road / Old Heath Road mini roundabout
- Abbot's Road site access junction (where priority is given to the site access and Abbot's Road east), and
- Mersea Road site access roundabout.

The full details of these junction assessments can be found in **Appendix F**. A summary of each junction is provided in the following sections.

3.5.1 Abbot's Road / Mersea Road Mini Roundabout

Since this junction was shown to be over-capacity in the 2019 Base scenario, it is not a surprise that it also fails in the 2032 Base tests. The results of this junction capacity assessment are summarised in **Table 3.3**.

Table 3.3 – Abbot's Road / Mersea Road Mini Roundabout Junction Capacity Assessment

	AM Peak (8am to 9am)			PM Peak (5pm to 6pm)		
	Delay (seconds)	Queue (PCU)	RFC	Delay (seconds)	Queue (PCU)	RFC
2019 Base						
Abbot's Road	42.97	6.6	0.89	112.57	18.7	1.01
Mersea Road South	434.33	104.2	1.22	22.35	4.2	0.82
Mersea Road North	9.96	1.5	0.59	16.09	3.0	0.75
2032 Base						
Abbot's Road	128.59	24.4	1.03	343.02	63.5	1.20
Mersea Road South	872.11	216.7	1.38	42.27	8.8	0.92
Mersea Road North	12.02	2.0	0.66	29.46	5.9	0.87
2032 Base + Development Scenario 1						
Abbot's Road	293.44	59.9	1.17	803.08	123.1	1.36
Mersea Road South	1942.85	454.0	1.64	108.28	27.4	1.02
Mersea Road North	14.42	2.7	0.73	203.12	59.0	1.11
2032 Base + Development Scenario 2						
Abbot's Road	11.13	0.7	0.41	31.72	2.8	0.75
Mersea Road South	673.03	169.2	1.31	15.25	2.7	0.73
Mersea Road North	11.13	0.7	0.41	66.30	17.5	0.98

In the 2019 Base scenario, both the AM peak and PM peak, Abbot's Road is over-capacity and, in the AM peak only, Mersea Road South is also over-capacity. In the 2032 Base Scenario, all arms are either failing or approaching capacity in both peaks, with the exception of Mersea Road North in the AM peak .These junction performance issues in the base scenarios illustrate that, even without development, existing traffic flows are creating a strain on this junction.

In the Base 2032 + Development Scenario 1 (without the link road), it shows that most of the approaches are over capacity in both peaks, with high levels of queues and delays, with the exception of Mersea Road North in the AM peak.

However, in the Base 2032 + Development Scenario 2 (with the link road), this shows how the proposed diversion route improves the performance of this junction. The diversion route drastically reduces the number of right turners into Abbot's Road and vehicles coming out onto Mersea Road. As a result, Abbot's Road performs well in capacity terms, with minimal delays and queuing in this scenario in both peaks. Only Mersea Road South in the AM peak and Mersea Road North in the PM peak still pose capacity issues.

However, it can be seen that the RFC values (the ratio of flow to capacity available) are lower in the "with" development scenario. This improvement is a result of the benefits of the relief provided by through traffic diverting to the route through the site.

Hence, although the overall performance of the junction remains busy in the future in both scenarios, the development scheme with the link road results in an overall betterment at the junction. Although some additional development traffic is added to the junction, there is a greater benefit by the relief that is achieved by the traffic that can re-route through the site.

The overall benefit of the relief road through the site is roughly a 10% increase in RFC on all arms of the junction, except the Mersea Road North arm in the PM peak.

On this basis, in theory, it would not be necessary to mitigate the junction to offset the detrimental impacts of development as the new link road through the site creates a localised re-routing of traffic that offsets the effects of the development. This therefore achieves an effective mitigation of the effects of the development. However, it could be expected that the highway authority would wish to proposed or require a mitigation scheme by 2032 in any case, to deal with the projected levels of delay that may exist at the junction at that time with or without development, and so consideration has been given to how the junction could be improved.

3.5.2 Abbot's Road / Mersea Road junction – Potential Mitigation Proposals

The junction capacity assessments show that this junction will be under considerable stress by 2032, with or without the development, and so the possibility to upgrade it has been investigated.

The existing highway is quite constrained around the junction and this is why a mini-roundabout has been implemented as an improvement to what was most likely a priority junction originally. It should also be noted that the lack of entry deflection on the existing mini roundabout means that drivers still tend to treat

this layout similar to a priority junction, and this is reflected in the junction modelling, and hence the lower performance than would be anticipated for a conventional roundabout.

Therefore, potential mitigation measures have been explored as shown in drawing number **40472-5513-008** in **Appendix G**. At Abbot's Road, it is proposed that the flare is widened in order to improve this arm's capacity levels whilst, at Mersea Road South, it is proposed that short right turn lane will help reduce queuing for right turners and in turn reduce delay. This additional provision is facilitated by the use of an area of the proposed development site frontage onto Abbot's Road. Also, it is proposed that the lane at Mersea Road North is widened into the central hatching to provide a longer flare to increase capacity. **Table 3.4** compares the result of the existing layout in 2032 with the mitigated layout in the 2032 Base + Development scenarios.

Table 3.4 – Abbot's Road / Mersea Road Mini Roundabout Mitigation Junction Capacity Assessment

	AM Peak (8am to 9am)			PM Peak (5pm to 6pm)		
	Delay (seconds)	Queue (PCU)	RFC	Delay (seconds)	Queue (PCU)	RFC
2032 Base (without mitigation)						
Abbot's Road	128.59	24.4	1.03	343.02	63.5	1.20
Mersea Road South	872.11	216.7	1.38	42.27	8.8	0.92
Mersea Road North	12.02	2.0	0.66	29.46	5.9	0.87
2032 Base + Development Scenario 1 (with mitigation)						
Abbot's Road	11.3	2.2	0.69	20.28	3.8	0.80
Mersea Road South	546.45	166.8	1.27	16.60	4.0	0.81
Mersea Road North	9.63	1.8	0.64	43.31	11.1	0.94
2032 Base + Development Scenario 2 (with mitigation)						
Abbot's Road	4.91	0.3	0.23	7.31	0.7	0.40
Mersea Road South	79.16	24.9	1.00	7.22	1.3	0.56
Mersea Road North	8.20	1.5	0.60	17.57	4.6	0.83

The results in **Table 3.4** show that, in Scenario 1, the improvement scheme mitigates the development impact on all arms except Mersea Road North in the PM peak. In Scenario 2, the improved layout performs considerably better than the existing layout on each arm in both peak periods.

Moreover, there is a petrol filling station located to the west of the site (as seen in **drawing number 40472-513-008** in **Appendix G**). The existing arrangement to access the filling station is via an exit-entry point and an exit only point. Due to the filling stations' proximity to the junction, it is likely that its access arrangements will need to be amended. It is not uncommon for individual land uses such as this to have a minor egress directly not a roundabout with little operational effect, but this would need to be considered in more detail as part of a planning application if mitigation at this junction was deemed necessary.

3.5.3 Abbot's Road / Old Heath Road Mini Roundabout

Again unsurprisingly, in the 2032 Base scenario without development added, this junction is over capacity. In the morning peak period, Old Heath Road South and Abbot's Road operate over capacity whilst, in the evening peak period, Old Heath Road North suffers from high levels of queueing and delay. Hence, in both the 2019 and 2032 scenarios, the junction is under some pressure.

When development traffic is added it shows a proportionate reduction in the performance of the junction. The situation is helped somewhat by the fact that the majority of development traffic is likely to head westwards away from the site, and so heads towards Mersea Road rather than Old Heath Road, but there is still a detrimental effect on performance.

The results of this junction capacity assessment are summarised in **Table 3.5** below.

Table 3.5 – Abbot's Road / Old Heath Road Mini Roundabout Junction Capacity Assessment

	AM Peak (8am to 9am)			PM Peak (5pm to 6pm)		
	Delay (seconds)	Queue (PCU)	RFC	Delay (seconds)	Queue (PCU)	RFC
2019 Base						
Old Heath Road South	18.91	2.8	0.75	8.18	0.7	0.40
Abbot's Road	26.18	4.2	0.82	10.99	1.6	0.61
Old Heath Road North	14.81	2.7	0.74	58.91	13.4	0.96
2032 Base						
Old Heath Road South	37.46	6.1	0.88	9.17	0.8	0.46
Abbot's Road	65.01	11.6	0.95	14.34	2.3	0.70
Old Heath Road North	23.16	4.7	0.83	172.62	50.1	1.09
2032 Base + Development Scenario 1						
Old Heath Road South	40.38	6.6	0.89	9.60	0.9	0.48
Abbot's Road	94.70	18.6	1.00	15.55	2.5	0.72
Old Heath Road North	25.03	5.1	0.85	225.73	64.9	1.12
2032 Base + Development Scenario 2						
Old Heath Road South	40.38	6.6	0.89	9.60	0.9	0.48
Abbot's Road	94.70	18.6	1.00	15.55	2.5	0.72
Old Heath Road North	25.03	5.1	0.85	225.73	64.9	1.12

Some mitigation of this junction would be expected, as the development worsens the performance of Abbot's Road in particular. Therefore, a potential improvement scheme has been investigated to see if this would provide an enhancement over and above the performance of the current mini-roundabout layout.

3.5.4 Abbot's Road / Old Heath Road Mini Roundabout – Potential Mitigation Proposals

The existing highway is quite constrained around the junction, and this is why a mini-roundabout has been implemented as an improvement to what was most likely a priority junction originally. It should also be noted that the lack of entry deflection on the existing mini roundabouts means that drivers still tend to treat this layout similar to a priority junction, and this is reflected in the junction modelling, and hence the lower performance than would be anticipated for a conventional roundabout.

Therefore, potential mitigation measures have been explored as shown in drawing number **40472-5513-009** in **Appendix G**. Changes to the existing layout could be made to provide additional capacity at this mini-roundabout. At Abbot's Road and Old Heath Road South, the entry width and flare has been extended whilst, at Old Heath Road North, the pedestrian island has been removed to potentially be replaced by a pelican crossing further north along the road to provide additional width to the lane. The results in **Table 3.6** show that the proposed mitigation scheme improves capacity at each arm in both the morning and evening peak periods.

Table 3.6 – Abbot's Road / Old Heath Road Mini Roundabout Mitigation Junction Capacity Assessment

	AM Peak (8am to 9am)			PM Peak (5pm to 6pm)		
	Delay (seconds)	Queue (PCU)	RFC	Delay (seconds)	Queue (PCU)	RFC
2032 Base						
Old Heath Road South	37.46	6.1	0.88	9.17	0.8	0.46
Abbot's Road	65.01	11.6	0.95	14.34	2.3	0.70
Old Heath Road North	23.16	4.7	0.83	172.62	50.1	1.09
2032 Base + Development Scenario 1						
Old Heath Road South	21.15	3.6	0.79	8.25	0.8	0.44
Abbot's Road	24.70	4.6	0.83	9.43	1.6	0.61
Old Heath Road North	14.75	3.1	0.76	84.51	23.4	1.00
2032 Base + Development Scenario 2						
Old Heath Road South	21.15	3.6	0.79	8.25	0.8	0.44
Abbot's Road	24.70	4.6	0.83	9.43	1.6	0.61
Old Heath Road North	14.75	3.1	0.76	84.51	23.4	1.00

3.5.5 Abbot's Road Site Access

Two potential access options have been considered from Abbot's Road:

1. A simple priority junction (as shown in drawing number 44072-5513-001 in **Appendix G**) which would be as a site access only in a scenario where a link through the site was not provided (and therefore non-site traffic does not reroute), and
2. A ghost island right turn junction (as shown in drawing number 44072-5513-007 in **Appendix G**) which establishes the through road being from Abbot's Road east into the site with the remaining section of Abbot's Road to the west being accessed as the minor arm at the new junction. This

layout allows for the junction to carry the diverted traffic through the site from Mersea Road. This junction is intended to emphasise the through route via the site road rather than Abbot's Road. This is particularly relevant for traffic that may re-route from Mersea Road towards Old Heath Lane as it removes the need for a more difficult right turn that would otherwise exist to exit the site road onto Abbot's Road.

The junction capacity assessment results of the simple priority junction are summarised in **Table 3.7** and the result of the realigned ghost island right turn junction are summarised in **Table 3.8**.

Table 3.7 – Abbot's Road Priority Access Junction Capacity Assessment (Scenario 1)

	AM Peak (8am to 9am)			PM Peak (5pm to 6pm)		
	Delay (seconds)	Queue (PCU)	RFC	Delay (seconds)	Queue (PCU)	RFC
2032 Base + Development (Scenario 1)						
Abbot's Road East	7.94	0.1	0.10	7.41	7.41	0.06
Access	15.04	0.1	0.12	14.04	14.04	0.07
Abbot's Road West	4.60	0.1	0.06	5.32	5.32	0.21

Table 3.8 – Abbot's Road Realigned Access Junction Capacity Assessment (Scenario 2)

	AM Peak (8am to 9am)			PM Peak (5pm to 6pm)		
	Delay (seconds)	Queue (PCU)	RFC	Delay (seconds)	Queue (PCU)	RFC
2032 Base + Development (Scenario 2)						
Abbot's Road East	12.93	1.1	0.52	9.60	0.4	0.31
Access	14.70	0.1	0.06	17.24	0.3	0.22
Abbot's Road West	11.72	0.8	0.44	16.14	1.6	0.61

3.5.6 Mersea Road Site Access

This junction is planned to be a small, conventional roundabout (not a mini-roundabout), which will be located partially within the site with the existing Mersea Road links re-aligned into it (as shown in **drawing number 40472-5513-006** in **Appendix G**). This junction layout solution will equalise the priority between the different entries, and so encourage the use of the new through route across the site, but without limiting accessibility along Mersea Road. The roundabout is also effective at allowing right turns to be made more easily, in all directions, which will assist with the overall creation of permeability in the local network.

It would be expected that there would be a reasonable volume of right turning traffic both from Mersea Road into the site access, and from the site access northwards along Mersea Road. Existing southbound flows on Mersea Road, which will now have to negotiate the roundabout, will also benefit from this layout.

The junction capacity assessment shows that the junction operates well within capacity in the "with development" scenario as seen in **Table 3.9** which summarises the results of assessment.

Table 3.9 – Mersea Road Access Junction Capacity Assessment

	AM Peak (8am to 9am)			PM Peak (5pm to 6pm)		
	Delay (seconds)	Queue (PCU)	RFC	Delay (seconds)	Queue (PCU)	RFC
2032 Base + Development (Scenario 1)						
Mersea Road North	3.67	0.7	0.40	6.73	2.0	0.67
Access	3.39	0.2	0.19	3.66	0.1	0.10
Mersea Road South	3.68	0.6	0.37	4.18	0.9	0.47
2032 Base + Development (Scenario 2)						
Mersea Road North	5.65	1.2	0.55	12.13	3.9	0.80
Access	6.33	1.3	0.57	5.86	0.8	0.44
Mersea Road South	6.23	1.5	0.61	6.34	1.7	0.64

3.6 IMPROVING LOCAL ACCESS

Drawing number 40472-5513-005 provides a plan of the local amenities close to the site which can be found in **Appendix H**.

There are many existing PROW's and cycleways to support active travel in Colchester and from the site. **Drawing number 404072-5513-003** in **Appendix I** shows the opportunities for travel by foot and cycle by providing connections from the site to existing infrastructure. The Essex Design Guidance suggests that the two accesses to the site should have at least one 2.0m footway and a 3.5m footway/ cycleway to promote active travel. From the Abbot's Road access, it could be proposed that the 3.5m footway/cycleway is extended to Old Heath Community Primary School as far as possible, combined with better maintenance of the existing route to provide the infrastructure to support walking and cycling to school.

Three new pedestrian and cycle crossing points have been suggested as part of the mitigation for the development scheme, and to encourage the use of walking and cycling and improve access to public transport. They are shown in drawing **404072-5513-010** in **Appendix C**. These crossing points are located directly by the site accesses and connect to existing cycle routes and PROW's. They are also located strategically in proximity to local facilities and bus stops to further promote sustainable travel.

Appendix A MIDDLEWICK RANGES DEVELOPMENT TEST REPORT (FEBRUARY 2019)

Essex Highways

Middlewick Ranges

Development Test Report

February 2019

RINGWAY JACOBS integrated expertise

Essex County Council

Document Control Sheet

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Executive Summary

In June 2015, Colchester Borough Council (CBC) asked Essex County Council (ECC) to provide transport modelling evidence to support their emerging Local Plan proposals. Essex Highways subsequently requested Jacobs to carry out that work. In 2016, the Ministry of Defence (MoD) made formal representations to CBC for an allocation of housing at Middlewick Ranges in the Colchester Local Plan. Subsequently, this has led to Jacobs recently undertaking this development test, that aims to better understand potential changes as a result of the increase in development at Middlewick Ranges.

Middlewick Ranges is located to the south of Colchester; the sites lies adjacent to the B1025, Mersea Road on the West, Abbots Road to the North and Old Heath Road/Fingringhoe Road to the East.

A series of tests with different levels of development at Middlewick Ranges have been conducted. The tests include two different potential growth scenarios within Colchester, referred to as Sensitivity Test 1 (ST1) and Sensitivity Test 2 (ST2). ST1 includes only the 'committed development' and ST2 includes 'local plan development' as well as 'committed development' . Each of these sensitivity tests is run in a scenario initially excluding Middlewick Ranges development, the Do Nothing (DN) in the case of ST1 and the Do Minimum (DM) for ST2. Then with three additional Do Something (DS) scenarios, each with different levels of development at Middlewick Ranges (DS1; 1,000 dwellings, DS2; 1,500 dwellings and DS3; 2,000 dwellings).

The development tests have been assessed in the transport models derived from the original work commissioned by ECC in June 2015. The models have a forecast year of 2032. The way in which the demand has been calculated is in line with the previous methodology from the Colchester Local Plan assessment. Although the methodology has remained the same, there were different assumptions applied to the NTEM v6.2 land uses used within TEMPro to develop the background growth levels. To be consistent with the previous modelling work (Colchester Local Plan assessment), a Variable Demand Model (VDM) was used to assess the demand response to changes in highway travel time between the test scenario and the reference case, which in this case is the scenario including the 'committed development'.

The trips generated in the ST1 scenario includes only the 'committed developments', whereas the ST2 scenario includes the committed and local plan

development, as a result of this, ST2 has approximately 3,000 more trips in both the AM and PM peak hours.

For this piece of work, in conjunction with the previous Colchester Local Plan assessment, only the scenarios which include the local plan development (i.e. DM, DS1 ST2, DS2 ST2 and DS3 ST2) were run through VDM. An acceptable level of convergence was achieved for all the ST2 scenarios. The results of VDM showed a reduction in demand as a result of the level of congestion in the network, in comparison to the reference case.

Both actual flows in Passenger Car Units (PCUs) and the ratio of Volume to Capacity (V/C) have been assessed for each scenario, by comparison with the base scenario, which is the scenario that has no development at Middlewick Ranges (DN and DM scenarios).

The flow differences between the base scenario and their corresponding development scenario have shown that, for each time period the distribution between the development scenarios is similar, however, with the additional development in each scenario the magnitude of the flow differences is greater.

The V/C is a commonly used metric that considers the ratio of traffic volume to capacity for each turning movement at junctions. For this piece of work, 18 junctions in the vicinity of the Middlewick Ranges have been reviewed, showing that the development leads to increases in terms of V/C of up to +15%. The V/C analysis identified a series of five junctions located near the development that showed significant V/C changes between the base and development scenario, the increase in V/C caused some junctions that were initially under capacity to become near or overcapacity.

The results of the actual flow analysis identified that the road network which accesses the Middlewick Ranges site experienced the greatest increases in traffic flow between the base scenario and the development scenario, with the roads near the Middlewick Ranges site (B1025, Abbot's Road and Old Heath Road) also affected.

1 Introduction

1.1 Background

In June 2015, Colchester Borough Council (CBC) asked Essex County Council (ECC) to provide transport modelling evidence to support their emerging Local Plan proposals. Essex Highways subsequently requested Jacobs to carry out that work. Formal representations made by the Ministry of Defence (MoD) to CBC in September 2016, requesting an allocation of housing at Middlewick Ranges in the Colchester Local Plan, lead to a request in May 2018, for Jacobs to undertake a piece of work that aims to better understand the potential changes as a result of the increase in development at Middlewick Ranges.

This work is to take the form of various sensitivity tests, of different levels of development at Middlewick Ranges in the context of different potential growth scenarios within Colchester.

1.2 Scope of Work

The scope of the project can be summarised as:

- Formal agreement on development quanta (for each test) and development access/loading assumptions
- Produce revised forecast networks reflecting the updated development network
- Produce revised forecast demand reflecting updated development scenarios
- Run Variable Demand Modelling for the updated models
- Produce a summary report of the key findings based on the model outputs

The methodology for producing the models to assess the Middlewick Ranges development is consistent with the previous Colchester Local Plan assessment modelling work. Therefore, only the AM and PM peak hours have been assessed.

A series of sensitivity tests with different levels of development at Middlewick Ranges in the context of different potential growth scenarios within Colchester were undertaken. These consist of a scenario excluding the Middlewick Ranges development (Do Nothing for Sensitivity Test 1 and Do Minimum for Sensitivity Test 2) and three additional Do Something scenarios of development, hereafter referred to as DS1, DS2 and DS3. The development scenarios have been agreed with ECC, and are identified in Table 1-1 below.

The different quanta of development at Middlewick Ranges are required to be modelled within two different assumptions of wider growth; test one which includes only committed development (Do Nothing) and test two which includes local plan development (Do Minimum). The forecast scenarios are summarised in the table below:

Scenario name	Background development	Middlewick Ranges development
Do Nothing (DN) – Sensitivity Test 1 (ST1)	Committed development only	Excluded
Do Minimum (DM) - Sensitivity Test 2 (ST2)	Committed and Local Plan development	Excluded
DS1_ST1	As per DN scenario	1000 dwellings
DS2_ST1	As per DN scenario	1500 dwellings
DS3_ST1	As per DN scenario	2000 dwellings
DS1_ST2	As per DM scenario	1000 dwellings
DS2_ST2	As per DM scenario	1500 dwellings
DS3_ST2	As per DM scenario	2000 dwellings

Table 1-1: Middlewick Ranges development scenario summary

2 Modelling Methodology

2.1 Models used

The transport models used for this assessment are derived from the original assessment commissioned by ECC in June 2015 for the purposes of the Local Plan. The precise scenarios used are:

- Scenario 0b (2032): Current allocated development
- Scenario 1c (2032): Development centered on East and West Colchester, assumes 2,500 dwellings in each

These scenarios were used as the basis for the DN and DM scenarios (as described in Table 1-1 above) respectively.

2.2 Demand Calculation

The demand calculation methodology used is the same as in the previous phases on the Colchester modelling project – based on TEMPro NTEM v6.2 database. The total level of growth in scenario 1c remains consistent with NTEM forecasts discounting the modelled developments. In scenario 0b the background growth is assumed the same as 1c, the only difference is the local plan growth. These two scenarios are used as a reference, and then adjusted with respect to the new scenarios examined (number of dwellings).

2.3 Variable Demand Model(s)

As part of the previous Local Plan assessment work, a Variable Demand Model (VDM) was developed to assess the demand response to changes in highway travel time between the test scenario and the current allocated development scenario. The premise of VDM is that any change in travel cost with respect to a reference case, through traffic intervention or changes in travel demand, is liable to either induce or suppress trips. Therefore, as traffic is added to the network from the local plan developments, with the result that travel time increases, this will impact on travel behaviour: Some trips may be made at a different time (time of day shift), be made using another mode (mode shift) or not be made at all.

Any changes in travel demand, will in turn affect travel times, which will consequentially affect travel demand again. The VDM model therefore follows an iterative process of modifying travel demand in response to changes in travel time. The model iterates until the changes in demand calculated from one iteration to the next are sufficiently small; this is termed ‘convergence’ and is measured by a statistic known as the ‘relative gap’, expressed as a percentage, and often referred to as %GAP. Guidance (TAG Unit M2 – Paragraph 6.3.8)

suggests that a relative gap (%GAP) under 0.2% is a favourable level of convergence, but gap values of less than 0.1% can be achieved in many cases. The %GAP values achieved in these VDM runs, as well as other modelling results are provided in Section 4. In this piece of work, only the Do Something scenarios which include the local plan development (i.e. DM, DS1 ST2, DS2 ST2 and DS3 ST2) were run through VDM. The other scenarios were not run using the Variable Demand Model, so as to be consistent with the previous modelling work. The results of these VDM runs are described in more detail in sections 4 and 5.

3 Middlewick Ranges Development

3.1 Overview

Middlewick Ranges is located to the south of Colchester. The site lies adjacent to the B1025, Mersea Road which runs to the West, Abbots Road to the North and Old Heath Road/Fingringhoe Road to the East. The site location and surrounding road network is shown in Figure 3-1.

Figure 3-1: Middlewick Ranges in relation to Colchester

3.2 Middlewick Ranges Development Land use Quantum

As summarised above in Table 1-1, the development at Middlewick Ranges has been tested with two different assumptions of wider growth; sensitivity test one which includes only committed development (Do Nothing) and sensitivity test two which includes committed and local plan development (Do Minimum), both these scenarios have been tested with the assumption of no development at Middlewick Ranges and then tested with three different levels of development included at Middlewick Ranges; 1,000 (DS1), 1,500 (DS2) and 2,000 (DS3) dwellings. A summary of the development scenarios is shown in Table 3-1.

Scenario name	Middlewick Ranges development	Other development
Do Nothing (DN) – Sensitivity Test 1 (ST1)	Excluded	Committed development only
Do Minimum (DM) - Sensitivity Test 2 (ST2)	Excluded	Local Plan development
DS1_ST1	1000 dwellings	As per DN scenario
DS2_ST1	1500 dwellings	As per DN scenario
DS3_ST1	2000 dwellings	As per DN scenario
DS1_ST2	1000 dwellings	As per DM scenario
DS2_ST2	1500 dwellings	As per DM scenario
DS3_ST2	2000 dwellings	As per DM scenario

Table 3-1: Middlewick Ranges Development quanta

Of these, the DN scenario already exists from the previous Colchester Local Plan Modelling work. Additionally, the scenario with Middlewick Ranges development quanta at 1,000 houses, Do Something 1 Sensitivity test 2 (DS1 ST2), also exists, again, as a result of the Colchester Local Plan Modelling work. The six other scenarios set out in the table above have been created.

3.3 Middlewick Ranges Development trip generation

The table below illustrates the trip generation for each of the levels of development; 1000, 1500 and 2000 dwellings. As the number of dwellings increases, so does the number of trips, which is to be expected. Trip rates are based on previous local plan work.

No. of dwellings	AM		PM		AM (Total)	PM (Total)
	Arrivals	Departures	Arrivals	Departures		
1000 dwellings (DS1)	105	301	280	140	406	420
1500 dwellings (DS2)	157	452	420	209	609	629
2000 dwellings (DS3)	210	603	561	279	813	840

Table 3-2: Middlewick Ranges development trip generation

3.4 Middlewick Ranges Development trip distribution

The methodology for the trip distribution of the Middlewick Ranges development trips already exists as part of the Colchester Local Plan Modelling work, whereby zone 1307 (Middlewick Ranges development zone) was allocated a donor zone. A “donor zone” is used in forecasting to duplicate distribution of a development zone from the distribution of a base year zone in close proximity to the development zone. A donor zone will also have similar land use characteristics as the development. For example, a development zone that contains a residential development, should use a donor zone containing housing only. In this instance zones were aggregated into sectors, from which the sector/zones that most aligned with the Middlewick Ranges development were used to distribute the trips. The following plots illustrate the total trips to and from the Middlewick Ranges development zone in the morning peak and in the evening peak.

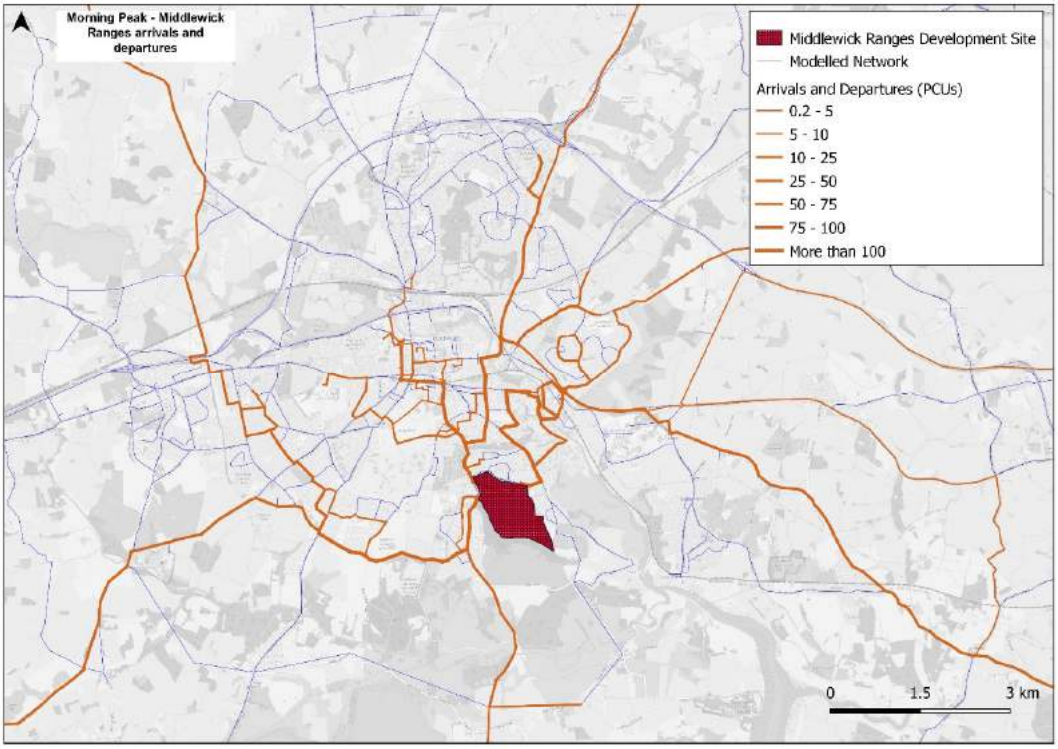


Figure 3-2: Middlewick Ranges development - Morning arrivals and departures

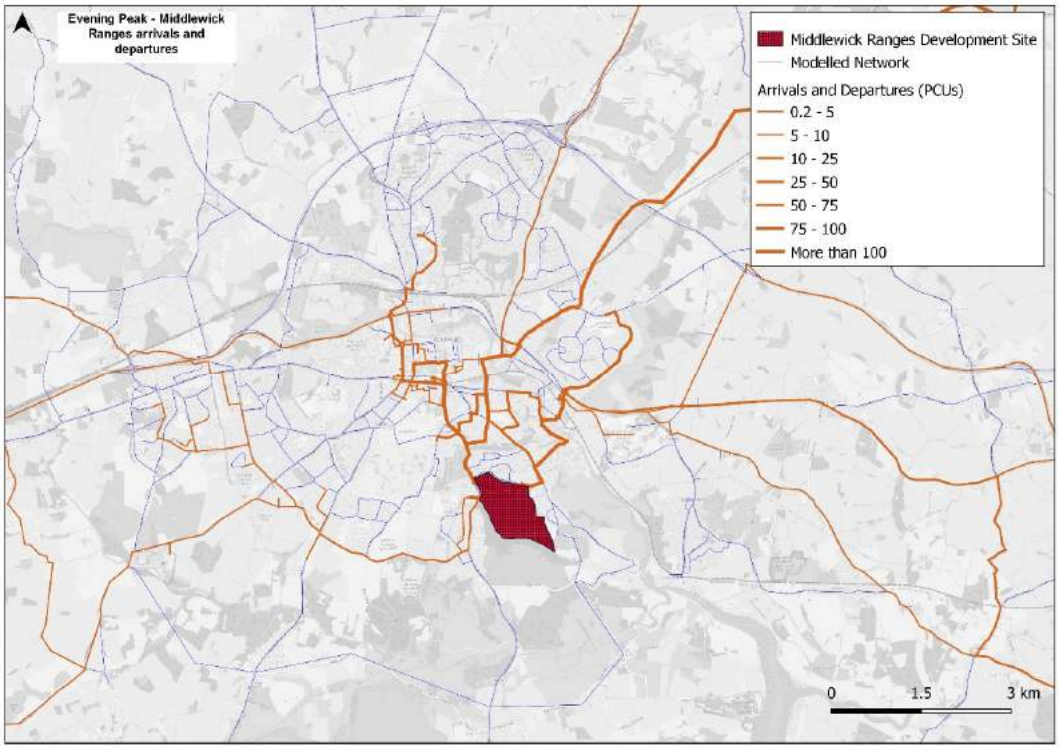


Figure 3-3: Middlewick Ranges development - Evening arrivals and departures

4 Modelling Results

4.1 Assignment of initial demand

The matrices referred to in earlier sections were assigned to the model networks for each scenario group. The assignment results prior to running VDM are detailed below. The standard SATURN assignment summary statistics for DN and DM scenarios are given in Table 4-1 and Table 4-2 respectively.

Attribute	AM				PM			
	DN	DS1_ST1	DS2_ST1	DS3_ST1	DN	DS1_ST1	DS2_ST1	DS3_ST1
Transient queues (pcu.hrs)	2,205	2,216	2,224	2,232	2,244	2,253	2,258	2,266
Overcapacity queues (pcu.hrs)	5,637	5,778	5,832	5,921	4,606	4,799	4,847	4,938
Link cruise time (pcu.hrs)	14,711	14,832	14,881	14,935	14,717	14,797	14,852	14,922
Total travel time (pcu.hrs)	22,553	22,826	22,937	23,088	21,566	21,850	21,958	22,127
Travel distance (pcu.kms)	986,135	989,286	990,764	992,310	988,916	991,171	992,666	993,893
Average speed (kph)	44	43	43	43	46	45	45	45
Total trips loaded (Inter-Zonals) (pcus)	52,730	53,034	53,186	53,338	49,482	49,754	49,888	50,024
Total trips (Grand Total) (pcus)	55,451	55,753	55,903	56,054	51,896	52,176	52,316	52,456

Table 4-1: Summary statistics for initial assignment (DN Scenarios)

Attribute	AM				PM			
	DM	DS1_ST2	DS2_ST2	DS3_ST2	DM	DS1_ST2	DS2_ST2	DS3_ST2
Transient queues (pcu.hrs)	2,371	2,380	2,384	2,399	2,381	2,377	2,419	2,413
Overcapacity queues (pcu.hrs)	6,903	7,051	7,151	7,306	6,168	6,765	6,684	6,162
Link cruise time (pcu.hrs)	15,813	15,937	15,995	16,037	15,547	15,672	15,707	15,858
Total travel time (pcu.hrs)	25,087	25,368	25,530	25,742	24,096	24,814	24,809	24,433
Travel distance (pcu.kms)	1,030,286	1,033,562	1,035,126	1,036,949	1,032,363	1,033,650	1,035,312	1,037,446
Average speed (kph)	41	41	41	40	43	42	42	42
Total trips loaded (Inter-Zonals) (pcus)	55,906	56,208	56,359	56,511	52,550	52,824	52,960	53,096
Total trips (Grand Total) (pcus)	58,398	58,700	58,850	59,001	54,754	55,034	55,174	55,314

Table 4-2: Summary statistics for initial assignment (DM Scenarios)

Figure 4-1 and *Figure 4-2* display the percentage change in summary statistics, for DS scenarios, when compared against the scenarios which exclude Middlewick Ranges developments (DN and DM) for the initial assignment.

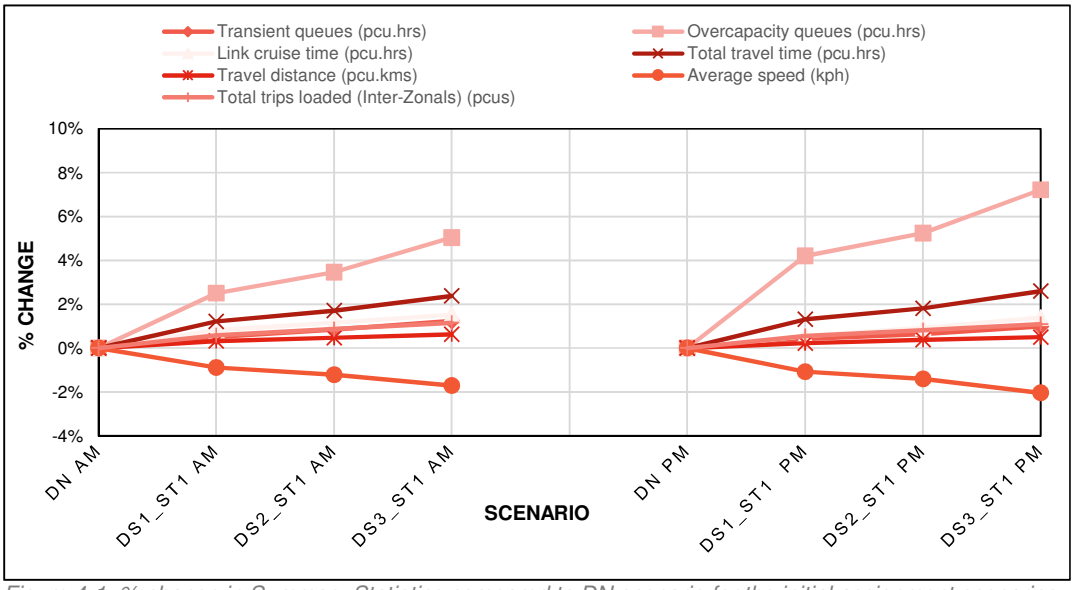


Figure 4-1: % change in Summary Statistics compared to DN scenario for the initial assignment scenarios DS1_ST1 – DS2_ST1 – DS3_ST1

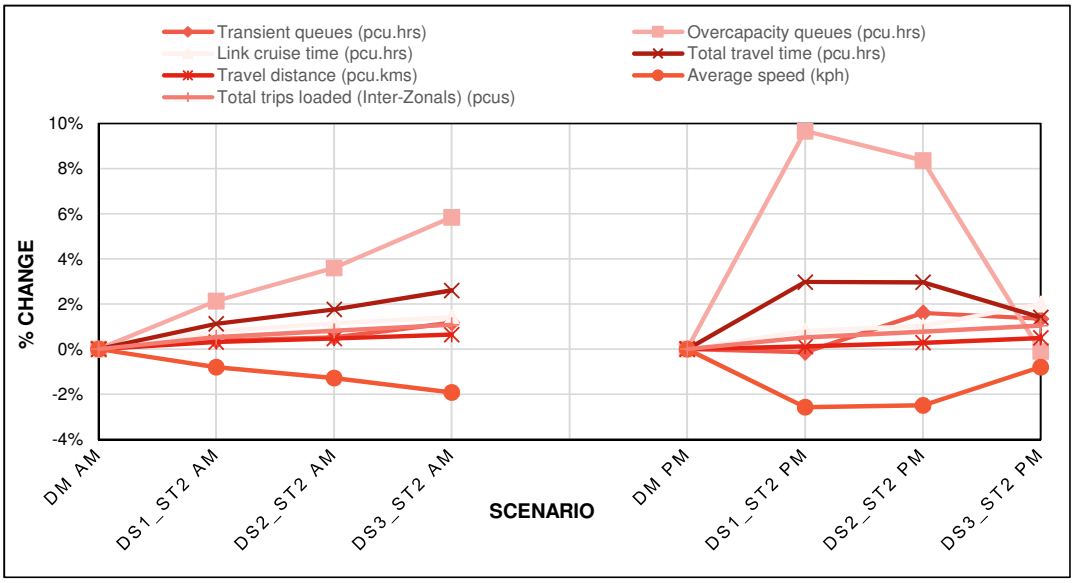


Figure 4-2: % change in Summary Statistics compared to DM scenario for the initial assignment scenarios DS1_ST2 – DS2_ST2 – DS3_ST2

As expected, in most cases, we observe that the scenarios excluding Middlewick Ranges development display the lowest levels of congestion, while the increasing level of development at Middlewick Ranges leads to more traffic, reflected by the slightly increased overcapacity queues, link cruise and total travel time and consequently decreased average speed. Although the pattern for DM scenarios, as observed in Figure 4-2, differs compared to DN, it also indicates slight changes (±10%) in network statistics, emerging from the development. Specifically, in the

PM peak, the overcapacity queues proportional changes do not follow the expected pattern, with the DS1 and DS2 scenarios presenting a significant rise in overcapacity queues. Some junctions, such as A133/A134 roundabout, in these scenarios operate over capacity and small changes in the assigned flows cause significant increases in overcapacity queues throughout the network.

4.2 Demand model outputs

The Variable Demand Modelling, described in Section 2.3 was utilised for the Do Minimum (DM) scenarios, which is consistent with the approach utilised for Colchester Local Plan assessment, where only the scenarios which included the local plan developments were run through the VDM, using the "committed development only" scenarios as a reference. Given the levels of congestion described in the initial assignments, over and above the committed and local plan developments, some switching of trips away is likely to occur.

The number of iterations, and the final % GAP value for each scenario, are summarised below, in Table 4-3.

Scenario	Time Period	Iteration	Final % GAP
DM	AM	10	0.054
	PM	15	0.055
DS1_ST2	AM	10	0.067
	PM	10	0.141
DS2_ST2	AM	10	0.080
	PM	17	0.070
DS3_ST2	AM	10	0.086
	PM	15	0.118

Table 4-3: Demand Model Convergence

For all the scenarios above, the %GAP value is below 0.2, which is considered an acceptable level of convergence as specified in WebTAG Unit M2, some scenarios have also achieved a % GAP of less than 0.1%.

4.3 Assignment of final demand

The peak hour Variable Demand Models developed were run for the DM scenarios. The effect of VDM is to forecast the change in trip generation due to transfer to alternative modes, and changes in trip frequency (including peak spreading) in response to increased highway congestion relative to the reference case, as described in Section 2.3. With the reduction in highway trips predicted by the demand model, the finalised matrices were assigned to the network to derive the final assessment of the impact of development. It is noted that the practical implications of the mode shift results from the demand model would

require further consideration, especially where modal shift impacts are potentially significant. However, this is outside the scope of this work, which is focussed on highway impacts.

The overall network statistics for final, post VDM assignments for the DM scenarios are summarised in Table 4-4.

	AM				PM			
Attribute	**DM**	**DS1_ST2**	**DS2_ST2**	**DS3_ST2**	**DM**	**DS1_ST2**	**DS2_ST2**	**DS3_ST2**
Iteration	10	10	10	10	15	10	17	15
Transient queues (pcu.hrs)	2,342	2,354	2,356	2,357	2,350	2,357	2,350	2,358
Overcapacity queues (pcu.hrs)	6,356	6,449	6,461	6,495	5,166	5,219	5,156	5,180
Link cruise time (pcu.hrs)	15,747	15,818	15,856	15,901	15,682	15,709	15,682	15,730
Total travel time (pcu.hrs)	24,445	24,620	24,672	24,753	23,197	23,285	23,188	23,268
Travel distance (pcu.kms)	1,023,692	1,025,474	1,026,477	1,027,848	1,026,721	1,027,582	1,025,984	1,027,943
Average speed (kph)	42	42	42	42	44	44	44	44
Total trips loaded (Inter-Zonals) (pcus)	55,774	55,987	56,085	56,203	52,396	52,572	52,523	52,633

Table 4-4: Summary statistics for final assignment (DM Scenarios)

Error! Reference source not found. displays the percentage change in summary statistics, for the DS scenarios, when compared against the scenarios which exclude Middlewick Ranges developments for the final assignment.

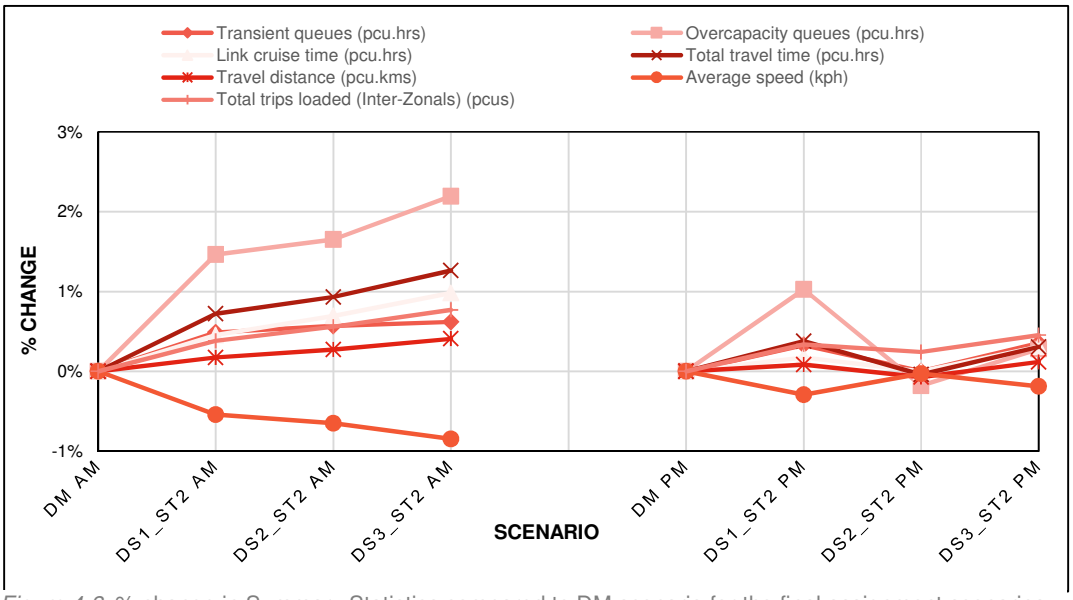


Figure 4-3: % change in Summary Statistics compared to DM scenario for the final assignment scenarios DS1_ST2 – DS2_ST2 – DS3_ST2

Through the VDM process, the total demand was reduced based on the level of network congestion. The number of trips reduced in each scenario is summarised below, in Table 4-5:

Scenario	Time Period	Trips loaded (Initial Demand)	Trips loaded (Final Demand)	Demand alteration (final vs initial assignment)
DM	AM	55906	55774	-132
DS1_ST2		56208	55987	-221
DS2_ST2		56359	56085	-274
DS3_ST2		56511	56203	-307
DM	PM	52550	52396	-155
DS1_ST2		52824	52572	-252
DS2_ST2		52960	52523	-437
DS3_ST2		53096	52633	-463

Table 4-5: Demand alteration (final vs initial assignment)

The reductions of demand totals are consistent and show the same pattern across the two time periods and for each level of development scenario.

Following completion of the VDM, the resulting finalised assignments indicate that the overall impacts of the DS scenarios still have the effect of slightly reducing average speeds and increasing congestion, when compared with the scenarios excluding any development in Middlewick Ranges. As observed in **Error! Reference source not found.**, in ST2 Scenarios, the VDM has a proportional change in network statistics of between -1% to +2% compared with the DM scenario, which is significantly lower in comparison with their corresponding alteration in pre-VDM, which ranges between -2% to +10% (Figure 4-2).

5 Link and Junction analysis

5.1 Actual flow difference plots

Actual flow can be defined as the amount of traffic that can use a link given upstream capacity constraint and queuing, as opposed to demand or 'unmetered' traffic flow. The plots included in this section show the actual flow difference between the development case scenarios and respective reference case scenarios.

For the purposes of this modelling exercise the traffic flow is shown as Passenger Car Units/ hour. Links with increases in actual flow are shown in red/orange and links with decreases in actual flow are shown in green, relative to the relative comparison scenario.

5.1.1 Actual flow difference plots – Do Nothing

The DN scenarios were not assigned using VDM, therefore the comparisons were made using the initial assignments.

Actual flow difference DN vs DS1 ST1 – AM Peak

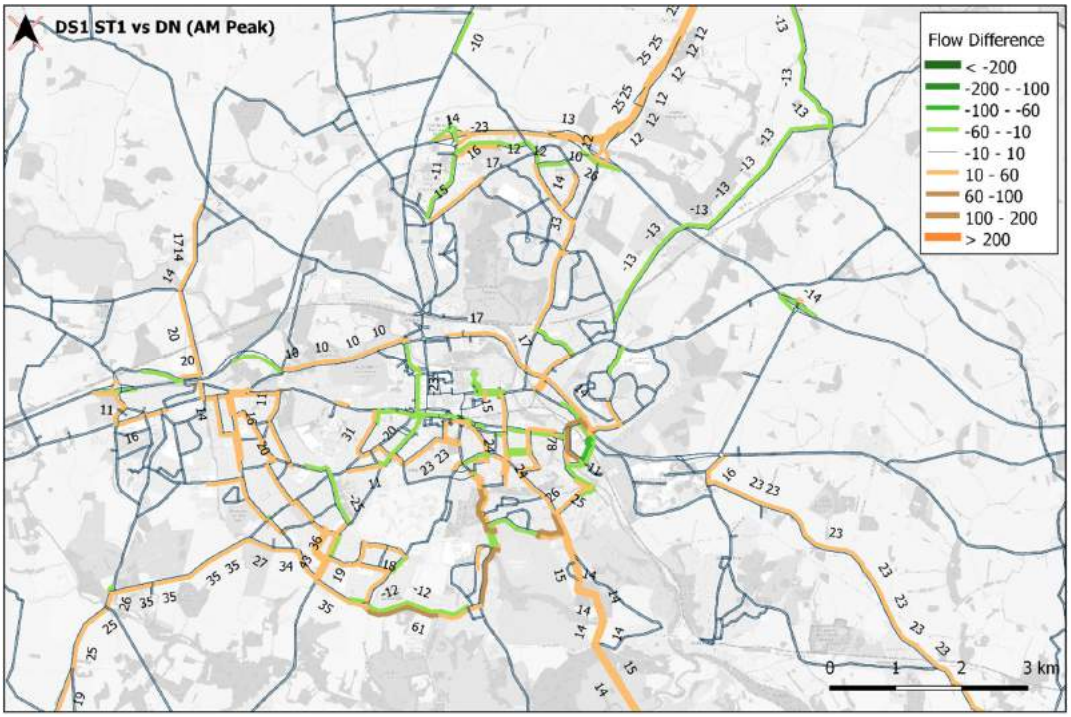


Figure 5-1: Flow difference, AM DN vs DS1 ST1

With 1,000 dwellings of the Middlewick Ranges development in place during the AM period, compared with the Do Nothing, there are flow increases in each direction on a number of routes in the area including Old Heath, Shrub End and Greenstead. The magnitude of these increases is generally between 10 and 40 vehicles, however trips from roads connecting the Middlewick Ranges development are much higher at around 90 to 120 vehicles.

Some increases can also be observed on the A12 between J28 and J29, however as these are in the order of 10 vehicles they are not considered significant and so are discounted from further analysis.

Actual flow difference DN vs DS1 ST1 – PM Peak

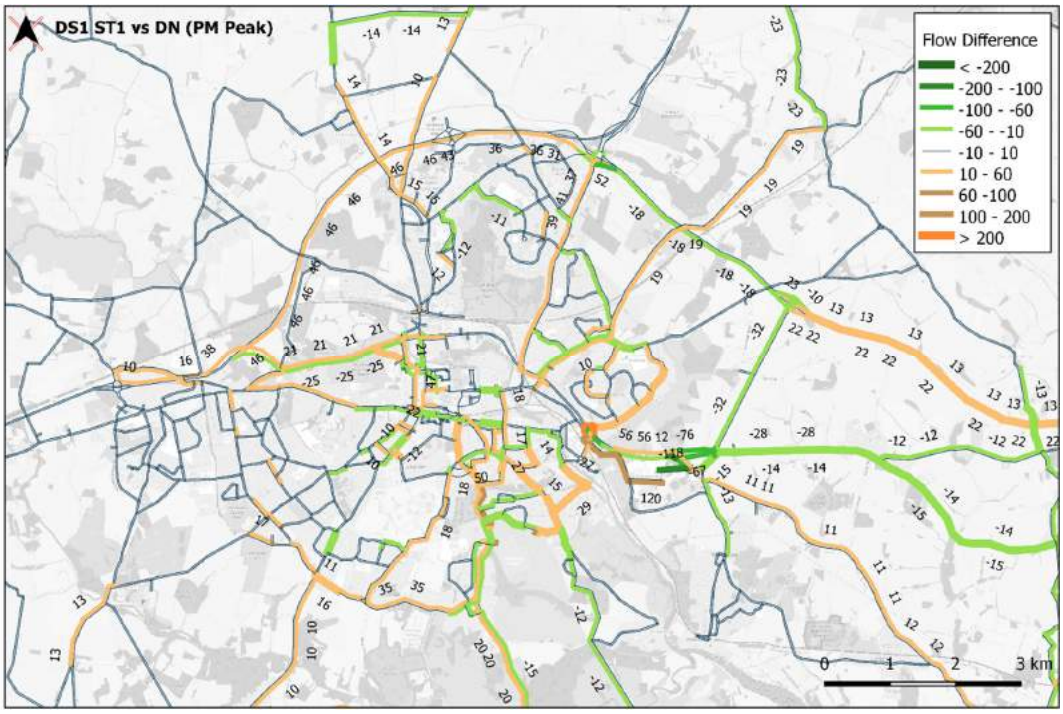


Figure 5-2: Flow difference, PM DN vs DS1 ST1

Impacts in the PM peak are similar to that of the AM, whereby flow differences are generally of the same magnitude. However, the distribution of the trips varies slightly from the AM. With fewer differences in the Lexden and Shrub End area. The connections from Middlewick Ranges show similar levels of trips entering and exiting the development.

It is possible that with the additional congestion caused by the Middlewick Ranges development traffic on the Old Heath Road, traffic is reassigning from Fingringhoe Road to the B1025, to avoid the delays on the east side of the development. As

with the preferred Local Plan scenario, another notable effect is that of an increase in flow difference of around 50 vehicles on the eastbound direction of Avon Way.

Actual flow difference DN vs DS2 ST1 – AM Peak

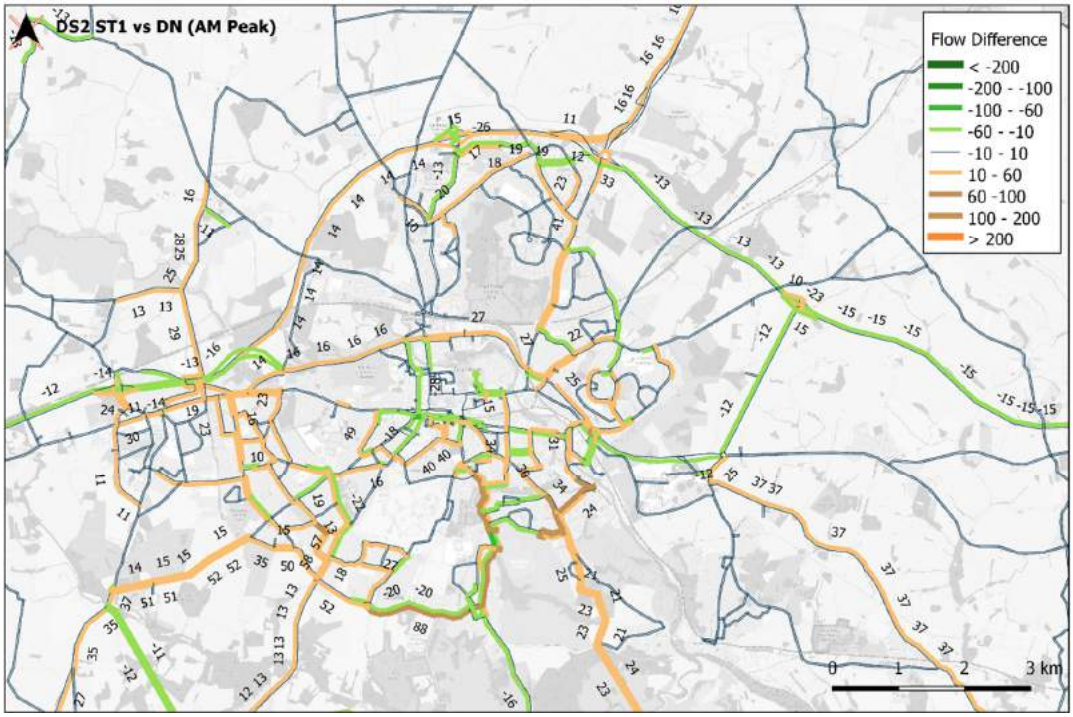


Figure 5-3: Flow difference, AM DN vs DS2 ST1

The effects seen in DS1 ST1 for the AM peak are intensified from the inclusion of a further 500 dwellings, but the distribution of these impacts remain similar. Flow increases are now approximately 20 to 50 vehicles, and traffic leaving the development in the westbound direction is now in the order of 150 vehicles.

With the additional development and therefore trips from Middlewick Ranges, both Shrub End and Old Heath are more significantly impacted. Also, it is likely with the additional trips to the west of Middlewick Ranges that this is causing trips to re-route from the B1025 to Fingringhoe Road and the B1026 to avoid the increased traffic to the north of the site caused by the trips from 500 more dwellings.

Actual flow difference DN vs DS2 ST1 – PM Peak

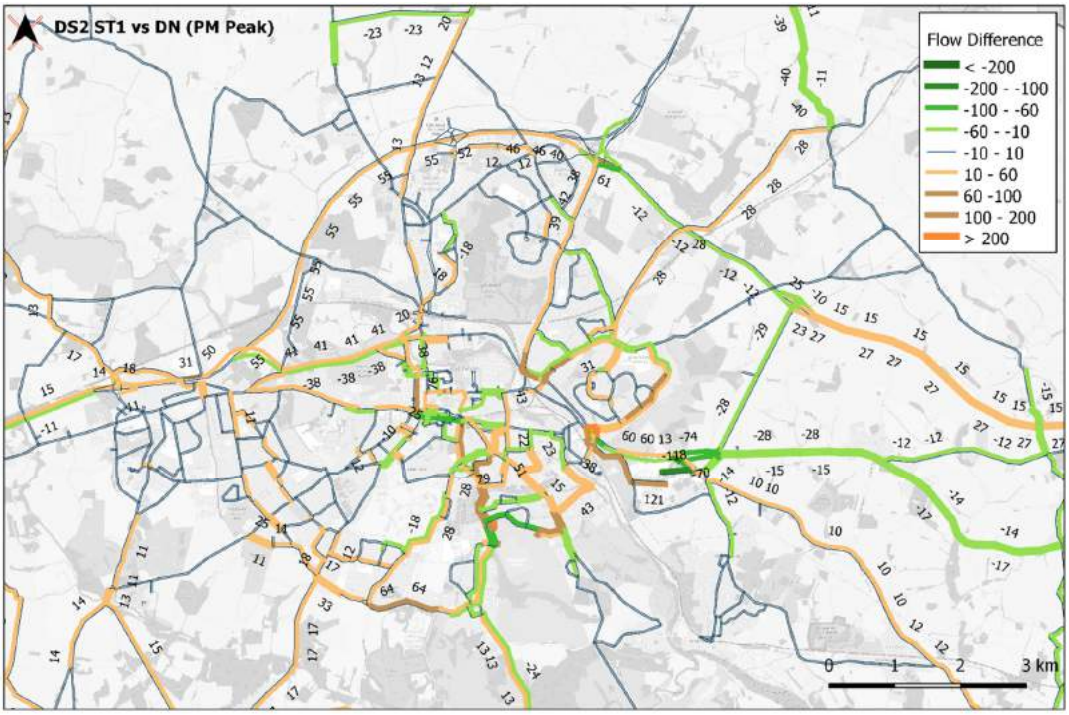


Figure 5-4: Flow difference, PM DN vs DS2 ST1

With 1,500 dwelling scenario assumed, the effects are similar to that of DS1 ST1 PM peak, with the distribution of trips being very similar. In this scenario the effects of the development on the centre of Colchester appear to be more significant. With between 22 and 70 vehicles leaving the A134 via Mersea Road, Military Road and Wimpole Road, which in turn is likely to cause increases in delay through the area south of the A134 and north of the Middlewick Ranges development.

Actual flow difference DN vs DS3 ST1 – AM Peak

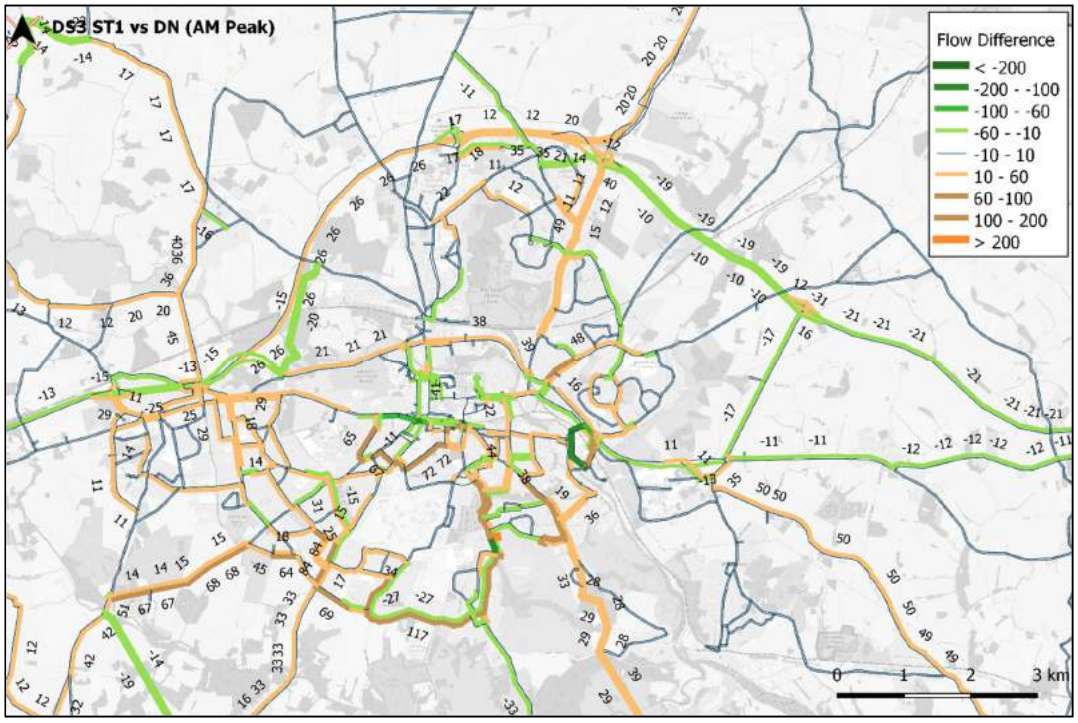


Figure 5-5: Flow difference, AM DN vs DS3 ST1

Compared to the AM peak for DS1 and DS2 ST2, traffic distribution is similar, although traffic volumes on the northbound direction of the B1025 has increased. The impact of additional development traffic in this area could be a reason of reassigning traffic onto alternate routes in the AM peak which avoid the development access junctions, such as more reassignment onto Fingringhoe Road. There is a noticeable difference in vehicles travelling west along Berechurch Hall Road, where there is an increase of 112 vehicles, although it appears traffic is being dispersed across a variety of other routes primarily to avoid the B1025 and Old Heath Road, on either side of the development.

There are a number of roads to the north of the development with appreciable increases in flow, where again traffic could be opting for routes with less delay and congestion than those that pass near the junctions to the development.

Actual flow difference DN vs DS3 ST1 – PM Peak

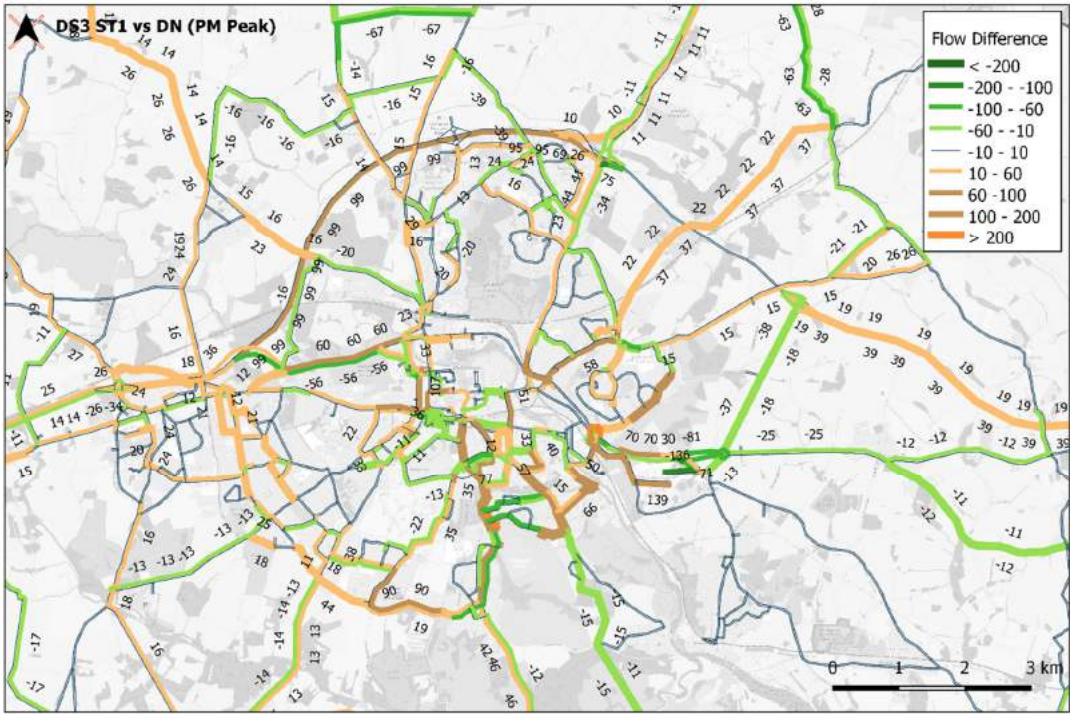


Figure 5-6: Flow difference, PM DN vs DS3 ST1

As observed in the other scenarios, the impact of the additional development traffic is the likely reason for the reassignment of existing traffic in the PM peak onto alternate routes which avoid the development access points. The route changes seen in DS1 ST2 are more apparent now, as nearly 90 vehicles are opting to take the longer route to Blackheath via Maypole Green, to avoid the increased traffic on the B1025 near the development accesses.

There are some increases in traffic flow in the centre of Colchester of approximately, specifically on A134/Balkerne Hill, Head Street and High Street, combined with the additional traffic from the development along Mersea Road, Military Road and Wimpole Road, there is likely to be increased delay through the town centre because of the increase in vehicles using this route, which is resulting in significant re-routing of traffic to other routes. The A12 shows some more differences of approximately 100 vehicles, although this is less than 3% of the total flows on the A12.

5.1.2 Actual flow difference plots – Do Minimum

The DM scenarios were assigned using VDM, therefore the comparisons were made using the post VDM assignments.

Actual flow difference DM vs DS1 ST2 – AM Peak

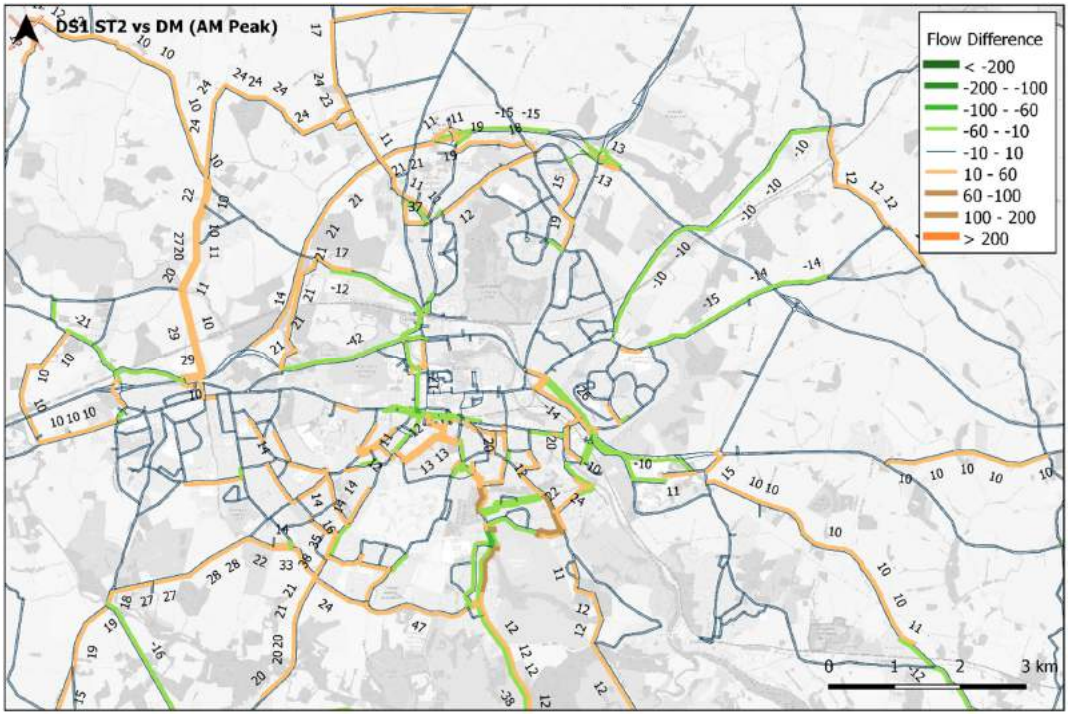


Figure 5-7: Flow difference, AM DM vs DS1 ST2

The inclusion of the Middlewick Ranges development, assuming 1,000 dwellings, compared to the preferred Local Plan scenario (DM) results in flow increases of 60 vehicles northbound from the site on the B1025 in the AM peak. Around 80 to 90 additional vehicles are also observed on Abbot's Road in the Eastbound direction, from the connection into the development, and at the intersection to Old Heath Road leading up to the junction with Whitehall Road. These increases are most likely due to the development trips accessing the network.

There are decreases in flow along the B1025 corridor due to the reassignment of existing traffic, which is diverting to alternative routes such as B1026, to avoid the development traffic. This includes a reduction of up to 40 PCU's.

Traffic is opting for minor roads (rat-running) in the centre of Colchester, such as South Street and West Street, to avoid congestion along the A134 corridor.

Actual flow difference DM vs DS1 ST2 – PM Peak

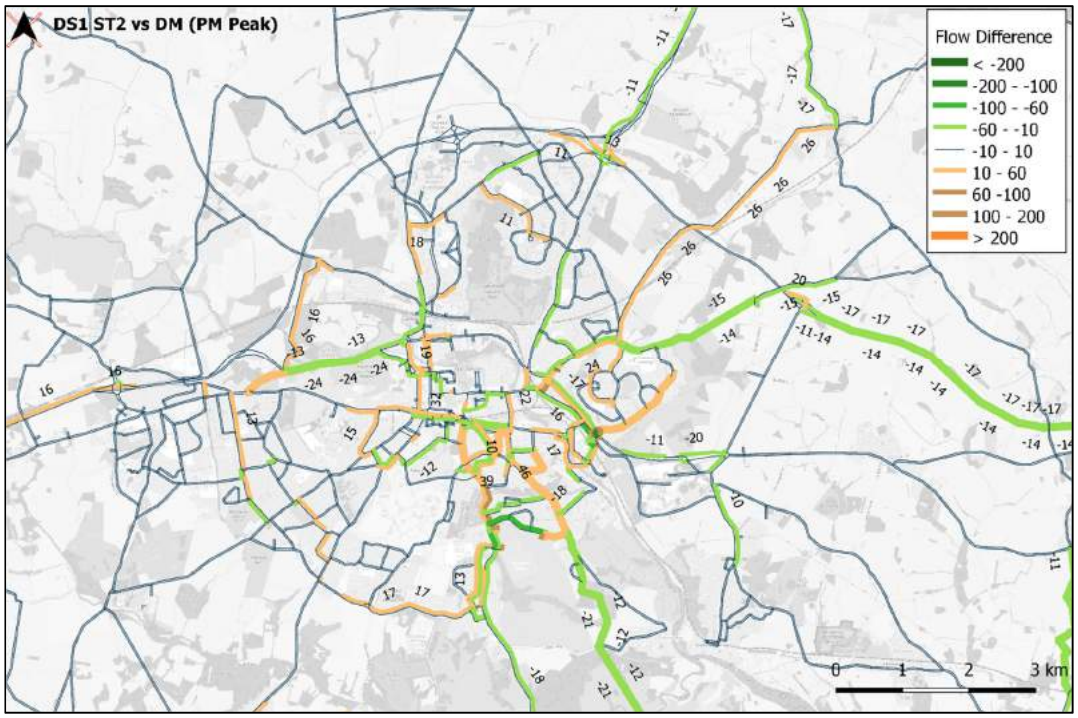


Figure 5-8: Flow difference, PM DM vs DS1 ST2

In the PM peak traffic flow is shown to increase on the B1025 from Colchester centre southbound by up to 75 vehicles and in both directions on Old Heath Road by up to 40 vehicles.

Congestion at the development site causes reductions in flow of between 20 to 30 PCU's along B1025 and also Fingringhoe Road, leading into Old Heath Road. However, there is an increase in flow difference of nearly 55 vehicles in the Eastbound direction of Avon Way.

Actual flow difference DM vs DS2 ST2 – AM Peak

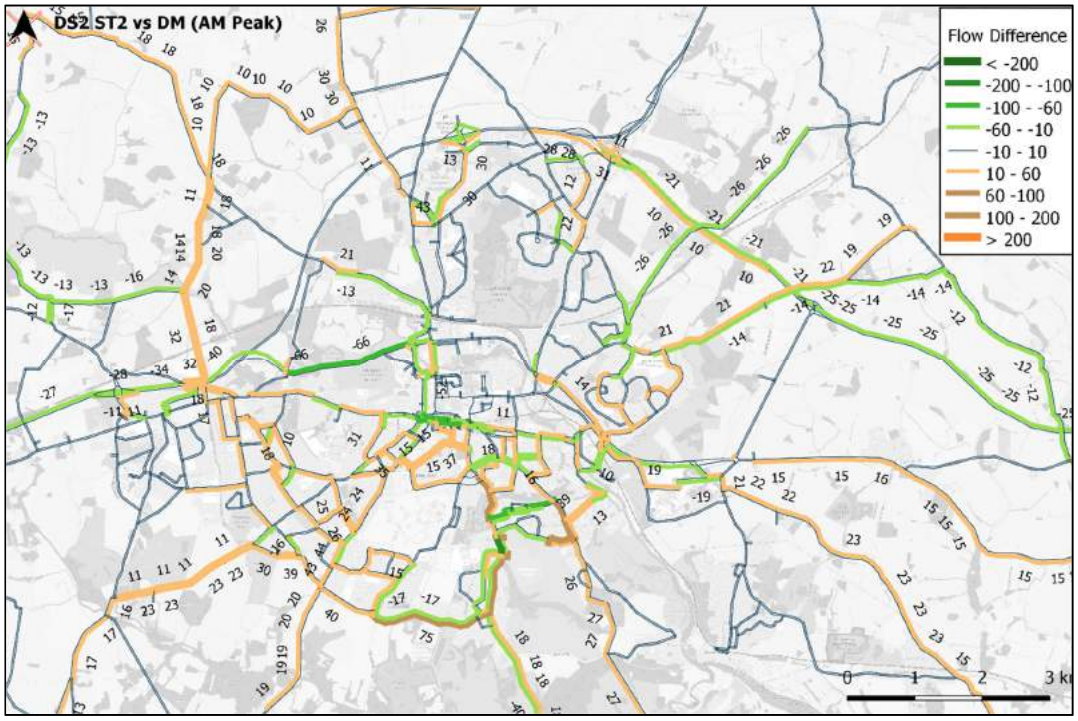


Figure 5-9: Flow difference, AM DM vs DS2 ST2

When a further 500 dwellings are considered, the effects observed in DS2 ST1 are compounded. Flow increases on the B1025 rise to around 100 vehicles, whilst traffic leaving the development eastbound on Abbot's road and then turning northbound on Old Heath Road shows levels of up to 158 vehicles.

A considerable reassignment of traffic (75 PCU's) is shown on Berechurch Hall Road, where traffic is avoiding the West side of the development. The reduction in flow along the Cymbeline Way and the A134 is now in the order of about 60 vehicles.

Actual flow difference DM vs DS2 ST2 – PM Peak

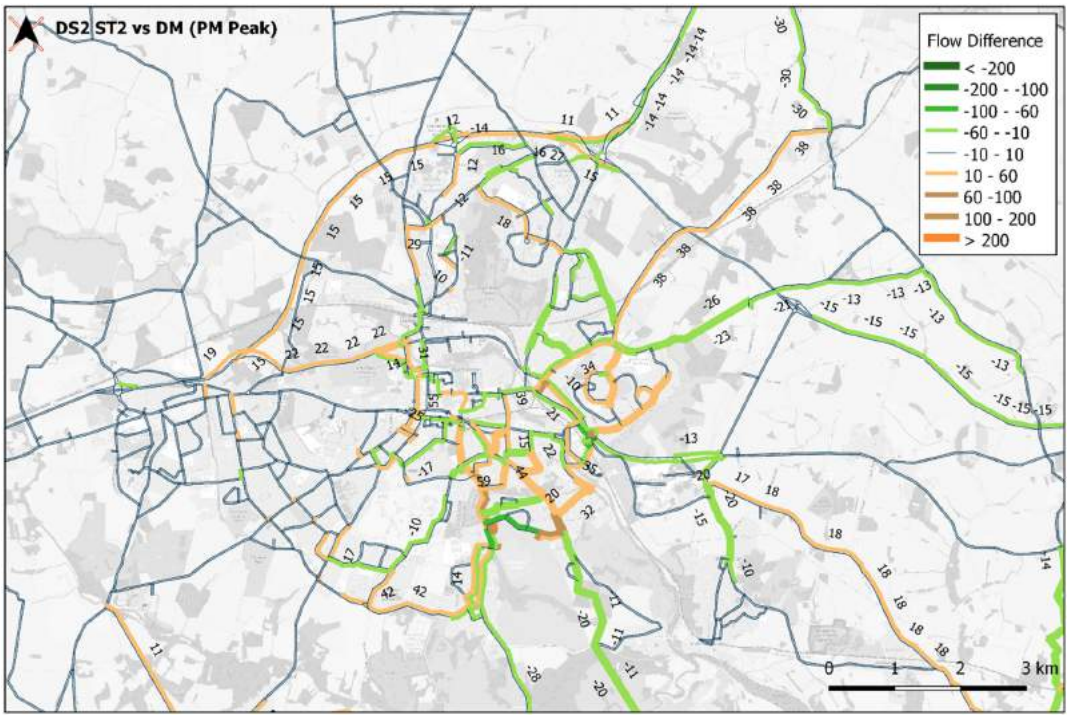


Figure 5-10: Flow difference, PM DM vs DS2 ST2

For the mid-sized scheme, in the PM peak, there is also considerable flow difference observed leaving the site at the north exit on to Abbot's Road and then joining Old Heath Road in the northbound direction.

Reassignment of traffic from B1025 corridor and Fingringhoe Road to Berechurch Hall Road has increased from DS2 ST1 with over 40 PCU's diverting to Berechurch Hall Road.

Actual flow difference DM vs DS3 ST2 – AM Peak

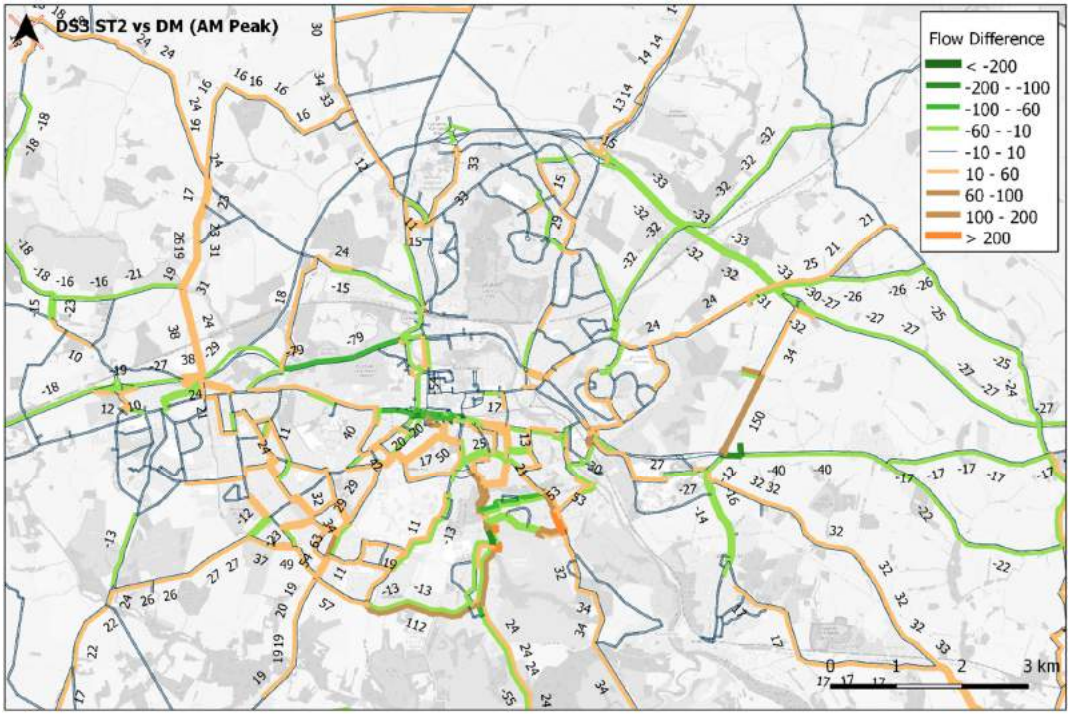


Figure 5-11: Flow difference, AM DM vs DS3 ST2

With full build-out of Middlewick Ranges development in place there are increases in actual traffic flow observed on a number of links during the AM peak near to the development, compared with the preferred Local Plan scenario.

Increased flows on Old Heath Road possibly due to traffic leaving the development onto Abbot's Road exceeds 200 PCU's in this scenario. As a result, traffic is diverting onto other local roads, in particular Berechurch Hall Road where a flow difference of over 110 PCU's is observed.

Actual flow difference DM vs DS3 ST2 – PM Peak

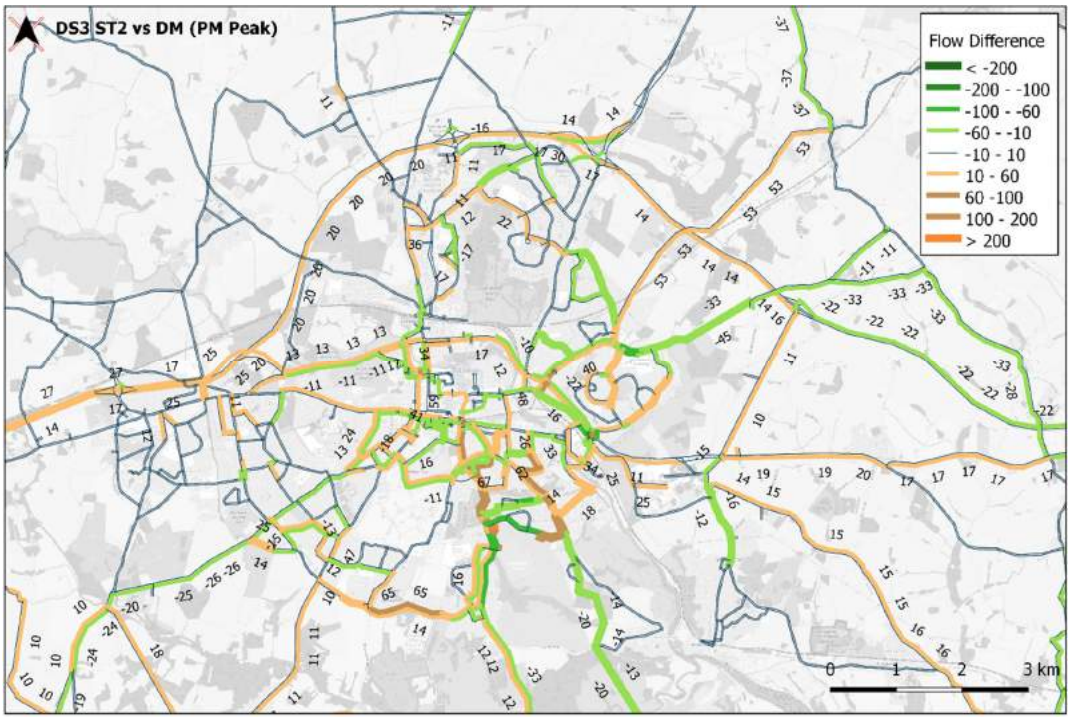


Figure 5-12: Flow difference, PM DM vs DS3 ST2

Considering 2,000 dwellings at the Middlewick Ranges development, the PM peak shows actual flow increases that focus around the north of the site. Greenstead exhibits a considerable impact in this scenario too, with stretches along the A137 and Hawthorn Avenue absorbing a majority of the traffic.

5.2 Junction Volume to Capacity (V/C) performance

The following sections sets out the results of a comparison of Volume to Capacity (V/C) between each development sensitivity test and its respective base scenario, for the key junctions on the major corridors around the Middlewick Ranges development.

V/C is a metric commonly used in the assessment of congestion at junctions, which considers the ratio of traffic volume to capacity for each turning movement. In this case, junctions have been assessed based on the worst performing turn, and classified according to the bands illustrated in the table below:

V/C Range	Congestion Band
< 75%	
75% - 84%	
85% - 99%	
≥ 100%	

% Change	Congestion Band
≤ -5%	
≥ 5%	

Table 5-1: V/C classification bands

The figure 5-13 below illustrates the junctions that were either geographically close to the Middlewick Ranges development, on a strategic route, had a high V/C range or a V/C that changed significantly throughout the DS scenarios. The analysis for each scenario and time period consisted of the same junctions as shown in

18	Colchester Rd/Brightlingsea Rd	117	117	117	117	0	0	0

Table 5-4 to Table 5-3. The following sections give an assessment of the junctions performance in terms of V/C.

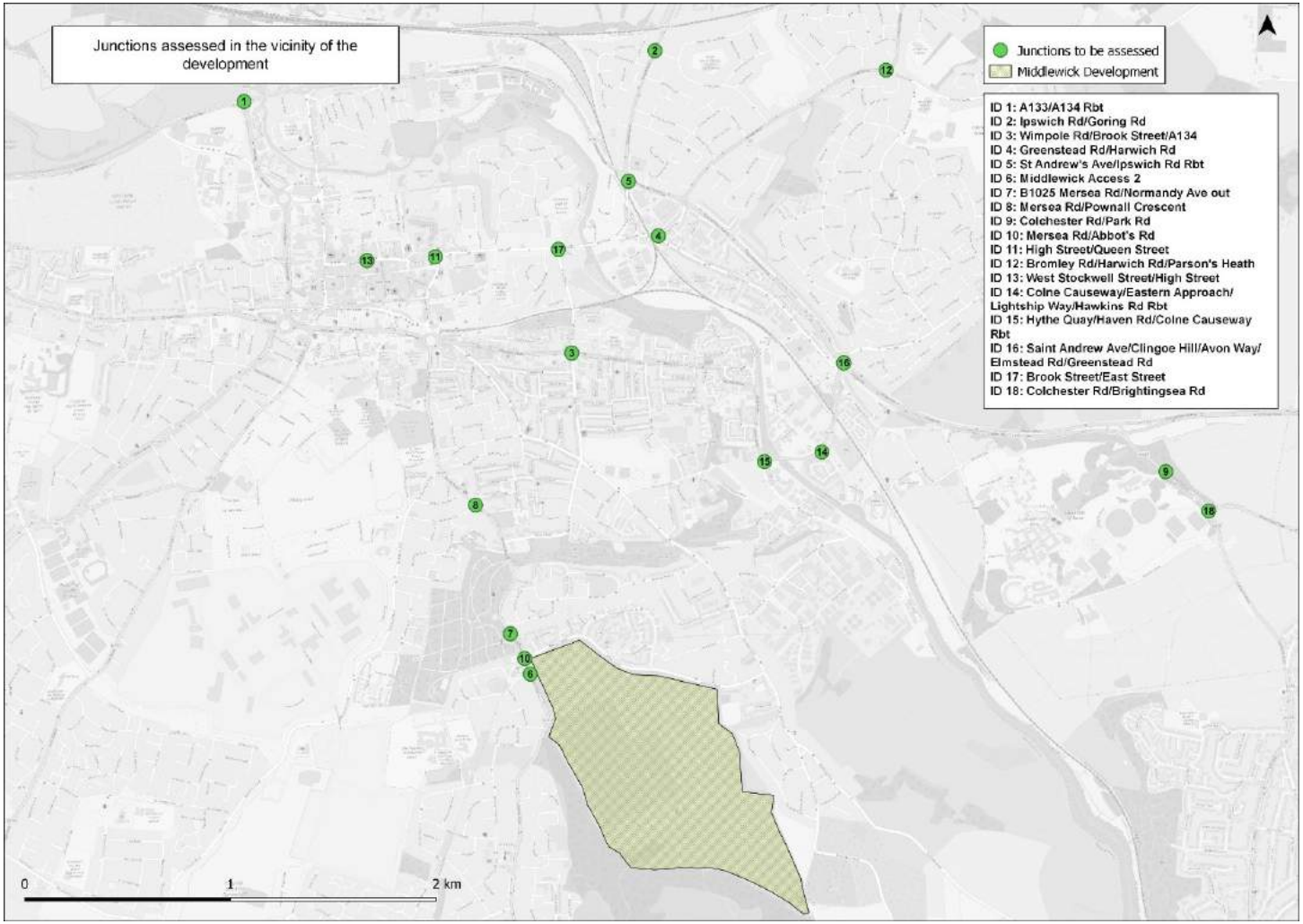


Figure 5-13: Junctions assessed

5.2.1 Junction V/C Performance – Do Nothing Scenarios – AM Peak

ID	Junction Name	V/C%				% Change		
		DN	DS1 ST1	DS2 ST1	DS3 ST1	DS1 ST1 - DN	DS2 ST1 - DN	DS3 ST1 - DN
1	A133/A134 Rbt	122	123	124	125	0	1	3
2	Ipswich Rd/Goring Rd	84	84	84	85	0	1	1
3	Wimpole Rd/Brook Street/A134	88	86	88	90	-2	0	3
4	Greenstead Rd/Harwich Rd	24	26	25	19	2	2	-5
5	St Andrew's Ave/Ipswich Rd Rbt	85	87	87	85	1	2	0
6	Middlewick Ranges Access 2	92	89	87	84	-3	-5	-8
7	B1025 Mersea Rd/Normandy Ave out	95	100	101	101	5	6	6
8	Mersea Rd/Pownall Crescent	76	80	82	84	4	6	8
9	Colchester Rd/Park Rd	71	71	70	70	0	-1	-1
10	Mersea Rd/Abbot's Rd	92	98	99	100	6	7	9
11	High Street/Queen Street	107	109	109	109	2	1	1
12	Bromley Rd/Harwich Rd/Parson's Heath	86	86	86	86	0	0	0
13	West Stockwell Street/High Street	50	51	51	50	0	0	-1
14	Colne Causeway/Eastern Approach/Lightship Way/Hawkins Rd Rbt	88	86	86	89	-3	-2	0
15	Hythe Quay/Haven Rd/Colne Causeway Rbt	124	127	127	132	2	3	7
16	Saint Andrew Ave/Clingoe Hill/Avon Way/Elmstead Rd/Greenstead Rd	108	110	109	107	1	0	-2
17	Brook Street/East Street	128	132	133	134	4	4	6
18	Colchester Rd/Brightlingsea Rd	114	114	114	114	0	0	0

Table 5-2: Do Nothing scenarios – Junction V/C in the AM

For the DN AM peak junctions ID4, ID9 and ID13 are all under capacity, and even with additional development at Middlewick Ranges they continue to work significantly under capacity. The opposite is true at junctions ID1, ID11, ID15, ID16, ID17 and ID18 whereby the junctions are all over capacity, shown by V/C's between 107 to 134%. Additionally, there are a series of junction (ID2, ID3, ID5, ID12 and ID14) that are all over capacity, but have V/C below 100%.

The influence of Middlewick Ranges is most evident at the following junctions along the B1025;

- Mersea Rd/Pownall Crescent (ID8): It shows progressive V/C changes in each development scenario, with the DS3 scenario pushing the junction to within 1% of capacity.

- B1025 Mersea Rd/Normandy Ave (ID7): This junction is already over capacity in the DN, although the influence of any dwellings at Middlewick Ranges results in this junction having a V/C over 100%.
- Mersea Rd/Abbots Rd (ID10): similar to junction 7, the V/C at this junction is above capacity but progressively worsens, to a point in the DS3 where the V/C reaches 100%.

5.2.2 Junction V/C Performance – Do Nothing Scenarios – PM Peak

ID	Junction Name	V/C%				% Change		
		DN	DS1 ST1	DS2 ST1	DS3 ST1	DS1 ST1 - DN	DS1 ST2 - DN	DS1 ST3 - DN
1	A133/A134 Rbt	102	102	102	102	0	0	0
2	Ipswich Rd/Goring Rd	91	91	91	91	0	0	0
3	Wimpole Rd/Brook Street/A134	80	83	88	89	3	7	9
4	Greenstead Rd/Harwich Rd	74	22	23	23	-52	-52	-51
5	St Andrew's Ave/Ipswich Rd Rbt	93	92	92	93	0	-1	0
6	Middlewick Ranges Access 2	83	90	95	99	7	12	15
7	B1025 Mersea Rd/Normandy Ave out	65	73	77	79	7	12	14
8	Mersea Rd/Pownall Crescent	81	83	85	86	3	5	5
9	Colchester Rd/Park Rd	112	120	120	122	8	8	10
10	Mersea Rd/Abbot's Rd	75	82	86	89	7	12	15
11	High Street/Queen Street	125	125	124	124	0	0	0
12	Bromley Rd/Harwich Rd/Parson's Heath	81	83	84	84	1	2	3
13	West Stockwell Street/High Street	101	67	72	93	-34	-28	-7
14	Colne Causeway/Eastern Approach/Lightship Way/Hawkins Rd Rbt	106	109	110	111	3	4	5
15	Hythe Quay/Haven Rd/Colne Causeway Rbt	131	122	122	122	-9	-9	-9
16	Saint Andrew Ave/Clingoe Hill/Avon Way/Elmstead Rd/Greenstead Rd	101	102	101	101	1	1	1
17	Brook Street/East Street	135	134	134	135	-1	-1	0
18	Colchester Rd/Brightlingsea Rd	109	108	108	109	0	0	0

Table 5-3: Do Nothing scenarios – Junction V/C in the PM

In the PM scenario, Junctions ID1, ID9, ID11, ID14, ID15, ID16, ID17 and ID18 have V/C's in the range of 101 to 135%. Both Ipswich Rd/Goring Rd (ID2) and St Andrew's Ave/Ipswich Rd Rbt (ID5) have V/C's above capacity, they are however, below 100%.

In some instances, the V/C reduces, such as Junctions ID4, ID13 and ID15, due to reassignment in the model which transfers the trips away from these junctions.

Junctions ID3, ID6, ID7, ID8, ID9 and ID10 all show significant V/C percentage increases in the development scenarios compared to the DN base. Of these junctions the influence of Middlewick Ranges is most evident at the following junctions:

- Wimpole Rd/Brook Street/ A134 (ID3)
- Mersea Rd/Pownall Crescent (ID8)
- Mersea Rd/Abbots's Rd (ID10)

All show that in the DN and DS1 ST1 scenario the junctions are working within capacity, however with the additional 1,500 and 2,000 dwellings associated with DS2 and DS3 respectively, the junctions shift to be above capacity. As expected, the increase in vehicles from the development has a direct impact on the capacity of these junctions.

Junction ID6 (Middlewick Ranges Access 2) is working under capacity in the DN scenario, however with any additional development trips from Middlewick Ranges the junction is pushed over capacity to a maximum of 99% in DS3.

5.2.3 Junction V/C Performance – Do Minimum Scenarios – AM Peak

ID	Junction Name	V/C%				% Change		
		DM	DS1 ST2	DS2 ST2	DS3 ST2	DS1 ST2 - DM	DS2 ST2 - DM	DS3 ST2 - DM
1	A133/A134 Rbt	123	126	124	127	3	2	4
2	Ipswich Rd/Goring Rd	90	90	90	91	0	1	1
3	Wimpole Rd/Brook Street/A134	87	92	94	99	4	7	12
4	Greenstead Rd/Harwich Rd	28	29	29	28	1	0	0
5	St Andrew's Ave/Ipswich Rd Rbt	96	96	97	97	1	1	2
6	Middlewick Ranges Access 2	98	93	89	86	-5	-9	-12
7	B1025 Mersea Rd/Normandy Ave out	100	101	101	102	1	1	1
8	Mersea Rd/Pownall Crescent	79	82	83	84	3	5	6
9	Colchester Rd/Park Rd	79	78	77	77	-1	-2	-2
10	Mersea Rd/Abbot's Rd	98	101	102	103	3	4	4
11	High Street/Queen Street	113	113	113	113	0	0	0
12	Bromley Rd/Harwich Rd/Parson's Heath	100	100	100	101	0	0	0
13	West Stockwell Street/High Street	49	49	49	50	0	0	1
14	Colne Causeway/Eastern Approach/Lightship Way/Hawkins Rd Rbt	99	97	95	94	-2	-4	-5
15	Hythe Quay/Haven Rd/Colne Causeway Rbt	125	126	126	127	1	1	2
16	Saint Andrew Ave/Clingoe Hill/Avon Way/Elmstead Rd/Greenstead Rd	111	111	110	110	0	0	-1
17	Brook Street/East Street	137	139	139	140	2	3	3
18	Colchester Rd/Brightlingsea Rd	117	117	117	117	0	0	0

Table 5-4: Do Minimum scenarios – Junction V/C in the AM

For the DM scenarios, the assessed junctions show similar patterns to the assessed junctions in the DN scenarios, in terms of distribution, albeit slightly higher in terms of V/C.

Junctions ID1, ID7, ID11, ID12, ID15, ID16, ID17 and ID18 have V/C's that exceed 100% in all forecast scenarios for the AM peak, with and without the development in place. Junctions ID4, ID9 and ID13 are all operating below capacity in development scenarios in the AM peak.

Junctions ID2, ID3, ID5, ID6 and ID14 are all above capacity but below 100%. Similar to DN scenarios, the influence of Middlewick Ranges is most evident at the following junctions:

- Wimpole Rd/Brook Street/A134 (ID3): there is a notable percentage increase in V/C compared with the DM case, which becomes more apparent in each subsequent scenario.

- Mersea Rd/Abbots's Rd (ID10): It is above capacity in the DM case, however, with any additional development at Middlewick Ranges the junction shows a V/C over 100%.
- Mersea Rd/Pownall Crescent (ID8): It is shown to work under capacity in the DM case, however the V/C increases of between 3% and 5% that bring the junction significantly closer to being at capacity.

5.2.4 Junction V/C Performance – Do Minimum Scenarios – PM Peak

ID	Junction Name	V/C%				% Change		
		DM	DS1 ST2	DS2 ST2	DS3 ST2	DS1 ST2 - DM	DS2 ST2 - DM	DS3 ST2 - DM
1	A133/A134 Rbt	103	105	102	102	3	0	-1
2	Ipswich Rd/Goring Rd	92	91	91	92	-2	-1	-1
3	Wimpole Rd/Brook Street/A134	79	84	86	88	5	7	9
4	Greenstead Rd/Harwich Rd	23	103	102	103	79	79	80
5	St Andrew's Ave/Ipswich Rd Rbt	100	100	100	100	0	0	0
6	Middlewick Ranges Access 2	83	90	95	99	7	12	15
7	B1025 Mersea Rd/Normandy Ave	72	74	77	81	2	6	9
8	Mersea Rd/Pownall Crescent	80	82	85	87	2	5	7
9	Colchester Rd/Park Rd	118	46	117	122	-72	0	4
10	Mersea Rd/Abbot's Rd	80	83	87	91	3	7	11
11	High Street/Queen Street	125	125	125	124	0	0	0
12	Bromley Rd/Harwich Rd/Parson's Heath	97	99	98	99	2	1	2
13	West Stockwell Street/High Street	102	102	102	103	1	0	1
14	Colne Causeway/Eastern Approach/Lightship Way/Hawkins Rd Rbt	111	103	113	113	-8	2	2
15	Hythe Quay/Haven Rd/Colne Causeway Rbt	123	123	123	123	1	0	0
16	Saint Andrew Ave/Clingoe Hill/Avon Way/Elmstead Rd/Greenstead Rd	101	107	101	101	6	0	0
17	Brook Street/East Street	138	140	138	138	1	0	-1
18	Colchester Rd/Brightlingsea Rd	109	109	109	109	0	0	0

Table 5-5: Do Minimum scenarios – Junction V/C in the PM

Junctions ID1, ID5, ID11, ID13, ID14, ID15, ID16, ID17 and ID18 in the PM have V/C's exceeding 100% with and without the development in place. Ipswich Rd/Goring Rd (ID2) and Bromley Rd/Harwich Rd/Parson's Heath (ID12) are junctions that are also over capacity, but have V/C's below 100%.

The junction B1025 Mersea Rd/Normandy Ave out (ID7) is operating well below its capacity, but the introduction of 2,000 dwellings in the DS3 scenario does push the junction to close to its capacity.

Similar to DN, the following junctions are working within capacity in the DM and DS1 ST2 scenario, however with the additional 1,500 and 2,000 dwellings associated with DS2 and DS3 respectively, the junctions shift to be above capacity:

- Wimpole Road/Brook Street/A134 (ID3)
- Mersea Rd/Pownall Crescent (ID8)
- Mersea Rd/Abbot's Rd (ID10)

For Middlewick Ranges Access 2 (ID6) the introduction of any development at Middlewick Ranges pushes the junction from a below capacity V/C of 83% in the DM to between 90% and 99% in the development scenarios.

6 Conclusion

Formal representations made by the Ministry of Defence (MoD) to CBC in September 2016, requesting an allocation of housing at Middlewick Ranges in the Colchester Local Plan, has led to Jacobs undertaking this piece of work that aims to better understand the potential impacts of development at Middlewick Ranges.

The development of Middlewick Ranges has been tested with two different assumptions of wider growth; test one which includes only committed development (Do Nothing) and test two which includes local plan development (Do Minimum), both these scenarios are in their very nature tested with no development at Middlewick Ranges and then tested with three different levels of development included at Middlewick Ranges; 1,000 (DS1), 1,500 (DS2) and 2,000 (DS3) dwellings.

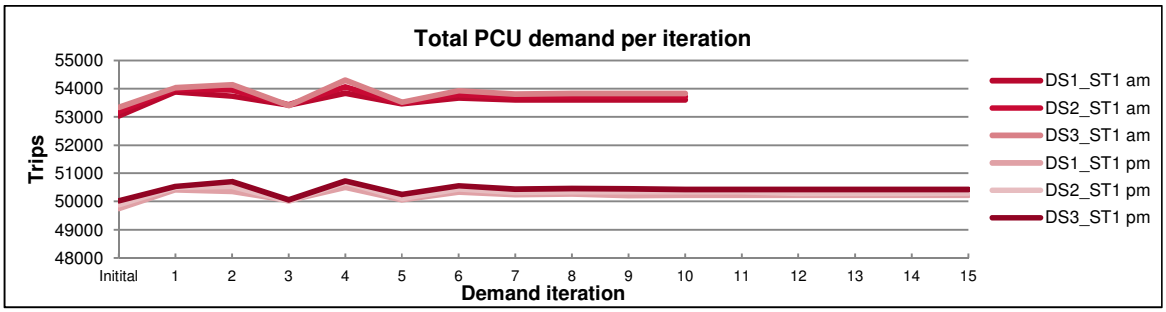
Actual flows have been extracted from each base scenario (DN and DM) and compared with actual flows from their corresponding development scenario. As a general observation, for each time period the distribution between the development scenarios is similar, however, with the additional development in each scenario the magnitude of the differences is greater. Also, traffic flow increases associated with the development are greatest in the vicinity of the site accesses, particularly on the B1025, Abbot's Road and Old Heath Road. Traffic flows show the reassignment of existing, non-development traffic, away from the Middlewick Ranges development, for example in the Greenstead area, these are as a result of traffic instead diverting to alternate routes to avoid the additional delay and congestion.

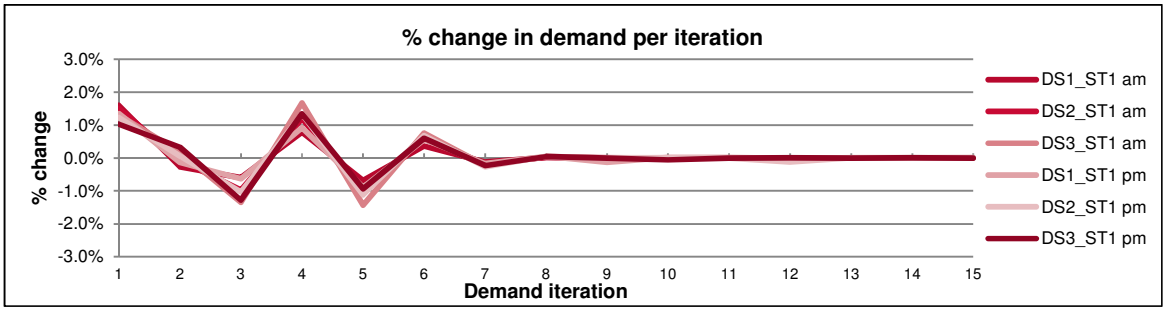
Volume to Capacity (V/C) performance data has been reviewed for 18 junctions in the vicinity of the development, for both the DN and DM, and also each development scenario. The results of the DN and DM have been compared against their respective development scenarios for each time period. The results indicate that the junctions that are worst affected by Middlewick Ranges Development, in terms of V/C % increase are the following:

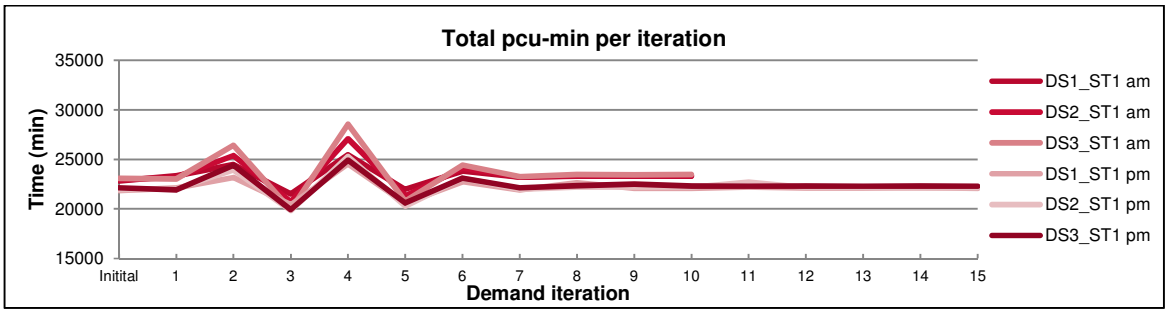
- Wimpole Rd/Brook Street/ A134 (ID3) – by up to +12%;
- B1025 Mersea Rd//Middlewick Ranges Access (ID6) – by up to +15%;
- B1025 Mersea Rd /Normandy Ave (ID7) – by up to +14%;
- B1025 Mersea Rd/Pownall Crescent (ID8) – by up to +8%; and,
- B1025 Mersea Rd/Abbots's Rd (ID10) – by up to +15%.

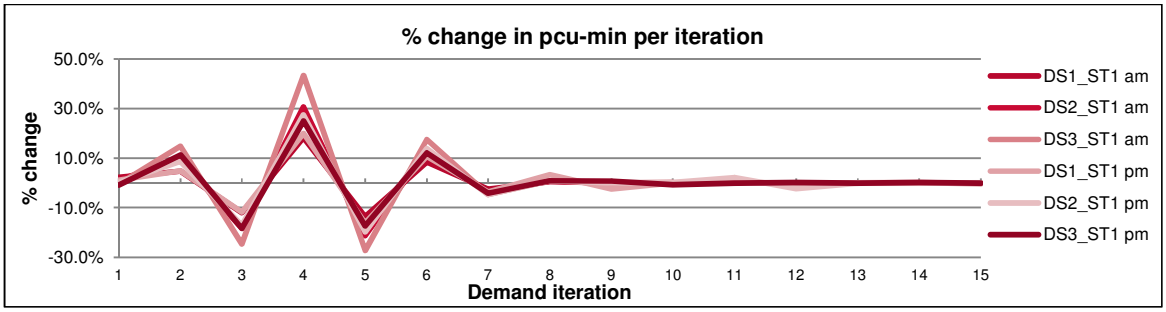
Appendix: Demand convergence

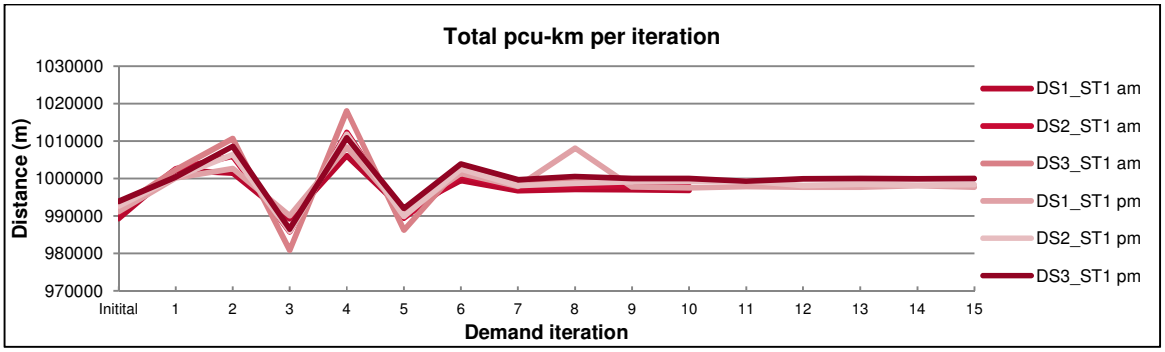
DN Scenarios

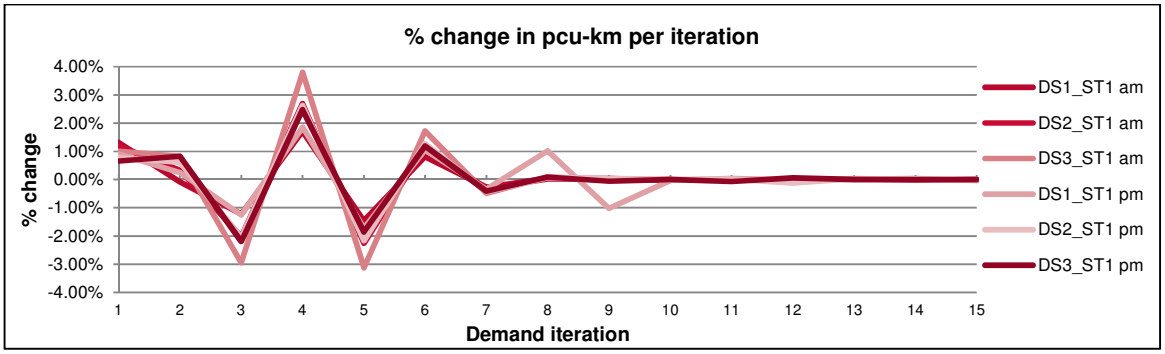




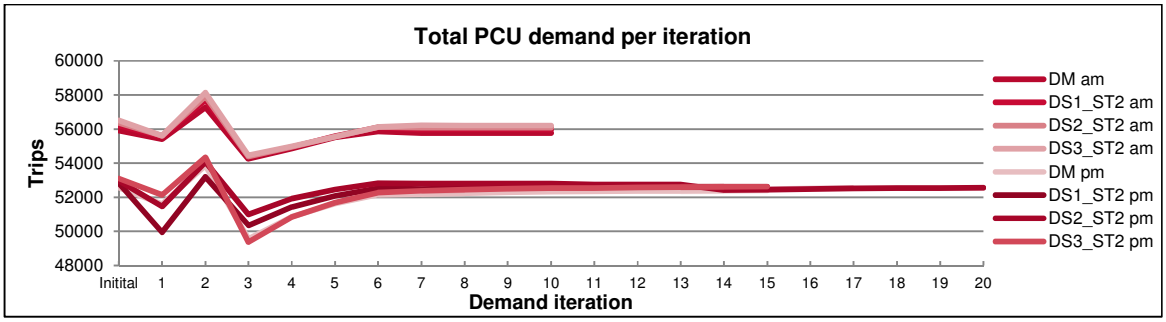


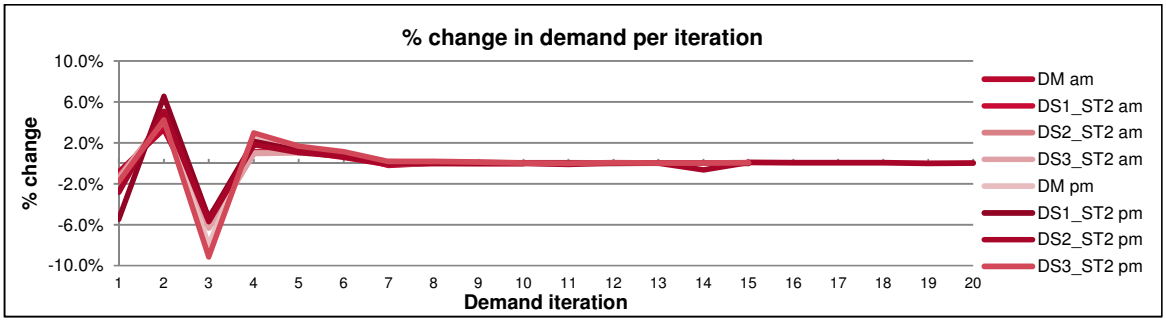


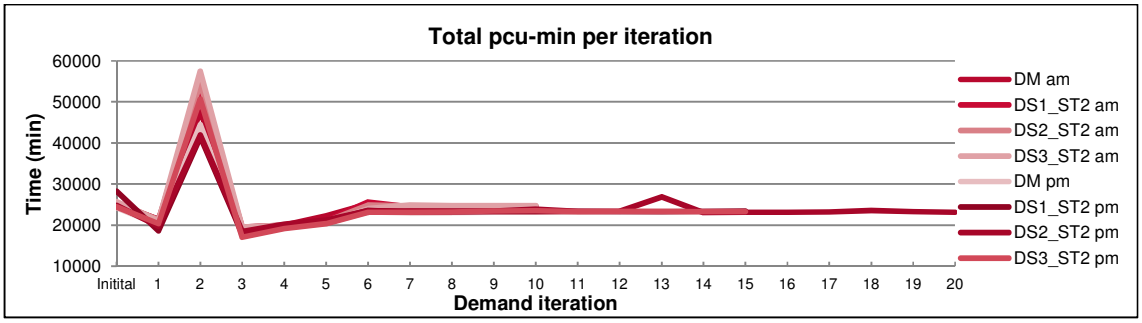




DM Scenarios



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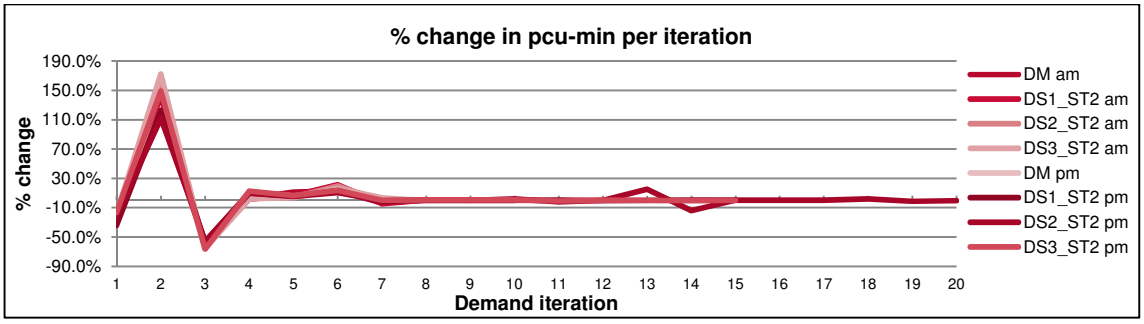
Time (min)
60000
50000
40000
30000
20000
10000
Initital 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Demand iteration
DM am
DS1_ST2 am
DS2_ST2 am
DS3_ST2 am
DM pm
DS1_ST2 pm
DS2_ST2 pm
DS3_ST2 pm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% change
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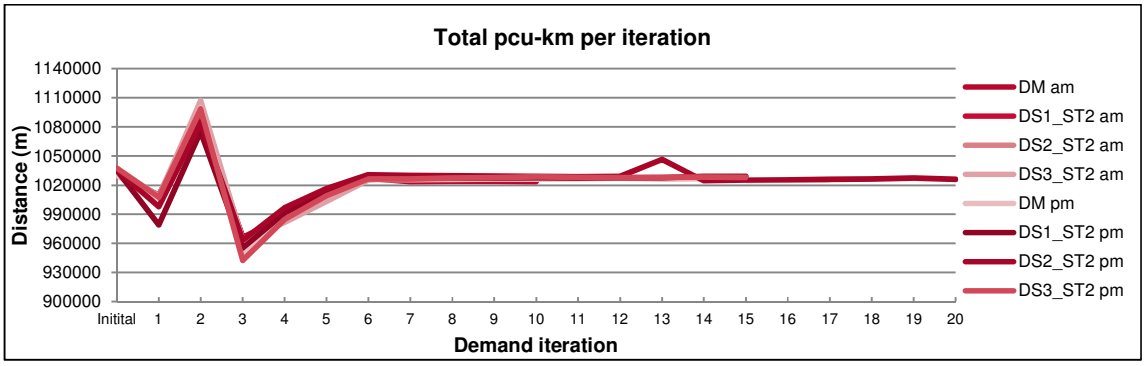
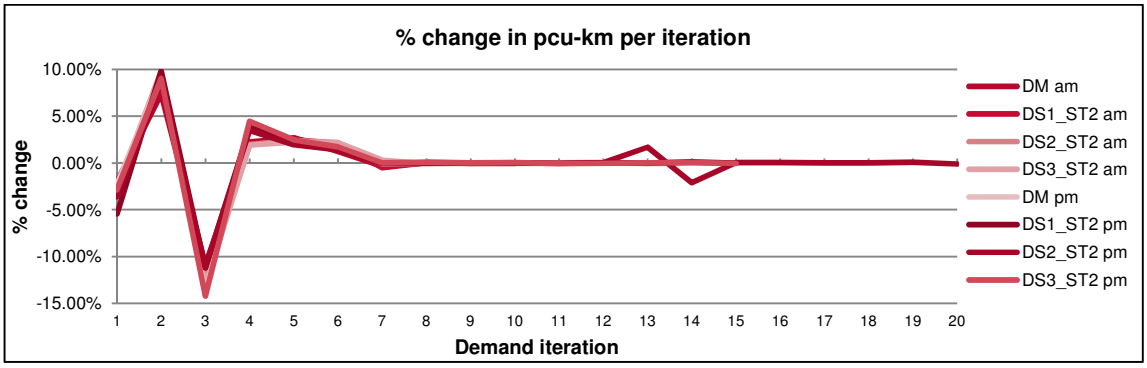
150.0%
110.0%
70.0%
30.0%
-10.0%
-50.0%
-90.0%
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Demand iteration
DM am
DS1_ST2 am
DS2_ST2 am
DS3_ST2 am
DM pm
DS1_ST2 pm
DS2_ST2 pm
DS3_ST2 pm


Total pcu-km per iteration
Distance (m)
1140000
1110000
1080000
1050000
1020000
990000
960000
930000
900000
Initital 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Demand iteration
DM am
DS1_ST2 am
DS2_ST2 am
DS3_ST2 am
DM pm
DS1_ST2 pm
DS2_ST2 pm
DS3_ST2 pm

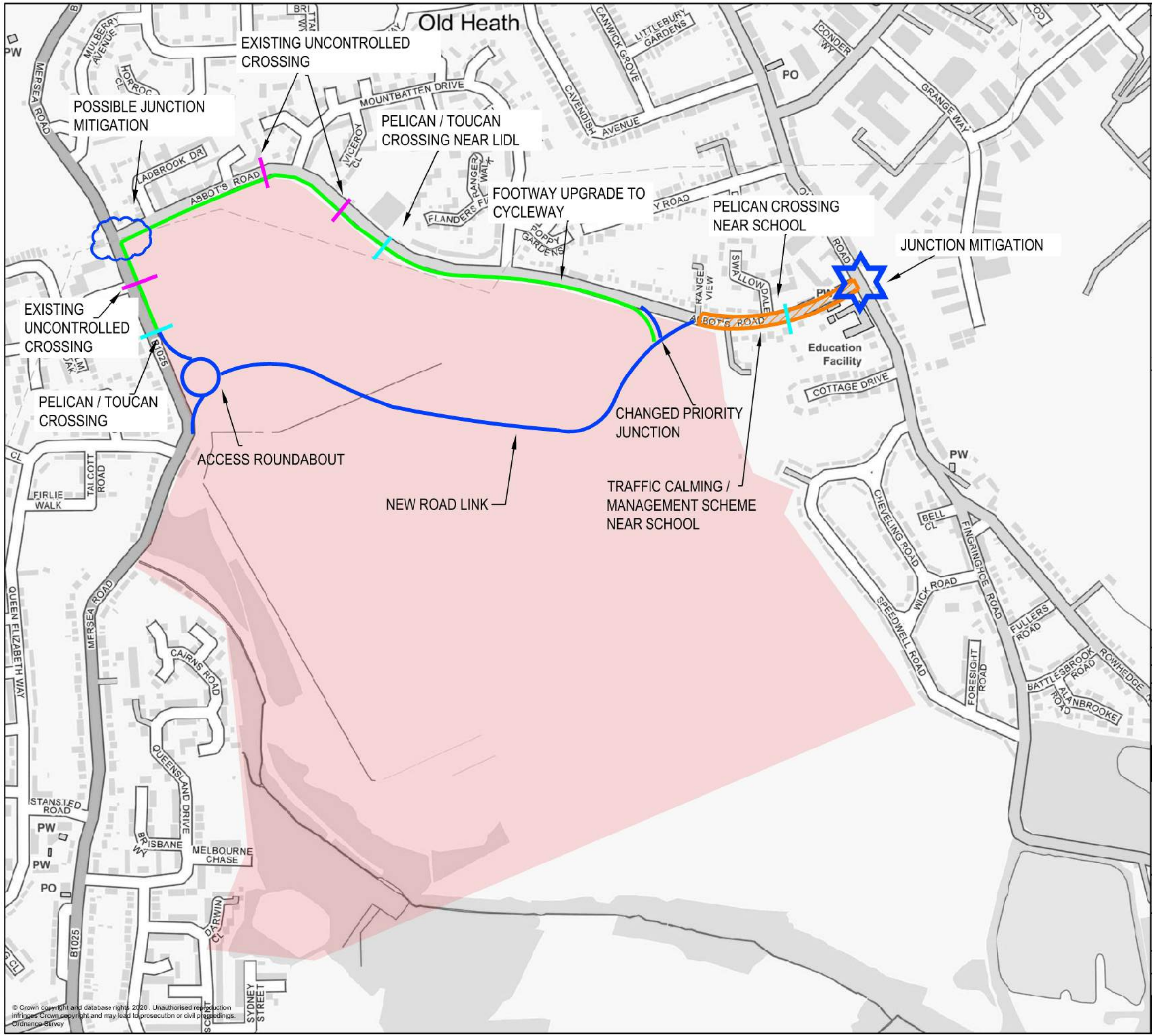

% change in pcu-km per iteration
% change
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Demand iteration
DM am
DS1_ST2 am
DS2_ST2 am
DS3_ST2 am
DM pm
DS1_ST2 pm
DS2_ST2 pm
DS3_ST2 pm

Appendix B TABLE 8 OF THE COLHESTER LOCAL PLAN TRAFFIC MODELLING TECHNICAL REPORT

Table 8 Total arrivals and departures to local development sites

			AM				PM			
			Pre VDM		After VDM		Pre VDM		After VDM	
Saturn zone	Description	Classification	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
1,705	Tiptree	Edge of Town	82	200	81	202	198	96	196	98
1,706	West Mersea	Edge of Town	27	67	27	66	66	32	65	32
1,603	Wivenhoe	Suburban Area	31	79	31	83	75	38	72	47
1,814	Colchester Tendring Borders Garden Settlement	Suburban Area	314	785	295	760	753	379	701	444
602	East Colchester & Welshwood Park	Suburban Area	109	141	112	142	138	69	140	69
603	East Colchester by Cyrus Road	Suburban Area	71	314	72	312	222	84	224	84
407	East Colchester & Land north of Bromley Road	Suburban Area	154	132	155	135	82	65	82	59
1,712	Langham & Dedham	Edge of Town	577	686	581	695	482	394	480	392
1,711	Great Horkesley, Boxted & Worrmingford	Edge of Town	1,000	1,479	999	1,471	1,280	867	1,286	873
1,719	Colchester Braintree borders Garden Settlement	Suburban Area	303	795	296	800	781	384	775	399
1,710	West Bergholt	Edge of Town	374	888	376	879	666	435	679	444
1,709	Eight Ash Green	Edge of Town	300	708	299	707	437	305	435	305
1,003	Stanway	Suburban Area	89	239	89	238	233	118	230	119
524	Northern Gateway	Suburban Area	33	92	32	92	90	43	89	44
1,307	Middlewick Ranges	Suburban Area	107	301	107	310	278	142	272	134
1,101	Gosbecks Phase 2	Suburban Area	159	366	158	364	177	50	177	50
1,107	Land South of Berechurch Hall Road	Suburban Area	66	79	65	79	77	92	77	91
501	North Colchester (Braiswick)	Suburban Area	315	429	319	425	295	256	295	256
317	Magdalen Street sites	Town Centre	17	42	17	42	43	22	45	21
418	Hythe Special Policy Area	Edge of Town Centre	32	71	33	80	69	48	65	49
301	Port Lane	Edge of Town Centre	251	109	249	108	117	220	120	215
902	Chitts Hill Stanway (Railway Sidings)	Suburban Area	148	263	150	261	264	166	264	164
1,701	Abberton	Edge of Town	560	609	544	596	411	276	406	266
1,713	Chappel and Wakes Colne	Edge of Town	429	739	431	730	529	337	524	335
1,711	Fordham	Edge of Town	1,000	1,479	999	1,471	1,280	867	1,286	873
1,713	Great Tey	Edge of Town	429	739	431	730	529	337	524	335
1,703	Layer de la Haye	Edge of Town	532	671	533	660	428	312	429	308
1,502	Rowhedge	Edge of Town	121	180	118	175	291	92	276	88
1,815	Employment site by Colchester Tendring Borders Garden Settlement	Suburban Area	233	37	219	37	28	182	26	194
1,717	Employment site by Colchester Braintree borders Garden Settlement	Suburban Area	241	41	238	43	31	189	31	200

Appendix C TRANSPORT STRATEGY DRAWINGS



NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS ARE IN MILLIMETRES. ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.

KEY:

- INDICATIVE RED LINE BOUNDARY
- HIGHWAY IMPROVEMENTS
- EXISTING CROSSING
- PROPOSED CROSSING
- FOOTWAY IMPROVEMENTS
- TRAFFIC CALMING MEASURES

Mark	Revision	Date	Drawn	Chkd	Appd

SCALING NOTE: Do not scale this drawing - any errors or omissions shall be reported to Stantec without delay.

UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

Drawing Issue Status: INDICATIVE

MIDDLEWICK TRAINING AREA
COLCHESTER
OVERALL MOVEMENT STRATEGY

DRAFT

Client: MINISTRY OF DEFENCE

Date of 1st Issue	Designed	Drawn
14.02.20	OT	OT
A3 Scale	Checked	Approved
NTS	RP	TA

Drawing Number: 40472-5513-010

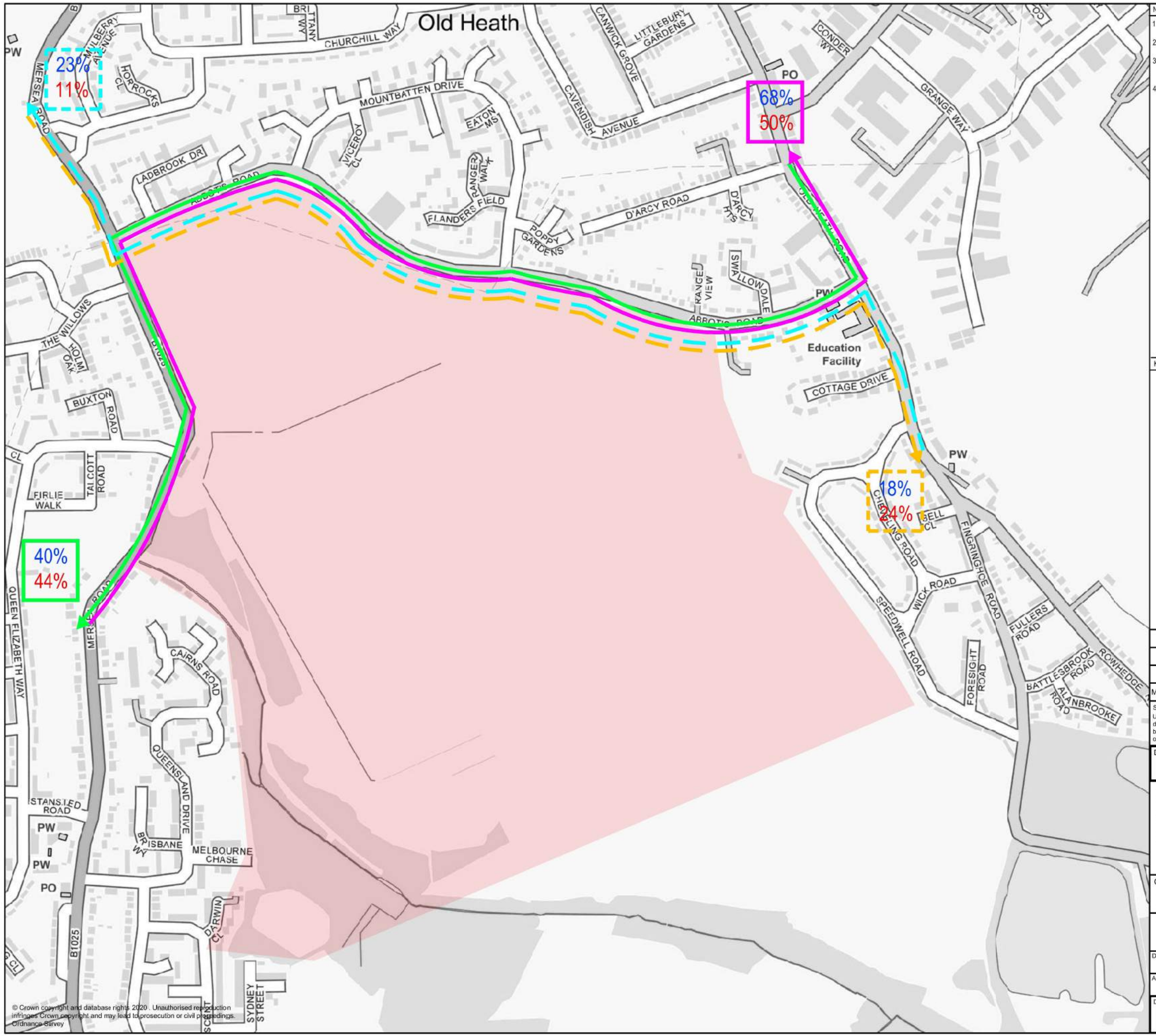
Revision: -

Stantec
stantec.com/uk

BIRMINGHAM
Tel: 0121 633 2900

user name: thomas, olivia

File Locaton: j:\40472 - middlewick training area, colchester\technical\drawings\5513\40472-5513-010 overall strategy.dwg



NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS ARE IN MILLIMETRES ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.

KEY:

- INDICATIVE RED LINE BOUNDARY
- SWITCHING ROUTES
- MERSEA ROAD SOUTH TO OLD HEATH ROAD NORTH
- MERSEA ROAD NORTH TO OLD HEATH ROAD SOUTH
- OLD HEATH ROAD NORTH TO MERSEA ROAD SOUTH
- OLD HEATH ROAD SOUTH TO MERSEA ROAD NORTH
- XX% AM DATA
- XX% PM DATA

Mark	Revision	Date	Drawn	Chkd	Appd

SCALING NOTE: Do not scale this drawing - any errors or omissions shall be reported to Stantec without delay.
UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

Drawing Issue Status: INDICATIVE

MIDDLEWICK TRAINING AREA COLCHESTER SWITCHING DIAGRAM

DRAFT

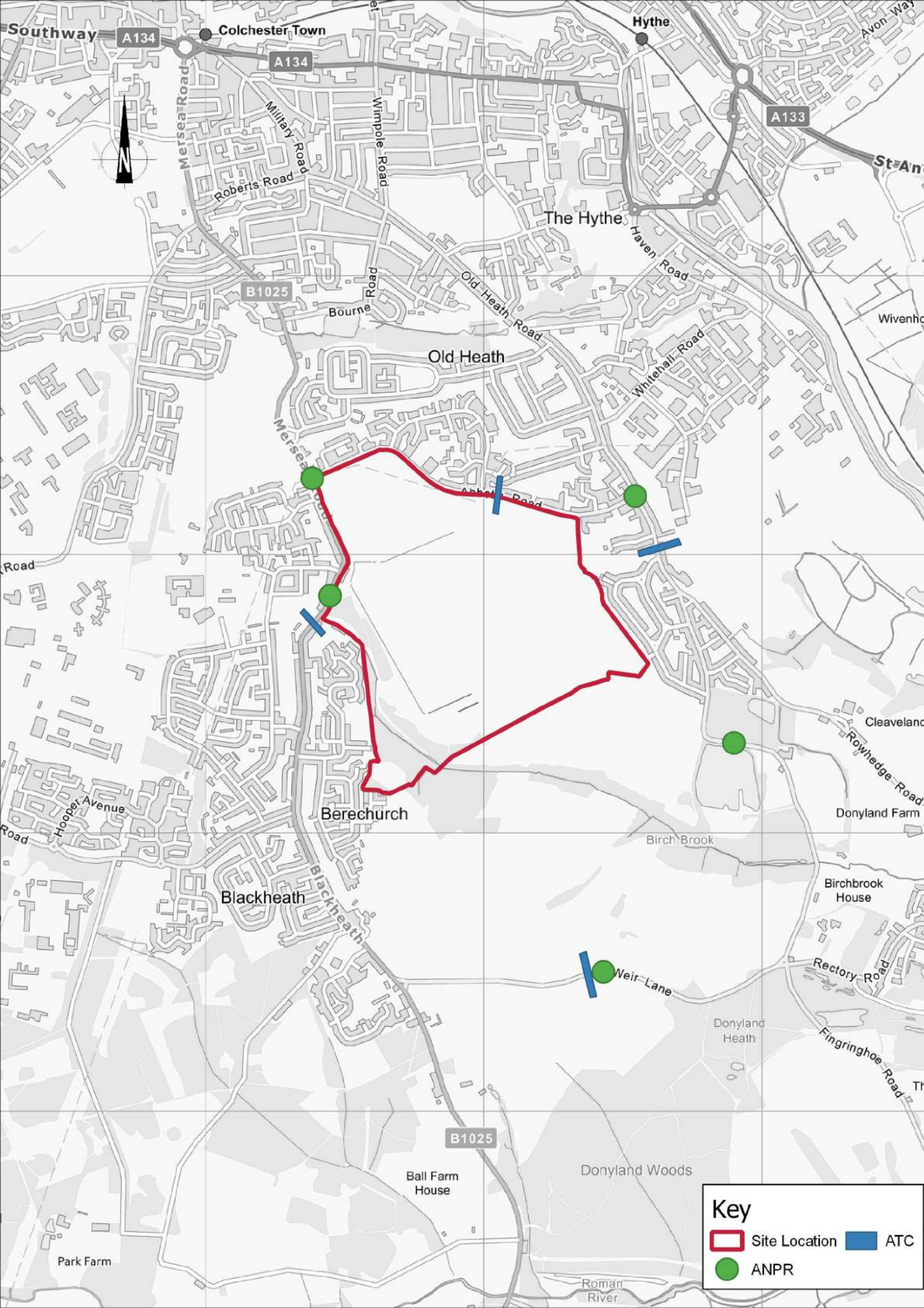
Client: MINISTRY OF DEFENCE

Date of 1st Issue	Designed	Drawn
12.02.20	OT	OT
A3 Scale: NTS	Checked: RP	Approved: TA
Drawing Number: 40472-5513-011	Revision: -	

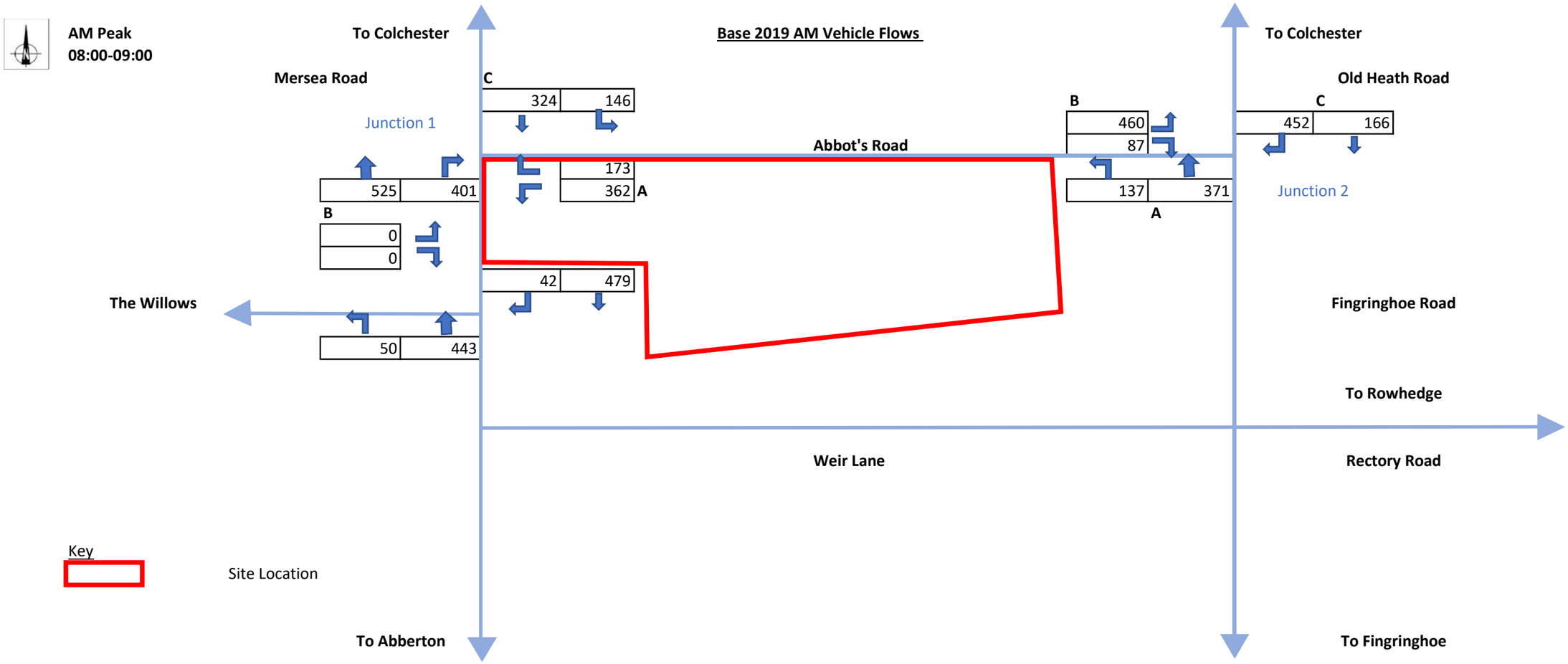
Stantec
stantec.com/uk

BIRMINGHAM
Tel: 0121 633 2900

Appendix D SURVEY LOCATIONS


Southway
A134
Colchester Town
A134
Hythe
A133
Avon Way
Mersea Road
Military Road
Wimpole Road
Roberts Road
The Hythe
Haven Road
B1025
Bourne Road
Old Heath Road
Old Heath
Whitehall Road
Wivenhoe
Abbotts Road
Cleaveland
Rowhedge Road
Donyland Farm
Hooper Avenue
Berechurch
Birch Brook
Blackheath
Blackheath
Birchbrook House
Weir Lane
Rectory Road
Donyland Heath
Fingringhoe Road
B1025
Ball Farm House
Donyland Woods
Park Farm
Roman River
Key
Site Location
ATC
ANPR

Appendix E FLOW DIAGRAMS



Junction 1: Mersea Road / Abbot's Road

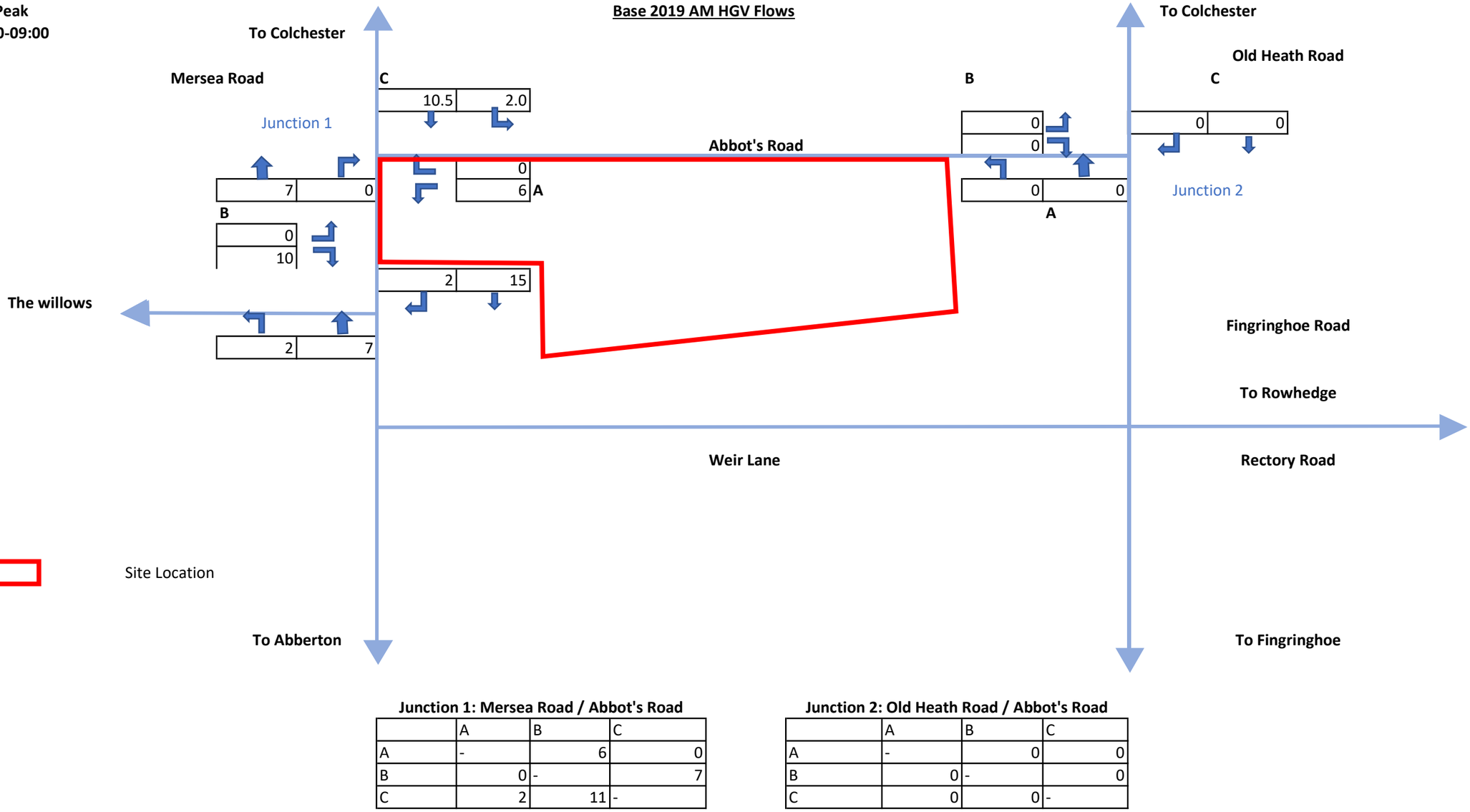
	A	B	C
A	-	362	173
B	401	-	525
C	146	324	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	137	371
B	87	-	460
C	166	452	-

AM Peak
08:00-09:00

Base 2019 AM HGV Flows



Key

Site Location

Junction 1: Mersea Road / Abbot's Road

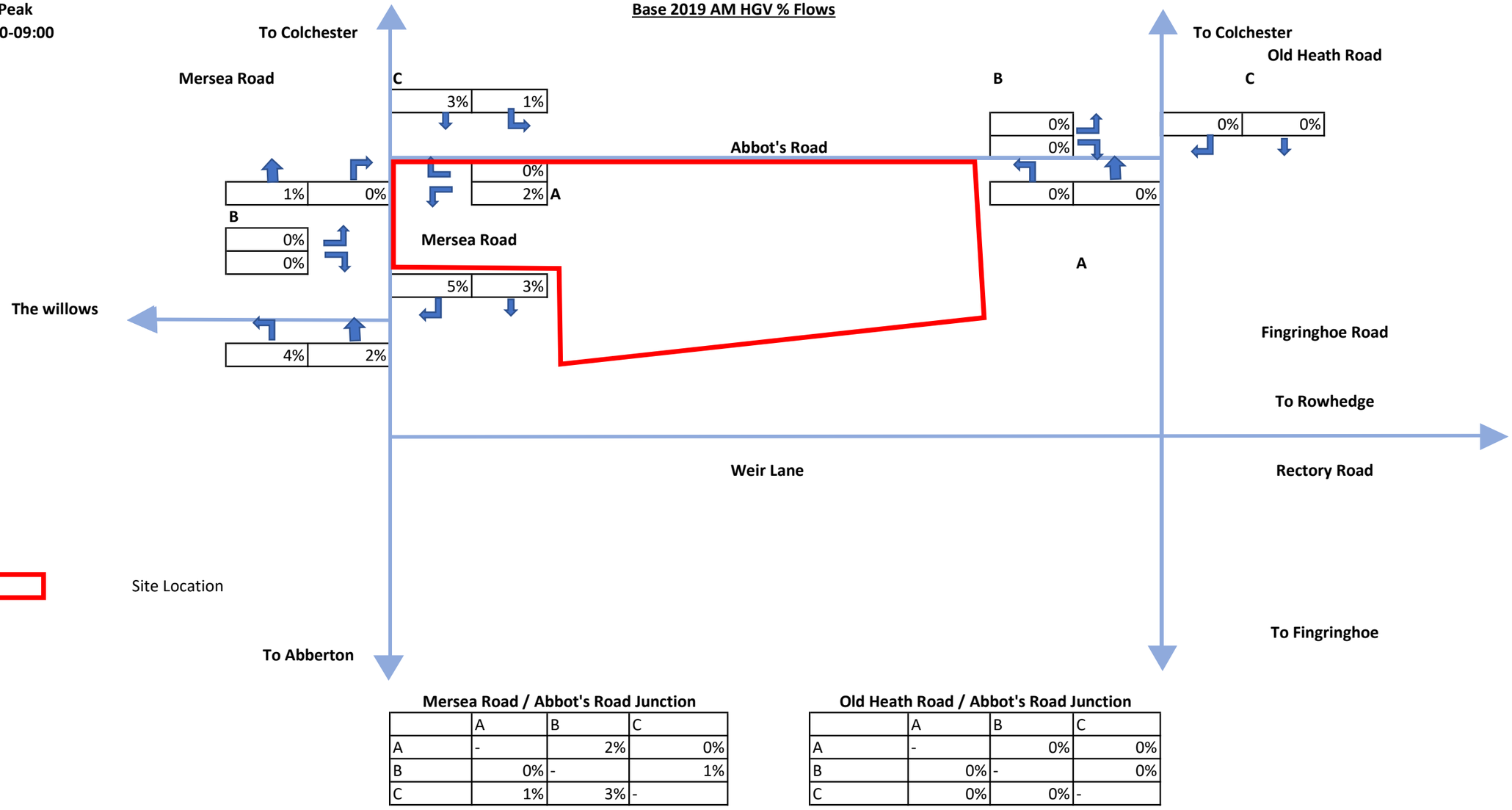
	A	B	C
A	-	6	0
B	0	-	7
C	2	11	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

AM Peak
08:00-09:00

Base 2019 AM HGV % Flows



Key

Site Location

Mersea Road / Abbot's Road Junction

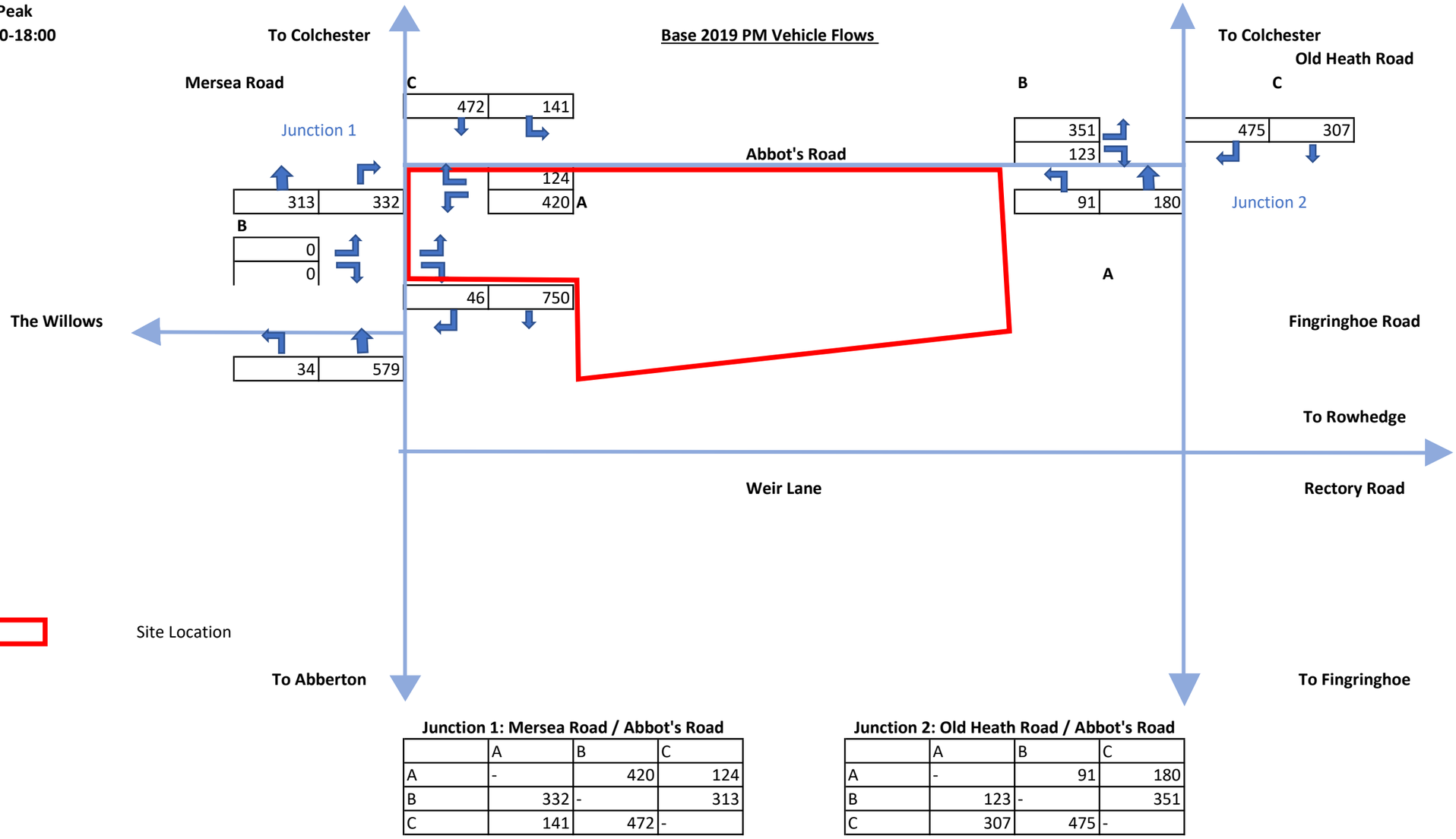
	A	B	C
A	-	2%	0%
B	0%	-	1%
C	1%	3%	-

Old Heath Road / Abbot's Road Junction

	A	B	C
A	-	0%	0%
B	0%	-	0%
C	0%	0%	-

PM Peak
17:00-18:00

Base 2019 PM Vehicle Flows



Key

Site Location

Junction 1: Mersea Road / Abbot's Road

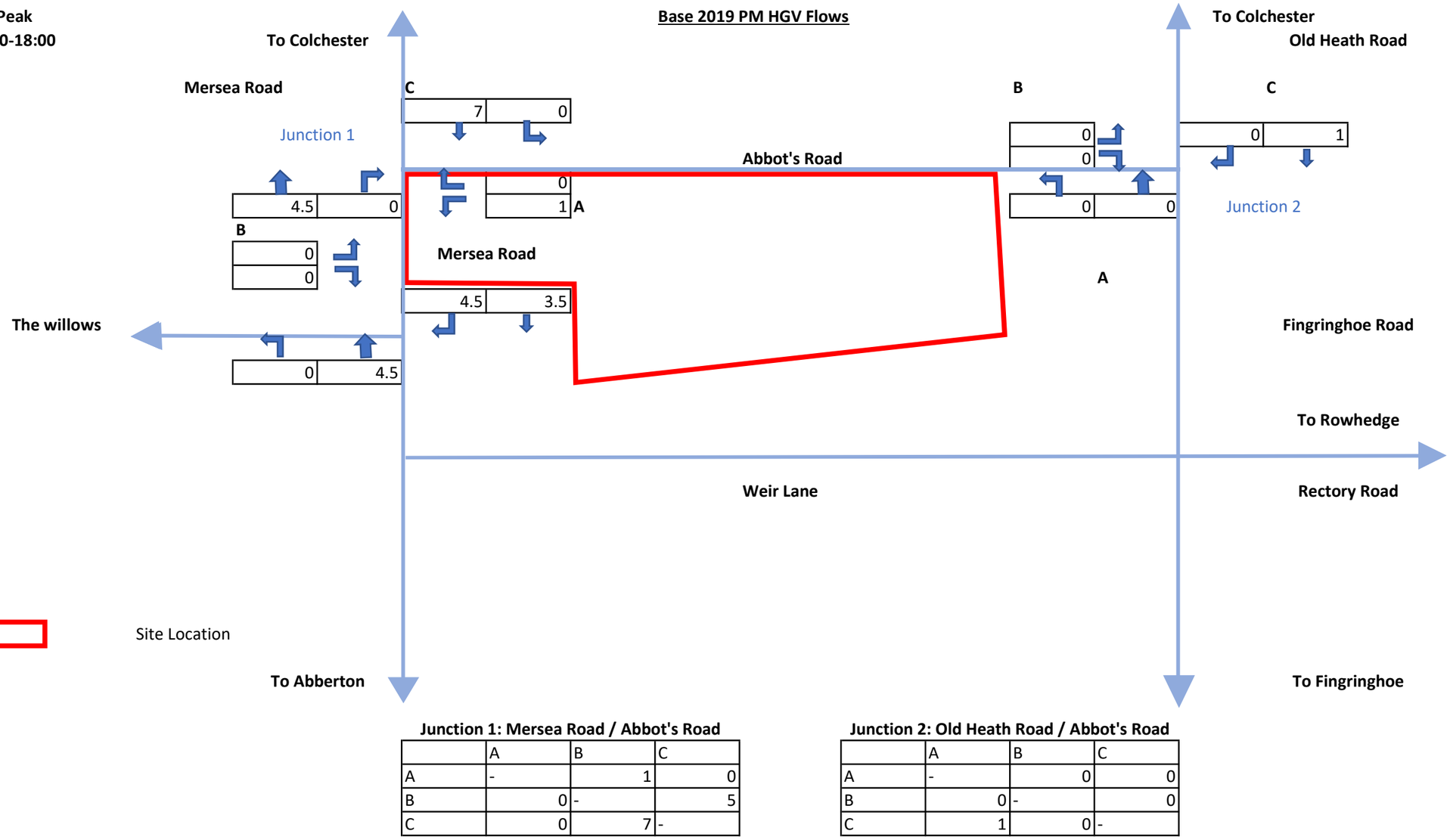
	A	B	C
A	-	420	124
B	332	-	313
C	141	472	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	91	180
B	123	-	351
C	307	475	-

PM Peak
17:00-18:00

Base 2019 PM HGV Flows



Key

Site Location

Junction 1: Mersea Road / Abbot's Road

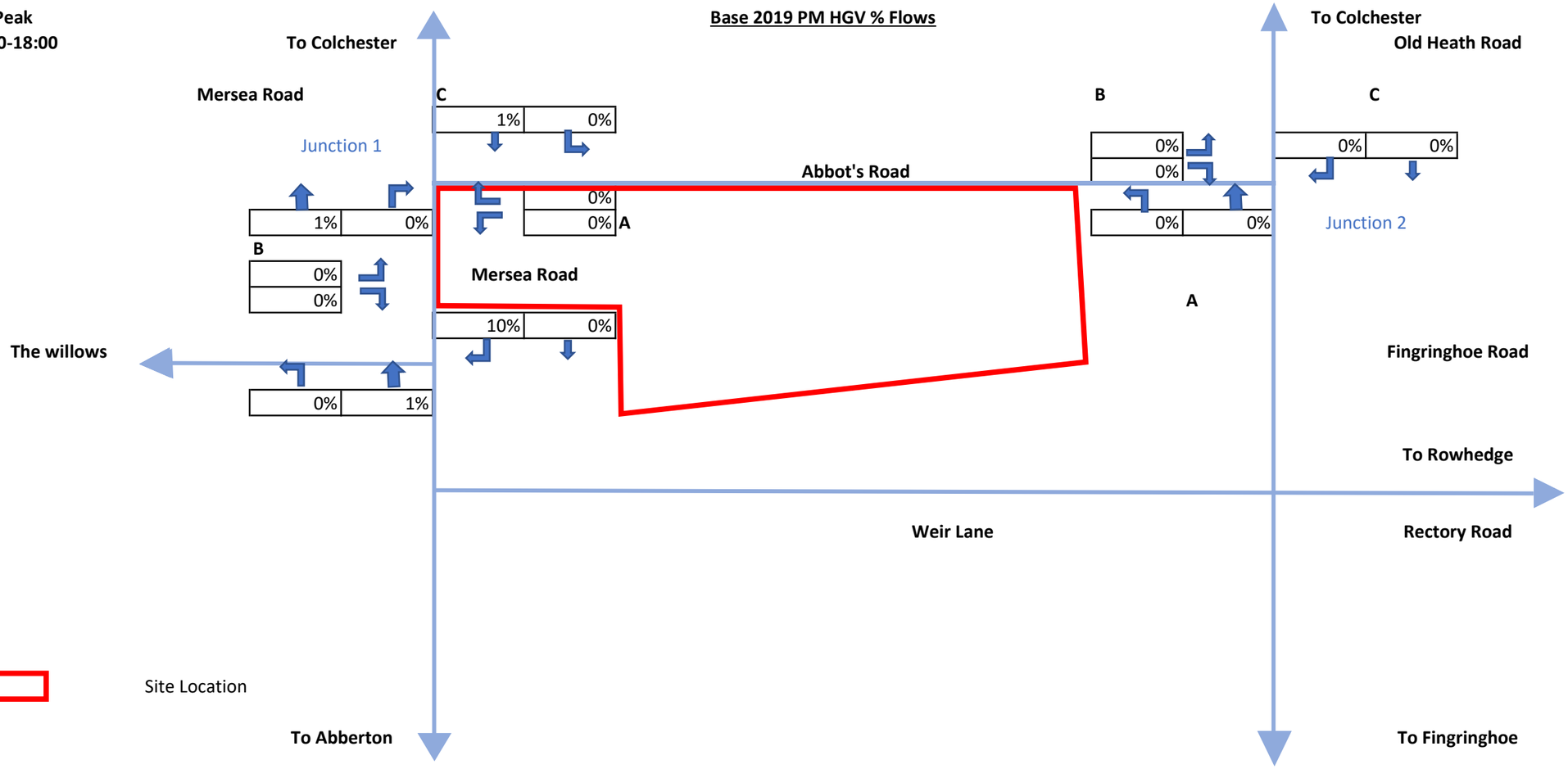
	A	B	C
A	-	1	0
B	0	-	5
C	0	7	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	1	0	-

PM Peak
17:00-18:00

Base 2019 PM HGV % Flows



Key

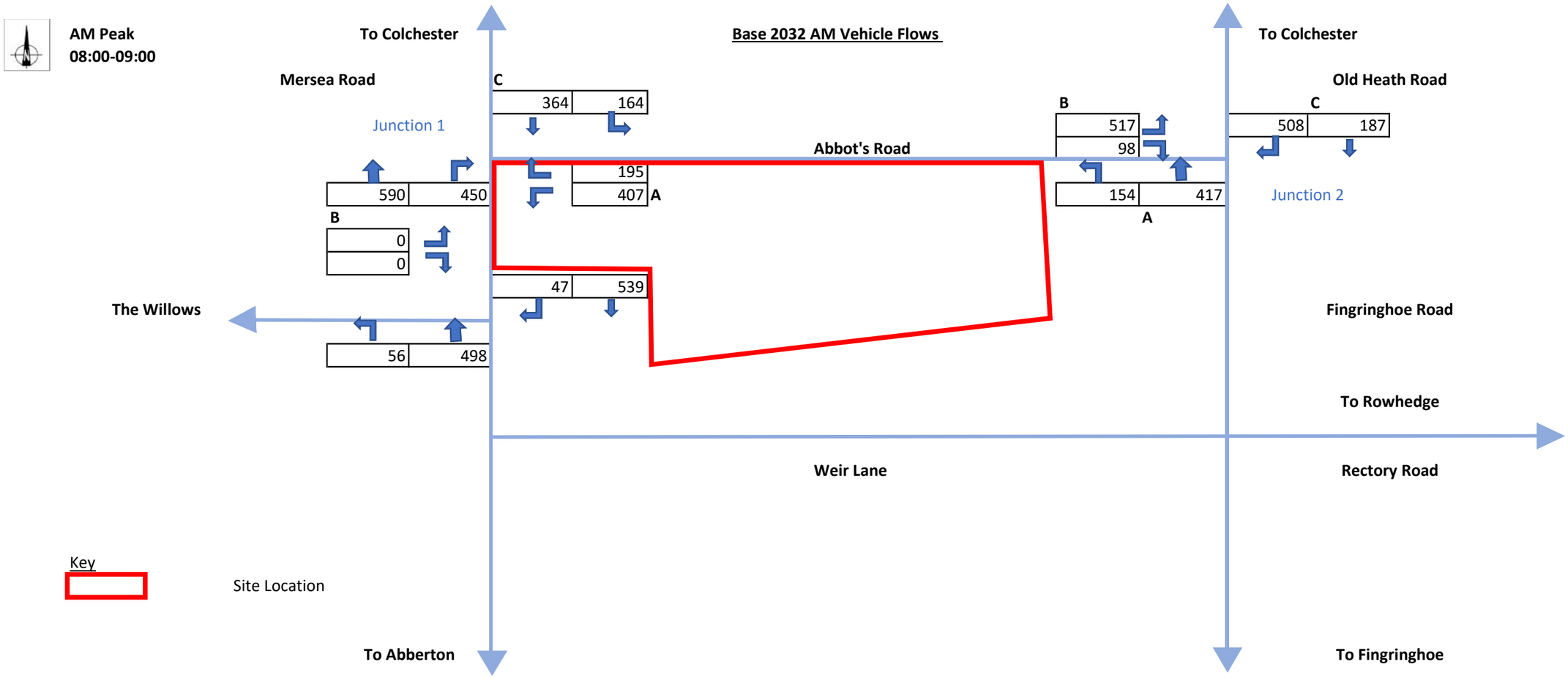
Site Location

Junction 1: Mersea Road / Abbot's Road

	A	B	C
A	-	0%	0%
B	0%	-	1%
C	0%	1%	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0%	0%
B	0%	-	0%
C	0%	0%	-



TEMPRO

AM GROWTH	1.1241
PM GROWTH	1.1225
Urban Minor Rd	
Colchester 016	

Junction 1: Mersea Road / Abbot's Road

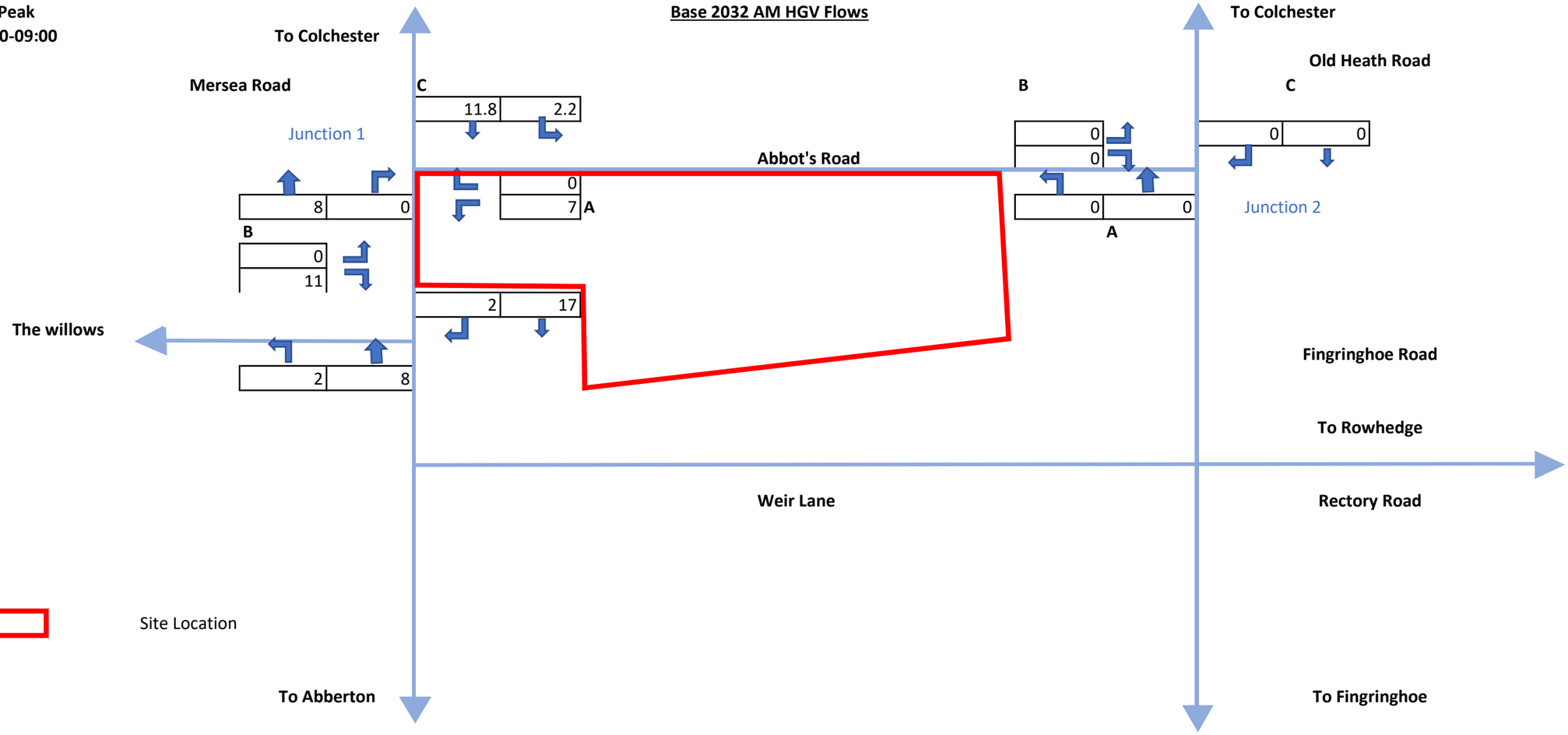
	A	B	C
A	-	407	195
B	450	-	590
C	164	364	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	154	417
B	98	-	517
C	187	508	-

AM Peak
08:00-09:00

Base 2032 AM HGV Flows



Key

Site Location

TEMPRO

AM GROW	1.1241
PM GROW	1.1225

Urban Minor Rd
Colchester 016

Junction 1: Mersea Road / Abbot's Road

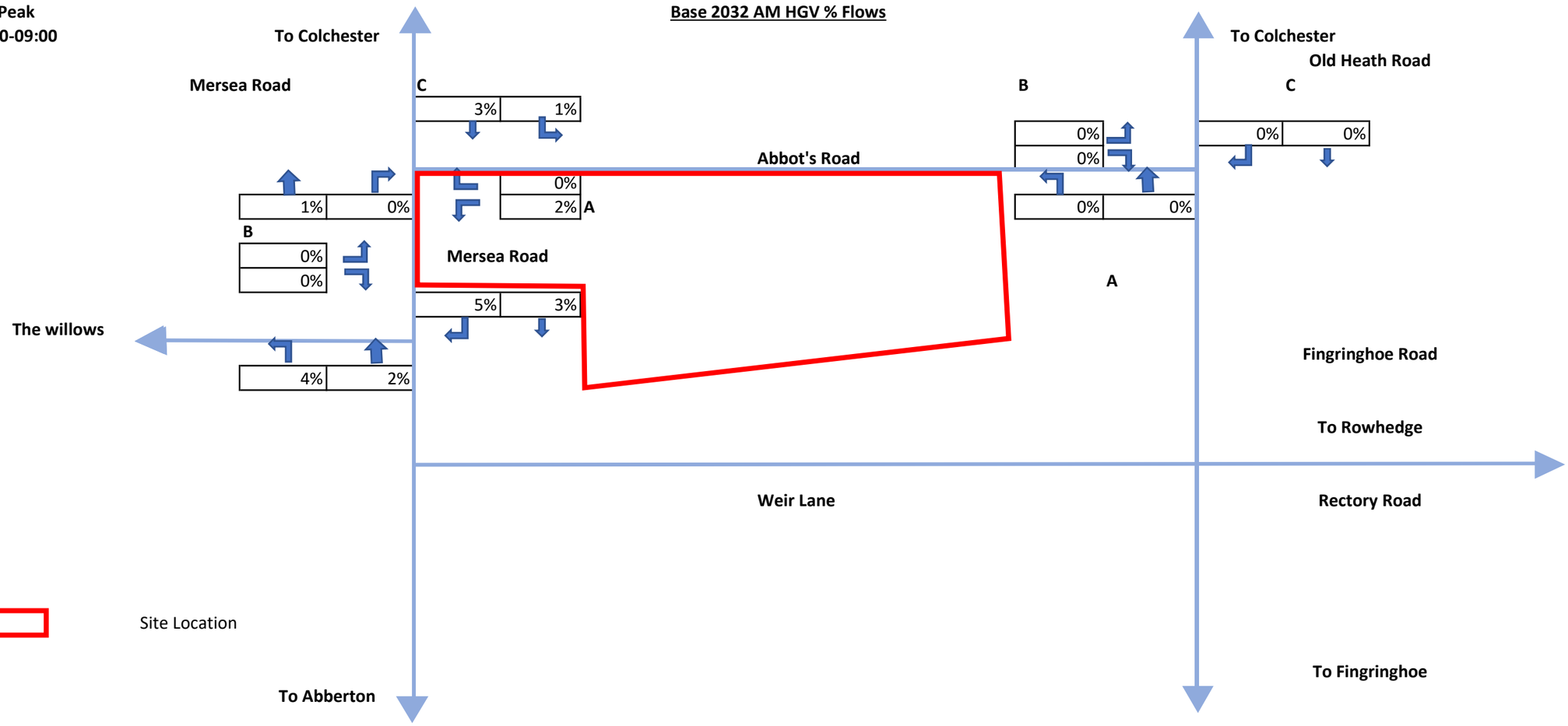
	A	B	C
A	-	7	0
B	0	-	8
C	2	12	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

AM Peak
08:00-09:00

Base 2032 AM HGV % Flows



Key

Site Location

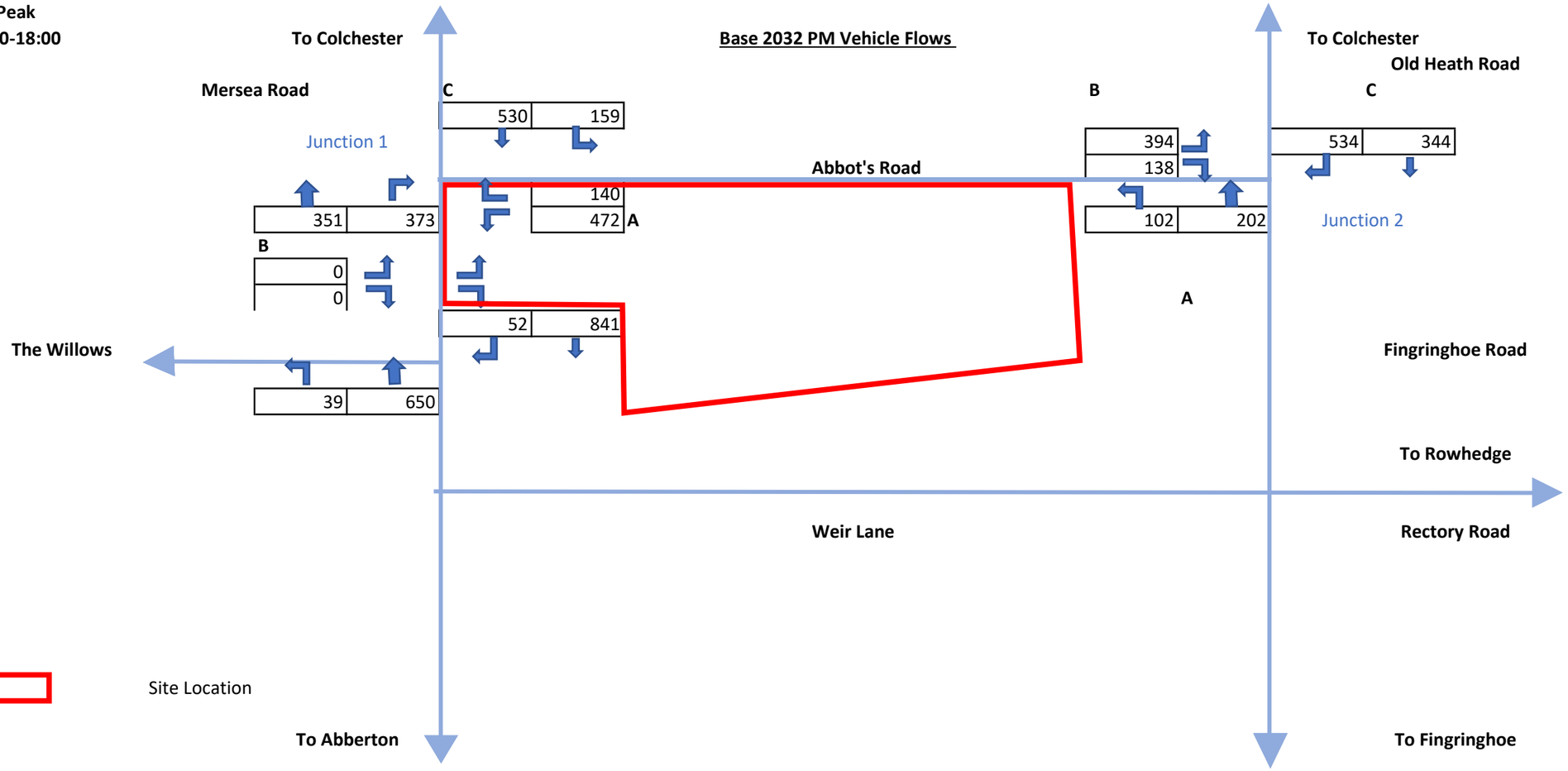
Mersea Road / Abbot's Road Junction

	A	B	C
A	-	2%	0%
B	0%	-	1%
C	1%	3%	-

Old Heath Road / Abbot's Road Junction

	A	B	C
A	-	0%	0%
B	0%	-	0%
C	0%	0%	-

PM Peak
17:00-18:00



Key

Site Location

TEMPRO

AM GROWTH	1.1241
PM GROWTH	1.1225

Urban Minor Rd
Colchester 016

Junction 1: Mersea Road / Abbot's Road

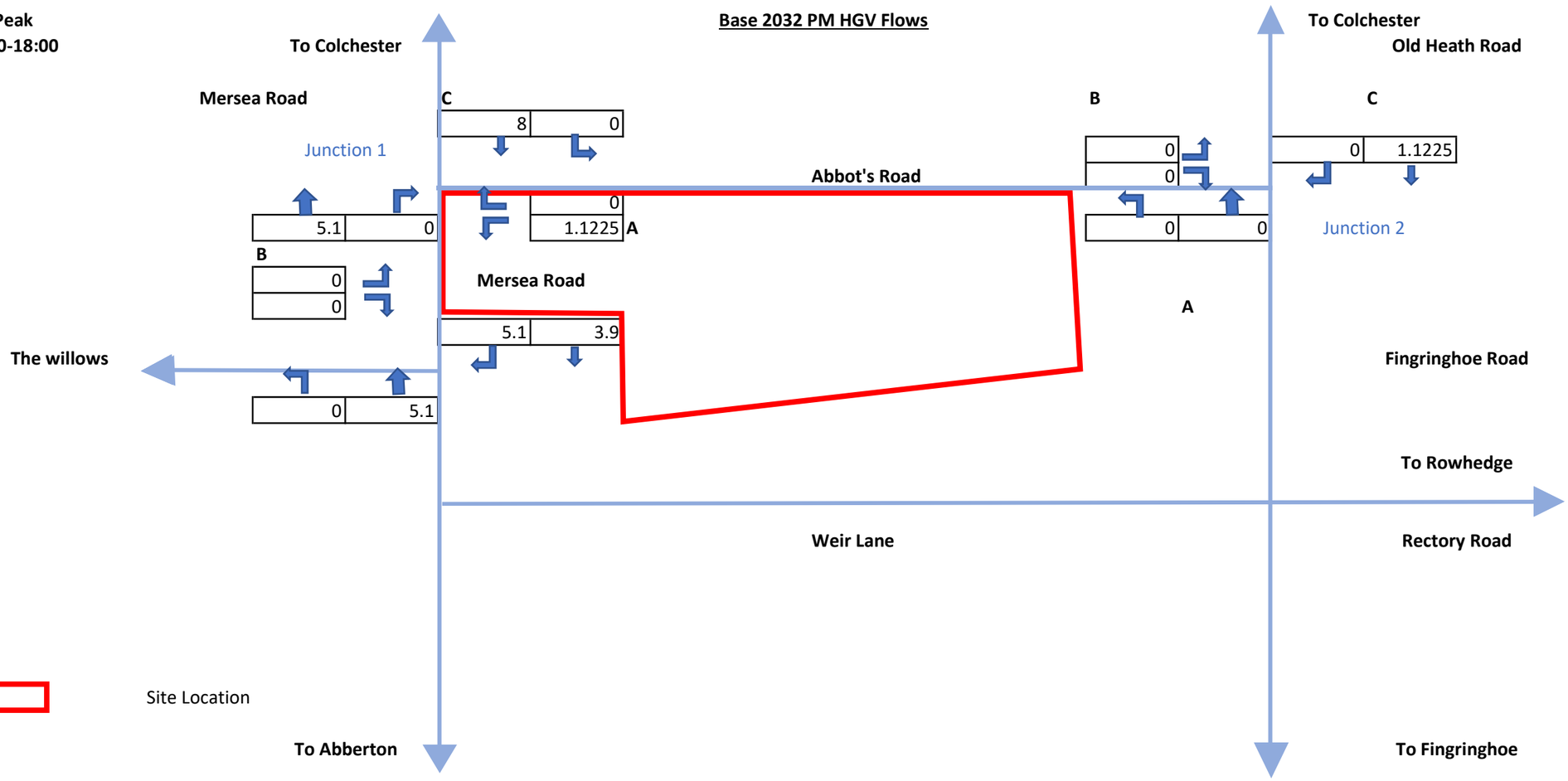
	A	B	C
A	-	472	140
B	373	-	351
C	159	530	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	102	202
B	138	-	394
C	344	534	-

PM Peak
17:00-18:00

Base 2032 PM HGV Flows



Key

Site Location

TEMPRO

AM GROWTH	1.1241
PM GROWTH	1.1225

Urban Minor Rd
Colchester 016

Junction 1: Mersea Road / Abbot's Road

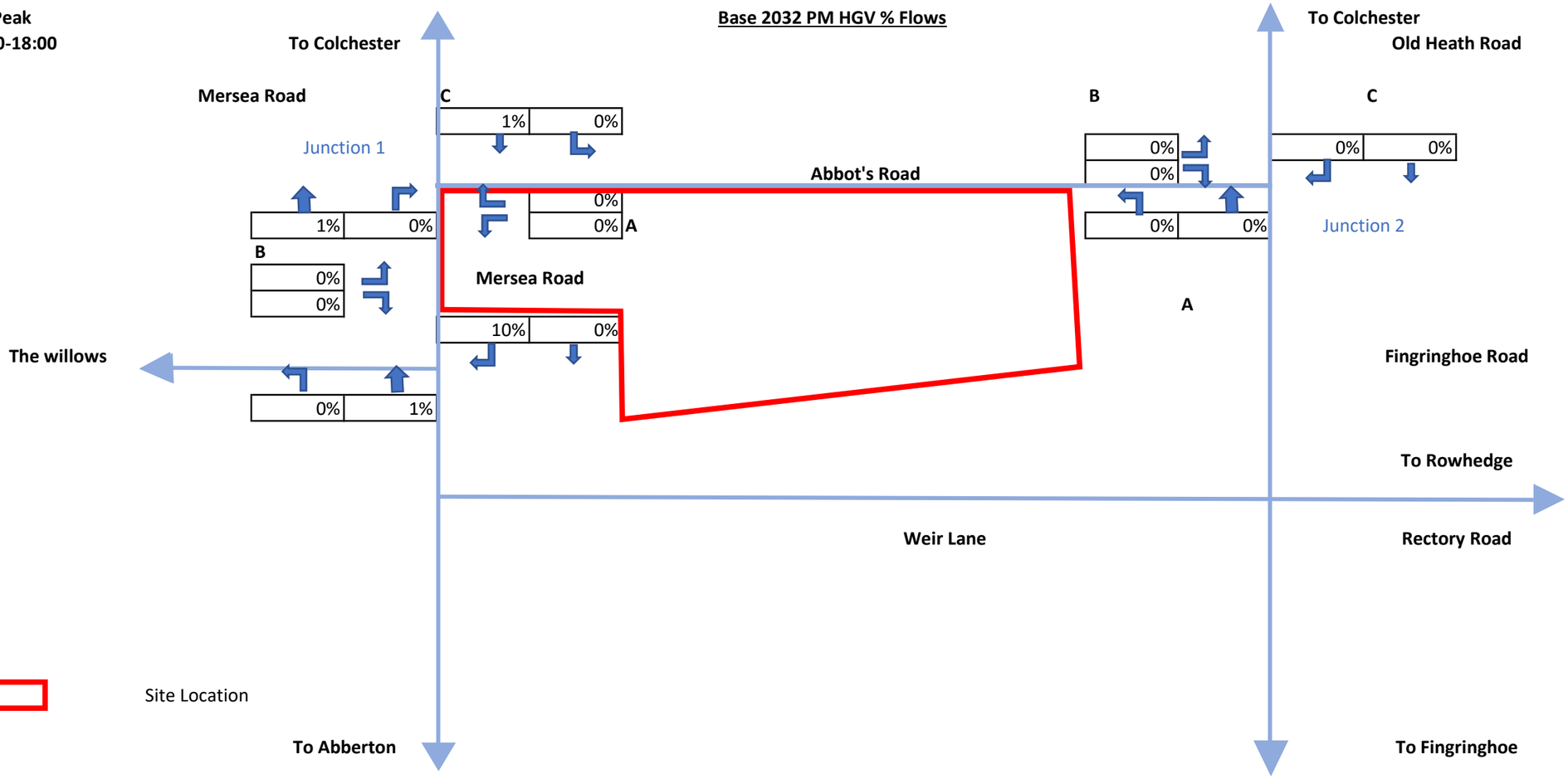
	A	B	C
A	-	1	0
B	0	-	5
C	0	8	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	1	0	-

PM Peak
17:00-18:00

Base 2032 PM HGV % Flows



Key

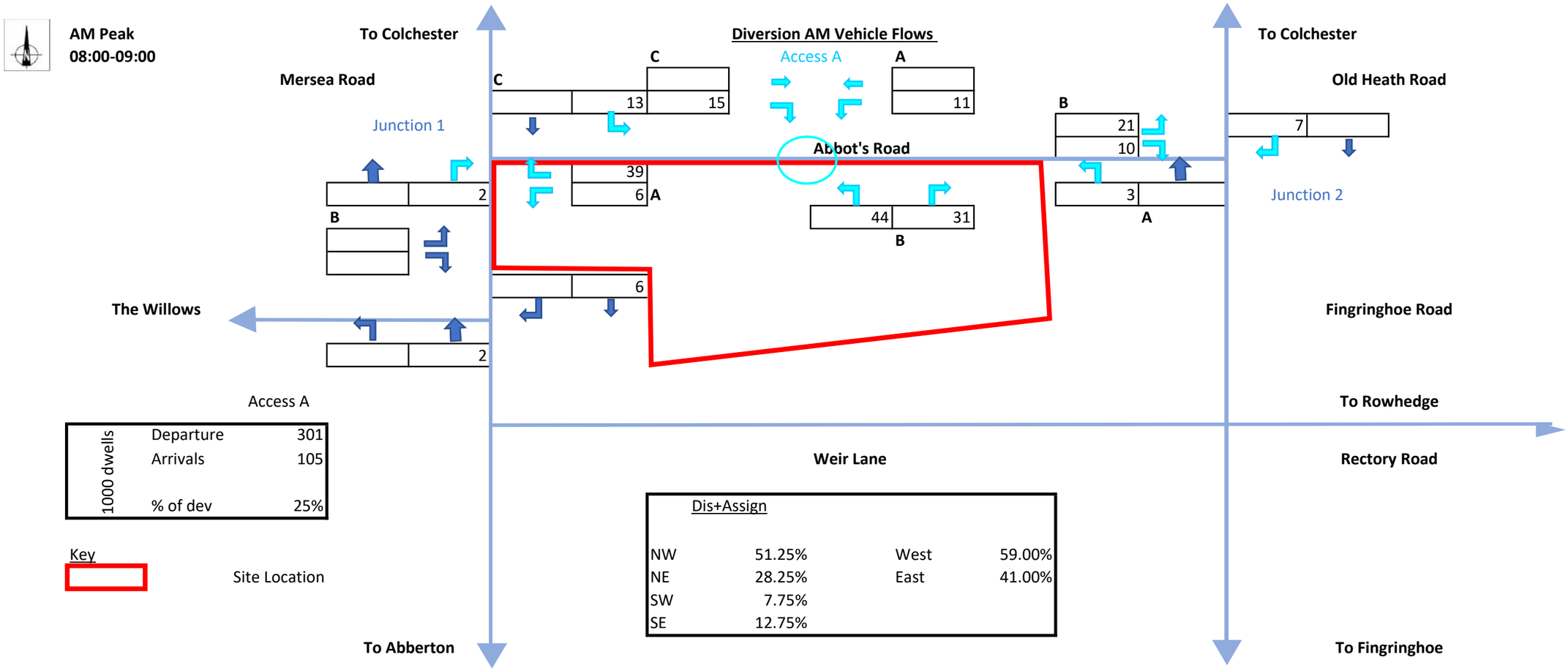
Site Location

Junction 1: Mersea Road / Abbot's Road

	A	B	C
A	-	0%	0%
B	0%	-	1%
C	0%	1%	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0%	0%
B	0%	-	0%
C	0%	0%	-



Junction 1: Mersea Road / Abbot's Road

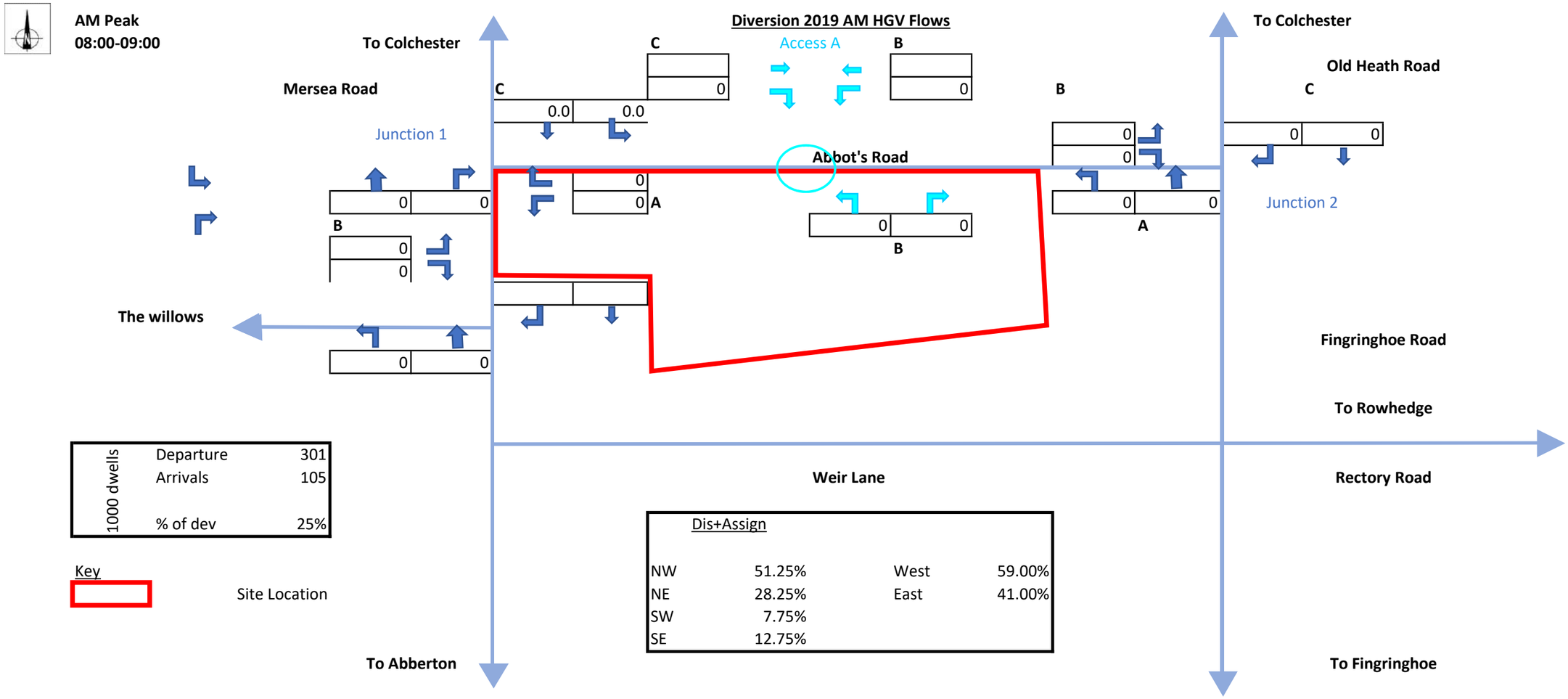
	A	B	C
A	-	6	39
B	2	-	0
C	13	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	3	0
B	10	-	21
C	0	7	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	11	0
B	31	-	44
C	0	15	-



Junction 1: Mersea Road / Abbot's Road

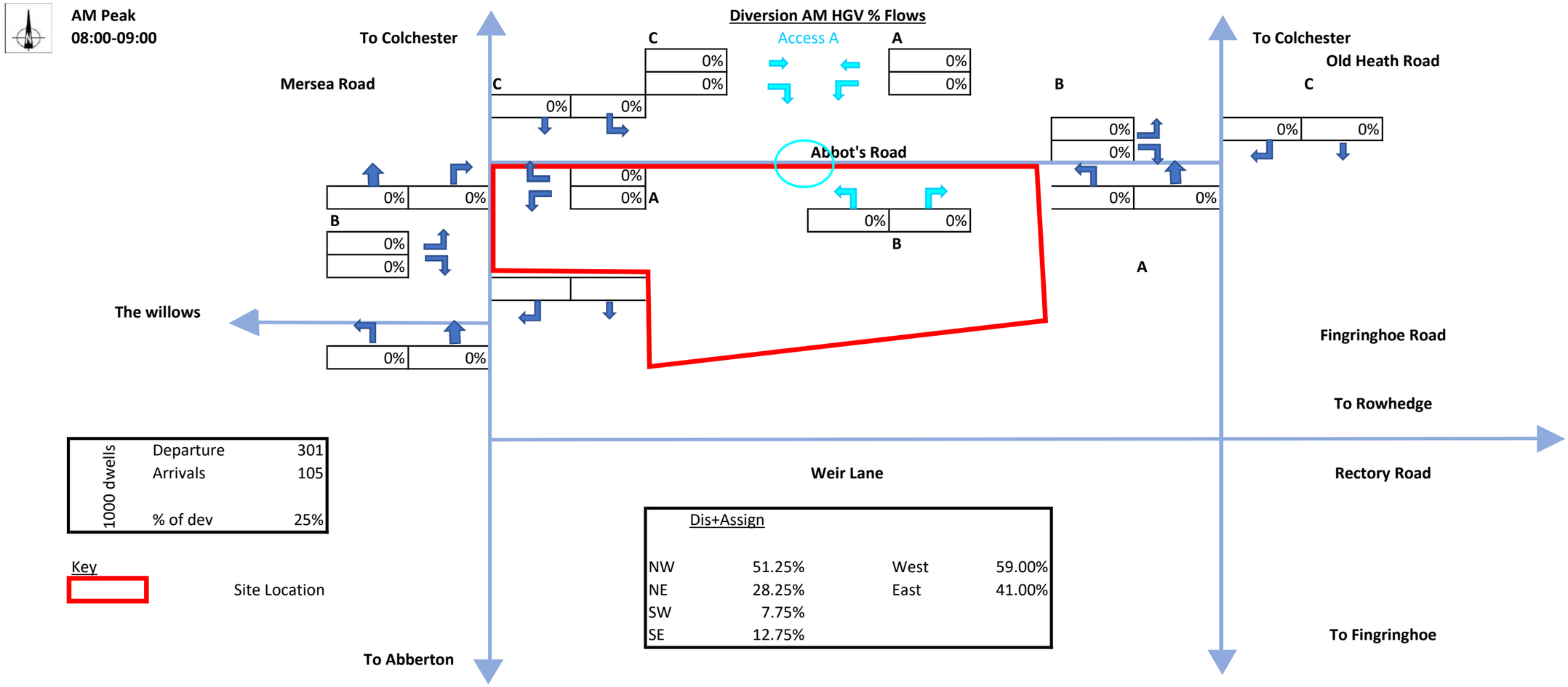
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Junction 1: Mersea Road / Abbot's Road

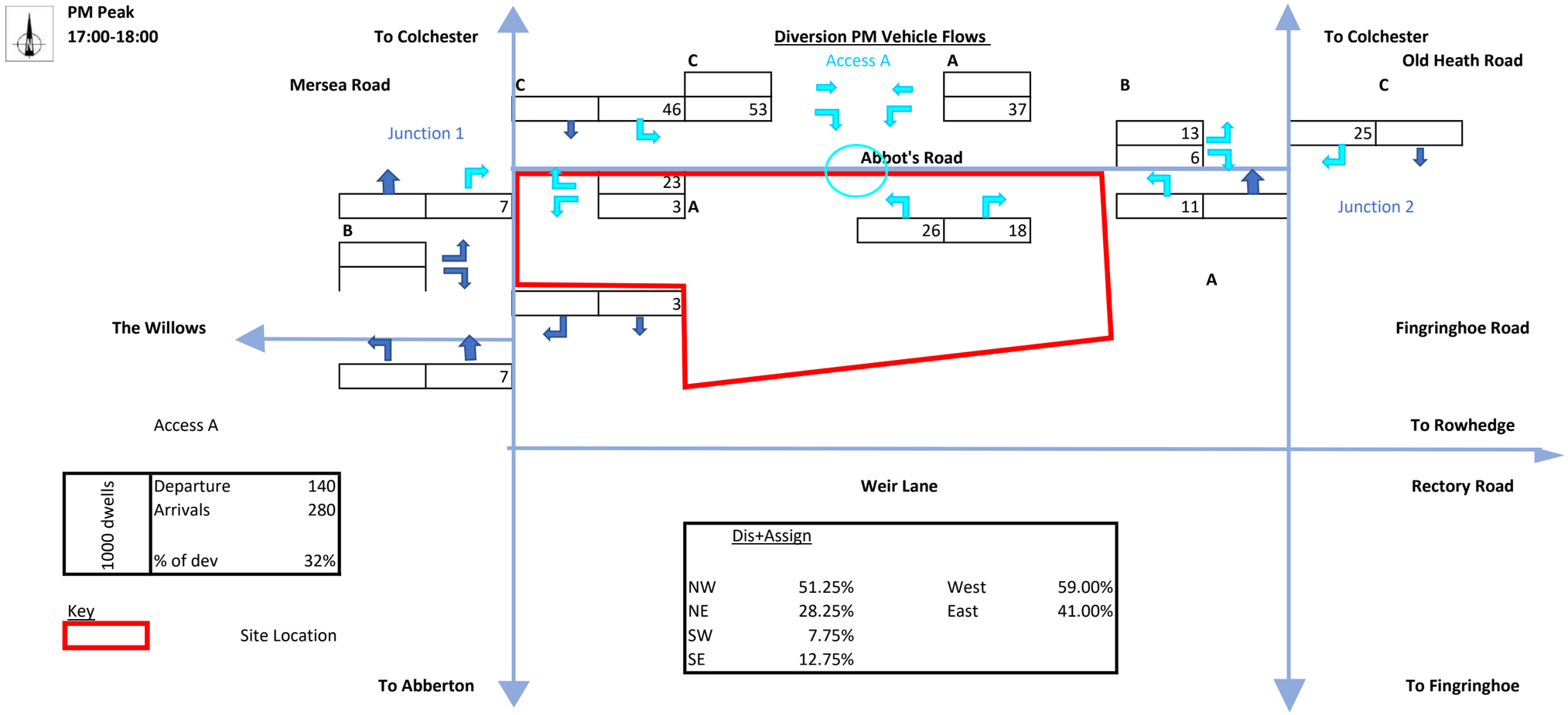
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Junction 1: Mersea Road / Abbot's Road

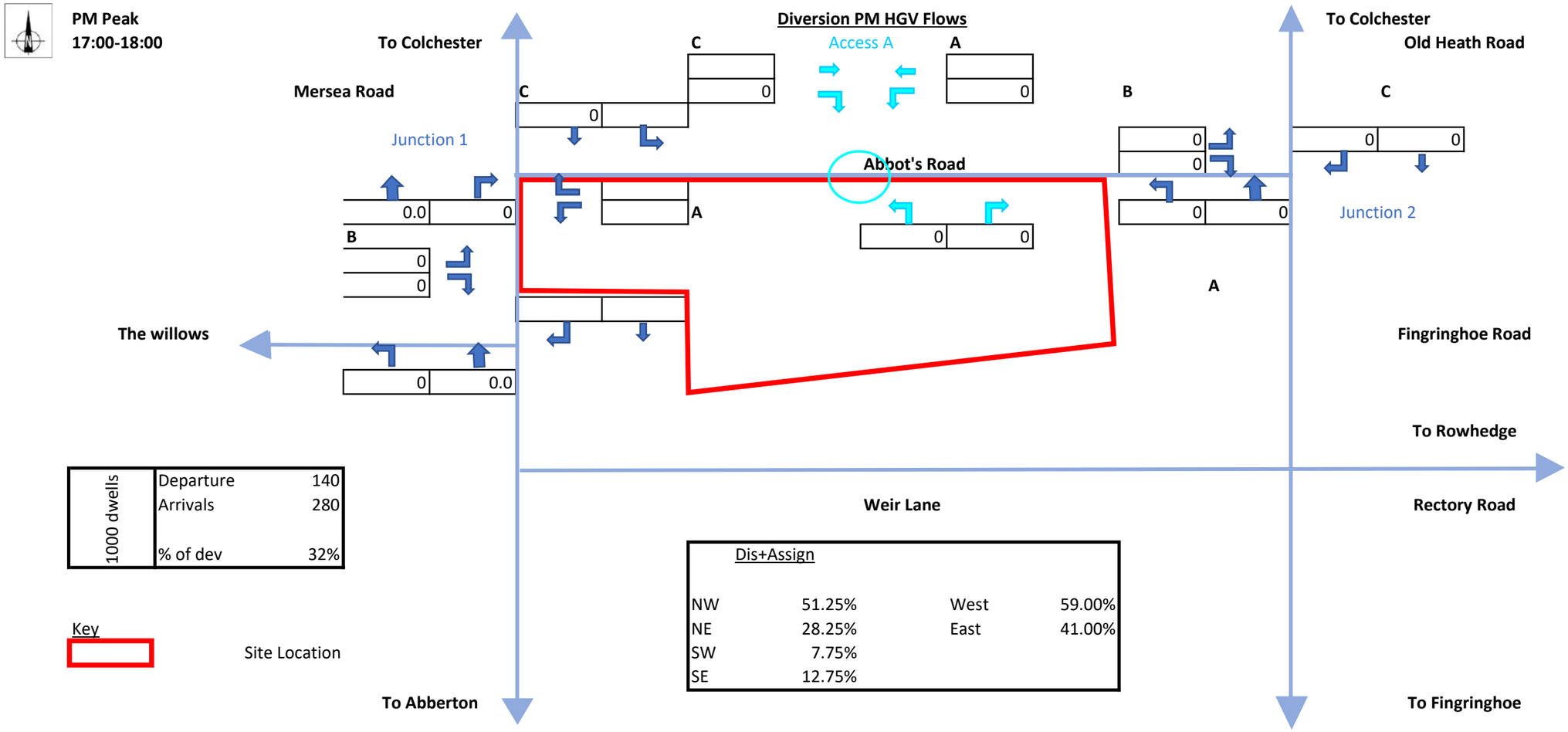
	A	B	C
A	-	3	23
B	7	-	0
C	46	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	11	0
B	6	-	13
C	0	25	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	37	0
B	18	-	26
C	0	53	-



1000 dwells		
	Departure	140
	Arrivals	280
	% of dev	32%

Key

Site Location

Dis+Assign

NW	51.25%	West	59.00%
NE	28.25%	East	41.00%
SW	7.75%		
SE	12.75%		

Junction 1: Mersea Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

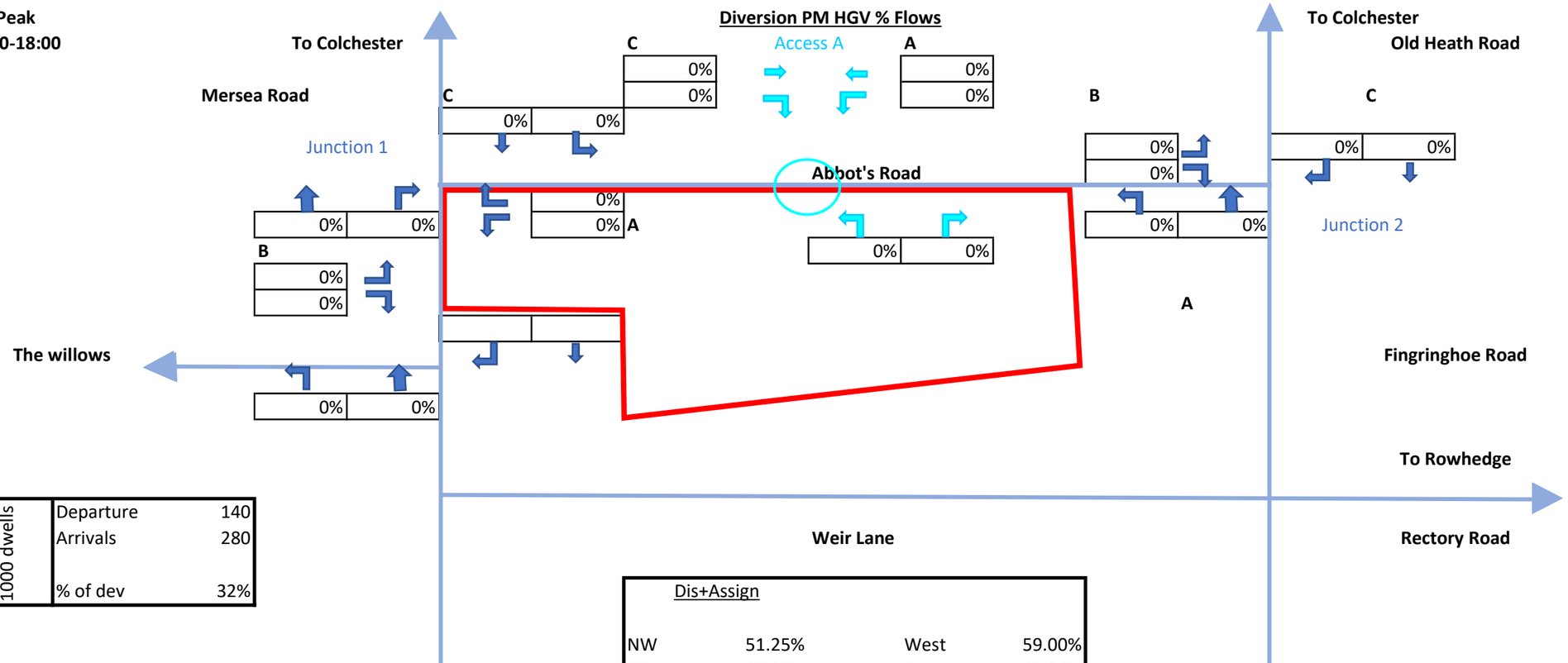
Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

PM Peak
17:00-18:00



1000 dwells		
	Departure	140
	Arrivals	280
	% of dev	32%

Dis+Assign			
NW	51.25%	West	59.00%
NE	28.25%	East	41.00%
SW	7.75%		
SE	12.75%		

Key

Site Location

Junction 1: Mersea Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

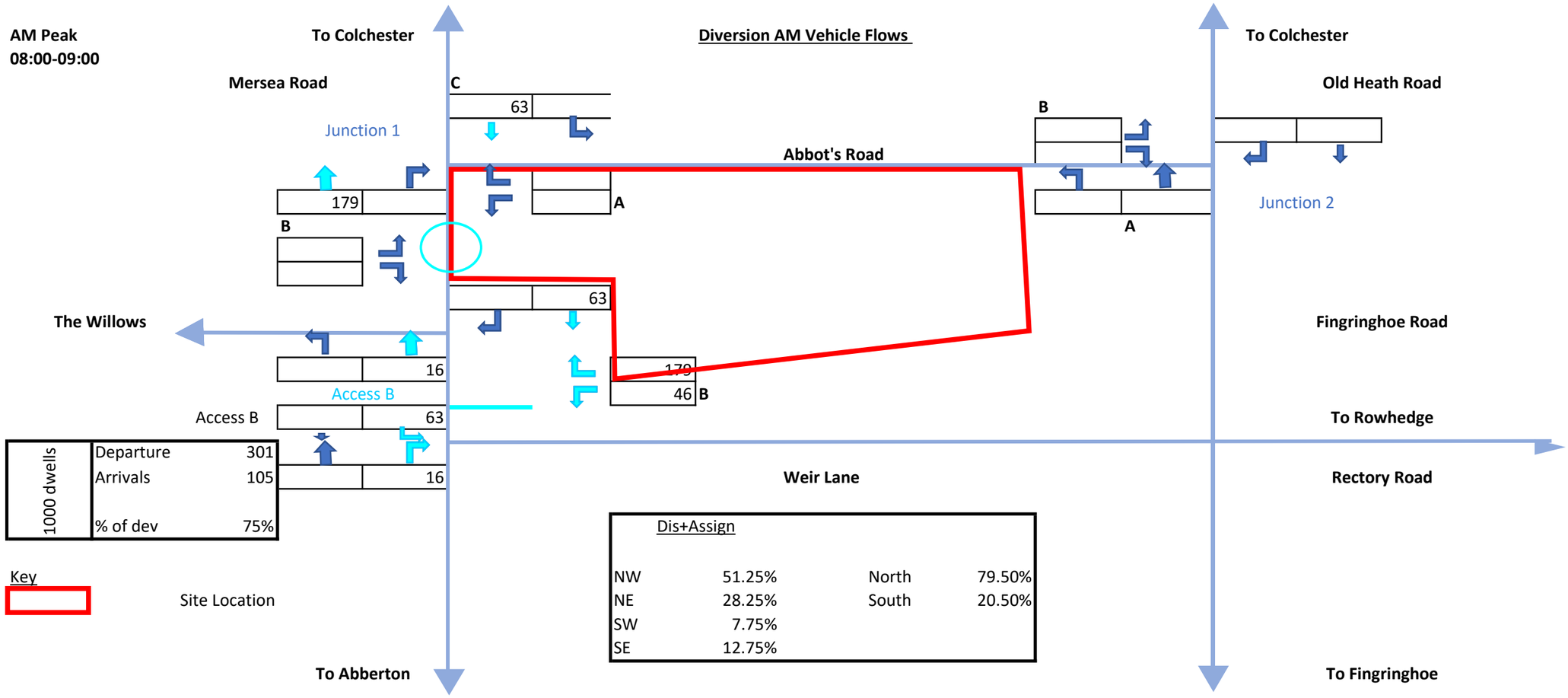
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

AM Peak
08:00-09:00

Diversion AM Vehicle Flows



1000 dwells		
	Departure	301
	Arrivals	105
	% of dev	75%

Key

Site Location

Dis+Assign

NW	51.25%	North	79.50%
NE	28.25%	South	20.50%
SW	7.75%		
SE	12.75%		

Access B : Mersea Road Access/Diversion

	A	B	C
A	-	63	0
B	179	-	46
C	0	16	-

Junction 1: Mersea Road / Abbot's Road

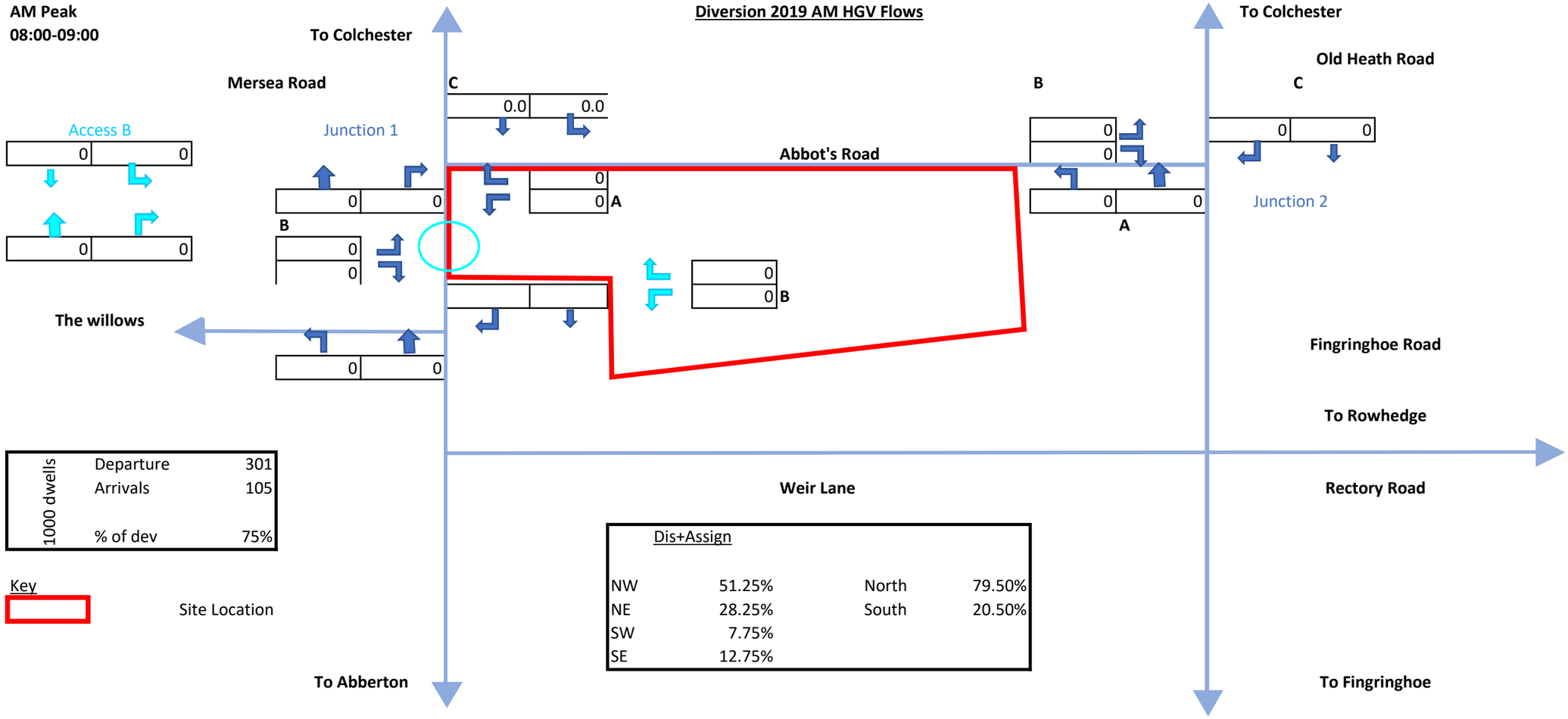
	A	B	C
A	-	0	0
B	0	-	179
C	0	63	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

AM Peak
08:00-09:00

Diversion 2019 AM HGV Flows



1000 dwells		
	Departure	301
	Arrivals	105
	% of dev	75%

Key

Site Location

Dis+Assign

NW	51.25%	North	79.50%
NE	28.25%	South	20.50%
SW	7.75%		
SE	12.75%		

Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

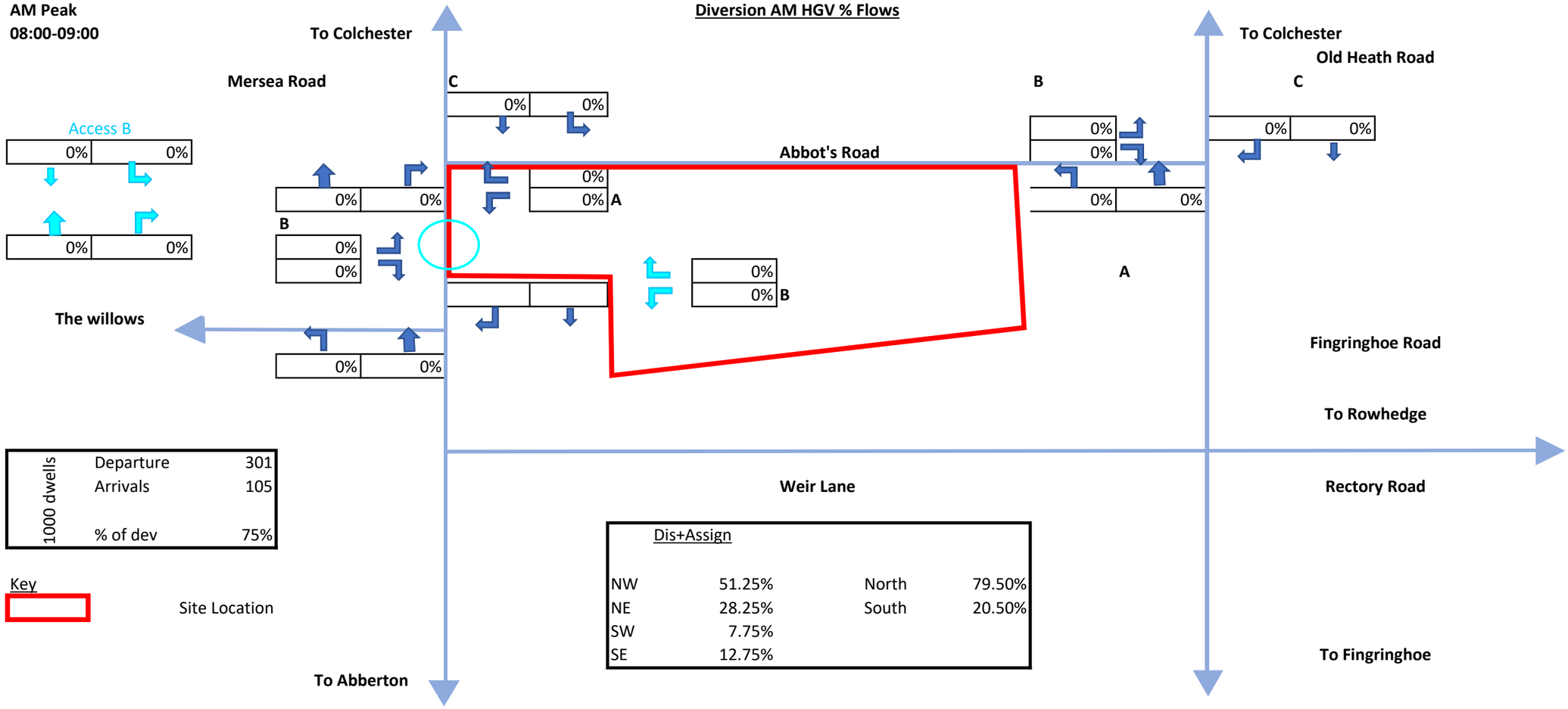
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

AM Peak
08:00-09:00

Diversion AM HGV % Flows



1000 dwells		
	Departure	301
	Arrivals	105
	% of dev	75%

Dis+Assign

NW	51.25%	North	79.50%
NE	28.25%	South	20.50%
SW	7.75%		
SE	12.75%		

Key

Site Location

Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

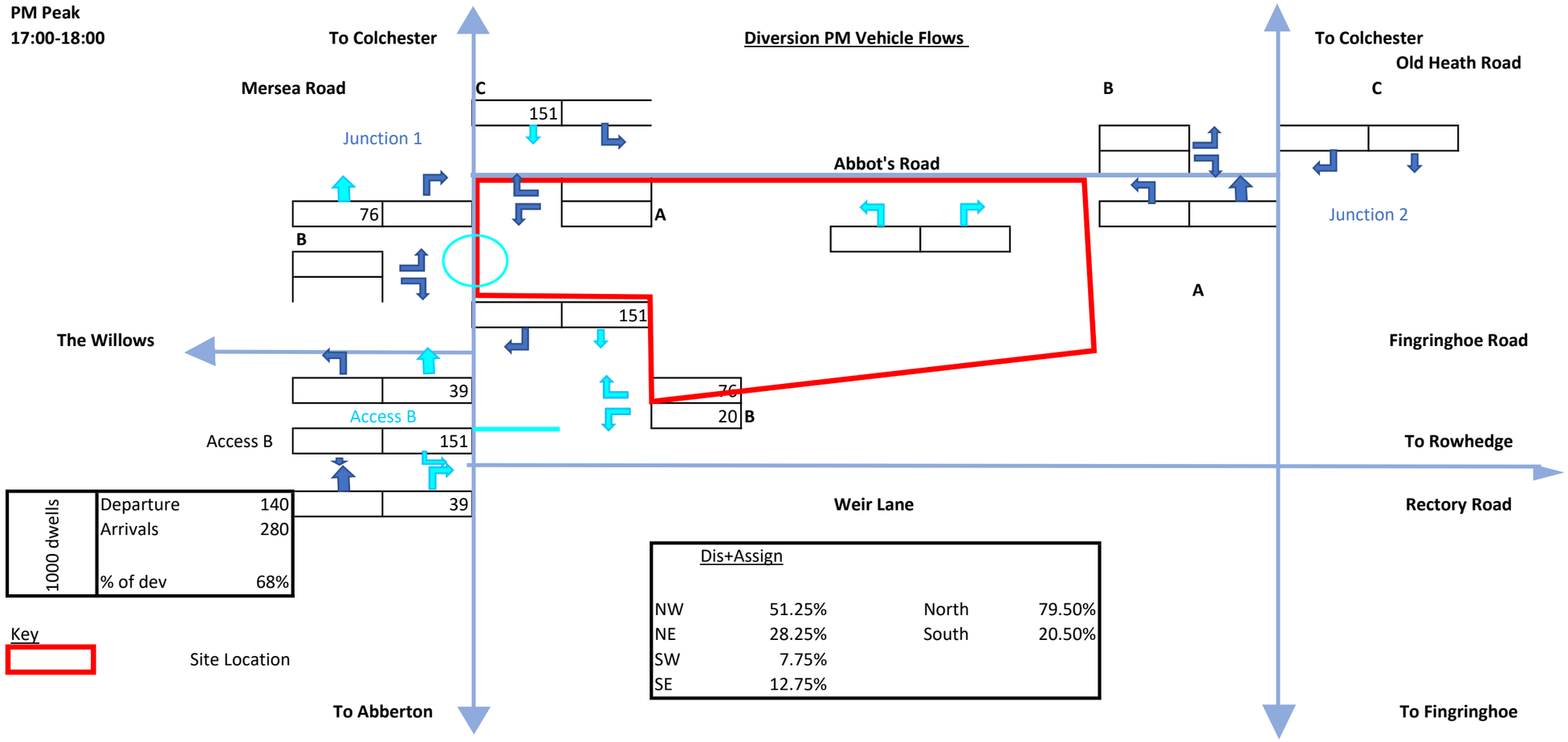
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

PM Peak
17:00-18:00

Diversion PM Vehicle Flows



1000 dwells		
	Departure	140
	Arrivals	280
	% of dev	68%

Dis+Assign

NW	51.25%	North	79.50%
NE	28.25%	South	20.50%
SW	7.75%		
SE	12.75%		

Key

Site Location

Access B : Mersea Road Access/Diversion

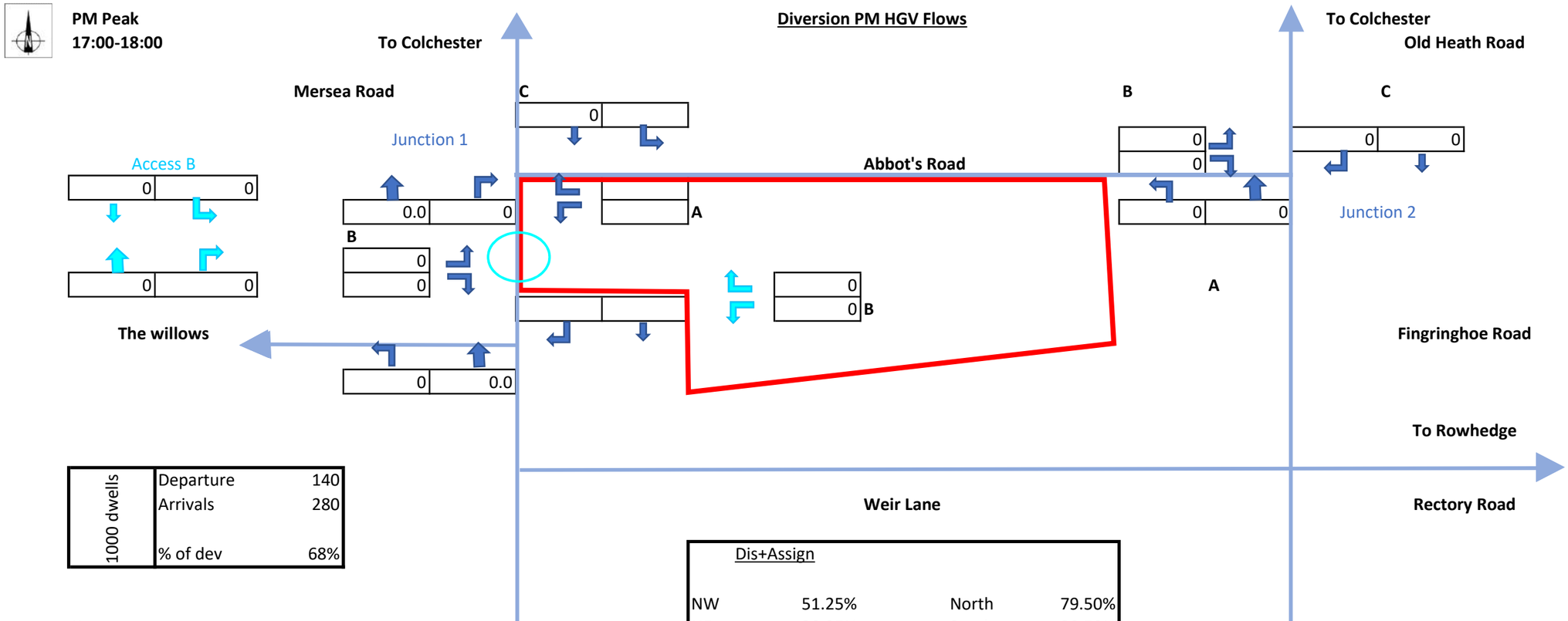
	A	B	C
A	-	151	0
B	76	-	20
C	0	39	-

Junction 1: Mersea Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	76
C	0	151	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Access B : Mersea Road Access/Diversion

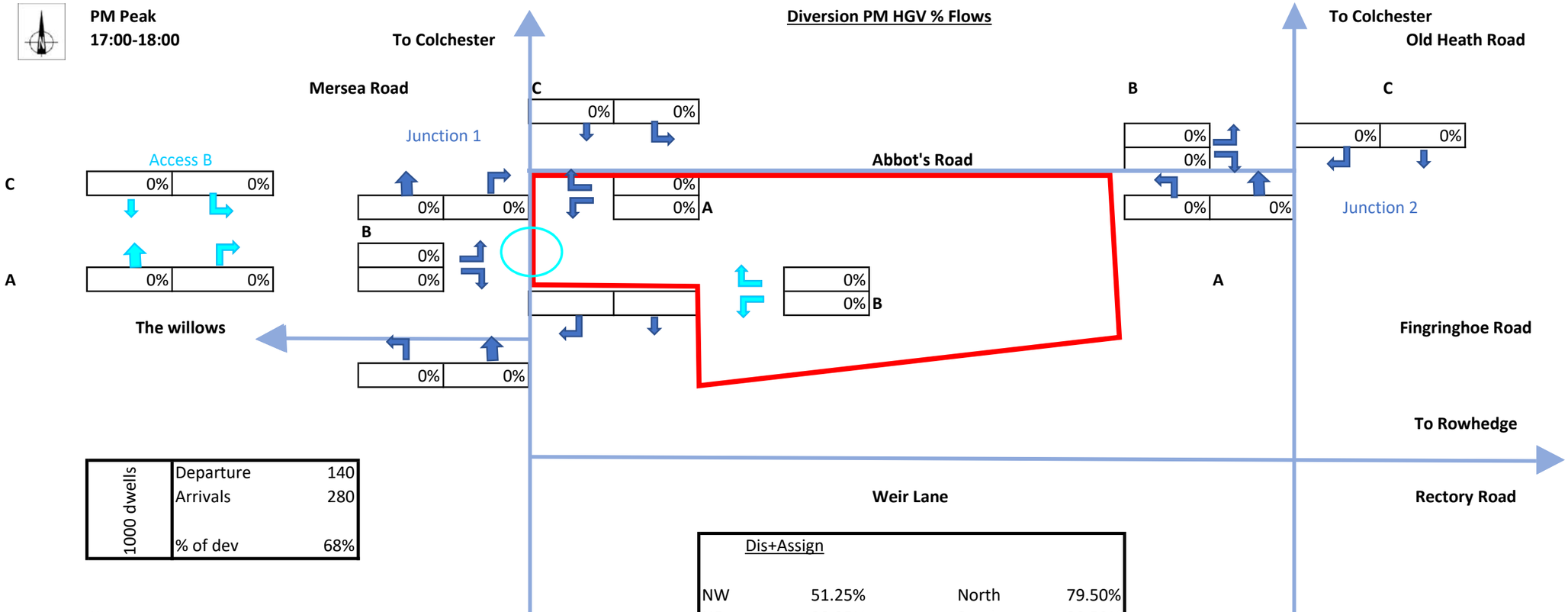
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



1000 dwells		
	Departure	140
	Arrivals	280
	% of dev	68%

Key

Site Location

Dis+Assign			
NW	51.25%	North	79.50%
NE	28.25%	South	20.50%
SW	7.75%		
SE	12.75%		

Access B : Mersea Road Access/Diversion

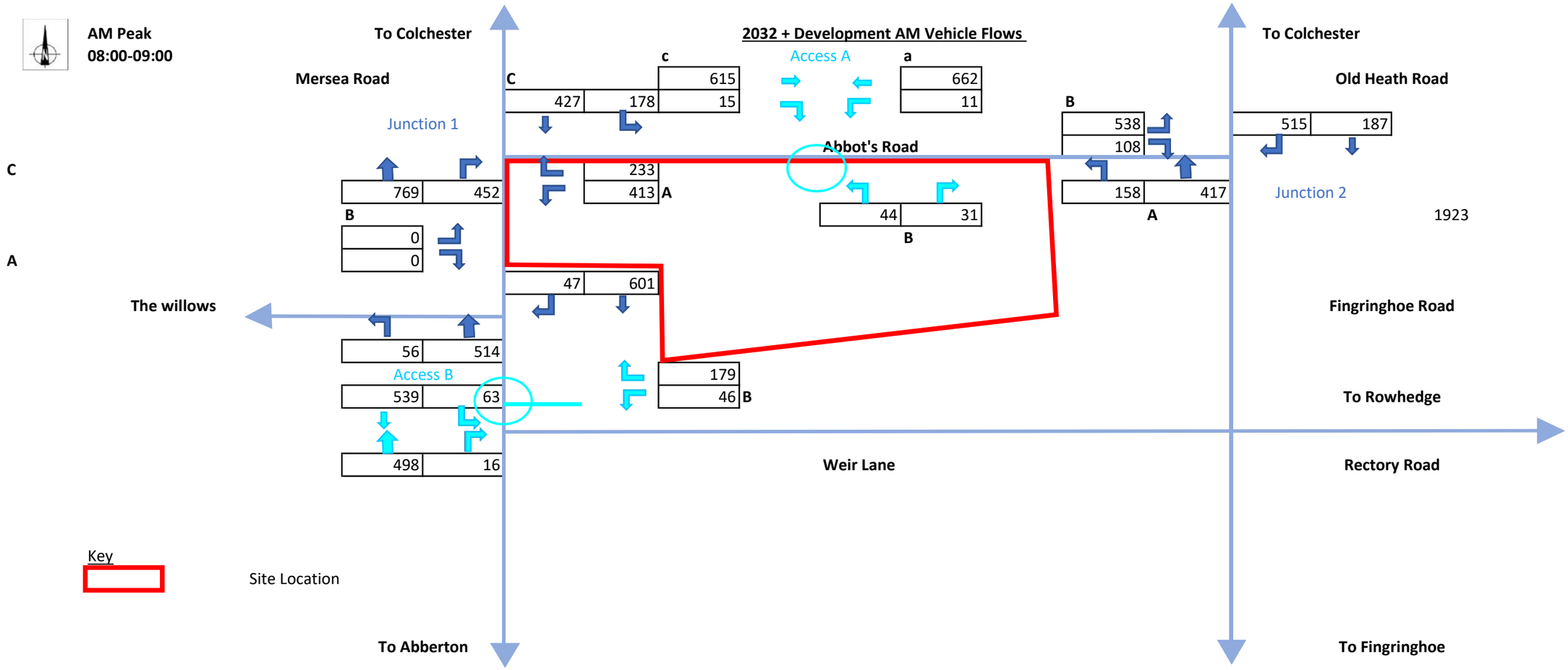
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Access B : Mersea Road Access/Diversion

	A	B	C
A	-	63	539
B	179	-	46
C	498	16	-

Junction 1: Mersea Road / Abbot's Road

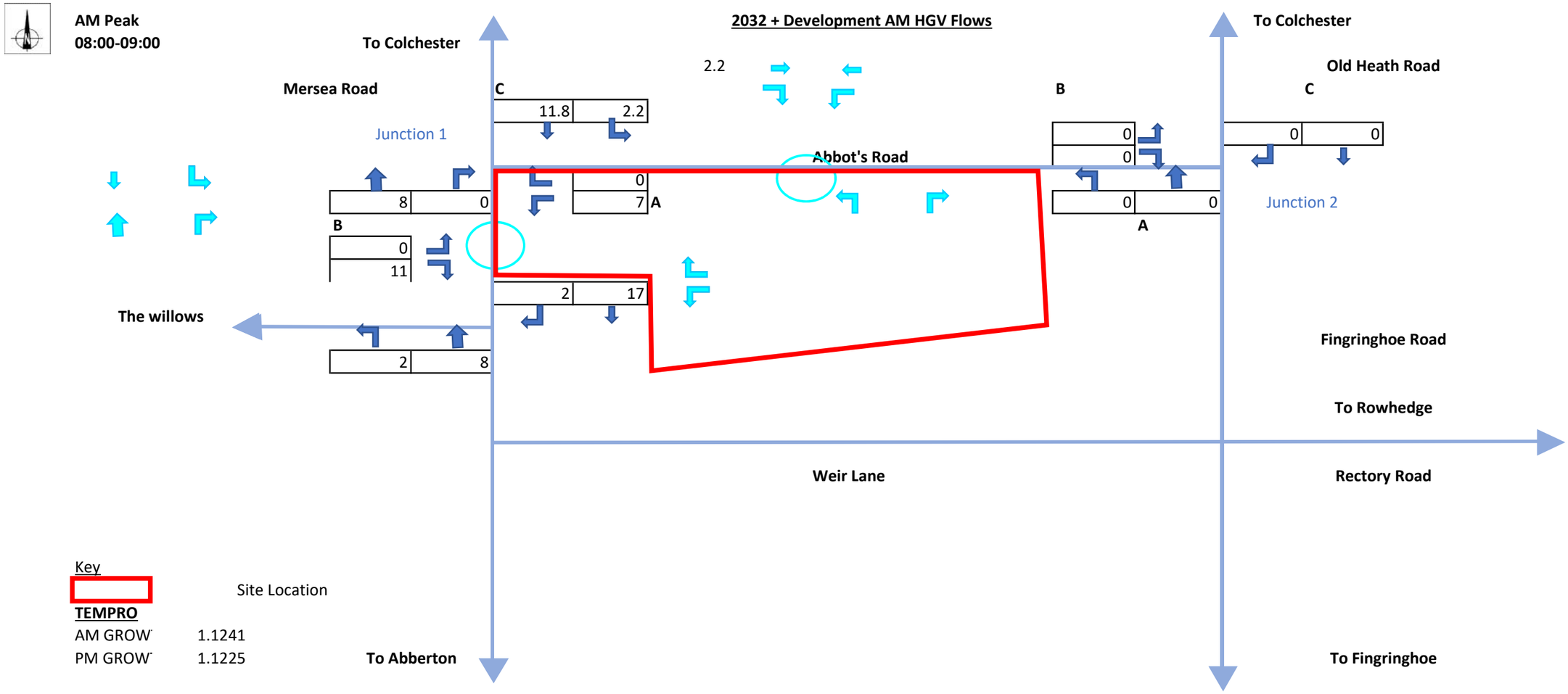
	A	B	C
A	-	413	233
B	452	-	769
C	178	427	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	158	417
B	108	-	538
C	187	515	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	11	662
B	31	-	44
C	615	15	-



Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	8	-

Junction 1: Mersea Road / Abbot's Road

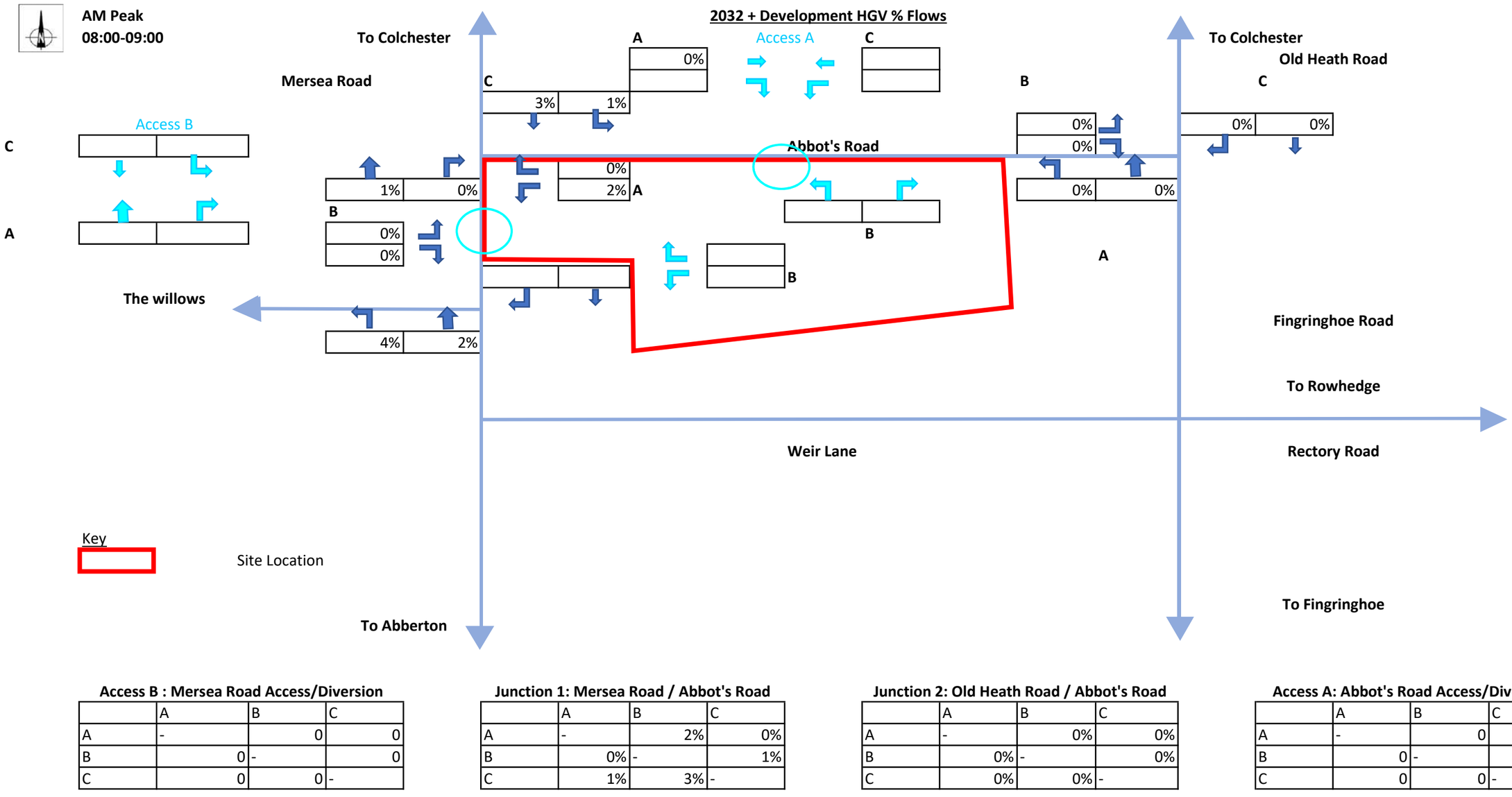
	A	B	C
A	-	7	0
B	0	-	8
C	2	12	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

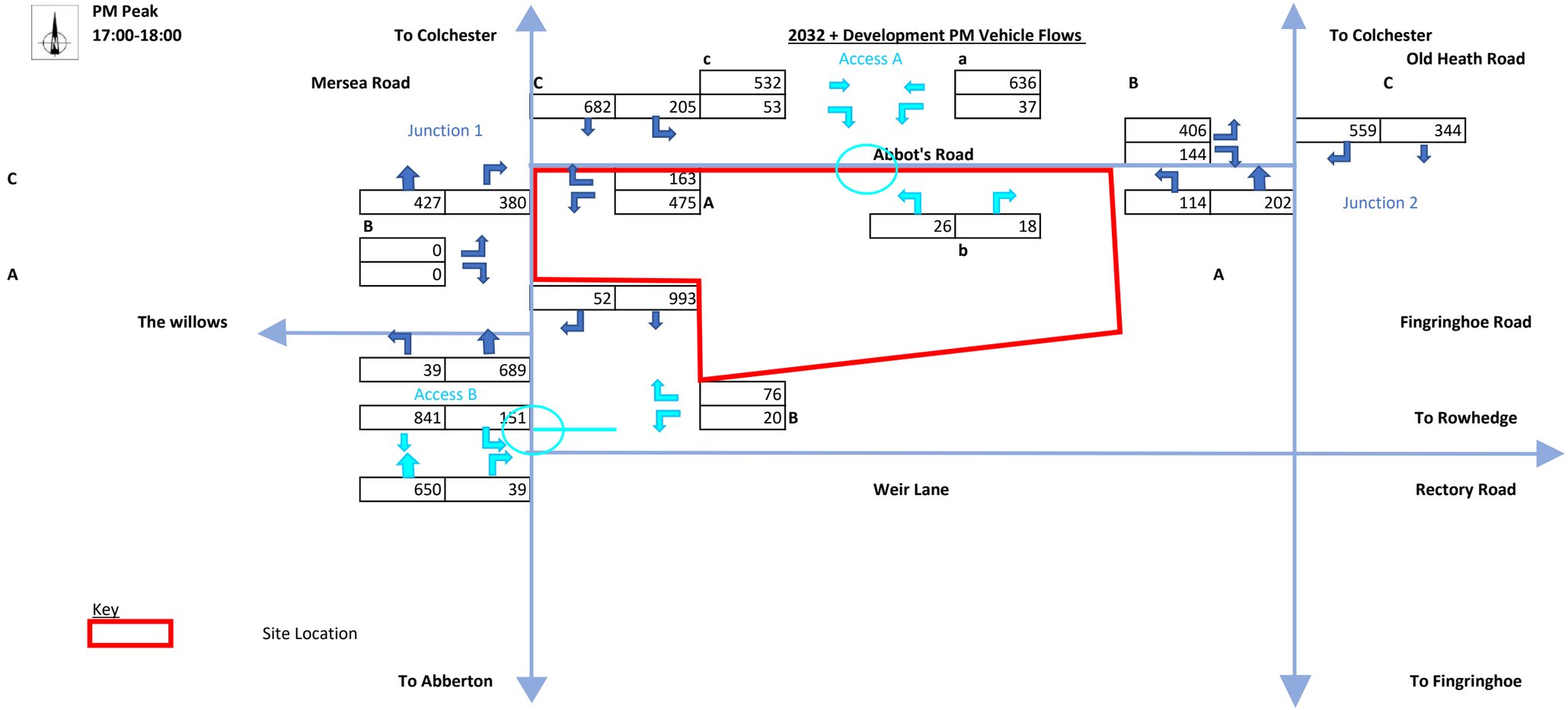
	A	B	C
A	-	2%	0%
B	0%	-	1%
C	1%	3%	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0%	0%
B	0%	-	0%
C	0%	0%	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Access B : Mersea Road Access/Diversion

	A	B	C
A	-	151	841
B	76	-	20
C	650	39	-

Junction 1: Mersea Road / Abbot's Road

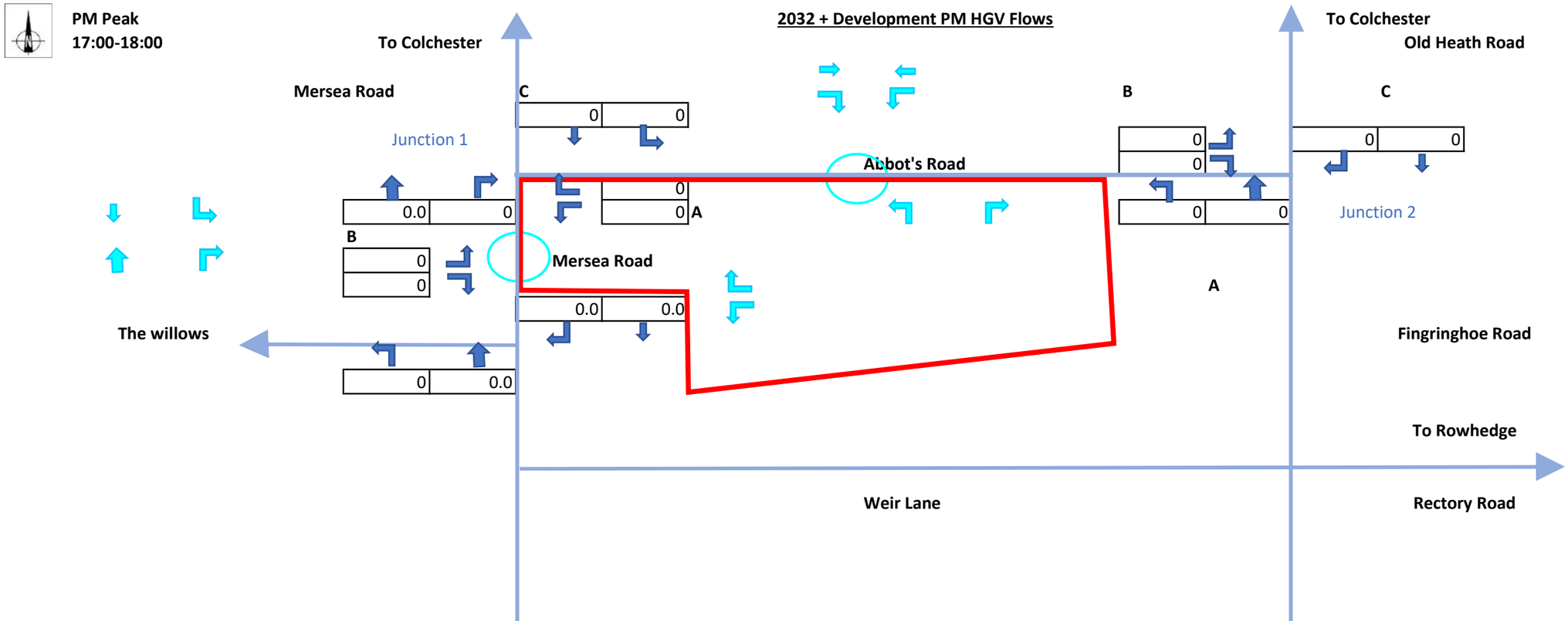
	A	B	C
A	-	475	163
B	380	-	427
C	205	682	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	114	202
B	144	-	406
C	344	559	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	37	636
B	18	-	26
C	532	53	-



Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

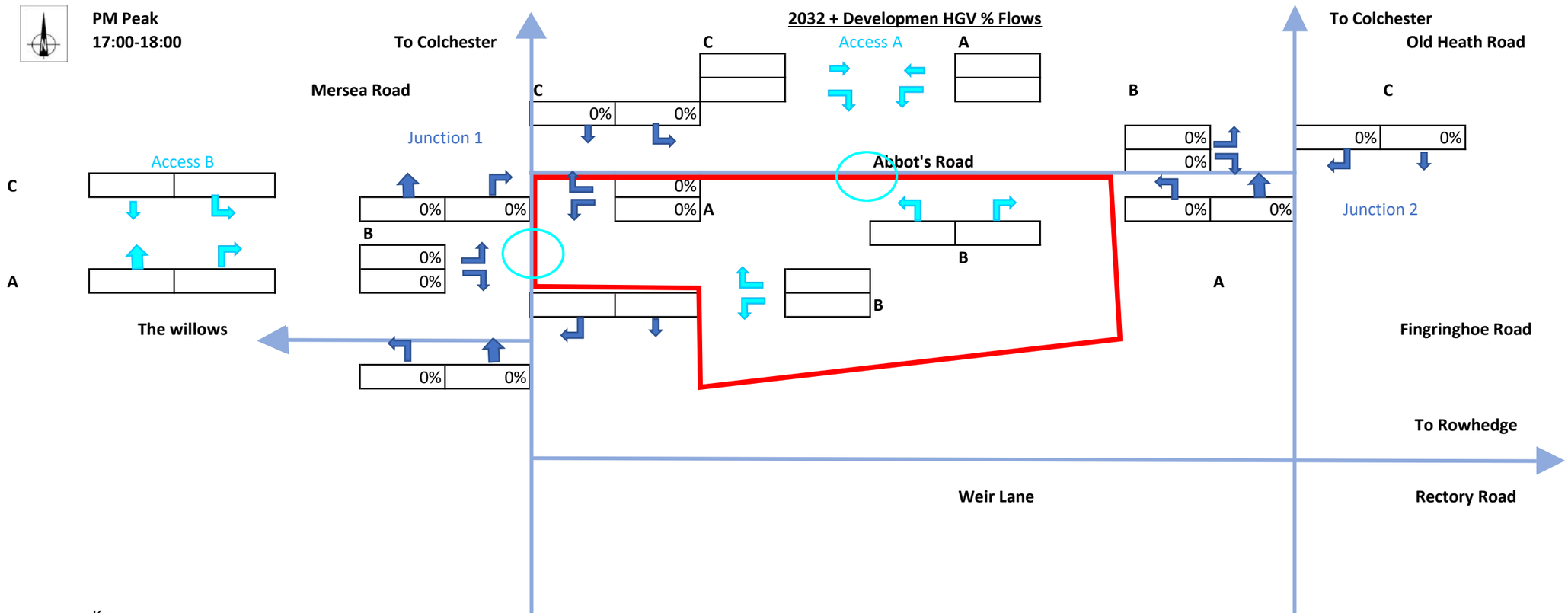
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Key

Site Location

To Abberton

To Fingringhoe

Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

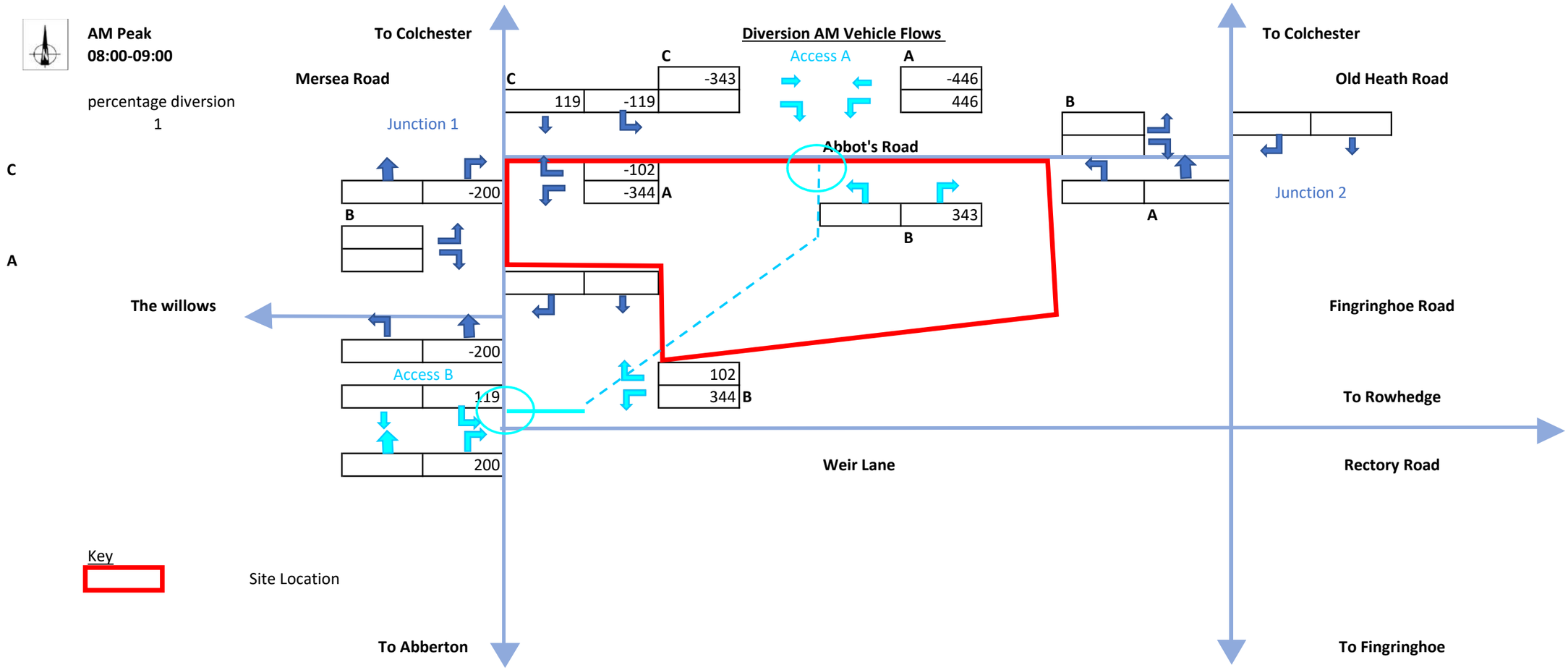
	A	B	C
A	-	0%	0%
B	0%	-	0%
C	0%	0%	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0%	0%
B	0%	-	0%
C	0%	0%	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Access B : Mersea Road Access/Diversion

	A	B	C
A	-	119	0
B	0	-	102
C	0	-200	-

Junction 1: Mersea Road / Abbot's Road

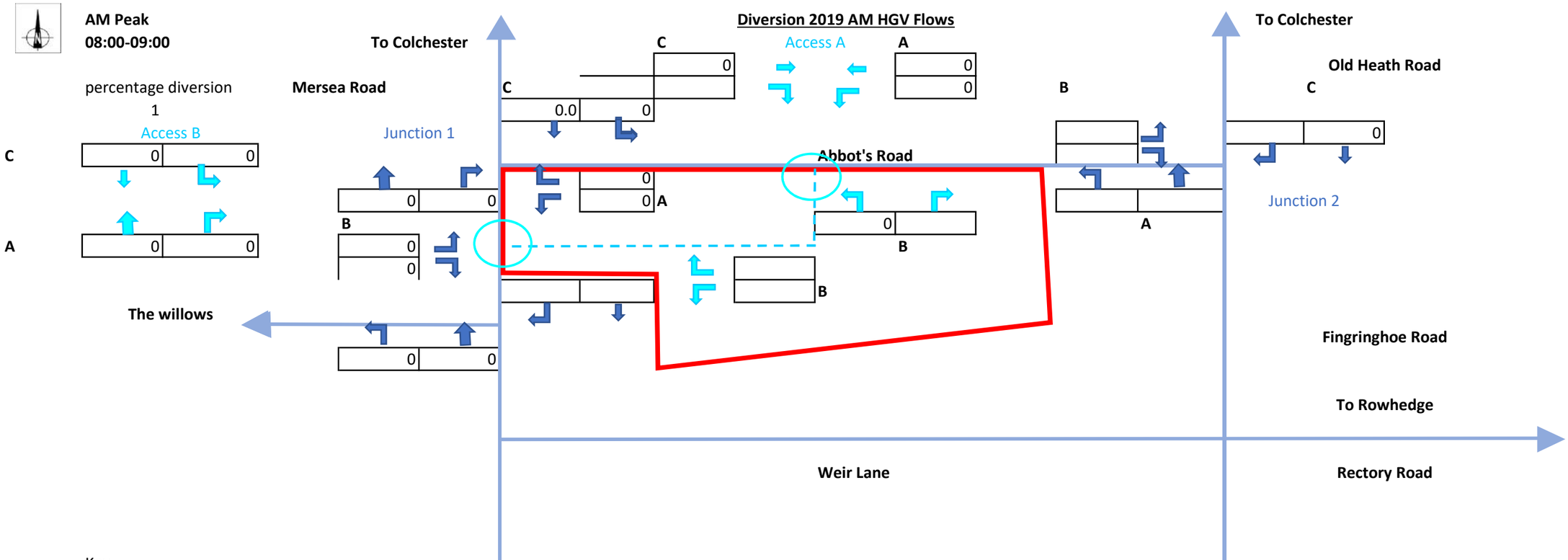
	A	B	C
A	-	-344	-102
B	-200	-	0
C	-119	119	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	446	-446
B	343	-	0
C	-343	0	-



Key

Site Location

Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

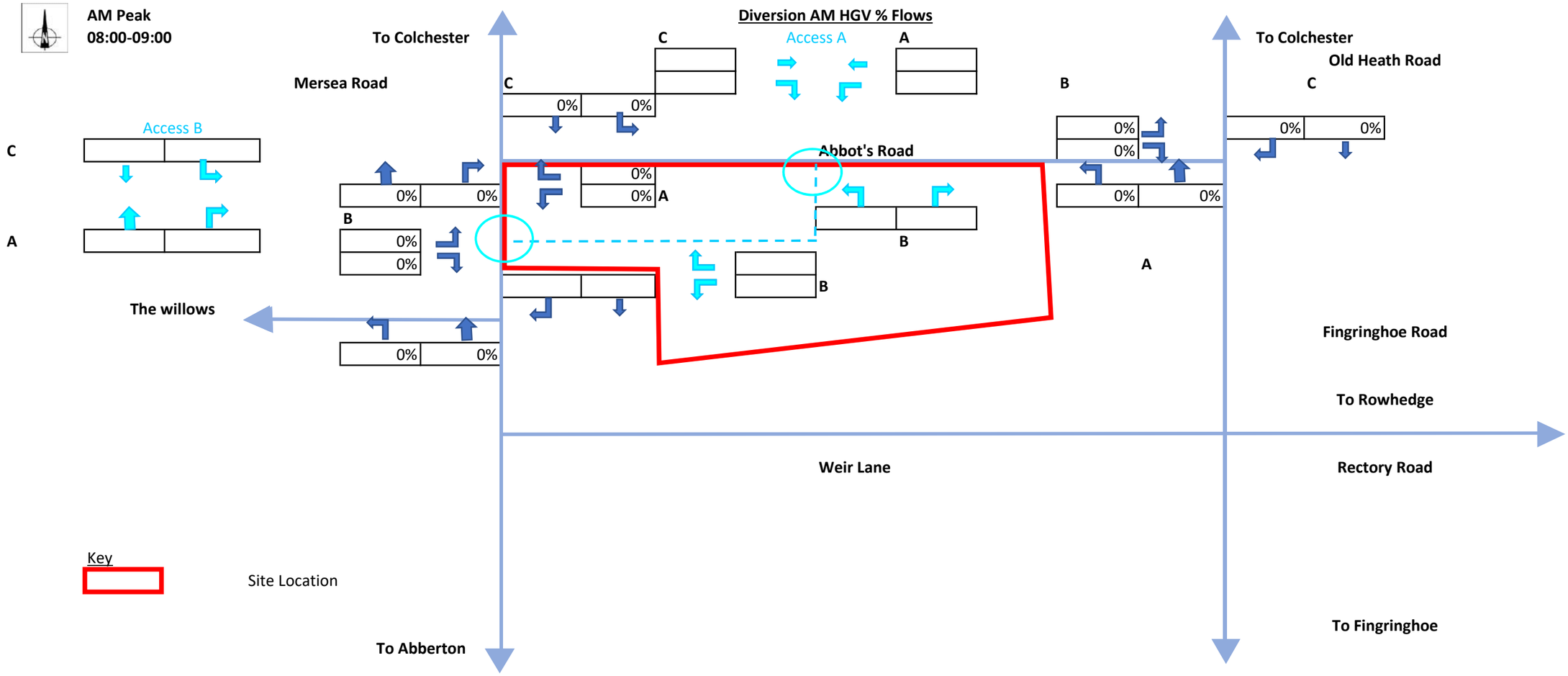
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

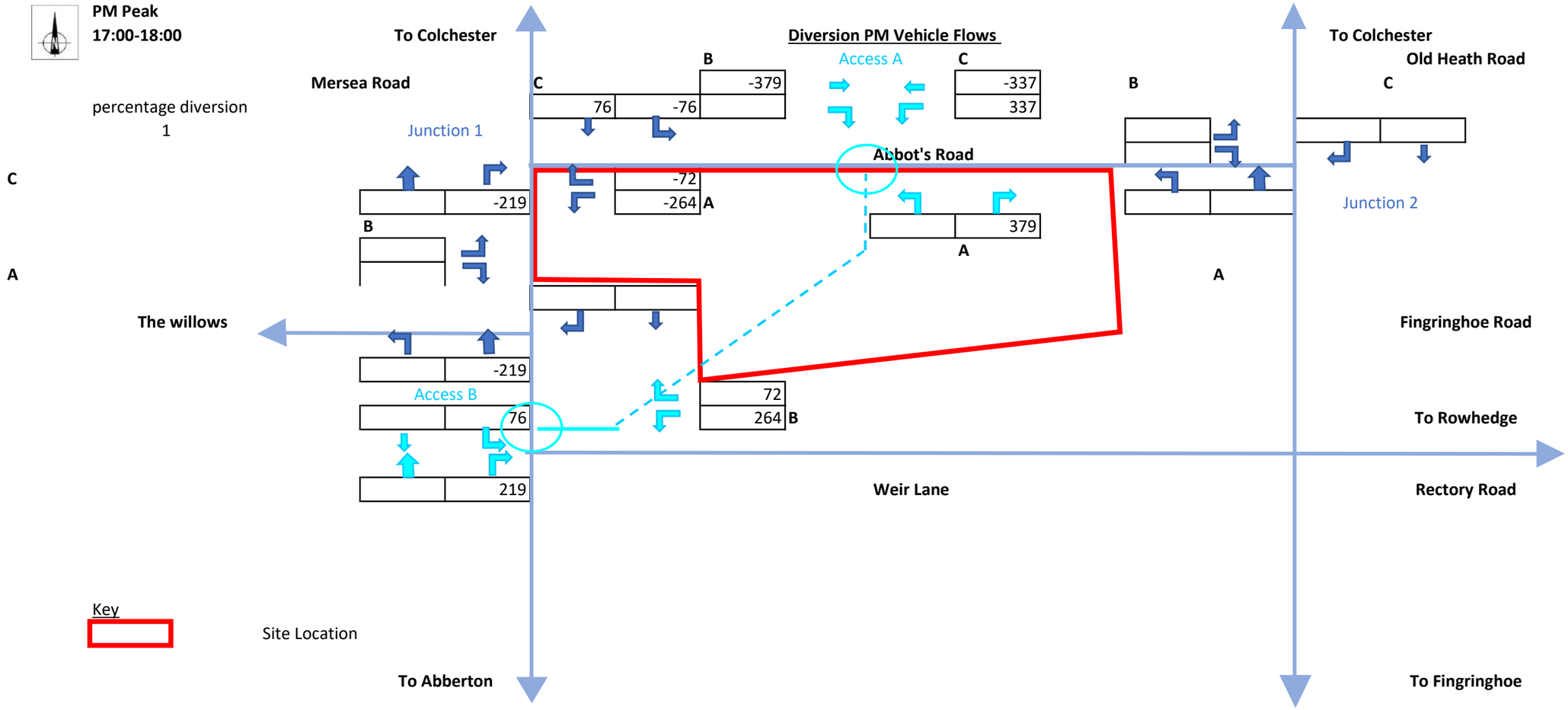
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Key

Site Location

Access B : Mersea Road Access/Diversion

	A	B	C
A	-	76	0
B	0	-	72
C	0	219	-

Junction 1: Mersea Road / Abbot's Road

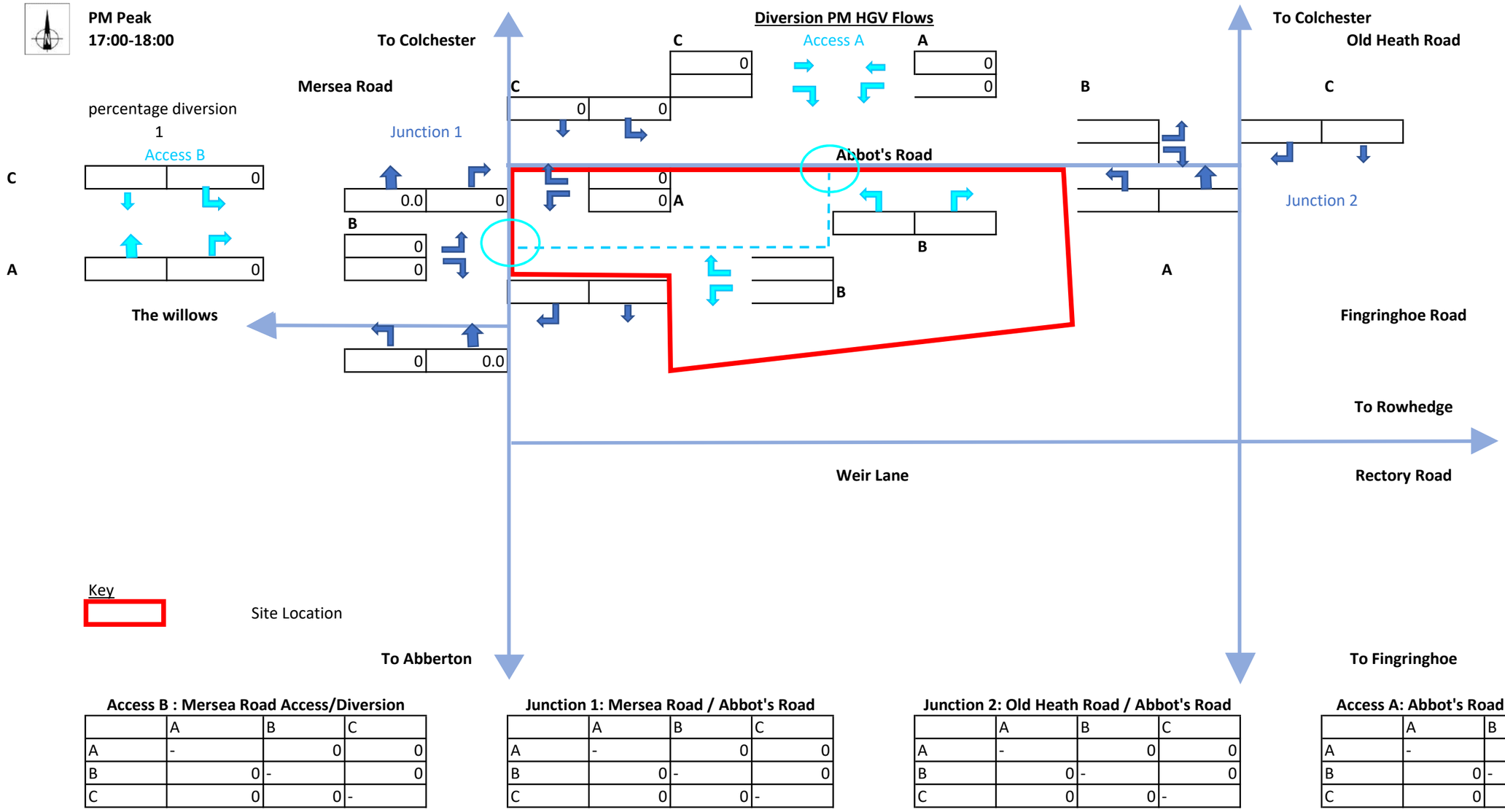
	A	B	C
A	-	-264	-72
B	-219	-	0
C	-76	76	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	337	-337
B	379	-	0
C	-379	0	-



Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

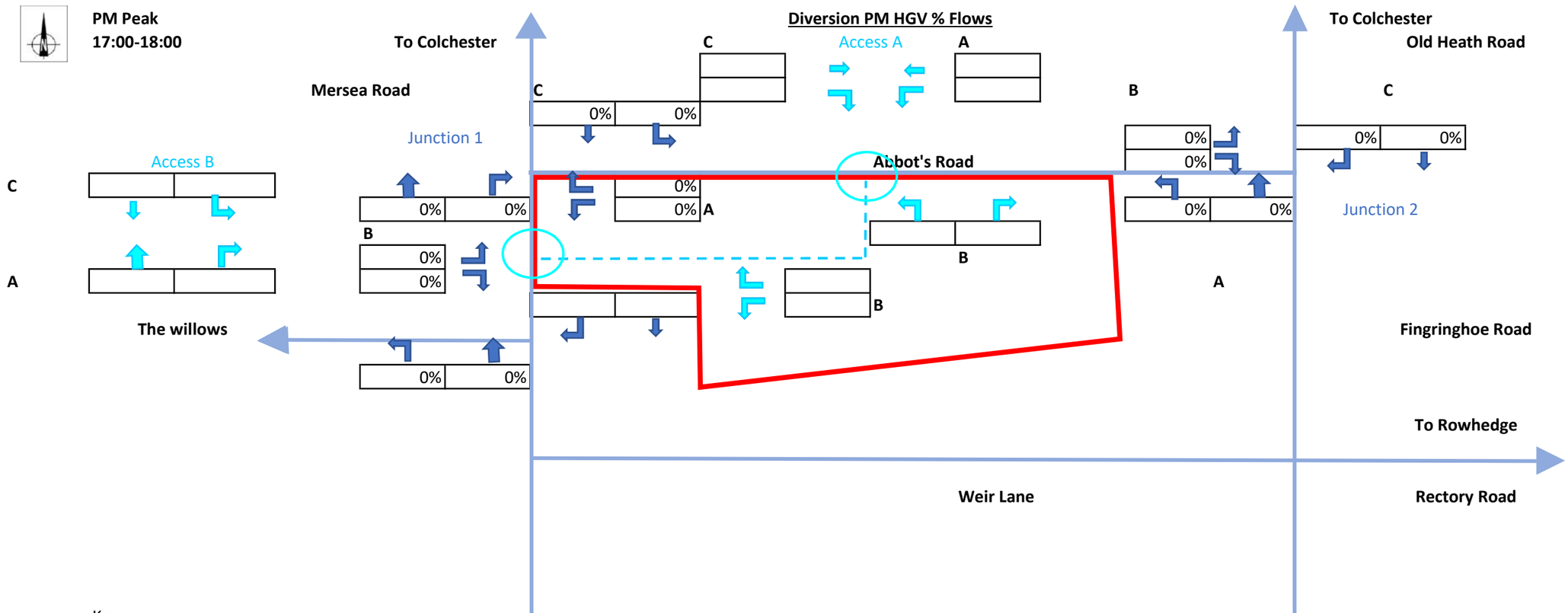
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Key

Site Location

To Abberton

To Fingringhoe

Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

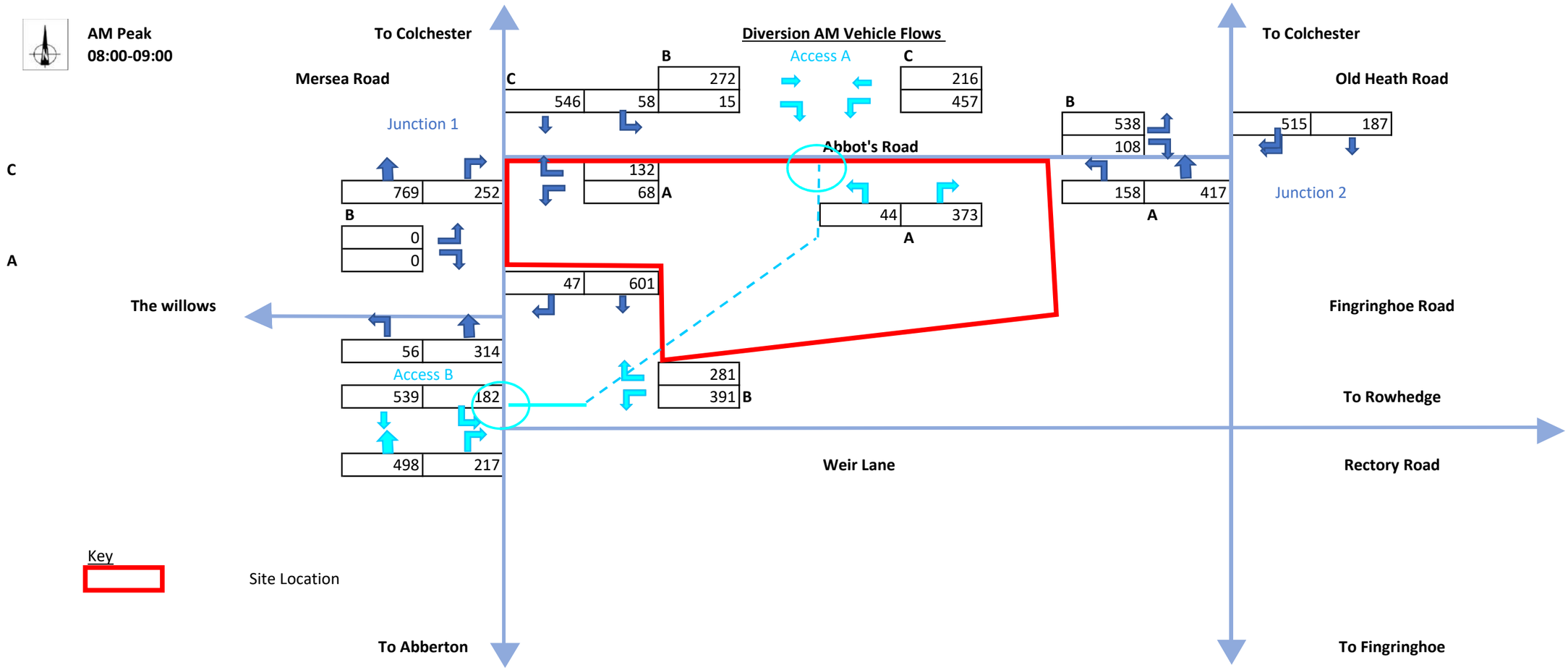
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Access B : Mersea Road Access/Diversion

	A	B	C
A	-	182	539
B	281	-	391
C	498	314	-

Junction 1: Mersea Road / Abbot's Road

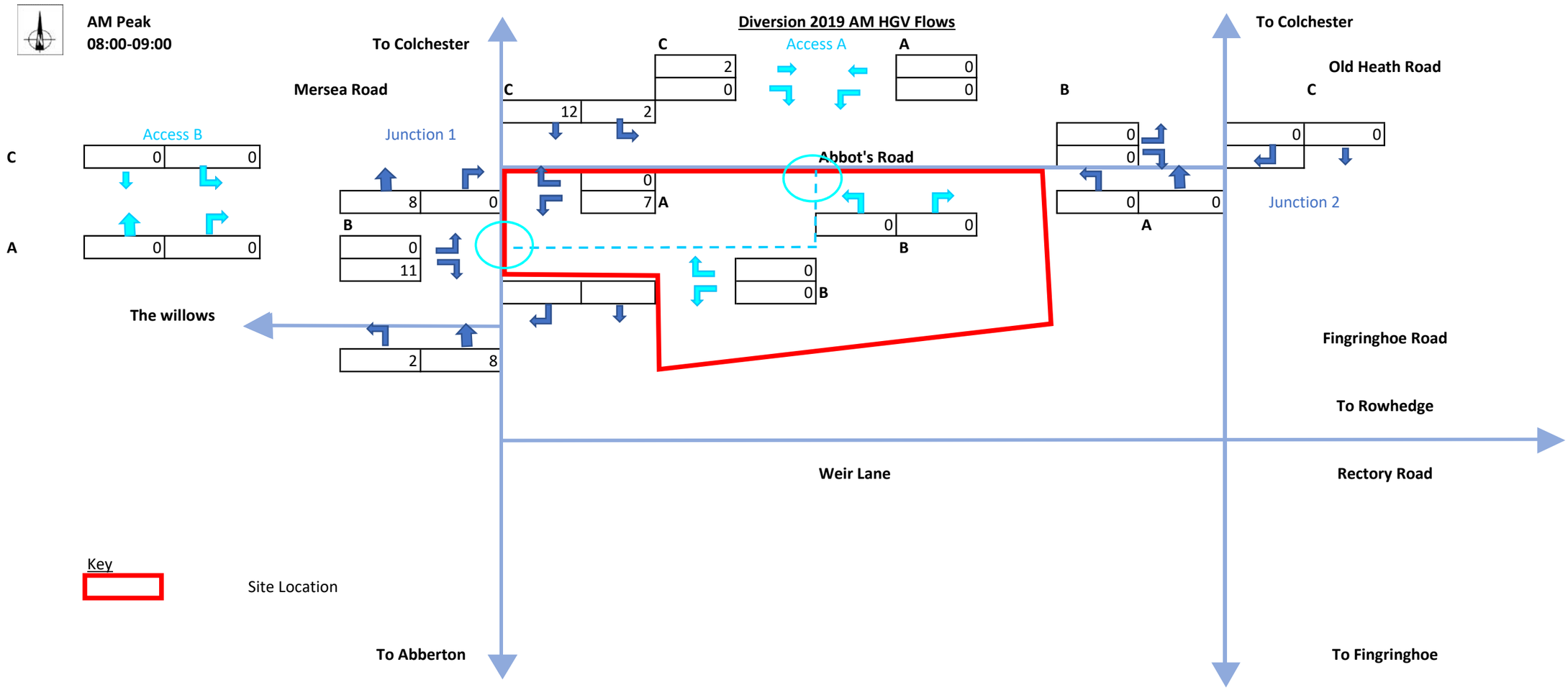
	A	B	C
A	-	68	132
B	252	-	769
C	58	546	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	158	417
B	108	-	538
C	187	515	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	44	373
B	15	-	272
C	457	216	-



Key

Site Location

Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	8	-

Junction 1: Mersea Road / Abbot's Road

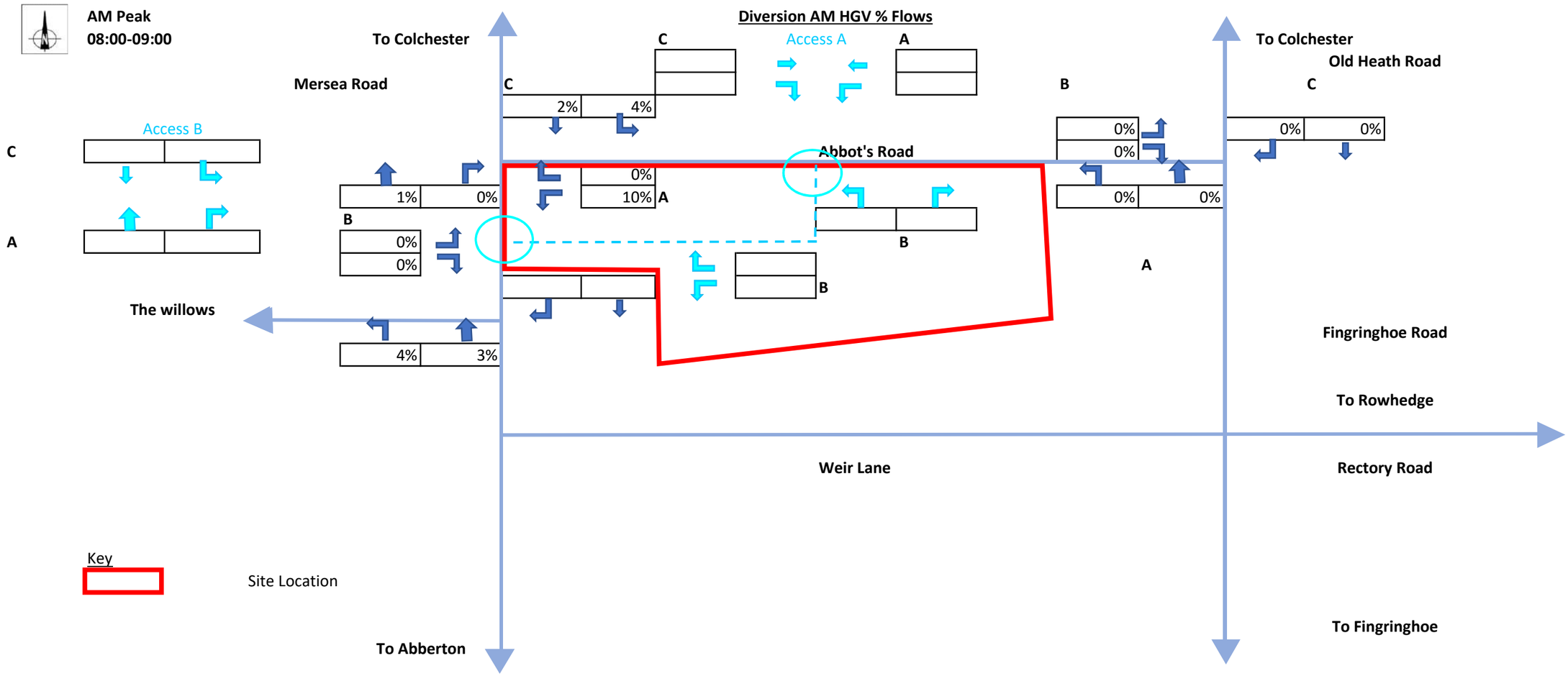
	A	B	C
A	-	7	0
B	0	-	8
C	2	12	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

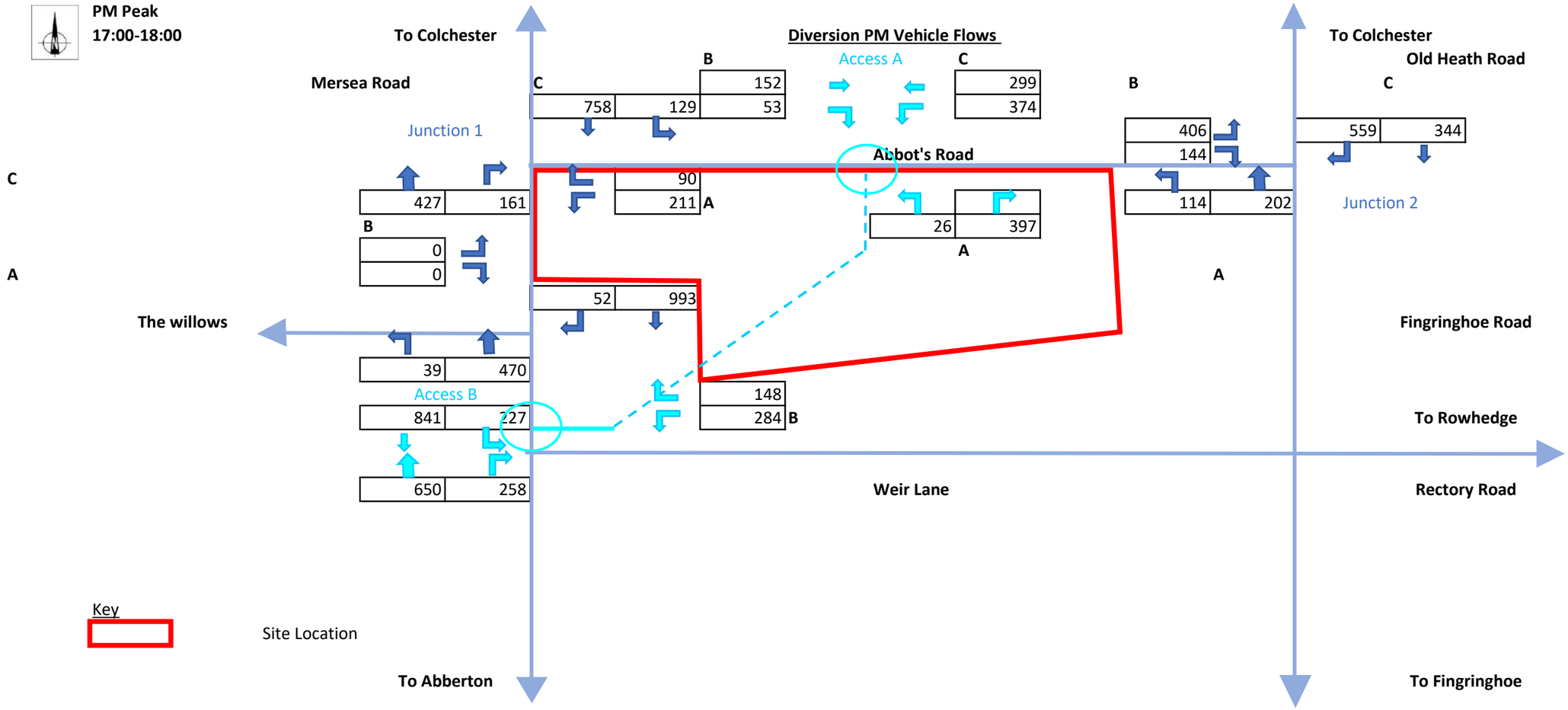
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Access B : Mersea Road Access/Diversion

	A	B	C
A	-	227	841
B	148	-	284
C	650	258	-

Junction 1: Mersea Road / Abbot's Road

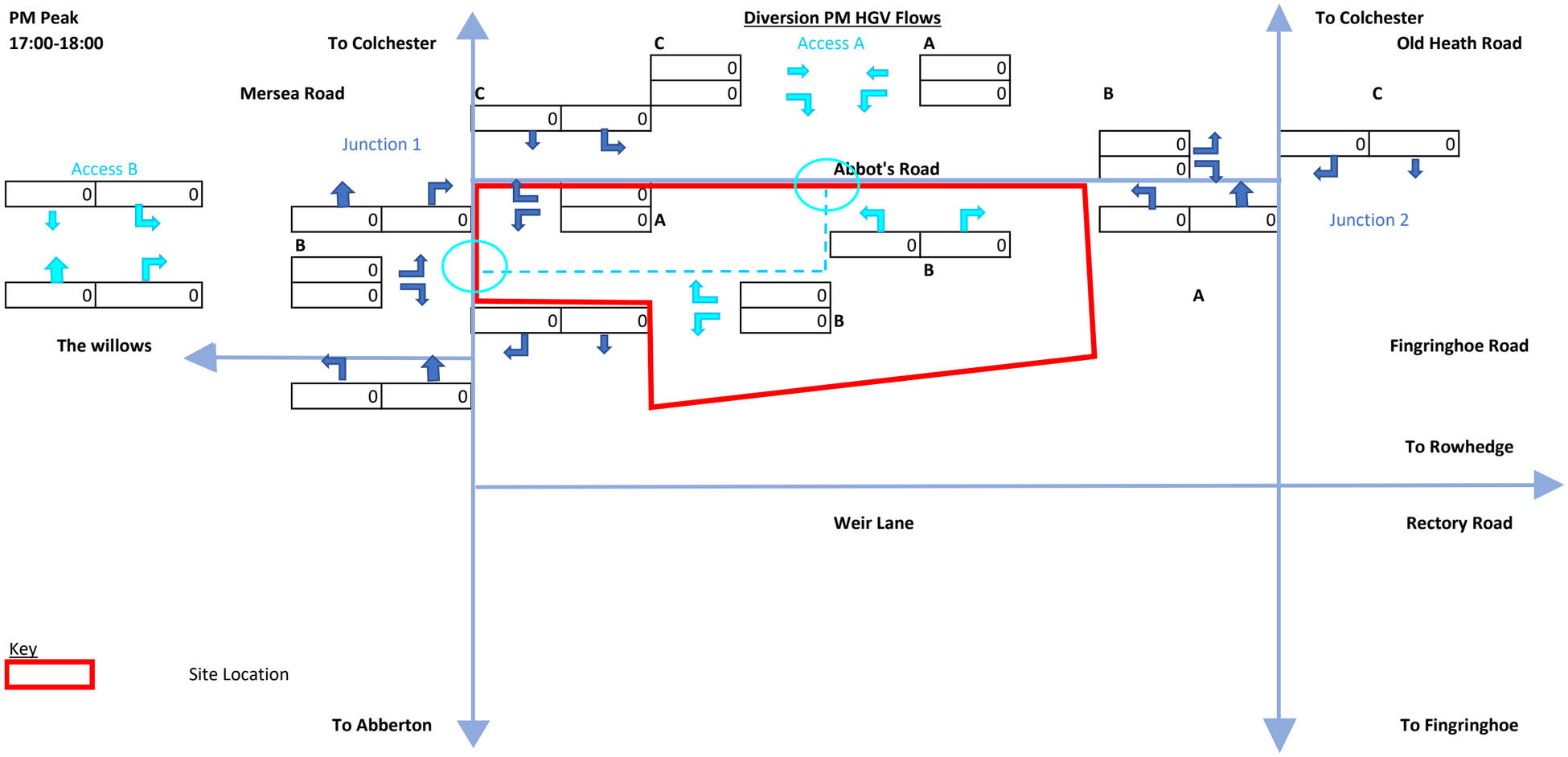
	A	B	C
A	-	211	90
B	161	-	427
C	129	758	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	114	202
B	144	-	406
C	344	559	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	26	397
B	53	-	152
C	374	299	-



Key

Site Location

Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

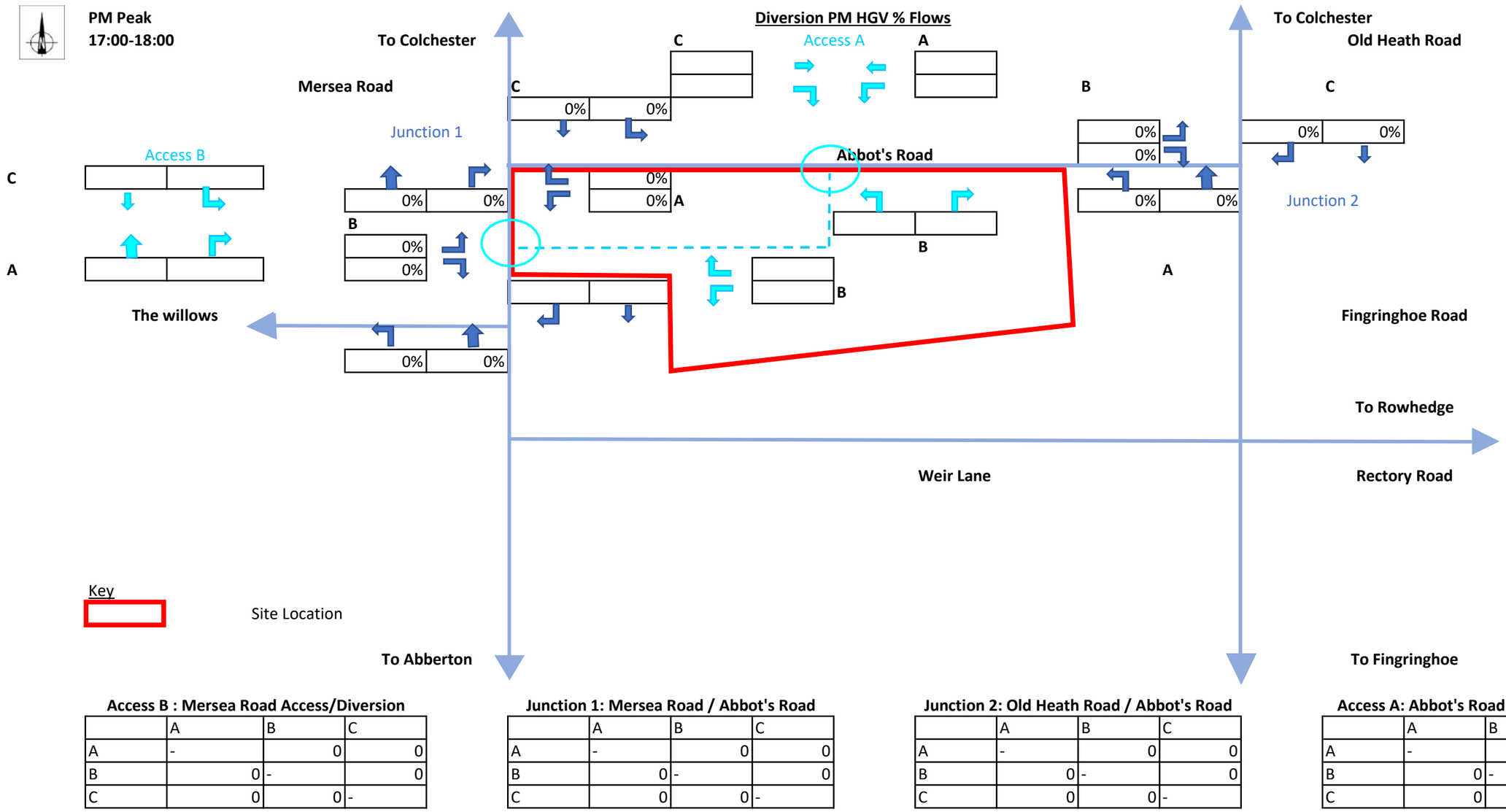
	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-



Key

Site Location

Access B : Mersea Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 1: Mersea Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Junction 2: Old Heath Road / Abbot's Road

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Access A: Abbot's Road Access/Diversion

	A	B	C
A	-	0	0
B	0	-	0
C	0	0	-

Appendix F JUNCTION CAPACITY ASSESSMENT FILES

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.0.6896

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: Abbots Road West Mini Roundabout.j9
Path: J:\40472 - Middlewick Training Area, Colchester\Technical\Calcs\Transport\Junction Assessments\1. Abbots Road-Mersea Road Mini
Report generation date: 18/02/2020 11:29:54

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2019 Base							
Arm 1	6.6	42.97	0.89	E	18.7	112.57	1.01	F
Arm 2	104.2	434.33	1.22	F	4.2	22.35	0.82	C
Arm 3	1.5	9.96	0.59	A	3.0	16.09	0.75	C
	2032 Base							
Arm 1	24.4	128.59	1.03	F	63.5	343.02	1.20	F
Arm 2	216.7	872.11	1.38	F	8.8	42.27	0.92	E
Arm 3	2.0	12.02	0.66	B	5.9	29.46	0.87	D
	2032 Base + Dev 1							
Arm 1	59.9	293.44	1.17	F	123.1	803.08	1.36	F
Arm 2	454.0	1942.85	1.64	F	27.4	108.28	1.02	F
Arm 3	2.7	14.42	0.73	B	59.0	203.12	1.11	F
	2032 Base + Dev 2							
Arm 1	0.7	11.13	0.41	B	2.8	31.72	0.75	D
Arm 2	169.2	673.03	1.31	F	2.7	15.25	0.73	C
Arm 3	2.3	12.18	0.69	B	17.5	66.30	0.98	F

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

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

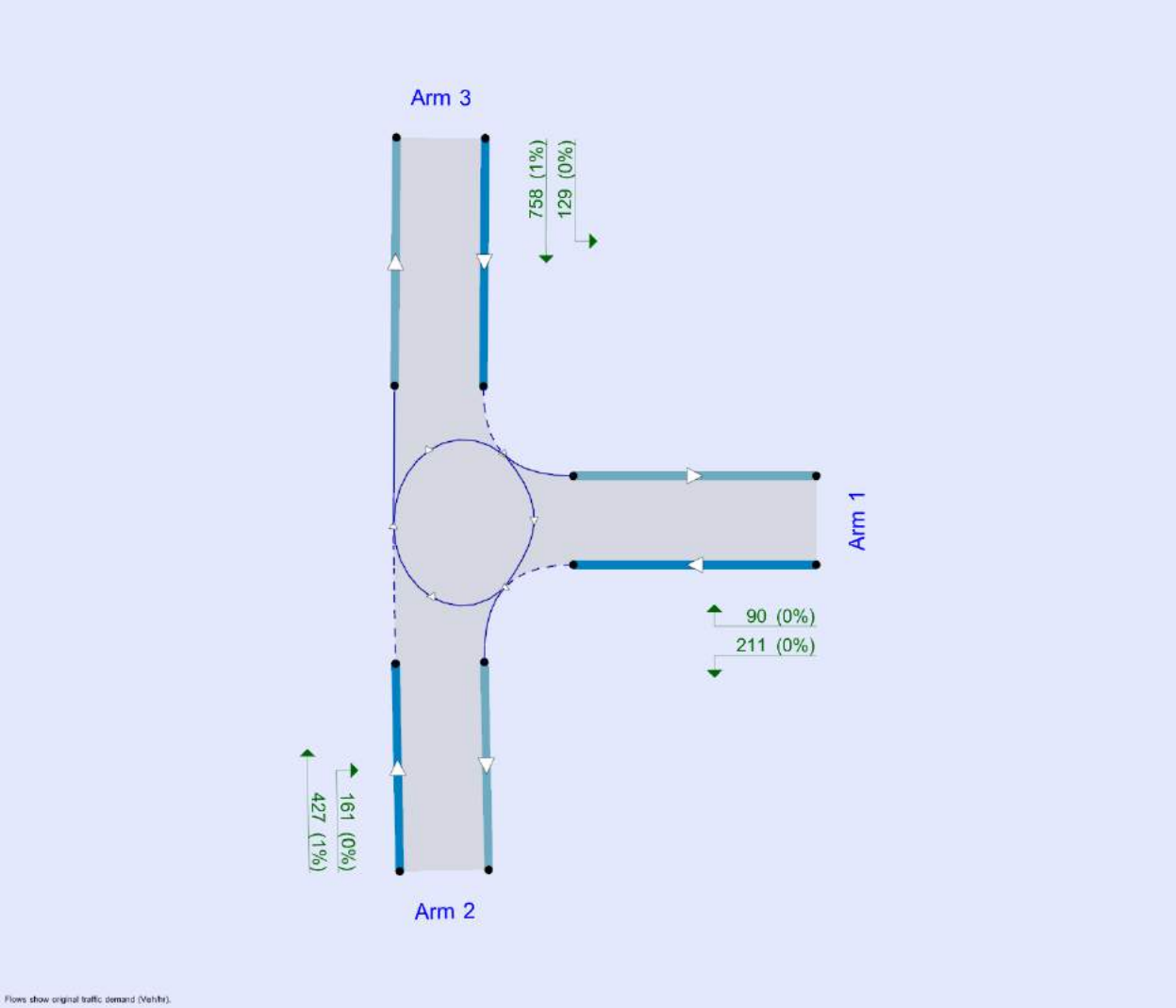
File summary

File Description

Title	Abbot's Road-Mersea Road Mini Roundabout
Location	Colchester
Site number	
Date	31/01/2020
Version	
Status	Existing
Identifier	
Client	DIO
Jobnumber	40472
Enumerator	CORP\othomas
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	Veh	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Mini-roundabout model	Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
JUNCTIONS 9			0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2019 Base	AM		ONE HOUR	08:00	09:30	15
D2	2019 Base	PM		ONE HOUR	08:00	09:30	15
D3	2032 Base	AM		ONE HOUR	08:00	09:30	15
D4	2032 Base	PM		ONE HOUR	08:00	09:30	15
D5	2032 Base + Dev 1	AM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15
D6	2032 Base + Dev 1	PM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15
D7	2032 Base + Dev 2	AM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

D8	2032 Base + Dev 2	PM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2019 Base, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	221.28	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Arms

Arms

Arm	Name	Description
1	Abbots Road	
2	Mersea Road South	
3	Mersea Road North	

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1	3.35	3.35	3.46	1.0	10.83	6.30	0.0	✓
2	3.30	3.30	3.42	1.0	13.57	14.30	0.0	✓
3	4.00	4.00	5.00	5.0	10.80	7.00	0.0	✓

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.496	852
2	0.511	939
3	0.541	1101

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2019 Base	AM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	535	100.000
2		✓	926	100.000
3		✓	470	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	362	173
	2	401	0	525
	3	146	324	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	1	0
	2	0	0	1
	3	1	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.89	42.97	6.6	E
2	1.22	434.33	104.2	F
3	0.59	9.96	1.5	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	406	252	727	0.557	401	1.2	10.931	B
2	701	129	873	0.803	686	3.7	18.148	C
3	365	296	942	0.387	362	0.6	6.375	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	484	302	703	0.689	481	2.1	16.072	C
2	837	154	860	0.973	804	11.9	47.469	E
3	435	346	914	0.476	434	0.9	7.714	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	593	370	669	0.886	578	5.9	35.093	E
2	1025	186	844	1.214	840	58.3	163.577	F
3	533	362	906	0.589	531	1.4	9.848	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	593	371	668	0.887	590	6.6	42.974	E
2	1025	190	842	1.217	842	104.2	355.076	F
3	533	362	905	0.589	533	1.5	9.959	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	484	304	701	0.690	501	2.4	19.417	C
2	837	161	857	0.977	849	101.3	434.328	F
3	435	365	904	0.482	437	1.0	7.989	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	406	254	726	0.558	410	1.3	11.601	B
2	701	132	872	0.804	863	60.8	339.926	F
3	365	372	900	0.405	366	0.7	6.952	A

2019 Base , PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	47.33	E

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2019 Base	PM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	544	100.000
2		✓	645	100.000
3		✓	613	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	420	124
	2	332	0	313
	3	141	472	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	1
	3	0	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	1.01	112.57	18.7	F
2	0.82	22.35	4.2	C
3	0.75	16.09	3.0	C

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	410	356	676	0.606	404	1.5	12.962	B
2	488	92	892	0.547	483	1.2	8.748	A
3	465	248	968	0.481	461	0.9	7.116	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	489	427	641	0.763	483	2.9	22.065	C
2	583	110	883	0.660	580	1.9	11.827	B
3	555	297	941	0.590	553	1.4	9.312	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	599	520	594	1.008	559	12.8	67.666	F
2	714	128	874	0.816	705	4.0	20.438	C
3	680	361	906	0.751	674	2.8	15.282	C

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	599	525	592	1.011	575	18.7	112.569	F
2	714	131	872	0.818	713	4.2	22.352	C
3	680	365	904	0.752	680	3.0	16.091	C

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	489	433	638	0.767	549	3.8	53.647	F
2	583	125	875	0.666	591	2.1	13.101	B
3	555	303	938	0.592	561	1.5	9.778	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	410	361	674	0.608	418	1.6	14.545	B
2	488	95	890	0.548	491	1.2	9.138	A
3	465	252	965	0.482	467	1.0	7.313	A

2032 Base , AM

Data Errors and Warnings
No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	453.80	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2032 Base	AM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	602	100.000
2		✓	1040	100.000
3		✓	528	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	407	195
	2	450	0	590
	3	164	364	0

Vehicle Mix

Heavy Vehicle Percentages

From	To			
		1	2	3
	1	0	1	0
	2	0	0	1
	3	1	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	1.03	128.59	24.4	F
2	1.38	872.11	216.7	F
3	0.66	12.02	2.0	B

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	456	283	712	0.641	449	1.7	13.466	B
2	787	145	865	0.910	759	7.2	28.883	D
3	410	326	925	0.443	406	0.8	7.113	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	545	339	684	0.796	538	3.5	23.630	C
2	940	173	851	1.105	837	32.9	101.069	F
3	489	360	907	0.540	488	1.2	8.824	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	667	415	647	1.032	617	16.0	73.677	F
2	1152	199	838	1.375	837	111.6	320.802	F
3	599	360	907	0.661	596	1.9	11.829	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	667	417	646	1.033	634	24.4	128.589	F
2	1152	204	835	1.379	835	190.8	658.424	F
3	599	359	907	0.660	599	2.0	12.025	B

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	545	342	683	0.798	623	4.9	74.953	F
2	940	200	837	1.124	837	216.7	870.124	F
3	489	360	907	0.539	492	1.2	9.010	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	456	286	711	0.642	468	1.9	15.634	C
2	787	151	862	0.913	858	199.0	872.113	F
3	410	369	902	0.454	411	0.9	7.586	A

2032 Base , PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	128.39	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2032 Base	PM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	612	100.000
2		✓	724	100.000
3		✓	689	100.000

Origin-Destination Data

Demand (Veh/hr)

From	To			
		1	2	3
	1	0	472	140
	2	373	0	351
	3	159	530	0

Vehicle Mix

Heavy Vehicle Percentages

From	To			
		1	2	3
	1	0	0	0
	2	0	0	1
	3	0	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	1.20	343.02	63.5	F
2	0.92	42.27	8.8	E
3	0.87	29.46	5.9	D

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	461	399	654	0.704	452	2.2	17.101	C
2	548	103	886	0.618	541	1.6	10.310	B
3	523	278	951	0.549	518	1.2	8.281	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	550	479	615	0.895	535	6.0	38.994	E
2	654	122	877	0.746	649	2.8	15.573	C
3	624	333	921	0.677	621	2.0	11.932	B

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service

1	674	579	565	1.192	558	35.0	150.566	F
2	801	128	874	0.917	782	7.6	33.538	D
3	764	401	885	0.864	751	5.3	24.993	C

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	674	588	561	1.201	560	63.5	324.180	F
2	801	128	874	0.917	796	8.8	42.265	E
3	764	408	881	0.868	762	5.9	29.456	D

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	550	492	608	0.905	599	51.4	343.017	F
2	654	137	869	0.752	676	3.3	20.497	C
3	624	347	914	0.683	639	2.3	13.809	B

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	461	406	651	0.708	639	6.9	172.606	F
2	548	146	865	0.634	554	1.8	11.847	B
3	523	284	948	0.551	527	1.3	8.692	A

2032 Base + Dev 1 , AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	1035.41	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2032 Base + Dev 1	AM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15

Vehicle mix source	PCU Factor for a HV (PCU)

HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	646	100.000
2		✓	1221	100.000
3		✓	605	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	413	233
	2	452	0	769
	3	178	427	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	1	0
	2	0	0	1
	3	1	3	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	1.17	293.44	59.9	F
2	1.64	1942.85	454.0	F
3	0.73	14.42	2.7	B

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	489	328	690	0.710	480	2.3	16.651	C
2	925	172	851	1.087	820	26.3	70.590	F

3	466	302	938	0.497	462	1.0	7.685	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	584	394	657	0.890	570	6.0	36.488	E
2	1105	204	835	1.323	834	94.0	270.961	F
3	557	307	936	0.595	555	1.5	9.635	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	716	481	614	1.166	605	33.7	135.315	F
2	1353	217	828	1.633	828	225.2	701.213	F
3	682	305	937	0.728	678	2.6	13.984	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	716	484	612	1.169	611	59.9	285.069	F
2	1353	219	827	1.635	827	356.6	1271.663	F
3	682	304	937	0.728	682	2.7	14.417	B

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	584	399	655	0.893	644	45.1	293.442	F
2	1105	231	821	1.345	821	427.4	1726.307	F
3	557	302	938	0.594	562	1.5	9.904	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	489	333	687	0.712	657	3.3	129.971	F
2	925	235	819	1.130	819	454.0	1942.849	F
3	466	301	939	0.497	468	1.0	7.878	A

2032 Base + Dev 1 , PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	333.64	F

Junction Network Options

Driving side	Lighting	Road surface	In London

Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2032 Base + Dev 1	PM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	638	100.000
2		✓	807	100.000
3		✓	887	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	475	163
	2	380	0	427
	3	205	682	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	1
	3	0	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	1.36	803.08	123.1	F
2	1.02	108.28	27.4	F
3	1.11	203.12	59.0	F

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	480	511	599	0.802	466	3.5	25.028	D
2	611	119	878	0.695	602	2.2	12.729	B
3	673	282	949	0.709	664	2.3	12.339	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	574	609	551	1.042	526	15.5	83.960	F
2	729	134	871	0.838	720	4.5	22.687	C
3	804	337	919	0.874	790	5.7	25.686	D

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	702	673	518	1.355	517	61.9	285.467	F
2	893	132	872	1.025	838	18.4	63.427	F
3	984	392	889	1.107	874	33.3	94.764	F

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	702	679	516	1.362	515	108.6	606.937	F
2	893	132	872	1.024	857	27.4	108.281	F
3	984	401	884	1.113	881	59.0	199.232	F

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	574	679	516	1.112	516	123.1	803.077	F
2	729	132	872	0.837	813	6.5	70.407	F
3	804	381	895	0.897	880	39.8	203.117	F

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	480	633	539	0.892	534	109.6	784.401	F
2	611	137	869	0.703	627	2.5	15.785	C
3	673	294	943	0.714	821	2.8	57.175	F

2032 Base + Dev 2 , AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 89% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	379.47	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D7	2032 Base + Dev 2	AM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	200	100.000
2		✓	1021	100.000
3		✓	604	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	68	132
	2	252	0	769
	3	58	546	0

Vehicle Mix

Heavy Vehicle Percentages

From	To			
		1	2	3
	1	0	1	0
	2	0	0	1
	3	1	3	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.41	11.13	0.7	B
2	1.31	673.03	169.2	F
3	0.69	12.18	2.3	B

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	151	420	644	0.235	150	0.3	7.292	A
2	774	99	889	0.871	752	5.6	23.694	C
3	467	184	1002	0.467	464	0.9	6.836	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	180	504	602	0.299	180	0.4	8.540	A
2	925	118	879	1.052	854	23.2	75.268	F
3	558	209	988	0.565	557	1.3	8.538	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	221	616	547	0.404	220	0.7	11.012	B
2	1133	145	865	1.309	864	90.4	247.436	F
3	684	212	987	0.693	680	2.2	11.910	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	221	619	545	0.405	221	0.7	11.125	B
2	1133	145	865	1.310	865	157.4	520.567	F
3	684	212	987	0.693	684	2.3	12.179	B

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	180	509	600	0.301	181	0.4	8.645	A
2	925	119	878	1.053	878	169.2	673.033	F
3	558	215	985	0.567	562	1.4	8.814	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	151	425	642	0.235	152	0.3	7.380	A
2	774	100	888	0.872	883	142.0	634.989	F
3	467	216	984	0.475	469	0.9	7.208	A

2032 Base + Dev 2 , PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 83% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	43.57	E

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D8	2032 Base + Dev 2	PM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	301	100.000
2		✓	588	100.000
3		✓	887	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	211	90
	2	161	0	427
	3	129	758	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	1
	3	0	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.75	31.72	2.8	D
2	0.73	15.25	2.7	C
3	0.98	66.30	17.5	F

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	227	570	570	0.398	224	0.6	10.341	B
2	446	67	905	0.493	442	1.0	7.770	A
3	673	120	1036	0.650	666	1.8	9.629	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	271	683	514	0.527	269	1.1	14.587	B
2	532	80	898	0.593	531	1.4	9.813	A
3	804	144	1023	0.786	798	3.4	15.635	C

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	331	809	451	0.735	326	2.5	27.536	D
2	652	97	889	0.733	647	2.6	14.692	B
3	985	176	1006	0.979	946	13.3	43.599	E

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	331	828	442	0.750	330	2.8	31.722	D
2	652	99	889	0.734	652	2.7	15.253	C
3	985	177	1006	0.979	968	17.5	66.300	F

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	271	734	488	0.554	277	1.3	17.433	C
2	532	83	897	0.594	537	1.5	10.209	B
3	804	146	1022	0.787	858	4.1	27.418	D

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	227	584	563	0.403	229	0.7	10.855	B
2	446	68	904	0.493	448	1.0	7.983	A
3	673	122	1036	0.650	682	1.9	10.506	B

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Abbots Road East Mini Roundabout.j9
Path: J:\40472 - Middlewick Training Area, Colchester\Technical\Calcs\Transport\Junction Assessments\2. Abbots Road-Old Heath Road Mini
Report generation date: 18/02/2020 14:45:19

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
2019 Base								
Arm 1	2.8	18.91	0.75	C	0.7	8.18	0.40	A
Arm 2	4.2	26.18	0.82	D	1.6	10.99	0.61	B
Arm 3	2.7	14.81	0.74	B	13.4	58.91	0.96	F
2032 Base								
Arm 1	6.1	37.46	0.88	E	0.8	9.17	0.46	A
Arm 2	11.6	65.01	0.95	F	2.3	14.34	0.70	B
Arm 3	4.7	23.16	0.83	C	50.1	172.62	1.09	F
2032 Base + Dev 1								
Arm 1	6.6	40.38	0.89	E	0.9	9.60	0.48	A
Arm 2	18.6	94.70	1.00	F	2.5	15.55	0.72	C
Arm 3	5.1	25.03	0.85	D	64.9	225.73	1.12	F
2032 Base + Dev 2								
Arm 1	6.6	40.38	0.89	E	0.9	9.60	0.48	A
Arm 2	18.6	94.70	1.00	F	2.5	15.55	0.72	C
Arm 3	5.1	25.03	0.85	D	64.9	225.73	1.12	F

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

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

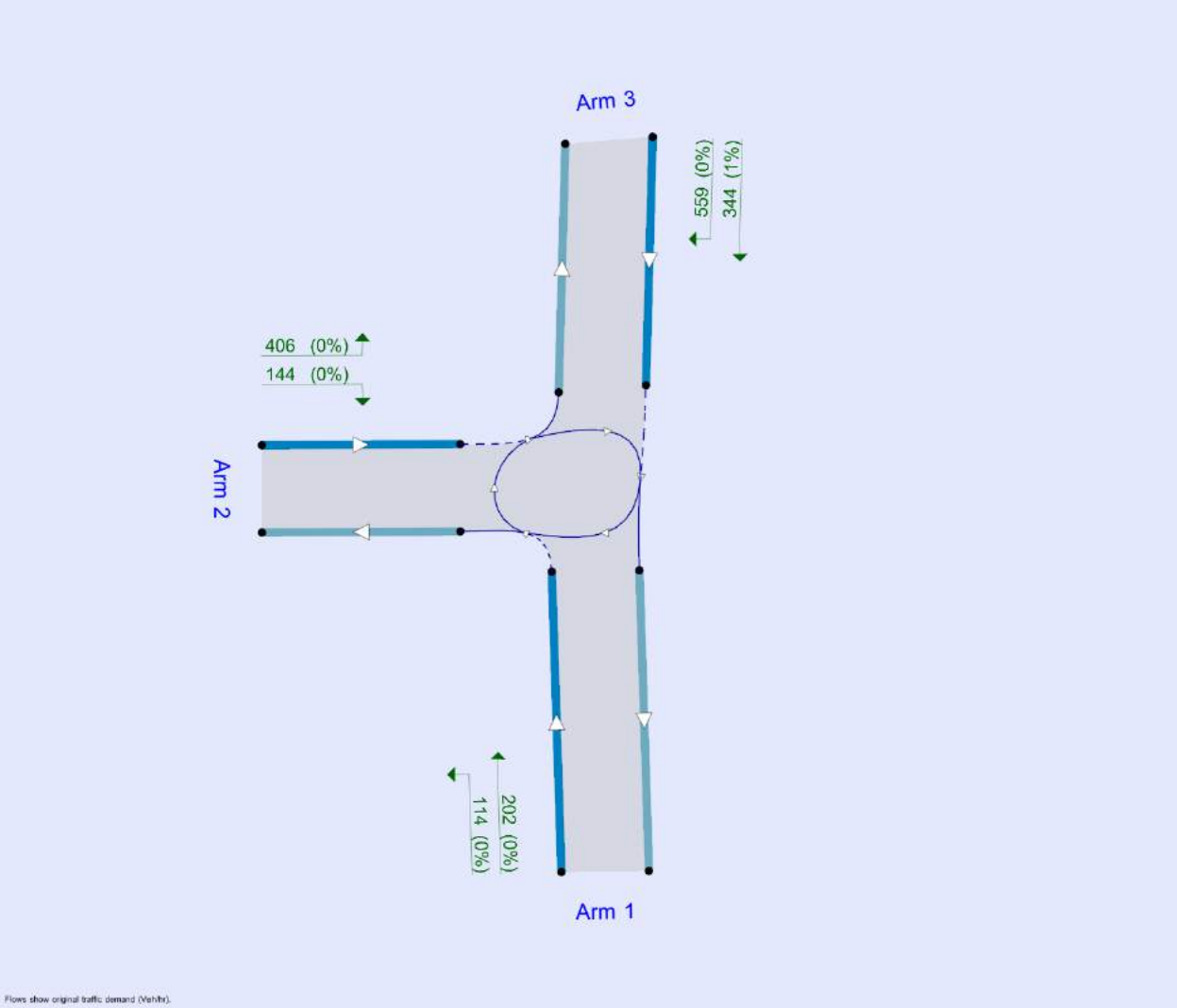
File summary

File Description

Title	Abbot's Road-Old Heath Road Mini Rbt
Location	Colchester
Site number	
Date	31/01/2020
Version	
Status	Existing
Identifier	
Client	DIO
Jobnumber	
Enumerator	CORP\othomas
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	Veh	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Mini-roundabout model	Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
JUNCTIONS 9			0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2019 Base	AM		ONE HOUR	08:00	09:30	15
D2	2019 Base	PM		ONE HOUR	08:00	09:30	15
D3	2032 Base	AM		ONE HOUR	08:00	09:30	15
D4	2032 Base	PM		ONE HOUR	08:00	09:30	15
D5	2032 Base + Dev 1	AM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15
D6	2032 Base + Dev 1	PM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15
D7	2032 Base + Dev 2	AM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

D8	2032 Base + Dev 2	PM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2019 Base, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	19.77	C

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Arms

Arms

Arm	Name	Description
1	Old Heath Road South	
2	Abbots Rd	
3	Old Heath Road North	

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1	3.54	3.54	5.30	1.8	10.20	8.50	0.0	✓
2	4.13	4.13	5.06	2.1	10.90	7.20	0.0	✓
3	3.30	3.30	3.30	0.0	16.10	15.90	0.0	✓

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.517	1005
2	0.537	955
3	0.530	973

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2019 Base	AM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	508	100.000
2		✓	547	100.000
3		✓	618	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	137	371
	2	87	0	460
	3	166	452	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.75	18.91	2.8	C
2	0.82	26.18	4.2	D
3	0.74	14.81	2.7	B

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	382	337	831	0.460	379	0.8	7.913	A
2	412	277	807	0.510	408	1.0	8.935	A
3	465	65	939	0.496	461	1.0	7.484	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	457	405	796	0.574	455	1.3	10.493	B
2	492	332	777	0.633	489	1.7	12.391	B
3	556	78	932	0.596	554	1.4	9.470	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	559	494	750	0.746	554	2.7	17.841	C
2	602	404	738	0.816	593	3.9	23.495	C
3	680	94	923	0.737	676	2.7	14.265	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	559	497	748	0.748	559	2.8	18.906	C
2	602	408	736	0.818	601	4.2	26.183	D
3	680	96	922	0.738	680	2.7	14.807	B

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	457	410	793	0.576	462	1.4	11.060	B
2	492	338	774	0.635	501	1.8	13.619	B
3	556	80	931	0.597	560	1.5	9.843	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	382	342	829	0.462	385	0.9	8.145	A
2	412	281	805	0.512	415	1.1	9.304	A
3	465	66	938	0.496	467	1.0	7.680	A

2019 Base, PM

Data Errors and Warnings

Severity	Area	Item	Description

Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 82% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	35.08	E

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2019 Base	PM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	271	100.000
2		✓	474	100.000
3		✓	782	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	91	180
	2	123	0	351
	3	307	475	0

Vehicle Mix

Heavy Vehicle Percentages

From	To			
		1	2	3
	1	0	0	0
	2	0	0	0
	3	1	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.40	8.18	0.7	A
2	0.61	10.99	1.6	B
3	0.96	58.91	13.4	F

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	204	353	823	0.248	203	0.3	5.796	A
2	357	135	883	0.404	354	0.7	6.773	A
3	591	92	924	0.639	584	1.7	10.425	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	244	424	786	0.310	243	0.4	6.622	A
2	426	162	869	0.491	425	0.9	8.092	A
3	706	110	915	0.772	700	3.2	16.400	C

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	298	505	744	0.401	298	0.7	8.043	A
2	522	198	849	0.615	519	1.5	10.834	B
3	864	135	902	0.959	834	10.7	41.483	E

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	298	517	738	0.404	298	0.7	8.181	A
2	522	198	849	0.615	522	1.6	10.994	B
3	864	135	901	0.959	854	13.4	58.913	F

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	244	450	772	0.315	244	0.5	6.831	A
2	426	162	868	0.491	428	1.0	8.230	A
3	706	111	914	0.772	744	3.7	25.058	D

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	204	362	818	0.249	205	0.3	5.872	A
2	357	136	882	0.404	358	0.7	6.882	A
3	591	93	924	0.640	598	1.8	11.347	B

2032 Base, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	41.19	E

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2032 Base	AM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	571	100.000
2		✓	615	100.000
3		✓	695	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	154	417
	2	98	0	517
	3	187	508	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.88	37.46	6.1	E
2	0.95	65.01	11.6	F
3	0.83	23.16	4.7	C

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	430	379	809	0.531	425	1.1	9.273	A
2	463	311	789	0.587	457	1.4	10.705	B
3	523	73	934	0.560	518	1.2	8.552	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	513	454	770	0.666	510	1.9	13.661	B
2	553	373	755	0.732	548	2.6	16.986	C
3	625	87	927	0.674	622	2.0	11.685	B

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	629	552	720	0.873	615	5.4	30.760	D
2	677	449	714	0.948	651	9.0	44.944	E
3	765	104	918	0.833	756	4.4	20.968	C

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	629	558	717	0.877	626	6.1	37.464	E
2	677	457	710	0.954	667	11.6	65.014	F
3	765	106	917	0.835	764	4.7	23.161	C

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	513	464	765	0.671	529	2.1	16.173	C
2	553	387	748	0.739	587	3.1	26.121	D
3	625	94	924	0.677	635	2.2	12.877	B

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	430	385	806	0.533	434	1.2	9.761	A
2	463	317	785	0.590	469	1.5	11.614	B
3	523	75	933	0.561	527	1.3	8.927	A

2032 Base, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 82% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	94.66	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)

D4	2032 Base	PM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	304	100.000
2		✓	532	100.000
3		✓	878	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	**2**	**3**
From	**1**	0	102	202
	2	138	0	394
	3	344	534	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	**2**	**3**
From	**1**	0	0	0
	2	0	0	0
	3	1	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.46	9.17	0.8	A
2	0.70	14.34	2.3	B
3	1.09	172.62	50.1	F

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	229	396	801	0.286	227	0.4	6.265	A
2	401	151	874	0.458	397	0.8	7.496	A
3	664	103	918	0.723	654	2.5	13.201	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	273	472	761	0.359	273	0.6	7.361	A
2	478	181	858	0.557	477	1.2	9.397	A
3	792	124	908	0.873	780	5.7	25.901	D

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	335	530	731	0.458	334	0.8	9.028	A
2	586	222	836	0.700	582	2.2	13.920	B
3	970	151	893	1.087	875	29.5	86.869	F

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	335	538	727	0.460	335	0.8	9.169	A
2	586	222	836	0.701	586	2.3	14.340	B
3	970	152	893	1.087	888	50.1	172.622	F

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	273	539	727	0.376	274	0.6	7.969	A
2	478	182	858	0.558	482	1.3	9.691	A
3	792	125	907	0.874	889	26.0	157.551	F

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	229	458	768	0.298	230	0.4	6.691	A
2	401	153	873	0.459	402	0.9	7.669	A
3	664	104	918	0.723	756	2.8	33.750	D

2032 Base + Dev 1, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	53.03	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2032 Base + Dev 1	AM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	575	100.000
2		✓	646	100.000
3		✓	702	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	158	417
	2	108	0	538
	3	187	515	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.89	40.38	6.6	E
2	1.00	94.70	18.6	F
3	0.85	25.03	5.1	D

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	433	384	807	0.537	428	1.1	9.406	A
2	486	311	789	0.617	480	1.6	11.455	B
3	529	80	931	0.568	523	1.3	8.735	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	517	461	767	0.674	514	2.0	14.005	B
2	581	372	755	0.769	575	3.1	19.293	C
3	631	96	922	0.684	628	2.1	12.117	B

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	633	559	716	0.884	618	5.8	32.438	D
2	711	448	715	0.995	672	12.9	57.587	F
3	773	112	914	0.846	762	4.8	22.322	C

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	633	566	713	0.888	630	6.6	40.383	E
2	711	457	710	1.002	688	18.6	94.701	F
3	773	115	912	0.847	772	5.1	25.028	D

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	517	471	762	0.679	535	2.2	16.947	C
2	581	388	747	0.777	639	3.9	43.648	E
3	631	107	916	0.689	642	2.3	13.623	B

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	433	391	803	0.539	437	1.2	9.932	A
2	486	317	785	0.619	495	1.7	12.786	B
3	529	83	929	0.569	532	1.3	9.156	A

2032 Base + Dev 1, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 82% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	121.98	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2032 Base + Dev 1	PM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	316	100.000
2		✓	550	100.000
3		✓	903	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	114	202
	2	144	0	406
	3	344	559	0

Vehicle Mix

Heavy Vehicle Percentages

From	To			
		1	2	3
	1	0	0	0
	2	0	0	0
	3	1	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.48	9.60	0.9	A
2	0.72	15.55	2.5	C
3	1.12	225.73	64.9	F

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	238	414	791	0.301	236	0.4	6.467	A
2	414	151	874	0.474	411	0.9	7.705	A
3	682	107	916	0.745	671	2.8	14.195	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	284	492	751	0.378	283	0.6	7.691	A
2	494	181	858	0.576	493	1.3	9.801	A
3	815	129	905	0.901	798	6.9	30.058	D

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	348	541	726	0.480	347	0.9	9.470	A
2	606	222	836	0.724	601	2.5	14.996	B
3	998	157	890	1.122	877	37.0	104.160	F

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	348	547	723	0.481	348	0.9	9.603	A
2	606	222	836	0.724	605	2.5	15.553	C
3	998	158	889	1.122	887	64.9	216.886	F

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	284	549	722	0.394	285	0.7	8.268	A
2	494	182	858	0.577	499	1.4	10.167	B
3	815	131	904	0.902	890	46.1	225.733	F

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	238	526	733	0.324	239	0.5	7.283	A
2	414	153	873	0.474	416	0.9	7.902	A
3	682	109	915	0.746	853	3.5	90.262	F

2032 Base + Dev 2, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	53.03	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D7	2032 Base + Dev 2	AM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	575	100.000
2		✓	646	100.000
3		✓	702	100.000

Origin-Destination Data

Demand (Veh/hr)

	To			
		1	2	3
From	1	0	158	417
	2	108	0	538
	3	187	515	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.89	40.38	6.6	E
2	1.00	94.70	18.6	F
3	0.85	25.03	5.1	D

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	433	384	807	0.537	428	1.1	9.406	A
2	486	311	789	0.617	480	1.6	11.455	B
3	529	80	931	0.568	523	1.3	8.735	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	517	461	767	0.674	514	2.0	14.005	B
2	581	372	755	0.769	575	3.1	19.293	C
3	631	96	922	0.684	628	2.1	12.117	B

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	633	559	716	0.884	618	5.8	32.438	D
2	711	448	715	0.995	672	12.9	57.587	F
3	773	112	914	0.846	762	4.8	22.322	C

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	633	566	713	0.888	630	6.6	40.383	E
2	711	457	710	1.002	688	18.6	94.701	F
3	773	115	912	0.847	772	5.1	25.028	D

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	517	471	762	0.679	535	2.2	16.947	C
2	581	388	747	0.777	639	3.9	43.648	E
3	631	107	916	0.689	642	2.3	13.623	B

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	433	391	803	0.539	437	1.2	9.932	A
2	486	317	785	0.619	495	1.7	12.786	B
3	529	83	929	0.569	532	1.3	9.156	A

2032 Base + Dev 2, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 82% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	121.98	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D8	2032 Base + Dev 2	PM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	316	100.000
2		✓	550	100.000
3		✓	903	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	114	202
	2	144	0	406
	3	344	559	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	1	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.48	9.60	0.9	A
2	0.72	15.55	2.5	C
3	1.12	225.73	64.9	F

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	238	414	791	0.301	236	0.4	6.467	A
2	414	151	874	0.474	411	0.9	7.705	A
3	682	107	916	0.745	671	2.8	14.195	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	284	492	751	0.378	283	0.6	7.691	A
2	494	181	858	0.576	493	1.3	9.801	A
3	815	129	905	0.901	798	6.9	30.058	D

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	348	541	726	0.480	347	0.9	9.470	A
2	606	222	836	0.724	601	2.5	14.996	B
3	998	157	890	1.122	877	37.0	104.160	F

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	348	547	723	0.481	348	0.9	9.603	A
2	606	222	836	0.724	605	2.5	15.553	C
3	998	158	889	1.122	887	64.9	216.886	F

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	284	549	722	0.394	285	0.7	8.268	A
2	494	182	858	0.577	499	1.4	10.167	B
3	815	131	904	0.902	890	46.1	225.733	F

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	238	526	733	0.324	239	0.5	7.283	A
2	414	153	873	0.474	416	0.9	7.902	A
3	682	109	915	0.746	853	3.5	90.262	F

Junctions 9

PICADY 9 - Priority Intersection Module

Filename: Abbot's Road Priority Junction.j9
Path: J:\40472 - Middlewick Training Area, Colchester\Technical\Calcs\Transport\Junction Assessments\New assessments 200214\Abbots' Road Priority Junction
Report generation date: 2/17/2020 9:04:25 AM

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2032 Base + D1							
Stream B-C	0.1	7.94	0.10	A	0.1	7.41	0.06	A
Stream B-A	0.1	15.04	0.12	C	0.1	14.04	0.07	B
Stream C-AB	0.1	4.60	0.06	A	0.7	5.32	0.21	A

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

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

File summary

File Description

Title	Abbot's Road Priority Junction
Location	Middlewick Ranges
Site number	40472
Date	1/31/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\othomas
Description	old priority basic prioirty junction design

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

The junction diagram reflects the last run of Junctions.

Analysis Options

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

Demand Set Summary

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2032 Base + D1	AM	Dev 1 - Abbots Rd and Mersea Rd access only	ONE HOUR	08:00	09:30	15
D6	2032 Base + D1	PM	Dev 1 - Abbots Rd and Mersea Rd access only	ONE HOUR	17:00	18:30	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2032 Base + D1, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Minor arm flare	Arm B - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.74	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Abbot's Road East		Major
B	Minor	Access	Minor
C	Abbot's Road West		Major

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)
C	6.83			0.0	✓	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	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B	One lane plus flare	7.73	3.30	3.14	2.99	2.99	✓	1.00	109	102

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	576	0.101	0.256	0.161	0.365
1	B-C	715	0.106	0.267	-	-
1	C-B	574	0.214	0.214	-	-

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	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2032 Base + D1	AM	Dev 1 - Abbots Rd and Mersea Rd access only	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	673	100.000
B		✓	75	100.000
C		✓	630	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	11	662
	B	31	0	44
	C	615	15	0

Vehicle Mix

Heavy Vehicle Percentages

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

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.10	7.94	0.1	A
B-A	0.12	15.04	0.1	C
C-AB	0.06	4.60	0.1	A
C-A				
A-B				
A-C				

Main Results for each time segment

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	33	572	0.058	33	0.1	6.677	A
B-A	23	369	0.063	23	0.1	10.396	B
C-AB	26	809	0.033	26	0.0	4.601	A
C-A	448			448			
A-B	8			8			
A-C	498			498			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	40	543	0.073	39	0.1	7.151	A
B-A	28	329	0.085	28	0.1	11.944	B
C-AB	38	861	0.044	38	0.1	4.374	A
C-A	529			529			
A-B	10			10			
A-C	595			595			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	48	502	0.097	48	0.1	7.938	A
B-A	34	273	0.125	34	0.1	15.020	C
C-AB	60	936	0.064	60	0.1	4.107	A
C-A	634			634			
A-B	12			12			
A-C	729			729			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	48	502	0.097	48	0.1	7.944	A
B-A	34	274	0.125	34	0.1	15.036	C
C-AB	60	936	0.064	60	0.1	4.110	A
C-A	634			634			
A-B	12			12			
A-C	729			729			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	40	543	0.073	40	0.1	7.158	A
B-A	28	329	0.085	28	0.1	11.956	B
C-AB	38	861	0.044	38	0.1	4.376	A
C-A	528			528			
A-B	10			10			
A-C	595			595			

09:15 - 09:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	33	572	0.058	33	0.1	6.687	A
B-A	23	370	0.063	23	0.1	10.407	B
C-AB	27	809	0.033	27	0.0	4.603	A
C-A	448			448			
A-B	8			8			
A-C	498			498			

2032 Base + D1, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Minor arm flare	Arm B - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.91	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2032 Base + D1	PM	Dev 1 - Abbots Rd and Mersea Rd access only	ONE HOUR	17:00	18:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	673	100.000
B		✓	44	100.000
C		✓	585	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	37	636
	B	18	0	26
	C	532	53	0

Vehicle Mix

Heavy Vehicle Percentages

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

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.06	7.41	0.1	A
B-A	0.07	14.04	0.1	B
C-AB	0.21	5.32	0.7	A
C-A				
A-B				
A-C				

Main Results for each time segment

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	20	579	0.034	19	0.0	6.428	A
B-A	14	371	0.037	13	0.0	10.073	B
C-AB	84	762	0.110	83	0.2	5.300	A
C-A	356			356			
A-B	28			28			
A-C	479			479			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	23	552	0.042	23	0.0	6.806	A
B-A	16	331	0.049	16	0.1	11.430	B
C-AB	118	805	0.147	118	0.4	5.248	A
C-A	408			408			
A-B	33			33			
A-C	572			572			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	29	514	0.056	29	0.1	7.410	A
B-A	20	276	0.072	20	0.1	14.020	B
C-AB	182	866	0.210	181	0.6	5.266	A
C-A	462			462			
A-B	41			41			
A-C	700			700			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	29	514	0.056	29	0.1	7.412	A
B-A	20	276	0.072	20	0.1	14.038	B
C-AB	182	867	0.210	182	0.7	5.281	A
C-A	462			462			
A-B	41			41			
A-C	700			700			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	23	552	0.042	23	0.0	6.810	A
B-A	16	331	0.049	16	0.1	11.439	B
C-AB	119	806	0.147	120	0.4	5.270	A
C-A	407			407			
A-B	33			33			
A-C	572			572			

18:15 - 18:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	20	579	0.034	20	0.0	6.434	A
B-A	14	371	0.037	14	0.0	10.085	B
C-AB	85	763	0.111	85	0.3	5.324	A
C-A	356			356			
A-B	28			28			
A-C	479			479			

Junctions 9

PICADY 9 - Priority Intersection Module

Filename: Abbot's Road Access Junction.j9
Path: J:\40472 - Middlewick Training Area, Colchester\Technical\Calcs\Transport\Junction Assessments\4. Abbots Road Realigned Access
Report generation date: 17/02/2020 11:01:48

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2032 + Dev S2							
Stream B-C	1.1	12.93	0.52	B	0.4	9.60	0.31	A
Stream B-A	0.1	14.70	0.06	B	0.3	17.24	0.22	C
Stream C-AB	0.8	11.72	0.44	B	1.6	16.14	0.61	C

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

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

File summary

File Description

Title	Abbots Road Access Junction
Location	Middlewick, Colchester
Site number	40472
Date	14/02/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\othomas

Description	Change from old design. Previously was simple t-junction. Now chnage of priority. realignment of abbots rd and abbots rd is now minor arm

Units

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

Analysis Options

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

Demand Set Summary

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2032 + Dev S2	AM	DIVERSION	ONE HOUR	08:00	09:30	15
D4	2032 + Dev S2	PM	DIVERSION	ONE HOUR	17:00	18:30	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2032 + Dev S2, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Minor arm flare	Arm B - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		4.57	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type

A	Site		Major
B	Abbots Road West into site		Minor
C	Aboots Road East		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Width for right turn (m)	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	6.00		✓	3.00	53.0	✓	5.00

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	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B	One lane plus flare	9.70	4.20	3.30	3.00	3.00	✓	1.00	42	54

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	606	0.110	0.279	0.175	0.399
1	B-C	704	0.108	0.273	-	-
1	C-B	657	0.255	0.255	-	-

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	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2032 + Dev S2	AM	DIVERSION	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	417	100.000
B		✓	287	100.000
C		✓	673	100.000

Origin-Destination Data

Demand (PCU/hr)

From	To			
		A	B	C
	A	0	44	373
	B	15	0	272
	C	457	216	0

Vehicle Mix

Heavy Vehicle Percentages

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

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.52	12.93	1.1	B
B-A	0.06	14.70	0.1	B
C-AB	0.44	11.72	0.8	B
C-A				
A-B				
A-C				

Main Results for each time segment

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	205	619	0.331	203	0.5	8.608	A
B-A	11	385	0.029	11	0.0	9.619	A
C-AB	163	578	0.282	161	0.4	8.608	A
C-A	344			344			
A-B	33			33			
A-C	281			281			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service

B-C	245	602	0.406	244	0.7	10.028	B
B-A	13	335	0.040	13	0.0	11.189	B
C-AB	195	564	0.346	194	0.5	9.727	A
C-A	410			410			
A-B	40			40			
A-C	335			335			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	299	578	0.518	298	1.0	12.800	B
B-A	17	262	0.063	16	0.1	14.629	B
C-AB	241	549	0.440	240	0.8	11.642	B
C-A	500			500			
A-B	48			48			
A-C	411			411			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	299	578	0.518	299	1.1	12.933	B
B-A	17	261	0.063	17	0.1	14.697	B
C-AB	241	549	0.440	241	0.8	11.717	B
C-A	500			500			
A-B	48			48			
A-C	411			411			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	245	602	0.406	246	0.7	10.156	B
B-A	13	334	0.040	14	0.0	11.243	B
C-AB	195	564	0.346	196	0.5	9.811	A
C-A	410			410			
A-B	40			40			
A-C	335			335			

09:15 - 09:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	205	619	0.331	206	0.5	8.723	A
B-A	11	384	0.029	11	0.0	9.665	A
C-AB	163	578	0.282	163	0.4	8.696	A
C-A	344			344			
A-B	33			33			
A-C	281			281			

2032 + Dev S2, PM

Data Errors and Warnings

Severity	Area	Item	Description

Warning	Minor arm flare	Arm B - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		5.65	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2032 + Dev S2	PM	DIVERSION	ONE HOUR	17:00	18:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	423	100.000
B		✓	205	100.000
C		✓	673	100.000

Origin-Destination Data

Demand (PCU/hr)

From	To			
		A	B	C
	A	0	26	397
	B	53	0	152
	C	374	299	0

Vehicle Mix

Heavy Vehicle Percentages

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

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.31	9.60	0.4	A
B-A	0.22	17.24	0.3	C
C-AB	0.61	16.14	1.6	C
C-A				
A-B				
A-C				

Main Results for each time segment

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	114	603	0.190	114	0.2	7.344	A
B-A	40	379	0.105	39	0.1	10.592	B
C-AB	226	579	0.391	224	0.6	10.068	B
C-A	281			281			
A-B	20			20			
A-C	299			299			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	137	580	0.236	136	0.3	8.114	A
B-A	48	332	0.143	47	0.2	12.620	B
C-AB	273	569	0.480	272	0.9	12.069	B
C-A	332			332			
A-B	23			23			
A-C	357			357			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	167	543	0.308	167	0.4	9.558	A
B-A	58	268	0.218	58	0.3	17.083	C

C-AB	351	574	0.611	348	1.6	15.791	C
C-A	390			390			
A-B	29			29			
A-C	437			437			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	167	542	0.309	167	0.4	9.598	A
B-A	58	267	0.218	58	0.3	17.239	C
C-AB	351	574	0.611	350	1.6	16.142	C
C-A	390			390			
A-B	29			29			
A-C	437			437			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	137	579	0.236	137	0.3	8.152	A
B-A	48	331	0.144	48	0.2	12.747	B
C-AB	273	569	0.480	276	1.0	12.383	B
C-A	332			332			
A-B	23			23			
A-C	357			357			

18:15 - 18:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	114	602	0.190	115	0.2	7.385	A
B-A	40	377	0.106	40	0.1	10.682	B
C-AB	226	579	0.391	227	0.7	10.281	B
C-A	281			281			
A-B	20			20			
A-C	299			299			

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.0.6896

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: Mersea Road Roundabout Access.j9
Path: J:\40472 - Middlewick Training Area, Colchester\Technical\Calcs\Transport\Junction Assessments\5. Mersea Road Access
Report generation date: 2/17/2020 11:35:21 AM

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2032 + Dev S1							
Arm 1	0.7	3.67	0.40	A	2.0	6.73	0.67	A
Arm 2	0.2	3.39	0.19	A	0.1	3.66	0.10	A
Arm 3	0.6	3.68	0.37	A	0.9	4.18	0.47	A
	2032 + Dev S2							
Arm 1	1.2	5.65	0.55	A	3.9	12.13	0.80	B
Arm 2	1.3	6.33	0.57	A	0.8	5.86	0.44	A
Arm 3	1.5	6.23	0.61	A	1.7	6.34	0.64	A

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

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

File summary

File Description

Title	Mersea Road Roundabout Access
Location	Middlewick, Colchester
Site number	40472
Date	2/14/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	40472
Enumerator	CORP\othomas
Description	To replace inital T-junction access proposal

Units

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

Analysis Options

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

Demand Set Summary

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2032 + Dev S1	AM	Access only W/OUT DIVERSION	ONE HOUR	08:00	09:30	15
D2	2032 + Dev S1	PM	Access only W/OUT DIVERSION	ONE HOUR	17:00	18:30	15
D3	2032 + Dev S2	AM	DIVERSION	ONE HOUR	08:00	09:30	15
D4	2032 + Dev S2	PM	DIVERSION	ONE HOUR	17:00	18:30	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2032 + Dev S1, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	3.63	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Mersea Road North	
2	Access	
3	untitled	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1	3.00	6.50	27.0	19.0	32.0	30.0	
2	3.00	6.30	36.2	25.0	32.0	30.0	
3	3.50	6.30	21.0	26.0	32.0	30.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.646	1654
2	0.659	1700
3	0.654	1674

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2032 + Dev S1	AM	Access only W/OUT DIVERSION	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	602	100.000
2		✓	225	100.000
3		✓	514	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	63	539
	2	179	0	46
	3	498	16	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.40	3.67	0.7	A
2	0.19	3.39	0.2	A
3	0.37	3.68	0.6	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	453	12	1647	0.275	452	0.4	3.009	A
2	169	404	1433	0.118	169	0.1	2.845	A
3	387	134	1586	0.244	386	0.3	2.997	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	541	14	1645	0.329	541	0.5	3.258	A
2	202	484	1381	0.147	202	0.2	3.054	A
3	462	161	1569	0.295	462	0.4	3.252	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	663	18	1643	0.403	662	0.7	3.669	A
2	248	593	1309	0.189	247	0.2	3.390	A
3	566	197	1545	0.366	565	0.6	3.672	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	663	18	1643	0.403	663	0.7	3.672	A
2	248	593	1309	0.189	248	0.2	3.392	A
3	566	197	1545	0.366	566	0.6	3.676	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	541	14	1645	0.329	542	0.5	3.264	A
2	202	485	1380	0.147	203	0.2	3.057	A
3	462	161	1569	0.295	463	0.4	3.256	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	453	12	1647	0.275	454	0.4	3.020	A
2	169	406	1432	0.118	170	0.1	2.851	A
3	387	135	1586	0.244	387	0.3	3.004	A

2032 + Dev S1, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	5.58	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2032 + Dev S1	PM	Access only W/OUT DIVERSION	ONE HOUR	17:00	18:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	992	100.000
2		✓	96	100.000
3		✓	689	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	151	841
	2	76	0	20
	3	650	39	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.67	6.73	2.0	A
2	0.10	3.66	0.1	A
3	0.47	4.18	0.9	A

Main Results for each time segment

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	747	29	1635	0.457	743	0.8	4.022	A
2	72	630	1284	0.056	72	0.1	2.969	A
3	519	57	1637	0.317	517	0.5	3.209	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	892	35	1632	0.547	890	1.2	4.845	A
2	86	755	1202	0.072	86	0.1	3.224	A
3	619	68	1629	0.380	619	0.6	3.561	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1092	43	1627	0.671	1089	2.0	6.656	A
2	106	923	1092	0.097	106	0.1	3.650	A
3	759	84	1619	0.469	758	0.9	4.173	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1092	43	1627	0.671	1092	2.0	6.733	A
2	106	926	1090	0.097	106	0.1	3.657	A
3	759	84	1619	0.469	759	0.9	4.183	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	892	35	1632	0.547	895	1.2	4.909	A
2	86	759	1200	0.072	86	0.1	3.235	A
3	619	68	1629	0.380	620	0.6	3.574	A

18:15 - 18:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	747	29	1635	0.457	748	0.8	4.065	A
2	72	634	1282	0.056	72	0.1	2.976	A
3	519	57	1636	0.317	519	0.5	3.226	A

2032 + Dev S2, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	6.07	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2032 + Dev S2	AM	DIVERSION	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	721	100.000
2		✓	672	100.000
3		✓	812	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	182	539
	2	281	0	391
	3	498	314	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.55	5.65	1.2	A
2	0.57	6.33	1.3	A
3	0.61	6.23	1.5	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	543	235	1502	0.361	541	0.6	3.736	A
2	506	404	1433	0.353	504	0.5	3.864	A
3	611	211	1536	0.398	609	0.7	3.871	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	648	282	1472	0.440	647	0.8	4.359	A
2	604	484	1381	0.438	603	0.8	4.623	A
3	730	252	1509	0.484	729	0.9	4.608	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	794	345	1432	0.554	792	1.2	5.612	A
2	740	592	1310	0.565	738	1.3	6.274	A
3	894	309	1472	0.607	892	1.5	6.178	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	794	346	1431	0.555	794	1.2	5.648	A
2	740	593	1309	0.565	740	1.3	6.328	A
3	894	309	1472	0.608	894	1.5	6.232	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	648	283	1471	0.440	650	0.8	4.392	A
2	604	486	1380	0.438	606	0.8	4.668	A
3	730	253	1508	0.484	732	0.9	4.653	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	543	237	1501	0.362	544	0.6	3.764	A
2	506	406	1432	0.353	507	0.5	3.897	A
3	611	212	1535	0.398	612	0.7	3.907	A

2032 + Dev S2, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	8.82	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2032 + Dev S2	PM	DIVERSION	ONE HOUR	17:00	18:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1		✓	1068	100.000
2		✓	432	100.000
3		✓	908	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	227	841
	2	148	0	284
	3	650	258	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.80	12.13	3.9	B
2	0.44	5.86	0.8	A
3	0.64	6.34	1.7	A

Main Results for each time segment

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	804	193	1529	0.526	800	1.1	4.904	A
2	325	630	1285	0.253	324	0.3	3.741	A
3	684	111	1601	0.427	681	0.7	3.898	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	960	232	1505	0.638	958	1.7	6.549	A
2	388	754	1203	0.323	388	0.5	4.414	A
3	816	133	1587	0.514	815	1.0	4.656	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1176	283	1471	0.799	1168	3.7	11.557	B
2	476	920	1094	0.435	474	0.8	5.801	A
3	1000	163	1568	0.638	997	1.7	6.279	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	1176	284	1471	0.799	1175	3.9	12.132	B
2	476	926	1090	0.436	476	0.8	5.859	A
3	1000	163	1567	0.638	1000	1.7	6.339	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	960	233	1504	0.638	968	1.8	6.821	A
2	388	763	1197	0.324	390	0.5	4.464	A
3	816	133	1587	0.514	819	1.1	4.707	A

18:15 - 18:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	804	195	1529	0.526	807	1.1	5.004	A
2	325	635	1281	0.254	326	0.3	3.769	A
3	684	112	1601	0.427	685	0.8	3.935	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Abbots Road West Mini Roundabout Mitigation.j9
Path: J:\40472 - Middlewick Training Area, Colchester\Technical\Calcs\Transport\Junction Assessments\1. Abbots Road-Mersea Road Mini\Mitigation
Report generation date: 18/02/2020 11:28:48

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2019 Base							
Arm 1	1.2	7.11	0.54	A	1.4	8.71	0.59	A
Arm 2	10.4	38.95	0.93	E	1.7	8.62	0.63	A
Arm 3	1.1	7.36	0.51	A	1.7	9.07	0.63	A
	2032 Base							
Arm 1	1.6	8.86	0.62	A	2.2	11.98	0.69	B
Arm 2	44.9	130.62	1.06	F	2.4	11.20	0.71	B
Arm 3	1.4	8.76	0.59	A	2.6	12.50	0.73	B
	2032 Base + Dev 1							
Arm 1	2.2	11.30	0.69	B	3.8	20.28	0.80	C
Arm 2	166.8	546.45	1.27	F	4.0	16.60	0.81	C
Arm 3	1.8	9.63	0.64	A	11.1	43.31	0.94	E
	2032 Base + Dev 2							
Arm 1	0.3	4.91	0.23	A	0.7	7.31	0.40	A
Arm 2	24.9	79.16	1.00	F	1.3	7.22	0.56	A
Arm 3	1.5	8.20	0.60	A	4.6	17.57	0.83	C

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

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

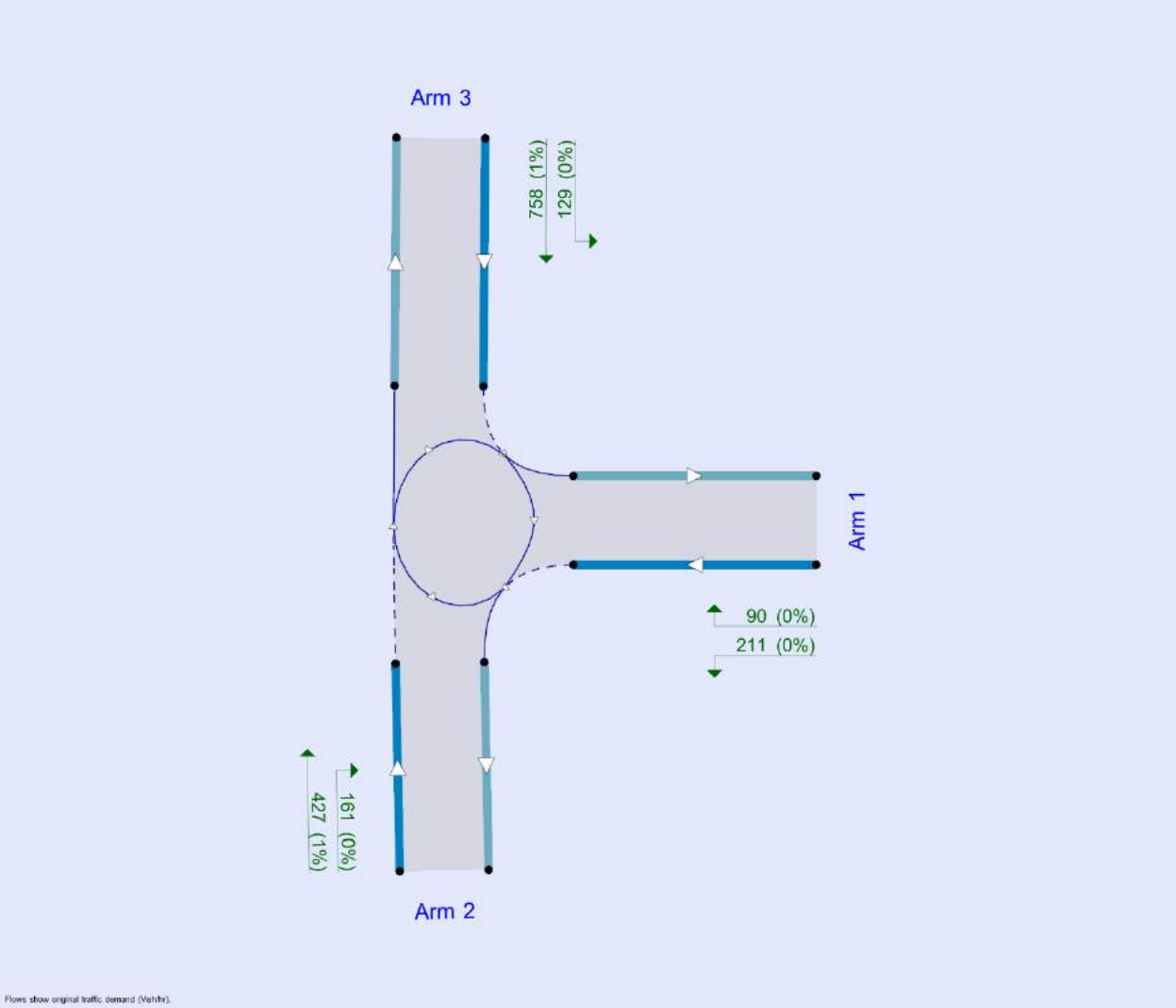
File summary

File Description

Title	Abbot's Road-Mersea Road Mini Roundabout
Location	Colchester
Site number	
Date	31/01/2020
Version	
Status	Existing
Identifier	
Client	DIO
Jobnumber	40472
Enumerator	CORP\othomas
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	Veh	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Mini-roundabout model	Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
JUNCTIONS 9			0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2019 Base	AM		ONE HOUR	08:00	09:30	15
D2	2019 Base	PM		ONE HOUR	08:00	09:30	15
D3	2032 Base	AM		ONE HOUR	08:00	09:30	15
D4	2032 Base	PM		ONE HOUR	08:00	09:30	15
D5	2032 Base + Dev 1	AM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15
D6	2032 Base + Dev 1	PM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15
D7	2032 Base + Dev 2	AM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

D8	2032 Base + Dev 2	PM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2019 Base, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	22.34	C

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Arms

Arms

Arm	Name	Description
1	Abbots Road	
2	Mersea Road South	
3	Mersea Road North	

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1	3.35	3.35	7.45	23.8	10.83	6.30	0.0	✓
2	3.30	3.30	6.86	9.0	14.50	14.30	0.0	✓
3	4.00	4.00	6.03	24.0	11.40	7.00	0.0	✓

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.593	1323
2	0.568	1211
3	0.578	1291

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2019 Base	AM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	535	100.000
2		✓	926	100.000
3		✓	470	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	362	173
	2	401	0	525
	3	146	324	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	1	0
	2	0	0	1
	3	1	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.54	7.11	1.2	A
2	0.93	38.95	10.4	E
3	0.51	7.36	1.1	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	406	252	1173	0.346	403	0.5	4.695	A
2	701	130	1137	0.617	695	1.6	8.075	A
3	365	299	1118	0.326	363	0.5	4.899	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	484	302	1144	0.423	483	0.7	5.482	A
2	837	155	1122	0.746	832	2.8	12.265	B
3	435	358	1084	0.402	435	0.7	5.708	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	593	370	1104	0.537	591	1.2	7.052	A
2	1025	190	1103	0.930	1001	8.9	30.031	D
3	533	431	1042	0.512	532	1.1	7.252	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	593	371	1103	0.538	593	1.2	7.105	A
2	1025	190	1102	0.930	1020	10.4	38.947	E
3	533	439	1037	0.514	533	1.1	7.360	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	484	304	1143	0.424	486	0.7	5.530	A
2	837	156	1122	0.746	866	3.1	15.565	C
3	435	373	1075	0.405	437	0.7	5.826	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	406	254	1172	0.346	406	0.5	4.736	A
2	701	131	1137	0.617	707	1.7	8.538	A
3	365	304	1115	0.327	366	0.5	4.957	A

2019 Base , PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	8.80	A

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2019 Base	PM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	544	100.000
2		✓	645	100.000
3		✓	613	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	420	124
	2	332	0	313
	3	141	472	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	1
	3	0	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.59	8.71	1.4	A
2	0.63	8.62	1.7	A
3	0.63	9.07	1.7	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	410	357	1111	0.368	407	0.6	5.096	A
2	488	93	1158	0.421	485	0.7	5.354	A
3	465	248	1147	0.405	462	0.7	5.274	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	489	428	1069	0.457	488	0.8	6.180	A
2	583	111	1147	0.508	581	1.0	6.379	A
3	555	298	1119	0.496	554	1.0	6.408	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	599	523	1013	0.591	597	1.4	8.597	A
2	714	136	1133	0.630	711	1.7	8.512	A
3	680	364	1080	0.629	677	1.7	8.936	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	599	525	1012	0.592	599	1.4	8.714	A
2	714	137	1133	0.630	714	1.7	8.617	A
3	680	365	1080	0.630	680	1.7	9.070	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	489	431	1068	0.458	491	0.9	6.271	A
2	583	112	1147	0.508	585	1.1	6.466	A
3	555	300	1118	0.497	558	1.0	6.511	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	410	360	1110	0.369	411	0.6	5.159	A
2	488	94	1157	0.422	489	0.7	5.424	A
3	465	251	1146	0.406	466	0.7	5.347	A

2032 Base , AM

Data Errors and Warnings
No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	66.82	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2032 Base	AM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	602	100.000
2		✓	1040	100.000
3		✓	528	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	407	195
	2	450	0	590
	3	164	364	0

Vehicle Mix

Heavy Vehicle Percentages

From	To			
		1	2	3
	1	0	1	0
	2	0	0	1
	3	1	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.62	8.86	1.6	A
2	1.06	130.62	44.9	F
3	0.59	8.76	1.4	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	456	283	1155	0.395	454	0.7	5.149	A
2	787	146	1128	0.698	778	2.2	10.131	B
3	410	335	1097	0.373	407	0.6	5.358	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	545	340	1122	0.486	544	0.9	6.258	A
2	940	175	1111	0.846	930	4.9	18.885	C
3	489	400	1060	0.462	488	0.9	6.479	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	667	415	1077	0.620	665	1.6	8.739	A
2	1152	214	1089	1.057	1062	27.3	67.427	F
3	599	457	1027	0.583	597	1.4	8.588	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	667	417	1076	0.620	667	1.6	8.862	A
2	1152	215	1089	1.058	1081	44.9	130.619	F
3	599	465	1022	0.586	599	1.4	8.764	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	545	342	1120	0.486	547	1.0	6.356	A
2	940	176	1111	0.847	1086	8.5	95.261	F
3	489	467	1021	0.479	491	1.0	7.030	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	456	286	1153	0.396	457	0.7	5.218	A
2	787	147	1127	0.699	812	2.4	12.302	B
3	410	349	1089	0.376	411	0.6	5.484	A

2032 Base , PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	11.88	B

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2032 Base	PM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	612	100.000
2		✓	724	100.000
3		✓	689	100.000

Origin-Destination Data

Demand (Veh/hr)

From	To			
		1	2	3
	1	0	472	140
	2	373	0	351
	3	159	530	0

Vehicle Mix

Heavy Vehicle Percentages

From	To			
		1	2	3
	1	0	0	0
	2	0	0	1
	3	0	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.69	11.98	2.2	B
2	0.71	11.20	2.4	B
3	0.73	12.50	2.6	B

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	461	400	1086	0.424	458	0.7	5.708	A
2	548	105	1151	0.476	544	0.9	5.926	A
3	523	279	1130	0.463	519	0.9	5.909	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	550	480	1038	0.530	549	1.1	7.304	A
2	654	126	1139	0.574	652	1.3	7.400	A
3	624	334	1098	0.569	622	1.3	7.602	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service

1	674	586	976	0.691	670	2.1	11.605	B
2	801	153	1124	0.713	797	2.4	10.922	B
3	764	408	1055	0.725	760	2.5	12.081	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	674	589	974	0.692	674	2.2	11.979	B
2	801	154	1123	0.713	801	2.4	11.205	B
3	764	411	1054	0.725	764	2.6	12.501	B

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	550	485	1035	0.531	554	1.2	7.546	A
2	654	127	1139	0.574	658	1.4	7.595	A
3	624	338	1096	0.570	629	1.4	7.850	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	461	404	1083	0.425	462	0.7	5.815	A
2	548	106	1151	0.476	550	0.9	6.036	A
3	523	282	1128	0.463	525	0.9	6.028	A

2032 Base + Dev 1 , AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	274.07	F

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2032 Base + Dev 1	AM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15

Vehicle mix source	PCU Factor for a HV (PCU)

HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	646	100.000
2		✓	1221	100.000
3		✓	605	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	413	233
	2	452	0	769
	3	178	427	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	1	0
	2	0	0	1
	3	1	3	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.69	11.30	2.2	B
2	1.27	546.45	166.8	F
3	0.64	9.63	1.8	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	489	329	1128	0.434	486	0.8	5.630	A
2	925	174	1112	0.832	907	4.5	16.515	C

3	466	334	1098	0.425	463	0.7	5.783	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	584	394	1089	0.537	583	1.1	7.135	A
2	1105	209	1092	1.012	1048	18.6	52.009	F
3	557	386	1068	0.521	556	1.1	7.172	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	716	482	1037	0.690	712	2.2	11.001	B
2	1353	255	1066	1.269	1063	90.9	195.257	F
3	682	391	1065	0.641	679	1.8	9.497	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	716	484	1036	0.691	716	2.2	11.295	B
2	1353	256	1065	1.270	1065	163.0	432.650	F
3	682	392	1065	0.641	682	1.8	9.630	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	584	397	1087	0.537	589	1.2	7.318	A
2	1105	211	1091	1.013	1089	166.8	546.452	F
3	557	401	1059	0.526	560	1.2	7.416	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	489	332	1126	0.435	491	0.8	5.721	A
2	925	176	1111	0.833	1104	122.0	471.762	F
3	466	406	1056	0.442	468	0.8	6.278	A

2032 Base + Dev 1 , PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	27.79	D

Junction Network Options

Driving side	Lighting	Road surface	In London

Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2032 Base + Dev 1	PM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	638	100.000
2		✓	807	100.000
3		✓	887	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	475	163
	2	380	0	427
	3	205	682	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	1
	3	0	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.80	20.28	3.8	C
2	0.81	16.60	4.0	C
3	0.94	43.31	11.1	E

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	480	514	1018	0.472	477	0.9	6.608	A
2	611	122	1141	0.535	606	1.1	6.706	A
3	673	284	1127	0.597	667	1.5	7.792	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	574	616	958	0.599	571	1.5	9.252	A
2	729	146	1128	0.647	727	1.8	8.963	A
3	804	340	1094	0.734	799	2.7	12.079	B

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	702	738	885	0.793	694	3.5	18.098	C
2	893	177	1110	0.805	885	3.8	15.555	C
3	984	415	1051	0.936	958	9.3	32.110	D

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	702	753	877	0.801	701	3.8	20.278	C
2	893	179	1109	0.806	893	4.0	16.602	C
3	984	418	1049	0.938	977	11.1	43.311	E

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	574	644	941	0.610	582	1.6	10.268	B
2	729	149	1126	0.648	738	1.9	9.504	A
3	804	346	1091	0.736	836	3.0	15.813	C

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	480	523	1013	0.474	483	0.9	6.828	A
2	611	123	1141	0.536	614	1.2	6.907	A
3	673	287	1125	0.598	679	1.5	8.231	A

2032 Base + Dev 2 , AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 89% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	47.29	E

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D7	2032 Base + Dev 2	AM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	200	100.000
2		✓	1021	100.000
3		✓	604	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	68	132
	2	252	0	769
	3	58	546	0

Vehicle Mix

Heavy Vehicle Percentages

From	To			
		1	2	3
	1	0	1	0
	2	0	0	1
	3	1	3	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.23	4.91	0.3	A
2	1.00	79.16	24.9	F
3	0.60	8.20	1.5	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	151	421	1073	0.141	150	0.2	3.911	A
2	774	99	1154	0.671	766	2.0	9.172	A
3	467	188	1183	0.395	465	0.7	5.139	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	180	505	1024	0.176	180	0.2	4.280	A
2	925	119	1143	0.809	917	3.9	15.504	C
3	558	225	1161	0.481	557	0.9	6.115	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	221	617	957	0.231	221	0.3	4.902	A
2	1133	145	1128	1.004	1078	17.5	47.774	E
3	684	264	1138	0.601	681	1.5	8.058	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	221	619	956	0.231	221	0.3	4.914	A
2	1133	145	1128	1.004	1103	24.9	79.158	F
3	684	270	1135	0.602	684	1.5	8.198	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	180	508	1022	0.177	181	0.2	4.296	A
2	925	119	1143	0.809	1005	4.8	35.729	E
3	558	246	1149	0.486	560	1.0	6.314	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	151	424	1071	0.141	151	0.2	3.928	A
2	774	100	1154	0.671	785	2.1	10.098	B
3	467	192	1180	0.396	469	0.7	5.212	A

2032 Base + Dev 2 , PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 83% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	12.41	B

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D8	2032 Base + Dev 2	PM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	301	100.000
2		✓	588	100.000
3		✓	887	100.000

Origin-Destination Data

Demand (Veh/hr)

	To			
		1	2	3
From	1	0	211	90
	2	161	0	427
	3	129	758	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		1	2	3
From	1	0	0	0
	2	0	0	1
	3	0	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.40	7.31	0.7	A
2	0.56	7.22	1.3	A
3	0.83	17.57	4.6	C

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	227	572	984	0.230	225	0.3	4.748	A
2	446	67	1172	0.380	443	0.6	4.958	A
3	673	121	1221	0.551	669	1.2	6.512	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	271	686	916	0.295	270	0.4	5.567	A
2	532	81	1165	0.457	532	0.8	5.718	A
3	804	144	1208	0.666	801	2.0	8.871	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	331	834	828	0.400	330	0.7	7.218	A
2	652	99	1155	0.565	650	1.3	7.165	A
3	985	177	1189	0.828	975	4.4	16.264	C

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	331	842	824	0.402	331	0.7	7.313	A
2	652	99	1154	0.565	652	1.3	7.218	A
3	985	177	1189	0.829	984	4.6	17.570	C

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	271	697	910	0.297	272	0.4	5.651	A
2	532	81	1165	0.457	534	0.9	5.768	A
3	804	145	1207	0.666	814	2.1	9.474	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	227	579	980	0.231	227	0.3	4.786	A
2	446	68	1172	0.380	447	0.6	5.008	A
3	673	121	1221	0.552	677	1.3	6.713	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Abbots Road East Mini Roundabout Mitigation.j9
Path: J:\40472 - Middlewick Training Area, Colchester\Technical\Calcs\Transport\Junction Assessments\2. Abbots Road-Old Heath Road Mini\Mitigation
Report generation date: 18/02/2020 14:50:18

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
2019 Base								
Arm 1	2.0	12.89	0.67	B	0.6	6.84	0.36	A
Arm 2	2.1	12.87	0.68	B	1.1	7.52	0.52	A
Arm 3	1.9	10.34	0.66	B	5.6	24.59	0.86	C
2032 Base								
Arm 1	3.4	20.17	0.78	C	0.7	7.83	0.42	A
Arm 2	3.7	20.20	0.79	C	1.4	8.96	0.59	A
Arm 3	2.9	13.98	0.75	B	16.2	62.74	0.97	F
2032 Base + Dev 1								
Arm 1	3.6	21.15	0.79	C	0.8	8.25	0.44	A
Arm 2	4.6	24.70	0.83	C	1.6	9.43	0.61	A
Arm 3	3.1	14.75	0.76	B	23.4	84.51	1.00	F
2032 Base + Dev 2								
Arm 1	3.6	21.15	0.79	C	0.8	8.25	0.44	A
Arm 2	4.6	24.70	0.83	C	1.6	9.43	0.61	A
Arm 3	3.1	14.75	0.76	B	23.4	84.51	1.00	F

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

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

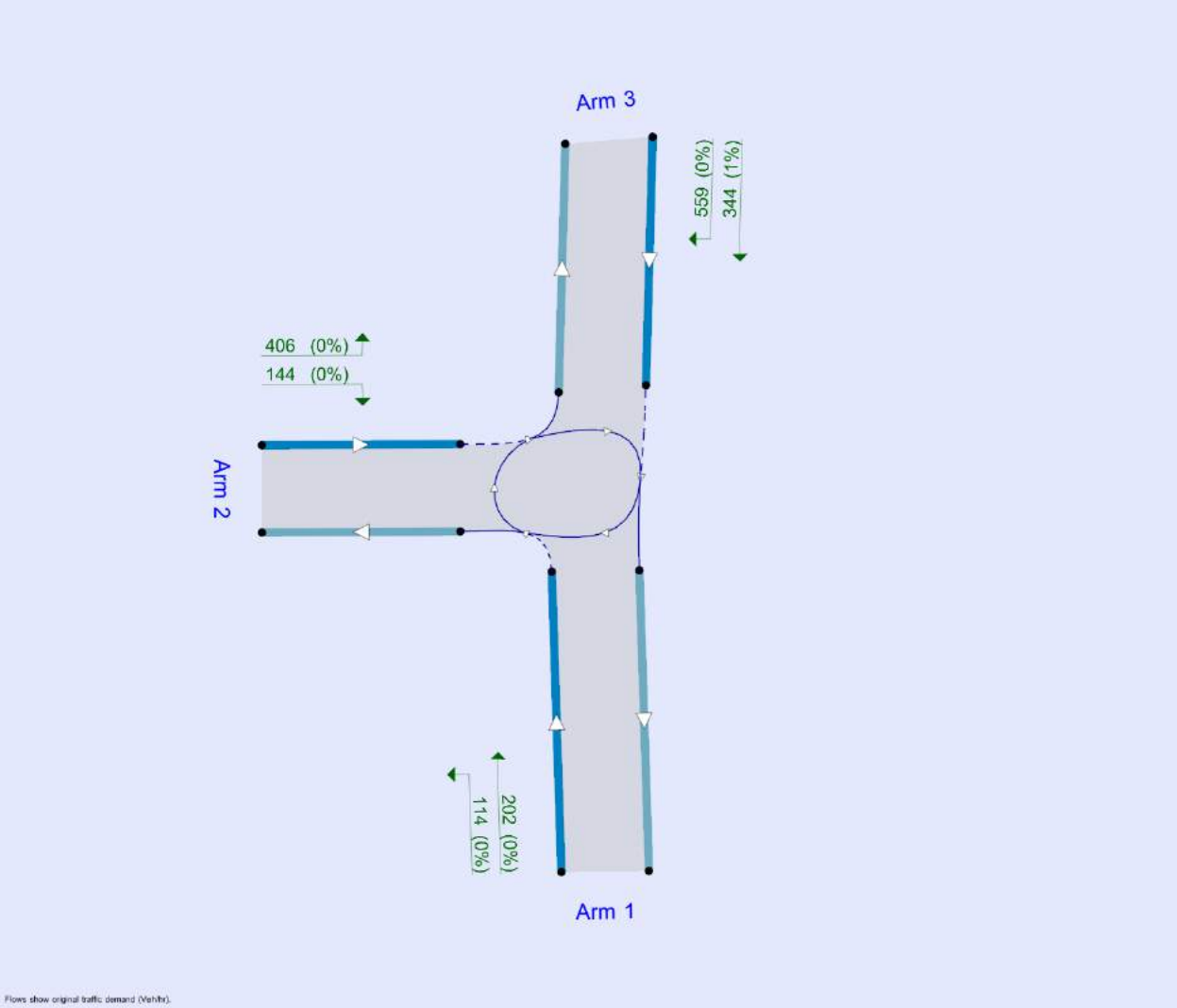
File summary

File Description

Title	Abbot's Road-Old Heath Road Mini Rbt
Location	Colchester
Site number	
Date	31/01/2020
Version	
Status	Existing
Identifier	
Client	DIO
Jobnumber	
Enumerator	CORP\othomas
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	Veh	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Mini-roundabout model	Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
JUNCTIONS 9			0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2019 Base	AM		ONE HOUR	08:00	09:30	15
D2	2019 Base	PM		ONE HOUR	08:00	09:30	15
D3	2032 Base	AM		ONE HOUR	08:00	09:30	15
D4	2032 Base	PM		ONE HOUR	08:00	09:30	15
D5	2032 Base + Dev 1	AM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15
D6	2032 Base + Dev 1	PM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15
D7	2032 Base + Dev 2	AM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

D8	2032 Base + Dev 2	PM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2019 Base , AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	11.94	B

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Arms

Arms

Arm	Name	Description
1	Old Heath Road South	
2	Abbots Rd	
3	Old Heath Road North	

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1	3.54	3.54	6.30	4.6	10.20	8.50	0.0	✓
2	4.13	4.13	5.71	16.4	10.90	7.20	0.0	✓
3	3.30	3.30	4.00	9.1	16.10	15.90	0.0	✓

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.536	1105
2	0.568	1113
3	0.551	1081

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2019 Base	AM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	508	100.000
2		✓	547	100.000
3		✓	618	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	137	371
	2	87	0	460
	3	166	452	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.67	12.89	2.0	B
2	0.68	12.87	2.1	B
3	0.66	10.34	1.9	B

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	382	338	924	0.414	380	0.7	6.587	A
2	412	277	956	0.431	409	0.7	6.546	A
3	465	65	1045	0.445	462	0.8	6.142	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	457	405	887	0.515	455	1.0	8.306	A
2	492	333	924	0.532	490	1.1	8.262	A
3	556	78	1038	0.535	554	1.1	7.421	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	559	495	839	0.667	556	1.9	12.552	B
2	602	406	883	0.682	598	2.1	12.499	B
3	680	95	1028	0.662	677	1.9	10.164	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	559	498	838	0.668	559	2.0	12.894	B
2	602	408	881	0.683	602	2.1	12.866	B
3	680	96	1028	0.662	680	1.9	10.341	B

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	457	409	886	0.516	460	1.1	8.529	A
2	492	336	922	0.533	496	1.2	8.507	A
3	556	79	1037	0.536	559	1.2	7.563	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	382	341	922	0.415	384	0.7	6.711	A
2	412	280	954	0.432	413	0.8	6.677	A
3	465	66	1045	0.445	467	0.8	6.243	A

2019 Base , PM

Data Errors and Warnings

Severity	Area	Item	Description

Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 82% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	16.15	C

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2019 Base	PM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	271	100.000
2		✓	474	100.000
3		✓	782	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	91	180
	2	123	0	351
	3	307	475	0

Vehicle Mix

Heavy Vehicle Percentages

From	To			
		1	2	3
	1	0	0	0
	2	0	0	0
	3	1	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.36	6.84	0.6	A
2	0.52	7.52	1.1	A
3	0.86	24.59	5.6	C

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	204	354	915	0.223	203	0.3	5.049	A
2	357	135	1037	0.344	355	0.5	5.262	A
3	591	92	1030	0.574	586	1.3	8.040	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	244	425	877	0.278	243	0.4	5.677	A
2	426	162	1022	0.417	425	0.7	6.030	A
3	706	110	1020	0.692	702	2.2	11.252	B

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	298	516	828	0.360	298	0.6	6.777	A
2	522	198	1001	0.521	520	1.1	7.468	A
3	864	135	1006	0.859	852	5.2	21.832	C

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	298	522	825	0.362	298	0.6	6.838	A
2	522	198	1001	0.521	522	1.1	7.516	A
3	864	135	1006	0.859	863	5.6	24.586	C

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	244	435	872	0.280	244	0.4	5.747	A
2	426	162	1021	0.417	428	0.7	6.080	A
3	706	111	1020	0.692	719	2.3	12.485	B

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	204	360	912	0.224	204	0.3	5.094	A
2	357	136	1036	0.344	358	0.5	5.310	A
3	591	93	1030	0.574	595	1.4	8.384	A

2032 Base , AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	17.90	C

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2032 Base	AM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	571	100.000
2		✓	615	100.000
3		✓	695	100.000

Origin-Destination Data

Demand (Veh/hr)

	To			
		1	2	3
From	1	0	154	417
	2	98	0	517
	3	187	508	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.78	20.17	3.4	C
2	0.79	20.20	3.7	C
3	0.75	13.98	2.9	B

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	430	380	901	0.477	426	0.9	7.526	A
2	463	311	936	0.494	459	1.0	7.483	A
3	523	73	1041	0.503	519	1.0	6.854	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	513	455	861	0.596	511	1.4	10.301	B
2	553	373	901	0.613	551	1.5	10.195	B
3	625	88	1033	0.605	623	1.5	8.742	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	629	555	807	0.779	622	3.2	18.727	C
2	677	454	855	0.792	669	3.5	18.618	C
3	765	107	1022	0.749	760	2.8	13.459	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	629	559	805	0.781	628	3.4	20.175	C
2	677	459	853	0.794	676	3.7	20.203	C
3	765	108	1022	0.749	765	2.9	13.982	B

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	513	461	858	0.598	521	1.5	10.907	B
2	553	380	897	0.616	561	1.7	10.943	B
3	625	89	1032	0.606	630	1.6	9.080	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	430	384	899	0.478	432	0.9	7.755	A
2	463	316	934	0.496	466	1.0	7.729	A
3	523	74	1040	0.503	525	1.0	7.027	A

2032 Base , PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 82% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	36.37	E

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)

D4	2032 Base	PM	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	304	100.000
2		✓	532	100.000
3		✓	878	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	**2**	**3**
From	**1**	0	102	202
	2	138	0	394
	3	344	534	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	**2**	**3**
From	**1**	0	0	0
	2	0	0	0
	3	1	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.42	7.83	0.7	A
2	0.59	8.96	1.4	A
3	0.97	62.74	16.2	F

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	229	398	891	0.257	227	0.3	5.411	A
2	401	151	1027	0.390	398	0.6	5.696	A
3	664	103	1024	0.648	656	1.8	9.654	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	273	476	849	0.322	273	0.5	6.239	A
2	478	181	1010	0.473	477	0.9	6.740	A
3	792	124	1013	0.782	786	3.4	15.521	C

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	335	566	801	0.418	334	0.7	7.683	A
2	586	222	987	0.593	584	1.4	8.866	A
3	970	151	997	0.973	934	12.5	42.197	E

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	335	579	794	0.421	335	0.7	7.833	A
2	586	222	987	0.593	586	1.4	8.965	A
3	970	152	997	0.973	956	16.2	62.745	F

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	273	510	831	0.329	274	0.5	6.471	A
2	478	182	1010	0.474	480	0.9	6.827	A
3	792	125	1012	0.783	841	3.9	25.782	D

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	229	407	886	0.258	229	0.4	5.483	A
2	401	152	1027	0.390	402	0.6	5.767	A
3	664	104	1023	0.648	672	1.9	10.500	B

2032 Base + Dev 1 , AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	20.01	C

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2032 Base + Dev 1	AM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	575	100.000
2		✓	646	100.000
3		✓	702	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	158	417
	2	108	0	538
	3	187	515	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.79	21.15	3.6	C
2	0.83	24.70	4.6	C
3	0.76	14.75	3.1	B

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	433	385	898	0.482	429	0.9	7.614	A
2	486	311	936	0.519	482	1.1	7.851	A
3	529	81	1036	0.510	524	1.0	6.965	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	517	461	857	0.603	515	1.5	10.437	B
2	581	373	901	0.644	578	1.8	11.037	B
3	631	97	1028	0.614	629	1.6	8.979	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	633	563	803	0.789	625	3.4	19.485	C
2	711	454	856	0.831	701	4.3	21.942	C
3	773	117	1016	0.761	767	3.0	14.124	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	633	567	801	0.791	632	3.6	21.149	C
2	711	459	853	0.834	710	4.6	24.695	C
3	773	119	1015	0.761	773	3.1	14.755	B

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	517	467	854	0.605	525	1.6	11.182	B
2	581	381	897	0.647	592	1.9	12.184	B
3	631	99	1026	0.615	637	1.6	9.375	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	433	389	896	0.483	435	1.0	7.859	A
2	486	316	934	0.521	490	1.1	8.156	A
3	529	82	1036	0.510	531	1.1	7.160	A

2032 Base + Dev 1 , PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 82% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	47.62	E

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2032 Base + Dev 1	PM	Abotts rd and mersea rd access	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	316	100.000
2		✓	550	100.000
3		✓	903	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	114	202
	2	144	0	406
	3	344	559	0

Vehicle Mix

Heavy Vehicle Percentages

From	To			
		1	2	3
	1	0	0	0
	2	0	0	0
	3	1	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.44	8.25	0.8	A
2	0.61	9.43	1.6	A
3	1.00	84.51	23.4	F

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	238	416	882	0.270	236	0.4	5.567	A
2	414	151	1028	0.403	411	0.7	5.819	A
3	682	108	1022	0.668	675	2.0	10.201	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	284	498	838	0.339	284	0.5	6.488	A
2	494	181	1010	0.489	493	0.9	6.946	A
3	815	129	1010	0.807	807	3.8	17.220	C

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	348	584	791	0.440	347	0.8	8.080	A
2	606	222	987	0.613	603	1.5	9.309	A
3	998	158	994	1.004	948	16.4	51.294	F

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	348	598	784	0.444	348	0.8	8.254	A
2	606	222	987	0.614	605	1.6	9.429	A
3	998	159	994	1.004	970	23.4	84.509	F

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	284	548	811	0.350	285	0.5	6.862	A
2	494	182	1010	0.490	497	1.0	7.048	A
3	815	130	1009	0.807	889	4.8	40.358	E

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	238	427	875	0.272	239	0.4	5.659	A
2	414	153	1027	0.403	415	0.7	5.897	A
3	682	109	1021	0.668	693	2.1	11.362	B

2032 Base + Dev 2 , AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	20.01	C

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D7	2032 Base + Dev 2	AM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	575	100.000
2		✓	646	100.000
3		✓	702	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	158	417
	2	108	0	538
	3	187	515	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.79	21.15	3.6	C
2	0.83	24.70	4.6	C
3	0.76	14.75	3.1	B

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	433	385	898	0.482	429	0.9	7.614	A
2	486	311	936	0.519	482	1.1	7.851	A
3	529	81	1036	0.510	524	1.0	6.965	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	517	461	857	0.603	515	1.5	10.437	B
2	581	373	901	0.644	578	1.8	11.037	B
3	631	97	1028	0.614	629	1.6	8.979	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	633	563	803	0.789	625	3.4	19.485	C
2	711	454	856	0.831	701	4.3	21.942	C
3	773	117	1016	0.761	767	3.0	14.124	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	633	567	801	0.791	632	3.6	21.149	C
2	711	459	853	0.834	710	4.6	24.695	C
3	773	119	1015	0.761	773	3.1	14.755	B

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	517	467	854	0.605	525	1.6	11.182	B
2	581	381	897	0.647	592	1.9	12.184	B
3	631	99	1026	0.615	637	1.6	9.375	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	433	389	896	0.483	435	1.0	7.859	A
2	486	316	934	0.521	490	1.1	8.156	A
3	529	82	1036	0.510	531	1.1	7.160	A

2032 Base + Dev 2, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 2 and 3 have 82% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout		1, 2, 3	47.62	E

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Description	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D8	2032 Base + Dev 2	PM	Abotts rd and mersea rd access with link road	ONE HOUR	08:00	09:30	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1		✓	316	100.000
2		✓	550	100.000
3		✓	903	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1	2	3
From	1	0	114	202
	2	144	0	406
	3	344	559	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1	2	3
From	1	0	0	0
	2	0	0	0
	3	1	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.44	8.25	0.8	A
2	0.61	9.43	1.6	A
3	1.00	84.51	23.4	F

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	238	416	882	0.270	236	0.4	5.567	A
2	414	151	1028	0.403	411	0.7	5.819	A
3	682	108	1022	0.668	675	2.0	10.201	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	284	498	838	0.339	284	0.5	6.488	A
2	494	181	1010	0.489	493	0.9	6.946	A
3	815	129	1010	0.807	807	3.8	17.220	C

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	348	584	791	0.440	347	0.8	8.080	A
2	606	222	987	0.613	603	1.5	9.309	A
3	998	158	994	1.004	948	16.4	51.294	F

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	348	598	784	0.444	348	0.8	8.254	A
2	606	222	987	0.614	605	1.6	9.429	A
3	998	159	994	1.004	970	23.4	84.509	F

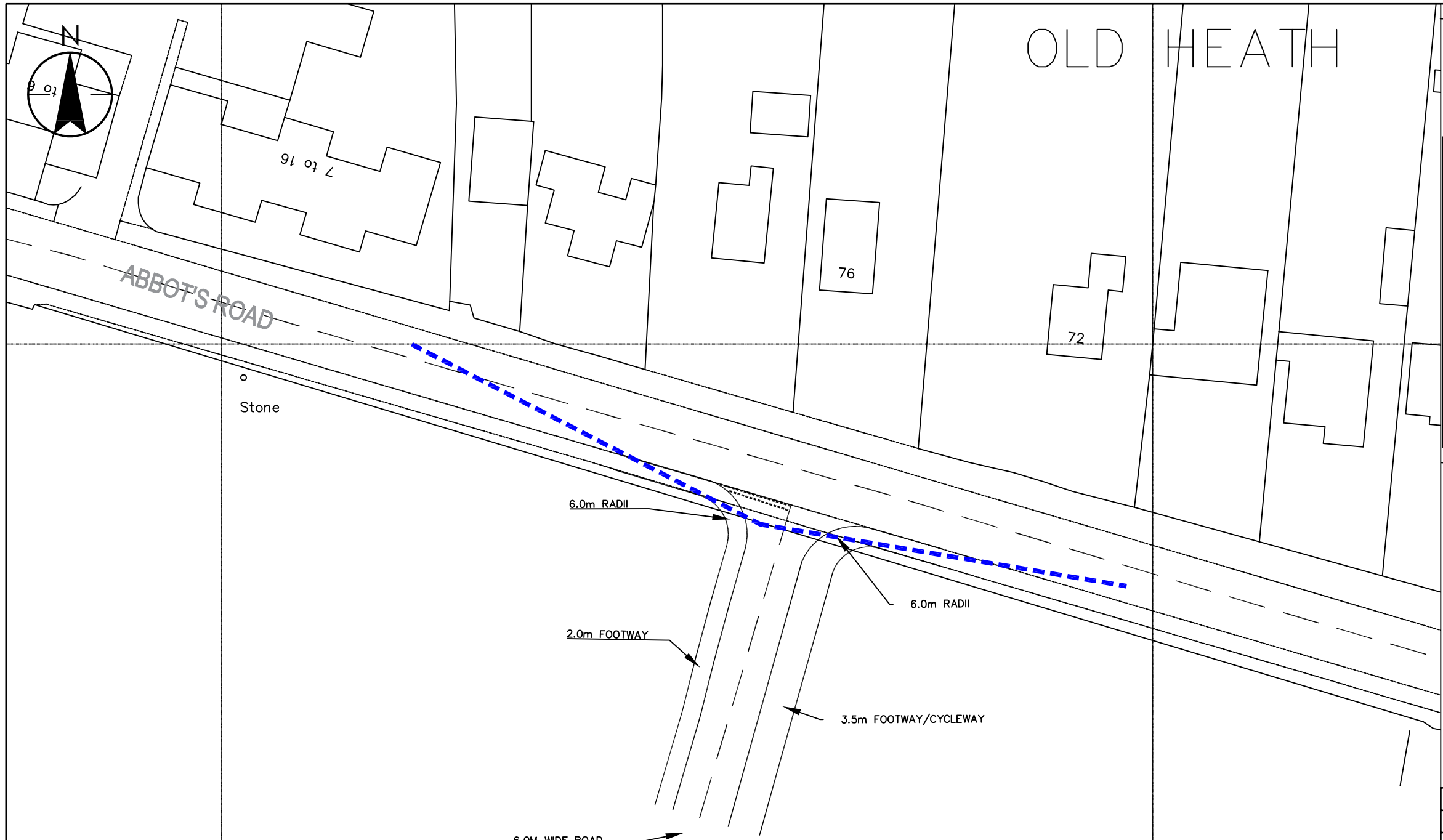
09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	284	548	811	0.350	285	0.5	6.862	A
2	494	182	1010	0.490	497	1.0	7.048	A
3	815	130	1009	0.807	889	4.8	40.358	E

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1	238	427	875	0.272	239	0.4	5.659	A
2	414	153	1027	0.403	415	0.7	5.897	A
3	682	109	1021	0.668	693	2.1	11.362	B

Appendix G ACCESS AND MITIGATION DRAWINGS



NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS ARE IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.

KEY:

2.4m x 40m VISIBILITY SPLAY

Mark	Revision	Date	Drawn	Chkd	Appd

SCALING NOTE: Do not scale this drawing - any errors or omissions shall be reported to Stantec without delay.

UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

Drawing Issue Status

INDICATIVE

MIDDLEWICK TRAINING AREA
COLCHESTER
ABBOT'S ROAD ACCESS

Client

MINISTRY OF DEFENCE

Date of 1st Issue	Designed	Drawn
30.01.20	OT	OT
A3 Scale 1:500	Checked PW	Approved MR
Drawing Number 40472-5513-001		Revision -

Stantec

stantec.com/uk

BIRMINGHAM
Tel: 0121 633 2900

DRAFT

TIE INTO EXISTING FOOTWAY

2M FOOTWAY

ALIGNMENT OF SITE ROAD
TO BE CONFIRMED

3.5M FOOT/ CYCLEWAY

FOOT/ CYCLEWAY TIE IN
TO BE CONFIRMED

MERSEA ROAD

BUXTON ROAD

Drain

Path (um)

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS ARE IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
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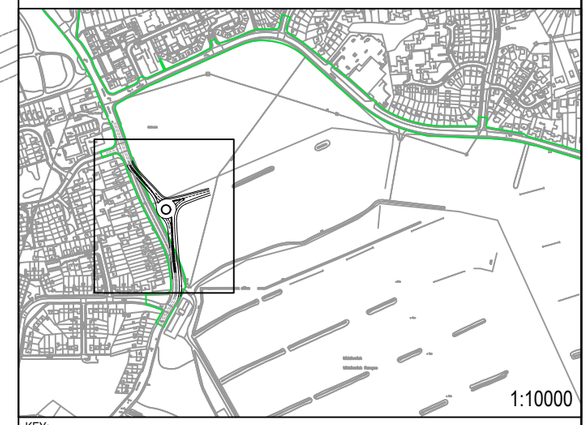

KEY:

HIGHWAY BOUNDARY

Mark	Revision	Date	Drawn	Chkd	Appd

SCALING NOTE: Do not scale this drawing - any errors or omissions shall be reported to Stantec without delay.
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Drawing Issue Status

INDICATIVE

MIDDLEWICK TRAINING AREA
COLCHESTER
MERSEA ROAD ROUNDABOUT ACCESS

DRAFT

Client

MINISTRY OF DEFENCE

Date of 1st Issue	Designed	Drawn
18.02.20	RP	RP
A3 Scale	Checked	Approved
1:1000	-	-
Drawing Number		Revision
40472-5513-006		-

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BIRMINGHAM
Tel: 0121 633 2900

OLD HEATH

7 to 16

76

72

Stone

ABBOT'S ROAD

ACCESS TO DRIVEWAYS
TO BE CONFIGURED

CHANGE IN PRIORITY -
ABBOT'S ROAD BECOMES
MINOR ARM OF NEW JUNCTION

2.0M FOOTWAY

3.5M FOOT/ CYCLEWAY

EXTENT OF FOOT/CYCLEWAY
AND TIE IN TO NARROW
FOOTWAY TO BE AGREED

NOTES:

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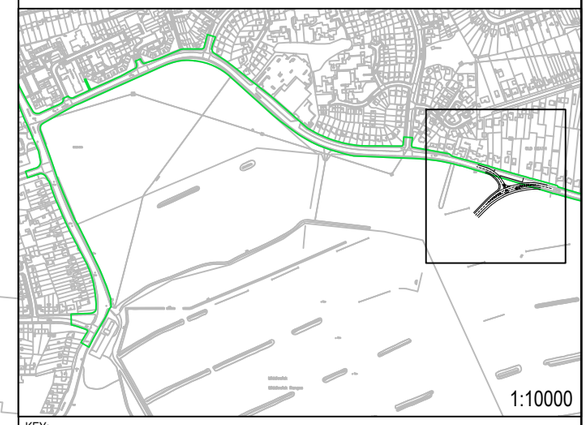
3. ALL DIMENSIONS ARE IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.



KEY:

HIGHWAY BOUNDARY

Mark	Revision	Date	Drawn	Chkd	Appd

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Drawing Issue Status

INDICATIVE

MIDDLEWICK TRAINING AREA
COLCHESTER
ABBOT'S ROAD ACCESS
REALIGNED T-JUNCTION

Client

MINISTRY OF DEFENCE

Date of 1st Issue	Designed	Drawn
18.02.20	RP	RP
A3 Scale	**Checked**	**Approved**
1:500	-	-

Drawing Number: 40472-5513-007

Revision: -

DRAFT

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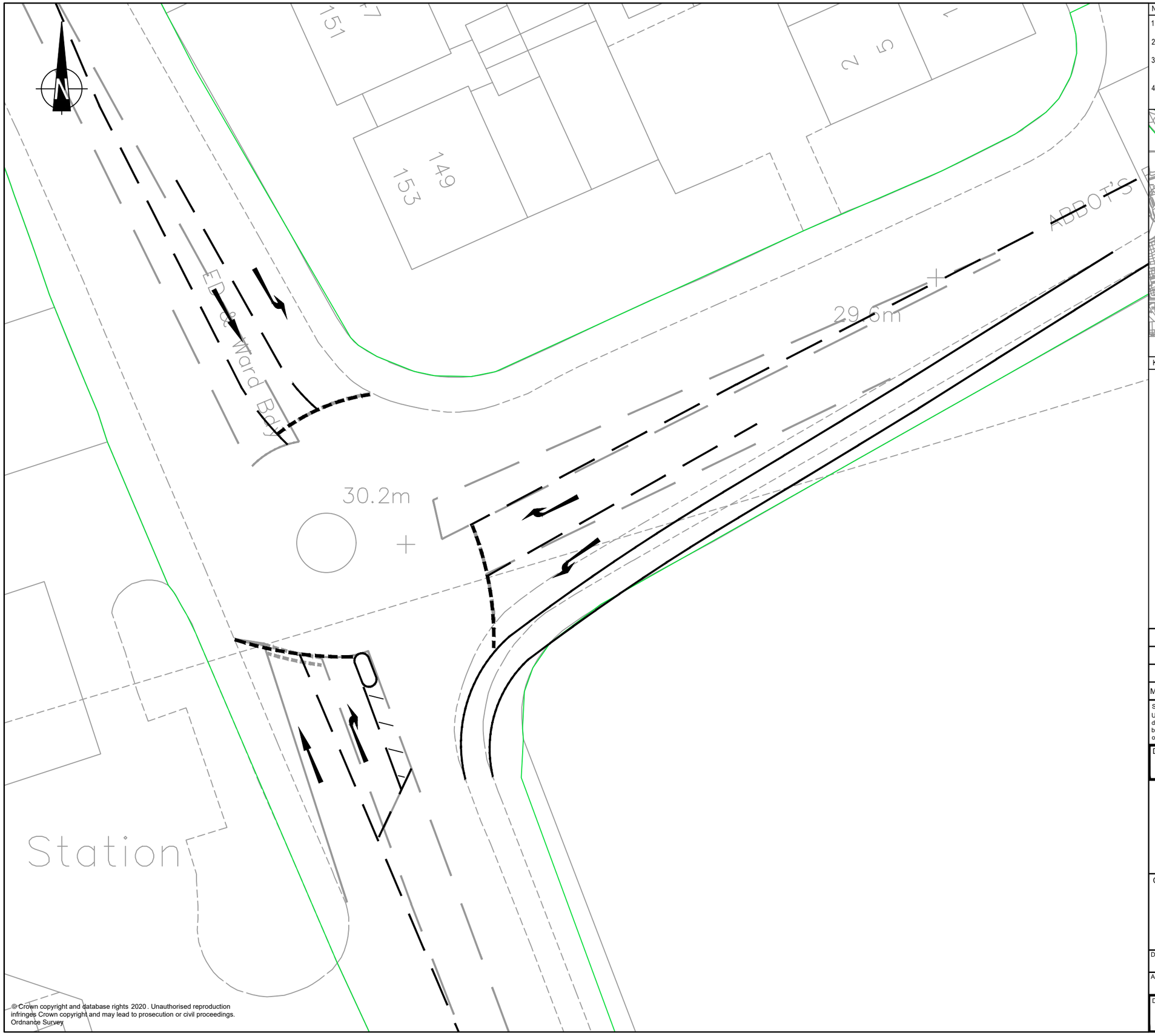

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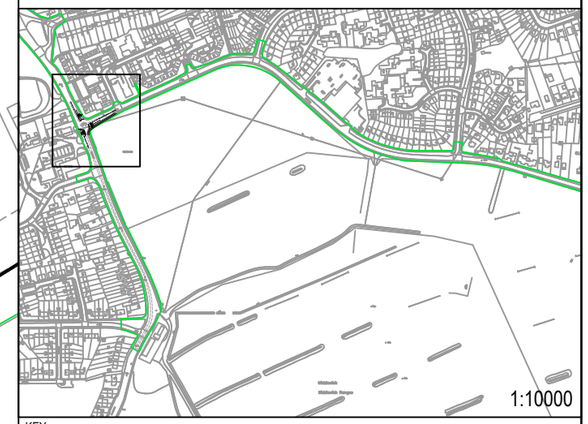

KEY:

HIGHWAY BOUNDARY

Mark	Revision	Date	Drawn	Chkd	Appd

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Drawing Issue Status

INDICATIVE

DRAFT

MIDDLEWICK TRAINING AREA
COLCHESTER
MERSEA ROAD/ ABBOT'S ROAD
MINI ROUNDABOUT MITIGATION SCHEME

Client

MINISTRY OF DEFENCE

Date of 1st Issue	Designed	Drawn
16.02.20	RP	RP
A3 Scale	Checked	Approved
1:250	-	-

Drawing Number: 40472-5513-008

Revision: -

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POSSIBLE PELICAN CROSSING

REMOVE PEDESTRIAN REFUGE

WIDEN ENTRY WIDTH AND EXTEND FLARE

WIDEN ENTRY WIDTH AND EXTEND FLARE

35
37
38
326
259
261
OLD

NOTES:

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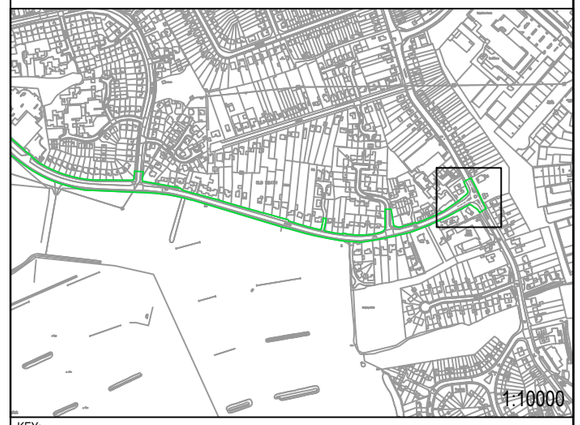

KEY:

HIGHWAY BOUNDARY

Mark	Revision	Date	Drawn	Chkd	Appd

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Drawing Issue Status

INDICATIVE

DRAFT

MIDDLEWICK TRAINING AREA
COLCHESTER
OLD HEATH ROAD/ ABBOT'S ROAD
MINI ROUNDABOUT MITIGATION SCHEME

Client

MINISTRY OF DEFENCE

Date of 1st Issue	Designed	Drawn
-	RP	RP
A3 Scale 1:250	Checked	Approved
	-	-

Drawing Number: 40472-5513-009

Revision: -

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user name: pawson, rob

File Location: \\pba.int\bir\projects\40472 - middlewick training area, colchester\technical\drawings\5513\40472-5513-009 old heath road mitigation.dwg

Appendix H AMENITIES PLAN

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
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KEY:

- ILLUSTRATIVE SITE AREA
- SCHOOLS
- SUPERMARKETS
- PETROL STATIONS
- POST OFFICES
- GP'S
- PHARMACIES

Mark	Revision	Date	Drawn	Chkd	Appd

SCALING NOTE: Do not scale this drawing - any errors or omissions shall be reported to Stantec without delay.

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Drawing Issue Status: INFORMATION

MIDDLEWICK RANGES COLCHESTER LOCAL AMENITIES

DRAFT

Client: MINISTRY OF DEFENCE

Date of 1st Issue	Designed	Drawn
02.02.20	OT	OT
A3 Scale: 1:5000	Checked: -	Approved: -
Drawing Number: 40472-5513-005	Revision: -	

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Appendix I PEDESTRIAN AND CYCLE OPPORTUNITIES

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
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4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.

KEY:

- ILLUSTRATIVE SITE AREA
- PROW
- ON ROAD CYCLE ROUTES
- OFF ROAD CYCLE ROUTES

Mark	Revision	Date	Drawn	Chkd	Appd

SCALING NOTE: Do not scale this drawing - any errors or omissions shall be reported to Stantec without delay.
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Drawing Issue Status: INFORMATION

MIDDLEWICK RANGES COLCHESTER EXISTING PEDESTRIAN AND CYCLE ROUTES

DRAFT

Client: MINISTRY OF DEFENCE

Date of 1st Issue	Designed	Drawn
02.20	OT	OT
A3 Scale 5000	Checked RP	Approved TA
Drawing Number 40472-5513-004	Revision -	

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