TECHNICAL NOTE

DATE:	24 January 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	A49 VISSIM Model Review		
PROJECT:	Peel Hall	**AUTHOR:**	MJ
CHECKED:	TL	**APPROVED:**	CEW

INTRODUCTION

WSP have been commissioned by Warrington Borough Council to provide technical advice regarding transport modelling for a development site at Peel Hall. As part of the development assessment a 2019 base Vissim microsimulation model of the A49 Corridor between A49 Winwick Link Road/Newton Road/ Winwick Park Avenue Junction and A49/ Retail Park Junction plus the M62 mainline at junction 9 has been constructed. A high level model review has been undertaken to assess the model validity and fitness for purpose. The findings are detailed in this Technical Note.

MODEL REVIEW

1. Network Layout Coding

   Network layout (numbers of lanes, lane widths, merge etc) have been checked against Google Map and Google Streetview and no major issues have been found.

2. Driving Behaviour Parameters

   We notice some roads are coded inconsistently, for example at M62 J9, the EB onslip and WB offslip are coded with a link behaviour type of 203:Slip Roads while WB onslip and EB offslip are coded as 4. Mway 2. It should be confirmed if these parameters are based on the previous validated VISSIM model developed by AECOM.

3. Signals

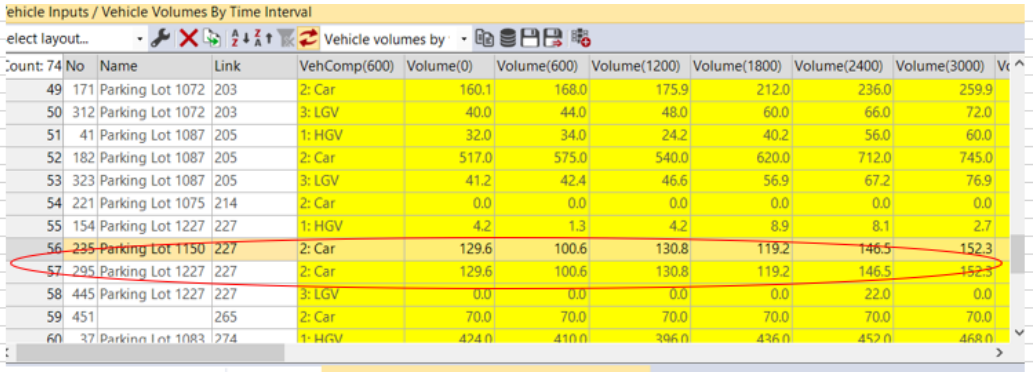
   Signals on M62 J9 should have two controllers from signal timing sheet while they have been coded in one controller in the model.

4. Speed Distributions and Speed Decisions

   Sandy Lane W free flow left turn has a desired speed distribution of 30 mph whereas the posted speed limit is 20 mph.

5. Traffic Demand

   Three vehicle classes: car, LGV and HGV have been defined in the model. In the AM peak, it seems the car demand has been doubled on one link, as shown in the screen shot below. Please check if this is an error.



Count: 74	No	Name	Link	VehComp(600)	Volume(0)	Volume(600)	Volume(1200)	Volume(1800)	Volume(2400)	Volume(3000)	Vo
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50	312	Parking Lot 1072	203	3: LGV	40.0	44.0	48.0	60.0	66.0	72.0	
51	41	Parking Lot 1087	205	1: HGV	32.0	34.0	24.2	40.2	56.0	60.0	
52	182	Parking Lot 1087	205	2: Car	517.0	575.0	540.0	620.0	712.0	745.0	
53	323	Parking Lot 1087	205	3: LGV	41.2	42.4	46.6	56.9	67.2	76.9	
54	221	Parking Lot 1075	214	2: Car	0.0	0.0	0.0	0.0	0.0	0.0	
55	154	Parking Lot 1227	227	1: HGV	4.2	1.3	4.2	8.9	8.1	2.7	
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60	37	Parking Lot 1083	274	1: HGV	424.0	410.0	396.0	436.0	452.0	468.0	

6. Simulation Parameters

   All simulation parameters in the model are acceptable. The LMVR states the model outputs are the average over ten random seeds but it is not clear what seeds have been used. From the model setting it is assumed the random seeds used in the model are: 5, 10, 15…45, 50. Please can this be confirmed.

7. Public Transport

   Bus routes and their departure times have been defined in the model. The bus timetables have not been checked against published schedules but it was noted that the departure times in AM and PM are the same.

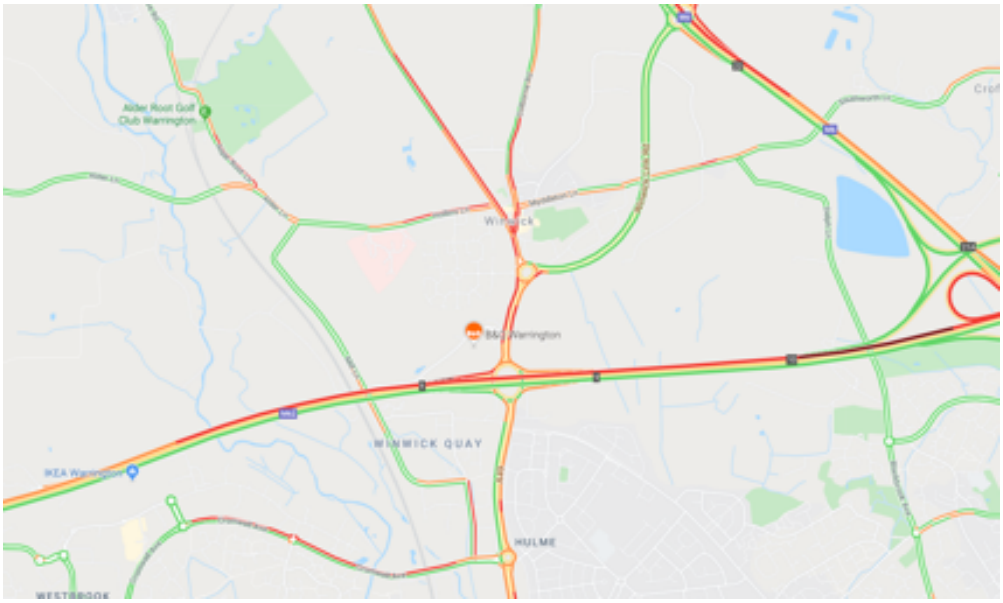
8. Observation of Model Simulation Runs

   We have checked the vehicle behaviours such as lane changing, overlapping etc and no major issues have been observed.

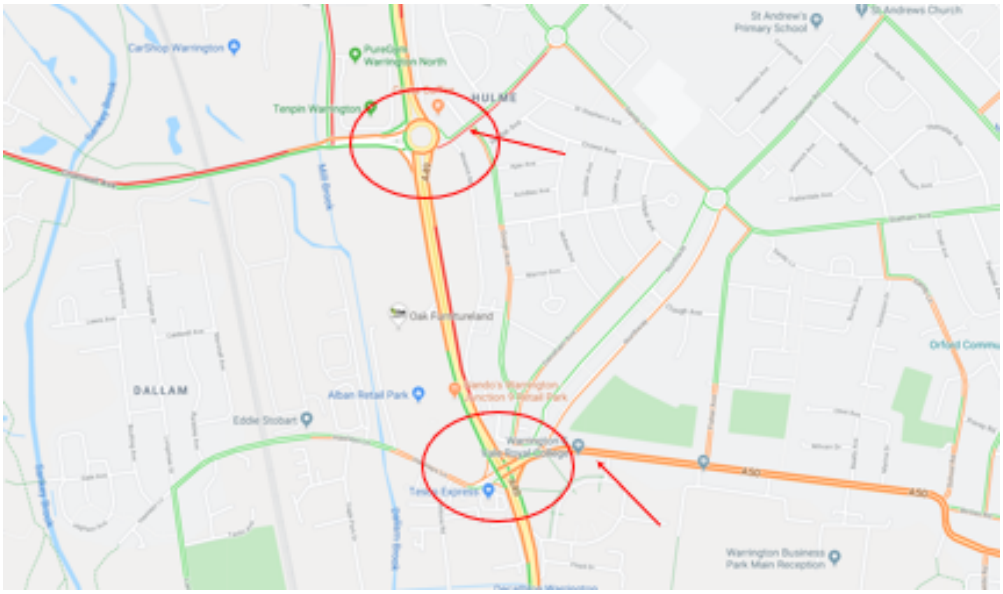
   We have also undertaken a high-level sense check against Google typical traffic conditions.

   In summary:

   a. Google Traffic shows long delays on M62 eastbound mainline and the eastbound off-slip road in the AM peak, as shown below. However, the model does not really replicate the queues. We are aware that there are currently roadworks on the M62 in this area for the implementation of smart motorways and therefore the local authority may be able to comment further on if this level of congestion is typical or just a product of temporary traffic management.



b. In both AM and PM, A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West Junction and A49 Winwick Road/ Nine Retail Park Junction are quite congested all through the peak times. The modelled queues are much shorter on Sandy Lane westbound and the A50 Long Lane westbound. These two roads along with M62 J9 are the main exits for vehicles generated by the proposed new development that this model will support so it is recommended to review the level of queuing and delay on these links in comparison to observed conditions because no journey time or queue comparison is currently included outside of the A49 corridor.



c. Significant queues have been observed on Northway in the AM model, which might be due to the potential double counting of demand we observed in Paragraph 5. If the demand is correct, we also recommend this link to be extended to show the real queue length and prevent latent demand.

9. Model Outputs

   Both AM and PM models have been run using 10 seeds and the average outputs have been compared with the modelled results (turning flows, journey times and link flows) reported in the LMVR. There are some very minor differences, which could be due to Vissim version, but in general the results can be replicated.

10. Error Message

    One error message is produced, again this might be due to the potential demand error identified in paragraph 5.

Warning	Vehicle input 235: Parking Lot 1150 could not be finished completely (remain: 106 vehicles).

SUMMARY

In summary this model has met the microsimulation modelling guidelines. Our main concerns are:

- A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West Junction, A49 Winwick Road/ A50 Junction, along with M62 J9 are the main exits for the vehicles generated by the proposed new developments. Compared with Google Traffic, the queues might be under estimated in the base model.
- Car demand on Northway (Link #227) seems to be doubled.

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07 February 2020

Dear Ben

Peel Hall Vissim Model – Base Model Review

Atkins has been commissioned by Highways England to audit a base VISSIM model and supporting Local Model Validation Report (LMVR) which has been produced by the Modelling Group on behalf of Highgate Transportation (HT) who have been commissioned by Satnam Millennium Ltd (Satnam) in support of the proposed development of land at Peel Hall in Warrington.

It should be noted at the outset that this review focuses on the parts of the network that are of interest to Highways England. As such, it cannot be said that Highways England agrees or disagrees with any part of the work that does not fall under that heading.

Basic Model Coding

The model has been built in Version 11.00.12 of the Vissim software. Although it is stated in the LMVR that this is the latest version of the software, PTV released Vissim Version 2020 in the Autumn of 2019 and it is recommended that the model is updated to this version of the software

When the model is opened it produces eight warnings with regards to discontinued vehicles. This is a function of the model being updated from Version 8 to Version 11 of the Vissim software. It is suggested that the 3D model distribution is updated so that all of the selected vehicle models are from the current database.

The model has been coded in a geographical location such that the background mapping is slightly mis-aligned to the model. This makes the detail of the network coding hard to audit and should therefore be amended.

The model has been set to a simulation resolution of 5 which is acceptable.

Use of Modifications

The model uses 12 separate modifications to reflect just the Morning and Evening Base scenarios. This is not recommended best practice and makes the model significantly more difficult to audit as well as making the scenarios longer to load. It is recommended that all of the modifications associated with the Morning Peak scenario are read into the base model and then removed from the list. Further, the modifications related to the Evening Peak scenario should be rationalised into a single modification which changes the appropriate settings from morning to evening such as the start time and flows.

For the avoidance of doubt, it would not be expected that the modelled network would be physically different between the Morning and Evening Peak scenarios without very strong justification.

Method of Assignment

The model is based on the original AECOM model which was coded using Dynamic Assignment. Although the model has been switched to a Static Assignment model, the coding associated with the original Dynamic Assignment including matrix files, parking lots, and nodes have been retained in the model making it unnecessarily complex. This coding should be removed.

It is unclear as to why the model has been converted from Dynamic to Static assignment, but it is clear from a review of the vehicle inputs and associated Static Vehicle Routes that the process has resulted in a significant drop in the number of OD pairs with flow assigned to them. It is unclear at this stage as to whether or not that will negatively impact on the model being fit-for-purpose.

Temporal Scope

The temporal scope of the model is as below:

- Morning Peak – 07:00 to 09:30
- Evening Peak – 16:00 to 18:30

A review of typical delays in Google Maps suggests that the M62 eastbound is already congested by 07:00 and that the Winnick Link suffers from some delay. In the evening, Google Maps suggests that the Winnick Link suffers from some delay. Overall, it is felt that the temporal scope is probably sufficiently robust subject to validation and calibration of the model.

Network Layout Coding

It has not been possible to check the network coding in detail due to the misalignment of the model against the background mapping. In saying that, there are areas of the model that are coded differently to the approach that Atkins would take including the bus stop laybys and the use of 'dummy' connectors at junctions. However, these differences in approach are not necessarily wrong and would not necessarily preclude the model from being fit-for-purpose noting, in particular, that buses are not the focus of this model.

We would welcome the opportunity to review the network coding in detail once the model is correctly aligned to the background.

Driving Behaviour Parameters

The majority of the network is coded as Urban Motorised as would be expected. The motorway is coded using a range of behaviour types include bespoke behaviours for the westbound carriageway and links coded to best accommodate weaving where appropriate. In general, this approach is regarded as being robust so long as the model can be validated and calibrated in these areas.

It is noted that at M62 J9, the western slip roads are coded with a link behaviour type of '203:Slip Roads' whilst the eastern slip roads are coded as '4. Mway 2'. This appears to be inconsistent and should be reviewed or justified.

It would be expected that a gradient is coded onto the off-slips at M62 J9 in order to accurately reflect the uphill gradient on the approach to the roundabout.

Traffic Flows

Notwithstanding previous comments on the assignment of the traffic, a review of the model running suggests that traffic flows around the model in a way that suggests the model is reasonably well coded. In saying that, lookback distances at the key roundabouts in the network may need reviewing in order to minimise the number of vehicles changing lane very close to the junction or within the junction itself.

It appears that the acceleration rate of some of the HGV's in the model is quite low. As such, it is recommended that the coding of the characteristics that feed into the acceleration such as 'Power' and 'Weight' as well as the 'Maximum Acceleration' and 'Maximum Deceleration' functions are reviewed against current best practice as would be default in Vissim Version 2020.

It appears that one of the 'Car' vehicle inputs, on link 227, may be coded into the model twice causing too much traffic to be loaded into the model.

Signals

A review of the signals in the model has focused on the area of main interest to Highways England, M62 J9 and the immediate junctions to the north and south. Signals on M62 J9 run using two controllers. However, they are coded in one controller in the model. Whilst not necessarily best practice, this should not negatively impact on the model's fitness for purpose.

It is noted that no operational timings were able to be acquired for M62 J9. As such, particular focus would be expected on the journey time validation through this junction in order to illustrate the appropriateness of the signal timings used.

Speed Distributions and Speed Decisions

Desired speed distributions generally appear to be fine as do the reduced speed areas. It is noted however that the Sandy Lane W free flow left turn appears to have a desired speed distribution of 30 mph whereas the posted speed limit is 20 mph.

Public Transport

Bus routes and their departure times have been defined in the model. Although bus timetables have not been checked against published schedules, it is noted that the departure times in both the Morning and Evening Peak models are the same. A review of the departure times is therefore recommended.

Calibration to Counts

For the Morning Peak, the LMVR reports the model flows for 08:00-09:00 matching only 57.1% to a GEH of less than 3. Whilst 85.7% match to a GEH of less than 5, it is noted that the model has no route choice and therefore a high match rate would be expected.

For the Evening Peak, the LMVR reports that the model flows match to a much better level.

It is suggested that the Morning Peak traffic inputs and routeing is reviewed.

Validation to Journey Times

For both peaks, the LMRV reports northbound and southbound journey times for eight sections that make up a route through the network along the A48. It would be preferable for the comfort of Highways England if additional routes through M62 J9 were also reviewed.

With regard to the Morning Peak, the overall journey times in the model when compared to the observed are -1% for the Northbound and +2% for the Southbound. These are considered acceptable. It is noted that the journey times for the section that reflects M62 J9 are +2% for the Northbound and -13% for the Southbound. The latter of this is somewhat concerning.

With regard to the Evening Peak, the overall journey times in the model when compared to the observed are 0% for the Northbound and -3% for the Southbound. These are considered acceptable. It is noted that the journey times for the section that reflects M62 J9 are +3% for the Northbound and +71% for the Southbound. The latter of this is very concerning.

In summary, whilst the overall journey times suggest the model is generally robust, the journey times for M62 J9 are of concern and it is recommended that the model is reviewed. In addition, it is recommended that additional routes are added to the model to reflect other movements at M62 J9.

Observation of Model Simulation Runs

Given the issues identified in the previous sections of this review, it is not felt productive to dwell on operational observations as the model will be updated to an extent. Notwithstanding this, it is noted that there is significant queuing on Northway in the Morning Peak model which exceeds the link length and is felt to be particularly unrepresentative. It is suggested that the priority rules and modelling of the flared approach to A50/A49 junction on the eastern arm is reviewed.

Summary

Atkins has been commissioned by Highways England to audit a base VISSIM model and supporting Local Model Validation Report (LMVR) which has been produced by the Modelling Group on behalf of Highgate Transportation (HT) who have been commissioned by Satnam Millennium Ltd (Satnam) in support of the proposed development of land at Peel Hall in Warrington.

The model looks to be overall of a reasonable standard. However, a number of issues have been noted through this review which should be addressed so that the model can be reviewed and agreed as being fit-for-purpose.

Yours faithfully

Gavin Coupe

TECHNICAL NOTE

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PROJECT:	Peel Hall	**AUTHOR:**	MJ
CHECKED:	TL	**APPROVED:**	CEW

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MODEL REVIEW

1. Network Layout Coding

   Network layout (numbers of lanes, lane widths, merge etc) have been checked against Google Map and Google Streetview and no major issues have been found.

2. Driving Behaviour Parameters

   We notice some roads are coded inconsistently, for example at M62 J9, the EB onslip and WB offslip are coded with a link behaviour type of 203:Slip Roads while WB onslip and EB offslip are coded as 4. Mway 2. It should be confirmed if these parameters are based on the previous validated VISSIM model developed by AECOM.

   Response 2: All link coding has been left as per the original AECOM model/s – there was a lot of different bespoke behaviours set up in that model and it seemed best to leave alone as we hadn't been involved in the original decision making processes.

3. Signals

   Signals on M62 J9 should have two controllers from signal timing sheet while they have been coded in one controller in the model.

   Response 3: This was judged to make no real material difference to the running of the signals at the junction and was considered best to leave as per the validated original model.

4. Speed Distributions and Speed Decisions

   Sandy Lane W free flow left turn has a desired speed distribution of 30 mph whereas the posted speed limit is 20 mph.

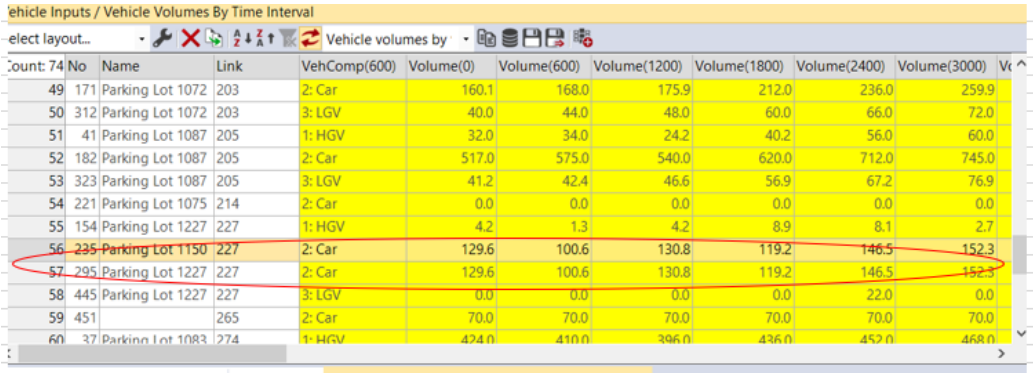
   Response 4: As the speed is set to the posted 20mph as soon as traffic goes around the corner onto Sandy Lane West, there must have been a good reason for this very short section (44m exiting the

roundabout, 22m approaching the roundabout) to do with calibration of the original model, quite possibly resultant of site observations in 2015. It was considered best to leave as per the original model.

5. Traffic Demand

   Three vehicle classes: car, LGV and HGV have been defined in the model. In the AM peak, it seems the car demand has been doubled on one link, as shown in the screen shot below. Please check if this is an error.

   Response 5: This was indeed an error on our part and has now been corrected.



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60	37	Parking Lot 1083	274	1: HGV	424.0	410.0	396.0	436.0	452.0	468.0	

6. Simulation Parameters

   All simulation parameters in the model are acceptable. The LMVR states the model outputs are the average over ten random seeds but it is not clear what seeds have been used. From the model setting it is assumed the random seeds used in the model are: 5, 10, 15…45, 50. Please can this be confirmed.

   Response 6: This has now been updated in the amended LMVR

7. Public Transport

   Bus routes and their departure times have been defined in the model. The bus timetables have not been checked against published schedules but it was noted that the departure times in AM and PM are the same.

   Response 7: This is as per the provided AECOM model

8. Observation of Model Simulation Runs

   We have checked the vehicle behaviours such as lane changing, overlapping etc and no major issues have been observed.

   We have also undertaken a high-level sense check against Google typical traffic conditions.

   In summary:

   a. Google Traffic shows long delays on M62 eastbound mainline and the eastbound off-slip road in the AM peak, as shown below. However, the model does not really replicate the queues. We are aware that there are currently roadworks on the M62 in this area for the implementation of smart

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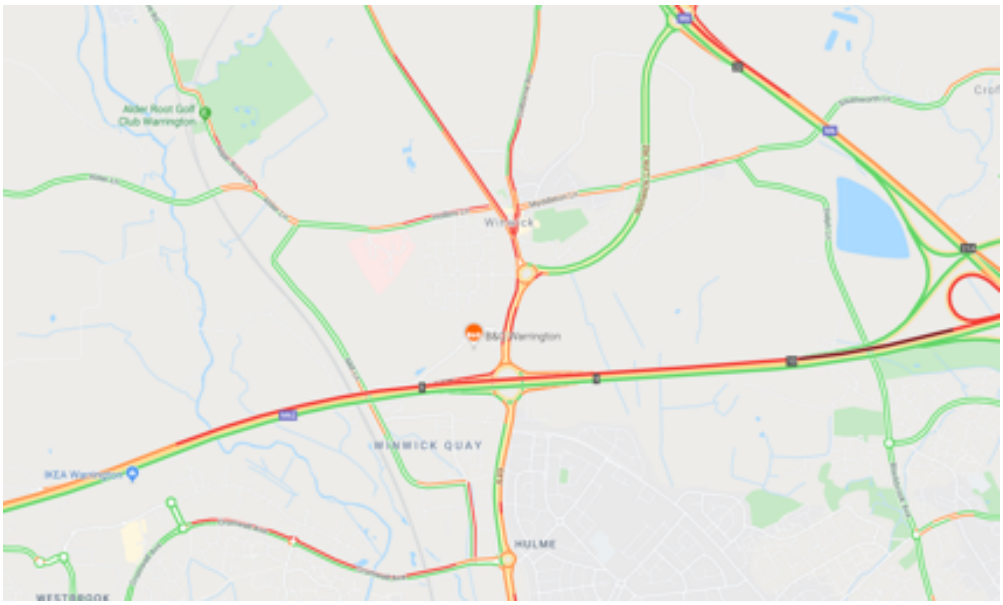
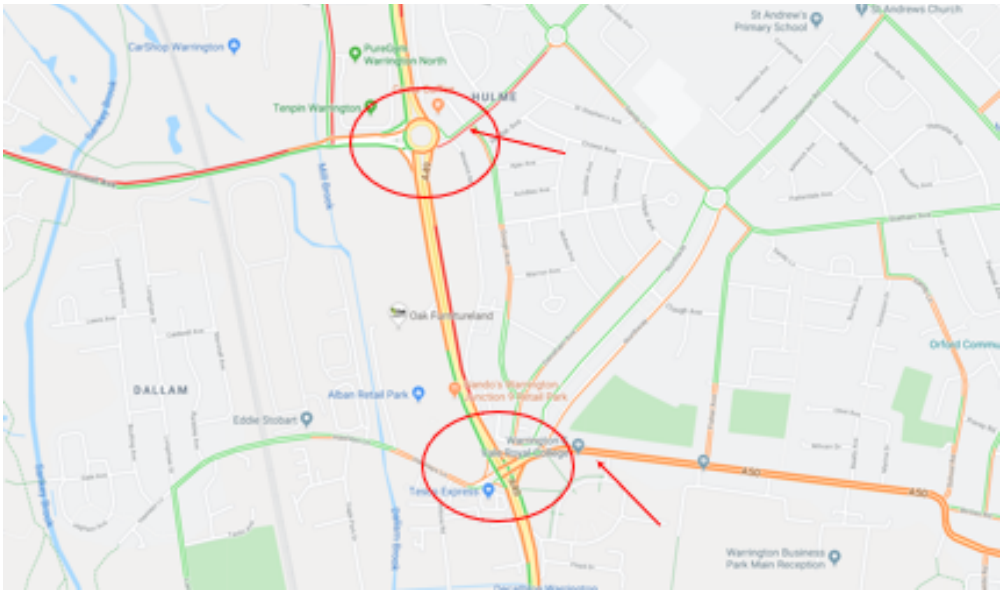


b. In both AM and PM, A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West Junction and A49 Winwick Road/ Nine Retail Park Junction are quite congested all through the peak times. The modelled queues are much shorter on Sandy Lane westbound and the A50 Long Lane westbound. These two roads along with M62 J9 are the main exits for vehicles generated by the proposed new development that this model will support so it is recommended to review the level of queuing and delay on these links in comparison to observed conditions because no journey time or queue comparison is currently included outside of the A49 corridor. **See summary**



c. Significant queues have been observed on Northway in the AM model, which might be due to the potential double counting of demand we observed in Paragraph 5.

Response 8c: This is as a result of the double counting mentioned

If the demand is correct, we also recommend this link to be extended to show the real queue length and prevent latent demand.

9. Model Outputs

   Both AM and PM models have been run using 10 seeds and the average outputs have been compared with the modelled results (turning flows, journey times and link flows) reported in the LMVR. There are some very minor differences, which could be due to Vissim version, but in general the results can be replicated.

10. Error Message

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SUMMARY

In summary this model has met the microsimulation modelling guidelines. Our main concerns are:

- A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West Junction, A49 Winwick Road/ A50 Junction, along with M62 J9 are the main exits for the vehicles generated by the proposed new developments. Compared with Google Traffic, the queues might be under estimated in the base model.

- Car demand on Northway (Link #227) seems to be doubled.

Summary Audit Response Comments

- In response to the over-arching comments regarding levels of queuing and delay – this was never a full model build and validation exercise, and hopefully isn't being audited as such. A best attempt was made firstly just to check that the model operation itself seemed reasonable, which it broadly was.

- After this, using the data available, a series of checks were carried out to compare it against the most recent data available. This largely consisted of turning count and journey time data, along with some signal data, so every attempt was made to make as minor tweaks and changes as was possible (so to keep it as true to the original as possible) in order to bring the model as much in line with this.

- As the model was provided as a previously approved model by Highways England, things like the level of delay caused by elements external to the model (i.e. M62 eastbound) were left as per the original modelling.

- Equally, in regard to the note about delays on entry links such as Sandy Lane etc - there is no data to suggest a need to change the original network coding, and the volume and journey time calibration has been fairly balanced considering it is made up of hybrid sources - it can only be assumed that any additional delay showing up on Big Data sources such as Google Traffic must be resultant of different/ additional/ suppressed traffic demand. As all future year testing will have its demand drawn from an approved strategic traffic model of the area, this seems to be a moot point in any event.

MODELLING GROUP

Base Modelling Report

MG0123 – A49 Corridor VISSIM, Warrington

Luke Best

10 January 2020

DOCUMENT CONTROL ISSUE SHEET

Project & Document Details

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Project Number	MG0123
Document Title	Base Modelling Report
Document Reference	Version 2

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Issue Control

Issue	Date	Author	Contributors	Authorisation	
				Approved	Date
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2	22/02/2020	Luke Best		Carl Moreno	22/02/2020

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1. INTRODUCTION

1.1 Background

1.1.1 BestMore Consulting Ltd (now Modelling Group Ltd) has been commissioned by Highgate Transportation to develop a microsimulation model of the A49 corridor for the area to the north of Warrington, surrounding the M62 junction 9. The aim of this model is to provide a robust platform on which the proposed development (Peel Hall) can be tested and impact upon the highway network assessed.

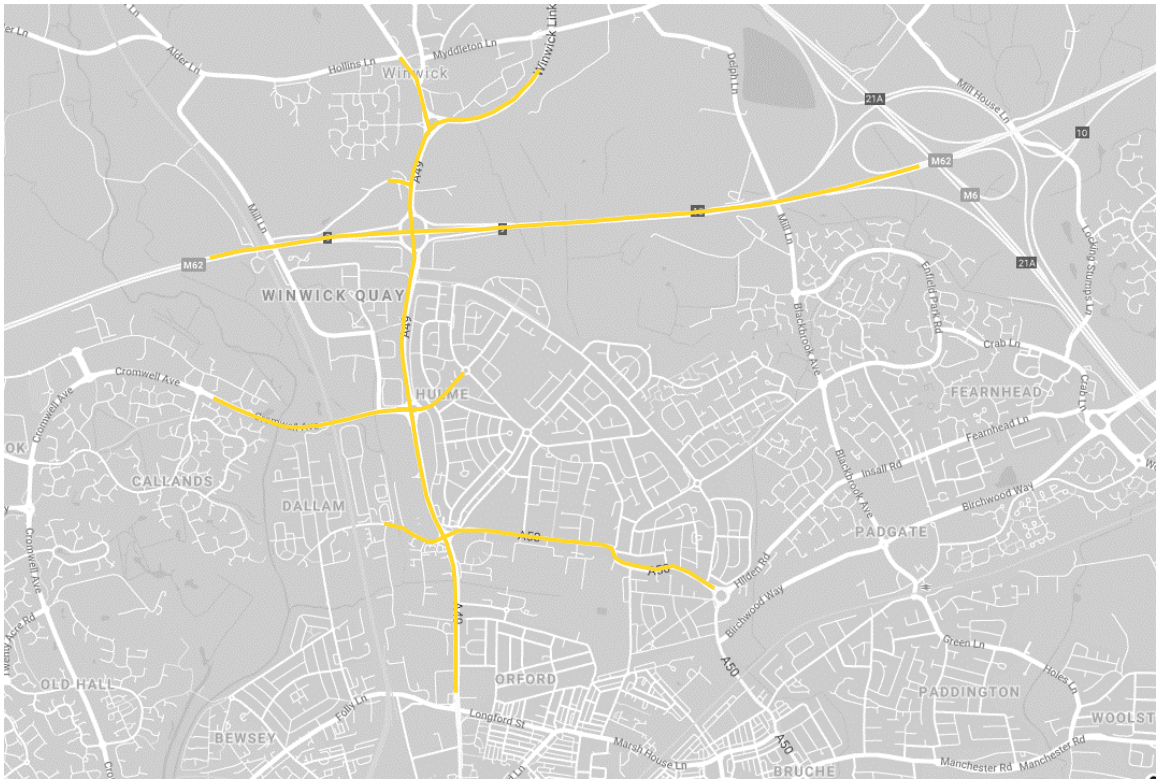

FIGURE 1.1: AREA OF INTEREST

1.2 Report Purpose

1.2.1 The following report summarises the methodology used to build and test the model, as well as the results obtained to determine the suitability of the model. For use in proposed option testing.

1.4 Report Structure

The report is structured as follows:

- Section 2: Base Model Development including details on the software used, the model extents alteration process, duration and any changes made to software parameters in line with best-practice recommendations;
- Section 3: Base Model Calibration including the comparison of previous model with newly cordoned model, as well as observed and modelled turning flows;
- Section 4: Model Validation including the comparison of observed and modelled journey times; and
- Section 5: Summary and Recommendations including a summary of the model development process and the overall suitability for future use.

2 BASE MODEL DEVELOPMENT

2.1 Previous Modelling

2.1.1 In 2017, a microsimulation model was developed by AECOM of the area surrounded by the A49 corridor to the west and the M6 to the east. The model was validated to 2015 conditions and data and included all of the main junctions and roads within the area defined in Figure 2.1. This model has been provided as a starting point for the revised model extents and model update.

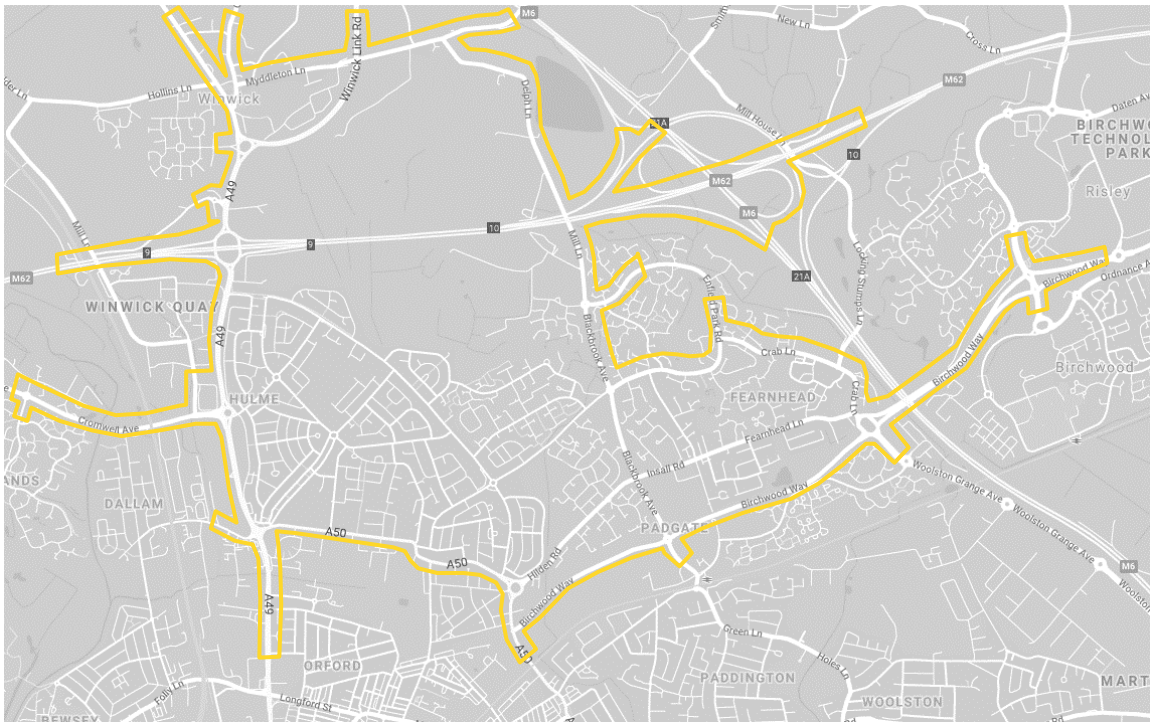

FIGURE 2.1: PREVIOUS MODEL EXTENTS

2.2 Changes to Previous Modelling

2.2.1 As the previous modelling had been carried out in an outdated version (08.00-04) of the software, it was decided to firstly update the network to the latest fully stable and tested version of the software (11.00-12). As a result of this, testing was required to ensure that key model performance indicators were comparable to the original model.

2.2.2 Tables 2.1 and 2.2 shows a comparison between turning volumes at each junction:

AM PEAK	Nodes – Average volume comparison per movement/ time period							
	VEHS (ALL)		VEHS (Car)		VEHS (LGV)		VEHS (HGV)	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
TOTAL	2112		2112		2112		2112	
GEH <=3	2106	99.7%	2106	99.7%	2108	99.8%	2112	100.0%
GEH <=5	2109	99.9%	2109	99.9%	2112	100.0%	2112	100.0%
GEH <=10	2112	100.0%	2112	100.0%	2112	100.0%	2112	100.0%

TABLE 2.1: AM SUMMARY DATA – VOLUME COMPARISON PER MOVEMENT

PM PEAK	Nodes – Average volume comparison per movement/ time period							
	VEHS (ALL)		VEHS (Car)		VEHS (LGV)		VEHS (HGV)	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
TOTAL	2112		2112		2112		2112	
GEH <=3	2107	99.8%	2107	99.8%	2112	100.0%	2112	100.0%
GEH <=5	2109	99.9%	2109	99.9%	2112	100.0%	2112	100.0%
GEH <=10	2112	100.0%	2112	100.0%	2112	100.0%	2112	100.0%

TABLE 2.2: PM SUMMARY DATA – VOLUME COMPARISON PER MOVEMENT

2.2.3 As can be seen, volumes of all vehicle types, at all junctions remained directly comparable. Analysis of journey time data was also carried out – a summary of the results is shown below in Tables 2.3 and 2.4:

AM PEAK – Travel Time Route Volumes						AM Peak – Travel Times			
GEH			Percentage Difference			Percentage Difference		Actual Difference	
Measure	Count	%	Measure	Count	%	Measure	%	Measure	%
TOTAL	99		TOTAL	99		**99** TOTAL		**99** TOTAL	
GEH <=3	99	100%	GEH <=3	97	98%	**79** <>5%	80%	**79** <>5%	86%
GEH <=5	99	100%	GEH <=5	99	100%	**85** <>10%	86%	**85** <>10%	92%
GEH <=10	99	100%	GEH <=10	99	100%	**86** <>15%	87%	**86** <>15%	96%

TABLE 2.3: AM SUMMARY DATA – TRAVEL TIME ROUTE VOLUMES & TIMES

PM PEAK – Travel Time Route Volumes						PM Peak – Travel Times			
GEH			Percentage Difference			Percentage Difference		Actual Difference	
Measure	Count	%	Measure	Count	%	Measure	%	Measure	%
TOTAL	99		TOTAL	99		**99** TOTAL		**99** TOTAL	
GEH <=3	99	100%	GEH <=3	85	86%	**82** <>5%	83%	**79** <>5%	96%
GEH <=5	99	100%	GEH <=5	93	94%	**92** <>10%	93%	**85** <>10%	100%
GEH <=10	99	100%	GEH <=10	99	100%	**96** <>15%	97%	**86** <>15%	100%

TABLE 2.4: PM SUMMARY DATA – TRAVEL TIME ROUTE VOLUMES & TIMES

2.2.4 Although there is some variation, likely as a result of revisions made default vehicle size and performance parameters, along with changes to the random seed algorithms, performance is still comparable.

2.3 Changes to Network Extents

2.3.1 As there was only a need for testing of effects to the operation of the A49 corridor itself, it was decided that it would be more efficient to cordon the network, as shown in Figure 1.1. In order to ensure that the traffic assignment remained the same, effectively frozen, the model was firstly transformed from a dynamic assignment model to a static assignment model. As there was to be no route choice in the newly cordoned area, this approach would still leave a perfectly functional model for the proposed testing.

2.3.2 In the same manner as previously, a comparison of key model performance indicators was carried out to ensure that turning volumes, route volumes and travel times were acceptably similar after the process of conversion to static assignment and cordoning of network extents and the subsequent adjustment to all vehicle routing had been completed.

2.3.3 Tables 2.5 and 2.6 show a comparison between turning volumes at each junction:

AM PEAK	Nodes – Average volume comparison per movement/ time period							
	VEHS (ALL)		VEHS (Car)		VEHS (LGV)		VEHS (HGV)	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
TOTAL	642		642		642		642	
GEH <=3	627	97.7%	627	97.7%	640	97.7%	642	100.0%
GEH <=5	638	99.4%	638	99.4%	642	100.0%	642	100.0%
GEH <=10	642	100.0%	642	100.0%	642	100.0%	642	100.0%

TABLE 2.5: AM SUMMARY DATA – VOLUME COMPARISON PER MOVEMENT

PM PEAK	Nodes – Average volume comparison per movement/ time period							
	VEHS (ALL)		VEHS (Car)		VEHS (LGV)		VEHS (HGV)	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
TOTAL	642		642		642		642	
GEH <=3	584	91.0%	582	90.7%	637	99.2%	637	99.2%
GEH <=5	614	95.6%	614	95.6%	642	100.0%	642	100.0%
GEH <=10	640	99.7%	640	99.7%	642	100.0%	642	100.0%

TABLE 2.6: PM SUMMARY DATA – VOLUME COMPARISON PER MOVEMENT

2.3.4 As can be seen, volumes of all vehicle types, at all junctions in the newly cordoned area remained almost directly comparable. Analysis of journey time data was also carried out – a summary of results is shown in Tables 2.7 and 2.8:

AM PEAK – Travel Time Route Volumes						AM Peak – Travel Times			
GEH			Percentage Difference			Percentage Difference		Actual Difference	
Measure	Count	%	Measure	Count	%	Measure	%	Measure	%
TOTAL	54		TOTAL	54		**54** TOTAL		**54** TOTAL	
GEH <=3	51	94%	GEH <=3	51	94%	**47** <>5%	87%	**52** <>5%	96%
GEH <=5	54	100%	GEH <=5	53	98%	**47** <>10%	87%	**52** <>10%	96%
GEH <=10	54	100%	GEH <=10	53	98%	**50** <>15%	93%	**52** <>15%	96%

TABLE 2.7: AM SUMMARY DATA – TRAVEL TIME ROUTE VOLUMES & TIME

TABLE 2.8: PM SUMMARY DATA – TRAVEL TIME ROUTE VOLUMES & TIME

PM PEAK – Travel Time Route Volumes						PM Peak – Travel Times			
GEH			Percentage Difference			Percentage Difference		Actual Difference	
Measure	Count	%	Measure	Count	%	Measure	%	Measure	%
TOTAL	54		TOTAL	54		**54** TOTAL		**54** TOTAL	
GEH <=3	34	63%	GEH <=3	37	69%	**39** <>5%	72%	**44** <>5%	81%
GEH <=5	46	85%	GEH <=5	43	80%	**43** <>10%	80%	**52** <>10%	96%
GEH <=10	53	98%	GEH <=10	50	93%	**49** <>15%	91%	**53** <>15%	98%

2.4 Updating of Modelled Year

2.4.1 As a result of the original inherited AECOM model having a base year of 2015, it was decided that testing needed to be carried out against an up to date dataset in order to ensure that the model was representative of current onsite conditions, and therefore a suitably robust platform for testing of proposed scenarios.

2.4.2 Manual Classified Count data had already been collected in April 2019 for the locations shown in Figure 2.2. To complement this, historical travel time data was also collated for the corridor (Streetwise - TomTom data) for neutral days (Tuesday, Wednesday & Thursday) for the month of April 2019 – shown in Figure 2.3.

FIGURE 2.2: APRIL 2019 MANUAL CLASSIFIED COUNT SITES

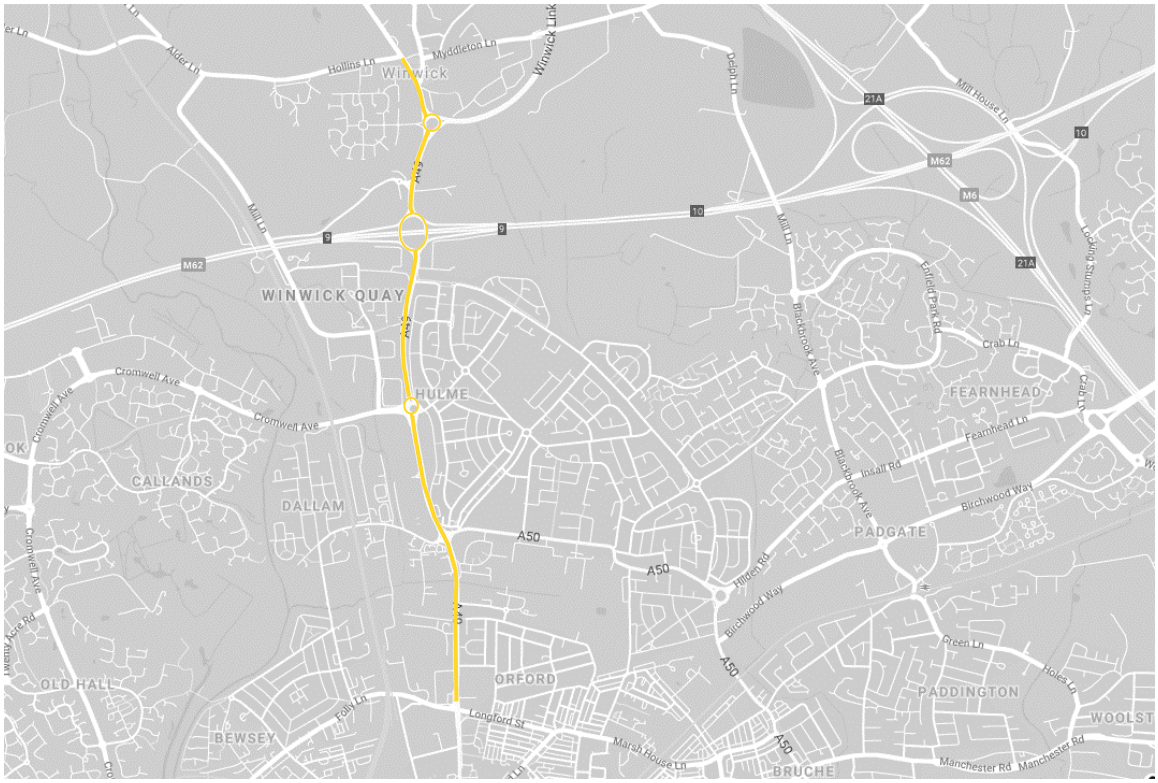

FIGURE 2.3: APRIL 2019 HISTORICAL TOMTOM DATA TRAVEL TIME ROUTE (NORTH & SOUTH)

2.4.3 However, when initial results were run, it was clear that the models did not validate well to 2019 data, meaning that there had clearly been some changes in local conditions, flow profiles and route choice in the area.

2.4.4 Tables 2.9 and 2.10 show the summary turning count validation data for the AM and PM peak models respectively. Further details can be found in Appendix A, but it was clear that some additional refining of the models would be needed in order to ensure that they were broadly representative of current conditions.

AM PEAK (08:00-09:00) TURNING COUNT VALIDATION	
Total number of counts considered	40
VISSIM model counts with GEH <=3	14
% of VISSIM counts with GEH <=3	**35.5%**
VISSIM model counts with GEH <=5	20
% of VISSIM counts with GEH <=5	**50.0%**
VISSIM model counts with GEH <=10	31
% of VISSIM counts with GEH <=10	**77.5%**
VISSIM model counts meeting WebTAG Unit 3.1 criteria	28
% of VISSIM model counts meeting WebTAG Unit 3.1 criteria	**70.0%**

TABLE 2.9: SUMMARY DATA – VOLUME COMPARISON PER MOVEMENT

PM PEAK (17:00-18:00) TURNING COUNT VALIDATION	
Total number of counts considered	40
VISSIM model counts with GEH <=3	13
% of VISSIM counts with GEH <=3	**32.5%**
VISSIM model counts with GEH <=5	21
% of VISSIM counts with GEH <=5	**52.5%**
VISSIM model counts with GEH <=10	30
% of VISSIM counts with GEH <=10	**75.0%**
VISSIM model counts meeting WebTAG Unit 3.1 criteria	25
% of VISSIM model counts meeting WebTAG Unit 3.1 criteria	**62.5%**

TABLEE 2.10: SUMMARY DATA – AVERAGE VOLUME COMPARISON PER MOVEMENT

2.5 Traffic Signals

2.5.1 The modelled network includes the following signal-controlled junctions:

- Site 1156 – Winwick Link
- Site 1150 – Delph Lane (B&Q)
- Site 1146 – M62 J9 South
- Site 1147 – M62 J9 North
- Site 1083 – Winwick Road/ Cromwell Avenue
- Site 1204 – Calver Road
- Site 1216 – J9 Retail Park
- Site 1077 – Long Lane

2.5.2 As the existing signal controllers in the model were set-up as fixed time controllers, this same set-up has been carried through to the updated models. Warrington UTMC has provided some updated controller specification and average stage and cycle time captures, which has been used to modify the signal controllers where necessary to aid in achieving validation.

2.6 Model Assignment

2.6.1 The network modelled has no real route choice as the focus is on the A49 corridor. As a result, and as a result of the methodology to freeze the previous 2015 assignment volumes into the model during the cordoning exercise, the model has been setup using static routing assignment.

2.6.2 During the process to convert the original model from dynamic assignment to static assignment, an option to remove any routes with less than 0.02 relative volume and/or less than 2 absolute minimum volume was selected in an attempt to minimise the subsequent total amount of static routes to work with. Otherwise though, all routes are as per the original models.

2.7 Driving Behaviour Parameters

2.7.1 No changes were made to any of the driving behaviour parameters as per the original 2015 AECOM model set-up.

2.8 Model Specification

VISSIM Version – 11.00-12.

Base Year – 2019.

Model Time Periods

- Weekday AM – 07:00-08:00 (warm-up), 08:00-09:00 (peak period), 09:00-09:30 (cool-down).
- Weekday PM – 16:00-17:00 (warm-up), 17:00-18:00 (peak period), 18:00-18:30 (cool-down).
- Vehicle Types
- Cars
- LGVs
- HGVs
- PT Buses (static routes)

2.8.1 Results have been output with a model simulation resolution of 5-time steps / second, as per the original modelling. Random seeds were set at 5 with an increase per run of 5, as per the original models (meaning seeds 5,10, 15, 20 etc were used).

3 MODEL CALIBRATION

This section summarises the calibration process undertaken and identifies sources of traffic flow data used to check and refine the flow profiles within the VISSIM model.

3.1 Traffic Flow Sources

3.1.1 Manual classified count (MCC) surveys were undertaken on Wednesday 3rd April 2019 at the locations highlighted in Figure 3.1. These include:

- A49/ Delph Lane
- A49/ Woburn Road
- A49/ Cromwell Avenue/ Sandy Lane
- A49/ Junction Nine Retail Park
- A49/ Hawleys Lane/ Long Lane

3.1.2 Link counts (April 2019) from the Hatris Database for were checked for the sections of motorway included in the model, taken from the following site locations (see Figure 3.2):

- M62 Westbound Mainline (M62/1260B) – west of junction 9
- M62 Eastbound Mainline (M62/1260A) – west of junction 9
- M62 Westbound Mainline (M62/1270B) – east of junction 9
- M62 Eastbound Mainline (M62/1269A) – east of junction 9
- M62 Westbound Mainline (M62/1275B) – east of junction 9
- M62 Eastbound Mainline (M62/1274A) – east of junction 9
- Link from M62 Eastbound to M6 (M6/7073K)

FIGURE 3.1: AVAILABLE 2019 TRAFFIC DATA

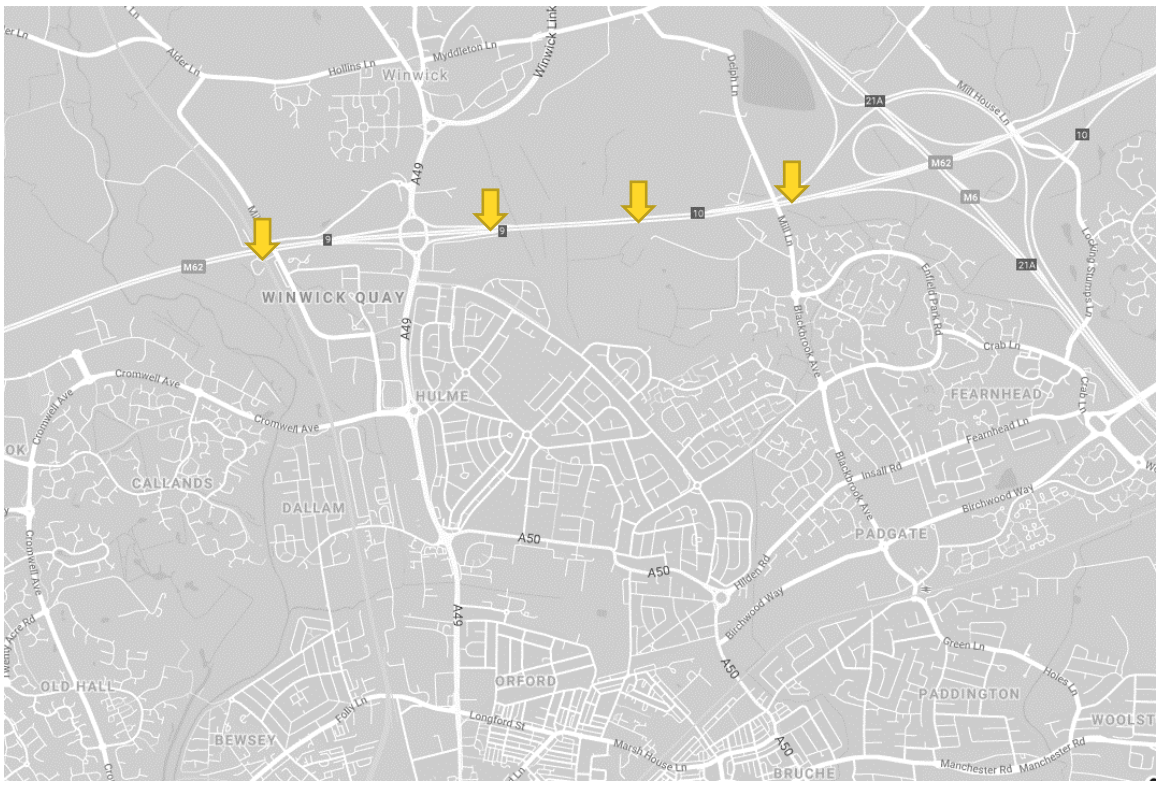

FIGURE 3.2: AVAILABLE HATRIS TRAFFIC DATA

3.2 Changes in Flows 2015 – 2019

3.2.1 Initially, it was found that at these locations traffic flows had changed, in some places considerably, between 2015 and 2019 with differences for individual movements up to 400-500 vehicles/ hour.

3.2.2 As the base model needs to be used to test in current and future years, and therefore needs to be shown to robustly represent current conditions a decision had to be made regarding how to manage this difference in flow, as described in the options below:

1. Scale up the 2015 model flow globally in an attempt to match the link counts provided, which would essentially increase either the flow or levels of congestion, or both, throughout the whole model; or
2. Limit any scaling of traffic to specific movements and key routes, in an attempt to, as far as possible, keep all other movements / proportions consistent with those in the 2015 model.

3.2.3 Option 2 above was considered the best way forward as it had the least impact on the distribution of flows around the cordoned network. This option was taken forward as current 2019 data is not available for all junctions modelled in the network. This creates the possibility of updating the model without the need for a full rebuild and validation exercise.

3.3 Traffic Compositions

As with the original models, three traffic compositions were used in the model: Cars, LGVs and HGVs. As Cars made up the vast majority of the overall volume in both peaks, tweaks to volumes and routing were primarily focussed here when carrying out the recalibration and validation exercise.

Vehicle Type	AM % Distribution	PM % Distribution
Car	83.7%	91.7%
LGV	8.4%	4.2%
HGV	7.9%	4.1%

TABLE 3.1: TRAFFIC COMPOSITION SUMMARY

3.4 Flow Calibration

The process of flow calibration has involved multiple iterations of minor adjustments to both the vehicle inputs and static routing proportions at key locations and on key routes. The calculated GEH statistic for the observed and modelled flows was considered for each of the junction turning counts in accordance with the criteria stated in WebTAG Unit 3.1. To consider day to day variation in driver behaviour, the models were run, and results averaged over ten random seeds, as per the original model specification. Table 3.2 summarises the flow calibration results.

	AM Peak	PM Peak
Criteria	08:00-09:00	17:00-18:00
85% of VISSIM counts with GEH <=3	82.5%	80.0%
85% of VISSIM counts with GEH <=5	**100.0%**	**92.5%**
100% of VISSIM counts with GEH <=10	**100.0%**	**100.0%**
85% of VISSIM counts meeting WebTAG Unit 3.1 flow criteria	**100.0%**	**100.0%**

TABLE 3.2: FLOW CALIBRATION SUMMARY

3.4.1 For transparency, completeness and robustness, these results also include a comparison against the TfL criteria for key links, using a GEH value of 3 or under. Although it has not been possible to achieve the ideal 85% count, the results still show that a strong flow calibration result has been achieved. A full breakdown of model calibration results can be found in Appendix A.

3.5 Signal Recalibration

3.5.1 Another element which was suspected to have likely changed on the ground since the 2015 model construction and validation was the traffic signal set-up and timing configuration. Subsequently, traffic signal specifications and drawings were obtained from Warrington UTMC for the following junctions:

- Site 1156 Winwick Link
- Site 1150 Delph Lane (B&Q)
- Site 1146 M62 J9 South
- Site 1147 M62 J9 North
- Site 1083 Cromwell Aveune / Winwick Road
- Site 1204 Calver Road
- Site 1216 J9 Retail Park
- Site 1077 Long Lane

3.5.2 Additionally, a capture of 1 weeks' worth of phase, stage and cycle timing data was carried out for each of the following nodes (with the exception of those highlighted):

- Site 1156 Winwick Link
- Site 1150 Delph Lane (B&Q)
- Site 1146 M62 J9 South – No comms to site
- Site 1147 M62 J9 North – No comms to site
- Site 1083 Cromwell Avenue / Winwick Road
- Site 1204 Calver Road
- Site 1216 J9 Retail Park - Unavailable due to roadworks
- Site 1077 Long Lane

3.5.3 The signal data showed that although some locations were running with exactly the same setup and timings as found in the 2015 model, most key signal controllers required timings to be recalibrated in line with current operation.

3.6 Calibration Summary

3.6.1 Overall, based on the flow comparison results highlighted in section 3.2, a good fit between observed and modelled traffic flows has been achieved.

4 MODEL VALIDATION

This section summarises the goodness of fit between modelled and observed outputs, independently collected.

4.1 Journey Time Validation

4.1.1 The journey time validation has been carried out using TomTom data collected for the network. This was chosen as it provides a high sample rate dataset which improves the overall robustness of the validation comparison. The data is provided in small link sections, so these were combined into more reasonable lengths from junction to junction in the network, which assisted the calibration of the model. The journey time data is averaged over April 2019, for Tuesdays, Wednesdays and Thursdays. The Easter break period was considered, and the date range removed from the travel time dataset (Easter holidays in Warrington were 6th April 2019 – 22nd April 2019*)

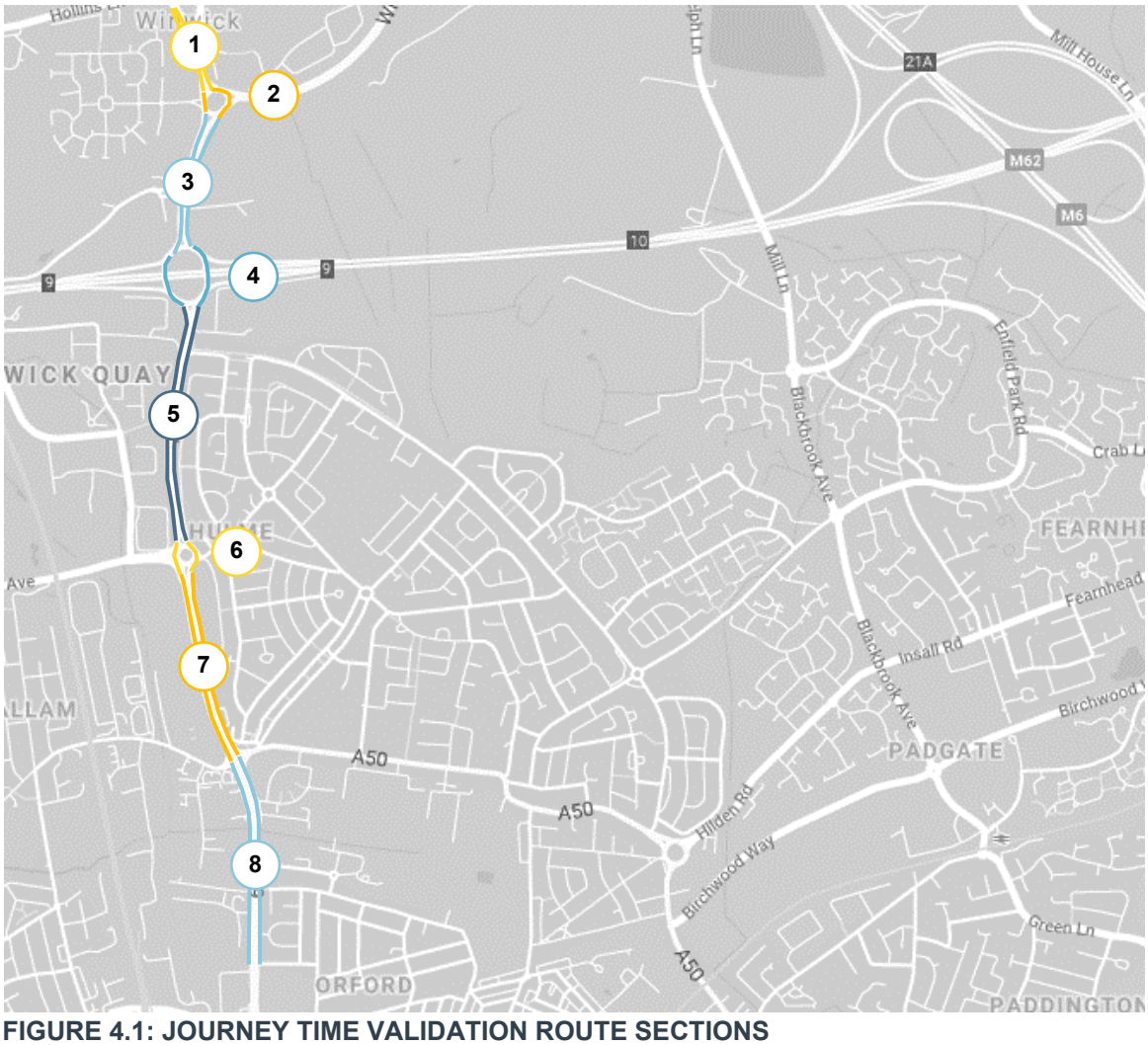

FIGURE 4.1: JOURNEY TIME VALIDATION ROUTE SECTIONS

**2019 Warrington term dates taken from www.familiesonline.co.uk – click link for details*

4.1.2 In accordance with WebTAG Unit 3.1 criteria, which recommends that the difference between observed and modelled journey times should be within 15% (or 1 minute if higher) for at least 85% of the routes evaluated (although that criteria is ideally designed for route sections over 3km in length). Tables 4.1 and 4.2 (on the following pages) shows that 24/32 route sections (75%) are within 15% and all route sections are within 60 seconds of the observed.

4.1.3 Route sections 2 and 6 are both very short in length, meaning that the percentage difference actually represents a very low actual difference, in seconds. If those sections were not considered, 23/28 route sections (82.14%) would be within 15%.

4.1.4 The total route validation (i.e. for the entire length when all route sections are combined) for the AM & PM peaks, for north and southbound traffic is within 15%.

4.1.5 In the PM peak, route section 4 southbound is slightly over 15% (20%) difference. This is as a result of performance differences resulting from modelling MOVA signals as fixed time modelled controllers. However, this still represents a relatively small average difference of 6 seconds.

4.1.6 Further details can be found in Appendix B.

4.2 Link Validation

4.2.1 The modelled flows have been compared to the motorway flows from the HATRIS Database not used in the flow calibration process. Together these provide an independent dataset to determine the robustness of the model.

	AM Peak	PM Peak
Criteria	08:00-09:00	17:00-18:00
85% of VISSIM counts with GEH <=3	42.9%	**85.7%**
85% of VISSIM counts with GEH <=5	**85.7%**	**100.0%**
100% of VISSIM counts with GEH <=10	**100.0%**	**100.0%**
85% of VISSIM counts meeting WebTAG Unit 3.1 flow criteria	**100.0%**	**100.0%**

TABLE 4.1: LINK VALIDATION SUMMARY

4.2.2 The results in Table 4.3 show that overall, for each of the peak hours modelled, the GEH is less than five for at least 85% of cases. Furthermore, WebTAG Unit 3.1 flow criteria is also met.

4.2.3 Appendix C shows the Link Validation in more detail.

4.3 Validation Summary

4.3.1 Overall, based on the journey time and link validation results above, a good fit between observed and modelled results has been achieved. Each complete A49 route validates well within the 15% criteria, with 68.75% of route sections (87.5% if very short sections are ignored) journey times compared within 15% of the observed and at least 85% of flows compared have a GEH < 5 in the AM peak. In the PM peak, each complete A49 journey time route also validates well within the 15% criteria, with 81.25% of route sections (91.25% if very short sections are ignored) journey times compared within 15% of the observed and at least 85% of flows compared have a GEH < 5.

4.3.2 Based on the fact that this model has been created from a hybrid of different data sources, considering all audit comments received regarding current levels of queuing and delay within the network (typical data drawn from current Big Data sources such as Google Traffic), it is felt that large amounts of time have been spend attempting to make the best of bridging the gaps between different sources. Spending further time making minute tweaks to traffic volume and routing data is therefore not believed to be likely to bring any real further benefit, particularly considering that all future year testing will use altered traffic flows anyway. The model is therefore considered to be fit for purpose.

TABLE 4.2: AM JOURNEY TIME VALIDATION SUMMARY

Section	Direction	Description			Observed		Modelled			AM Peak 08:00 - 09:00 Validation - Northbound				
		From	-	To	Dist.	Avg	Min	Avg	Max	Actual Diff.	% Diff.	Within 15%	Within 60 seconds	Validates
1	NB	Winwick Link Rd	-	Hollins Ln	384m	75	67	72	79	-7	-9%	✓	✓	✓
2	*NB*	*Roundabout*			*43m*	*6*	*6*	*7*	*8*	*1*	*22%*	×	✓	✓
3	NB	M62 Junction 9	-	Winwick Link Rd	447m	81	79	86	104	7	9%	✓	✓	✓
4	NB	M62 Junction 9			254m	36	35	36	40	1	3%	✓	✓	✓
5	NB	Cromwell Ave	-	M62 Junction 9	810m	68	73	74	75	6	9%	✓	✓	✓
6	*NB*	*Roundabout*			*63m*	*5*	*7*	*7*	*8*	*2*	*41%*	×	✓	✓
7	NB	Hawleys Ln	-	Cromwell Ave	645m	94	75	87	95	-2	-3%	✓	✓	✓
8	NB	Ireland St	-	Hawleys Ln	720m	104	91	92	93	1	1%	✓	✓	✓
TOTAL	**NB**	**Ireland St**	**-**	**Hollins Ln**	**3364m**	**468**	**449**	**462**	**490**	**10**	**2%**	✓	✓	✓

Section	Direction	Description			Observed		Modelled			AM Peak 08:00 - 09:00 Validation - Southbound				
		From	-	To	Dist.	Avg	Min	Avg	Max	Actual Diff.	% Diff.	Within 15%	Within 60 seconds	Validates
1	SB	Hollins Ln	-	Winwick Link Rd	356m	64	59	64	68	*16*	*24%*	×	✓	✓
2	*SB*	*Roundabout*			*110m*	*21*	*19*	*20*	*21*	*1*	*6%*	✓	✓	✓
3	SB	Winwick Link Rd	-	M62 Junction 9	492m	115	110	114	118	3	2%	✓	✓	✓
4	SB	M62 Junction 9			232m	42	36	37	38	-3	-7%	✓	✓	✓
5	SB	M62 Junction 9	-	Sandy Ln	811m	158	150	171	210	21	14%	✓	✓	✓
6	*SB*	*Roundabout*			*68m*	*11*	*10*	*11*	*12*	*4*	*39%*	×	✓	✓
7	SB	Sandy Ln	-	Long Ln	650m	144	139	159	184	*27*	*19%*	×	✓	✓
8	SB	Long Ln	-	Ireland St	725m	82	72	73	74	-11	-13%	✓	✓	✓
TOTAL	**SB**	**Hollins Ln**	**-**	**Ireland St**	**3444m**	**637**	**615**	**648**	**713**	58	9%	✓	✓	✓
												68.8%	100%	100%

TABLE 4.3: PM JOURNEY TIME VALIDATION SUMMARY

Section	Direction	Description			Observed		Modelled			AM Peak 08:00 - 09:00 Validation - Northbound				
		From	-	To	Dist.	Avg.	Min.	Avg.	Max.	Actual Diff.	% Diff.	Within 15%	Within 60 seconds	Validates
1	NB	Winwick Link Rd	-	Hollins Ln	384m	84	76	79	84	-9	-10%	✓	✓	✓
2	*NB*	*Roundabout*			*43m*	*5*	*7*	*8*	*8*	*2*	*46%*	×	✓	✓
3	NB	M62 Junction 9	-	Winwick Link Rd	447m	105	85	94	102	-5	-5%	✓	✓	✓
4	NB	M62 Junction 9			254m	40	38	42	43	4	11%	✓	✓	✓
5	NB	Cromwell Ave	-	M62 Junction 9	810m	86	79	81	84	-5	-6%	✓	✓	✓
6	*NB*	*Roundabout*			*63m*	*6*	*6*	*6*	*6*	*0*	*-2%*	✓	✓	✓
7	NB	Hawleys Ln	-	Cromwell Ave	645m	137	116	124	133	1	1%	✓	✓	✓
8	NB	Ireland St	-	Hawleys Ln	720m	251	264	283	293	11	4%	✓	✓	✓
TOTAL	**NB**	**Ireland St**	**-**	**Hollins Ln**	**3364m**	**716**	**707**	**717**	**726**	-1	0%	✓	✓	✓

Section	Direction	Description			Observed		Modelled			AM Peak 08:00 - 09:00 Validation - Southbound				
		From	-	To	Dist.	Avg.	Min.	Avg.	Max.	Actual Diff.	% Diff.	Within 15%	Within 60 seconds	Validates
1	SB	Hollins Ln	-	Winwick Link Rd	356m	64	58	60	64	1	2%	✓	✓	✓
2	*SB*	*Roundabout*			*110m*	*17*	*15*	*16*	*17*	*2*	*12%*	✓	✓	✓
3	SB	Winwick Link Rd	-	M62 Junction 9	492m	114	91	101	110	-12	-10%	✓	✓	✓
4	SB	M62 Junction 9			232m	30	49	52	55	6	20%	×	✓	✓
5	SB	M62 Junction 9	-	Sandy Ln	811m	94	79	94	100	2	2%	✓	✓	✓
6	*SB*	*Roundabout*			*68m*	*15*	*8*	*8*	*8*	*-8*	*-49%*	×	✓	✓
7	SB	Sandy Ln	-	Long Ln	650m	97	86	91	97	-2	-2%	✓	✓	✓
8	SB	Long Ln	-	Ireland St	725m	75	70	70	71	-4	-6%	✓	✓	✓
TOTAL	**SB**	**Hollins Ln**	**-**	**Ireland St**	**3444m**	**507**	**476**	**493**	**506**	-14	-3%	✓	✓	✓
												81.3%	100%	100%

5 SUMMARY & RECOMMENDATIONS

5.1.1 In summary, the results demonstrate a suitable fit between modelled and observed flows with an accurate distribution of traffic around the network, representative of a typical weekday in April 2019. Considering journey times, almost 85% of modelled sections routes are within 15% of the observed and all are within 60 seconds of the observed, and both full routes are within 15%. As such, the base models are considered an appropriate starting point to test future changes in traffic patterns.

APPENDIX A:

TURNING COUNT CALIBRATION RESULTS

AM Peak (08:00-09:00) Summary	
Total number of counts considered	40
VISSIM model counts with GEH <3	33
% of VISSIM counts with GEH <3	82.50%
VISSIM model counts with GEH <5	40
% of VISSIM counts with GEH <5	100.00%
VISSIM model counts with GEH <10	40
% of VISSIM counts with GEH <10	100.00%
VISSIM model counts meeting WebTAG Unit 3.1 criteria	40
% of VISSIM counts meeting WebTAG Unit 3.1 flow criteria	100.00%

Junction/ Movement		Vehicle Flow		Difference		GEH Criteria Met			Flow Criteria Met			
Junction	Approach	Observed	Modelled	Actual	%	Critical	GEH	Pass	FLOW	<700	700 - 2700	>2700
A49 Newton Road/ Delph Lane	A49 NB	1266	1223	-43	-3%	N	1.22	✓	✓			
	A49 NB to Delp Ln	179	189	10	6%	N	0.74	✓	✓			
	A49 SB	1699	1646	-53	-3%	N	1.30	✓	✓			
	A49 SB to Delph Ln	64	44	-20	-31%	N	2.72	✓	✓			
	Delph Ln to A49 NB	87	49	-38	-44%	N	4.61	✓	✓			
	Delph Ln to A49 SB	192	145	-47	-24%	N	3.62	✓	✓			
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	16	19	3	19%	N	0.72	✓	✓			
	A49 NB	1220	1236	16	1%	N	0.46	✓	✓			
	A49 SB	1650	1783	133	8%	N	3.21	✓	✓			
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln	154	147	-7	-5%	N	0.57	✓	✓			
	A49 SB	1277	1314	37	3%	N	1.03	✓	✓			
	A49 SB to Cromwell Ave	243	266	23	9%	N	1.44	✓	✓			
	Cromwell Ave to A49 NB	250	230	-20	-8%	N	1.29	✓	✓			
	Cromwell Ave to Sandy Ln	314	288	-26	-8%	N	1.50	✓	✓			
	Cromwell Ave to A49 SB	645	616	-29	-4%	N	1.15	✓	✓			
	Cromwell Ave to Cromwell Ave (U-turn)	55	44	-11	-20%	N	1.56	✓	✓			
	A49 NB	776	778	2	0%	N	0.07	✓	✓			
	A49 NB to Sandy Ln	71	91	20	28%	N	2.22	✓	✓			
	A49 NB to Cromwell Ave	424	426	2	0%	N	0.10	✓	✓			
	Sandy Ln to A49 NB	210	234	24	11%	N	1.61	✓	✓			
	Sandy Ln to Sandy Ln (U-turn	0	0	0	-	N	0.00	✓	✓			
	Sandy Ln to A49 SB	81	68	-13	-16%	N	1.51	✓	✓			
	Sandy Ln to Cromwell Ave	203	177	-26	-13%	N	1.89	✓	✓			
A49 Winwick Road @ Junction NINE Retail Park	A49 SB	1888	1812	-76	-4%	N	1.77	✓	✓			
	A49 SB to Junction NINE Retail	115	155	40	35%	N	3.44	✓	✓			
	A49 NB	1199	1206	7	1%	N	0.20	✓	✓			
	Junction NINE Retail to A49 SB	16	19	3	19%	N	0.72	✓	✓			
	Junction NINE Retail to A49 NB	72	77	5	7%	N	0.58	✓	✓			
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	199	202	3	2%	N	0.21	✓	✓			
	A49 SB to Long Lane	258	233	-25	-10%	N	1.60	✓	✓			
	A49 SB	1447	1411	-36	-2%	N	0.95	✓	✓			
	A49 NB to Hawleys Lane	77	43	-34	-44%	N	4.39	✓	✓			
	A49 NB to Long Lane	236	187	-49	-21%	N	3.37	✓	✓			
	A49 NB	805	820	15	2%	N	0.53	✓	✓			
	Long Lane to A49 SB	390	345	-45	-12%	N	2.35	✓	✓			
	Long Lane to Hawleys Lane	134	98	-36	-27%	N	3.34	✓	✓			
	Long Lane to A49 NB	239	233	-6	-3%	N	0.39	✓	✓			
	Hawleys Lane to Long Lane	113	90	-23	-20%	N	2.28	✓	✓			
	Hawleys Lane to A49 SB	58	53	-5	-9%	N	0.67	✓	✓			
	Hawleys Lane to A49 NB	174	167	-7	-4%	N	0.54	✓	✓			

PM Peak (17:00-18:00) Summary	
Total number of counts considered	40
VISSIM model counts with GEH <3	32
% of VISSIM counts with GEH <3	80.00%
VISSIM model counts with GEH <5	37
% of VISSIM counts with GEH <5	92.50%
VISSIM model counts with GEH <10	40
% of VISSIM counts with GEH <10	100.00%
VISSIM model counts meeting WebTAG Unit 3.1 criteria	40
% of VISSIM counts meeting WebTAG Unit 3.1 flow criteria	100.00%

Junction/ Movement		Vehicle Flow		Difference		GEH Criteria Met			Flow Criteria Met			
Junction	Approach	Observed	Modelled	Actual	%	Critical	GEH	Pass	FLOW	<700	700 - 2700	>2700
A49 Newton Road/ Delph Lane	A49 NB	1739	1684	-55	-3%	N	1.33	✓	✓			
	A49 NB to Delp Ln	203	198	-5	-2%	N	0.35	✓	✓			
	A49 SB	1273	1193	-80	-6%	N	2.28	✓	✓			
	A49 SB to Delph Ln	111	89	-22	-20%	N	2.20	✓	✓			
	Delph Ln to A49 NB	195	175	-20	-10%	N	1.47	✓	✓			
	Delph Ln to A49 SB	169	193	24	14%	N	1.78	✓	✓			
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	23	11	-12	-52%	N	2.91	✓	✓			
	A49 NB	2008	1929	-79	-4%	N	1.78	✓	✓			
	A49 SB	1345	1365	20	1%	N	0.54	✓	✓			
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln	233	168	-65	-28%	N	4.59	✓	✓			
	A49 SB	822	884	62	8%	N	2.12	✓	✓			
	A49 SB to Cromwell Ave	306	303	-3	-1%	N	0.17	✓	✓			
	Cromwell Ave to A49 NB	403	391	-12	-3%	N	0.60	✓	✓			
	Cromwell Ave to Sandy Ln	259	226	-33	-13%	N	2.12	✓	✓			
	Cromwell Ave to A49 SB	517	497	-20	-4%	N	0.89	✓	✓			
	Cromwell Ave to Cromwell Ave (U-turn)	96	81	-15	-16%	N	1.59	✓	✓			
	A49 NB	1423	1381	-42	-3%	N	1.12	✓	✓			
	A49 NB to Sandy Ln	104	89	-15	-14%	N	1.53	✓	✓			
	A49 NB to Cromwell Ave	657	672	15	2%	N	0.58	✓	✓			
	Sandy Ln to A49 NB	205	151	-54	-26%	N	4.05	✓	✓			
	Sandy Ln to Sandy Ln (U-turn	0	0	0	-	N	0.00	✓	✓			
	Sandy Ln to A49 SB	103	103	0	0%	N	0.00	✓	✓			
	Sandy Ln to Cromwell Ave	260	183	-77	-30%	N	5.17	✗	✓			
A49 Winwick Road @ Junction NINE Retail Park	A49 SB	1309	1354	45	3%	N	1.23	✓	✓			
	A49 SB to Junction NINE Retail	133	138	5	4%	N	0.43	✓	✓			
	A49 NB	1923	1956	33	2%	N	0.75	✓	✓			
	Junction NINE Retail to A49 SB	103	71	-32	-31%	N	3.43	✓	✓			
	Junction NINE Retail to A49 NB	261	201	-60	-23%	N	3.95	✓	✓			
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	189	175	-14	-7%	N	1.04	✓	✓			
	A49 SB to Long Lane	319	368	49	15%	N	2.64	✓	✓			
	A49 SB	904	871	-33	-4%	N	1.11	✓	✓			
	A49 NB to Hawleys Lane	70	46	-24	-34%	N	3.15	✓	✓			
	A49 NB to Long Lane	215	147	-68	-32%	N	5.05	✗	✓			
	A49 NB	1357	1387	30	2%	N	0.81	✓	✓			
	Long Lane to A49 SB	246	205	-41	-17%	N	2.73	✓	✓			
	Long Lane to Hawleys Lane	158	99	-59	-37%	N	5.20	✗	✓			
	Long Lane to A49 NB	298	279	-19	-6%	N	1.12	✓	✓			
	Hawleys Lane to Long Lane	134	127	-7	-5%	N	0.61	✓	✓			
	Hawleys Lane to A49 SB	65	80	15	23%	N	1.76	✓	✓			
	Hawleys Lane to A49 NB	353	409	56	16%	N	2.87	✓	✓			

APPENDIX B:

JOURNEY TIME VALIDATION RESULTS

AM Journey Time (s)

Section	0730-0745				0745-0800				0800-0815				0815-0830				0830-0845				0845-0900				0800-0900				0900-0915				0915-0930			
	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%
1 NB	113	58	-55	-49%	124	59	-65	-52%	86	65	-21	-25%	80	74	-6	-7%	74	68	-6	-8%	61	67	6	10%	75	68	-7	-9%	53	66	13	25%	49	59	9	19%
2 NB	6	6	1	11%	6	7	1	22%	6	7	1	25%	5	6	1	17%	6	6	1	15%	6	7	2	31%	6	7	1	22%	5	8	2	49%	4	5	1	23%
3 NB	112	74	-38	-34%	110	92	-18	-16%	83	104	21	25%	88	80	-8	-9%	84	79	-4	-5%	70	89	19	27%	81	88	7	9%	58	108	50	86%	67	67	0	0%
4 NB	38	35	-3	-7%	37	37	0	0%	35	39	5	13%	37	35	-2	-4%	35	35	0	0%	36	37	1	4%	36	37	1	3%	37	37	0	1%	35	33	-2	-5%
5 NB	81	73	-8	-10%	74	76	2	3%	71	74	3	4%	72	73	1	2%	64	74	10	15%	65	76	11	17%	68	74	6	9%	61	72	12	19%	63	70	6	10%
6 NB	5	7	3	53%	6	8	2	37%	5	8	3	53%	5	7	2	39%	6	8	2	37%	6	8	2	35%	5	8	2	41%	5	7	2	38%	5	7	2	29%
7 NB	94	97	2	2%	96	80	-16	-17%	91	74	-17	-19%	97	89	-8	-8%	93	107	14	15%	93	94	1	1%	94	91	-2	-3%	93	81	-12	-13%	91	88	-4	-4%
8 NB	84	88	4	5%	90	104	14	15%	95	101	6	6%	117	101	-16	-14%	104	108	5	4%	99	109	10	10%	104	105	1	1%	105	90	-15	-14%	114	85	-29	-26%
	533	438	-94.46	-18%	542	463	-79.4	-15%	472	472	0.18	0%	502	466	-35.24	-7%	464	486	21.47	5%	435	487	52.23	12%	**468**	**478**	**9.66**	**2%**	416	468	52.32	13%	430	413	-17.01	-4%

Section	0730-0745				0745-0800				0800-0815				0815-0830				0830-0845				0845-0900				0800-0900				0900-0915				0915-0930			
	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%
1 SB	71	55	-16	-22%	76	71	-4	-6%	72	78	6	8%	69	81	12	17%	59	92	33	56%	58	70	11	20%	64	80	16	24%	48	56	8	16%	47	49	3	6%
2 SB	15	18	4	26%	19	21	1	7%	22	20	-2	-9%	20	21	1	3%	22	21	-1	-4%	18	25	7	42%	21	22	1	6%	13	20	7	53%	13	17	3	25%
3 SB	89	85	-3	-4%	118	101	-18	-15%	121	117	-4	-3%	117	109	-8	-7%	130	113	-17	-13%	93	132	40	43%	115	118	3	2%	71	117	46	64%	64	85	21	33%
4 SB	25	37	11	45%	27	37	10	39%	33	37	4	11%	37	37	0	-1%	53	38	-16	-29%	45	44	-1	-1%	42	39	-3	-7%	29	44	14	48%	32	44	12	38%
5 SB	78	91	13	17%	89	110	21	24%	115	161	46	40%	146	156	10	7%	187	169	-18	-10%	187	234	47	25%	158	180	21	14%	146	279	133	91%	125	281	156	125%
6 SB	8	12	4	45%	9	13	4	44%	9	14	5	55%	10	14	4	38%	13	15	2	17%	11	16	6	52%	11	15	4	39%	11	18	7	65%	10	19	10	101%
7 SB	95	88	-7	-7%	108	119	11	10%	112	145	33	30%	148	163	15	10%	157	184	27	17%	158	191	32	20%	144	171	27	19%	144	216	72	50%	131	207	76	58%
8 SB	71	70	-1	-2%	70	72	2	3%	78	71	-6	-8%	87	71	-16	-18%	80	71	-9	-11%	84	73	-11	-13%	82	72	-11	-13%	83	71	-12	-14%	81	70	-11	-14%
	452	457	4.55	1%	516	544	28.45	6%	560	642	81.84	15%	634	651	16.86	3%	701	702	1.24	0%	653	785	132.56	20%	**637**	**695**	**58.1**	**9%**	546	820	274.83	50%	503	773	269.95	54%

PM Journey Time (s)

Section	1630-1645				1645-1700				1700-1715				1715-1730				1730-1745				1745-1800				1700-1800				1800-1815				1815-1830			
	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%
1 NB	76	68	-8	-10%	87	74	-12	-14%	86	73	-12	-15%	96	73	-23	-24%	80	80	0	0%	76	76	0	0%	84	76	-9	-10%	58	71	13	23%	49	69	21	42%
2 NB	5	7	2	41%	6	7	1	27%	6	8	2	40%	5	7	2	45%	5	7	2	49%	6	8	3	50%	5	8	2	46%	4	7	3	66%	5	7	2	45%
3 NB	105	90	-16	-15%	104	89	-14	-14%	109	98	-11	-10%	117	102	-15	-13%	95	91	-4	-4%	98	109	11	11%	105	100	-5	-5%	86	86	0	0%	69	78	9	14%
4 NB	44	40	-3	-7%	42	43	1	2%	43	40	-4	-8%	40	49	9	23%	36	45	9	24%	41	44	3	8%	40	44	4	11%	38	38	0	-1%	33	35	2	5%
5 NB	76	82	6	8%	90	87	-2	-3%	90	79	-10	-12%	87	84	-3	-4%	89	82	-6	-7%	80	78	-2	-3%	86	81	-5	-6%	75	79	4	6%	63	77	14	22%
6 NB	6	6	1	13%	7	6	-1	-11%	7	6	-1	-11%	6	6	0	-1%	6	6	0	-4%	6	6	1	11%	6	6	0	-2%	5	6	1	14%	5	6	1	13%
7 NB	117	138	21	18%	124	118	-6	-5%	157	141	-16	-10%	140	133	-8	-6%	133	133	1	0%	120	148	28	23%	137	139	1	1%	106	131	26	24%	94	115	20	22%
8 NB	240	164	-75	-31%	215	225	10	5%	290	279	-11	-4%	269	287	18	7%	235	271	35	15%	211	212	0	0%	251	262	11	4%	138	133	-5	-3%	97	93	-4	-4%
	668	595	-72.44	-11%	674	650	-23.4	-3%	787	724	-62.92	-8%	761	741	-20.25	-3%	679	716	36.76	5%	638	681	43.47	7%	**716**	**715**	**-0.7**	**0%**	509	551	41.98	8%	415	480	64.89	16%

Section	0730-0745				0745-0800				0800-0815				0815-0830				0830-0845				0845-0900				1700-1800				0900-0915				0915-0930			
	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%
1 SB	63	70	7	10%	61	60	-1	-2%	60	65	5	9%	70	64	-6	-8%	64	66	2	4%	62	64	2	4%	64	65	1	2%	54	60	6	11%	54	63	9	17%
2 SB	15	23	8	55%	16	17	1	8%	19	22	3	14%	16	18	2	13%	16	17	0	1%	16	19	3	21%	17	19	2	12%	13	16	3	26%	14	15	1	5%
3 SB	120	108	-12	-10%	118	95	-23	-19%	102	108	6	6%	127	109	-18	-14%	113	95	-18	-16%	113	96	-17	-15%	114	102	-12	-10%	76	84	8	11%	61	85	24	39%
4 SB	31	37	6	19%	30	37	7	24%	30	37	7	23%	30	37	7	21%	31	36	6	18%	30	36	6	19%	30	36	6	20%	29	36	7	26%	28	35	6	22%
5 SB	76	92	16	21%	77	91	14	18%	85	94	8	10%	81	89	8	9%	97	102	5	5%	112	101	-12	-10%	94	96	2	2%	105	98	-7	-7%	77	98	21	28%
6 SB	15	8	-7	-48%	13	8	-6	-43%	15	8	-7	-48%	14	8	-6	-45%	17	8	-9	-53%	16	8	-8	-49%	15	8	-8	-49%	15	8	-8	-50%	13	8	-5	-40%
7 SB	100	81	-19	-19%	100	93	-7	-7%	100	91	-9	-9%	94	97	3	3%	90	96	6	6%	104	98	-6	-6%	97	96	-2	-2%	97	89	-9	-9%	93	92	-1	-1%
8 SB	81	71	-10	-12%	75	70	-4	-5%	80	70	-11	-13%	76	70	-6	-8%	73	71	-2	-3%	71	72	1	1%	75	71	-4	-6%	73	71	-3	-4%	72	72	0	1%
	501	489	-12.29	-2%	490	471	-19.1	-4%	492	495	2.54	1%	508	491	-17	-3%	501	491	-10.29	-2%	524	494	-30.4	-6%	**507**	**493**	**-14**	**-3%**	462	461	-1.14	0%	411	467	55.93	14%

APPENDIX C:

HATRIS MOTORWAY COUNT VALIDATION RESULTS

		OBSERVED - AM HATRIS					
		07:00-08:00		08:00-09:00		09:00-09:30	
	#	#Veh	Mph	#Veh	Mph	#Veh	Mph
EB_M62_WestOfJ9	13	4844	53.5	4413	55	1979	58
WB_M62_WestOfJ9	14	4661	62	4337	59.3	2124	61
EB_M62_J9	15	3577	38	3150	44.8	1418	58
WB_M62_J9	16	3395	65.8	3278	62	1589	65
EB_M62_EastOfJ9	17	4291	34.8	3697	39	1676	57
WB_M62_EastOfJ9	18	3908	64.8	3940	62.5	1890	63
EB_M62-M6link	19	2065	43.8	2207	43.8	955	44

		OBSERVED - PM HATRIS					
		16:00-17:00		17:00-18:00		18:00-18:30	
	#	#Veh	Mph	#Veh	Mph	#Veh	Mph
EB_M62_WestOfJ9	13	5205	59.8	4826	61	2137	59
WB_M62_WestOfJ9	14	5658	51.8	5935	61.5	2713	62
EB_M62_J9	15	4219	59.3	3879	60	1618	60
WB_M62_J9	16	4569	53.5	4720	64	2253	64
EB_M62_EastOfJ9	17	5120	58	4748	58	1951	59
WB_M62_EastOfJ9	18	5410	52.8	5574	63	2610	63
EB_M62-M6link	19	2614	47.8	2286	54.8	979	55

		MODELLED - AM VISSIM					
		07:00-08:00		08:00-09:00		09:00-09:30	
	#	#Veh	Mph	#Veh	Mph	#Veh	Mph
EB_M62_WestOfJ9	13	4574	59.2	4292	59.7	1890	61
WB_M62_WestOfJ9	14	4642	59.4	4362	60.4	2097	61
EB_M62_J9	15	3871	57.4	3407	44.4	1574	60
WB_M62_J9	16	3979	60.4	3397	61.4	1697	61
EB_M62_EastOfJ9	17	4020	41.1	4120	38.5	1796	57
WB_M62_EastOfJ9	18	4588	57.7	4148	58.4	2003	59
EB_M62-M6link	19	1957	46.2	1987	45.9	825	56

		MODELLED - PM VISSIM					
		16:00-17:00		17:00-18:00		18:00-18:30	
	#	#Veh	Mph	#Veh	Mph	#Veh	Mph
EB_M62_WestOfJ9	13	5234	58.4	4789	59	2092	61
WB_M62_WestOfJ9	14	5566	57.9	5899	57	2505	60
EB_M62_J9	15	4392	57.4	3992	58.4	1677	61
WB_M62_J9	16	4775	59.8	4881	59.5	2009	61
EB_M62_EastOfJ9	17	4810	51.6	4498	52.9	1936	55
WB_M62_EastOfJ9	18	5347	55.9	5539	55.3	2338	58
EB_M62-M6link	19	2467	47.3	2322	52.3	1008	56

		DIFFERENCE - AM ACTUAL					
		07:00-08:00		08:00-09:00		09:00-09:30	
	#	#Veh	Mph	#Veh	Mph	#Veh	Mph
EB_M62_WestOfJ9	13	-270	5.72	-121	4.69	-89	2.7
WB_M62_WestOfJ9	14	-19	-2.6	25	1.1	-27	-0.1
EB_M62_J9	15	294	19.4	257	-0.3	156	2.3
WB_M62_J9	16	584	-5.4	119	-0.6	108	-3.3
EB_M62_EastOfJ9	17	-271	6.39	423	-0.5	120	0
WB_M62_EastOfJ9	18	680	-7.1	208	-4.1	113	-4.2
EB_M62-M6link	19	-108	2.4	-220	2.1	-130	13

		DIFFERENCE - PM ACTUAL					
		16:00-17:00		17:00-18:00		18:00-18:30	
	#	#Veh	Mph	#Veh	Mph	#Veh	Mph
EB_M62_WestOfJ9	13	29	-1.4	-37	-2	-45	1.6
WB_M62_WestOfJ9	14	-92	6.2	-36	-4.5	-208	-2.2
EB_M62_J9	15	173	-1.9	113	-1.6	59	0.7
WB_M62_J9	16	206	6.3	161	-4.5	-244	-2.7
EB_M62_EastOfJ9	17	-310	-6.4	-250	-5.1	-15	-3.6
WB_M62_EastOfJ9	18	-63	3.2	-35	-7.7	-272	-4.8
EB_M62-M6link	19	-147	-0.4	36	-2.5	29	0.6

		DIFFERENCE - AM PERCENTAGE					
		07:00-08:00		08:00-09:00		09:00-09:30	
	#	#Veh	Mph	#Veh	Mph	#Veh	Mph
EB_M62_WestOfJ9	13	-6%	11%	-3%	9%	-4%	5%
WB_M62_WestOfJ9	14	0%	-4%	1%	2%	-1%	0%
EB_M62_J9	15	8%	51%	8%	-1%	11%	4%
WB_M62_J9	16	17%	-8%	4%	-1%	7%	-5%
EB_M62_EastOfJ9	17	-6%	18%	11%	-1%	7%	0%
WB_M62_EastOfJ9	18	17%	-11%	5%	-7%	6%	-7%
EB_M62-M6link	19	-5%	5%	-10%	5%	-14%	29%

		DIFFERENCE - PM PERCENTAGE					
		16:00-17:00		17:00-18:00		18:00-18:30	
	#	#Veh	Mph	#Veh	Mph	#Veh	Mph
EB_M62_WestOfJ9	13	1%	-2%	-1%	-3%	-2%	3%
WB_M62_WestOfJ9	14	-2%	12%	-1%	-7%	-8%	-4%
EB_M62_J9	15	4%	-3%	3%	-3%	4%	1%
WB_M62_J9	16	5%	12%	3%	-7%	-11%	-4%
EB_M62_EastOfJ9	17	-6%	-11%	-5%	-9%	-1%	-6%
WB_M62_EastOfJ9	18	-1%	6%	-1%	-12%	-10%	-8%
EB_M62-M6link	19	-6%	-1%	2%	-4%	3%	1%

		DIFFERENCE - AM GEH (VOLUME)					
		07:00-08:00		08:00-09:00		09:00-09:30	
	#	#Veh	Mph	#Veh	Mph	#Veh	Mph
EB_M62_WestOfJ9	13	3.93	11%	1.83	9%	2.02	5%
WB_M62_WestOfJ9	14	0.28	-4%	0.38	2%	0.59	0%
EB_M62_J9	15	4.82	51%	4.49	-1%	4.03	4%
WB_M62_J9	16	9.62	-8%	2.06	-1%	2.66	-5%
EB_M62_EastOfJ9	17	4.20	18%	6.77	-1%	2.88	0%
WB_M62_EastOfJ9	18	10.43	-11%	3.27	-7%	2.56	-7%
EB_M62-M6link	19	2.41	5%	4.80	5%	4.36	29%

		DIFFERENCE - PM GEH (VOLUME)					
		16:00-17:00		17:00-18:00		18:00-18:30	
	#	#Veh	Mph	#Veh	Mph	#Veh	Mph
EB_M62_WestOfJ9	13	0.40	-2%	0.53	-3%	0.98	3%
WB_M62_WestOfJ9	14	1.23	12%	0.47	-7%	4.07	-4%
EB_M62_J9	15	2.64	-3%	1.80	-3%	1.45	1%
WB_M62_J9	16	3.01	12%	2.32	-7%	5.29	-4%
EB_M62_EastOfJ9	17	4.40	-11%	3.68	-9%	0.34	-6%
WB_M62_EastOfJ9	18	0.86	6%	0.47	-12%	5.47	-8%
EB_M62-M6link	19	2.92	-1%	0.75	-4%	0.92	1%

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07 February 2020

Dear Ben

Peel Hall Vissim Model – Base Model Review

Atkins has been commissioned by Highways England to audit a base VISSIM model and supporting Local Model Validation Report (LMVR) which has been produced by the Modelling Group on behalf of Highgate Transportation (HT) who have been commissioned by Satnam Millennium Ltd (Satnam) in support of the proposed development of land at Peel Hall in Warrington.

It should be noted at the outset that this review focuses on the parts of the network that are of interest to Highways England. As such, it cannot be said that Highways England agrees or disagrees with any part of the work that does not fall under that heading.

Basic Model Coding

The model has been built in Version 11.00.12 of the Vissim software. Although it is stated in the LMVR that this is the latest version of the software, The statement reads "…update the network to the **latest fully stable and tested version** of the software…" PTV released Vissim Version 2020 in the Autumn of 2019 and it is recommended that the model is updated to this version of the software As the work was started before this point it would not be good practice to swap versions. Our standard practice is always that we do not immediately start using the latest version of VISSIM until we have completed rigorous in-house testing has been completed, as past early release versions have almost always been found to contain a lot of 'bugs' and other issues. An update to another version of the software would create unacceptable delays to the assessment programme, for no discernible benefit.

When the model is opened it produces eight warnings with regards to discontinued vehicles. This is a function of the model being updated from Version 8 to Version 11 of the Vissim software. It is suggested that the 3D model distribution is updated so that all of the selected vehicle models are from the current database. This has now been updated.

The model has been coded in a geographical location such that the background mapping is slightly mis-aligned to the model. This makes the detail of the network coding hard to audit and should therefore be amended. The model is in the geographical location which AECOM coded it in. This exercise has not been to build the model, but to cordon what previously used and agreed. Google mapping can be used for reference in this case.

The model has been set to a simulation resolution of 5 which is acceptable.

Use of Modifications

The model uses 12 separate modifications to reflect just the Morning and Evening Base scenarios. This is not recommended best practice and makes the model significantly more difficult to audit as well as making the scenarios longer to load. The model only takes seconds to open – perhaps Atkins need to explain this point further. It is recommended that all of the modifications associated with the Morning Peak scenario are read into the base model and then removed from the list. Further, the modifications related to the Evening Peak scenario should be rationalised into a single modification which changes the appropriate settings from morning to evening such as the start time and flows. Although the recommendations are noted, there are no central UK standards that dictate the way that modification files 'should' be used. Our way of working ensures that different elements and settings can easily be used and interchanged between multiple different scenarios, rather than having to potentially repeat elements of work creating the chance for changes and errors to creep in.

For the avoidance of doubt, it would not be expected that the modelled network would be physically different between the Morning and Evening Peak scenarios without very strong justification. We would agree. It is quite a quick and relatively simple process to see that the modifications used do not create separate physical changes between peaks, but rather track minor input, routing and signal changes between peaks, in order to achieve calibration. This allows an auditor to see exactly what has been done to the original model, rather than if the modifications were all just read into the base which has the potential to obscure/ provide less transparency, regarding the process taken.

Method of Assignment

The model is based on the original AECOM model which was coded using Dynamic Assignment. Although the model has been switched to a Static Assignment model, the coding associated with the original Dynamic Assignment including matrix files, parking lots, and nodes have been retained in the model making it unnecessarily complex. This coding should be removed. There is no complexity, once the model is a static model, all dynamic assignment elements are ignored. Nodes are used for evaluation purposes, so cannot be removed, parking lots and matrices are turned off/ ignored.

It is unclear as to why the model has been converted from Dynamic to Static assignment This is a process which was clearly laid out in the provided methodology document in November 2019., but it is clear from a review of the vehicle inputs and associated Static Vehicle Routes that the process has resulted in a significant drop in the number of OD pairs with flow assigned to them. It is unclear at this stage as to whether or not that will negatively impact on the model being fit-for-purpose. As stated in the LMVR "During the process to convert the original model from dynamic assignment to static assignment, an option to remove any routes with less than 0.02 relative volume and/or less than 2 absolute minimum volume was selected in an attempt to minimise the subsequent total amount of static routes to work with. Otherwise though, all routes are as per the original models." The 'significant drop' is due to the fact that the original models contained large volumes of routes with total volumes which were often less than 1. This is an unnecessary level of detail, and would also considerably extend the processing time of the data for no discernible benefit.
As for the comment as to whether this could "…negatively impact on the model being fit-for-purpose", this is the whole point of the comparison tables provided right at the front of the LMVR (Tables 2.1 – 2.4) which show that there is almost exactly the same level of turning vehicles and a similar level of journey time performance, as was found in the original model.

Temporal Scope

The temporal scope of the model is as below:

- Morning Peak – 07:00 to 09:30
- Evening Peak – 16:00 to 18:30

A review of typical delays in Google Maps suggests that the M62 eastbound is already congested by 07:00 and that the Winnick Link suffers from some delay. In the evening, Google Maps suggests that the Winnick Link suffers from some delay. Overall, it is felt that the temporal scope is probably sufficiently robust subject to validation and calibration of the model.

Network Layout Coding

It has not been possible to check the network coding in detail due to the misalignment of the model against the background mapping. In saying that, there are areas of the model that are coded differently to the approach that Atkins would take including the bus stop laybys and the use of 'dummy' connectors at junctions. However, these differences in approach are not necessarily wrong and would not necessarily preclude the model from being fit-for-purpose noting, in particular, that buses are not the focus of this model. This is the previously agreed model, and although it is not a method we would have used if building the model in-house, the point is whether it achieves a reasonable representation of real-world performance.

We would welcome the opportunity to review the network coding in detail once the model is correctly aligned to the background. As already set out above, this is a previous model and the background can be checked against an external source such as Google mapping

Driving Behaviour Parameters

The majority of the network is coded as Urban Motorised as would be expected. The motorway is coded using a range of behaviour types include bespoke behaviours for the westbound carriageway and links coded to best accommodate weaving where appropriate. In general, this approach is regarded as being robust so long as the model can be validated and calibrated in these areas.

It is noted that at M62 J9, the western slip roads are coded with a link behaviour type of '203:Slip Roads' whilst the eastern slip roads are coded as '4. Mway 2'. This appears to be inconsistent and should be reviewed or justified.

It would be expected that a gradient is coded onto the off-slips at M62 J9 in order to accurately reflect the uphill gradient on the approach to the roundabout. No changes were made to the provided, previously approved model driving/ link behaviour setup.

Traffic Flows

Notwithstanding previous comments on the assignment of the traffic, a review of the model running suggests that traffic flows around the model in a way that suggests the model is reasonably well coded. In saying that, lookback distances at the key roundabouts in the network may need reviewing in order to minimise the number of vehicles changing lane very close to the junction or within the junction itself. Whilst it is agreed that some elements such as lookback distances are not all entirely 'default', this is likely to be resultant of localised observations during the original model development.

It appears that the acceleration rate of some of the HGV's in the model is quite low. As such, it is recommended that the coding of the characteristics that feed into the acceleration such as 'Power' and 'Weight' as well as the 'Maximum Acceleration' and 'Maximum Deceleration' functions are reviewed against current best practice as would be default in Vissim Version 2020. Whilst it is agreed that some elements such as HGV acceleration/ power/ weight are not all entirely 'default', this, again, is likely to be resultant of localised observations during the original model development. Also, we are not working in VISSIM version 2020, so this point is not relevant.

It appears that one of the 'Car' vehicle inputs, on link 227, may be coded into the model twice causing too much traffic to be loaded into the model. This was an error which had been missed – thank you, it has now been corrected.

Signals

A review of the signals in the model has focused on the area of main interest to Highways England, M62 J9 and the immediate junctions to the north and south. Signals on M62 J9 run using two controllers. However, they are coded in one controller in the model. Whilst not necessarily best practice, this should not negatively impact on the model's fitness for purpose.

It is noted that no operational timings were able to be acquired for M62 J9. As such, particular focus would be expected on the journey time validation through this junction in order to illustrate the appropriateness of the signal timings used.

Speed Distributions and Speed Decisions

Desired speed distributions generally appear to be fine as do the reduced speed areas. It is noted however that the Sandy Lane W free flow left turn appears to have a desired speed distribution of 30 mph whereas the posted speed limit is 20 mph. As the speed is set to the posted 20mph as soon as traffic goes around the corner onto Sandy Lane West, it was assumed that there must have been a good reason for this very short section (44m exiting the roundabout, 22m approaching the roundabout) to do with calibration of the original model, most likely as a result of site observations in 2015.

Public Transport

Bus routes and their departure times have been defined in the model. Although bus timetables have not been checked against published schedules, it is noted that the departure times in both the Morning and Evening Peak models are the same. A review of the departure times is therefore recommended. This is as per the provided AECOM model

Calibration to Counts

For the Morning Peak, the LMVR reports the model flows for 08:00-09:00 matching only 57.1% to a GEH of less than 3. Whilst 85.7% match to a GEH of less than 5, it is noted that the model has no route choice and therefore a high match rate would be expected. This doesn't consider the hybrid nature of using a previously developed model, multiple sources of updated flow data, and a separate historical journey time data collection averaged over all relevant days in the month of the majority of the updated flow data. As always this is a balancing act to get the best out of the turning comparison vs the journey time data. Huge amounts of time have already been spent making smaller and smaller manual tweaks – eventually a point is reached the returns for time spent dwindle to almost nothing. This is not a point which is arrived at lightly, but it is genuinely felt that there is not value in spending further time going back and forth trying to tweak the AM model considering the combined calibration levels already achieved (which are above nationally stipulated values in any event).

For the Evening Peak, the LMVR reports that the model flows match to a much better level.

It is suggested that the Morning Peak traffic inputs and routeing is reviewed.

Validation to Journey Times

For both peaks, the LMRV reports northbound and southbound journey times for eight sections that make up a route through the network along the A48. It would be preferable for the comfort of Highways England if additional routes through M62 J9 were also reviewed.

With regard to the Morning Peak, the overall journey times in the model when compared to the observed are -1% for the Northbound and +2% for the Southbound. These are considered acceptable. It is noted that the journey times for the section that reflects M62 J9 are +2% for the Northbound and -13% for the Southbound. The latter of this is somewhat concerning.

With regard to the Evening Peak, the overall journey times in the model when compared to the observed are 0% for the Northbound and -3% for the Southbound. These are considered acceptable. It is noted that the journey times for the section that reflects M62 J9 are +3% for the Northbound and +71% for the Southbound. The latter of this is very concerning. This section is 232m long – the 'very concerning' 71% which has been highlighted here represents 21 seconds. This draws attention to the fact that these standards were never designed for very small sections (the original criteria for journey time validation was meant for routes of at least 3km).

In summary, whilst the overall journey times suggest the model is generally robust, the journey times for M62 J9 are of concern and it is recommended that the model is reviewed. In addition, it is recommended that additional routes are added to the model to reflect other movements at M62 J9.

Observation of Model Simulation Runs

Given the issues identified in the previous sections of this review, it is not felt productive to dwell on operational observations as the model will be updated to an extent. Notwithstanding this, it is noted that there is significant queuing on Northway in the Morning Peak model which exceeds the link length and is felt to be particularly unrepresentative. It is suggested that the priority rules and modelling of the flared approach to A50/A49 junction on the eastern arm is reviewed. This is entirely resultant of the double counting which your auditing highlighted, and which has now been corrected.

Summary

Atkins has been commissioned by Highways England to audit a base VISSIM model and supporting Local Model Validation Report (LMVR) which has been produced by the Modelling Group on behalf of Highgate Transportation (HT) who have been commissioned by Satnam Millennium Ltd (Satnam) in support of the proposed development of land at Peel Hall in Warrington.

The model looks to be overall of a reasonable standard. However, a number of issues have been noted through this review which should be addressed so that the model can be reviewed and agreed as being fit-for-purpose.

There are some understandable points, but overall it is felt that this audit is unnecessarily petty and alarmist in the issues it raises. It feels that the specifics of this project have not been considered, in that using an older model, developed by a different consultant, using different practices, is never the easiest or most ideal start point. However, it is felt that when all of this history/ background is considered, along with the hybrid nature of available data used, along with the fact that all flows (and most likely signal timings) will be altered during future year testing, that actually this is a pretty decent start point for testing. Spending further time on minute details feels counter-productive and time-wasting.

Yours faithfully

Gavin Coupe

MODELLING GROUP

Access Strategy A

MG0123 – A49 Corridor VISSIM, Warrington

Luke Best
04 February 2020

DOCUMENT CONTROL ISSUE SHEET

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1. INTRODUCTION

1.1 Background

1.1.1 Modelling Group Ltd has previously developed a base-year microsimulation model of the A49 corridor for the area to the north of Warrington, surrounding the M62 junction 9. For further detailed information relating to this exercise, please refer to '*MG0123_A49WarringCorridor_BaseModellingReport_v1.2.pdf*'.

1.1.2 The aim of this model has been to provide a robust platform on which the proposed development (Peel Hall) can be tested and impact upon the highway network assessed in the future years 2022, 2027 and 2032.

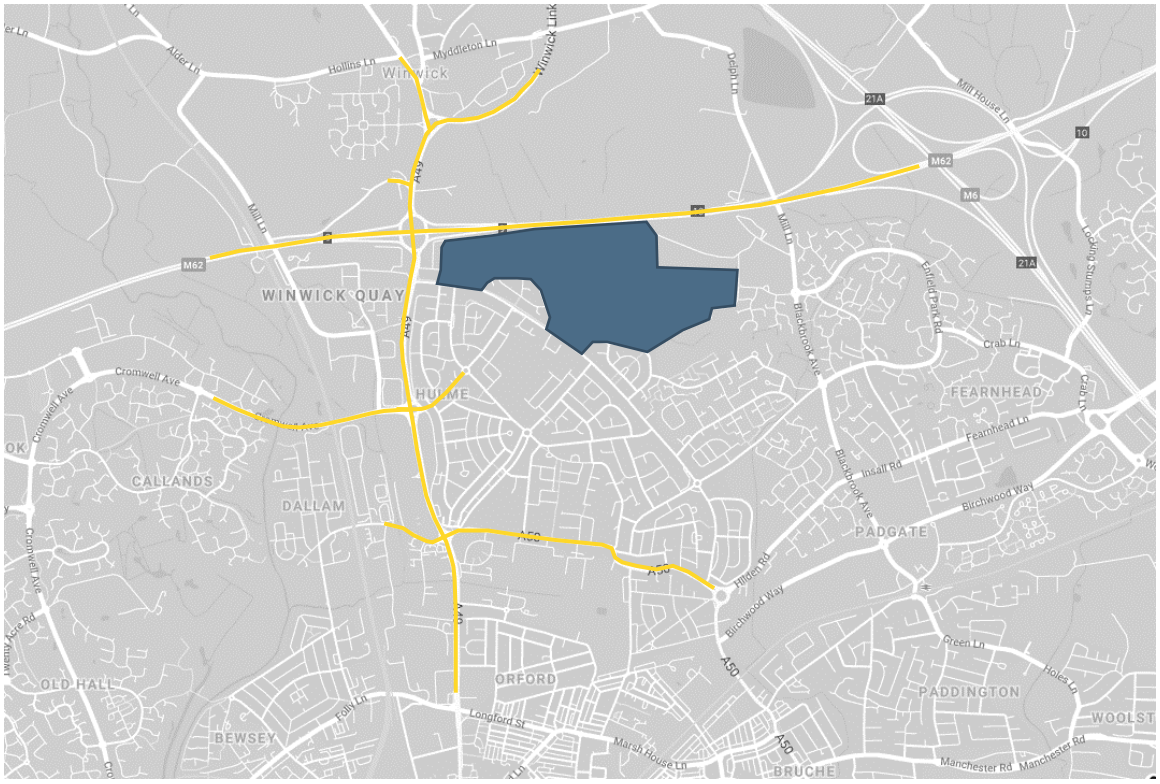


FIGURE 1.1: NETWORK EXTENTS AND APPROXIMATE LOCATION OF DEVELOPMENT

1.2 Report Purpose

1.2.1 The following report summarises the methodology used to build and test the model, as well as the results obtained to determine the comparative performance impacts of Peel Hall Access Strategy A flows within the committed future year networks, as detailed above.

1.4 Report Structure

The report is structured as follows:

- **Section 2: Methodology** including information on the model development and scenarios tested;
- **Section 3: Model Performance** including network performance statistics, queue lengths and journey times; and
- **Section 4: Summary and Recommendations.**

2 METHODOLOGY

2.1 Overview

2.1.1 The model extent used is consistent with the 2019 base model as highlighted in Figure 2.1.

2.1.2 Also consistent with the 2019 base year modelling, the 2022, 2027 and 2032 models are modelled to cover a 2.5-hour period, for the AM and PM traffic peaks.

2.1.3 In the AM, this period covers 07:00-09:30, with an hour 'warm-up' from 07:00-08:00, and a half-hour 'cool-down' from 09:00-09:30. In the PM, this period covers 16:00-18:30, with an hour 'warm-up' from 16:00-17:00, and a half-hour 'cool-down' from 18:00-18:30.

2.1.4 The model has been developed using the same version of the software as used for the validated base model (PTV VISSIM 11.00-12). Results have been output with a model resolution of 5-time steps per second, as was used in the base model. The same random seeds have also been used (starting from 5, increasing by 5 each run, for 10 runs).

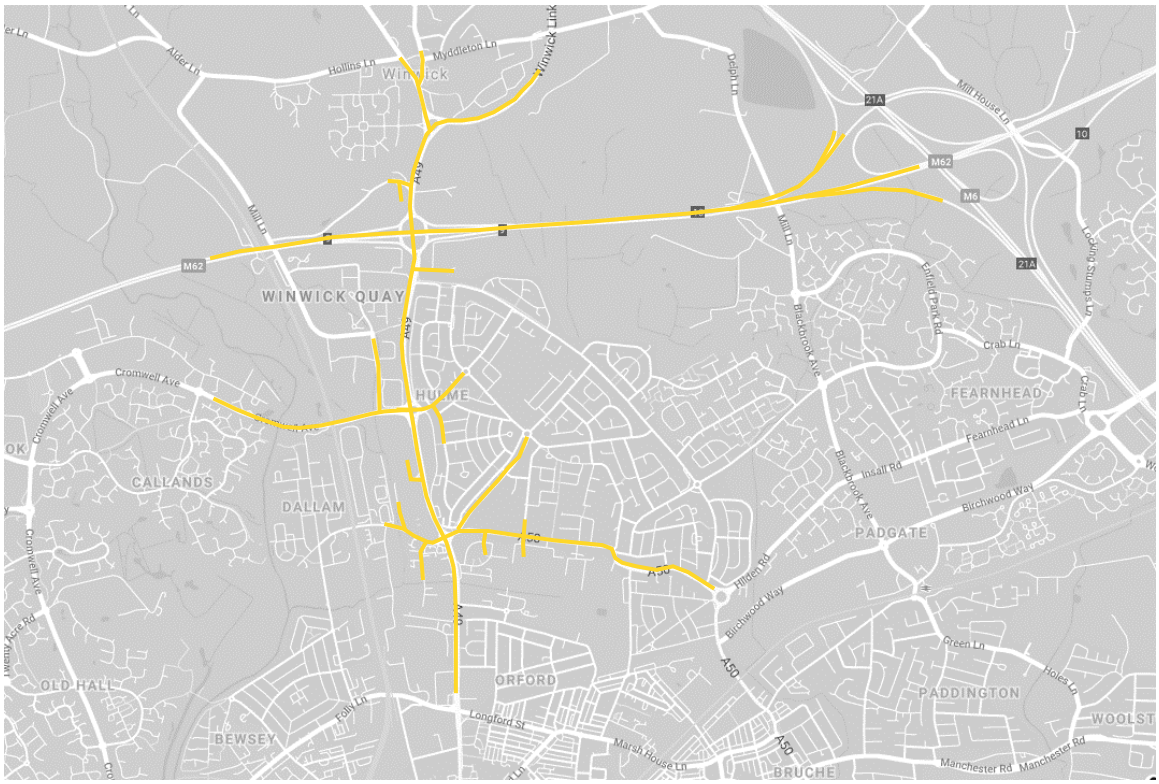


FIGURE 2.1: VALIDATED 2019 MODEL EXTENTS

2.2 Scenarios Tested

2.2.1 The scenarios tested in the model were:

- 2022 Do Minimum (Reference Case)
- 2022 Do Something (Full Development Scenario)
- 2027 Do Minimum (Reference Case)
- 2027 Do Something (Full Development Scenario)
- 2032 Do Minimum (Reference Case)
- 2032 Do Something (Full Development Scenario)

2.2.2 The flows for each scenario were provided by Highgate Transportation in the spreadsheet '*Peel Hall Access Strategy A - Flow Diagram Spreadsheet - REISSUE 200120.xlsm*'. The flow diagrams within this were developed using the SATURN model (WMMTM16) outputs provided by AECOM.

2.2.3 In order to ensure a fully transparent and traceable process in the conversion of these flows into a useable format for entry into the VISSIM models, the matrices creation module in LinSig 3 was used to develop Origin-Destination matrices for each vehicle type.

2.2.4 The current model area does not have any route choice, hence the choice of LinSig was considered appropriate to evaluate the routing for both lights and heavies. A total of 15 different scenarios for Lights and Heavies have been processed. A skeleton model of the area was constructed and turning counts were imported at each junction for validation purposes.

2.2.5 Flow consistency checks were undertaken on the SATURN flow diagrams provided to make sure that the number of vehicles leaving one junction were equal to the number of vehicles entering the next one. It was concluded that the flow provided was consistent and could be used for flow estimation in LinSig. Traffic data was processed by LinSig and it was concluded that 100% of the GEH values for all scenarios were below a threshold of 3.

2.2.6 The LinSig model has been provided for review as part of the final model submission for Option A, and is detailed further in Appendix B.

2.3 Network Development

2.3.1 Several changes have been made to the model network to reflect planned improvements in the area. These include:

- **A49 Newton Road/ Winwick Link Road Junction (Winwick Island)** – Widening of the northbound and southbound approaches on Newton Road, widening of the westbound approach from Winwick Link Road including the creation of a segregated left turn lane. Also included, is widening of the circulatory carriageway.
- **A49 Newton Road / Delph Lane Junction** – Additional lane for Newton Road northbound, including widened exit merge.
- **A49 Winwick Road/ Junction Nine Retail Park Junction** – Widening of Winwick Road northbound to facilitate a dedicated left turn lane into the retail park, Widening of Winwick Road southbound to extend the existing dedicated right turn lane into the retail park.

2.3.2 Detailed drawings used to model junction mitigations are shown in Appendix E.

2.3.3 Additional changes were also made to remove some priority rules at the roundabout, as it became apparent that the increase in overall traffic volume caused the network to 'lock up' on some model runs, in a manner which was judged to be entirely unrealistic.

2.4 Traffic Compositions

As with the original models, three primary traffic compositions were used in the models: Cars, LGVs and HGVs. However, when modelling the 'Do Something' scenario models, additional development related traffic was added as a separate vehicle type, based on the Cars composition.

3 MODEL PERFORMANCE

3.1 Overview

3.1.1 The impact of the development on the local highway network has been assessed in 2022, 2027, and 2032, using the following model outputs:

- Overall network performance statistics; including average per vehicle delay/speed, total network delay, latent demand;
- Average maximum & “average average” queue lengths at key junctions; and
- Average journey times and volumes along key routes.

3.1.2 All modelled scenario results are averaged over 10 random seed runs, to reflect daily fluctuations in arrival patterns.

3.2 Network Performance Statistics

3.2.1 This section summarises the network performance statistics. Network performance data is split into two main types – average per vehicle data, and total network statistics (taken over the peak hour).

3.2.2 Data is then further broken down as follows:

- Per Trip Average Per Vehicle Data:
  - **Delay** – defined as average time spent in a delay state (i.e. being held below desired speed due to network conditions);
  - **Stops** – defined as the average number of times each vehicle comes to a full stop;
  - **Speed** – defined as the overall average speed per trip, in miles per hour;
  - **Stopped Delay** – defined as the average amount of time spent in an unwanted, stopped state
- Total Network Data
  - **Distance** – defined as the total cumulative distance travelled by all vehicles completing trips within the peak hour;
  - **Travel Time** – defined as the total cumulative travel time of all vehicles completing trips within the peak hour;
  - **Delay Time** – defined as the total cumulative time spent in a delay state by all vehicles during the peak hour;
  - **Stops** – defined as the total cumulative number of vehicle stops within the network during the peak hour;
  - **Stopped Delay** – defined as the total cumulative amount of time spent in an unwanted, stopped state by all vehicles during the peak hour;
  - **Vehicles Active** – defined as the total number of vehicles still active within the network at the end of the peak hour;
  - **Vehicles Arrived** – defined as the total number of completed trips by the end of the peak hour;
  - **Latent Delay** – defined as the total amount of delay stored outside of the network (i.e. experienced by **Latent Demand** – see below, and therefore not counted in the **Delay Time** statistic defined above) at the end of the evaluation interval;
  - **Latent Demand** – defined as the total number of vehicles (demand) stuck outside of the network at the end of the evaluation interval (generally due to queueing and delays).

3.2.3 Tables 3.1 and 3.2 show the summary data for the AM and PM modelled peaks respectively.

3.2.4 There are two or three primary links with congestion levels which tend to lead to latent demand at the end of the peak periods (i.e. trapped outside of the network). These are:

- Golborne Road – in the morning peak, traffic struggles to access the A49 at this junction due to the high volume of right turners (in and out) combined with the high volume of northbound and southbound traffic on the A49 itself. If remedied, and using the detail found in the error files as a guide (although it is worth noting that the error files only record latent demand at the end of the model run – i.e. after the half-hour long cool-down period, whereas the summary data in tables 3.1 and 3.2 is just for the actual modelled peak, but only shows the total with no further detail) this could lead to as much 400-500 additional vehicles entering the network in the AM 2032 Do Something model. In the AM 2032 Do Minimum model, there is approximately 200 vehicles trapped outside of the network here. This is despite this entry link being extended to approximately 2.5km from the junction.
- Sandy Lane West and/ or Cromwell Avenue – The signalised roundabout junction with the A49 is a very congested junction in most future year scenarios. However, in the PM peak, there is the added complication that there is a high proportion of right-turning traffic from each of the approaches, as well as heavy ahead movements on all arms. This makes balancing fixed-time plans very difficult. As the volumes on the A49 are so high, the northbound and southbound traffic has to have a lot of priority, meaning traffic on either Cromwell Avenue or Sandy Lane West, or both, struggle to get through the junction. In 2032, this results in some latent demand.

	Average Per/Vehicle - 08:00-09:00				Total Network Statistics - 08:00-09:00								
	Delay	Stops	Speed	Stopped Delay	Distance	Travel Time	Delay Time	Stops	Stopped Delay	Vehicles Active	Vehicles Arrived	Latent Delay	Latent Demand
AM DoMin 2022	144	8	26	58	62372	5270989	2445827	139932	988752	1341	15695	939	3
AM DoSom 2022	195	10	22	85	63084	6378632	3462379	184486	1508796	1644	16075	250855	209
AM DoMin 2027	179	11	24	72	65018	6171315	3233343	195161	1298129	1467	16579	105573	129
AM DoSom 2027	203	12	22	81	65786	6788242	3773433	220861	1494284	1656	16893	259067	230
AM DoMin 2032	232	15	20	90	68507	7555407	4469041	288945	1726514	1699	17586	140302	160
AM DoSom 2032	282	17	18	114	69255	8797932	5620567	342031	2273726	2113	17848	431226	334

TABLE 3.1: AM PEAK NETWORK PERFORMANCE STATISTICS SUMMARY

	Average Per/Vehicle - 17:00-18:00				Total Network Statistics - 17:00-18:00								
	Delay	Stops	Speed	Stopped Delay	Distance	Travel Time	Delay Time	Stops	Stopped Delay	Vehicles Active	Vehicles Arrived	Latent Delay	Latent Demand
PM DoMin 2022	106	3	29	57	63419	4908340	1996392	58286	1069227	1359	17473	1357	0
PM DoSom 2022	126	4	26	64	64776	5527084	2485479	71876	1251305	1541	18135	5880	0
PM DoMin 2027	100	3	30	52	66713	5063540	1998446	56795	1031286	1379	18531	23684	16
PM DoSom 2027	143	5	25	73	67798	6151377	2972079	100662	1516812	1683	19036	150179	106
PM DoMin 2032	112	3	28	58	70417	5596665	2363268	69767	1223348	1503	19567	54959	40
PM DoSom 2032	174	6	22	93	71047	7125402	3805499	133757	2034172	2001	19916	288881	184

TABLE 3.2: PM PEAK NETWORK PERFORMANCE STATISTICS SUMMARY

3.3 Queue Length Comparison

3.3.1 Average absolute maximum queue lengths (i.e. the average of the single largest queue lengths to occur at any point during each of the seed runs), and “average average” (i.e. the average of the queue lengths over the entire peak period, averaged for all seed runs) have been analysed at the following junctions:

- A49 Newton Road / Winwick Park Avenue / Winwick Link Road
- A49 Newton Road / Delph Lane
- M62 Junction 9
- A49 Winwick Road / Birch Avenue
- A49 Winwick Road / Poplars Avenue
- A49 Winwick Road / A574 Cromwell Avenue / Sandy Lane West
- A49 Winwick Road / Junction NINE Retail Park
- A49 Winwick Road / Hawleys Lane / A50 Long Lane

3.3.2 Queue lengths have been extracted for comparison during the AM peak (08:00-09:00) period and PM peak (17:00-18:00) periods.

3.3.3 When analysing the figures, it is worth noting that VISSIM collects queue lengths from a given marker extending backwards along the link until it reaches another queue marker. Hence, where there are junctions close together the queue lengths are capped at the distance between the junctions. This can be misleading – as such, queue outputs should be read in conjunction with journey time results to gain a full understanding of scenario differences.

3.3.4 Tables 3.3 and 3.4 summarise the AM peak average and average maximum queue comparisons respectively. There are some more notable increases to maximum queue lengths for traffic on the eastbound off-slip from the M62 which are reasonably consistent in all scenarios. When watching the model, it is clear this is just down to the slightly non-responsive nature of the signal controller within the model, which has been created as a fixed time controller. As a result, it is likely that the numbers shown very much represent a worst-case scenario, as the signals onsite run under MOVA control. The queueing vehicles are always well contained within the link stacking capacity (of approximately 315m within the model – maximum queue lengths are approximately 200m in all Do Something scenarios).

3.3.5 To the south of M62 Junction 9, the worst impacts are seen on the Sandy Lane West approach to the A49 Winwick Road / A574 Cromwell Avenue / Sandy Lane West roundabout. There was a need to extend the link length for Sandy Lane West (from approximately 300m in reality, to almost 1500m), in an attempt to get all traffic loaded into the model.

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	14	17	4	26%	17	23	6	38%	25	49	24	96%
	A49 NB	14	17	4	26%	17	23	6	38%	25	49	24	96%
	A49 NB to Winwick Link Rd	14	17	4	26%	17	23	6	38%	25	49	24	96%
	Winwick Park Ave to A49 NB	4	5	0	2%	5	5	0	0%	5	5	0	0%
	Winwick Park Ave to Winwick Link Rd	4	5	0	2%	5	5	0	0%	5	5	0	0%
	Winwick Park Ave to A49 SB	4	5	0	2%	5	5	0	0%	5	5	0	0%
	A49 SB to Winwick Link Rd	51	57	6	13%	43	45	2	4%	41	32	-9	-21%
	A49 SB	51	57	6	13%	43	45	2	4%	41	32	-9	-21%
	A49 SB to Winwick Park Ave	51	57	6	13%	43	45	2	4%	41	32	-9	-21%
	Winwick Link Rd to A49 SB	2	2	0	-1%	3	3	0	-1%	4	3	0	-3%
	Winwick Link Rd to Winwick Park Ave	3	3	0	-2%	5	5	0	-1%	5	5	0	9%
	Winwick Link Rd to A49 NB	3	3	0	-2%	5	5	0	-1%	5	5	0	9%
A49 Newton Road/ Delph Lane	A49 NB	21	24	3	16%	38	57	19	50%	57	28	-29	-51%
	A49 NB to Delp Ln	21	24	3	17%	38	57	19	50%	58	29	-29	-51%
	A49 SB	44	45	1	2%	50	49	-1	-2%	61	64	3	5%
	A49 SB to Delph Ln	12	12	0	0%	12	12	0	4%	12	34	22	187%
	Delph Ln to A49 NB	6	6	0	-2%	6	5	0	-3%	7	8	1	15%
	Delph Ln to A49 SB	8	8	0	0%	7	7	0	1%	8	8	1	7%
M62 Junction 9	A49 NB to M62 WB	15	16	2	11%	22	28	6	26%	60	39	-21	-35%
	A49 NB	15	16	2	11%	22	28	6	26%	60	39	-21	-35%
	A49 NB to M62 EB	15	16	2	11%	22	28	6	26%	60	39	-21	-35%
	A49 NB to A49 SB (U-Turn)	15	16	2	11%	22	28	6	26%	60	39	-21	-35%
	M62 EB to A49 NB	26	90	64	251%	16	44	28	174%	18	35	17	91%
	M62 EB to A49 SB	26	90	64	251%	16	44	28	174%	18	35	17	91%
	A49 SB to M62 EB	41	40	-1	-3%	41	40	-1	-3%	44	57	14	31%
	A49 SB	41	40	-1	-3%	41	40	-1	-3%	44	57	14	31%
	A49 SB to M62 WB	41	40	-1	-3%	41	40	-1	-3%	44	57	14	31%
	M62 WB to A49 SB	14	14	0	2%	14	14	0	-1%	17	28	11	68%
	M62 WB to A49 NB	14	14	0	2%	14	14	0	-1%	17	28	11	68%

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	2	2	-	0	0	0	-	0	8	8	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	2	2	-	49	20	-29	-59%
	A49 NB	0	0	0	-	0	2	2	-	49	20	-29	-59%
	A49 SB	2	10	8	449%	2	0	-2	-98%	25	39	14	59%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	208	199	-9	-4%	124	136	12	9%	263	211	-52	-20%
	A49 SB	208	199	-9	-4%	124	136	12	9%	263	211	-52	-20%
	A49 SB to Cromwell Ave	208	199	-9	-4%	124	136	12	9%	263	211	-52	-20%
	Cromwell Ave to A49 NB	17	20	3	18%	23	27	4	18%	34	51	17	51%
	Cromwell Ave to Sandy Ln West	30	35	5	18%	40	47	7	18%	58	84	26	45%
	Cromwell Ave to A49 SB	30	35	5	18%	40	47	7	18%	58	84	26	45%
	Cromwell Ave to Cromwell Ave (U-turn)	30	35	5	18%	40	47	7	18%	58	84	26	45%
	A49 NB	4	7	3	63%	6	10	3	48%	11	12	1	12%
	A49 NB to Sandy Ln West	4	7	3	63%	6	10	3	48%	11	12	1	12%
	A49 NB to Cromwell Ave	4	7	3	63%	6	10	3	48%	11	12	1	12%
	Sandy Ln West to A49 NB	17	194	177	1024%	21	200	179	875%	99	224	125	126%
	Sandy Ln West to Sandy Ln (U-turn	17	194	177	1024%	21	200	179	875%	99	224	125	126%
	Sandy Ln West to A49 SB	17	194	177	1024%	21	200	179	875%	99	224	125	126%
	Sandy Ln West to Cromwell Ave	17	194	177	1024%	21	200	179	875%	99	224	125	126%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	16	16	1	4%	23	24	1	4%	23	24	0	2%
	A49 NB to Junction NINE Retail	16	16	1	4%	23	24	1	4%	23	24	0	2%
	Junction NINE Retail to A49 SB	6	6	0	2%	6	6	0	-2%	6	6	0	1%
	Junction NINE Retail to A49 NB	5	5	0	6%	5	5	0	2%	5	6	0	7%
	A49 SB	16	12	-5	-29%	45	36	-9	-21%	133	115	-18	-13%
	A49 SB to Junction NINE Retail	12	12	0	1%	12	13	1	10%	13	13	1	5%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	61	55	-6	-9%	65	62	-4	-5%	85	78	-7	-8%
	A49 SB to Long Lane	0	2	1	369%	0	0	0	-	0	0	0	-
	A49 SB	138	113	-25	-18%	172	167	-5	-3%	206	200	-6	-3%
	A49 NB to Hawleys Lane	19	23	4	20%	34	51	18	52%	123	248	125	102%
	A49 NB to Long Lane	9	10	0	5%	13	19	6	43%	45	112	67	148%
	A49 NB	19	23	4	20%	34	51	18	52%	123	248	125	102%
	Long Lane to A49 SB	21	85	64	313%	18	57	40	225%	28	98	70	247%
	Long Lane to Hawleys Lane	74	116	42	57%	46	79	34	74%	55	97	43	78%
	Long Lane to A49 NB	74	116	42	57%	46	79	34	74%	55	97	43	78%
	Hawleys Lane to Long Lane	9	9	1	7%	9	9	0	3%	10	10	0	-1%
	Hawleys Lane to A49 SB	9	9	1	7%	9	9	0	3%	10	10	0	-1%
	Hawleys Lane to A49 NB	5	5	0	1%	5	5	0	2%	5	5	0	0%

TABLE 3.3: AVERAGE AM PEAK HOUR QUEUE LENGTH COMPARISON

3.3.6 The southbound movement on the A49 has the largest traffic volume and is very sensitive to any increase in delay – even tiny changes to signal timings can quickly lead to queue lengths reaching back to, and beyond, M62 Junction 9. As a result, Sandy Lane West gets a disproportionate penalisation as a result of being the movement directly competing for green time with southbound traffic on the A49.

3.3.7 There are steadily increasing average queue lengths for all traffic on the A49 northbound and from A50 Long Lane at the southernmost junction within the model extents. This is particularly true in 2032, where the comparative increase in average queue lengths is approximately 50-125m on both approaches.

3.3.8 Tables 3.5 and 3.6 summarise the PM peak average and average maximum queue comparisons respectively. In much the same way as with the morning peak models, there are some more notable increases to maximum queue lengths for traffic on the eastbound off-slip from the M62 which are reasonably consistent in all scenarios. The average queue length increases are much lower though, and both are well contained within the link stacking capacity (the largest maximum being ~250m in 2032, with a stacking capacity of 315m for the link – although with all average measures being considerably lower, it is unlikely that this happens often in the model.)

3.3.9 To the south of M62 Junction 9, there are also increases to average and maximum queue lengths on the Sandy Lane West arm of the A49 Winwick Road / A574 Cromwell Avenue / Sandy Lane West roundabout. In much the same way as is found with the AM peak models, the level of congestion and need to give the A49 priority at this junction make it very difficult to assign enough time to the side arms, leading to high levels of queuing.

3.3.10 Further south, there are increases to average queue lengths for northbound traffic on the A49 at the A49 Winwick Road / Hawleys Lane / A50 Long Lane junction, although the queuing here does clear, as can be seen from the lack of any latent demand at the southernmost end of the model.

3.3.11 Further details regarding queue length output data can be found in Appendix C.

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	104	137	34	33%	109	141	31	29%	144	177	34	24%
	A49 NB	104	137	34	33%	109	141	31	29%	144	177	34	24%
	A49 NB to Winwick Link Rd	104	137	34	33%	109	141	31	29%	144	177	34	24%
	Winwick Park Ave to A49 NB	34	35	1	3%	35	35	0	0%	37	37	0	0%
	Winwick Park Ave to Winwick Link Rd	34	35	1	3%	35	35	0	0%	37	37	0	0%
	Winwick Park Ave to A49 SB	34	35	1	3%	35	35	0	0%	37	37	0	0%
	A49 SB to Winwick Link Rd	181	183	2	1%	166	167	1	1%	168	154	-14	-8%
	A49 SB	181	183	2	1%	166	167	1	1%	168	154	-14	-8%
	A49 SB to Winwick Park Ave	181	183	2	1%	166	167	1	1%	168	154	-14	-8%
	Winwick Link Rd to A49 SB	31	29	-2	-5%	41	38	-3	-8%	35	33	-2	-5%
	Winwick Link Rd to Winwick Park Ave	31	29	-1	-4%	41	38	-3	-8%	36	73	37	105%
	Winwick Link Rd to A49 NB	31	29	-1	-4%	41	38	-3	-8%	36	73	37	105%
A49 Newton Road/ Delph Lane	A49 NB	126	180	54	43%	179	241	62	35%	239	191	-48	-20%
	A49 NB to Delp Ln	131	185	54	42%	184	245	62	34%	243	195	-48	-20%
	A49 SB	211	220	8	4%	238	234	-4	-2%	273	302	29	10%
	A49 SB to Delph Ln	86	100	13	15%	86	95	9	10%	95	229	133	140%
	Delph Ln to A49 NB	48	47	0	0%	41	40	-1	-2%	49	51	2	4%
	Delph Ln to A49 SB	42	42	0	0%	37	36	-1	-3%	45	46	1	3%
M62 Junction 9	A49 NB to M62 WB	122	110	-12	-10%	120	133	13	11%	157	145	-12	-8%
	A49 NB	122	110	-12	-10%	120	133	13	11%	157	145	-12	-8%
	A49 NB to M62 EB	122	110	-12	-10%	120	133	13	11%	157	145	-12	-8%
	A49 NB to A49 SB (U-Turn)	122	110	-12	-10%	120	133	13	11%	157	145	-12	-8%
	M62 EB to A49 NB	95	227	132	139%	83	198	115	137%	92	198	106	116%
	M62 EB to A49 SB	95	227	132	139%	83	198	115	137%	92	198	106	116%
	A49 SB to M62 EB	163	165	2	1%	163	165	1	1%	163	167	4	3%
	A49 SB	163	165	2	1%	163	165	1	1%	163	167	4	3%
	A49 SB to M62 WB	163	165	2	1%	163	165	1	1%	163	167	4	3%
	M62 WB to A49 SB	79	79	1	1%	81	82	1	1%	90	130	40	45%
	M62 WB to A49 NB	79	79	1	1%	81	82	1	1%	90	130	40	45%

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	7	7	-	0	0	0	-	1	28	26	1890%
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	4	20	16	405%	132	80	-52	-39%
	A49 NB	0	0	0	-	4	20	16	405%	132	80	-52	-39%
	A49 SB	32	43	11	33%	18	6	-12	-67%	166	127	-39	-23%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	407	431	24	6%	328	392	64	20%	471	471	0	0%
	A49 SB	407	431	24	6%	328	392	64	20%	471	471	0	0%
	A49 SB to Cromwell Ave	407	431	24	6%	328	392	64	20%	471	471	0	0%
	Cromwell Ave to A49 NB	120	124	4	3%	127	131	4	3%	135	140	5	4%
	Cromwell Ave to Sandy Ln West	120	124	4	3%	127	131	4	3%	135	140	5	4%
	Cromwell Ave to A49 SB	120	124	4	3%	127	131	4	3%	135	140	5	4%
	Cromwell Ave to Cromwell Ave (U-turn)	120	124	4	3%	127	131	4	3%	135	140	5	4%
	A49 NB	85	108	23	27%	103	121	18	17%	133	141	8	6%
	A49 NB to Sandy Ln West	85	108	23	27%	103	121	18	17%	133	141	8	6%
	A49 NB to Cromwell Ave	85	108	23	27%	103	121	18	17%	133	141	8	6%
	Sandy Ln West to A49 NB	114	292	178	157%	122	294	171	140%	252	296	44	18%
	Sandy Ln West to Sandy Ln (U-turn	114	292	178	157%	122	294	171	140%	252	296	44	18%
	Sandy Ln West to A49 SB	114	292	178	157%	122	294	171	140%	252	296	44	18%
	Sandy Ln West to Cromwell Ave	114	292	178	157%	122	294	171	140%	252	296	44	18%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	147	167	20	13%	168	173	6	3%	174	171	-2	-1%
	A49 NB to Junction NINE Retail	147	167	20	13%	168	173	6	3%	174	171	-2	-1%
	Junction NINE Retail to A49 SB	27	27	0	0%	27	27	0	0%	30	34	3	11%
	Junction NINE Retail to A49 NB	25	25	0	0%	25	25	0	0%	28	31	3	12%
	A49 SB	140	127	-13	-9%	206	218	12	6%	361	348	-13	-4%
	A49 SB to Junction NINE Retail	54	58	3	6%	63	66	3	4%	69	66	-3	-5%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	302	283	-19	-6%	312	311	-1	0%	328	330	2	1%
	A49 SB to Long Lane	32	74	42	130%	0	0	0	-	0	0	0	-
	A49 SB	325	316	-9	-3%	334	331	-3	-1%	336	340	4	1%
	A49 NB to Hawleys Lane	175	219	43	25%	233	303	70	30%	438	508	70	16%
	A49 NB to Long Lane	75	88	13	18%	108	177	69	64%	351	501	150	43%
	A49 NB	175	219	43	25%	233	303	70	30%	438	508	70	16%
	Long Lane to A49 SB	152	188	36	23%	132	190	58	44%	154	170	16	10%
	Long Lane to Hawleys Lane	164	187	23	14%	155	182	28	18%	149	159	10	7%
	Long Lane to A49 NB	164	187	23	14%	155	182	28	18%	149	159	10	7%
	Hawleys Lane to Long Lane	65	69	4	6%	56	60	5	8%	80	76	-4	-5%
	Hawleys Lane to A49 SB	65	69	4	6%	56	60	5	8%	80	76	-4	-5%
	Hawleys Lane to A49 NB	62	52	-10	-15%	52	56	4	7%	70	65	-4	-6%

TABLE 3.4: AVERAGE MAXIMUM AM PEAK HOUR QUEUE LENGTH COMPARISON

17:00-18:00																
		2022				2027				2032						
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference				
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%			
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	11	12	0	3%	12	13	1	7%	13	20	7	53%			
	A49 NB	11	12	0	3%	12	13	1	7%	13	20	7	53%			
	A49 NB to Winwick Link Rd	11	12	0	3%	12	13	1	7%	13	20	7	53%			
	Winwick Park Ave to A49 NB	1	3	2	193%	1	1	0	-1%	1	4	2	167%			
	Winwick Park Ave to Winwick Link Rd	1	3	2	193%	1	1	0	-1%	1	4	2	167%			
	Winwick Park Ave to A49 SB	1	3	2	193%	1	1	0	-1%	1	4	2	167%			
	A49 SB to Winwick Link Rd	18	20	2	11%	20	21	1	6%	22	28	6	30%			
	A49 SB	18	20	2	11%	20	21	1	6%	22	28	6	30%			
	A49 SB to Winwick Park Ave	18	20	2	11%	20	21	1	6%	22	28	6	30%			
	Winwick Link Rd to A49 SB	16	26	10	64%	8	4	-4	-47%	10	63	53	514%			
	Winwick Link Rd to Winwick Park Ave	4	11	7	166%	4	5	1	18%	6	39	33	568%			
	Winwick Link Rd to A49 NB	4	11	7	166%	4	5	1	18%	6	39	33	568%			
A49 Newton Road/ Delph Lane	A49 NB	29	31	2	7%	30	39	9	32%	39	44	6	15%			
	A49 NB to Delp Ln	29	31	2	7%	29	39	10	33%	39	44	6	15%			
	A49 SB	92	114	23	25%	62	58	-4	-7%	86	206	120	139%			
	A49 SB to Delph Ln	11	11	-1	-6%	10	10	0	1%	11	49	38	356%			
	Delph Ln to A49 NB	52	70	18	36%	88	89	1	1%	100	100	0	0%			
	Delph Ln to A49 SB	49	67	18	37%	84	85	1	1%	97	97	0	0%			
M62 Junction 9	A49 NB to M62 WB	12	13	1	9%	12	12	0	2%	13	16	3	24%			
	A49 NB	12	13	1	9%	12	12	0	2%	13	16	3	24%			
	A49 NB to M62 EB	12	13	1	9%	12	12	0	2%	13	16	3	24%			
	A49 NB to A49 SB (U-Turn)	12	13	1	9%	12	12	0	2%	13	16	3	24%			
	M62 EB to A49 NB	17	51	34	195%	21	50	29	142%	21	62	41	197%			
	M62 EB to A49 SB	17	51	34	195%	21	50	29	142%	21	62	41	197%			
	A49 SB to M62 EB	60	69	10	16%	57	58	1	2%	62	82	20	32%			
	A49 SB	60	69	10	16%	57	58	1	2%	62	82	20	32%			
	A49 SB to M62 WB	60	69	10	16%	57	58	1	2%	62	82	20	32%			
	M62 WB to A49 SB	17	20	3	19%	12	12	1	6%	12	25	13	111%			
	M62 WB to A49 NB	17	20	3	19%	12	12	1	6%	12	25	13	111%			

17:00-18:00																
		2022				2027				2032						
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference				
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%			
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	8	0	-8	-100%	0	0	0	-			
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-			
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-			
	A49 NB	0	0	0	-	0	0	0	-	0	0	0	-			
	A49 SB	145	158	13	9%	48	50	2	3%	81	163	82	101%			
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	378	367	-10	-3%	288	331	43	15%	347	394	47	14%			
	A49 SB	378	367	-10	-3%	288	331	43	15%	347	394	47	14%			
	A49 SB to Cromwell Ave	378	367	-10	-3%	288	331	43	15%	347	394	47	14%			
	Cromwell Ave to A49 NB	40	32	-8	-21%	53	59	6	10%	49	44	-5	-9%			
	Cromwell Ave to Sandy Ln West	62	52	-10	-17%	76	89	13	17%	78	73	-5	-6%			
	Cromwell Ave to A49 SB	62	52	-10	-17%	76	89	13	17%	78	73	-5	-6%			
	Cromwell Ave to Cromwell Ave (U-turn)	62	52	-10	-17%	76	89	13	17%	78	73	-5	-6%			
	A49 NB	22	22	0	2%	28	34	5	19%	54	61	7	12%			
	A49 NB to Sandy Ln West	22	22	0	2%	28	34	5	19%	54	61	7	12%			
	A49 NB to Cromwell Ave	22	22	0	2%	28	34	5	19%	54	61	7	12%			
	Sandy Ln West to A49 NB	17	181	164	984%	32	260	228	708%	63	263	200	316%			
	Sandy Ln West to Sandy Ln (U-turn	17	181	164	984%	32	260	228	708%	63	263	200	316%			
	Sandy Ln West to A49 SB	17	181	164	984%	32	260	228	708%	63	263	200	316%			
	Sandy Ln West to Cromwell Ave	17	181	164	984%	32	260	228	708%	63	263	200	316%			
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	31	32	1	2%	39	41	2	6%	44	43	-1	-1%			
	A49 NB to Junction NINE Retail	31	32	1	2%	39	41	2	6%	44	43	-1	-1%			
	Junction NINE Retail to A49 SB	45	100	55	122%	30	63	33	110%	29	39	10	33%			
	Junction NINE Retail to A49 NB	42	97	55	130%	28	61	33	119%	27	36	10	36%			
	A49 SB	304	273	-31	-10%	289	215	-75	-26%	273	227	-45	-17%			
	A49 SB to Junction NINE Retail	41	14	-27	-66%	11	17	6	51%	13	15	2	18%			
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	39	39	0	-1%	28	36	8	28%	34	32	-3	-8%			
	A49 SB to Long Lane	34	107	73	218%	46	56	10	23%	24	42	18	77%			
	A49 SB	255	257	1	0%	245	246	2	1%	246	244	-2	-1%			
	A49 NB to Hawleys Lane	31	54	22	70%	43	112	69	161%	109	353	245	225%			
	A49 NB to Long Lane	8	11	3	30%	10	36	26	251%	31	234	203	655%			
	A49 NB	31	54	22	70%	43	112	69	161%	109	353	245	225%			
	Long Lane to A49 SB	8	22	14	169%	11	34	23	213%	19	54	35	185%			
	Long Lane to Hawleys Lane	30	38	8	28%	32	48	17	52%	49	80	32	65%			
	Long Lane to A49 NB	30	38	8	28%	32	48	17	52%	49	80	32	65%			
	Hawleys Lane to Long Lane	31	43	12	37%	60	75	15	25%	74	82	8	11%			
	Hawleys Lane to A49 SB	31	43	12	37%	60	75	15	25%	74	82	8	11%			
	Hawleys Lane to A49 NB	24	29	6	24%	42	57	16	37%	58	64	6	10%			

TABLE 3.5: AVERAGE PM PEAK HOUR QUEUE LENGTH COMPARISON

		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	98	107	9	9%	98	119	21	21%	120	152	32	27%
	A49 NB	98	107	9	9%	98	119	21	21%	120	152	32	27%
	A49 NB to Winwick Link Rd	98	107	9	9%	98	119	21	21%	120	152	32	27%
	Winwick Park Ave to A49 NB	12	26	14	123%	11	12	2	14%	13	27	14	104%
	Winwick Park Ave to Winwick Link Rd	12	26	14	123%	11	12	2	14%	13	27	14	104%
	Winwick Park Ave to A49 SB	12	26	14	123%	11	12	2	14%	13	27	14	104%
	A49 SB to Winwick Link Rd	75	92	17	23%	79	90	11	13%	88	106	18	20%
	A49 SB	75	92	17	23%	79	90	11	13%	88	106	18	20%
	A49 SB to Winwick Park Ave	75	92	17	23%	79	90	11	13%	88	106	18	20%
	Winwick Link Rd to A49 SB	197	247	49	25%	133	101	-32	-24%	183	364	181	99%
	Winwick Link Rd to Winwick Park Ave	156	72	-84	-54%	60	74	14	22%	73	175	102	141%
	Winwick Link Rd to A49 NB	156	72	-84	-54%	60	74	14	22%	73	175	102	141%
A49 Newton Road/ Delph Lane	A49 NB	189	228	39	20%	191	301	110	58%	249	279	30	12%
	A49 NB to Delp Ln	194	233	39	20%	195	305	110	56%	254	284	30	12%
	A49 SB	335	372	37	11%	253	264	11	4%	327	440	114	35%
	A49 SB to Delph Ln	92	70	-23	-24%	64	64	0	0%	65	179	113	173%
	Delph Ln to A49 NB	179	185	6	3%	188	187	-1	0%	202	187	-14	-7%
	Delph Ln to A49 SB	175	181	6	3%	184	183	-1	0%	198	183	-14	-7%
M62 Junction 9	A49 NB to M62 WB	116	128	12	10%	113	117	4	4%	112	130	18	16%
	A49 NB	116	128	12	10%	113	117	4	4%	112	130	18	16%
	A49 NB to M62 EB	116	128	12	10%	113	117	4	4%	112	130	18	16%
	A49 NB to A49 SB (U-Turn)	116	128	12	10%	113	117	4	4%	112	130	18	16%
	M62 EB to A49 NB	108	234	126	117%	119	229	110	93%	115	256	141	122%
	M62 EB to A49 SB	108	234	126	117%	119	229	110	93%	115	256	141	122%
	A49 SB to M62 EB	172	178	6	3%	166	167	1	1%	171	174	3	2%
	A49 SB	172	178	6	3%	166	167	1	1%	171	174	3	2%
	A49 SB to M62 WB	172	178	6	3%	166	167	1	1%	171	174	3	2%
	M62 WB to A49 SB	88	105	17	19%	62	85	23	37%	64	113	49	76%
	M62 WB to A49 NB	88	105	17	19%	62	85	23	37%	64	113	49	76%

		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	38	0	-38	-100%	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	1	1	-	0	0	0	-	0	12	12	-
	A49 NB	0	1	1	-	0	0	0	-	0	12	12	-
	A49 SB	459	482	22	5%	202	309	107	53%	406	472	66	16%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	512	512	-1	0%	489	509	20	4%	511	512	0	0%
	A49 SB	512	512	-1	0%	489	509	20	4%	511	512	0	0%
	A49 SB to Cromwell Ave	512	512	-1	0%	489	509	20	4%	511	512	0	0%
	Cromwell Ave to A49 NB	124	123	-2	-1%	132	135	3	2%	132	131	-1	-1%
	Cromwell Ave to Sandy Ln West	124	123	-2	-1%	132	135	3	2%	132	131	-1	-1%
	Cromwell Ave to A49 SB	124	123	-2	-1%	132	135	3	2%	132	131	-1	-1%
	Cromwell Ave to Cromwell Ave (U-turn)	124	123	-2	-1%	132	135	3	2%	132	131	-1	-1%
	A49 NB	216	214	-2	-1%	230	249	20	9%	264	271	7	3%
	A49 NB to Sandy Ln West	216	214	-2	-1%	230	249	20	9%	264	271	7	3%
	A49 NB to Cromwell Ave	216	214	-2	-1%	230	249	20	9%	264	271	7	3%
	Sandy Ln West to A49 NB	142	292	150	106%	179	293	113	63%	228	293	64	28%
	Sandy Ln West to Sandy Ln (U-turn	142	292	150	106%	179	293	113	63%	228	293	64	28%
	Sandy Ln West to A49 SB	142	292	150	106%	179	293	113	63%	228	293	64	28%
	Sandy Ln West to Cromwell Ave	142	292	150	106%	179	293	113	63%	228	293	64	28%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	236	238	3	1%	241	249	7	3%	268	256	-12	-4%
	A49 NB to Junction NINE Retail	236	238	3	1%	241	249	7	3%	268	256	-12	-4%
	Junction NINE Retail to A49 SB	101	170	69	69%	86	134	48	55%	81	100	19	23%
	Junction NINE Retail to A49 NB	98	167	69	70%	84	132	48	57%	79	97	19	24%
	A49 SB	452	450	-2	0%	449	397	-51	-11%	473	446	-27	-6%
	A49 SB to Junction NINE Retail	92	61	-31	-34%	56	93	37	66%	58	69	11	19%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	250	279	29	12%	246	299	53	21%	327	328	1	0%
	A49 SB to Long Lane	69	241	172	249%	70	172	101	144%	68	137	70	103%
	A49 SB	343	343	0	0%	343	340	-3	-1%	341	341	0	0%
	A49 NB to Hawleys Lane	319	414	95	30%	325	503	178	55%	459	509	51	11%
	A49 NB to Long Lane	79	123	45	57%	135	271	136	101%	233	502	269	115%
	A49 NB	319	414	95	30%	325	503	178	55%	459	509	51	11%
	Long Lane to A49 SB	71	152	81	114%	114	154	40	35%	146	155	9	6%
	Long Lane to Hawleys Lane	129	148	19	15%	143	148	5	3%	146	151	5	3%
	Long Lane to A49 NB	129	148	19	15%	143	148	5	3%	146	151	5	3%
	Hawleys Lane to Long Lane	126	128	2	2%	126	127	1	1%	128	131	3	3%
	Hawleys Lane to A49 SB	126	128	2	2%	126	127	1	1%	128	131	3	3%
	Hawleys Lane to A49 NB	130	133	3	2%	133	133	1	0%	134	137	4	3%

TABLE 3.6: AVERAGE MAXIMUM PM PEAK HOUR QUEUE LENGTH COMPARISON

3.4 Journey Times Comparison

3.4.1 Consistent with the base year modelling, average journey times have been extracted for a single evaluation interval covering the peak hour for both the AM (08:00-09:00) and PM (17:00-18:00) scenario models. The separate routes used for evaluation were as follows:

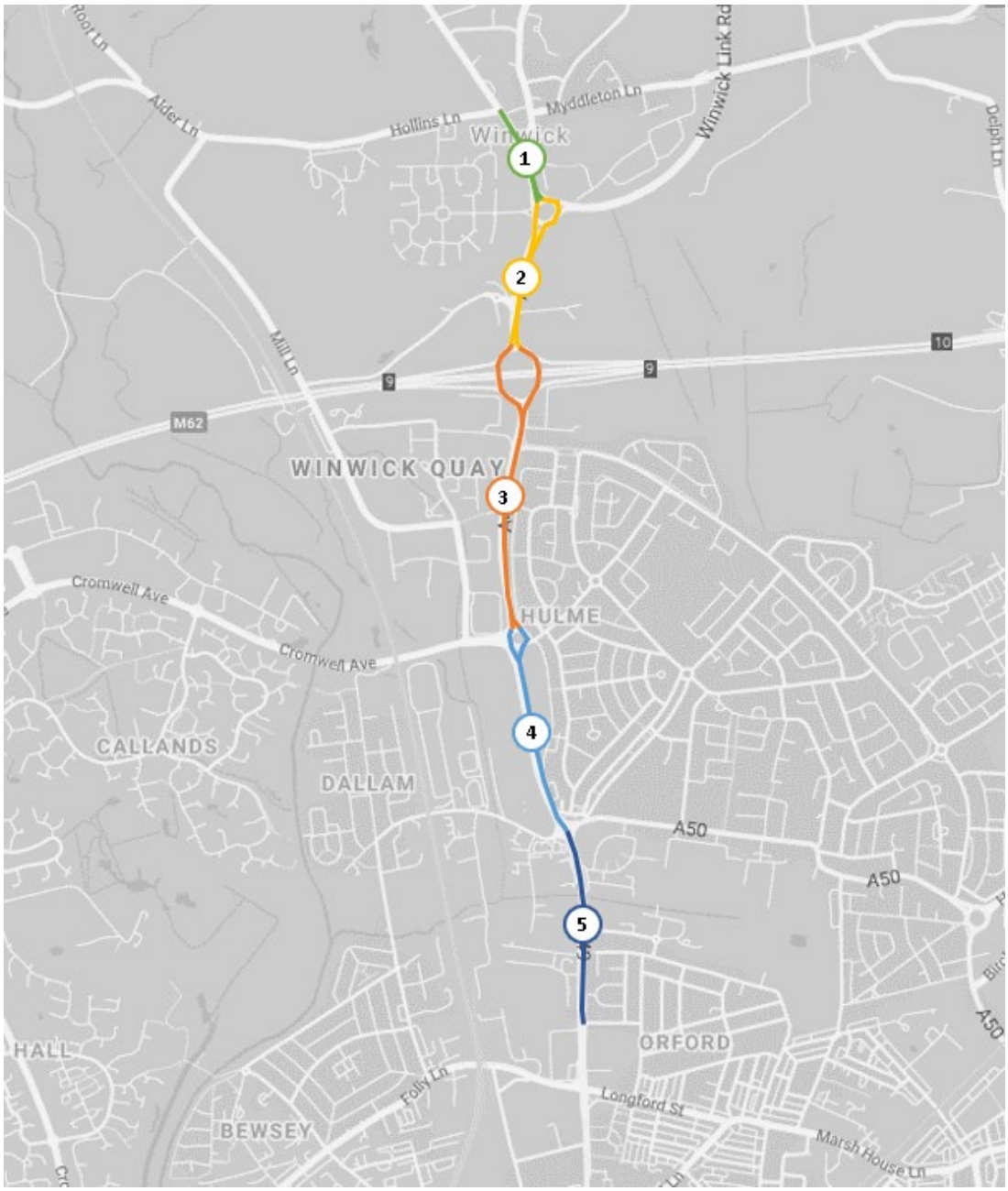


FIGURE 3.1: JOURNEY TIME SECTIONS ASSESSED

3.4.2 Table 3.7 summarises the average peak hour journey times for both northbound and southbound traffic during the AM peak, for each future year scenario.

3.4.3 It is clear that for both northbound and southbound traffic travelling on the A49, there is not any sort of statistically noticeable impact until 2032. Even then, the majority of that impact happens on the northbound approach to one signalised junction – the junction with the A49 / A50 – which may be at least partially a result of the signal controller setup

AM Journey Time (s) - 08:00-09:00												
	AM 2022				AM 2027				AM 2032			
Section	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	80	91	11	13%	97	98	1	1%	101	113	12	11%
2 NB	104	109	5	5%	116	116	0	0%	119	128	9	7%
3 NB	84	86	2	2%	91	92	1	1%	127	105	-22	-17%
4 NB	96	98	3	3%	102	103	1	1%	103	104	1	1%
5 NB	89	93	4	4%	120	121	1	0%	173	250	77	45%
	452	476	24.32	5%	527	530	3.53	1%	623	700	76.87	12%

	AM 2022				AM 2027				AM 2032			
Section	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	73	79	5	7%	70	71	0	0%	67	59	-8	-12%
2 SB	103	105	1	1%	104	104	0	0%	108	114	6	5%
3 SB	179	181	2	1%	151	151	0	0%	206	189	-17	-8%
4 SB	140	130	-11	-8%	160	160	0	0%	208	198	-10	-5%
5 SB	63	65	2	3%	65	65	0	0%	65	66	1	2%
	559	559	-0.27	0%	550	551	0.99	0%	654	626	-28.03	-4%

TABLE 3.7: AM PEAK JOURNEY TIME COMPARISON

PM Journey Time (s) - 17:00-18:00												
	PM 2022				PM 2027				PM 2032			
Section	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	57	59	2	3%	63	63	0	0%	70	70	0	0%
2 NB	115	115	0	0%	118	118	0	0%	132	132	0	0%
3 NB	85	87	3	3%	87	87	0	0%	89	89	0	0%
4 NB	102	102	0	0%	108	109	0	0%	112	113	1	1%
5 NB	90	105	15	16%	129	130	0	0%	209	209	0	0%
	448	468	19.45	4%	506	507	1.34	0%	612	613	1.39	0%

	PM 2022				PM 2027				PM 2032			
Section	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	55	60	5	8%	57	57	0	0%	70	70	0	0%
2 SB	157	183	27	17%	116	117	1	1%	221	223	2	1%
3 SB	341	313	-28	-8%	249	250	1	0%	285	286	1	0%
4 SB	316	315	-1	0%	273	274	1	0%	269	269	1	0%
5 SB	62	62	0	0%	64	64	0	0%	64	65	0	0%
	932	934	2.35	0%	759	762	2.48	0%	909	912	3.23	0%

TABLE 3.8: PM PEAK JOURNEY TIME COMPARISON

3.4.4 Table 3.8 summarises the average peak hour journey times for both northbound and southbound traffic during the PM peak, for each future year scenario.

3.4.5 In an effort to ensure that the comparison was fair, the same signal timings were used for each peak/ year combination. In the PM peak, it is clear that the development has no real impact on travel times along the A49 when this is the case.

4 SUMMARY AND RECOMMENDATIONS

4.1.1 Building on the 2019 Base Year Model, 2022, 2027 and 2032 'Do Minimum' model scenarios were produced to act as reference case models for the purposes of comparison, with the aim of assessing the impact of traffic flow changes associated with the proposed Peel Hall development.

4.1.2 The following 'Do Something', or 'With Development' scenarios, were compared to their associated reference cases:

- 2022 Do Something (Full Development Scenario)
- 2027 Do Something (Part Development Scenario)
- 2032 Do Something (Full Development Scenario)

4.1.3 There are some relatively minor, steady increases to delay, queue lengths etc. as a result of the growth in both background traffic and specific development related traffic. However, there are some notable areas where higher levels of delay are apparent. These are primarily the following locations:

- Eastbound M62 off-slip – this is likely an issue which could be partially, if not entirely solved through proper revalidation of the MOVA dataset onsite. A better understanding of the potential benefits could be achieved with more detailed modelling of the signals within the VISSIM model (the junction still currently runs from the original models fixed-time signal controller).
- Eastbound motorway diverge M62 – this is an issue in the AM peak scenarios, which becomes more and more apparent as each layer of growth is added. The effect of the edge of network delay is modelled as per the original AECOM model, provided by Highways England.
- A49 Winwick Road / A574 Cromwell Avenue / Sandy Lane West – this junction is very sensitive to traffic growth, runs very tight, fixed-time signal plans, and is particularly physically constrained. There is the potential that more responsive, demand-dependent signal control would help balance the delay-demand. If there is scope for additional highway space (there is currently very little internal storage, and the entry arm from Sandy Lane West is particularly constrained) then this would also warrant further investigation.
- A49 Winwick Road / Hawleys Lane / A50 Long Lane – this junction is modelled as per the original model signal controller. This is very limited in its ability to be anything like as responsive as the on-street controller (which is MOVA controlled). A better understanding of the potential benefits could be achieved with more detailed modelling of the signals within the VISSIM model.

APPENDIX A:

TURNING VOLUME CALIBRATION CHECKS

AM VOLUME COMPARISON – 07:00-08:00 (WARM-UP PERIOD)

		07:00-08:00											
		2022				2027				2032			
Junction/ Movement		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference	
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	15	17	2	13%	17	18	1	6%	19	18	-1	-5%
	A49 NB	683	696	13	2%	722	728	6	1%	738	766	28	4%
	A49 NB to Winwick Link Rd	408	405	-3	-1%	438	439	1	0%	456	460	4	1%
	Winwick Park Ave to A49 NB	23	25	2	9%	27	27	0	0%	29	29	0	0%
	Winwick Park Ave to Winwick Link Rd	46	46	0	0%	50	50	0	0%	55	53	-2	-4%
	Winwick Park Ave to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
	A49 SB to Winwick Link Rd	1	10	9	900%	24	29	5	21%	26	32	6	23%
	A49 SB	806	827	21	3%	826	825	-1	0%	823	841	18	2%
	A49 SB to Winwick Park Ave	4	4	0	0%	3	3	0	0%	3	3	0	0%
	Winwick Link Rd to A49 SB	683	683	0	0%	718	715	-3	0%	758	761	3	0%
	Winwick Link Rd to Winwick Park Ave	8	8	0	0%	9	9	0	0%	10	10	0	0%
	Winwick Link Rd to A49 NB	10	11	1	10%	56	57	1	2%	57	57	0	0%
A49 Newton Road/ Delph Lane	A49 NB	1045	1056	11	1%	1113	1123	10	1%	1151	1177	26	2%
	A49 NB to Delp Ln	200	212	12	6%	234	249	15	6%	253	245	-8	-3%
	A49 SB	1306	1330	24	2%	1347	1349	2	0%	1386	1408	22	2%
	A49 SB to Delph Ln	166	164	-2	-1%	175	169	-6	-3%	172	172	0	0%
	Delph Ln to A49 NB	86	86	0	0%	89	88	-1	-1%	93	93	0	0%
	Delph Ln to A49 SB	92	92	0	0%	91	92	1	1%	94	98	4	4%
M62 Junction 9	A49 NB to M62 WB	163	169	6	4%	169	169	0	0%	187	222	35	19%
	A49 NB	430	444	14	3%	449	466	17	4%	483	493	10	2%
	A49 NB to M62 EB	384	401	17	4%	414	424	10	2%	438	444	6	1%
	A49 NB to A49 SB (U-Turn)	0	5	5	-	0	5	5	-	0	6	6	-
	M62 EB to A49 NB	723	734	11	2%	815	831	16	2%	854	871	17	2%
	M62 EB to A49 SB	244	235	-9	-4%	227	227	0	0%	245	252	7	3%
	A49 SB to M62 EB	250	275	25	10%	254	262	8	3%	272	295	23	8%
	A49 SB	707	693	-14	-2%	717	713	-4	-1%	731	738	7	1%
	A49 SB to M62 WB	398	410	12	3%	426	423	-3	-1%	436	431	-5	-1%
	M62 WB to A49 SB	599	609	10	2%	648	655	7	1%	707	725	18	3%
	M62 WB to A49 NB	103	99	-4	-4%	92	86	-6	-7%	77	68	-9	-12%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	5	14	9	180%	6	14	8	133%	6	15	9	150%
	Birch Rd to A49 SB	6	24	18	300%	6	24	18	300%	6	24	18	300%
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	1017	1056	39	4%	1069	1103	34	3%	1147	1199	52	5%
	A49 SB	1547	1546	-1	0%	1587	1605	18	1%	1678	1725	47	3%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	188	208	20	11%	250	285	35	14%	313	317	4	1%
	A49 SB	1030	1003	-27	-3%	1002	979	-23	-2%	987	995	8	1%
	A49 SB to Cromwell Ave	249	256	7	3%	271	275	4	1%	299	320	21	7%
	Cromwell Ave to A49 NB	254	255	1	0%	267	265	-2	-1%	293	282	-11	-4%
	Cromwell Ave to Sandy Ln West	268	297	29	11%	295	312	17	6%	302	325	23	8%
	Cromwell Ave to A49 SB	486	504	18	4%	539	558	19	4%	590	583	-7	-1%
	Cromwell Ave to Cromwell Ave (U-turn)	28	29	1	4%	30	29	-1	-3%	32	31	-1	-3%
	A49 NB	628	626	-2	0%	652	651	-1	0%	684	688	4	1%
	A49 NB to Sandy Ln West	47	66	19	40%	59	88	29	49%	74	98	24	32%
	A49 NB to Cromwell Ave	252	259	7	3%	266	276	10	4%	284	295	11	4%
	Sandy Ln West to A49 NB	149	188	39	26%	164	199	35	21%	184	238	54	29%
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-
	Sandy Ln West to A49 SB	18	6	-12	-67%	4	7	3	75%	4	8	4	100%
	Sandy Ln West to Cromwell Ave	224	302	78	35%	237	286	49	21%	251	317	66	26%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	859	881	22	3%	904	935	31	3%	947	980	33	3%
	A49 NB to Junction NINE Retail	48	53	5	10%	48	51	3	6%	51	58	7	14%
	Junction NINE Retail to A49 SB	86	88	2	2%	84	78	-6	-7%	76	73	-3	-4%
	Junction NINE Retail to A49 NB	86	91	5	6%	100	107	7	7%	121	130	9	7%
	A49 SB	1410	1386	-24	-2%	1409	1405	-4	0%	1436	1438	2	0%
	A49 SB to Junction NINE Retail	109	111	2	2%	120	124	4	3%	124	129	5	4%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	185	188	3	2%	195	190	-5	-3%	194	196	2	1%
	A49 SB to Long Lane	146	126	-20	-14%	83	84	1	1%	65	58	-7	-11%
	A49 SB	1133	1132	-1	0%	1157	1154	-3	0%	1173	1181	8	1%
	A49 NB to Hawleys Lane	155	163	8	5%	176	180	4	2%	199	198	-1	-1%
	A49 NB to Long Lane	104	106	2	2%	104	105	1	1%	104	104	0	0%
	A49 NB	692	705	13	2%	710	736	26	4%	755	772	17	2%
	Long Lane to A49 SB	185	315	130	70%	214	293	79	37%	263	387	124	47%
	Long Lane to Hawleys Lane	198	203	5	3%	208	214	6	3%	217	223	6	3%
	Long Lane to A49 NB	86	97	11	13%	91	99	8	9%	98	112	14	14%
	Hawleys Lane to Long Lane	67	70	3	4%	69	68	-1	-1%	72	73	1	1%
	Hawleys Lane to A49 SB	0	0	0	-	1	1	0	0%	1	1	0	0%
	Hawleys Lane to A49 NB	144	149	5	3%	158	160	2	1%	172	179	7	4%

AM VOLUME COMPARISON – 08:00-09:00 (PEAK PERIOD)

08:00-09:00															
		2022				2027				2032					
Junction/ Movement		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference			
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%		
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	20	18	-2	-10%	19	20	1	5%	21	22	1	5%		
	A49 NB	751	783	32	4%	795	811	16	2%	815	841	26	3%		
	A49 NB to Winwick Link Rd	452	453	1	0%	468	476	8	2%	491	494	3	1%		
	Winwick Park Ave to A49 NB	35	31	-4	-11%	36	37	1	3%	45	43	-2	-4%		
	Winwick Park Ave to Winwick Link Rd	62	66	4	6%	69	71	2	3%	75	77	2	3%		
	Winwick Park Ave to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-		
	A49 SB to Winwick Link Rd	1	11	10	1000%	32	35	3	9%	32	38	6	19%		
	A49 SB	973	965	-8	-1%	950	948	-2	0%	941	943	2	0%		
	A49 SB to Winwick Park Ave	6	4	-2	-33%	4	5	1	25%	4	4	0	0%		
	Winwick Link Rd to A49 SB	788	788	0	0%	831	827	-4	0%	875	880	5	1%		
	Winwick Link Rd to Winwick Park Ave	9	9	0	0%	7	7	0	0%	9	9	0	0%		
	Winwick Link Rd to A49 NB	12	13	1	8%	70	70	0	0%	71	71	0	0%		
A49 Newton Road/ Delph Lane	A49 NB	1132	1164	32	3%	1189	1215	26	2%	1220	1261	41	3%		
	A49 NB to Delp Ln	228	242	14	6%	264	285	21	8%	285	272	-13	-5%		
	A49 SB	1551	1549	-2	0%	1582	1578	-4	0%	1609	1620	11	1%		
	A49 SB to Delph Ln	201	195	-6	-3%	200	198	-2	-1%	206	204	-2	-1%		
	Delph Ln to A49 NB	84	84	0	0%	86	85	-1	-1%	92	94	2	2%		
	Delph Ln to A49 SB	100	100	0	0%	95	96	1	1%	103	105	2	2%		
M62 Junction 9	A49 NB to M62 WB	210	222	12	6%	226	232	6	3%	257	295	38	15%		
	A49 NB	579	592	13	2%	606	621	15	2%	632	640	8	1%		
	A49 NB to M62 EB	540	554	14	3%	570	579	9	2%	585	603	18	3%		
	A49 NB to A49 SB (U-Turn)	0	6	6	-	0	6	6	-	0	8	8	-		
	M62 EB to A49 NB	679	719	40	6%	761	792	31	4%	800	827	27	3%		
	M62 EB to A49 SB	238	245	7	3%	218	224	6	3%	236	247	11	5%		
	A49 SB to M62 EB	306	328	22	7%	318	323	5	2%	334	353	19	6%		
	A49 SB	876	847	-29	-3%	866	858	-8	-1%	871	876	5	1%		
	A49 SB to M62 WB	480	485	5	1%	502	502	0	0%	510	498	-12	-2%		
	M62 WB to A49 SB	555	565	10	2%	601	607	6	1%	652	659	7	1%		
	M62 WB to A49 NB	104	100	-4	-4%	91	86	-5	-5%	75	68	-7	-9%		
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	5	15	10	200%	5	16	11	220%	5	15	10	200%		
	Birch Rd to A49 SB	15	37	22	147%	15	38	23	153%	14	33	19	136%		
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-		
	A49 NB	1320	1368	48	4%	1407	1443	36	3%	1493	1552	59	4%		
	A49 SB	1677	1683	6	0%	1695	1719	24	1%	1760	1801	41	2%		
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	207	232	25	12%	267	303	36	13%	324	327	3	1%		
	A49 SB	1193	1155	-38	-3%	1121	1098	-23	-2%	1077	1089	12	1%		
	A49 SB to Cromwell Ave	295	306	11	4%	315	313	-2	-1%	339	366	27	8%		
	Cromwell Ave to A49 NB	295	297	2	1%	315	318	3	1%	349	331	-18	-5%		
	Cromwell Ave to Sandy Ln West	341	378	37	11%	377	400	23	6%	393	415	22	6%		
	Cromwell Ave to A49 SB	609	635	26	4%	675	707	32	5%	749	733	-16	-2%		
	Cromwell Ave to Cromwell Ave (U-turn)	40	37	-3	-8%	37	38	1	3%	43	38	-5	-12%		
	A49 NB	827	830	3	0%	876	879	3	0%	917	909	-8	-1%		
	A49 NB to Sandy Ln West	61	84	23	38%	80	111	31	39%	99	124	25	25%		
	A49 NB to Cromwell Ave	320	326	6	2%	337	342	5	1%	354	362	8	2%		
	Sandy Ln West to A49 NB	199	238	39	20%	216	248	32	15%	242	293	51	21%		
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-		
	Sandy Ln West to A49 SB	25	9	-16	-64%	6	9	3	50%	6	10	4	67%		
	Sandy Ln West to Cromwell Ave	285	373	88	31%	308	355	47	15%	318	380	62	19%		
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	1108	1129	21	2%	1168	1204	36	3%	1232	1249	17	1%		
	A49 NB to Junction NINE Retail	68	76	8	12%	68	74	6	9%	70	77	7	10%		
	Junction NINE Retail to A49 SB	80	80	0	0%	75	71	-4	-5%	70	69	-1	-1%		
	Junction NINE Retail to A49 NB	94	100	6	6%	111	115	4	4%	127	135	8	6%		
	A49 SB	1677	1646	-31	-2%	1644	1652	8	0%	1672	1672	0	0%		
	A49 SB to Junction NINE Retail	136	140	4	3%	142	148	6	4%	148	151	3	2%		
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	234	234	0	0%	234	239	5	2%	251	249	-2	-1%		
	A49 SB to Long Lane	172	147	-25	-15%	104	99	-5	-5%	83	73	-10	-12%		
	A49 SB	1335	1331	-4	0%	1404	1406	2	0%	1414	1419	5	0%		
	A49 NB to Hawleys Lane	201	211	10	5%	233	238	5	2%	254	248	-6	-2%		
	A49 NB to Long Lane	148	149	1	1%	150	150	0	0%	147	146	-1	-1%		
	A49 NB	893	914	21	2%	949	980	31	3%	962	968	6	1%		
	Long Lane to A49 SB	255	397	142	56%	296	385	89	30%	351	471	120	34%		
	Long Lane to Hawleys Lane	256	252	-4	-2%	255	264	9	4%	263	269	6	2%		
	Long Lane to A49 NB	115	121	6	5%	116	125	9	8%	119	129	10	8%		
	Hawleys Lane to Long Lane	80	82	2	3%	82	84	2	2%	87	89	2	2%		
	Hawleys Lane to A49 SB	1	1	0	0%	1	1	0	0%	1	1	0	0%		
	Hawleys Lane to A49 NB	179	184	5	3%	191	193	2	1%	209	216	7	3%		

AM VOLUME COMPARISON – 09:00-09:30 (COOL-DOWN PERIOD)

		09:00-09:30											
		2022				2027				2032			
Junction/ Movement		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference	
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	7	8	1	14%	9	7	-2	-22%	8	8	0	0%
	A49 NB	338	359	21	6%	356	370	14	4%	370	403	33	9%
	A49 NB to Winwick Link Rd	203	207	4	2%	217	221	4	2%	231	239	8	3%
	Winwick Park Ave to A49 NB	13	15	2	15%	15	16	1	7%	15	16	1	7%
	Winwick Park Ave to Winwick Link Rd	23	23	0	0%	24	24	0	0%	26	26	0	0%
	Winwick Park Ave to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
	A49 SB to Winwick Link Rd	0	7	7	-	15	16	1	7%	16	20	4	25%
	A49 SB	474	472	-2	0%	451	452	1	0%	444	434	-10	-2%
	A49 SB to Winwick Park Ave	2	1	-1	-50%	3	2	-1	-33%	2	2	0	0%
	Winwick Link Rd to A49 SB	345	346	1	0%	369	366	-3	-1%	388	389	1	0%
	Winwick Link Rd to Winwick Park Ave	5	4	-1	-20%	4	4	0	0%	4	4	0	0%
	Winwick Link Rd to A49 NB	5	5	0	0%	29	28	-1	-3%	28	28	0	0%
A49 Newton Road/ Delph Lane	A49 NB	521	545	24	5%	549	569	20	4%	579	614	35	6%
	A49 NB to Delp Ln	103	113	10	10%	122	130	8	7%	128	127	-1	-1%
	A49 SB	739	740	1	0%	732	732	0	0%	746	738	-8	-1%
	A49 SB to Delph Ln	94	92	-2	-2%	99	96	-3	-3%	99	95	-4	-4%
	Delph Ln to A49 NB	36	36	0	0%	39	39	0	0%	40	41	1	3%
	Delph Ln to A49 SB	51	52	1	2%	48	49	1	2%	53	54	1	2%
M62 Junction 9	A49 NB to M62 WB	94	104	10	11%	103	111	8	8%	120	149	29	24%
	A49 NB	258	271	13	5%	273	289	16	6%	308	322	14	5%
	A49 NB to M62 EB	238	252	14	6%	257	272	15	6%	288	287	-1	0%
	A49 NB to A49 SB (U-Turn)	0	3	3	-	0	3	3	-	0	3	3	-
	M62 EB to A49 NB	307	330	23	7%	343	362	19	6%	357	381	24	7%
	M62 EB to A49 SB	109	112	3	3%	102	107	5	5%	107	112	5	5%
	A49 SB to M62 EB	140	159	19	14%	138	144	6	4%	145	162	17	12%
	A49 SB	416	397	-19	-5%	412	405	-7	-2%	419	411	-8	-2%
	A49 SB to M62 WB	227	230	3	1%	231	231	0	0%	236	226	-10	-4%
	M62 WB to A49 SB	270	276	6	2%	293	296	3	1%	319	331	12	4%
	M62 WB to A49 NB	53	51	-2	-4%	47	44	-3	-6%	39	37	-2	-5%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	3	8	5	167%	3	7	4	133%	3	7	4	133%
	Birch Rd to A49 SB	9	21	12	133%	9	21	12	133%	9	25	16	178%
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	583	622	39	7%	612	658	46	8%	689	753	64	9%
	A49 SB	805	804	-1	0%	814	823	9	1%	856	880	24	3%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	104	113	9	9%	133	154	21	16%	172	167	-5	-3%
	A49 SB	574	555	-19	-3%	538	525	-13	-2%	538	528	-10	-2%
	A49 SB to Cromwell Ave	134	139	5	4%	148	148	0	0%	167	173	6	4%
	Cromwell Ave to A49 NB	138	139	1	1%	142	141	-1	-1%	155	169	14	9%
	Cromwell Ave to Sandy Ln West	154	170	16	10%	166	180	14	8%	178	207	29	16%
	Cromwell Ave to A49 SB	266	274	8	3%	304	318	14	5%	335	370	35	10%
	Cromwell Ave to Cromwell Ave (U-turn)	14	15	1	7%	16	17	1	6%	16	19	3	19%
	A49 NB	346	348	2	1%	366	372	6	2%	398	416	18	5%
	A49 NB to Sandy Ln West	28	38	10	36%	34	52	18	53%	47	64	17	36%
	A49 NB to Cromwell Ave	137	142	5	4%	149	153	4	3%	163	176	13	8%
	Sandy Ln West to A49 NB	90	124	34	38%	99	134	35	35%	115	149	34	30%
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-
	Sandy Ln West to A49 SB	11	5	-6	-55%	3	6	3	100%	3	5	2	67%
	Sandy Ln West to Cromwell Ave	126	189	63	50%	131	182	51	39%	145	192	47	32%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	454	472	18	4%	492	516	24	5%	534	579	45	8%
	A49 NB to Junction NINE Retail	27	31	4	15%	29	31	2	7%	30	35	5	17%
	Junction NINE Retail to A49 SB	41	41	0	0%	42	39	-3	-7%	38	35	-3	-8%
	Junction NINE Retail to A49 NB	47	49	2	4%	52	54	2	4%	62	67	5	8%
	A49 SB	784	782	-2	0%	793	790	-3	0%	806	818	12	1%
	A49 SB to Junction NINE Retail	68	67	-1	-1%	69	71	2	3%	74	79	5	7%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	117	117	0	0%	121	117	-4	-3%	120	123	3	3%
	A49 SB to Long Lane	84	74	-10	-12%	51	49	-2	-4%	43	38	-5	-12%
	A49 SB	637	639	2	0%	652	655	3	0%	720	727	7	1%
	A49 NB to Hawleys Lane	76	80	4	5%	85	86	1	1%	104	111	7	7%
	A49 NB to Long Lane	55	59	4	7%	56	60	4	7%	65	72	7	11%
	A49 NB	344	350	6	2%	354	372	18	5%	422	466	44	10%
	Long Lane to A49 SB	128	211	83	65%	142	203	61	43%	172	231	59	34%
	Long Lane to Hawleys Lane	128	133	5	4%	137	143	6	4%	128	130	2	2%
	Long Lane to A49 NB	56	62	6	11%	58	67	9	16%	59	66	7	12%
	Hawleys Lane to Long Lane	41	43	2	5%	44	42	-2	-5%	42	43	1	2%
	Hawleys Lane to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
	Hawleys Lane to A49 NB	75	77	2	3%	88	90	2	2%	92	96	4	4%

PM VOLUME COMPARISON – 16:00-17:00 (WARM-UP PERIOD)

Junction/ Movement		16:00-17:00											
		2022				2027				2032			
		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference	
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	83	82	-1	-1%	86	91	5	6%	91	96	5	5%
	A49 NB	872	875	3	0%	903	918	15	2%	935	929	-6	-1%
	A49 NB to Winwick Link Rd	855	849	-6	-1%	903	893	-10	-1%	941	931	-10	-1%
	Winwick Park Ave to A49 NB	3	24	21	700%	3	3	0	0%	4	25	21	525%
	Winwick Park Ave to Winwick Link Rd	4	6	2	50%	4	5	1	25%	5	7	2	40%
	Winwick Park Ave to A49 SB	10	22	12	120%	9	10	1	11%	12	24	12	100%
	A49 SB to Winwick Link Rd	9	18	9	100%	63	64	1	2%	63	64	1	2%
	A49 SB	496	496	0	0%	536	548	12	2%	561	566	5	1%
	A49 SB to Winwick Park Ave	13	11	-2	-15%	12	14	2	17%	13	14	1	8%
	Winwick Link Rd to A49 SB	860	859	-1	0%	899	902	3	0%	951	952	1	0%
	Winwick Link Rd to Winwick Park Ave	17	18	1	6%	17	17	0	0%	19	19	0	0%
	Winwick Link Rd to A49 NB	0	2	2	-	40	41	1	3%	40	42	2	5%
A49 Newton Road/ Delph Lane	A49 NB	1566	1543	-23	-1%	1600	1606	6	0%	1661	1646	-15	-1%
	A49 NB to Delp Ln	101	106	5	5%	104	102	-2	-2%	111	108	-3	-3%
	A49 SB	1262	1267	5	0%	1339	1357	18	1%	1416	1434	18	1%
	A49 SB to Delph Ln	93	97	4	4%	93	92	-1	-1%	95	92	-3	-3%
	Delph Ln to A49 NB	275	293	18	7%	322	325	3	1%	342	342	0	0%
	Delph Ln to A49 SB	150	159	9	6%	167	167	0	0%	174	173	-1	-1%
M62 Junction 9	A49 NB to M62 WB	366	378	12	3%	383	393	10	3%	406	413	7	2%
	A49 NB	1003	976	-27	-3%	994	995	1	0%	1025	1019	-6	-1%
	A49 NB to M62 EB	219	222	3	1%	235	225	-10	-4%	240	241	1	0%
	A49 NB to A49 SB (U-Turn)	4	14	10	250%	4	16	12	300%	4	14	10	250%
	M62 EB to A49 NB	616	630	14	2%	658	660	2	0%	691	684	-7	-1%
	M62 EB to A49 SB	472	539	67	14%	505	512	7	1%	533	620	87	16%
	A49 SB to M62 EB	150	145	-5	-3%	163	163	0	0%	169	165	-4	-2%
	A49 SB	886	916	30	3%	922	943	21	2%	977	1011	34	3%
	A49 SB to M62 WB	341	332	-9	-3%	382	379	-3	-1%	403	388	-15	-4%
	M62 WB to A49 SB	273	303	30	11%	286	295	9	3%	302	330	28	9%
	M62 WB to A49 NB	58	57	-1	-2%	62	61	-1	-2%	65	63	-2	-3%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	19	36	17	89%	22	35	13	59%	22	37	15	68%
	Birch Rd to A49 SB	0	12	12	-	0	12	12	-	0	12	12	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	1620	1621	1	0%	1649	1659	10	1%	1712	1723	11	1%
	A49 SB	1610	1736	126	8%	1687	1734	47	3%	1784	1938	154	9%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	266	414	148	56%	288	339	51	18%	332	483	151	45%
	A49 SB	934	926	-8	-1%	977	966	-11	-1%	1008	1004	-4	0%
	A49 SB to Cromwell Ave	343	324	-19	-6%	365	358	-7	-2%	378	365	-13	-3%
	Cromwell Ave to A49 NB	243	232	-11	-5%	223	215	-8	-4%	226	218	-8	-4%
	Cromwell Ave to Sandy Ln West	212	273	61	29%	237	275	38	16%	247	312	65	26%
	Cromwell Ave to A49 SB	398	376	-22	-6%	398	387	-11	-3%	420	401	-19	-5%
	Cromwell Ave to Cromwell Ave (U-turn)	36	33	-3	-8%	37	36	-1	-3%	38	37	-1	-3%
	A49 NB	1220	1197	-23	-2%	1244	1226	-18	-1%	1280	1297	17	1%
	A49 NB to Sandy Ln West	73	103	30	41%	120	173	53	44%	146	170	24	16%
	A49 NB to Cromwell Ave	500	503	3	1%	517	513	-4	-1%	529	530	1	0%
	Sandy Ln West to A49 NB	190	225	35	18%	210	253	43	20%	238	240	2	1%
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-
	Sandy Ln West to A49 SB	42	66	24	57%	41	57	16	39%	47	55	8	17%
	Sandy Ln West to Cromwell Ave	318	406	88	28%	348	400	52	15%	378	410	32	8%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	1674	1683	9	1%	1739	1768	29	2%	1788	1809	21	1%
	A49 NB to Junction NINE Retail	90	91	1	1%	98	98	0	0%	99	104	5	5%
	Junction NINE Retail to A49 SB	201	218	17	8%	194	219	25	13%	187	206	19	10%
	Junction NINE Retail to A49 NB	146	147	1	1%	174	179	5	3%	203	223	20	10%
	A49 SB	1222	1205	-17	-1%	1285	1263	-22	-2%	1324	1302	-22	-2%
	A49 SB to Junction NINE Retail	95	109	14	15%	100	118	18	18%	112	124	12	11%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	111	104	-7	-6%	111	107	-4	-4%	117	115	-2	-2%
	A49 SB to Long Lane	168	190	22	13%	167	190	23	14%	161	163	2	1%
	A49 SB	1082	1067	-15	-1%	1116	1100	-16	-1%	1162	1156	-6	-1%
	A49 NB to Hawleys Lane	82	84	2	2%	86	85	-1	-1%	89	92	3	3%
	A49 NB to Long Lane	191	212	21	11%	199	237	38	19%	204	225	21	10%
	A49 NB	1386	1398	12	1%	1457	1468	11	1%	1479	1497	18	1%
	Long Lane to A49 SB	206	325	119	58%	237	358	121	51%	268	361	93	35%
	Long Lane to Hawleys Lane	162	172	10	6%	165	176	11	7%	170	175	5	3%
	Long Lane to A49 NB	99	98	-1	-1%	103	106	3	3%	101	100	-1	-1%
	Hawleys Lane to Long Lane	116	128	12	10%	120	126	6	5%	123	129	6	5%
	Hawleys Lane to A49 SB	15	16	1	7%	16	16	0	0%	17	18	1	6%
	Hawleys Lane to A49 NB	290	290	0	0%	302	318	16	5%	331	342	11	3%

PM VOLUME COMPARISON – 17:00-18:00 (PEAK PERIOD)

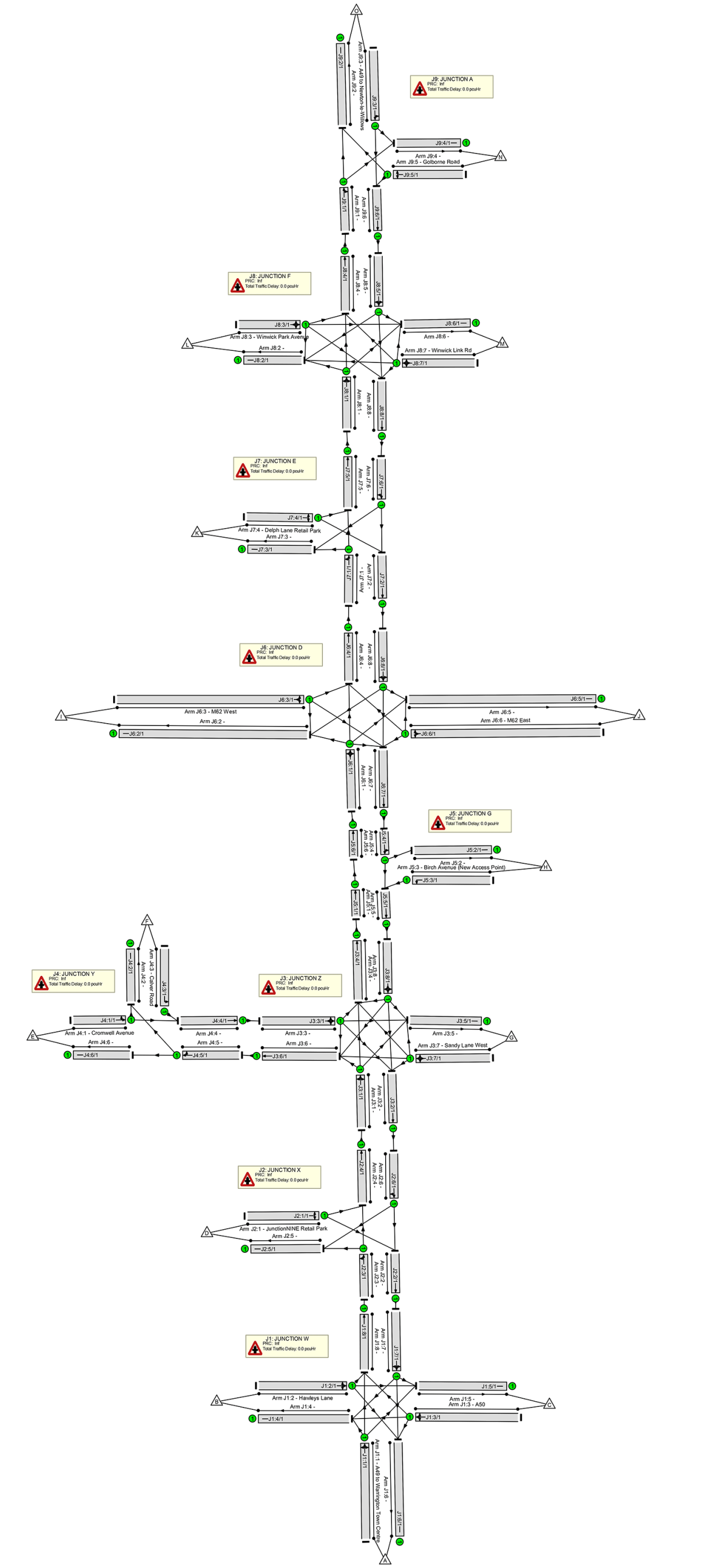
		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference	
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	86	88	2	2%	89	94	5	6%	99	100	1	1%
	A49 NB	915	928	13	1%	935	960	25	3%	976	948	-28	-3%
	A49 NB to Winwick Link Rd	917	922	5	1%	950	942	-8	-1%	998	978	-20	-2%
	Winwick Park Ave to A49 NB	4	40	36	900%	4	4	0	0%	5	41	36	720%
	Winwick Park Ave to Winwick Link Rd	7	8	1	14%	8	7	-1	-13%	9	9	0	0%
	Winwick Park Ave to A49 SB	14	30	16	114%	15	15	0	0%	18	33	15	83%
	A49 SB to Winwick Link Rd	12	21	9	75%	75	78	3	4%	74	76	2	3%
	A49 SB	537	532	-5	-1%	584	606	22	4%	611	592	-19	-3%
	A49 SB to Winwick Park Ave	14	15	1	7%	14	15	1	7%	15	15	0	0%
	Winwick Link Rd to A49 SB	848	832	-16	-2%	913	923	10	1%	960	870	-90	-9%
	Winwick Link Rd to Winwick Park Ave	18	18	0	0%	18	18	0	0%	19	17	-2	-11%
	Winwick Link Rd to A49 NB	0	2	2	-	40	41	1	3%	40	41	1	3%
A49 Newton Road/ Delph Lane	A49 NB	1598	1611	13	1%	1622	1641	19	1%	1711	1686	-25	-1%
	A49 NB to Delp Ln	110	116	6	5%	118	118	0	0%	122	123	1	1%
	A49 SB	1287	1273	-14	-1%	1405	1437	32	2%	1477	1384	-93	-6%
	A49 SB to Delph Ln	93	98	5	5%	101	101	0	0%	103	94	-9	-9%
	Delph Ln to A49 NB	313	324	11	4%	347	352	5	1%	356	349	-7	-2%
	Delph Ln to A49 SB	193	201	8	4%	208	208	0	0%	214	212	-2	-1%
M62 Junction 9	A49 NB to M62 WB	403	433	30	7%	427	438	11	3%	451	463	12	3%
	A49 NB	1085	1079	-6	-1%	1074	1086	12	1%	1132	1116	-16	-1%
	A49 NB to M62 EB	243	245	2	1%	252	246	-6	-2%	271	268	-3	-1%
	A49 NB to A49 SB (U-Turn)	4	15	11	275%	3	20	17	567%	2	16	14	700%
	M62 EB to A49 NB	562	580	18	3%	603	611	8	1%	634	627	-7	-1%
	M62 EB to A49 SB	444	516	72	16%	479	492	13	3%	503	591	88	17%
	A49 SB to M62 EB	169	162	-7	-4%	178	181	3	2%	187	170	-17	-9%
	A49 SB	913	933	20	2%	999	1032	33	3%	1045	1008	-37	-4%
	A49 SB to M62 WB	370	350	-20	-5%	429	429	0	0%	451	405	-46	-10%
	M62 WB to A49 SB	281	316	35	12%	303	315	12	4%	324	355	31	10%
	M62 WB to A49 NB	62	61	-1	-2%	65	65	0	0%	69	67	-2	-3%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	19	35	16	84%	20	38	18	90%	20	38	18	90%
	Birch Rd to A49 SB	0	11	11	-	0	11	11	-	0	11	11	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	1733	1769	36	2%	1751	1792	41	2%	1846	1864	18	1%
	A49 SB	1598	1739	141	9%	1758	1819	61	3%	1842	1930	88	5%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	254	411	157	62%	300	357	57	19%	339	486	147	43%
	A49 SB	941	944	3	0%	1035	1036	1	0%	1056	1038	-18	-2%
	A49 SB to Cromwell Ave	347	333	-14	-4%	372	372	0	0%	388	371	-17	-4%
	Cromwell Ave to A49 NB	261	251	-10	-4%	232	215	-17	-7%	230	219	-11	-5%
	Cromwell Ave to Sandy Ln West	223	292	69	31%	243	282	39	16%	258	331	73	28%
	Cromwell Ave to A49 SB	442	422	-20	-5%	433	417	-16	-4%	451	445	-6	-1%
	Cromwell Ave to Cromwell Ave (U-turn)	42	39	-3	-7%	43	42	-1	-2%	43	44	1	2%
	A49 NB	1257	1241	-16	-1%	1283	1285	2	0%	1346	1368	22	2%
	A49 NB to Sandy Ln West	77	111	34	44%	121	178	57	47%	154	181	27	18%
	A49 NB to Cromwell Ave	496	508	12	2%	516	517	1	0%	539	545	6	1%
	Sandy Ln West to A49 NB	206	270	64	31%	236	286	50	21%	266	270	4	2%
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-
	Sandy Ln West to A49 SB	48	74	26	54%	43	60	17	40%	46	56	10	22%
	Sandy Ln West to Cromwell Ave	349	458	109	31%	384	445	61	16%	418	447	29	7%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	1676	1705	29	2%	1736	1788	52	3%	1820	1856	36	2%
	A49 NB to Junction NINE Retail	89	94	5	6%	98	102	4	4%	109	118	9	8%
	Junction NINE Retail to A49 SB	193	194	1	1%	191	215	24	13%	185	200	15	8%
	Junction NINE Retail to A49 NB	146	145	-1	-1%	178	180	2	1%	208	228	20	10%
	A49 SB	1350	1341	-9	-1%	1382	1366	-16	-1%	1437	1415	-22	-2%
	A49 SB to Junction NINE Retail	101	117	16	16%	107	130	23	21%	122	128	6	5%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	120	114	-6	-5%	124	124	0	0%	128	123	-5	-4%
	A49 SB to Long Lane	183	203	20	11%	185	214	29	16%	167	179	12	7%
	A49 SB	1215	1192	-23	-2%	1307	1283	-24	-2%	1317	1309	-8	-1%
	A49 NB to Hawleys Lane	77	80	3	4%	82	85	3	4%	88	91	3	3%
	A49 NB to Long Lane	188	214	26	14%	192	237	45	23%	205	233	28	14%
	A49 NB	1358	1393	35	3%	1424	1466	42	3%	1484	1535	51	3%
	Long Lane to A49 SB	219	349	130	59%	238	379	141	59%	289	402	113	39%
	Long Lane to Hawleys Lane	178	187	9	5%	179	194	15	8%	193	206	13	7%
	Long Lane to A49 NB	107	107	0	0%	104	108	4	4%	110	112	2	2%
	Hawleys Lane to Long Lane	131	144	13	10%	133	138	5	4%	140	141	1	1%
	Hawleys Lane to A49 SB	19	19	0	0%	18	18	0	0%	19	19	0	0%
	Hawleys Lane to A49 NB	307	305	-2	-1%	311	320	9	3%	339	338	-1	0%

PM VOLUME COMPARISON – 18:00-18:30 (COOL-DOWN PERIOD)

18:00-18:30													
		2022				2027				2032			
Junction/ Movement		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference	
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	41	42	1	2%	43	43	0	0%	46	45	-1	-2%
	A49 NB	391	403	12	3%	416	438	22	5%	448	454	6	1%
	A49 NB to Winwick Link Rd	404	407	3	1%	430	436	6	1%	454	451	-3	-1%
	Winwick Park Ave to A49 NB	3	22	19	633%	3	3	0	0%	4	22	18	450%
	Winwick Park Ave to Winwick Link Rd	4	6	2	50%	5	5	0	0%	4	6	2	50%
	Winwick Park Ave to A49 SB	9	17	8	89%	8	9	1	13%	9	20	11	122%
	A49 SB to Winwick Link Rd	4	9	5	125%	31	35	4	13%	31	34	3	10%
	A49 SB	284	296	12	4%	301	314	13	4%	319	329	10	3%
	A49 SB to Winwick Park Ave	8	8	0	0%	7	8	1	14%	8	8	0	0%
	Winwick Link Rd to A49 SB	425	437	12	3%	437	431	-6	-1%	471	458	-13	-3%
	Winwick Link Rd to Winwick Park Ave	9	9	0	0%	9	9	0	0%	9	9	0	0%
	Winwick Link Rd to A49 NB	0	1	1	-	19	19	0	0%	19	21	2	11%
A49 Newton Road/ Delph Lane	A49 NB	706	707	1	0%	724	751	27	4%	760	762	2	0%
	A49 NB to Delp Ln	49	49	0	0%	53	57	4	8%	56	54	-2	-4%
	A49 SB	677	711	34	5%	702	706	4	1%	758	760	2	0%
	A49 SB to Delph Ln	50	55	5	10%	52	50	-2	-4%	51	52	1	2%
	Delph Ln to A49 NB	137	147	10	7%	170	172	2	1%	193	190	-3	-2%
	Delph Ln to A49 SB	75	81	6	8%	90	89	-1	-1%	97	96	-1	-1%
M62 Junction 9	A49 NB to M62 WB	173	183	10	6%	181	193	12	7%	196	205	9	5%
	A49 NB	461	462	1	0%	466	489	23	5%	492	498	6	1%
	A49 NB to M62 EB	103	110	7	7%	114	116	2	2%	121	120	-1	-1%
	A49 NB to A49 SB (U-Turn)	2	9	7	350%	1	10	9	900%	2	9	7	350%
	M62 EB to A49 NB	253	259	6	2%	269	276	7	3%	282	278	-4	-1%
	M62 EB to A49 SB	204	234	30	15%	211	213	2	1%	228	263	35	15%
	A49 SB to M62 EB	75	77	2	3%	81	79	-2	-2%	87	83	-4	-5%
	A49 SB	497	532	35	7%	501	507	6	1%	538	552	14	3%
	A49 SB to M62 WB	192	196	4	2%	214	214	0	0%	233	224	-9	-4%
	M62 WB to A49 SB	134	147	13	10%	138	141	3	2%	143	160	17	12%
	M62 WB to A49 NB	34	33	-1	-3%	35	36	1	3%	36	36	0	0%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	9	21	12	133%	11	20	9	82%	12	23	11	92%
	Birch Rd to A49 SB	0	6	6	-	0	6	6	-	0	6	6	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	743	770	27	4%	761	807	46	6%	813	839	26	3%
	A49 SB	835	918	83	10%	849	871	22	3%	915	988	73	8%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	140	223	83	59%	152	177	25	16%	176	251	75	43%
	A49 SB	517	529	12	2%	546	534	-12	-2%	558	545	-13	-2%
	A49 SB to Cromwell Ave	191	182	-9	-5%	203	194	-9	-4%	210	204	-6	-3%
	Cromwell Ave to A49 NB	122	117	-5	-4%	105	104	-1	-1%	118	109	-9	-8%
	Cromwell Ave to Sandy Ln West	106	140	34	32%	119	147	28	24%	134	165	31	23%
	Cromwell Ave to A49 SB	214	200	-14	-7%	212	215	3	1%	240	214	-26	-11%
	Cromwell Ave to Cromwell Ave (U-turn)	21	20	-1	-5%	24	22	-2	-8%	23	21	-2	-9%
	A49 NB	537	542	5	1%	560	559	-1	0%	579	609	30	5%
	A49 NB to Sandy Ln West	35	52	17	49%	56	83	27	48%	67	84	17	25%
	A49 NB to Cromwell Ave	208	208	0	0%	216	220	4	2%	223	232	9	4%
	Sandy Ln West to A49 NB	89	114	25	28%	97	145	48	49%	110	138	28	25%
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-
	Sandy Ln West to A49 SB	19	32	13	68%	18	31	13	72%	19	29	10	53%
	Sandy Ln West to Cromwell Ave	136	196	60	44%	154	225	71	46%	174	226	52	30%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	726	741	15	2%	768	803	35	5%	806	852	46	6%
	A49 NB to Junction NINE Retail	40	44	4	10%	45	45	0	0%	46	52	6	13%
	Junction NINE Retail to A49 SB	77	96	19	25%	67	84	17	25%	68	75	7	10%
	Junction NINE Retail to A49 NB	48	56	8	17%	56	59	3	5%	65	79	14	22%
	A49 SB	704	697	-7	-1%	735	726	-9	-1%	758	724	-34	-4%
	A49 SB to Junction NINE Retail	49	64	15	31%	56	67	11	20%	62	66	4	6%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	68	70	2	3%	66	66	0	0%	69	68	-1	-1%
	A49 SB to Long Lane	102	109	7	7%	93	108	15	16%	93	91	-2	-2%
	A49 SB	615	616	1	0%	633	625	-8	-1%	672	663	-9	-1%
	A49 NB to Hawleys Lane	34	35	1	3%	34	35	1	3%	37	41	4	11%
	A49 NB to Long Lane	82	93	11	13%	86	107	21	24%	90	104	14	16%
	A49 NB	573	588	15	3%	597	613	16	3%	630	669	39	6%
	Long Lane to A49 SB	101	173	72	71%	116	191	75	65%	134	204	70	52%
	Long Lane to Hawleys Lane	86	84	-2	-2%	85	90	5	6%	87	97	10	11%
	Long Lane to A49 NB	52	54	2	4%	54	58	4	7%	56	57	1	2%
	Hawleys Lane to Long Lane	61	67	6	10%	66	74	8	12%	66	72	6	9%
	Hawleys Lane to A49 SB	8	8	0	0%	9	9	0	0%	9	9	0	0%
	Hawleys Lane to A49 NB	136	136	0	0%	149	166	17	11%	166	176	10	6%

APPENDIX B:

LinSig NETWORK DIAGRAM


J9: JUNCTION A
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J8: JUNCTION F
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J7: JUNCTION E
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J6: JUNCTION D
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J5: JUNCTION G
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J4: JUNCTION Y
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J3: JUNCTION Z
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J2: JUNCTION X
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J1: JUNCTION W
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
Arm J9:3 - A49 to Newton-le-Willows
Arm J9:2 -
Arm J9:4 -
Arm J9:5 - Golborne Road
Arm J9:6 -
Arm J9:1 -
Arm J8:5 -
Arm J8:4 -
Arm J8:3 - Winwick Park Avenue
Arm J8:2 -
Arm J8:6 -
Arm J8:7 - Winwick Link Rd
Arm J8:1 -
Arm J8:8 -
Arm J7:5 -
Arm J7:6 -
Arm J7:4 - Delph Lane Retail Park
Arm J7:3 -
Arm J7:1 -
Arm J7:2 -
Arm J6:8 -
Arm J6:4 -
Arm J6:3 - M62 West
Arm J6:2 -
Arm J6:5 -
Arm J6:6 - M62 East
Arm J6:1 -
Arm J6:7 -
Arm J5:4 -
Arm J5:6 -
Arm J5:2 -
Arm J5:3 - Birch Avenue (New Access Point)
Arm J5:1 -
Arm J5:5 -
Arm J4:3 - Calver Road
Arm J4:2 -
Arm J4:1 - Cromwell Avenue
Arm J4:6 -
Arm J4:4 -
Arm J4:5 -
Arm J3:4 -
Arm J3:3 -
Arm J3:6 -
Arm J3:5 -
Arm J3:7 - Sandy Lane West
Arm J3:1 -
Arm J3:2 -
Arm J2:4 -
Arm J2:6 -
Arm J2:1 - JunctionNINE Retail Park
Arm J2:5 -
Arm J2:3 -
Arm J2:2 -
Arm J1:8 -
Arm J1:7 -
Arm J1:2 - Hawleys Lane
Arm J1:4 -
Arm J1:5 -
Arm J1:3 - A50
Arm J1:1 - A49 to Warrington Town Centre
Arm J1:6 -

APPENDIX C:

QUEUE DATA

AM AVERAGE QUEUE LENGTH COMPARISON

		07:00-08:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	11	11	0	0%	13	13	0	-1%	15	16	0	2%
	A49 NB	11	11	0	0%	13	13	0	-1%	15	16	0	2%
	A49 NB to Winwick Link Rd	11	11	0	0%	13	13	0	-1%	15	16	0	2%
	Winwick Park Ave to A49 NB	4	4	0	1%	4	4	0	0%	4	4	0	0%
	Winwick Park Ave to Winwick Link Rd	4	4	0	1%	4	4	0	0%	4	4	0	0%
	Winwick Park Ave to A49 SB	4	4	0	1%	4	4	0	0%	4	4	0	0%
	A49 SB to Winwick Link Rd	33	38	5	16%	31	32	1	4%	30	27	-3	-10%
	A49 SB	33	38	5	16%	31	32	1	4%	30	27	-3	-10%
	A49 SB to Winwick Park Ave	33	38	5	16%	31	32	1	4%	30	27	-3	-10%
	Winwick Link Rd to A49 SB	2	2	0	-2%	3	3	0	-3%	3	3	0	-3%
	Winwick Link Rd to Winwick Park Ave	3	3	0	-2%	4	4	0	-2%	4	4	0	-2%
	Winwick Link Rd to A49 NB	3	3	0	-2%	4	4	0	-2%	4	4	0	-2%
A49 Newton Road/ Delph Lane	A49 NB	19	20	1	6%	23	24	1	7%	23	18	-5	-20%
	A49 NB to Delp Ln	19	20	1	6%	23	24	1	5%	23	18	-5	-20%
	A49 SB	27	31	4	15%	31	31	0	1%	32	25	-6	-20%
	A49 SB to Delph Ln	11	11	0	-3%	11	10	-1	-7%	11	22	12	107%
	Delph Ln to A49 NB	6	6	0	2%	6	6	0	5%	6	8	2	27%
	Delph Ln to A49 SB	8	8	0	1%	7	7	0	2%	8	8	1	7%
M62 Junction 9	A49 NB to M62 WB	9	10	1	8%	10	10	0	1%	11	12	1	11%
	A49 NB	9	10	1	8%	10	10	0	1%	11	12	1	11%
	A49 NB to M62 EB	9	10	1	8%	10	10	0	1%	11	12	1	11%
	A49 NB to A49 SB (U-Turn)	9	10	1	8%	10	10	0	1%	11	12	1	11%
	M62 EB to A49 NB	37	122	85	229%	18	53	36	203%	20	42	22	109%
	M62 EB to A49 SB	37	122	85	229%	18	53	36	203%	20	42	22	109%
	A49 SB to M62 EB	24	25	1	3%	29	29	-1	-2%	31	36	6	18%
	A49 SB	24	25	1	3%	29	29	-1	-2%	31	36	6	18%
	A49 SB to M62 WB	24	25	1	3%	29	29	-1	-2%	31	36	6	18%
	M62 WB to A49 SB	15	15	0	1%	17	16	0	-1%	18	18	0	1%
	M62 WB to A49 NB	15	15	0	1%	17	16	0	-1%	18	18	0	1%

07:00-08:00															
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	0	0	0	-	0	0	0	-	0	0	0	-
	A49 SB	0	0	0	-	0	0	0	-100%	0	0	0	-100%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	88	79	-10	-11%	81	72	-8	-10%	89	81	-8	-9%
	A49 SB	88	79	-10	-11%	81	72	-8	-10%	89	81	-8	-9%
	A49 SB to Cromwell Ave	88	79	-10	-11%	81	72	-8	-10%	89	81	-8	-9%
	Cromwell Ave to A49 NB	11	13	1	12%	14	16	1	10%	19	23	5	26%
	Cromwell Ave to Sandy Ln West	19	22	3	13%	24	27	3	11%	32	40	8	26%
	Cromwell Ave to A49 SB	19	22	3	13%	24	27	3	11%	32	40	8	26%
	Cromwell Ave to Cromwell Ave (U-turn)	19	22	3	13%	24	27	3	11%	32	40	8	26%
	A49 NB	2	3	0	22%	3	2	0	-3%	3	4	1	55%
	A49 NB to Sandy Ln West	2	3	0	22%	3	2	0	-3%	3	4	1	55%
	A49 NB to Cromwell Ave	2	3	0	22%	3	2	0	-3%	3	4	1	55%
	Sandy Ln West to A49 NB	9	41	32	340%	9	40	31	327%	14	53	39	275%
	Sandy Ln West to Sandy Ln (U-turn	9	41	32	340%	9	40	31	327%	14	53	39	275%
	Sandy Ln West to A49 SB	9	41	32	340%	9	40	31	327%	14	53	39	275%
	Sandy Ln West to Cromwell Ave	9	41	32	340%	9	40	31	327%	14	53	39	275%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	2	2	0	3%	5	5	0	8%	14	14	0	3%
	A49 NB to Junction NINE Retail	2	2	0	3%	5	5	0	8%	14	14	0	3%
	Junction NINE Retail to A49 SB	6	6	0	-1%	6	6	0	-5%	6	6	0	-2%
	Junction NINE Retail to A49 NB	4	5	0	5%	5	5	0	0%	5	6	0	7%
	A49 SB	7	6	0	-4%	7	7	0	-6%	10	13	3	27%
	A49 SB to Junction NINE Retail	9	9	0	-2%	10	10	0	3%	10	11	1	5%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	21	20	-1	-4%	29	23	-6	-19%	35	40	6	17%
	A49 SB to Long Lane	1	0	-1	-57%	0	0	0	-	0	0	0	-
	A49 SB	54	55	0	0%	67	65	-2	-3%	98	103	5	6%
	A49 NB to Hawleys Lane	13	15	1	9%	17	20	3	17%	24	28	4	17%
	A49 NB to Long Lane	6	6	0	5%	7	7	0	5%	7	8	1	14%
	A49 NB	13	15	1	9%	17	20	3	17%	24	28	4	17%
	Long Lane to A49 SB	10	36	26	259%	9	20	11	128%	11	46	36	328%
	Long Lane to Hawleys Lane	43	60	17	40%	31	42	11	36%	27	56	29	105%
	Long Lane to A49 NB	43	60	17	40%	31	42	11	36%	27	56	29	105%
	Hawleys Lane to Long Lane	6	7	0	2%	7	7	0	-2%	7	7	0	1%
	Hawleys Lane to A49 SB	6	7	0	2%	7	7	0	-2%	7	7	0	1%
	Hawleys Lane to A49 NB	3	3	0	2%	4	4	0	-3%	4	4	0	7%

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	14	17	4	26%	17	23	6	38%	25	49	24	96%
	A49 NB	14	17	4	26%	17	23	6	38%	25	49	24	96%
	A49 NB to Winwick Link Rd	14	17	4	26%	17	23	6	38%	25	49	24	96%
	Winwick Park Ave to A49 NB	4	5	0	2%	5	5	0	0%	5	5	0	0%
	Winwick Park Ave to Winwick Link Rd	4	5	0	2%	5	5	0	0%	5	5	0	0%
	Winwick Park Ave to A49 SB	4	5	0	2%	5	5	0	0%	5	5	0	0%
	A49 SB to Winwick Link Rd	51	57	6	13%	43	45	2	4%	41	32	-9	-21%
	A49 SB	51	57	6	13%	43	45	2	4%	41	32	-9	-21%
	A49 SB to Winwick Park Ave	51	57	6	13%	43	45	2	4%	41	32	-9	-21%
	Winwick Link Rd to A49 SB	2	2	0	-1%	3	3	0	-1%	4	3	0	-3%
	Winwick Link Rd to Winwick Park Ave	3	3	0	-2%	5	5	0	-1%	5	5	0	9%
	Winwick Link Rd to A49 NB	3	3	0	-2%	5	5	0	-1%	5	5	0	9%
A49 Newton Road/ Delph Lane	A49 NB	21	24	3	16%	38	57	19	50%	57	28	-29	-51%
	A49 NB to Delp Ln	21	24	3	17%	38	57	19	50%	58	29	-29	-51%
	A49 SB	44	45	1	2%	50	49	-1	-2%	61	64	3	5%
	A49 SB to Delph Ln	12	12	0	0%	12	12	0	4%	12	34	22	187%
	Delph Ln to A49 NB	6	6	0	-2%	6	5	0	-3%	7	8	1	15%
	Delph Ln to A49 SB	8	8	0	0%	7	7	0	1%	8	8	1	7%
M62 Junction 9	A49 NB to M62 WB	15	16	2	11%	22	28	6	26%	60	39	-21	-35%
	A49 NB	15	16	2	11%	22	28	6	26%	60	39	-21	-35%
	A49 NB to M62 EB	15	16	2	11%	22	28	6	26%	60	39	-21	-35%
	A49 NB to A49 SB (U-Turn)	15	16	2	11%	22	28	6	26%	60	39	-21	-35%
	M62 EB to A49 NB	26	90	64	251%	16	44	28	174%	18	35	17	91%
	M62 EB to A49 SB	26	90	64	251%	16	44	28	174%	18	35	17	91%
	A49 SB to M62 EB	41	40	-1	-3%	41	40	-1	-3%	44	57	14	31%
	A49 SB	41	40	-1	-3%	41	40	-1	-3%	44	57	14	31%
	A49 SB to M62 WB	41	40	-1	-3%	41	40	-1	-3%	44	57	14	31%
	M62 WB to A49 SB	14	14	0	2%	14	14	0	-1%	17	28	11	68%
	M62 WB to A49 NB	14	14	0	2%	14	14	0	-1%	17	28	11	68%

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	2	2	-	0	0	0	-	0	8	8	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	2	2	-	49	20	-29	-59%
	A49 NB	0	0	0	-	0	2	2	-	49	20	-29	-59%
	A49 SB	2	10	8	449%	2	0	-2	-98%	25	39	14	59%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	208	199	-9	-4%	124	136	12	9%	263	211	-52	-20%
	A49 SB	208	199	-9	-4%	124	136	12	9%	263	211	-52	-20%
	A49 SB to Cromwell Ave	208	199	-9	-4%	124	136	12	9%	263	211	-52	-20%
	Cromwell Ave to A49 NB	17	20	3	18%	23	27	4	18%	34	51	17	51%
	Cromwell Ave to Sandy Ln West	30	35	5	18%	40	47	7	18%	58	84	26	45%
	Cromwell Ave to A49 SB	30	35	5	18%	40	47	7	18%	58	84	26	45%
	Cromwell Ave to Cromwell Ave (U-turn)	30	35	5	18%	40	47	7	18%	58	84	26	45%
	A49 NB	4	7	3	63%	6	10	3	48%	11	12	1	12%
	A49 NB to Sandy Ln West	4	7	3	63%	6	10	3	48%	11	12	1	12%
	A49 NB to Cromwell Ave	4	7	3	63%	6	10	3	48%	11	12	1	12%
	Sandy Ln West to A49 NB	17	194	177	1024%	21	200	179	875%	99	224	125	126%
	Sandy Ln West to Sandy Ln (U-turn	17	194	177	1024%	21	200	179	875%	99	224	125	126%
	Sandy Ln West to A49 SB	17	194	177	1024%	21	200	179	875%	99	224	125	126%
	Sandy Ln West to Cromwell Ave	17	194	177	1024%	21	200	179	875%	99	224	125	126%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	16	16	1	4%	23	24	1	4%	23	24	0	2%
	A49 NB to Junction NINE Retail	16	16	1	4%	23	24	1	4%	23	24	0	2%
	Junction NINE Retail to A49 SB	6	6	0	2%	6	6	0	-2%	6	6	0	1%
	Junction NINE Retail to A49 NB	5	5	0	6%	5	5	0	2%	5	6	0	7%
	A49 SB	16	12	-5	-29%	45	36	-9	-21%	133	115	-18	-13%
	A49 SB to Junction NINE Retail	12	12	0	1%	12	13	1	10%	13	13	1	5%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	61	55	-6	-9%	65	62	-4	-5%	85	78	-7	-8%
	A49 SB to Long Lane	0	2	1	369%	0	0	0	-	0	0	0	-
	A49 SB	138	113	-25	-18%	172	167	-5	-3%	206	200	-6	-3%
	A49 NB to Hawleys Lane	19	23	4	20%	34	51	18	52%	123	248	125	102%
	A49 NB to Long Lane	9	10	0	5%	13	19	6	43%	45	112	67	148%
	A49 NB	19	23	4	20%	34	51	18	52%	123	248	125	102%
	Long Lane to A49 SB	21	85	64	313%	18	57	40	225%	28	98	70	247%
	Long Lane to Hawleys Lane	74	116	42	57%	46	79	34	74%	55	97	43	78%
	Long Lane to A49 NB	74	116	42	57%	46	79	34	74%	55	97	43	78%
	Hawleys Lane to Long Lane	9	9	1	7%	9	9	0	3%	10	10	0	-1%
	Hawleys Lane to A49 SB	9	9	1	7%	9	9	0	3%	10	10	0	-1%
	Hawleys Lane to A49 NB	5	5	0	1%	5	5	0	2%	5	5	0	0%

		09:00-09:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	11	13	2	13%	12	14	1	11%	13	19	6	44%
	A49 NB	11	13	2	13%	12	14	1	11%	13	19	6	44%
	A49 NB to Winwick Link Rd	11	13	2	13%	12	14	1	11%	13	19	6	44%
	Winwick Park Ave to A49 NB	4	4	0	0%	4	4	0	0%	4	4	0	1%
	Winwick Park Ave to Winwick Link Rd	4	4	0	0%	4	4	0	0%	4	4	0	1%
	Winwick Park Ave to A49 SB	4	4	0	0%	4	4	0	0%	4	4	0	1%
	A49 SB to Winwick Link Rd	41	57	16	38%	38	39	2	4%	34	29	-5	-15%
	A49 SB	41	57	16	38%	38	39	2	4%	34	29	-5	-15%
	A49 SB to Winwick Park Ave	41	57	16	38%	38	39	2	4%	34	29	-5	-15%
	Winwick Link Rd to A49 SB	2	2	0	-4%	3	3	0	4%	3	3	0	-1%
	Winwick Link Rd to Winwick Park Ave	3	2	0	-5%	4	4	0	2%	4	4	0	0%
	Winwick Link Rd to A49 NB	3	2	0	-5%	4	4	0	2%	4	4	0	0%
A49 Newton Road/ Delph Lane	A49 NB	19	21	2	12%	31	38	7	24%	104	22	-83	-79%
	A49 NB to Delp Ln	19	21	2	12%	31	38	8	25%	106	22	-84	-79%
	A49 SB	39	36	-3	-7%	33	31	-2	-5%	46	21	-24	-53%
	A49 SB to Delph Ln	12	12	0	1%	14	12	-1	-10%	15	22	7	46%
	Delph Ln to A49 NB	6	6	0	-2%	5	6	0	6%	7	8	1	18%
	Delph Ln to A49 SB	8	8	0	2%	7	7	0	0%	8	9	1	8%
M62 Junction 9	A49 NB to M62 WB	10	12	2	15%	13	21	8	59%	62	18	-45	-71%
	A49 NB	10	12	2	15%	13	21	8	59%	62	18	-45	-71%
	A49 NB to M62 EB	10	12	2	15%	13	21	8	59%	62	18	-45	-71%
	A49 NB to A49 SB (U-Turn)	10	12	2	15%	13	21	8	59%	62	18	-45	-71%
	M62 EB to A49 NB	19	60	40	208%	15	36	21	140%	15	29	13	88%
	M62 EB to A49 SB	19	60	40	208%	15	36	21	140%	15	29	13	88%
	A49 SB to M62 EB	31	31	0	0%	35	35	-1	-2%	40	39	-1	-2%
	A49 SB	31	31	0	0%	35	35	-1	-2%	40	39	-1	-2%
	A49 SB to M62 WB	31	31	0	0%	35	35	-1	-2%	40	39	-1	-2%
	M62 WB to A49 SB	13	13	0	2%	13	13	0	-1%	30	29	-1	-4%
	M62 WB to A49 NB	13	13	0	2%	13	13	0	-1%	30	29	-1	-4%

		09:00-09:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	5	25	20	391%
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	48	0	-48	-100%
	A49 NB	0	0	0	-	0	0	0	-	48	0	-48	-100%
	A49 SB	0	0	0	-	0	0	0	-	67	38	-29	-43%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	103	125	21	21%	62	96	34	55%	283	209	-74	-26%
	A49 SB	103	125	21	21%	62	96	34	55%	283	209	-74	-26%
	A49 SB to Cromwell Ave	103	125	21	21%	62	96	34	55%	283	209	-74	-26%
	Cromwell Ave to A49 NB	13	13	1	5%	15	20	4	28%	21	48	27	126%
	Cromwell Ave to Sandy Ln West	21	22	1	6%	27	35	8	30%	37	79	42	114%
	Cromwell Ave to A49 SB	21	22	1	6%	27	35	8	30%	37	79	42	114%
	Cromwell Ave to Cromwell Ave (U-turn)	21	22	1	6%	27	35	8	30%	37	79	42	114%
	A49 NB	2	3	1	33%	3	3	0	1%	5	8	4	76%
	A49 NB to Sandy Ln West	2	3	1	33%	3	3	0	1%	5	8	4	76%
	A49 NB to Cromwell Ave	2	3	1	33%	3	3	0	1%	5	8	4	76%
	Sandy Ln West to A49 NB	11	234	223	1949%	12	216	205	1758%	37	266	229	617%
	Sandy Ln West to Sandy Ln (U-turn	11	234	223	1949%	12	216	205	1758%	37	266	229	617%
	Sandy Ln West to A49 SB	11	234	223	1949%	12	216	205	1758%	37	266	229	617%
	Sandy Ln West to Cromwell Ave	11	234	223	1949%	12	216	205	1758%	37	266	229	617%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	24	25	0	1%	6	7	0	4%	29	33	4	15%
	A49 NB to Junction NINE Retail	24	25	0	1%	6	7	0	4%	29	33	4	15%
	Junction NINE Retail to A49 SB	6	6	0	-3%	6	6	0	-3%	6	6	0	3%
	Junction NINE Retail to A49 NB	4	5	0	7%	5	5	0	1%	5	6	0	5%
	A49 SB	60	22	-38	-63%	19	10	-9	-48%	79	144	64	81%
	A49 SB to Junction NINE Retail	12	12	0	-3%	11	12	1	14%	12	13	1	8%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	61	52	-9	-15%	46	39	-7	-15%	63	70	8	12%
	A49 SB to Long Lane	19	1	-19	-97%	0	0	0	-100%	0	0	0	-
	A49 SB	157	134	-23	-14%	120	102	-19	-15%	172	198	26	15%
	A49 NB to Hawleys Lane	11	11	0	0%	14	18	5	36%	70	242	172	246%
	A49 NB to Long Lane	5	6	1	12%	7	11	3	42%	31	148	117	384%
	A49 NB	11	11	0	0%	14	18	5	36%	70	242	172	246%
	Long Lane to A49 SB	24	114	90	383%	19	116	96	497%	29	124	95	333%
	Long Lane to Hawleys Lane	77	128	51	66%	66	131	65	99%	59	124	65	110%
	Long Lane to A49 NB	77	128	51	66%	66	131	65	99%	59	124	65	110%
	Hawleys Lane to Long Lane	8	9	1	10%	9	8	-1	-12%	9	10	1	7%
	Hawleys Lane to A49 SB	8	9	1	10%	9	8	-1	-12%	9	10	1	7%
	Hawleys Lane to A49 NB	3	3	0	1%	3	3	0	2%	3	4	0	13%

PM AVERAGE QUEUE LENGTH COMPARISON

		16:00-17:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	11	12	0	3%	12	13	1	8%	13	13	0	-3%
	A49 NB	11	12	0	3%	12	13	1	8%	13	13	0	-3%
	A49 NB to Winwick Link Rd	11	12	0	3%	12	13	1	8%	13	13	0	-3%
	Winwick Park Ave to A49 NB	1	2	1	172%	1	1	0	4%	1	2	1	148%
	Winwick Park Ave to Winwick Link Rd	1	2	1	172%	1	1	0	4%	1	2	1	148%
	Winwick Park Ave to A49 SB	1	2	1	172%	1	1	0	4%	1	2	1	148%
	A49 SB to Winwick Link Rd	16	17	0	3%	18	18	0	3%	19	19	0	1%
	A49 SB	16	17	0	3%	18	18	0	3%	19	19	0	1%
	A49 SB to Winwick Park Ave	16	17	0	3%	18	18	0	3%	19	19	0	1%
	Winwick Link Rd to A49 SB	1	1	0	5%	2	2	0	2%	2	2	0	0%
	Winwick Link Rd to Winwick Park Ave	2	2	0	6%	4	4	0	3%	4	4	0	3%
	Winwick Link Rd to A49 NB	2	2	0	6%	4	4	0	3%	4	4	0	3%
A49 Newton Road/ Delph Lane	A49 NB	29	33	3	11%	32	43	10	32%	37	41	4	12%
	A49 NB to Delp Ln	29	32	3	12%	32	43	11	34%	37	41	4	12%
	A49 SB	16	17	0	3%	19	21	2	9%	21	26	6	27%
	A49 SB to Delph Ln	10	13	3	25%	11	10	-1	-10%	12	12	-1	-5%
	Delph Ln to A49 NB	17	20	2	13%	24	24	0	2%	28	27	-1	-3%
	Delph Ln to A49 SB	16	18	2	13%	21	21	1	3%	25	25	-1	-2%
M62 Junction 9	A49 NB to M62 WB	11	11	0	-3%	11	12	1	9%	11	13	2	14%
	A49 NB	11	11	0	-3%	11	12	1	9%	11	13	2	14%
	A49 NB to M62 EB	11	11	0	-3%	11	12	1	9%	11	13	2	14%
	A49 NB to A49 SB (U-Turn)	11	11	0	-3%	11	12	1	9%	11	13	2	14%
	M62 EB to A49 NB	20	63	43	210%	25	67	42	170%	24	77	54	228%
	M62 EB to A49 SB	20	63	43	210%	25	67	42	170%	24	77	54	228%
	A49 SB to M62 EB	27	27	0	1%	33	35	2	6%	34	41	7	21%
	A49 SB	27	27	0	1%	33	35	2	6%	34	41	7	21%
	A49 SB to M62 WB	27	27	0	1%	33	35	2	6%	34	41	7	21%
	M62 WB to A49 SB	7	9	2	25%	8	9	2	20%	8	10	2	31%
	M62 WB to A49 NB	7	9	2	25%	8	9	2	20%	8	10	2	31%

16:00-17:00															
		2022				2027				2032					
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference			
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%		
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-		
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-		
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-		
	A49 NB	0	0	0	-	0	0	0	-	0	0	0	-		
	A49 SB	0	0	0	-	0	0	0	-	1	14	13	1554%		
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	66	108	42	63%	56	96	40	72%	105	161	56	53%		
	A49 SB	66	108	42	63%	56	96	40	72%	105	161	56	53%		
	A49 SB to Cromwell Ave	66	108	42	63%	56	96	40	72%	105	161	56	53%		
	Cromwell Ave to A49 NB	18	18	0	-1%	21	30	10	47%	25	26	1	5%		
	Cromwell Ave to Sandy Ln West	31	31	0	-1%	36	51	15	41%	44	46	2	5%		
	Cromwell Ave to A49 SB	31	31	0	-1%	36	51	15	41%	44	46	2	5%		
	Cromwell Ave to Cromwell Ave (U-turn)	31	31	0	-1%	36	51	15	41%	44	46	2	5%		
	A49 NB	27	27	0	0%	37	36	-1	-2%	53	62	9	17%		
	A49 NB to Sandy Ln West	27	27	0	0%	37	36	-1	-2%	53	62	9	17%		
	A49 NB to Cromwell Ave	27	27	0	0%	37	36	-1	-2%	53	62	9	17%		
	Sandy Ln West to A49 NB	12	98	86	703%	20	181	161	799%	43	201	158	372%		
	Sandy Ln West to Sandy Ln (U-turn	12	98	86	703%	20	181	161	799%	43	201	158	372%		
	Sandy Ln West to A49 SB	12	98	86	703%	20	181	161	799%	43	201	158	372%		
	Sandy Ln West to Cromwell Ave	12	98	86	703%	20	181	161	799%	43	201	158	372%		
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	38	38	0	-1%	42	41	-1	-3%	48	48	0	0%		
	A49 NB to Junction NINE Retail	38	38	0	-1%	42	41	-1	-3%	48	48	0	0%		
	Junction NINE Retail to A49 SB	25	41	15	60%	19	32	13	67%	18	22	4	25%		
	Junction NINE Retail to A49 NB	23	38	15	67%	17	30	12	71%	16	20	4	28%		
	A49 SB	72	55	-17	-24%	58	55	-2	-4%	28	40	12	41%		
	A49 SB to Junction NINE Retail	11	12	2	15%	10	16	6	66%	13	15	2	14%		
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	25	19	-6	-23%	22	24	1	5%	24	23	-1	-6%		
	A49 SB to Long Lane	0	32	32	-	7	12	5	61%	1	14	13	1459%		
	A49 SB	177	159	-18	-10%	158	153	-5	-3%	145	143	-2	-2%		
	A49 NB to Hawleys Lane	45	67	23	51%	51	81	29	57%	74	156	81	110%		
	A49 NB to Long Lane	9	12	4	41%	12	17	5	47%	13	55	41	310%		
	A49 NB	45	67	23	51%	51	81	29	57%	74	156	81	110%		
	Long Lane to A49 SB	8	20	12	161%	12	35	24	206%	18	39	20	112%		
	Long Lane to Hawleys Lane	30	40	10	32%	49	61	12	24%	62	70	7	12%		
	Long Lane to A49 NB	30	40	10	32%	49	61	12	24%	62	70	7	12%		
	Hawleys Lane to Long Lane	21	32	11	53%	30	39	10	32%	37	38	2	4%		
	Hawleys Lane to A49 SB	21	32	11	53%	30	39	10	32%	37	38	2	4%		
	Hawleys Lane to A49 NB	16	21	5	32%	23	31	8	34%	28	31	3	9%		

		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	11	12	0	3%	12	13	1	7%	13	20	7	53%
	A49 NB	11	12	0	3%	12	13	1	7%	13	20	7	53%
	A49 NB to Winwick Link Rd	11	12	0	3%	12	13	1	7%	13	20	7	53%
	Winwick Park Ave to A49 NB	1	3	2	193%	1	1	0	-1%	1	4	2	167%
	Winwick Park Ave to Winwick Link Rd	1	3	2	193%	1	1	0	-1%	1	4	2	167%
	Winwick Park Ave to A49 SB	1	3	2	193%	1	1	0	-1%	1	4	2	167%
	A49 SB to Winwick Link Rd	18	20	2	11%	20	21	1	6%	22	28	6	30%
	A49 SB	18	20	2	11%	20	21	1	6%	22	28	6	30%
	A49 SB to Winwick Park Ave	18	20	2	11%	20	21	1	6%	22	28	6	30%
	Winwick Link Rd to A49 SB	16	26	10	64%	8	4	-4	-47%	10	63	53	514%
	Winwick Link Rd to Winwick Park Ave	4	11	7	166%	4	5	1	18%	6	39	33	568%
	Winwick Link Rd to A49 NB	4	11	7	166%	4	5	1	18%	6	39	33	568%
A49 Newton Road/ Delph Lane	A49 NB	29	31	2	7%	30	39	9	32%	39	44	6	15%
	A49 NB to Delp Ln	29	31	2	7%	29	39	10	33%	39	44	6	15%
	A49 SB	92	114	23	25%	62	58	-4	-7%	86	206	120	139%
	A49 SB to Delph Ln	11	11	-1	-6%	10	10	0	1%	11	49	38	356%
	Delph Ln to A49 NB	52	70	18	36%	88	89	1	1%	100	100	0	0%
	Delph Ln to A49 SB	49	67	18	37%	84	85	1	1%	97	97	0	0%
M62 Junction 9	A49 NB to M62 WB	12	13	1	9%	12	12	0	2%	13	16	3	24%
	A49 NB	12	13	1	9%	12	12	0	2%	13	16	3	24%
	A49 NB to M62 EB	12	13	1	9%	12	12	0	2%	13	16	3	24%
	A49 NB to A49 SB (U-Turn)	12	13	1	9%	12	12	0	2%	13	16	3	24%
	M62 EB to A49 NB	17	51	34	195%	21	50	29	142%	21	62	41	197%
	M62 EB to A49 SB	17	51	34	195%	21	50	29	142%	21	62	41	197%
	A49 SB to M62 EB	60	69	10	16%	57	58	1	2%	62	82	20	32%
	A49 SB	60	69	10	16%	57	58	1	2%	62	82	20	32%
	A49 SB to M62 WB	60	69	10	16%	57	58	1	2%	62	82	20	32%
	M62 WB to A49 SB	17	20	3	19%	12	12	1	6%	12	25	13	111%
	M62 WB to A49 NB	17	20	3	19%	12	12	1	6%	12	25	13	111%

17:00-18:00

Junction/ Movement		2022				2027				2032			
		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	8	0	-8	-100%	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	0	0	0	-	0	0	0	-	0	0	0	-
	A49 SB	145	158	13	9%	48	50	2	3%	81	163	82	101%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	378	367	-10	-3%	288	331	43	15%	347	394	47	14%
	A49 SB	378	367	-10	-3%	288	331	43	15%	347	394	47	14%
	A49 SB to Cromwell Ave	378	367	-10	-3%	288	331	43	15%	347	394	47	14%
	Cromwell Ave to A49 NB	40	32	-8	-21%	53	59	6	10%	49	44	-5	-9%
	Cromwell Ave to Sandy Ln West	62	52	-10	-17%	76	89	13	17%	78	73	-5	-6%
	Cromwell Ave to A49 SB	62	52	-10	-17%	76	89	13	17%	78	73	-5	-6%
	Cromwell Ave to Cromwell Ave (U-turn)	62	52	-10	-17%	76	89	13	17%	78	73	-5	-6%
	A49 NB	22	22	0	2%	28	34	5	19%	54	61	7	12%
	A49 NB to Sandy Ln West	22	22	0	2%	28	34	5	19%	54	61	7	12%
	A49 NB to Cromwell Ave	22	22	0	2%	28	34	5	19%	54	61	7	12%
	Sandy Ln West to A49 NB	17	181	164	984%	32	260	228	708%	63	263	200	316%
	Sandy Ln West to Sandy Ln (U-turn	17	181	164	984%	32	260	228	708%	63	263	200	316%
	Sandy Ln West to A49 SB	17	181	164	984%	32	260	228	708%	63	263	200	316%
	Sandy Ln West to Cromwell Ave	17	181	164	984%	32	260	228	708%	63	263	200	316%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	31	32	1	2%	39	41	2	6%	44	43	-1	-1%
	A49 NB to Junction NINE Retail	31	32	1	2%	39	41	2	6%	44	43	-1	-1%
	Junction NINE Retail to A49 SB	45	100	55	122%	30	63	33	110%	29	39	10	33%
	Junction NINE Retail to A49 NB	42	97	55	130%	28	61	33	119%	27	36	10	36%
	A49 SB	304	273	-31	-10%	289	215	-75	-26%	273	227	-45	-17%
	A49 SB to Junction NINE Retail	41	14	-27	-66%	11	17	6	51%	13	15	2	18%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	39	39	0	-1%	28	36	8	28%	34	32	-3	-8%
	A49 SB to Long Lane	34	107	73	218%	46	56	10	23%	24	42	18	77%
	A49 SB	255	257	1	0%	245	246	2	1%	246	244	-2	-1%
	A49 NB to Hawleys Lane	31	54	22	70%	43	112	69	161%	109	353	245	225%
	A49 NB to Long Lane	8	11	3	30%	10	36	26	251%	31	234	203	655%
	A49 NB	31	54	22	70%	43	112	69	161%	109	353	245	225%
	Long Lane to A49 SB	8	22	14	169%	11	34	23	213%	19	54	35	185%
	Long Lane to Hawleys Lane	30	38	8	28%	32	48	17	52%	49	80	32	65%
	Long Lane to A49 NB	30	38	8	28%	32	48	17	52%	49	80	32	65%
	Hawleys Lane to Long Lane	31	43	12	37%	60	75	15	25%	74	82	8	11%
	Hawleys Lane to A49 SB	31	43	12	37%	60	75	15	25%	74	82	8	11%
	Hawleys Lane to A49 NB	24	29	6	24%	42	57	16	37%	58	64	6	10%

		18:00-18:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	10	15	5	50%	11	11	0	2%	11	40	29	270%
	A49 NB	10	15	5	50%	11	11	0	2%	11	40	29	270%
	A49 NB to Winwick Link Rd	10	15	5	50%	11	11	0	2%	11	40	29	270%
	Winwick Park Ave to A49 NB	1	4	2	192%	1	1	0	16%	1	4	2	173%
	Winwick Park Ave to Winwick Link Rd	1	4	2	192%	1	1	0	16%	1	4	2	173%
	Winwick Park Ave to A49 SB	1	4	2	192%	1	1	0	16%	1	4	2	173%
	A49 SB to Winwick Link Rd	18	25	7	41%	19	21	2	10%	21	36	15	74%
	A49 SB	18	25	7	41%	19	21	2	10%	21	36	15	74%
	A49 SB to Winwick Park Ave	18	25	7	41%	19	21	2	10%	21	36	15	74%
	Winwick Link Rd to A49 SB	92	110	18	20%	47	26	-20	-44%	39	178	139	354%
	Winwick Link Rd to Winwick Park Ave	69	49	-19	-28%	31	8	-23	-73%	31	127	96	307%
	Winwick Link Rd to A49 NB	69	49	-19	-28%	31	8	-23	-73%	31	127	96	307%
A49 Newton Road/ Delph Lane	A49 NB	21	24	3	15%	23	26	3	14%	25	69	45	183%
	A49 NB to Delp Ln	19	22	3	16%	21	25	4	17%	24	69	46	193%
	A49 SB	262	260	-2	-1%	127	107	-20	-16%	169	346	177	104%
	A49 SB to Delph Ln	51	50	-2	-3%	28	40	12	45%	31	198	167	547%
	Delph Ln to A49 NB	16	20	4	25%	43	44	2	4%	87	104	18	21%
	Delph Ln to A49 SB	15	18	4	27%	40	42	2	4%	83	101	18	21%
M62 Junction 9	A49 NB to M62 WB	8	9	0	4%	9	10	1	14%	11	37	26	242%
	A49 NB	8	9	0	4%	9	10	1	14%	11	37	26	242%
	A49 NB to M62 EB	8	9	0	4%	9	10	1	14%	11	37	26	242%
	A49 NB to A49 SB (U-Turn)	8	9	0	4%	9	10	1	14%	11	37	26	242%
	M62 EB to A49 NB	13	29	16	124%	14	29	15	112%	15	96	81	532%
	M62 EB to A49 SB	13	29	16	124%	14	29	15	112%	15	96	81	532%
	A49 SB to M62 EB	80	76	-5	-6%	52	54	2	3%	63	81	18	29%
	A49 SB	80	76	-5	-6%	52	54	2	3%	63	81	18	29%
	A49 SB to M62 WB	80	76	-5	-6%	52	54	2	3%	63	81	18	29%
	M62 WB to A49 SB	21	22	1	3%	10	12	2	24%	12	17	5	45%
	M62 WB to A49 NB	21	22	1	3%	10	12	2	24%	12	17	5	45%

18:00-18:30															
		2022				2027				2032					
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference			
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%		
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-		
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-		
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	44	44	-		
	A49 NB	0	0	0	-	0	0	0	-	0	44	44	-		
	A49 SB	249	217	-33	-13%	55	99	44	80%	124	162	38	30%		
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	461	449	-12	-3%	302	410	108	36%	412	411	-1	0%		
	A49 SB	461	449	-12	-3%	302	410	108	36%	412	411	-1	0%		
	A49 SB to Cromwell Ave	461	449	-12	-3%	302	410	108	36%	412	411	-1	0%		
	Cromwell Ave to A49 NB	29	21	-8	-28%	46	58	12	27%	53	48	-5	-10%		
	Cromwell Ave to Sandy Ln West	50	36	-14	-27%	71	87	17	24%	84	78	-6	-8%		
	Cromwell Ave to A49 SB	50	36	-14	-27%	71	87	17	24%	84	78	-6	-8%		
	Cromwell Ave to Cromwell Ave (U-turn)	50	36	-14	-27%	71	87	17	24%	84	78	-6	-8%		
	A49 NB	6	5	-1	-11%	8	9	1	12%	10	31	21	207%		
	A49 NB to Sandy Ln West	6	5	-1	-11%	8	9	1	12%	10	31	21	207%		
	A49 NB to Cromwell Ave	6	5	-1	-11%	8	9	1	12%	10	31	21	207%		
	Sandy Ln West to A49 NB	8	63	55	651%	12	260	248	2065%	22	261	239	1082%		
	Sandy Ln West to Sandy Ln (U-turn	8	63	55	651%	12	260	248	2065%	22	261	239	1082%		
	Sandy Ln West to A49 SB	8	63	55	651%	12	260	248	2065%	22	261	239	1082%		
	Sandy Ln West to Cromwell Ave	8	63	55	651%	12	260	248	2065%	22	261	239	1082%		
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	23	24	1	5%	25	27	2	9%	28	52	24	86%		
	A49 NB to Junction NINE Retail	23	24	1	5%	25	27	2	9%	28	52	24	86%		
	Junction NINE Retail to A49 SB	14	52	38	267%	12	20	9	73%	11	14	4	34%		
	Junction NINE Retail to A49 NB	12	50	38	324%	10	18	8	84%	9	12	4	43%		
	A49 SB	233	229	-5	-2%	334	255	-80	-24%	366	144	-222	-61%		
	A49 SB to Junction NINE Retail	18	15	-3	-14%	12	17	5	41%	13	17	4	27%		
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	40	40	0	0%	30	33	3	10%	38	29	-9	-24%		
	A49 SB to Long Lane	26	118	92	359%	40	30	-11	-26%	1	3	2	261%		
	A49 SB	241	251	11	4%	240	234	-6	-3%	231	194	-37	-16%		
	A49 NB to Hawleys Lane	17	18	1	8%	21	26	5	22%	23	64	41	181%		
	A49 NB to Long Lane	8	9	1	17%	9	16	7	81%	10	27	18	181%		
	A49 NB	17	18	1	8%	21	26	5	22%	23	64	41	181%		
	Long Lane to A49 SB	8	22	15	193%	9	25	17	195%	15	48	33	216%		
	Long Lane to Hawleys Lane	27	30	4	13%	20	27	7	35%	34	65	32	94%		
	Long Lane to A49 NB	27	30	4	13%	20	27	7	35%	34	65	32	94%		
	Hawleys Lane to Long Lane	21	26	5	24%	39	65	25	65%	45	76	30	67%		
	Hawleys Lane to A49 SB	21	26	5	24%	39	65	25	65%	45	76	30	67%		
	Hawleys Lane to A49 NB	14	15	1	5%	28	54	26	92%	35	64	29	81%		

AM MAXIMUM QUEUE LENGTH COMPARISON

		07:00-08:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	83	82	-1	-2%	110	112	2	2%	122	115	-6	-5%
	A49 NB	83	82	-1	-2%	110	112	2	2%	122	115	-6	-5%
	A49 NB to Winwick Link Rd	83	82	-1	-2%	110	112	2	2%	122	115	-6	-5%
	Winwick Park Ave to A49 NB	29	29	1	2%	30	29	0	-1%	30	30	0	0%
	Winwick Park Ave to Winwick Link Rd	29	29	1	2%	30	29	0	-1%	30	30	0	0%
	Winwick Park Ave to A49 SB	29	29	1	2%	30	29	0	-1%	30	30	0	0%
	A49 SB to Winwick Link Rd	168	176	8	5%	140	148	8	6%	127	107	-21	-16%
	A49 SB	168	176	8	5%	140	148	8	6%	127	107	-21	-16%
	A49 SB to Winwick Park Ave	168	176	8	5%	140	148	8	6%	127	107	-21	-16%
	Winwick Link Rd to A49 SB	32	33	1	2%	36	33	-3	-9%	37	36	0	-1%
	Winwick Link Rd to Winwick Park Ave	32	33	1	2%	37	33	-4	-10%	37	37	0	0%
	Winwick Link Rd to A49 NB	32	33	1	2%	37	33	-4	-10%	37	37	0	0%
A49 Newton Road/ Delph Lane	A49 NB	130	153	22	17%	159	178	20	12%	162	171	10	6%
	A49 NB to Delp Ln	135	157	22	17%	163	183	20	12%	166	176	10	6%
	A49 SB	159	191	32	20%	193	201	9	5%	198	197	-1	0%
	A49 SB to Delph Ln	78	78	0	0%	73	74	1	1%	67	125	58	86%
	Delph Ln to A49 NB	43	42	-1	-2%	41	41	0	-1%	46	47	1	3%
	Delph Ln to A49 SB	40	39	-1	-2%	38	38	-1	-2%	47	43	-3	-7%
M62 Junction 9	A49 NB to M62 WB	88	94	6	7%	100	95	-5	-5%	92	107	15	16%
	A49 NB	88	94	6	7%	100	95	-5	-5%	92	107	15	16%
	A49 NB to M62 EB	88	94	6	7%	100	95	-5	-5%	92	107	15	16%
	A49 NB to A49 SB (U-Turn)	88	94	6	7%	100	95	-5	-5%	92	107	15	16%
	M62 EB to A49 NB	143	285	141	99%	95	233	138	146%	103	223	121	118%
	M62 EB to A49 SB	143	285	141	99%	95	233	138	146%	103	223	121	118%
	A49 SB to M62 EB	154	158	4	3%	161	159	-3	-2%	159	163	4	3%
	A49 SB	154	158	4	3%	161	159	-3	-2%	159	163	4	3%
	A49 SB to M62 WB	154	158	4	3%	161	159	-3	-2%	159	163	4	3%
	M62 WB to A49 SB	93	95	2	2%	93	97	3	3%	101	104	4	4%
	M62 WB to A49 NB	93	95	2	2%	93	97	3	3%	101	104	4	4%

		07:00-08:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	0	0	0	-	0	0	0	-	0	0	0	-
	A49 SB	0	0	0	-	7	0	-7	-100%	4	0	-4	-100%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	350	351	1	0%	310	334	24	8%	363	387	24	7%
	A49 SB	350	351	1	0%	310	334	24	8%	363	387	24	7%
	A49 SB to Cromwell Ave	350	351	1	0%	310	334	24	8%	363	387	24	7%
	Cromwell Ave to A49 NB	109	109	0	0%	112	127	15	14%	127	131	4	3%
	Cromwell Ave to Sandy Ln West	109	109	0	0%	112	127	15	14%	127	131	4	3%
	Cromwell Ave to A49 SB	109	109	0	0%	112	127	15	14%	127	131	4	3%
	Cromwell Ave to Cromwell Ave (U-turn)	109	109	0	0%	112	127	15	14%	127	131	4	3%
	A49 NB	78	76	-1	-2%	92	76	-16	-17%	69	82	13	19%
	A49 NB to Sandy Ln West	78	76	-1	-2%	92	76	-16	-17%	69	82	13	19%
	A49 NB to Cromwell Ave	78	76	-1	-2%	92	76	-16	-17%	69	82	13	19%
	Sandy Ln West to A49 NB	91	228	137	152%	90	225	135	149%	117	270	153	131%
	Sandy Ln West to Sandy Ln (U-turn	91	228	137	152%	90	225	135	149%	117	270	153	131%
	Sandy Ln West to A49 SB	91	228	137	152%	90	225	135	149%	117	270	153	131%
	Sandy Ln West to Cromwell Ave	91	228	137	152%	90	225	135	149%	117	270	153	131%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	58	51	-7	-12%	48	54	6	12%	112	117	5	4%
	A49 NB to Junction NINE Retail	58	51	-7	-12%	48	54	6	12%	112	117	5	4%
	Junction NINE Retail to A49 SB	26	27	1	6%	27	27	0	-1%	28	29	1	5%
	Junction NINE Retail to A49 NB	23	25	2	7%	25	24	0	-1%	25	27	2	7%
	A49 SB	104	102	-2	-2%	105	108	3	3%	142	148	6	4%
	A49 SB to Junction NINE Retail	53	50	-2	-4%	59	58	-2	-3%	59	60	2	3%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	199	206	8	4%	236	182	-55	-23%	305	289	-15	-5%
	A49 SB to Long Lane	74	47	-27	-36%	1	0	-1	-100%	0	0	0	-
	A49 SB	274	257	-17	-6%	269	264	-5	-2%	334	328	-6	-2%
	A49 NB to Hawleys Lane	160	170	10	6%	201	236	36	18%	276	320	44	16%
	A49 NB to Long Lane	61	62	2	3%	85	112	27	32%	88	125	37	42%
	A49 NB	160	170	10	6%	201	236	36	18%	276	320	44	16%
	Long Lane to A49 SB	104	162	58	56%	83	144	61	74%	97	156	59	60%
	Long Lane to Hawleys Lane	142	156	15	10%	145	152	7	4%	127	150	22	18%
	Long Lane to A49 NB	142	156	15	10%	145	152	7	4%	127	150	22	18%
	Hawleys Lane to Long Lane	43	41	-2	-4%	52	52	0	1%	56	51	-5	-8%
	Hawleys Lane to A49 SB	43	41	-2	-4%	52	52	0	1%	56	51	-5	-8%
	Hawleys Lane to A49 NB	47	44	-4	-8%	55	46	-8	-15%	54	54	0	0%

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	104	137	34	33%	109	141	31	29%	144	177	34	24%
	A49 NB	104	137	34	33%	109	141	31	29%	144	177	34	24%
	A49 NB to Winwick Link Rd	104	137	34	33%	109	141	31	29%	144	177	34	24%
	Winwick Park Ave to A49 NB	34	35	1	3%	35	35	0	0%	37	37	0	0%
	Winwick Park Ave to Winwick Link Rd	34	35	1	3%	35	35	0	0%	37	37	0	0%
	Winwick Park Ave to A49 SB	34	35	1	3%	35	35	0	0%	37	37	0	0%
	A49 SB to Winwick Link Rd	181	183	2	1%	166	167	1	1%	168	154	-14	-8%
	A49 SB	181	183	2	1%	166	167	1	1%	168	154	-14	-8%
	A49 SB to Winwick Park Ave	181	183	2	1%	166	167	1	1%	168	154	-14	-8%
	Winwick Link Rd to A49 SB	31	29	-2	-5%	41	38	-3	-8%	35	33	-2	-5%
	Winwick Link Rd to Winwick Park Ave	31	29	-1	-4%	41	38	-3	-8%	36	73	37	105%
	Winwick Link Rd to A49 NB	31	29	-1	-4%	41	38	-3	-8%	36	73	37	105%
A49 Newton Road/ Delph Lane	A49 NB	126	180	54	43%	179	241	62	35%	239	191	-48	-20%
	A49 NB to Delp Ln	131	185	54	42%	184	245	62	34%	243	195	-48	-20%
	A49 SB	211	220	8	4%	238	234	-4	-2%	273	302	29	10%
	A49 SB to Delph Ln	86	100	13	15%	86	95	9	10%	95	229	133	140%
	Delph Ln to A49 NB	48	47	0	0%	41	40	-1	-2%	49	51	2	4%
	Delph Ln to A49 SB	42	42	0	0%	37	36	-1	-3%	45	46	1	3%
M62 Junction 9	A49 NB to M62 WB	122	110	-12	-10%	120	133	13	11%	157	145	-12	-8%
	A49 NB	122	110	-12	-10%	120	133	13	11%	157	145	-12	-8%
	A49 NB to M62 EB	122	110	-12	-10%	120	133	13	11%	157	145	-12	-8%
	A49 NB to A49 SB (U-Turn)	122	110	-12	-10%	120	133	13	11%	157	145	-12	-8%
	M62 EB to A49 NB	95	227	132	139%	83	198	115	137%	92	198	106	116%
	M62 EB to A49 SB	95	227	132	139%	83	198	115	137%	92	198	106	116%
	A49 SB to M62 EB	163	165	2	1%	163	165	1	1%	163	167	4	3%
	A49 SB	163	165	2	1%	163	165	1	1%	163	167	4	3%
	A49 SB to M62 WB	163	165	2	1%	163	165	1	1%	163	167	4	3%
	M62 WB to A49 SB	79	79	1	1%	81	82	1	1%	90	130	40	45%
	M62 WB to A49 NB	79	79	1	1%	81	82	1	1%	90	130	40	45%

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	7	7	-	0	0	0	-	1	28	26	1890%
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	4	20	16	405%	132	80	-52	-39%
	A49 NB	0	0	0	-	4	20	16	405%	132	80	-52	-39%
	A49 SB	32	43	11	33%	18	6	-12	-67%	166	127	-39	-23%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	407	431	24	6%	328	392	64	20%	471	471	0	0%
	A49 SB	407	431	24	6%	328	392	64	20%	471	471	0	0%
	A49 SB to Cromwell Ave	407	431	24	6%	328	392	64	20%	471	471	0	0%
	Cromwell Ave to A49 NB	120	124	4	3%	127	131	4	3%	135	140	5	4%
	Cromwell Ave to Sandy Ln West	120	124	4	3%	127	131	4	3%	135	140	5	4%
	Cromwell Ave to A49 SB	120	124	4	3%	127	131	4	3%	135	140	5	4%
	Cromwell Ave to Cromwell Ave (U-turn)	120	124	4	3%	127	131	4	3%	135	140	5	4%
	A49 NB	85	108	23	27%	103	121	18	17%	133	141	8	6%
	A49 NB to Sandy Ln West	85	108	23	27%	103	121	18	17%	133	141	8	6%
	A49 NB to Cromwell Ave	85	108	23	27%	103	121	18	17%	133	141	8	6%
	Sandy Ln West to A49 NB	114	292	178	157%	122	294	171	140%	252	296	44	18%
	Sandy Ln West to Sandy Ln (U-turn	114	292	178	157%	122	294	171	140%	252	296	44	18%
	Sandy Ln West to A49 SB	114	292	178	157%	122	294	171	140%	252	296	44	18%
	Sandy Ln West to Cromwell Ave	114	292	178	157%	122	294	171	140%	252	296	44	18%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	147	167	20	13%	168	173	6	3%	174	171	-2	-1%
	A49 NB to Junction NINE Retail	147	167	20	13%	168	173	6	3%	174	171	-2	-1%
	Junction NINE Retail to A49 SB	27	27	0	0%	27	27	0	0%	30	34	3	11%
	Junction NINE Retail to A49 NB	25	25	0	0%	25	25	0	0%	28	31	3	12%
	A49 SB	140	127	-13	-9%	206	218	12	6%	361	348	-13	-4%
	A49 SB to Junction NINE Retail	54	58	3	6%	63	66	3	4%	69	66	-3	-5%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	302	283	-19	-6%	312	311	-1	0%	328	330	2	1%
	A49 SB to Long Lane	32	74	42	130%	0	0	0	-	0	0	0	-
	A49 SB	325	316	-9	-3%	334	331	-3	-1%	336	340	4	1%
	A49 NB to Hawleys Lane	175	219	43	25%	233	303	70	30%	438	508	70	16%
	A49 NB to Long Lane	75	88	13	18%	108	177	69	64%	351	501	150	43%
	A49 NB	175	219	43	25%	233	303	70	30%	438	508	70	16%
	Long Lane to A49 SB	152	188	36	23%	132	190	58	44%	154	170	16	10%
	Long Lane to Hawleys Lane	164	187	23	14%	155	182	28	18%	149	159	10	7%
	Long Lane to A49 NB	164	187	23	14%	155	182	28	18%	149	159	10	7%
	Hawleys Lane to Long Lane	65	69	4	6%	56	60	5	8%	80	76	-4	-5%
	Hawleys Lane to A49 SB	65	69	4	6%	56	60	5	8%	80	76	-4	-5%
	Hawleys Lane to A49 NB	62	52	-10	-15%	52	56	4	7%	70	65	-4	-6%

09:00-09:30													
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	85	86	1	1%	86	102	15	18%	99	121	22	22%
	A49 NB	85	86	1	1%	86	102	15	18%	99	121	22	22%
	A49 NB to Winwick Link Rd	85	86	1	1%	86	102	15	18%	99	121	22	22%
	Winwick Park Ave to A49 NB	24	25	1	2%	25	24	-1	-2%	25	25	0	0%
	Winwick Park Ave to Winwick Link Rd	24	25	1	2%	25	24	-1	-2%	25	25	0	0%
	Winwick Park Ave to A49 SB	24	25	1	2%	25	24	-1	-2%	25	25	0	0%
	A49 SB to Winwick Link Rd	128	178	50	39%	122	125	3	3%	107	101	-6	-5%
	A49 SB	128	178	50	39%	122	125	3	3%	107	101	-6	-5%
	A49 SB to Winwick Park Ave	128	178	50	39%	122	125	3	3%	107	101	-6	-5%
	Winwick Link Rd to A49 SB	25	26	0	1%	27	28	1	5%	30	30	0	0%
	Winwick Link Rd to Winwick Park Ave	25	26	0	1%	27	28	1	5%	31	31	0	1%
	Winwick Link Rd to A49 NB	25	26	0	1%	27	28	1	5%	31	31	0	1%
A49 Newton Road/ Delph Lane	A49 NB	115	141	26	22%	152	174	22	15%	246	189	-57	-23%
	A49 NB to Delp Ln	119	145	26	22%	156	178	22	14%	250	194	-57	-23%
	A49 SB	200	184	-16	-8%	172	167	-6	-3%	222	139	-83	-37%
	A49 SB to Delph Ln	69	68	-1	-2%	78	63	-15	-19%	97	87	-10	-10%
	Delph Ln to A49 NB	45	44	-1	-3%	35	37	1	4%	42	51	9	21%
	Delph Ln to A49 SB	41	40	-1	-3%	32	33	1	2%	38	47	9	23%
M62 Junction 9	A49 NB to M62 WB	84	85	0	0%	98	118	20	21%	165	115	-50	-30%
	A49 NB	84	85	0	0%	98	118	20	21%	165	115	-50	-30%
	A49 NB to M62 EB	84	85	0	0%	98	118	20	21%	165	115	-50	-30%
	A49 NB to A49 SB (U-Turn)	84	85	0	0%	98	118	20	21%	165	115	-50	-30%
	M62 EB to A49 NB	81	168	86	106%	80	167	87	108%	80	181	101	126%
	M62 EB to A49 SB	81	168	86	106%	80	167	87	108%	80	181	101	126%
	A49 SB to M62 EB	158	153	-5	-3%	157	152	-5	-3%	157	152	-5	-3%
	A49 SB	158	153	-5	-3%	157	152	-5	-3%	157	152	-5	-3%
	A49 SB to M62 WB	158	153	-5	-3%	157	152	-5	-3%	157	152	-5	-3%
	M62 WB to A49 SB	63	64	1	2%	72	69	-2	-3%	107	121	14	13%
	M62 WB to A49 NB	63	64	1	2%	72	69	-2	-3%	107	121	14	13%

		09:00-09:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	10	35	24	235%
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	1	0	-1	-100%	2	10	8	348%	121	1	-120	-99%
	A49 NB	1	0	-1	-100%	2	10	8	348%	121	1	-120	-99%
	A49 SB	0	8	8	-	0	10	10	-	183	110	-72	-40%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	289	292	3	1%	228	265	37	16%	416	375	-41	-10%
	A49 SB	289	292	3	1%	228	265	37	16%	416	375	-41	-10%
	A49 SB to Cromwell Ave	289	292	3	1%	228	265	37	16%	416	375	-41	-10%
	Cromwell Ave to A49 NB	96	102	5	5%	110	123	13	11%	125	135	10	8%
	Cromwell Ave to Sandy Ln West	96	102	5	5%	110	123	13	11%	125	135	10	8%
	Cromwell Ave to A49 SB	96	102	5	5%	110	123	13	11%	125	135	10	8%
	Cromwell Ave to Cromwell Ave (U-turn)	96	102	5	5%	110	123	13	11%	125	135	10	8%
	A49 NB	63	67	4	6%	76	76	0	0%	72	95	23	32%
	A49 NB to Sandy Ln West	63	67	4	6%	76	76	0	0%	72	95	23	32%
	A49 NB to Cromwell Ave	63	67	4	6%	76	76	0	0%	72	95	23	32%
	Sandy Ln West to A49 NB	83	293	211	255%	88	294	206	235%	163	295	133	81%
	Sandy Ln West to Sandy Ln (U-turn	83	293	211	255%	88	294	206	235%	163	295	133	81%
	Sandy Ln West to A49 SB	83	293	211	255%	88	294	206	235%	163	295	133	81%
	Sandy Ln West to Cromwell Ave	83	293	211	255%	88	294	206	235%	163	295	133	81%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	131	134	3	2%	125	118	-7	-6%	136	156	21	15%
	A49 NB to Junction NINE Retail	131	134	3	2%	125	118	-7	-6%	136	156	21	15%
	Junction NINE Retail to A49 SB	25	27	1	5%	25	25	1	3%	26	30	4	15%
	Junction NINE Retail to A49 NB	23	24	1	6%	22	23	1	3%	24	28	4	15%
	A49 SB	225	137	-88	-39%	134	116	-18	-14%	224	326	102	45%
	A49 SB to Junction NINE Retail	52	55	3	6%	49	60	11	23%	56	58	2	3%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	268	250	-18	-7%	264	256	-8	-3%	293	311	17	6%
	A49 SB to Long Lane	72	20	-52	-72%	13	0	-13	-100%	0	0	0	-
	A49 SB	301	295	-6	-2%	299	294	-4	-1%	319	329	9	3%
	A49 NB to Hawleys Lane	122	122	1	0%	132	213	81	61%	415	507	92	22%
	A49 NB to Long Lane	47	57	10	22%	60	88	28	47%	264	501	237	90%
	A49 NB	122	122	1	0%	132	213	81	61%	415	507	92	22%
	Long Lane to A49 SB	125	192	66	53%	141	218	77	55%	143	187	44	31%
	Long Lane to Hawleys Lane	174	184	9	5%	162	209	47	29%	151	178	27	18%
	Long Lane to A49 NB	174	184	9	5%	162	209	47	29%	151	178	27	18%
	Hawleys Lane to Long Lane	47	51	4	7%	52	43	-9	-18%	50	61	11	23%
	Hawleys Lane to A49 SB	47	51	4	7%	52	43	-9	-18%	50	61	11	23%
	Hawleys Lane to A49 NB	34	38	3	9%	46	40	-6	-12%	33	40	7	21%

PM MAXIMUM QUEUE LENGTH COMPARISON

		16:00-17:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	111	113	2	2%	116	121	5	4%	115	118	3	2%
	A49 NB	111	113	2	2%	116	121	5	4%	115	118	3	2%
	A49 NB to Winwick Link Rd	111	113	2	2%	116	121	5	4%	115	118	3	2%
	Winwick Park Ave to A49 NB	10	18	8	74%	10	11	1	5%	10	18	8	73%
	Winwick Park Ave to Winwick Link Rd	10	18	8	74%	10	11	1	5%	10	18	8	73%
	Winwick Park Ave to A49 SB	10	18	8	74%	10	11	1	5%	10	18	8	73%
	A49 SB to Winwick Link Rd	73	84	11	15%	76	83	7	9%	81	86	5	6%
	A49 SB	73	84	11	15%	76	83	7	9%	81	86	5	6%
	A49 SB to Winwick Park Ave	73	84	11	15%	76	83	7	9%	81	86	5	6%
	Winwick Link Rd to A49 SB	27	27	0	-1%	27	28	1	4%	29	29	0	0%
	Winwick Link Rd to Winwick Park Ave	27	27	0	-1%	27	28	1	4%	29	29	0	0%
	Winwick Link Rd to A49 NB	27	27	0	-1%	27	28	1	4%	29	29	0	0%
A49 Newton Road/ Delph Lane	A49 NB	209	250	41	20%	213	284	70	33%	251	273	22	9%
	A49 NB to Delp Ln	213	255	41	19%	216	288	73	34%	255	277	22	9%
	A49 SB	132	146	14	11%	150	163	13	9%	154	185	31	20%
	A49 SB to Delph Ln	58	79	21	35%	73	65	-8	-10%	82	78	-5	-6%
	Delph Ln to A49 NB	90	101	11	12%	110	110	0	0%	130	129	-1	-1%
	Delph Ln to A49 SB	86	97	11	12%	106	106	0	0%	126	125	-1	-1%
M62 Junction 9	A49 NB to M62 WB	113	110	-3	-3%	106	136	30	28%	100	130	30	30%
	A49 NB	113	110	-3	-3%	106	136	30	28%	100	130	30	30%
	A49 NB to M62 EB	113	110	-3	-3%	106	136	30	28%	100	130	30	30%
	A49 NB to A49 SB (U-Turn)	113	110	-3	-3%	106	136	30	28%	100	130	30	30%
	M62 EB to A49 NB	124	275	151	122%	138	274	136	99%	125	287	161	129%
	M62 EB to A49 SB	124	275	151	122%	138	274	136	99%	125	287	161	129%
	A49 SB to M62 EB	152	148	-4	-2%	161	162	0	0%	163	163	0	0%
	A49 SB	152	148	-4	-2%	161	162	0	0%	163	163	0	0%
	A49 SB to M62 WB	152	148	-4	-2%	161	162	0	0%	163	163	0	0%
	M62 WB to A49 SB	50	74	24	48%	52	78	26	49%	53	82	29	55%
	M62 WB to A49 NB	50	74	24	48%	52	78	26	49%	53	82	29	55%

16:00-17:00															
		2022				2027				2032					
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference			
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%		
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-		
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-		
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	6	2	-5	-75%	0	6	6	-	0	0	0	-		
	A49 NB	6	2	-5	-75%	0	6	6	-	0	0	0	-		
	A49 SB	0	8	8	-	0	1	1	-	18	161	143	806%		
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	297	386	89	30%	298	406	108	36%	379	444	65	17%		
	A49 SB	297	386	89	30%	298	406	108	36%	379	444	65	17%		
	A49 SB to Cromwell Ave	297	386	89	30%	298	406	108	36%	379	444	65	17%		
	Cromwell Ave to A49 NB	102	104	2	2%	117	132	14	12%	121	122	2	1%		
	Cromwell Ave to Sandy Ln West	102	104	2	2%	117	132	14	12%	121	122	2	1%		
	Cromwell Ave to A49 SB	102	104	2	2%	117	132	14	12%	121	122	2	1%		
	Cromwell Ave to Cromwell Ave (U-turn)	102	104	2	2%	117	132	14	12%	121	122	2	1%		
	A49 NB	239	239	0	0%	235	247	11	5%	262	276	13	5%		
	A49 NB to Sandy Ln West	239	239	0	0%	235	247	11	5%	262	276	13	5%		
	A49 NB to Cromwell Ave	239	239	0	0%	235	247	11	5%	262	276	13	5%		
	Sandy Ln West to A49 NB	121	295	174	144%	155	295	140	91%	196	295	98	50%		
	Sandy Ln West to Sandy Ln (U-turn	121	295	174	144%	155	295	140	91%	196	295	98	50%		
	Sandy Ln West to A49 SB	121	295	174	144%	155	295	140	91%	196	295	98	50%		
	Sandy Ln West to Cromwell Ave	121	295	174	144%	155	295	140	91%	196	295	98	50%		
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	246	242	-4	-1%	239	230	-9	-4%	257	238	-20	-8%		
	A49 NB to Junction NINE Retail	246	242	-4	-1%	239	230	-9	-4%	257	238	-20	-8%		
	Junction NINE Retail to A49 SB	86	119	33	38%	61	96	35	57%	51	66	15	29%		
	Junction NINE Retail to A49 NB	83	116	33	40%	59	94	35	59%	49	64	15	30%		
	A49 SB	344	361	17	5%	298	294	-4	-1%	225	267	42	19%		
	A49 SB to Junction NINE Retail	55	60	5	9%	53	89	36	69%	81	68	-13	-16%		
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	194	179	-14	-7%	204	192	-12	-6%	248	243	-5	-2%		
	A49 SB to Long Lane	0	167	167	-	69	105	36	52%	58	68	10	16%		
	A49 SB	340	339	-1	0%	338	339	1	0%	339	337	-2	-1%		
	A49 NB to Hawleys Lane	346	438	92	27%	376	468	92	24%	463	507	45	10%		
	A49 NB to Long Lane	94	200	106	113%	190	295	105	55%	238	492	254	107%		
	A49 NB	346	438	92	27%	376	468	92	24%	463	507	45	10%		
	Long Lane to A49 SB	98	153	55	56%	127	153	26	20%	148	154	7	4%		
	Long Lane to Hawleys Lane	135	140	5	4%	141	149	8	5%	148	148	0	0%		
	Long Lane to A49 NB	135	140	5	4%	141	149	8	5%	148	148	0	0%		
	Hawleys Lane to Long Lane	119	126	6	5%	121	125	4	3%	124	125	1	1%		
	Hawleys Lane to A49 SB	119	126	6	5%	121	125	4	3%	124	125	1	1%		
	Hawleys Lane to A49 NB	116	130	13	11%	129	130	1	1%	129	129	1	0%		

		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	98	107	9	9%	98	119	21	21%	120	152	32	27%
	A49 NB	98	107	9	9%	98	119	21	21%	120	152	32	27%
	A49 NB to Winwick Link Rd	98	107	9	9%	98	119	21	21%	120	152	32	27%
	Winwick Park Ave to A49 NB	12	26	14	123%	11	12	2	14%	13	27	14	104%
	Winwick Park Ave to Winwick Link Rd	12	26	14	123%	11	12	2	14%	13	27	14	104%
	Winwick Park Ave to A49 SB	12	26	14	123%	11	12	2	14%	13	27	14	104%
	A49 SB to Winwick Link Rd	75	92	17	23%	79	90	11	13%	88	106	18	20%
	A49 SB	75	92	17	23%	79	90	11	13%	88	106	18	20%
	A49 SB to Winwick Park Ave	75	92	17	23%	79	90	11	13%	88	106	18	20%
	Winwick Link Rd to A49 SB	197	247	49	25%	133	101	-32	-24%	183	364	181	99%
	Winwick Link Rd to Winwick Park Ave	156	72	-84	-54%	60	74	14	22%	73	175	102	141%
	Winwick Link Rd to A49 NB	156	72	-84	-54%	60	74	14	22%	73	175	102	141%
A49 Newton Road/ Delph Lane	A49 NB	189	228	39	20%	191	301	110	58%	249	279	30	12%
	A49 NB to Delp Ln	194	233	39	20%	195	305	110	56%	254	284	30	12%
	A49 SB	335	372	37	11%	253	264	11	4%	327	440	114	35%
	A49 SB to Delph Ln	92	70	-23	-24%	64	64	0	0%	65	179	113	173%
	Delph Ln to A49 NB	179	185	6	3%	188	187	-1	0%	202	187	-14	-7%
	Delph Ln to A49 SB	175	181	6	3%	184	183	-1	0%	198	183	-14	-7%
M62 Junction 9	A49 NB to M62 WB	116	128	12	10%	113	117	4	4%	112	130	18	16%
	A49 NB	116	128	12	10%	113	117	4	4%	112	130	18	16%
	A49 NB to M62 EB	116	128	12	10%	113	117	4	4%	112	130	18	16%
	A49 NB to A49 SB (U-Turn)	116	128	12	10%	113	117	4	4%	112	130	18	16%
	M62 EB to A49 NB	108	234	126	117%	119	229	110	93%	115	256	141	122%
	M62 EB to A49 SB	108	234	126	117%	119	229	110	93%	115	256	141	122%
	A49 SB to M62 EB	172	178	6	3%	166	167	1	1%	171	174	3	2%
	A49 SB	172	178	6	3%	166	167	1	1%	171	174	3	2%
	A49 SB to M62 WB	172	178	6	3%	166	167	1	1%	171	174	3	2%
	M62 WB to A49 SB	88	105	17	19%	62	85	23	37%	64	113	49	76%
	M62 WB to A49 NB	88	105	17	19%	62	85	23	37%	64	113	49	76%

		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	38	0	-38	-100%	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	1	1	-	0	0	0	-	0	12	12	-
	A49 NB	0	1	1	-	0	0	0	-	0	12	12	-
	A49 SB	459	482	22	5%	202	309	107	53%	406	472	66	16%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	512	512	-1	0%	489	509	20	4%	511	512	0	0%
	A49 SB	512	512	-1	0%	489	509	20	4%	511	512	0	0%
	A49 SB to Cromwell Ave	512	512	-1	0%	489	509	20	4%	511	512	0	0%
	Cromwell Ave to A49 NB	124	123	-2	-1%	132	135	3	2%	132	131	-1	-1%
	Cromwell Ave to Sandy Ln West	124	123	-2	-1%	132	135	3	2%	132	131	-1	-1%
	Cromwell Ave to A49 SB	124	123	-2	-1%	132	135	3	2%	132	131	-1	-1%
	Cromwell Ave to Cromwell Ave (U-turn)	124	123	-2	-1%	132	135	3	2%	132	131	-1	-1%
	A49 NB	216	214	-2	-1%	230	249	20	9%	264	271	7	3%
	A49 NB to Sandy Ln West	216	214	-2	-1%	230	249	20	9%	264	271	7	3%
	A49 NB to Cromwell Ave	216	214	-2	-1%	230	249	20	9%	264	271	7	3%
	Sandy Ln West to A49 NB	142	292	150	106%	179	293	113	63%	228	293	64	28%
	Sandy Ln West to Sandy Ln (U-turn	142	292	150	106%	179	293	113	63%	228	293	64	28%
	Sandy Ln West to A49 SB	142	292	150	106%	179	293	113	63%	228	293	64	28%
	Sandy Ln West to Cromwell Ave	142	292	150	106%	179	293	113	63%	228	293	64	28%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	236	238	3	1%	241	249	7	3%	268	256	-12	-4%
	A49 NB to Junction NINE Retail	236	238	3	1%	241	249	7	3%	268	256	-12	-4%
	Junction NINE Retail to A49 SB	101	170	69	69%	86	134	48	55%	81	100	19	23%
	Junction NINE Retail to A49 NB	98	167	69	70%	84	132	48	57%	79	97	19	24%
	A49 SB	452	450	-2	0%	449	397	-51	-11%	473	446	-27	-6%
	A49 SB to Junction NINE Retail	92	61	-31	-34%	56	93	37	66%	58	69	11	19%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	250	279	29	12%	246	299	53	21%	327	328	1	0%
	A49 SB to Long Lane	69	241	172	249%	70	172	101	144%	68	137	70	103%
	A49 SB	343	343	0	0%	343	340	-3	-1%	341	341	0	0%
	A49 NB to Hawleys Lane	319	414	95	30%	325	503	178	55%	459	509	51	11%
	A49 NB to Long Lane	79	123	45	57%	135	271	136	101%	233	502	269	115%
	A49 NB	319	414	95	30%	325	503	178	55%	459	509	51	11%
	Long Lane to A49 SB	71	152	81	114%	114	154	40	35%	146	155	9	6%
	Long Lane to Hawleys Lane	129	148	19	15%	143	148	5	3%	146	151	5	3%
	Long Lane to A49 NB	129	148	19	15%	143	148	5	3%	146	151	5	3%
	Hawleys Lane to Long Lane	126	128	2	2%	126	127	1	1%	128	131	3	3%
	Hawleys Lane to A49 SB	126	128	2	2%	126	127	1	1%	128	131	3	3%
	Hawleys Lane to A49 NB	130	133	3	2%	133	133	1	0%	134	137	4	3%

		18:00-18:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	85	97	13	15%	75	84	8	11%	81	160	79	98%
	A49 NB	85	97	13	15%	75	84	8	11%	81	160	79	98%
	A49 NB to Winwick Link Rd	85	97	13	15%	75	84	8	11%	81	160	79	98%
	Winwick Park Ave to A49 NB	12	25	13	103%	11	13	2	18%	11	23	12	103%
	Winwick Park Ave to Winwick Link Rd	12	25	13	103%	11	13	2	18%	11	23	12	103%
	Winwick Park Ave to A49 SB	12	25	13	103%	11	13	2	18%	11	23	12	103%
	A49 SB to Winwick Link Rd	68	98	29	43%	77	86	9	11%	77	113	35	46%
	A49 SB	68	98	29	43%	77	86	9	11%	77	113	35	46%
	A49 SB to Winwick Park Ave	68	98	29	43%	77	86	9	11%	77	113	35	46%
	Winwick Link Rd to A49 SB	269	265	-4	-1%	165	135	-30	-18%	178	375	197	110%
	Winwick Link Rd to Winwick Park Ave	169	123	-47	-27%	124	71	-53	-43%	121	272	151	125%
	Winwick Link Rd to A49 NB	169	123	-47	-27%	124	71	-53	-43%	121	272	151	125%
A49 Newton Road/ Delph Lane	A49 NB	120	145	25	21%	154	152	-2	-1%	155	244	89	58%
	A49 NB to Delp Ln	124	150	25	20%	159	157	-2	-1%	160	249	89	56%
	A49 SB	353	405	51	15%	232	236	4	2%	309	440	131	42%
	A49 SB to Delph Ln	87	162	75	86%	106	137	31	29%	124	292	167	135%
	Delph Ln to A49 NB	84	107	23	27%	144	152	9	6%	179	182	3	2%
	Delph Ln to A49 SB	80	103	23	28%	140	148	9	6%	175	178	3	2%
M62 Junction 9	A49 NB to M62 WB	82	81	0	0%	81	99	18	22%	99	128	29	29%
	A49 NB	82	81	0	0%	81	99	18	22%	99	128	29	29%
	A49 NB to M62 EB	82	81	0	0%	81	99	18	22%	99	128	29	29%
	A49 NB to A49 SB (U-Turn)	82	81	0	0%	81	99	18	22%	99	128	29	29%
	M62 EB to A49 NB	77	185	107	139%	87	177	90	104%	88	255	166	188%
	M62 EB to A49 SB	77	185	107	139%	87	177	90	104%	88	255	166	188%
	A49 SB to M62 EB	170	170	0	0%	159	159	0	0%	166	169	3	2%
	A49 SB	170	170	0	0%	159	159	0	0%	166	169	3	2%
	A49 SB to M62 WB	170	170	0	0%	159	159	0	0%	166	169	3	2%
	M62 WB to A49 SB	79	88	10	12%	55	61	6	11%	57	87	31	54%
	M62 WB to A49 NB	79	88	10	12%	55	61	6	11%	57	87	31	54%

		18:00-18:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	3	3	-	0	102	102	-
	A49 NB	0	0	0	-	0	3	3	-	0	102	102	-
	A49 SB	450	452	2	0%	185	329	144	77%	341	440	99	29%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	512	510	-3	0%	464	510	46	10%	509	509	0	0%
	A49 SB	512	510	-3	0%	464	510	46	10%	509	509	0	0%
	A49 SB to Cromwell Ave	512	510	-3	0%	464	510	46	10%	509	509	0	0%
	Cromwell Ave to A49 NB	117	107	-10	-8%	129	133	4	3%	132	132	0	0%
	Cromwell Ave to Sandy Ln West	117	107	-10	-8%	129	133	4	3%	132	132	0	0%
	Cromwell Ave to A49 SB	117	107	-10	-8%	129	133	4	3%	132	132	0	0%
	Cromwell Ave to Cromwell Ave (U-turn)	117	107	-10	-8%	129	133	4	3%	132	132	0	0%
	A49 NB	106	101	-6	-5%	130	126	-5	-4%	130	189	59	45%
	A49 NB to Sandy Ln West	106	101	-6	-5%	130	126	-5	-4%	130	189	59	45%
	A49 NB to Cromwell Ave	106	101	-6	-5%	130	126	-5	-4%	130	189	59	45%
	Sandy Ln West to A49 NB	82	269	187	229%	99	292	194	196%	135	292	158	117%
	Sandy Ln West to Sandy Ln (U-turn	82	269	187	229%	99	292	194	196%	135	292	158	117%
	Sandy Ln West to A49 SB	82	269	187	229%	99	292	194	196%	135	292	158	117%
	Sandy Ln West to Cromwell Ave	82	269	187	229%	99	292	194	196%	135	292	158	117%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	180	188	8	4%	183	189	6	3%	205	244	39	19%
	A49 NB to Junction NINE Retail	180	188	8	4%	183	189	6	3%	205	244	39	19%
	Junction NINE Retail to A49 SB	55	140	85	153%	35	58	22	64%	36	50	15	41%
	Junction NINE Retail to A49 NB	53	138	85	160%	33	55	22	68%	33	48	15	44%
	A49 SB	403	416	13	3%	444	362	-82	-18%	460	275	-185	-40%
	A49 SB to Junction NINE Retail	85	54	-30	-36%	53	62	9	17%	55	61	6	11%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	216	221	5	2%	158	236	78	49%	275	171	-104	-38%
	A49 SB to Long Lane	35	239	204	589%	69	102	34	49%	26	34	8	31%
	A49 SB	337	339	2	1%	338	338	0	0%	339	331	-8	-3%
	A49 NB to Hawleys Lane	155	176	21	13%	196	231	35	18%	208	358	151	73%
	A49 NB to Long Lane	74	82	8	11%	83	134	51	61%	108	215	106	98%
	A49 NB	155	176	21	13%	196	231	35	18%	208	358	151	73%
	Long Lane to A49 SB	67	138	71	106%	68	152	84	124%	109	153	44	40%
	Long Lane to Hawleys Lane	100	123	23	23%	101	122	21	21%	126	139	13	10%
	Long Lane to A49 NB	100	123	23	23%	101	122	21	21%	126	139	13	10%
	Hawleys Lane to Long Lane	111	115	5	4%	115	124	9	8%	124	127	3	3%
	Hawleys Lane to A49 SB	111	115	5	4%	115	124	9	8%	124	127	3	3%
	Hawleys Lane to A49 NB	109	113	4	3%	122	132	11	9%	130	133	3	2%

APPENDIX D:

JOURNEY TIME DATA

AM Journey Time (s) - 07:00-08:00

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	68	72	4	6%	78	80	2	3%	82	85	2	3%
2 NB	98	100	2	2%	104	104	1	1%	103	100	-3	-3%
3 NB	80	82	2	3%	81	82	1	1%	81	85	5	6%
4 NB	81	83	2	3%	80	83	3	4%	88	89	1	1%
5 NB	86	88	2	2%	91	94	4	4%	99	104	5	5%
	413	425	12.15	3%	433	443	10.19	2%	453	463	9.45	2%

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	62	67	5	8%	61	62	1	2%	60	56	-4	-7%
2 SB	92	96	5	5%	96	96	1	1%	96	95	-1	-1%
3 SB	145	142	-3	-2%	135	132	-2	-2%	136	132	-4	-3%
4 SB	106	106	0	0%	117	116	-1	-1%	132	138	7	5%
5 SB	61	62	1	1%	62	63	0	1%	63	65	1	2%
	466	473	7.67	2%	470	469	-0.97	0%	488	486	-1.81	0%

PM Journey Time (s) - 16:00-17:00

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	57	58	1	2%	61	63	2	3%	63	63	0	1%
2 NB	116	118	1	1%	117	121	4	4%	121	123	2	2%
3 NB	84	86	2	2%	84	87	3	4%	84	87	2	3%
4 NB	104	105	1	1%	106	108	2	2%	113	116	2	2%
5 NB	100	114	14	14%	99	116	17	17%	111	142	30	27%
	461	481	19.32	4%	467	495	27.89	6%	492	530	37.63	8%

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	55	56	1	1%	56	56	0	1%	56	57	1	1%
2 SB	84	85	2	2%	87	90	3	3%	88	93	6	7%
3 SB	140	155	14	10%	134	149	15	11%	149	170	21	14%
4 SB	224	209	-15	-7%	197	194	-3	-1%	177	181	5	3%
5 SB	61	62	1	2%	62	62	1	2%	62	63	1	2%
	564	568	3.6	1%	536	552	16.32	3%	532	564	32.55	6%

AM Journey Time (s) - 08:00-09:00

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	80	91	11	13%	97	98	1	1%	101	113	12	11%
2 NB	104	109	5	5%	116	116	0	0%	119	128	9	7%
3 NB	84	86	2	2%	91	92	1	1%	127	105	-22	-17%
4 NB	96	98	3	3%	102	103	1	1%	103	104	1	1%
5 NB	89	93	4	4%	120	121	1	0%	173	250	77	45%
	452	476	24.32	5%	527	530	3.53	1%	623	700	76.87	12%

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	73	79	5	7%	70	71	0	0%	67	59	-8	-12%
2 SB	103	105	1	1%	104	104	0	0%	108	114	6	5%
3 SB	179	181	2	1%	151	151	0	0%	206	189	-17	-8%
4 SB	140	130	-11	-8%	160	160	0	0%	208	198	-10	-5%
5 SB	63	65	2	3%	65	65	0	0%	65	66	1	2%
	559	559	-0.27	0%	550	551	0.99	0%	654	626	-28.03	-4%

PM Journey Time (s) - 17:00-18:00

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	57	59	2	3%	63	63	0	0%	70	70	0	0%
2 NB	115	115	0	0%	118	118	0	0%	132	132	0	0%
3 NB	85	87	3	3%	87	87	0	0%	89	89	0	0%
4 NB	102	102	0	0%	108	109	0	0%	112	113	1	1%
5 NB	90	105	15	16%	129	130	0	0%	209	209	0	0%
	448	468	19.45	4%	506	507	1.34	0%	612	613	1.39	0%

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	55	60	5	8%	57	57	0	0%	70	70	0	0%
2 SB	157	183	27	17%	116	117	1	1%	221	223	2	1%
3 SB	341	313	-28	-8%	249	250	1	0%	285	286	1	0%
4 SB	316	315	-1	0%	273	274	1	0%	269	269	1	0%
5 SB	62	62	0	0%	64	64	0	0%	64	65	0	0%
	932	934	2.35	0%	759	762	2.48	0%	909	912	3.23	0%

AM Journey Time (s) - 09:00-09:30

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	69	74	5	7%	76	77	1	1%	77	83	6	8%
2 NB	97	103	5	6%	106	106	1	1%	112	102	-11	-9%
3 NB	80	84	3	4%	89	89	0	0%	127	89	-37	-29%
4 NB	108	110	2	2%	84	84	1	1%	106	109	3	3%
5 NB	84	83	-1	-1%	93	94	1	1%	131	234	103	78%
	439	453	14.32	3%	447	451	3.19	1%	553	617	64.08	12%

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	66	79	13	20%	65	65	0	0%	61	57	-4	-7%
2 SB	98	101	4	4%	99	99	1	1%	104	95	-9	-9%
3 SB	144	156	12	9%	137	137	0	0%	220	180	-40	-18%
4 SB	171	146	-25	-15%	124	124	0	0%	175	202	27	15%
5 SB	63	64	1	2%	66	66	0	0%	63	66	3	4%
	541	546	5.21	1%	490	491	1.57	0%	623	600	-23.8	-4%

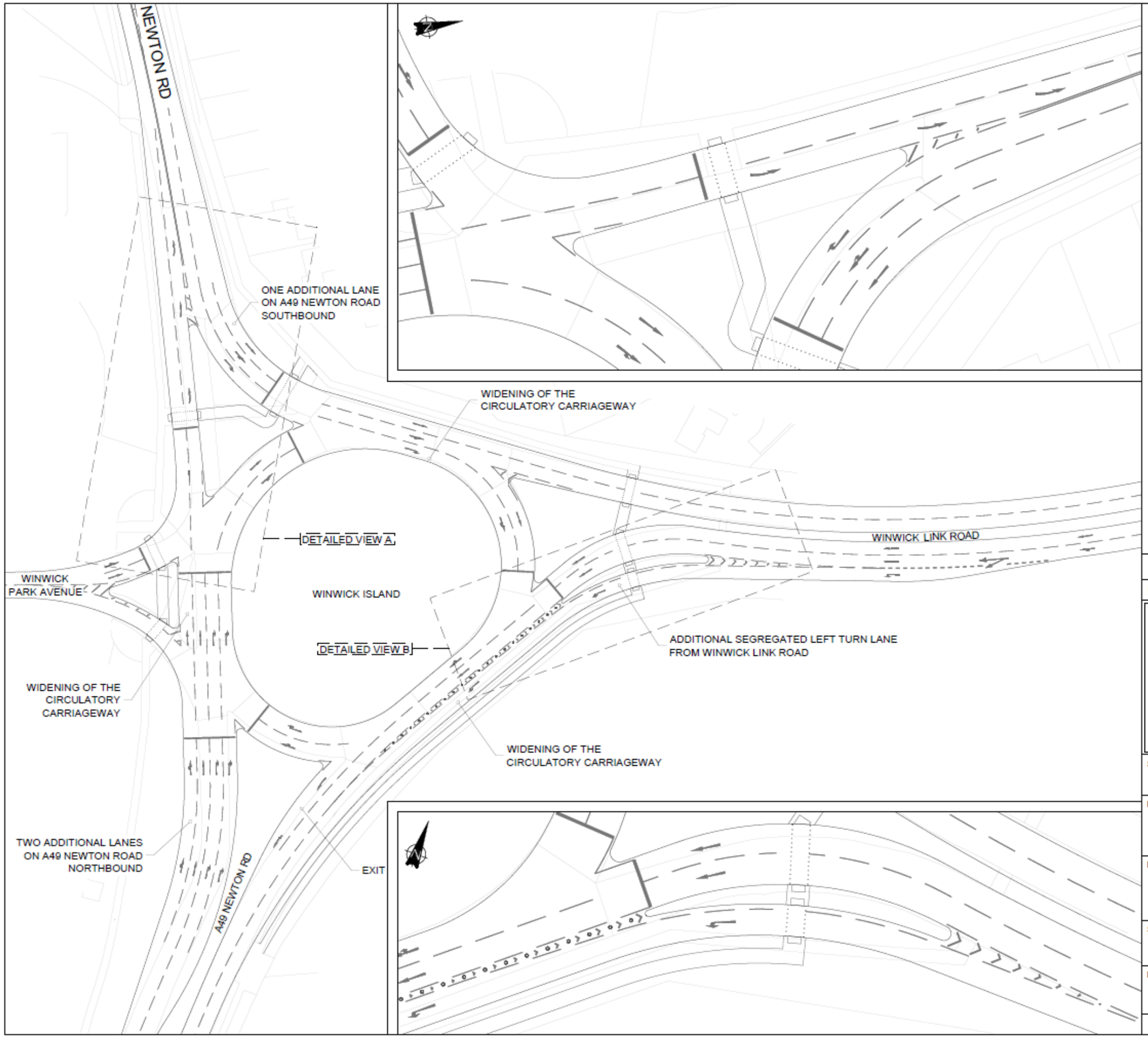
PM Journey Time (s) - 18:00-18:30

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	53	60	6	12%	59	59	0	0%	75	75	0	0%
2 NB	109	113	4	4%	113	113	0	0%	142	143	1	1%
3 NB	82	84	2	2%	86	87	0	0%	131	131	0	0%
4 NB	94	95	0	0%	95	96	1	1%	118	119	1	1%
5 NB	82	84	2	2%	91	91	1	1%	106	106	0	0%
	421	436	14.5	3%	444	446	1.87	0%	572	574	2.02	0%

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	58	67	9	16%	56	56	0	0%	80	81	0	0%
2 SB	204	196	-7	-3%	128	129	1	1%	235	236	1	0%
3 SB	381	323	-58	-15%	290	290	-1	0%	277	277	0	0%
4 SB	275	288	13	5%	243	244	0	0%	212	212	0	0%
5 SB	63	62	-1	-1%	64	64	0	0%	65	65	0	0%
	980	937	-42.86	-4%	781	781	0.45	0%	870	871	1.38	0%

APPENDIX E:

MITIGATION DESIGNS



NOTES:

Rev:	Description:	Date:	By:	Chkd:
A	Existing lines rendered under proposed	29/02/16	DD	KY

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Structures - Civils - Environmental - Infrastructure - Transport Planning - Sustainability - Expert Advisory Services
Birmingham - Bristol - Cardiff - Douglas - Edinburgh - Kendal - Leeds - Liverpool - London - Manchester - Nottingham

Status: PRELIMINARY

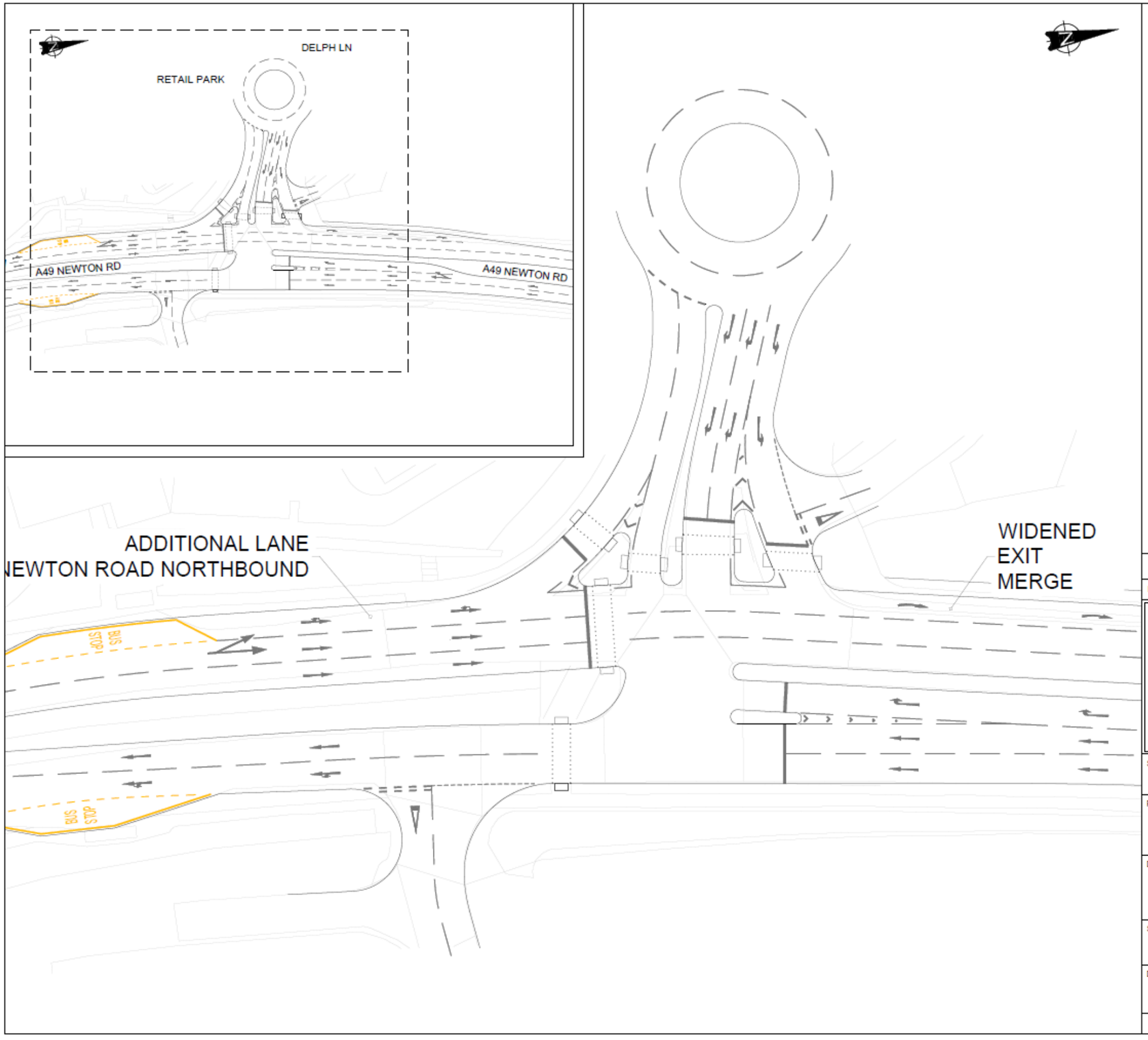
Project: PARKSIDE PHASE I

Drg Title: JUNCTION IMPROVEMENT PROPOSAL JUNCTION 3 - WINWICK ISLAND

Scale:	Size:	First Issue:	Drawn:	Checked:
1:1000	A3	16/02/16	DD	JG

Drg No: TPMA1389-103

Rev: A



NOTES:

Rev:	Description:	Date:	By:	Chkd:
A	Existing lines rendered under proposed	29/02/16	DD	NY

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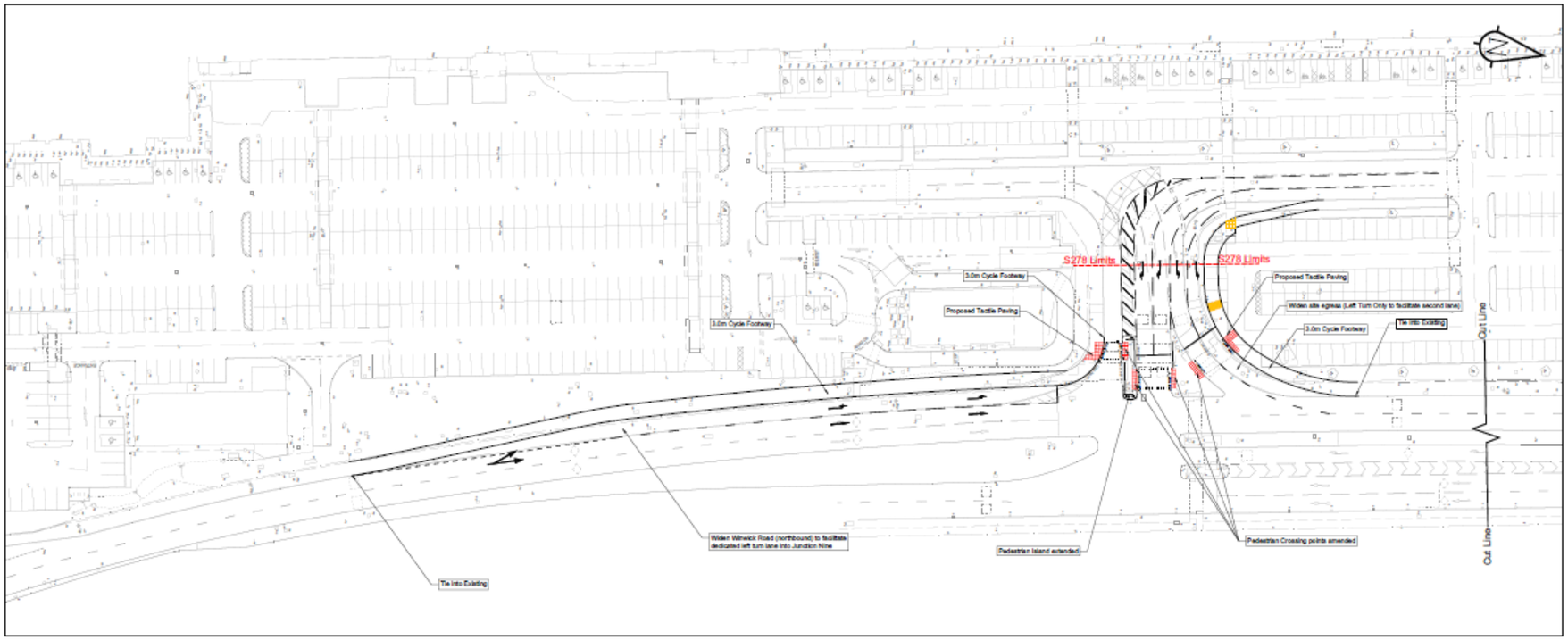

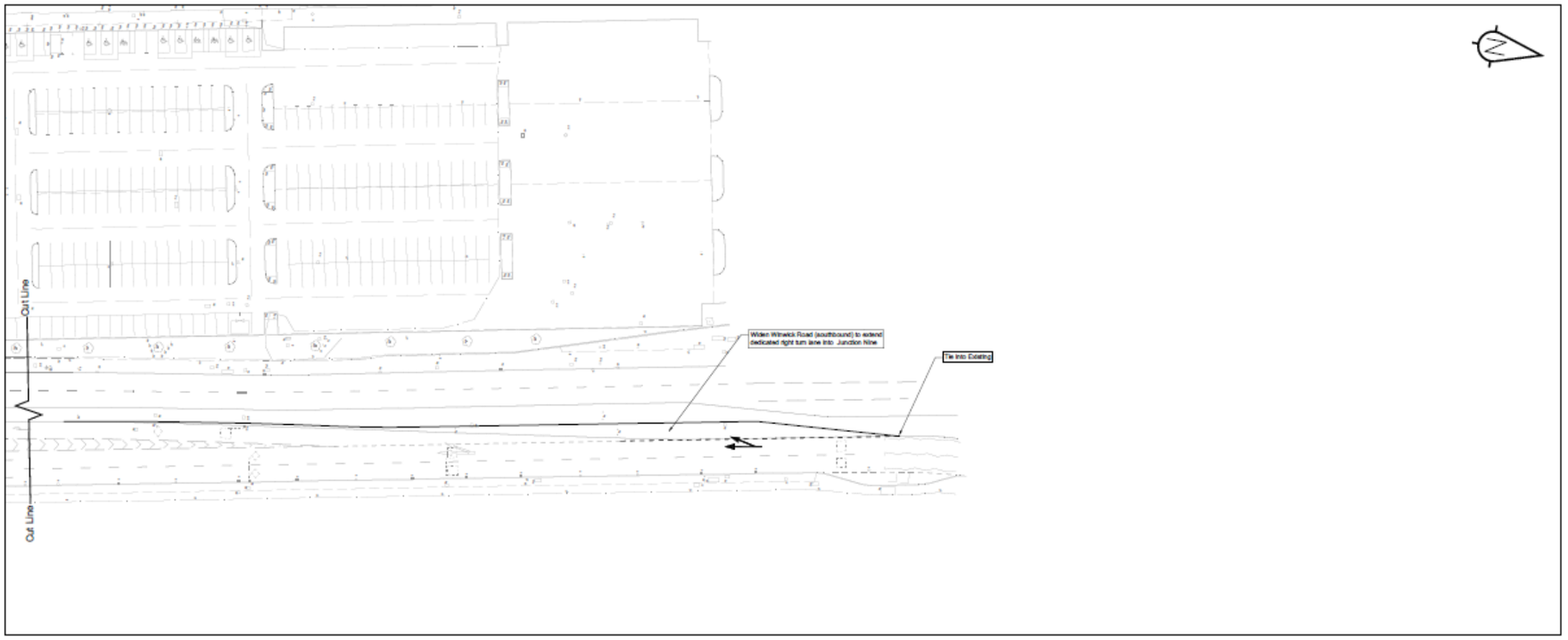

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MODELLING GROUP

Access Strategy A

MG0123 – A49 Corridor VISSIM, Warrington

Luke Best

06 March 2020

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1. INTRODUCTION

1.1 Background

1.1.1 Modelling Group Ltd has previously developed a base-year microsimulation model of the A49 corridor for the area to the north of Warrington, surrounding the M62 junction 9. For further detailed information relating to this exercise, please refer to '*MG0123_A49WarringCorridor_BaseModellingReport_v2*'.

1.1.2 The aim of this model has been to provide a robust platform on which the proposed development (Peel Hall) can be tested and impact upon the highway network assessed in the future years 2022, 2027 and 2032.

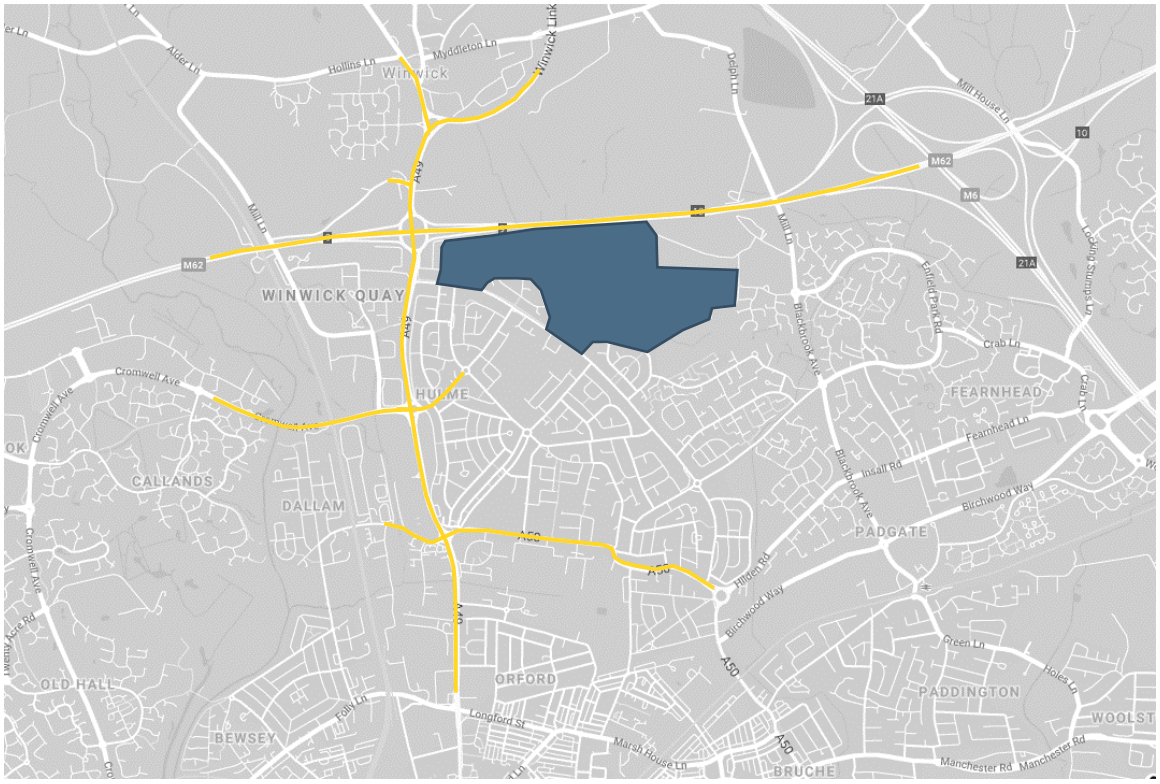


FIGURE 1.1: NETWORK EXTENTS AND APPROXIMATE LOCATION OF DEVELOPMENT

1.2 Report Purpose

1.2.1 The following report summarises the methodology used to build and test the model, as well as the results obtained to determine the comparative performance impacts of Peel Hall Access Strategy A flows within the committed future year networks, as detailed above.

1.4 Report Structure

The report is structured as follows:

- **Section 2: Methodology** including information on the model development and scenarios tested;
- **Section 3: Model Performance** including network performance statistics, queue lengths and journey times; and
- **Section 4: Summary and Recommendations.**

2 METHODOLOGY

2.1 Overview

2.1.1 The model extent used is consistent with the 2019 base model as highlighted in Figure 2.1. As a result of levels of queueing found during the development of future year models, some links have been extended in an attempt to ensure that all demand is able to enter the model.

2.1.2 Also consistent with the 2019 base year modelling, the 2022, 2027 and 2032 models are modelled to cover a 2.5-hour period, for the AM and PM traffic peaks.

2.1.3 In the AM, this period covers 07:00-09:30, with an hour 'warm-up' from 07:00-08:00, and a half-hour 'cool-down' from 09:00-09:30. In the PM, this period covers 16:00-18:30, with an hour 'warm-up' from 16:00-17:00, and a half-hour 'cool-down' from 18:00-18:30.

2.1.4 The model has been developed using the same version of the software as used for the validated base model (PTV VISSIM 11.00-12). Results have been output with a model resolution of 5-time steps per second, as was used in the base model. The same random seeds have also been used (starting from 5, increasing by 5 each run, for 10 runs).

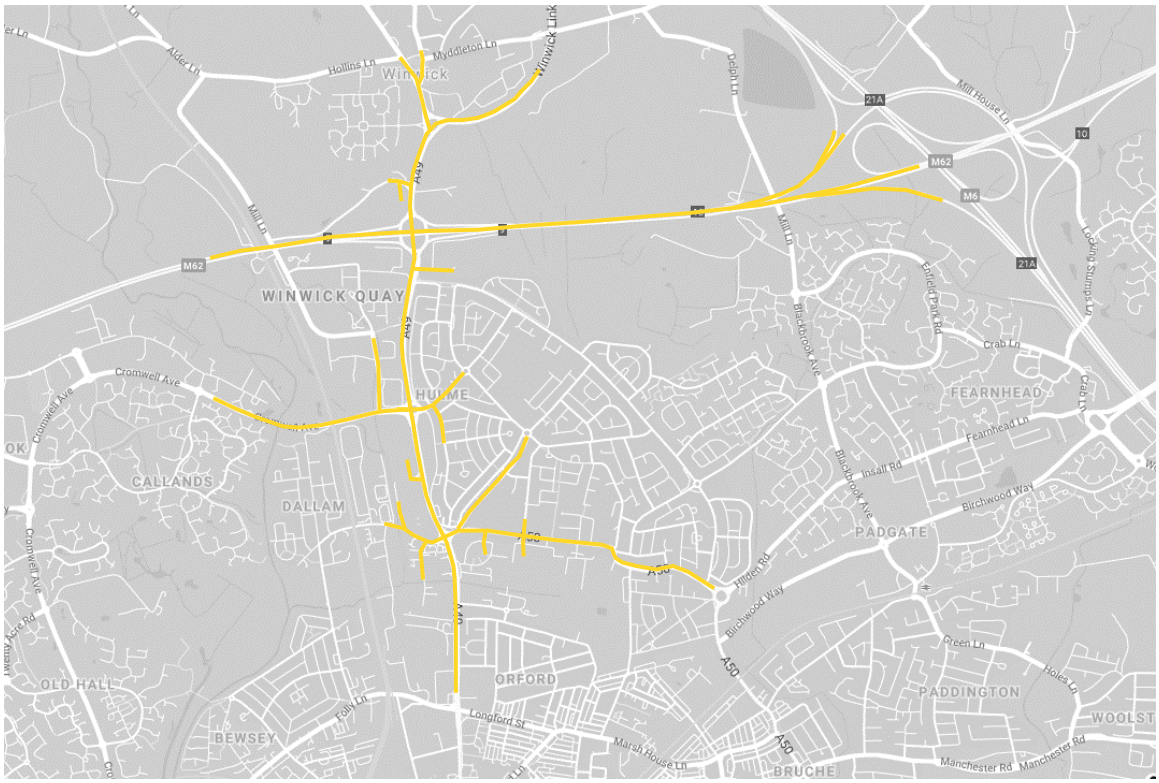


FIGURE 2.1: VALIDATED 2019 MODEL EXTENTS

2.2 Scenarios Tested

2.2.1 The scenarios tested in the model were:

- 2022 Do Minimum (Reference Case)
- 2022 Do Something (Full Development Scenario)
- 2027 Do Minimum (Reference Case)
- 2027 Do Something (Part Development Scenario)
- 2032 Do Minimum (Reference Case)
- 2032 Do Something (Full Development Scenario)

2.2.2 The flows for each scenario were provided by Highgate Transportation in the spreadsheet '*Peel Hall Access Strategy A - Flow Diagram Spreadsheet - REISSUE 200120.xlsm*'. The flow diagrams within this were developed using the SATURN model (WMMTM16) outputs provided by AECOM.

2.2.3 In order to ensure a fully transparent and traceable process in the conversion of these flows into a useable format for entry into the VISSIM models, the matrices creation module in LinSig 3 was used to develop Origin-Destination matrices for each vehicle type.

2.2.4 The current model area does not have any route choice, hence the choice of LinSig was considered appropriate to evaluate the routing for both lights and heavies. A total of 15 different scenarios for Lights and Heavies have been processed. A skeleton model of the area was constructed and turning counts were imported at each junction for validation purposes.

2.2.5 Flow consistency checks were undertaken on the SATURN flow diagrams provided to make sure that the number of vehicles leaving one junction were equal to the number of vehicles entering the next one. It was concluded that the flow provided was consistent and could be used for flow estimation in LinSig. Traffic data was processed by LinSig and it was concluded that 100% of the GEH values for all scenarios were below a threshold of 3.

2.2.6 The LinSig model has been provided for review as part of the final model submission for Option A, and is detailed further in Appendix B.

2.3 Network Development

2.3.1 Several changes have been made to the model network to reflect planned improvements in the area. These include:

- **A49 Newton Road/ Winwick Link Road Junction (Winwick Island)** – Widening of the northbound and southbound approaches on Newton Road, widening of the westbound approach from Winwick Link Road including the creation of a segregated left turn lane. Also included, is widening of the circulatory carriageway.
- **A49 Newton Road / Delph Lane Junction** – Additional lane for Newton Road northbound, including widened exit merge.
- **A49 Winwick Road/ Junction Nine Retail Park Junction** – Widening of Winwick Road northbound to facilitate a dedicated left turn lane into the retail park, Widening of Winwick Road southbound to extend the existing dedicated right turn lane into the retail park.

2.3.2 Additionally, as a result of impacts to network performance in the AM peak, particularly in 2032, a further two mitigation proposals were also tested in all Do Something models. These were as follows:

- **A49 Newton Road/ Golborne Road Junction** – Improvements were made to the existing road widths and layout at this junction in order to increase queuing capacity, particularly for right turning vehicles which contribute heavily to the wider impact on the surrounding network.
- **A49 Winwick Road/ A50 Long Lane/ Hawley's Lane Junction** – A much more detailed and responsive signal controller was created at this location, in order to allow a more accurate understanding of the potential impacts of improvements to the current vehicle actuated signal control setup.

2.3.3 Detailed drawings used to model junction mitigations are shown in Appendix E.

2.3.4 Additional changes were also made to remove/ rationalise/ improve on some priority rules at the A49/ Sandy Lane West/ Cromwell Avenue roundabout, as it became apparent that the increase in overall traffic volume caused the network to 'lock up' on some model runs, in a manner which was judged to be entirely unrealistic.

2.4 Traffic Compositions

As with the original models, three primary traffic compositions were used in the models: Cars, LGVs and HGVs. However, when modelling the 'Do Something' scenario models, additional development related traffic was added as a separate vehicle type, based on the Cars composition.

3 MODEL PERFORMANCE

3.1 Overview

3.1.1 The impact of the development on the local highway network has been assessed in 2022, 2027, and 2032, using the following model outputs:

- Overall network performance statistics; including average per vehicle delay/speed, total network delay, latent demand;
- Average maximum & “average average” queue lengths at key junctions; and
- Average journey times and volumes along key routes.

3.1.2 All modelled scenario results are averaged over 10 random seed runs, to reflect daily fluctuations in arrival patterns.

3.2 Network Performance Statistics

3.2.1 This section summarises the network performance statistics. Network performance data is split into two main types – average per vehicle data, and total network statistics (taken over the peak hour).

3.2.2 Data is then further broken down as follows:

- Per Trip Average Per Vehicle Data:
  - **Delay** – defined as average time spent in a delay state (i.e. being held below desired speed due to network conditions);
  - **Stops** – defined as the average number of times each vehicle comes to a full stop;
  - **Speed** – defined as the overall average speed per trip, in miles per hour;
  - **Stopped Delay** – defined as the average amount of time spent in an unwanted, stopped state
- Total Network Data
  - **Distance** – defined as the total cumulative distance travelled by all vehicles completing trips within the peak hour;
  - **Travel Time** – defined as the total cumulative travel time of all vehicles completing trips within the peak hour;
  - **Delay Time** – defined as the total cumulative time spent in a delay state by all vehicles during the peak hour;
  - **Stops** – defined as the total cumulative number of vehicle stops within the network during the peak hour;
  - **Stopped Delay** – defined as the total cumulative amount of time spent in an unwanted, stopped state by all vehicles during the peak hour;
  - **Vehicles Active** – defined as the total number of vehicles still active within the network at the end of the peak hour;
  - **Vehicles Arrived** – defined as the total number of completed trips by the end of the peak hour;
  - **Latent Delay** – defined as the total amount of delay stored outside of the network (i.e. experienced by **Latent Demand** – see below, and therefore not counted in the **Delay Time** statistic defined above) at the end of the evaluation interval;
  - **Latent Demand** – defined as the total number of vehicles (demand) stuck outside of the network at the end of the evaluation interval (generally due to queueing and delays).

3.2.3 Tables 3.1 and 3.2 show the summary data for the AM and PM modelled peaks respectively.

3.2.4 There are two or three primary links with congestion levels which can lead to latent demand at the end of the peak periods (i.e. trapped outside of the network). These are all in the northern end of the model, as follows:

- Golborne Road – in the morning peak, traffic struggles to access the A49 at this junction due to the high volume of right turners (in and out) combined with the high volume of northbound and southbound traffic on the A49 itself. If remedied, and using the detail found in the error files as a guide (although it is worth noting that the error files only record latent demand at the end of the model run – i.e. after the half-hour long cool-down period, whereas the summary data in tables 3.1 and 3.2 is just for the actual modelled peak, but only shows the total with no further detail) this could lead to as many 159 additional vehicles entering the network in the AM 2032 Do Something model, plus all of the vehicles stored on the extended link within the model itself (using an average PCU value of 6m, this could be approximately 430 vehicles, as the link is almost 2.6km in length).
- Winwick Link Road and/ or A49 Newton Road and/ or Delph Lane – in the evening peak, there is a small amount of latent demand found in some of the random seed runs, in 2032, for southbound traffic trying to enter the northern part of the model. This is very low, and does not suggest a serious issue, but does serve to highlight that there can be occasional delay here.

	Average Per/Vehicle				Total Network Statistics								
	Delay	Stops	Speed	Stopped Delay	Distance	Travel Time	Delay Time	Stops	Stopped Delay	Vehicles Active	Vehicles Arrived	Latent Delay	Latent Demand
AM DoMin 2022	138	8	27	55	62824	5203267	2354196	133077	939669	1298	15736	885	0
AM DoSom 2022	167	9	24	64	64182	5955184	2974860	153729	1137841	1513	16303	28663	43
AM DoMin 2027	168	10	24	63	65809	6027188	3048604	185725	1140495	1465	16680	1228	4
AM DoSom 2027	200	11	22	76	66641	6802413	3741949	212143	1429144	1665	17022	48843	72
AM DoMin 2032	227	15	21	82	69338	7524387	4397475	285946	1598887	1755	17652	3428	10
AM DoSom 2032	297	19	17	121	69755	9173208	5970528	373811	2427764	2371	17746	139776	159

TABLE 3.1: AM PEAK NETWORK PERFORMANCE STATISTICS SUMMARY

	Average Per/Vehicle				Total Network Statistics								
	Delay	Stops	Speed	Stopped Delay	Distance	Travel Time	Delay Time	Stops	Stopped Delay	Vehicles Active	Vehicles Arrived	Latent Delay	Latent Demand
PM DoMin 2022	83	2	32	42	63745	4494766	1562535	38553	786124	1182	17590	3114	1
PM DoSom 2022	94	2	30	41	65253	4913615	1842540	44937	802205	1257	18337	3517	0
PM DoMin 2027	98	3	30	51	66758	5028345	1961771	54572	1014993	1359	18561	15746	3
PM DoSom 2027	124	4	26	60	68124	5777220	2576812	78318	1243579	1567	19175	29561	12
PM DoMin 2032	107	3	29	54	70336	5485367	2257723	66237	1145036	1494	19560	44161	23
PM DoSom 2032	172	6	22	91	71033	7109294	3791448	131329	2003036	2088	19916	74581	66

TABLE 3.2: PM PEAK NETWORK PERFORMANCE STATISTICS SUMMARY

3.3 Queue Length Comparison

3.3.1 Average maximum queue lengths (i.e. the average of the single largest queue lengths to occur at any point during each of the seed runs), and "average average" (i.e. the average of the queue lengths over the entire peak period, averaged for all seed runs) have been analysed at the following junctions:

- A49 Newton Road / Winwick Park Avenue / Winwick Link Road
- A49 Newton Road / Delph Lane
- M62 Junction 9
- A49 Winwick Road / Birch Avenue
- A49 Winwick Road / Poplars Avenue
- A49 Winwick Road / A574 Cromwell Avenue / Sandy Lane West
- A49 Winwick Road / Junction NINE Retail Park
- A49 Winwick Road / Hawleys Lane / A50 Long Lane

3.3.2 Queue lengths have been extracted for comparison during the AM peak (08:00-09:00) period and PM peak (17:00-18:00) periods.

3.3.3 When analysing the figures, it is worth noting that VISSIM collects queue lengths from a given marker extending backwards along the link until it reaches another queue marker. Hence, where there are junctions close together the queue lengths are capped at the distance between the junctions. This can be misleading – as such, queue outputs should be read in conjunction with journey time results to gain a full understanding of scenario differences.

3.3.4 Tables 3.3 and 3.4 summarise the AM peak average and average maximum queue comparisons respectively. There are some more notable increases to maximum queue lengths for traffic on the eastbound off-slip from the M62. Up to 2032, the queueing vehicles are always contained within the link stacking capacity (of approximately 315m within the model – maximum queue lengths are 314m in the 2027 Do Something scenario, although the average is just over 90m, showing the maximum to be unusual).

3.3.5 However, in the 2032 AM Do Something scenario, there is northbound exit arm blocking during the last half of the peak, which is entirely the result of the delays caused by the A49 Newton Road/ Golborne Road junction being over-capacity.

3.3.6 To the south of M62 Junction 9, the worst impacts in 2032 are seen on the Sandy Lane West and A49 southbound approaches to the A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West roundabout. The Sandy Lane West queue reaches a maximum of almost 300m, approximately the distance back to the Cotswold Road/ Cleveland Road/ Sandy Lane/ Sandy lane West roundabout.

08:00-09:00															
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	17	29	12	71%	115	146	31	27%	170	205	35	21%
	A49 NB	17	29	12	71%	115	146	31	27%	170	205	35	21%
	A49 NB to Winwick Link Rd	17	29	12	71%	115	146	31	27%	170	205	35	21%
	Winwick Park Ave to A49 NB	4	4	0	1%	5	5	0	-1%	5	5	0	-4%
	Winwick Park Ave to Winwick Link Rd	4	4	0	1%	5	5	0	-1%	5	5	0	-4%
	Winwick Park Ave to A49 SB	4	4	0	1%	5	5	0	-1%	5	5	0	-4%
	A49 SB to Winwick Link Rd	75	58	-17	-23%	39	43	4	10%	40	57	17	42%
	A49 SB	75	58	-17	-23%	39	43	4	10%	40	57	17	42%
	A49 SB to Winwick Park Ave	75	58	-17	-23%	39	43	4	10%	40	57	17	42%
	Winwick Link Rd to A49 SB	2	2	0	-1%	3	3	0	-1%	4	4	0	11%
	Winwick Link Rd to Winwick Park Ave	3	3	0	-2%	5	5	0	-2%	6	9	3	43%
	Winwick Link Rd to A49 NB	3	3	0	-2%	5	5	0	-2%	6	9	3	43%
A49 Newton Road/ Delph Lane	A49 NB	21	20	-1	-3%	55	93	38	69%	106	209	104	98%
	A49 NB to Delp Ln	21	20	-1	-5%	56	94	38	69%	107	213	105	98%
	A49 SB	72	71	-2	-2%	68	63	-5	-8%	171	245	74	43%
	A49 SB to Delph Ln	13	24	12	92%	19	18	-1	-3%	47	119	72	153%
	Delph Ln to A49 NB	6	7	1	19%	7	6	0	-1%	8	8	0	2%
	Delph Ln to A49 SB	7	8	0	6%	7	7	0	2%	8	8	0	3%
M62 Junction 9	A49 NB to M62 WB	15	17	2	13%	16	22	6	38%	43	86	43	100%
	A49 NB	15	17	2	13%	16	22	6	38%	43	86	43	100%
	A49 NB to M62 EB	15	17	2	13%	16	22	6	38%	43	86	43	100%
	A49 NB to A49 SB (U-Turn)	15	17	2	13%	16	22	6	38%	43	86	43	100%
	M62 EB to A49 NB	25	22	-3	-13%	29	92	63	217%	87	249	162	187%
	M62 EB to A49 SB	25	22	-3	-13%	29	92	63	217%	87	249	162	187%
	A49 SB to M62 EB	49	53	4	8%	57	54	-3	-5%	64	63	-1	-2%
	A49 SB	49	53	4	8%	57	54	-3	-5%	64	63	-1	-2%
	A49 SB to M62 WB	49	53	4	8%	57	54	-3	-5%	64	63	-1	-2%
	M62 WB to A49 SB	15	14	-1	-5%	14	14	0	-1%	15	16	1	5%
	M62 WB to A49 NB	15	14	-1	-5%	14	14	0	-1%	15	16	1	5%

08:00-09:00													
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-100%	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	18	77	59	330%
	A49 NB	0	0	0	-	0	0	0	-	18	77	59	330%
	A49 SB	8	0	-8	-100%	0	0	0	-	0	9	9	2168%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	251	109	-142	-57%	90	75	-15	-16%	194	216	22	11%
	A49 SB	251	109	-142	-57%	90	75	-15	-16%	194	216	22	11%
	A49 SB to Cromwell Ave	251	109	-142	-57%	90	75	-15	-16%	194	216	22	11%
	Cromwell Ave to A49 NB	12	15	3	28%	15	21	6	41%	34	39	5	16%
	Cromwell Ave to Sandy Ln West	19	24	5	28%	24	35	11	47%	53	62	9	18%
	Cromwell Ave to A49 SB	19	24	5	28%	24	35	11	47%	53	62	9	18%
	Cromwell Ave to Cromwell Ave (U-turn)	19	24	5	28%	24	35	11	47%	53	62	9	18%
	A49 NB	4	4	0	4%	5	6	1	15%	8	11	3	39%
	A49 NB to Sandy Ln West	4	4	0	4%	5	6	1	15%	8	11	3	39%
	A49 NB to Cromwell Ave	4	4	0	4%	5	6	1	15%	8	11	3	39%
	Sandy Ln West to A49 NB	18	85	68	384%	14	96	82	605%	17	205	188	1092%
	Sandy Ln West to Sandy Ln (U-turn	18	85	68	384%	14	96	82	605%	17	205	188	1092%
	Sandy Ln West to A49 SB	18	85	68	384%	14	96	82	605%	17	205	188	1092%
	Sandy Ln West to Cromwell Ave	18	85	68	384%	14	96	82	605%	17	205	188	1092%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	16	14	-2	-10%	18	20	2	10%	21	25	4	18%
	A49 NB to Junction NINE Retail	16	14	-2	-10%	18	20	2	10%	21	25	4	18%
	Junction NINE Retail to A49 SB	6	6	0	4%	6	6	0	-1%	6	6	0	0%
	Junction NINE Retail to A49 NB	5	5	0	6%	5	5	0	4%	5	6	0	6%
	A49 SB	31	49	18	58%	41	66	25	60%	152	139	-13	-9%
	A49 SB to Junction NINE Retail	12	13	0	3%	13	14	1	9%	14	14	0	-1%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	68	74	6	10%	77	69	-9	-11%	80	85	4	6%
	A49 SB to Long Lane	1	1	0	36%	0	0	0	-	0	0	0	-
	A49 SB	155	183	27	18%	176	161	-15	-9%	194	185	-8	-4%
	A49 NB to Hawleys Lane	19	17	-2	-12%	18	21	3	18%	24	29	5	19%
	A49 NB to Long Lane	9	12	3	27%	13	16	4	28%	14	19	5	38%
	A49 NB	19	17	-2	-12%	18	21	3	18%	24	29	5	19%
	Long Lane to A49 SB	18	59	41	221%	20	53	33	169%	28	106	77	272%
	Long Lane to Hawleys Lane	76	75	-2	-2%	42	74	32	75%	55	103	48	88%
	Long Lane to A49 NB	76	75	-2	-2%	42	74	32	75%	55	103	48	88%
	Hawleys Lane to Long Lane	9	9	0	3%	9	8	0	-2%	10	10	0	3%
	Hawleys Lane to A49 SB	9	9	0	3%	9	8	0	-2%	10	10	0	3%
	Hawleys Lane to A49 NB	5	6	1	16%	6	6	0	8%	7	7	0	5%

TABLE 3.3: AVERAGE AM PEAK HOUR QUEUE LENGTH COMPARISON

AM peak continued

3.3.7 The southbound movement on the A49 has the largest traffic volume and is very sensitive to any increase in delay – even tiny changes to signal timings can quickly lead to queue lengths reaching back to, and beyond, M62 Junction 9. As a result, Sandy Lane West and Cromwell Avenue can easily get a disproportionate penalisation as a result of being the movements directly competing for green time with southbound traffic on the A49.

3.3.8 As a result of these issues, the signal controller was optimised at the A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West roundabout in order to 'double-cycle' the timings. This meant have one cycle which prioritised the side road movements, followed by one cycle which prioritised the main road movements. This allowed all movements enough time to clear the roundabout's limited internal storage, without overall affecting the conflicting flows.

3.3.9 Tables 3.5 and 3.6 summarise the PM peak average and average maximum queue comparisons respectively. In much the same way as with the morning peak models, there are some more notable increases to maximum queue lengths for traffic on the eastbound off-slip from the M62 which are reasonably consistent in all scenarios. The average queue length increases are much lower though, and both are well contained within the link stacking capacity. (The largest maximum being 268m in 2032, with a stacking capacity of 315m for the link – although with all average measures being considerably lower, it is unlikely that this happens often in the model.)

3.3.10 To the south of M62 Junction 9, there are also increases to average and maximum queue lengths on the Sandy Lane West arm of the A49 Winwick Road / A574 Cromwell Avenue / Sandy Lane West roundabout. In much the same way as is found with the AM peak models, the level of congestion and need to give the A49 priority at this junction make it very difficult to assign enough time to the side arms, leading to the potential for high levels of queuing. As with the AM peak though, it was found that double cycling the signal timings provided considerable benefit in the PM peak at this roundabout too.

3.3.11 Further south, there are increases to average and maximum queue lengths for northbound traffic on the A49 at the A49 Winwick Road / Hawleys Lane / A50 Long Lane junction, although the queuing here does clear within the peak, as can be seen from the lack of any latent demand at the southernmost end of the model.

3.3.12 Further details regarding queue length output data can be found in Appendix C.

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	106	156	50	47%	244	287	44	18%	295	305	11	4%
	A49 NB	106	156	50	47%	244	287	44	18%	295	305	11	4%
	A49 NB to Winwick Link Rd	106	156	50	47%	244	287	44	18%	295	305	11	4%
	Winwick Park Ave to A49 NB	36	37	1	3%	36	36	0	0%	38	37	-2	-4%
	Winwick Park Ave to Winwick Link Rd	36	37	1	3%	36	36	0	0%	38	37	-2	-4%
	Winwick Park Ave to A49 SB	36	37	1	3%	36	36	0	0%	38	37	-2	-4%
	A49 SB to Winwick Link Rd	178	176	-2	-1%	161	161	0	0%	151	160	8	6%
	A49 SB	178	176	-2	-1%	161	161	0	0%	151	160	8	6%
	A49 SB to Winwick Park Ave	178	176	-2	-1%	161	161	0	0%	151	160	8	6%
	Winwick Link Rd to A49 SB	31	29	-2	-5%	41	38	-4	-9%	36	56	20	55%
	Winwick Link Rd to Winwick Park Ave	31	29	-1	-4%	49	38	-11	-22%	107	155	49	46%
	Winwick Link Rd to A49 NB	31	29	-1	-4%	49	38	-11	-22%	107	155	49	46%
A49 Newton Road/ Delph Lane	A49 NB	131	161	30	23%	210	270	60	29%	319	394	75	23%
	A49 NB to Delp Ln	136	166	30	22%	215	264	49	23%	323	398	75	23%
	A49 SB	291	289	-2	-1%	320	269	-50	-16%	399	434	36	9%
	A49 SB to Delph Ln	117	197	81	69%	179	147	-32	-18%	279	379	100	36%
	Delph Ln to A49 NB	46	47	2	3%	43	42	-1	-2%	42	46	4	10%
	Delph Ln to A49 SB	40	42	2	6%	41	39	-2	-4%	40	43	2	6%
M62 Junction 9	A49 NB to M62 WB	124	120	-4	-3%	131	124	-7	-5%	155	204	49	31%
	A49 NB	124	120	-4	-3%	131	124	-7	-5%	155	204	49	31%
	A49 NB to M62 EB	124	120	-4	-3%	131	124	-7	-5%	155	204	49	31%
	A49 NB to A49 SB (U-Turn)	124	120	-4	-3%	131	124	-7	-5%	155	204	49	31%
	M62 EB to A49 NB	98	164	66	67%	146	314	168	115%	316	495	179	57%
	M62 EB to A49 SB	98	164	66	67%	146	314	168	115%	316	495	179	57%
	A49 SB to M62 EB	165	169	4	2%	168	168	0	0%	171	171	0	0%
	A49 SB	165	169	4	2%	168	168	0	0%	171	171	0	0%
	A49 SB to M62 WB	165	169	4	2%	168	168	0	0%	171	171	0	0%
	M62 WB to A49 SB	88	81	-6	-7%	82	80	-2	-3%	86	87	2	2%
	M62 WB to A49 NB	88	81	-6	-7%	82	80	-2	-3%	86	87	2	2%

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	1	0	-1	-100%	0	0	0	-	0	1	1	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	1	7	6	448%	89	212	123	138%
	A49 NB	0	0	0	-	1	7	6	448%	89	212	123	138%
	A49 SB	76	0	-76	-100%	0	0	0	-	19	65	46	238%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	436	386	-50	-12%	316	332	15	5%	423	442	19	4%
	A49 SB	436	386	-50	-12%	316	332	15	5%	423	442	19	4%
	A49 SB to Cromwell Ave	436	386	-50	-12%	316	332	15	5%	423	442	19	4%
	Cromwell Ave to A49 NB	97	124	28	28%	119	128	10	8%	131	131	1	0%
	Cromwell Ave to Sandy Ln West	97	124	28	28%	119	128	10	8%	131	131	1	0%
	Cromwell Ave to A49 SB	97	124	28	28%	119	128	10	8%	131	131	1	0%
	Cromwell Ave to Cromwell Ave (U-turn)	97	124	28	28%	119	128	10	8%	131	131	1	0%
	A49 NB	85	95	9	11%	105	101	-4	-4%	127	151	24	19%
	A49 NB to Sandy Ln West	85	95	9	11%	105	101	-4	-4%	127	151	24	19%
	A49 NB to Cromwell Ave	85	95	9	11%	105	101	-4	-4%	127	151	24	19%
	Sandy Ln West to A49 NB	115	286	171	148%	110	293	182	165%	123	295	172	140%
	Sandy Ln West to Sandy Ln (U-turn	115	286	171	148%	110	293	182	165%	123	295	172	140%
	Sandy Ln West to A49 SB	115	286	171	148%	110	293	182	165%	123	295	172	140%
	Sandy Ln West to Cromwell Ave	115	286	171	148%	110	293	182	165%	123	295	172	140%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	150	139	-10	-7%	156	163	7	4%	163	173	10	6%
	A49 NB to Junction NINE Retail	150	139	-10	-7%	156	163	7	4%	163	173	10	6%
	Junction NINE Retail to A49 SB	27	28	1	3%	27	27	0	1%	30	33	3	9%
	Junction NINE Retail to A49 NB	25	25	1	3%	25	25	0	1%	28	31	3	10%
	A49 SB	201	241	40	20%	225	224	-1	0%	350	297	-53	-15%
	A49 SB to Junction NINE Retail	61	63	1	2%	64	68	4	6%	69	65	-3	-5%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	316	326	9	3%	320	312	-8	-3%	320	325	5	1%
	A49 SB to Long Lane	38	34	-4	-11%	0	0	0	-	0	0	0	-
	A49 SB	327	334	7	2%	325	325	0	0%	334	329	-5	-1%
	A49 NB to Hawleys Lane	174	176	1	1%	177	211	34	19%	220	235	15	7%
	A49 NB to Long Lane	75	103	28	37%	106	131	25	24%	114	150	36	31%
	A49 NB	174	176	1	1%	177	211	34	19%	220	235	15	7%
	Long Lane to A49 SB	136	164	28	20%	147	175	28	19%	153	185	32	21%
	Long Lane to Hawleys Lane	160	160	-1	0%	150	169	19	13%	152	176	24	16%
	Long Lane to A49 NB	160	160	-1	0%	150	169	19	13%	152	176	24	16%
	Hawleys Lane to Long Lane	66	61	-5	-7%	58	66	9	15%	75	73	-3	-3%
	Hawleys Lane to A49 SB	66	61	-5	-7%	58	66	9	15%	75	73	-3	-3%
	Hawleys Lane to A49 NB	58	54	-5	-8%	53	65	12	23%	75	70	-5	-6%

TABLE 3.4: AVERAGE MAXIMUM AM PEAK HOUR QUEUE LENGTH COMPARISON

17:00-18:00																
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	11	12	1	6%	12	12	0	1%	13	14	2	13%
	A49 NB	11	12	1	6%	12	12	0	1%	13	14	2	13%
	A49 NB to Winwick Link Rd	11	12	1	6%	12	12	0	1%	13	14	2	13%
	Winwick Park Ave to A49 NB	1	3	2	190%	1	1	0	-1%	1	4	2	161%
	Winwick Park Ave to Winwick Link Rd	1	3	2	190%	1	1	0	-1%	1	4	2	161%
	Winwick Park Ave to A49 SB	1	3	2	190%	1	1	0	-1%	1	4	2	161%
	A49 SB to Winwick Link Rd	18	19	1	7%	20	22	2	10%	22	50	28	125%
	A49 SB	18	19	1	7%	20	22	2	10%	22	50	28	125%
	A49 SB to Winwick Park Ave	18	19	1	7%	20	22	2	10%	22	50	28	125%
	Winwick Link Rd to A49 SB	1	1	0	-3%	10	19	9	97%	23	104	81	358%
	Winwick Link Rd to Winwick Park Ave	2	2	0	4%	12	11	-1	-7%	10	65	55	545%
	Winwick Link Rd to A49 NB	2	2	0	4%	12	11	-1	-7%	10	65	55	545%
A49 Newton Road/ Delph Lane	A49 NB	36	45	9	25%	45	56	11	24%	45	94	49	109%
	A49 NB to Delp Ln	36	45	9	25%	45	56	11	25%	45	94	49	108%
	A49 SB	20	21	1	6%	81	82	1	1%	159	292	133	83%
	A49 SB to Delph Ln	9	11	3	32%	10	10	0	2%	10	48	39	402%
	Delph Ln to A49 NB	56	61	5	9%	86	96	10	11%	103	103	-1	-1%
	Delph Ln to A49 SB	53	57	5	9%	83	93	10	12%	100	99	-1	-1%
M62 Junction 9	A49 NB to M62 WB	12	13	1	11%	12	16	4	33%	16	31	15	97%
	A49 NB	12	13	1	11%	12	16	4	33%	16	31	15	97%
	A49 NB to M62 EB	12	13	1	11%	12	16	4	33%	16	31	15	97%
	A49 NB to A49 SB (U-Turn)	12	13	1	11%	12	16	4	33%	16	31	15	97%
	M62 EB to A49 NB	17	49	31	180%	22	46	24	108%	21	84	63	298%
	M62 EB to A49 SB	17	49	31	180%	22	46	24	108%	21	84	63	298%
	A49 SB to M62 EB	37	37	0	0%	65	59	-6	-9%	72	96	24	33%
	A49 SB	37	37	0	0%	65	59	-6	-9%	72	96	24	33%
	A49 SB to M62 WB	37	37	0	0%	65	59	-6	-9%	72	96	24	33%
	M62 WB to A49 SB	8	10	2	31%	13	14	1	7%	19	39	20	103%
	M62 WB to A49 NB	8	10	2	31%	13	14	1	7%	19	39	20	103%

17:00-18:00																
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	4	4	42400%
	A49 NB	0	0	0	-	0	0	0	-	0	4	4	42400%
	A49 SB	2	1	-1	-41%	102	96	-6	-5%	156	280	123	79%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	121	103	-17	-14%	314	325	11	3%	353	429	76	22%
	A49 SB	121	103	-17	-14%	314	325	11	3%	353	429	76	22%
	A49 SB to Cromwell Ave	121	103	-17	-14%	314	325	11	3%	353	429	76	22%
	Cromwell Ave to A49 NB	8	9	1	16%	8	10	1	17%	9	11	2	28%
	Cromwell Ave to Sandy Ln West	12	14	2	20%	13	16	3	22%	14	19	5	34%
	Cromwell Ave to A49 SB	12	14	2	20%	13	16	3	22%	14	19	5	34%
	Cromwell Ave to Cromwell Ave (U-turn)	12	14	2	20%	13	16	3	22%	14	19	5	34%
	A49 NB	17	15	-2	-9%	23	31	8	33%	52	72	20	40%
	A49 NB to Sandy Ln West	17	15	-2	-9%	23	31	8	33%	52	72	20	40%
	A49 NB to Cromwell Ave	17	15	-2	-9%	23	31	8	33%	52	72	20	40%
	Sandy Ln West to A49 NB	113	127	14	12%	17	254	236	1371%	30	258	228	758%
	Sandy Ln West to Sandy Ln (U-turn	113	127	14	12%	17	254	236	1371%	30	258	228	758%
	Sandy Ln West to A49 SB	113	127	14	12%	17	254	236	1371%	30	258	228	758%
	Sandy Ln West to Cromwell Ave	113	127	14	12%	17	254	236	1371%	30	258	228	758%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	28	27	0	-1%	32	37	5	15%	37	46	9	25%
	A49 NB to Junction NINE Retail	28	27	0	-1%	32	37	5	15%	37	46	9	25%
	Junction NINE Retail to A49 SB	37	52	15	41%	30	71	40	133%	29	43	14	49%
	Junction NINE Retail to A49 NB	35	50	15	44%	28	68	40	144%	27	41	14	51%
	A49 SB	196	74	-122	-62%	204	173	-31	-15%	184	200	16	9%
	A49 SB to Junction NINE Retail	12	14	2	17%	11	20	9	83%	13	14	1	8%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	35	27	-8	-24%	33	28	-5	-14%	30	22	-9	-29%
	A49 SB to Long Lane	76	23	-53	-70%	68	41	-27	-40%	22	0	-22	-100%
	A49 SB	248	227	-22	-9%	252	247	-5	-2%	248	249	1	0%
	A49 NB to Hawleys Lane	27	27	-1	-3%	43	45	2	5%	44	239	195	448%
	A49 NB to Long Lane	8	10	1	12%	9	14	4	45%	9	142	133	1421%
	A49 NB	27	27	-1	-3%	43	45	2	5%	44	239	195	448%
	Long Lane to A49 SB	9	34	25	287%	11	44	33	299%	22	50	28	124%
	Long Lane to Hawleys Lane	30	74	43	142%	33	82	49	150%	80	94	14	18%
	Long Lane to A49 NB	30	74	43	142%	33	82	49	150%	80	94	14	18%
	Hawleys Lane to Long Lane	52	51	-2	-3%	58	54	-4	-6%	51	64	13	27%
	Hawleys Lane to A49 SB	52	51	-2	-3%	58	54	-4	-6%	51	64	13	27%
	Hawleys Lane to A49 NB	37	39	2	5%	40	41	1	3%	41	49	8	20%

TABLE 3.5: AVERAGE PM PEAK HOUR QUEUE LENGTH COMPARISON

		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	97	104	7	7%	117	111	-5	-5%	111	134	23	21%
	A49 NB	97	104	7	7%	117	111	-5	-5%	111	134	23	21%
	A49 NB to Winwick Link Rd	97	104	7	7%	117	111	-5	-5%	111	134	23	21%
	Winwick Park Ave to A49 NB	12	26	14	123%	11	12	2	14%	13	27	14	104%
	Winwick Park Ave to Winwick Link Rd	12	26	14	123%	11	12	2	14%	13	27	14	104%
	Winwick Park Ave to A49 SB	12	26	14	123%	11	12	2	14%	13	27	14	104%
	A49 SB to Winwick Link Rd	78	96	18	23%	81	104	22	27%	96	151	55	57%
	A49 SB	78	96	18	23%	81	104	22	27%	96	151	55	57%
	A49 SB to Winwick Park Ave	78	96	18	23%	81	104	22	27%	96	151	55	57%
	Winwick Link Rd to A49 SB	26	24	-1	-5%	135	143	9	6%	257	458	201	78%
	Winwick Link Rd to Winwick Park Ave	26	24	-1	-5%	151	89	-63	-41%	126	363	237	189%
	Winwick Link Rd to A49 NB	26	24	-1	-5%	151	89	-63	-41%	126	363	237	189%
A49 Newton Road/ Delph Lane	A49 NB	222	302	79	36%	278	324	46	17%	297	373	76	26%
	A49 NB to Delp Ln	227	306	79	35%	283	329	46	16%	301	378	76	25%
	A49 SB	140	148	8	6%	320	305	-16	-5%	429	483	55	13%
	A49 SB to Delph Ln	49	67	18	37%	60	90	31	51%	68	185	117	171%
	Delph Ln to A49 NB	181	183	2	1%	189	188	-2	-1%	188	188	0	0%
	Delph Ln to A49 SB	177	179	2	1%	185	184	-2	-1%	184	184	0	0%
M62 Junction 9	A49 NB to M62 WB	112	117	5	5%	116	135	19	17%	151	160	9	6%
	A49 NB	112	117	5	5%	116	135	19	17%	151	160	9	6%
	A49 NB to M62 EB	112	117	5	5%	116	135	19	17%	151	160	9	6%
	A49 NB to A49 SB (U-Turn)	112	117	5	5%	116	135	19	17%	151	160	9	6%
	M62 EB to A49 NB	104	241	137	132%	127	226	99	78%	120	268	147	123%
	M62 EB to A49 SB	104	241	137	132%	127	226	99	78%	120	268	147	123%
	A49 SB to M62 EB	161	161	-1	0%	171	168	-3	-2%	175	179	4	2%
	A49 SB	161	161	-1	0%	171	168	-3	-2%	175	179	4	2%
	A49 SB to M62 WB	161	161	-1	0%	171	168	-3	-2%	175	179	4	2%
	M62 WB to A49 SB	53	80	27	50%	73	89	16	21%	93	143	50	53%
	M62 WB to A49 NB	53	80	27	50%	73	89	16	21%	93	143	50	53%

		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	3	2	-1	-31%	0	5	5	-	3	33	31	1121%
	A49 NB	3	2	-1	-31%	0	5	5	-	3	33	31	1121%
	A49 SB	28	37	9	31%	419	384	-35	-8%	465	507	43	9%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	390	390	0	0%	485	510	25	5%	512	513	1	0%
	A49 SB	390	390	0	0%	485	510	25	5%	512	513	1	0%
	A49 SB to Cromwell Ave	390	390	0	0%	485	510	25	5%	512	513	1	0%
	Cromwell Ave to A49 NB	68	76	9	13%	71	80	9	12%	70	87	18	26%
	Cromwell Ave to Sandy Ln West	68	76	9	13%	71	80	9	12%	70	87	18	26%
	Cromwell Ave to A49 SB	68	76	9	13%	71	80	9	12%	70	87	18	26%
	Cromwell Ave to Cromwell Ave (U-turn)	68	76	9	13%	71	80	9	12%	70	87	18	26%
	A49 NB	192	177	-15	-8%	221	230	9	4%	261	261	0	0%
	A49 NB to Sandy Ln West	192	177	-15	-8%	221	230	9	4%	261	261	0	0%
	A49 NB to Cromwell Ave	192	177	-15	-8%	221	230	9	4%	261	261	0	0%
	Sandy Ln West to A49 NB	262	292	31	12%	142	293	151	106%	178	293	114	64%
	Sandy Ln West to Sandy Ln (U-turn	262	292	31	12%	142	293	151	106%	178	293	114	64%
	Sandy Ln West to A49 SB	262	292	31	12%	142	293	151	106%	178	293	114	64%
	Sandy Ln West to Cromwell Ave	262	292	31	12%	142	293	151	106%	178	293	114	64%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	225	210	-15	-7%	232	238	5	2%	244	255	12	5%
	A49 NB to Junction NINE Retail	225	210	-15	-7%	232	238	5	2%	244	255	12	5%
	Junction NINE Retail to A49 SB	90	116	26	28%	80	150	71	89%	88	113	25	28%
	Junction NINE Retail to A49 NB	88	113	26	29%	77	148	71	91%	86	111	25	29%
	A49 SB	396	282	-114	-29%	416	419	3	1%	422	439	16	4%
	A49 SB to Junction NINE Retail	59	63	4	6%	57	95	38	67%	63	65	2	3%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	302	260	-42	-14%	274	273	0	0%	305	168	-137	-45%
	A49 SB to Long Lane	105	139	35	33%	173	104	-68	-40%	35	1	-34	-98%
	A49 SB	340	339	-1	0%	343	338	-6	-2%	340	341	1	0%
	A49 NB to Hawleys Lane	283	294	11	4%	334	396	62	19%	381	509	128	34%
	A49 NB to Long Lane	75	105	29	39%	100	158	58	58%	90	502	411	455%
	A49 NB	283	294	11	4%	334	396	62	19%	381	509	128	34%
	Long Lane to A49 SB	83	154	71	85%	113	154	40	36%	150	154	4	3%
	Long Lane to Hawleys Lane	141	150	9	6%	140	149	9	6%	149	151	2	1%
	Long Lane to A49 NB	141	150	9	6%	140	149	9	6%	149	151	2	1%
	Hawleys Lane to Long Lane	126	126	1	0%	126	127	0	0%	127	126	-1	-1%
	Hawleys Lane to A49 SB	126	126	1	0%	126	127	0	0%	127	126	-1	-1%
	Hawleys Lane to A49 NB	132	133	1	1%	132	133	0	0%	133	132	-1	-1%

TABLE 3.6: AVERAGE MAXIMUM PM PEAK HOUR QUEUE LENGTH COMPARISON

3.4 Journey Times Comparison

3.4.1 Consistent with the base year modelling, average journey times have been extracted for a single evaluation interval covering the peak hour for both the AM (08:00-09:00) and PM (17:00-18:00) scenario models. The separate routes used for evaluation were as follows:

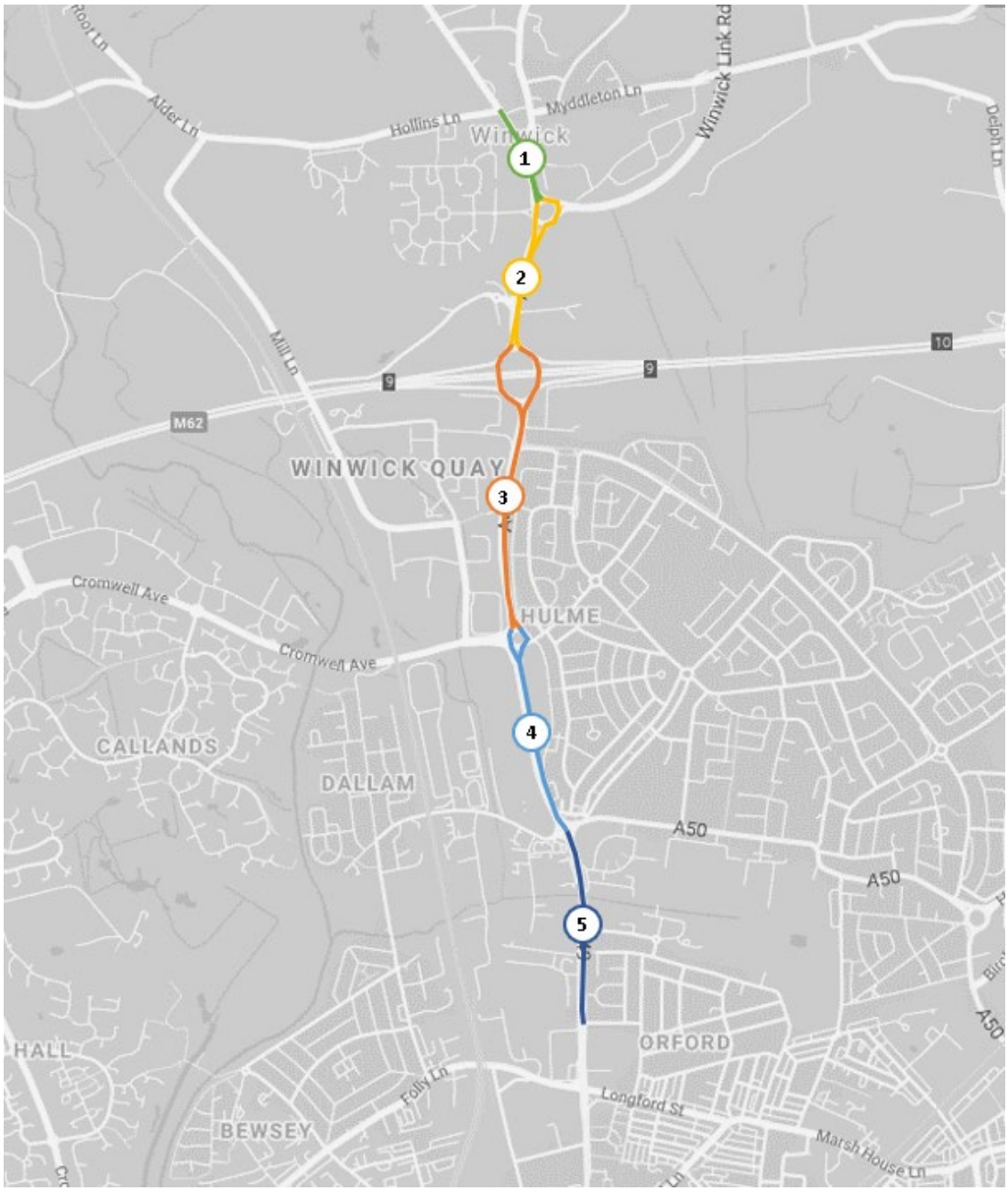


FIGURE 3.1: JOURNEY TIME SECTIONS ASSESSED

3.4.2 Table 3.7 summarises the average peak hour journey times for both northbound and southbound traffic during the AM peak, for each future year scenario.

3.4.3 It is clear that for both northbound and southbound traffic travelling on the A49, there is not any sort of statistically noticeable impact (other than a reduction of almost 1 minute for the southbound section approaching the A49/ Sandy Lane West/ Cromwell Avenue roundabout in 2022 AM peak. This is likely as a result of improvements to the signal timings at this junction) until 2032. Those impacts are almost exclusively the result of the junction between A49 Newton Road/ Golborne Road being over capacity and unable to cope with the volume of right turning traffic in particular.

AM Journey Time (s) - 08:00-09:00												
	AM 2022				AM 2027				AM 2032			
Section	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	93	106	13	13%	145	149	4	3%	157	165	8	5%
2 NB	106	116	9	9%	196	235	39	20%	270	366	96	36%
3 NB	84	86	2	2%	85	89	4	5%	105	159	54	52%
4 NB	95	93	-2	-2%	95	98	3	3%	101	104	4	4%
5 NB	89	84	-5	-6%	84	88	3	4%	89	93	4	4%
	467	484	16.77	4%	606	659	52.72	9%	721	887	166.25	23%

	AM 2022				AM 2027				AM 2032			
Section	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	101	86	-15	-15%	68	72	5	7%	70	91	21	31%
2 SB	114	113	-1	-1%	111	110	-2	-2%	145	173	28	20%
3 SB	195	136	-59	-30%	129	127	-2	-2%	159	169	10	6%
4 SB	154	172	18	12%	165	161	-4	-2%	194	179	-15	-8%
5 SB	64	65	2	3%	64	65	1	2%	65	66	1	2%
	627	571	-55.67	-9%	537	535	-2.14	0%	632	678	45.66	7%

TABLE 3.7: AM PEAK JOURNEY TIME COMPARISON

PM Journey Time (s) - 17:00-18:00												
	PM 2022				PM 2027				PM 2032			
Section	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	55	57	2	4%	58	61	3	6%	66	66	0	0%
2 NB	116	122	6	5%	121	128	7	6%	138	138	0	0%
3 NB	84	87	3	3%	84	90	6	7%	95	95	0	0%
4 NB	96	97	1	1%	101	105	4	4%	117	118	0	0%
5 NB	88	87	-1	-1%	97	97	0	0%	162	162	0	0%
	438	449	10.77	2%	461	482	20.25	4%	578	579	0.95	0%

	PM 2022				PM 2027				PM 2032			
Section	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	55	56	2	3%	56	58	2	4%	112	113	1	1%
2 SB	92	94	1	1%	137	136	-1	-1%	318	320	2	1%
3 SB	161	152	-9	-6%	275	262	-14	-5%	340	341	1	0%
4 SB	282	217	-65	-23%	290	270	-20	-7%	281	282	1	0%
5 SB	63	63	0	0%	63	64	0	0%	64	64	0	0%
	653	583	-70.37	-11%	822	790	-31.8	-4%	1114	1119	4.67	0%

TABLE 3.8: PM PEAK JOURNEY TIME COMPARISON

3.4.4 Table 3.8 summarises the average peak hour journey times for both northbound and southbound traffic during the PM peak, for each future year scenario.

3.4.5 In the PM peak, it is clear that the development has no real negative impact on travel times along the A49.

4 SUMMARY

4.1.1 Building on the 2019 Base Year Model, 2022, 2027 and 2032 'Do Minimum' model scenarios were produced to act as reference case models for the purposes of comparison, with the aim of assessing the impact of traffic flow changes associated with the proposed Peel Hall development.

4.1.2 The following 'Do Something', or 'With Development' scenarios, were compared to their associated reference cases:

- 2022 Do Something (Full Development Scenario)
- 2027 Do Something (Part Development Scenario)
- 2032 Do Something (Full Development Scenario)

4.1.3 There are some relatively minor, steady increases to delay, queue lengths etc. as a result of the growth in both background traffic and specific development related traffic. However, there are some notable areas where higher levels of delay are apparent. These are primarily the following locations:

- Eastbound M62 off-slip – this particularly shows in the queue data for the 2032 AM Do Something model, but is actually a symptom of delays caused by the junction with A49 Newton Road/ Golborne Road. Although an attempt was made to mitigate against the effects of this, with some success, the junction is very constrained physically, so options to enlarge the junction significantly were not explored as part of this study.
- Eastbound motorway diverge M62 – this is an issue in the AM peak scenarios, which becomes more and more apparent as each layer of growth is added. The effect of the edge of network delay is modelled as per the original AECOM model, provided by Highways England.
- A49 Winwick Road / A574 Cromwell Avenue / Sandy Lane West – this junction is very sensitive to traffic growth, runs very tight, fixed-time signal plans, and is particularly physically constrained. The optimised signal setup used within the Do Something scenario models involves 'double cycling' the signal timings, meaning that the controller alternates between one set of timings aimed at maximising throughput for the A49, and one set of timings aimed at maximising throughput for the two side roads. This has proven to be the best option tested.
- A49 Winwick Road / Hawleys Lane / A50 Long Lane – this junction is modelled with a responsive, vehicle actuated controller in the Do Something scenarios, in an attempt to assess the possible impact of upgrading this junction controller. The results, particularly in the AM peak, demonstrate that queue lengths remain largely unchanged, despite the increased traffic levels associated with the development.

APPENDIX A:

TURNING VOLUME CALIBRATION CHECKS

AM VOLUME COMPARISON – 07:00-08:00 (WARM-UP PERIOD)

Junction/ Movement		07:00-08:00											
		2022				2027				2032			
		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference	
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	15	17	2	13%	17	18	1	6%	19	17	-2	-11%
	A49 NB	683	705	22	3%	713	715	2	0%	728	741	13	2%
	A49 NB to Winwick Link Rd	409	411	2	0%	438	440	2	0%	458	458	0	0%
	Winwick Park Ave to A49 NB	38	38	0	0%	40	39	-1	-3%	43	40	-3	-7%
	Winwick Park Ave to Winwick Link Rd	56	56	0	0%	60	60	0	0%	64	64	0	0%
	Winwick Park Ave to A49 SB	51	53	2	4%	55	55	0	0%	58	60	2	3%
	A49 SB to Winwick Link Rd	1	11	10	1000%	25	30	5	20%	27	34	7	26%
	A49 SB	816	855	39	5%	855	856	1	0%	856	873	17	2%
	A49 SB to Winwick Park Ave	4	4	0	0%	4	3	-1	-25%	3	4	1	33%
	Winwick Link Rd to A49 SB	682	680	-2	0%	716	714	-2	0%	754	758	4	1%
	Winwick Link Rd to Winwick Park Ave	8	8	0	0%	9	9	0	0%	10	10	0	0%
	Winwick Link Rd to A49 NB	10	11	1	10%	56	56	0	0%	57	56	-1	-2%
A49 Newton Road/ Delph Lane	A49 NB	1046	1069	23	2%	1113	1125	12	1%	1150	1173	23	2%
	A49 NB to Delp Ln	201	215	14	7%	234	249	15	6%	255	247	-8	-3%
	A49 SB	1359	1391	32	2%	1419	1422	3	0%	1459	1479	20	1%
	A49 SB to Delph Ln	171	170	-1	-1%	182	177	-5	-3%	181	182	1	1%
	Delph Ln to A49 NB	86	86	0	0%	89	88	-1	-1%	93	93	0	0%
	Delph Ln to A49 SB	92	93	1	1%	92	92	0	0%	94	98	4	4%
M62 Junction 9	A49 NB to M62 WB	164	169	5	3%	169	169	0	0%	188	224	36	19%
	A49 NB	431	446	15	3%	451	468	17	4%	484	496	12	2%
	A49 NB to M62 EB	385	406	21	5%	419	428	9	2%	443	446	3	1%
	A49 NB to A49 SB (U-Turn)	0	5	5	-	0	5	5	-	0	6	6	-
	M62 EB to A49 NB	722	748	26	4%	815	835	20	2%	856	872	16	2%
	M62 EB to A49 SB	244	242	-2	-1%	228	230	2	1%	246	252	6	2%
	A49 SB to M62 EB	257	286	29	11%	268	276	8	3%	287	311	24	8%
	A49 SB	737	729	-8	-1%	755	753	-2	0%	769	776	7	1%
	A49 SB to M62 WB	411	430	19	5%	448	446	-2	0%	458	452	-6	-1%
	M62 WB to A49 SB	599	608	9	2%	649	655	6	1%	707	725	18	3%
	M62 WB to A49 NB	103	99	-4	-4%	92	86	-6	-7%	77	68	-9	-12%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	5	14	9	180%	6	14	8	133%	6	15	9	150%
	Birch Rd to A49 SB	6	24	18	300%	6	24	18	300%	6	24	18	300%
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	1018	1059	41	4%	1073	1106	33	3%	1155	1209	54	5%
	A49 SB	1575	1590	15	1%	1627	1646	19	1%	1718	1762	44	3%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	192	215	23	12%	259	294	35	14%	322	326	4	1%
	A49 SB	1051	1039	-12	-1%	1029	1004	-25	-2%	1012	1014	2	0%
	A49 SB to Cromwell Ave	254	264	10	4%	277	279	2	1%	304	324	20	7%
	Cromwell Ave to A49 NB	254	254	0	0%	265	263	-2	-1%	291	282	-9	-3%
	Cromwell Ave to Sandy Ln West	267	295	28	10%	293	310	17	6%	300	324	24	8%
	Cromwell Ave to A49 SB	486	506	20	4%	541	560	19	4%	592	593	1	0%
	Cromwell Ave to Cromwell Ave (U-turn)	28	29	1	4%	30	29	-1	-3%	32	31	-1	-3%
	A49 NB	629	639	10	2%	664	666	2	0%	701	705	4	1%
	A49 NB to Sandy Ln West	47	66	19	40%	60	88	28	47%	75	98	23	31%
	A49 NB to Cromwell Ave	253	265	12	5%	271	281	10	4%	291	303	12	4%
	Sandy Ln West to A49 NB	149	189	40	27%	164	199	35	21%	185	239	54	29%
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-
	Sandy Ln West to A49 SB	18	6	-12	-67%	4	7	3	75%	4	8	4	100%
	Sandy Ln West to Cromwell Ave	224	302	78	35%	237	286	49	21%	252	317	65	26%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	859	888	29	3%	907	939	32	4%	963	994	31	3%
	A49 NB to Junction NINE Retail	48	54	6	13%	48	51	3	6%	52	58	6	12%
	Junction NINE Retail to A49 SB	86	87	1	1%	84	78	-6	-7%	76	73	-3	-4%
	Junction NINE Retail to A49 NB	86	91	5	6%	101	107	6	6%	121	130	9	7%
	A49 SB	1426	1420	-6	0%	1434	1424	-10	-1%	1459	1459	0	0%
	A49 SB to Junction NINE Retail	111	114	3	3%	122	127	5	4%	126	131	5	4%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	187	190	3	2%	197	192	-5	-3%	202	202	0	0%
	A49 SB to Long Lane	148	127	-21	-14%	85	85	0	0%	67	61	-6	-9%
	A49 SB	1143	1139	-4	0%	1181	1186	5	0%	1208	1217	9	1%
	A49 NB to Hawleys Lane	155	163	8	5%	179	185	6	3%	202	203	1	0%
	A49 NB to Long Lane	104	108	4	4%	105	106	1	1%	105	107	2	2%
	A49 NB	693	709	16	2%	723	759	36	5%	769	795	26	3%
	Long Lane to A49 SB	186	332	146	78%	215	293	78	36%	260	385	125	48%
	Long Lane to Hawleys Lane	198	216	18	9%	209	216	7	3%	215	222	7	3%
	Long Lane to A49 NB	86	103	17	20%	91	99	8	9%	97	111	14	14%
	Hawleys Lane to Long Lane	67	71	4	6%	69	68	-1	-1%	70	71	1	1%
	Hawleys Lane to A49 SB	0	0	0	-	1	1	0	0%	1	1	0	0%
	Hawleys Lane to A49 NB	144	149	5	3%	156	158	2	1%	171	177	6	4%

AM VOLUME COMPARISON – 08:00-09:00 (PEAK PERIOD)

08:00-09:00															
		2022				2027				2032					
Junction/ Movement		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference			
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%		
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	20	19	-1	-5%	18	19	1	6%	20	19	-1	-5%		
	A49 NB	751	787	36	5%	765	775	10	1%	746	714	-32	-4%		
	A49 NB to Winwick Link Rd	451	456	5	1%	464	463	-1	0%	466	435	-31	-7%		
	Winwick Park Ave to A49 NB	49	48	-1	-2%	51	50	-1	-2%	54	51	-3	-6%		
	Winwick Park Ave to Winwick Link Rd	77	77	0	0%	81	82	1	1%	85	87	2	2%		
	Winwick Park Ave to A49 SB	67	70	3	4%	71	72	1	1%	78	79	1	1%		
	A49 SB to Winwick Link Rd	1	13	12	1200%	33	38	5	15%	34	41	7	21%		
	A49 SB	1017	1057	40	4%	1019	1020	1	0%	1001	1008	7	1%		
	A49 SB to Winwick Park Ave	6	5	-1	-17%	4	5	1	25%	4	4	0	0%		
	Winwick Link Rd to A49 SB	788	791	3	0%	833	829	-4	0%	879	876	-3	0%		
	Winwick Link Rd to Winwick Park Ave	9	9	0	0%	7	7	0	0%	9	9	0	0%		
	Winwick Link Rd to A49 NB	12	13	1	8%	70	70	0	0%	70	71	1	1%		
A49 Newton Road/ Delph Lane	A49 NB	1132	1171	39	3%	1174	1186	12	1%	1167	1103	-64	-5%		
	A49 NB to Delp Ln	228	242	14	6%	259	279	20	8%	275	237	-38	-14%		
	A49 SB	1647	1698	51	3%	1701	1703	2	0%	1732	1736	4	0%		
	A49 SB to Delph Ln	213	212	-1	0%	217	214	-3	-1%	219	217	-2	-1%		
	Delph Ln to A49 NB	84	85	1	1%	85	83	-2	-2%	88	87	-1	-1%		
	Delph Ln to A49 SB	100	98	-2	-2%	93	93	0	0%	100	102	2	2%		
M62 Junction 9	A49 NB to M62 WB	209	225	16	8%	226	236	10	4%	260	299	39	15%		
	A49 NB	578	600	22	4%	609	627	18	3%	646	632	-14	-2%		
	A49 NB to M62 EB	539	560	21	4%	574	593	19	3%	608	601	-7	-1%		
	A49 NB to A49 SB (U-Turn)	0	6	6	-	0	6	6	-	0	8	8	-		
	M62 EB to A49 NB	679	718	39	6%	747	765	18	2%	746	666	-80	-11%		
	M62 EB to A49 SB	238	243	5	2%	214	219	5	2%	224	201	-23	-10%		
	A49 SB to M62 EB	321	356	35	11%	335	343	8	2%	350	374	24	7%		
	A49 SB	930	921	-9	-1%	933	928	-5	-1%	946	940	-6	-1%		
	A49 SB to M62 WB	508	530	22	4%	539	537	-2	0%	545	531	-14	-3%		
	M62 WB to A49 SB	555	566	11	2%	601	607	6	1%	655	668	13	2%		
	M62 WB to A49 NB	104	100	-4	-4%	91	85	-6	-7%	74	68	-6	-8%		
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	5	15	10	200%	5	16	11	220%	5	15	10	200%		
	Birch Rd to A49 SB	15	37	22	147%	15	38	23	153%	15	38	23	153%		
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-		
	A49 NB	1320	1389	69	5%	1407	1463	56	4%	1513	1563	50	3%		
	A49 SB	1730	1756	26	2%	1758	1784	26	1%	1832	1840	8	0%		
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	214	243	29	14%	276	317	41	15%	341	334	-7	-2%		
	A49 SB	1219	1204	-15	-1%	1171	1145	-26	-2%	1130	1122	-8	-1%		
	A49 SB to Cromwell Ave	299	314	15	5%	324	325	1	0%	355	373	18	5%		
	Cromwell Ave to A49 NB	294	299	5	2%	318	320	2	1%	347	335	-12	-3%		
	Cromwell Ave to Sandy Ln West	341	379	38	11%	380	402	22	6%	388	414	26	7%		
	Cromwell Ave to A49 SB	608	630	22	4%	673	705	32	5%	731	726	-5	-1%		
	Cromwell Ave to Cromwell Ave (U-turn)	40	37	-3	-8%	37	38	1	3%	41	37	-4	-10%		
	A49 NB	826	825	-1	0%	870	869	-1	0%	917	921	4	0%		
	A49 NB to Sandy Ln West	61	85	24	39%	80	111	31	39%	99	128	29	29%		
	A49 NB to Cromwell Ave	319	326	7	2%	334	340	6	2%	353	367	14	4%		
	Sandy Ln West to A49 NB	199	252	53	27%	216	262	46	21%	245	297	52	21%		
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-		
	Sandy Ln West to A49 SB	25	9	-16	-64%	6	10	4	67%	7	10	3	43%		
	Sandy Ln West to Cromwell Ave	285	391	106	37%	308	373	65	21%	322	389	67	21%		
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	1108	1140	32	3%	1174	1214	40	3%	1246	1288	42	3%		
	A49 NB to Junction NINE Retail	67	77	10	15%	69	75	6	9%	71	80	9	13%		
	Junction NINE Retail to A49 SB	80	80	0	0%	76	71	-5	-7%	70	68	-2	-3%		
	Junction NINE Retail to A49 NB	94	100	6	6%	111	115	4	4%	127	135	8	6%		
	A49 SB	1702	1687	-15	-1%	1695	1700	5	0%	1693	1696	3	0%		
	A49 SB to Junction NINE Retail	139	144	5	4%	146	152	6	4%	153	155	2	1%		
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	234	242	8	3%	243	246	3	1%	249	250	1	0%		
	A49 SB to Long Lane	172	151	-21	-12%	106	101	-5	-5%	83	73	-10	-12%		
	A49 SB	1351	1365	14	1%	1427	1413	-14	-1%	1428	1435	7	0%		
	A49 NB to Hawleys Lane	201	211	10	5%	230	234	4	2%	258	257	-1	0%		
	A49 NB to Long Lane	148	146	-2	-1%	148	149	1	1%	150	152	2	1%		
	A49 NB	892	907	15	2%	937	959	22	2%	984	1015	31	3%		
	Long Lane to A49 SB	253	422	169	67%	299	389	90	30%	351	467	116	33%		
	Long Lane to Hawleys Lane	257	265	8	3%	258	267	9	3%	263	267	4	2%		
	Long Lane to A49 NB	115	126	11	10%	117	127	10	9%	119	129	10	8%		
	Hawleys Lane to Long Lane	80	84	4	5%	83	86	3	4%	89	91	2	2%		
	Hawleys Lane to A49 SB	1	1	0	0%	1	1	0	0%	1	1	0	0%		
	Hawleys Lane to A49 NB	179	184	5	3%	193	197	4	2%	209	217	8	4%		

AM VOLUME COMPARISON – 09:00-09:30 (COOL-DOWN PERIOD)

Junction/ Movement		09:00-09:30											
		2022				2027				2032			
		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference	
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	7	8	1	14%	10	8	-2	-20%	9	9	0	0%
	A49 NB	338	352	14	4%	394	419	25	6%	450	502	52	12%
	A49 NB to Winwick Link Rd	203	200	-3	-1%	222	233	11	5%	256	283	27	11%
	Winwick Park Ave to A49 NB	19	19	0	0%	20	20	0	0%	22	20	-2	-9%
	Winwick Park Ave to Winwick Link Rd	29	29	0	0%	30	31	1	3%	32	33	1	3%
	Winwick Park Ave to A49 SB	28	29	1	4%	30	31	1	3%	32	33	1	3%
	A49 SB to Winwick Link Rd	0	7	7	-	16	17	1	6%	16	20	4	25%
	A49 SB	499	527	28	6%	480	471	-9	-2%	439	444	5	1%
	A49 SB to Winwick Park Ave	2	1	-1	-50%	2	2	0	0%	3	2	-1	-33%
	Winwick Link Rd to A49 SB	345	346	1	0%	368	366	-2	-1%	389	396	7	2%
	Winwick Link Rd to Winwick Park Ave	5	4	-1	-20%	4	4	0	0%	4	5	1	25%
	Winwick Link Rd to A49 NB	5	5	0	0%	29	29	0	0%	29	29	0	0%
A49 Newton Road/ Delph Lane	A49 NB	520	536	16	3%	565	598	33	6%	640	737	97	15%
	A49 NB to Delp Ln	103	111	8	8%	127	136	9	7%	138	155	17	12%
	A49 SB	794	826	32	4%	797	790	-7	-1%	785	805	20	3%
	A49 SB to Delph Ln	98	99	1	1%	99	98	-1	-1%	99	99	0	0%
	Delph Ln to A49 NB	36	36	0	0%	39	39	0	0%	41	43	2	5%
	Delph Ln to A49 SB	51	53	2	4%	50	51	1	2%	55	56	1	2%
M62 Junction 9	A49 NB to M62 WB	94	102	8	9%	102	107	5	5%	116	148	32	28%
	A49 NB	257	268	11	4%	269	283	14	5%	300	333	33	11%
	A49 NB to M62 EB	239	246	7	3%	248	258	10	4%	269	294	25	9%
	A49 NB to A49 SB (U-Turn)	0	3	3	-	0	3	3	-	0	4	4	-
	M62 EB to A49 NB	307	323	16	5%	359	387	28	8%	409	499	90	22%
	M62 EB to A49 SB	109	109	0	0%	105	111	6	6%	119	147	28	24%
	A49 SB to M62 EB	150	171	21	14%	149	153	4	3%	152	174	22	14%
	A49 SB	447	443	-4	-1%	440	431	-9	-2%	434	445	11	3%
	A49 SB to M62 WB	243	254	11	5%	252	248	-4	-2%	249	246	-3	-1%
	M62 WB to A49 SB	271	276	5	2%	293	296	3	1%	316	322	6	2%
	M62 WB to A49 NB	53	51	-2	-4%	47	44	-3	-6%	39	36	-3	-8%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	2	8	6	300%	3	7	4	133%	3	7	4	133%
	Birch Rd to A49 SB	9	21	12	133%	9	21	12	133%	9	21	12	133%
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	582	610	28	5%	608	640	32	5%	668	749	81	12%
	A49 SB	838	842	4	0%	843	851	8	1%	874	928	54	6%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	105	117	12	11%	135	158	23	17%	175	174	-1	-1%
	A49 SB	593	585	-8	-1%	553	548	-5	-1%	554	549	-5	-1%
	A49 SB to Cromwell Ave	140	149	9	6%	154	157	3	2%	172	178	6	3%
	Cromwell Ave to A49 NB	138	137	-1	-1%	139	139	0	0%	158	162	4	3%
	Cromwell Ave to Sandy Ln West	154	169	15	10%	165	179	14	8%	183	206	23	13%
	Cromwell Ave to A49 SB	266	276	10	4%	302	318	16	5%	348	366	18	5%
	Cromwell Ave to Cromwell Ave (U-turn)	15	15	0	0%	17	17	0	0%	19	19	0	0%
	A49 NB	347	346	-1	0%	360	368	8	2%	382	390	8	2%
	A49 NB to Sandy Ln West	28	38	10	36%	34	51	17	50%	46	58	12	26%
	A49 NB to Cromwell Ave	138	141	3	2%	147	151	4	3%	158	166	8	5%
	Sandy Ln West to A49 NB	90	112	22	24%	99	123	24	24%	111	158	47	42%
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-
	Sandy Ln West to A49 SB	11	4	-7	-64%	3	5	2	67%	3	5	2	67%
	Sandy Ln West to Cromwell Ave	126	176	50	40%	131	168	37	28%	139	199	60	43%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	454	465	11	2%	479	502	23	5%	508	528	20	4%
	A49 NB to Junction NINE Retail	27	31	4	15%	27	29	2	7%	28	32	4	14%
	Junction NINE Retail to A49 SB	41	41	0	0%	42	39	-3	-7%	37	35	-2	-5%
	Junction NINE Retail to A49 NB	47	49	2	4%	52	54	2	4%	62	67	5	8%
	A49 SB	798	806	8	1%	795	804	9	1%	837	839	2	0%
	A49 SB to Junction NINE Retail	69	70	1	1%	70	71	1	1%	75	80	5	7%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	121	126	5	4%	119	118	-1	-1%	124	126	2	2%
	A49 SB to Long Lane	85	77	-8	-9%	52	51	-1	-2%	43	39	-4	-9%
	A49 SB	646	681	35	5%	685	688	3	0%	720	722	2	0%
	A49 NB to Hawleys Lane	76	79	3	4%	86	87	1	1%	96	97	1	1%
	A49 NB to Long Lane	55	59	4	7%	57	61	4	7%	59	62	3	5%
	A49 NB	344	349	5	1%	355	375	20	6%	383	395	12	3%
	Long Lane to A49 SB	129	217	88	68%	137	202	65	47%	175	230	55	31%
	Long Lane to Hawleys Lane	127	133	6	5%	135	140	5	4%	134	132	-2	-1%
	Long Lane to A49 NB	55	64	9	16%	58	66	8	14%	61	64	3	5%
	Hawleys Lane to Long Lane	41	42	1	2%	43	41	-2	-5%	42	44	2	5%
	Hawleys Lane to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
	Hawleys Lane to A49 NB	75	78	3	4%	87	87	0	0%	94	98	4	4%

PM VOLUME COMPARISON – 16:00-17:00 (WARM-UP PERIOD)

Junction/ Movement		16:00-17:00											
		2022				2027				2032			
		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference	
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	83	82	-1	-1%	86	91	5	6%	92	96	4	4%
	A49 NB	873	875	2	0%	902	918	16	2%	934	930	-4	0%
	A49 NB to Winwick Link Rd	856	850	-6	-1%	902	893	-9	-1%	941	933	-8	-1%
	Winwick Park Ave to A49 NB	3	24	21	700%	3	3	0	0%	4	25	21	525%
	Winwick Park Ave to Winwick Link Rd	4	6	2	50%	4	5	1	25%	5	7	2	40%
	Winwick Park Ave to A49 SB	10	22	12	120%	9	10	1	11%	12	24	12	100%
	A49 SB to Winwick Link Rd	9	18	9	100%	63	64	1	2%	63	64	1	2%
	A49 SB	498	497	-1	0%	538	552	14	3%	565	572	7	1%
	A49 SB to Winwick Park Ave	13	11	-2	-15%	12	14	2	17%	13	14	1	8%
	Winwick Link Rd to A49 SB	860	859	-1	0%	899	902	3	0%	951	952	1	0%
	Winwick Link Rd to Winwick Park Ave	17	18	1	6%	17	17	0	0%	19	19	0	0%
	Winwick Link Rd to A49 NB	0	2	2	-	40	41	1	3%	40	42	2	5%
A49 Newton Road/ Delph Lane	A49 NB	1565	1546	-19	-1%	1600	1612	12	1%	1662	1652	-10	-1%
	A49 NB to Delp Ln	101	105	4	4%	104	102	-2	-2%	111	109	-2	-2%
	A49 SB	1264	1267	3	0%	1340	1361	21	2%	1418	1436	18	1%
	A49 SB to Delph Ln	92	97	5	5%	94	92	-2	-2%	94	92	-2	-2%
	Delph Ln to A49 NB	275	293	18	7%	322	325	3	1%	342	341	-1	0%
	Delph Ln to A49 SB	150	159	9	6%	167	167	0	0%	174	173	-1	-1%
M62 Junction 9	A49 NB to M62 WB	365	380	15	4%	381	396	15	4%	409	419	10	2%
	A49 NB	1003	977	-26	-3%	990	1006	16	2%	1031	1031	0	0%
	A49 NB to M62 EB	219	223	4	2%	235	229	-6	-3%	242	244	2	1%
	A49 NB to A49 SB (U-Turn)	4	14	10	250%	4	17	13	325%	4	15	11	275%
	M62 EB to A49 NB	616	630	14	2%	658	660	2	0%	690	684	-6	-1%
	M62 EB to A49 SB	472	541	69	15%	505	509	4	1%	532	614	82	15%
	A49 SB to M62 EB	150	145	-5	-3%	163	163	0	0%	170	165	-5	-3%
	A49 SB	886	916	30	3%	924	944	20	2%	977	1005	28	3%
	A49 SB to M62 WB	342	332	-10	-3%	382	380	-2	-1%	403	389	-14	-3%
	M62 WB to A49 SB	273	303	30	11%	286	295	9	3%	302	328	26	9%
	M62 WB to A49 NB	58	57	-1	-2%	62	62	0	0%	65	63	-2	-3%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	19	36	17	89%	22	35	13	59%	22	37	15	68%
	Birch Rd to A49 SB	0	12	12	-	0	12	12	-	0	12	12	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	1624	1632	8	0%	1649	1686	37	2%	1728	1750	22	1%
	A49 SB	1610	1743	133	8%	1689	1731	42	2%	1785	1920	135	8%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	267	418	151	57%	288	338	50	17%	331	473	142	43%
	A49 SB	947	942	-5	-1%	975	962	-13	-1%	1005	982	-23	-2%
	A49 SB to Cromwell Ave	349	331	-18	-5%	360	354	-6	-2%	376	356	-20	-5%
	Cromwell Ave to A49 NB	243	233	-10	-4%	221	216	-5	-2%	225	219	-6	-3%
	Cromwell Ave to Sandy Ln West	213	273	60	28%	239	283	44	18%	249	316	67	27%
	Cromwell Ave to A49 SB	403	381	-22	-5%	407	405	-2	0%	428	411	-17	-4%
	Cromwell Ave to Cromwell Ave (U-turn)	37	34	-3	-8%	38	38	0	0%	39	38	-1	-3%
	A49 NB	1218	1202	-16	-1%	1247	1236	-11	-1%	1295	1305	10	1%
	A49 NB to Sandy Ln West	74	104	30	41%	119	172	53	45%	146	170	24	16%
	A49 NB to Cromwell Ave	499	506	7	1%	517	516	-1	0%	534	532	-2	0%
	Sandy Ln West to A49 NB	189	227	38	20%	211	269	58	27%	239	260	21	9%
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-
	Sandy Ln West to A49 SB	42	67	25	60%	41	61	20	49%	47	61	14	30%
	Sandy Ln West to Cromwell Ave	317	409	92	29%	350	424	74	21%	380	444	64	17%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	1680	1696	16	1%	1743	1779	36	2%	1804	1816	12	1%
	A49 NB to Junction NINE Retail	90	92	2	2%	98	100	2	2%	101	106	5	5%
	Junction NINE Retail to A49 SB	208	233	25	12%	197	222	25	13%	189	205	16	8%
	Junction NINE Retail to A49 NB	143	147	4	3%	173	177	4	2%	203	224	21	10%
	A49 SB	1270	1252	-18	-1%	1286	1276	-10	-1%	1334	1295	-39	-3%
	A49 SB to Junction NINE Retail	94	108	14	15%	97	117	20	21%	110	120	10	9%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	113	108	-5	-4%	110	107	-3	-3%	116	112	-4	-3%
	A49 SB to Long Lane	172	199	27	16%	166	195	29	17%	162	162	0	0%
	A49 SB	1107	1118	11	1%	1116	1127	11	1%	1175	1154	-21	-2%
	A49 NB to Hawleys Lane	83	86	3	4%	86	87	1	1%	90	93	3	3%
	A49 NB to Long Lane	193	215	22	11%	199	239	40	20%	207	227	20	10%
	A49 NB	1395	1423	28	2%	1456	1491	35	2%	1503	1513	10	1%
	Long Lane to A49 SB	208	324	116	56%	236	352	116	49%	268	359	91	34%
	Long Lane to Hawleys Lane	163	170	7	4%	164	172	8	5%	170	174	4	2%
	Long Lane to A49 NB	100	98	-2	-2%	103	102	-1	-1%	99	98	-1	-1%
	Hawleys Lane to Long Lane	116	128	12	10%	120	126	6	5%	124	129	5	4%
	Hawleys Lane to A49 SB	15	16	1	7%	16	16	0	0%	17	18	1	6%
	Hawleys Lane to A49 NB	290	290	0	0%	302	318	16	5%	333	342	9	3%

PM VOLUME COMPARISON – 17:00-18:00 (PEAK PERIOD)

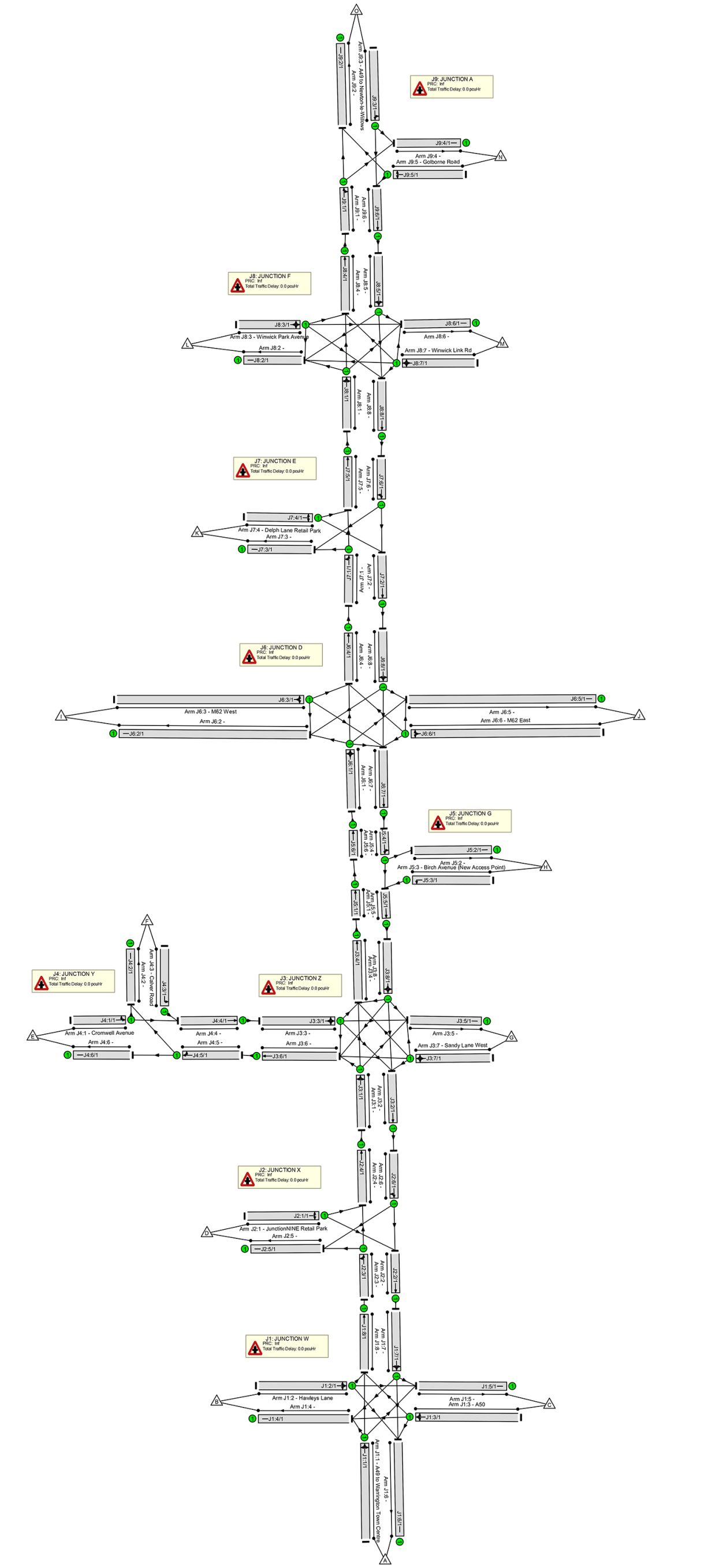
		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference	
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	86	88	2	2%	89	95	6	7%	99	103	4	4%
	A49 NB	911	932	21	2%	939	971	32	3%	978	976	-2	0%
	A49 NB to Winwick Link Rd	915	924	9	1%	955	952	-3	0%	999	992	-7	-1%
	Winwick Park Ave to A49 NB	4	40	36	900%	4	4	0	0%	5	41	36	720%
	Winwick Park Ave to Winwick Link Rd	7	8	1	14%	8	7	-1	-13%	9	9	0	0%
	Winwick Park Ave to A49 SB	15	31	16	107%	15	15	0	0%	17	32	15	88%
	A49 SB to Winwick Link Rd	12	21	9	75%	74	79	5	7%	73	74	1	1%
	A49 SB	555	562	7	1%	581	605	24	4%	605	556	-49	-8%
	A49 SB to Winwick Park Ave	14	15	1	7%	14	15	1	7%	15	15	0	0%
	Winwick Link Rd to A49 SB	892	892	0	0%	913	910	-3	0%	929	774	-155	-17%
	Winwick Link Rd to Winwick Park Ave	19	18	-1	-5%	18	18	0	0%	18	16	-2	-11%
	Winwick Link Rd to A49 NB	0	2	2	-	40	41	1	3%	40	38	-2	-5%
A49 Newton Road/ Delph Lane	A49 NB	1598	1612	14	1%	1629	1672	43	3%	1715	1728	13	1%
	A49 NB to Delp Ln	110	117	7	6%	119	120	1	1%	122	124	2	2%
	A49 SB	1366	1385	19	1%	1396	1417	21	2%	1432	1247	-185	-13%
	A49 SB to Delph Ln	96	103	7	7%	100	100	0	0%	102	87	-15	-15%
	Delph Ln to A49 NB	313	327	14	4%	350	342	-8	-2%	352	342	-10	-3%
	Delph Ln to A49 SB	193	202	9	5%	209	206	-3	-1%	213	209	-4	-2%
M62 Junction 9	A49 NB to M62 WB	401	431	30	7%	432	448	16	4%	451	475	24	5%
	A49 NB	1078	1078	0	0%	1086	1112	26	2%	1133	1148	15	1%
	A49 NB to M62 EB	241	245	4	2%	254	251	-3	-1%	271	275	4	1%
	A49 NB to A49 SB (U-Turn)	4	15	11	275%	3	21	18	600%	2	16	14	700%
	M62 EB to A49 NB	562	581	19	3%	602	612	10	2%	634	631	-3	0%
	M62 EB to A49 SB	455	524	69	15%	476	493	17	4%	499	586	87	17%
	A49 SB to M62 EB	178	175	-3	-2%	178	179	1	1%	183	157	-26	-14%
	A49 SB	989	1026	37	4%	991	1016	25	3%	1012	920	-92	-9%
	A49 SB to M62 WB	394	384	-10	-3%	424	423	-1	0%	437	367	-70	-16%
	M62 WB to A49 SB	287	318	31	11%	304	315	11	4%	323	354	31	10%
	M62 WB to A49 NB	64	62	-2	-3%	65	65	0	0%	70	67	-3	-4%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	19	37	18	95%	20	39	19	95%	20	37	17	85%
	Birch Rd to A49 SB	0	11	11	-	0	11	11	-	0	11	11	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	1719	1761	42	2%	1769	1826	57	3%	1848	1915	67	4%
	A49 SB	1719	1856	137	8%	1731	1805	74	4%	1798	1836	38	2%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	281	447	166	59%	291	355	64	22%	328	466	138	42%
	A49 SB	1021	1030	9	1%	1018	1036	18	2%	1039	1003	-36	-3%
	A49 SB to Cromwell Ave	382	364	-18	-5%	372	374	2	1%	382	359	-23	-6%
	Cromwell Ave to A49 NB	261	253	-8	-3%	239	231	-8	-3%	239	230	-9	-4%
	Cromwell Ave to Sandy Ln West	223	294	71	32%	252	305	53	21%	270	349	79	29%
	Cromwell Ave to A49 SB	448	425	-23	-5%	449	451	2	0%	477	463	-14	-3%
	Cromwell Ave to Cromwell Ave (U-turn)	42	39	-3	-7%	44	42	-2	-5%	44	44	0	0%
	A49 NB	1254	1228	-26	-2%	1283	1273	-10	-1%	1337	1374	37	3%
	A49 NB to Sandy Ln West	78	111	33	42%	123	178	55	45%	155	182	27	17%
	A49 NB to Cromwell Ave	493	501	8	2%	518	515	-3	-1%	536	550	14	3%
	Sandy Ln West to A49 NB	201	267	66	33%	234	305	71	30%	265	300	35	13%
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-
	Sandy Ln West to A49 SB	47	74	27	57%	43	65	22	51%	46	61	15	33%
	Sandy Ln West to Cromwell Ave	340	459	119	35%	383	482	99	26%	420	496	76	18%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	1661	1690	29	2%	1738	1793	55	3%	1815	1885	70	4%
	A49 NB to Junction NINE Retail	88	94	6	7%	98	101	3	3%	109	119	10	9%
	Junction NINE Retail to A49 SB	196	223	27	14%	187	203	16	9%	178	195	17	10%
	Junction NINE Retail to A49 NB	147	149	2	1%	177	175	-2	-1%	205	224	19	9%
	A49 SB	1376	1405	29	2%	1383	1412	29	2%	1431	1403	-28	-2%
	A49 SB to Junction NINE Retail	108	126	18	17%	108	132	24	22%	121	127	6	5%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	128	127	-1	-1%	124	126	2	2%	130	125	-5	-4%
	A49 SB to Long Lane	195	218	23	12%	186	212	26	14%	168	176	8	5%
	A49 SB	1291	1282	-9	-1%	1307	1276	-31	-2%	1318	1299	-19	-1%
	A49 NB to Hawleys Lane	78	79	1	1%	83	83	0	0%	87	92	5	6%
	A49 NB to Long Lane	185	211	26	14%	192	238	46	24%	203	235	32	16%
	A49 NB	1357	1375	18	1%	1425	1442	17	1%	1466	1545	79	5%
	Long Lane to A49 SB	212	345	133	63%	239	372	133	56%	280	372	92	33%
	Long Lane to Hawleys Lane	175	186	11	6%	180	189	9	5%	186	190	4	2%
	Long Lane to A49 NB	105	105	0	0%	105	109	4	4%	108	100	-8	-7%
	Hawleys Lane to Long Lane	127	141	14	11%	133	142	9	7%	140	143	3	2%
	Hawleys Lane to A49 SB	18	19	1	6%	18	19	1	6%	20	20	0	0%
	Hawleys Lane to A49 NB	299	300	1	0%	311	328	17	5%	343	348	5	1%

PM VOLUME COMPARISON – 18:00-18:30 (COOL-DOWN PERIOD)

18:00-18:30															
		2022				2027				2032					
Junction/ Movement		Vehicle Flow		Difference		Vehicle Flow		Difference		Vehicle Flow		Difference			
Junction	Approach	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%	DoMin	DoSom	Actual	%		
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	40	42	2	5%	43	44	1	2%	47	46	-1	-2%		
	A49 NB	393	399	6	2%	412	442	30	7%	447	464	17	4%		
	A49 NB to Winwick Link Rd	406	404	-2	0%	426	439	13	3%	453	471	18	4%		
	Winwick Park Ave to A49 NB	3	22	19	633%	3	3	0	0%	4	21	17	425%		
	Winwick Park Ave to Winwick Link Rd	4	6	2	50%	5	5	0	0%	4	6	2	50%		
	Winwick Park Ave to A49 SB	8	16	8	100%	8	9	1	13%	9	20	11	122%		
	A49 SB to Winwick Link Rd	4	8	4	100%	31	35	4	13%	31	35	4	13%		
	A49 SB	270	272	2	1%	302	313	11	4%	320	331	11	3%		
	A49 SB to Winwick Park Ave	8	7	-1	-13%	7	8	1	14%	8	8	0	0%		
	Winwick Link Rd to A49 SB	401	400	-1	0%	442	448	6	1%	482	412	-70	-15%		
	Winwick Link Rd to Winwick Park Ave	9	8	-1	-11%	9	9	0	0%	9	7	-2	-22%		
	Winwick Link Rd to A49 NB	0	1	1	-	19	20	1	5%	20	19	-1	-5%		
A49 Newton Road/ Delph Lane	A49 NB	707	700	-7	-1%	715	747	32	4%	755	791	36	5%		
	A49 NB to Delp Ln	49	49	0	0%	52	55	3	6%	55	57	2	4%		
	A49 SB	635	637	2	0%	714	729	15	2%	773	727	-46	-6%		
	A49 SB to Delph Ln	49	52	3	6%	52	52	0	0%	51	49	-2	-4%		
	Delph Ln to A49 NB	137	145	8	6%	167	182	15	9%	198	203	5	3%		
	Delph Ln to A49 SB	75	80	5	7%	89	91	2	2%	98	101	3	3%		
M62 Junction 9	A49 NB to M62 WB	175	183	8	5%	177	193	16	9%	195	213	18	9%		
	A49 NB	468	458	-10	-2%	455	486	31	7%	484	522	38	8%		
	A49 NB to M62 EB	104	108	4	4%	111	114	3	3%	118	125	7	6%		
	A49 NB to A49 SB (U-Turn)	2	9	7	350%	1	11	10	1000%	2	10	8	400%		
	M62 EB to A49 NB	252	258	6	2%	270	275	5	2%	282	286	4	1%		
	M62 EB to A49 SB	196	227	31	16%	215	215	0	0%	232	280	48	21%		
	A49 SB to M62 EB	70	69	-1	-1%	82	83	1	1%	88	77	-11	-13%		
	A49 SB	460	475	15	3%	511	525	14	3%	553	538	-15	-3%		
	A49 SB to M62 WB	179	174	-5	-3%	220	220	0	0%	237	216	-21	-9%		
	M62 WB to A49 SB	131	147	16	12%	137	141	4	3%	143	163	20	14%		
	M62 WB to A49 NB	33	33	0	0%	35	36	1	3%	36	37	1	3%		
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	8	20	12	150%	11	21	10	91%	12	24	12	100%		
	Birch Rd to A49 SB	0	6	6	-	0	6	6	-	0	6	6	-		
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-		
	A49 NB	750	765	15	2%	745	806	61	8%	802	868	66	8%		
	A49 SB	780	849	69	9%	880	895	15	2%	938	991	53	6%		
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	133	208	75	56%	161	187	26	16%	182	250	68	37%		
	A49 SB	505	499	-6	-1%	564	554	-10	-2%	567	545	-22	-4%		
	A49 SB to Cromwell Ave	181	174	-7	-4%	208	203	-5	-2%	211	201	-10	-5%		
	Cromwell Ave to A49 NB	122	117	-5	-4%	100	98	-2	-2%	114	112	-2	-2%		
	Cromwell Ave to Sandy Ln West	107	138	31	29%	109	136	27	25%	123	163	40	33%		
	Cromwell Ave to A49 SB	211	196	-15	-7%	193	195	2	1%	222	222	0	0%		
	Cromwell Ave to Cromwell Ave (U-turn)	21	20	-1	-5%	23	22	-1	-4%	24	22	-2	-8%		
	A49 NB	526	542	16	3%	556	563	7	1%	581	611	30	5%		
	A49 NB to Sandy Ln West	34	52	18	53%	56	83	27	48%	67	84	17	25%		
	A49 NB to Cromwell Ave	209	210	1	0%	214	223	9	4%	224	231	7	3%		
	Sandy Ln West to A49 NB	94	115	21	22%	99	151	52	53%	111	152	41	37%		
	Sandy Ln West to Sandy Ln (U-turn	0	0	0	-	0	0	0	-	0	0	0	-		
	Sandy Ln West to A49 SB	19	31	12	63%	18	30	12	67%	19	31	12	63%		
	Sandy Ln West to Cromwell Ave	147	192	45	31%	152	229	77	51%	170	252	82	48%		
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	732	743	11	2%	765	792	27	4%	803	833	30	4%		
	A49 NB to Junction NINE Retail	39	43	4	10%	45	45	0	0%	45	51	6	13%		
	Junction NINE Retail to A49 SB	72	89	17	24%	69	88	19	28%	68	74	6	9%		
	Junction NINE Retail to A49 NB	48	50	2	4%	56	63	7	13%	65	79	14	22%		
	A49 SB	718	677	-41	-6%	739	721	-18	-2%	761	728	-33	-4%		
	A49 SB to Junction NINE Retail	50	61	11	22%	57	68	11	19%	62	67	5	8%		
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	68	66	-2	-3%	67	67	0	0%	70	65	-5	-7%		
	A49 SB to Long Lane	103	109	6	6%	93	110	17	18%	93	93	0	0%		
	A49 SB	620	626	6	1%	636	646	10	2%	665	652	-13	-2%		
	A49 NB to Hawleys Lane	34	35	1	3%	34	35	1	3%	37	39	2	5%		
	A49 NB to Long Lane	80	93	13	16%	86	107	21	24%	88	102	14	16%		
	A49 NB	567	590	23	4%	596	624	28	5%	624	651	27	4%		
	Long Lane to A49 SB	103	173	70	68%	115	197	82	71%	140	203	63	45%		
	Long Lane to Hawleys Lane	86	86	0	0%	85	93	8	9%	89	97	8	9%		
	Long Lane to A49 NB	51	54	3	6%	53	59	6	11%	57	60	3	5%		
	Hawleys Lane to Long Lane	62	68	6	10%	66	70	4	6%	67	72	5	7%		
	Hawleys Lane to A49 SB	8	8	0	0%	9	9	0	0%	9	10	1	11%		
	Hawleys Lane to A49 NB	141	139	-2	-1%	149	157	8	5%	162	172	10	6%		

APPENDIX B:

LinSig NETWORK DIAGRAM


J9: JUNCTION A
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J8: JUNCTION F
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J7: JUNCTION E
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J6: JUNCTION D
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J5: JUNCTION G
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J4: JUNCTION Y
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J3: JUNCTION Z
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J2: JUNCTION X
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
J1: JUNCTION W
PRC: Inf
Total Traffic Delay: 0.0 pcuHr
Arm J9:3 - A49 to Newton-le-Willows
Arm J9:2 -
Arm J9:4 -
Arm J9:5 - Golborne Road
Arm J9:6 -
Arm J9:1 -
Arm J8:5 -
Arm J8:4 -
Arm J8:3 - Winwick Park Avenue
Arm J8:2 -
Arm J8:6 -
Arm J8:7 - Winwick Link Rd
Arm J8:1 -
Arm J8:8 -
Arm J7:5 -
Arm J7:6 -
Arm J7:4 - Delph Lane Retail Park
Arm J7:3 -
Arm J7:1 -
Arm J7:2 -
Arm J6:8 -
Arm J6:4 -
Arm J6:3 - M62 West
Arm J6:2 -
Arm J6:5 -
Arm J6:6 - M62 East
Arm J6:1 -
Arm J6:7 -
Arm J5:4 -
Arm J5:6 -
Arm J5:2 -
Arm J5:3 - Birch Avenue (New Access Point)
Arm J5:1 -
Arm J5:5 -
Arm J4:3 - Calver Road
Arm J4:2 -
Arm J4:1 - Cromwell Avenue
Arm J4:6 -
Arm J4:4 -
Arm J4:5 -
Arm J3:4 -
Arm J3:3 -
Arm J3:6 -
Arm J3:5 -
Arm J3:7 - Sandy Lane West
Arm J3:1 -
Arm J3:2 -
Arm J2:4 -
Arm J2:6 -
Arm J2:1 - JunctionNINE Retail Park
Arm J2:5 -
Arm J2:3 -
Arm J2:2 -
Arm J1:8 -
Arm J1:7 -
Arm J1:2 - Hawleys Lane
Arm J1:4 -
Arm J1:5 -
Arm J1:3 - A50
Arm J1:1 - A49 to Warrington Town Centre
Arm J1:6 -

APPENDIX C:

QUEUE DATA

AM AVERAGE QUEUE LENGTH COMPARISON

		07:00-08:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	11	12	1	9%	15	20	5	32%	16	25	8	51%
	A49 NB	11	12	1	9%	15	20	5	32%	16	25	8	51%
	A49 NB to Winwick Link Rd	11	12	1	9%	15	20	5	32%	16	25	8	51%
	Winwick Park Ave to A49 NB	3	4	0	2%	4	4	0	0%	4	4	0	-1%
	Winwick Park Ave to Winwick Link Rd	3	4	0	2%	4	4	0	0%	4	4	0	-1%
	Winwick Park Ave to A49 SB	3	4	0	2%	4	4	0	0%	4	4	0	-1%
	A49 SB to Winwick Link Rd	37	38	2	4%	31	33	3	9%	29	33	4	15%
	A49 SB	37	38	2	4%	31	33	3	9%	29	33	4	15%
	A49 SB to Winwick Park Ave	37	38	2	4%	31	33	3	9%	29	33	4	15%
	Winwick Link Rd to A49 SB	2	2	0	-2%	3	3	0	-2%	3	3	0	-3%
	Winwick Link Rd to Winwick Park Ave	3	3	0	-1%	4	4	0	-2%	4	4	0	-3%
	Winwick Link Rd to A49 NB	3	3	0	-1%	4	4	0	-2%	4	4	0	-3%
A49 Newton Road/ Delph Lane	A49 NB	19	17	-2	-12%	16	18	3	17%	17	20	3	19%
	A49 NB to Delp Ln	20	16	-3	-17%	15	18	3	17%	16	19	3	19%
	A49 SB	30	30	0	-2%	30	30	0	1%	34	37	3	10%
	A49 SB to Delph Ln	11	15	4	35%	16	13	-3	-16%	15	18	3	20%
	Delph Ln to A49 NB	6	7	1	10%	7	7	0	1%	7	7	0	4%
	Delph Ln to A49 SB	8	7	0	-2%	7	7	0	1%	8	8	0	3%
M62 Junction 9	A49 NB to M62 WB	9	10	2	19%	10	11	1	9%	11	13	1	11%
	A49 NB	9	10	2	19%	10	11	1	9%	11	13	1	11%
	A49 NB to M62 EB	9	10	2	19%	10	11	1	9%	11	13	1	11%
	A49 NB to A49 SB (U-Turn)	9	10	2	19%	10	11	1	9%	11	13	1	11%
	M62 EB to A49 NB	37	27	-10	-28%	13	33	19	145%	15	36	22	145%
	M62 EB to A49 SB	37	27	-10	-28%	13	33	19	145%	15	36	22	145%
	A49 SB to M62 EB	27	30	4	15%	32	35	2	6%	37	36	-1	-2%
	A49 SB	27	30	4	15%	32	35	2	6%	37	36	-1	-2%
	A49 SB to M62 WB	27	30	4	15%	32	35	2	6%	37	36	-1	-2%
	M62 WB to A49 SB	15	15	0	2%	17	16	0	-1%	18	18	0	1%
	M62 WB to A49 NB	15	15	0	2%	17	16	0	-1%	18	18	0	1%

		07:00-08:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	0	0	0	-	0	0	0	-	0	0	0	-
	A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	87	45	-42	-48%	41	47	6	14%	57	83	26	46%
	A49 SB	87	45	-42	-48%	41	47	6	14%	57	83	26	46%
	A49 SB to Cromwell Ave	87	45	-42	-48%	41	47	6	14%	57	83	26	46%
	Cromwell Ave to A49 NB	9	10	1	14%	10	11	1	12%	12	14	2	14%
	Cromwell Ave to Sandy Ln West	13	15	2	16%	15	18	2	14%	19	22	3	16%
	Cromwell Ave to A49 SB	13	15	2	16%	15	18	2	14%	19	22	3	16%
	Cromwell Ave to Cromwell Ave (U-turn)	13	15	2	16%	15	18	2	14%	19	22	3	16%
	A49 NB	2	3	1	29%	2	3	1	25%	4	5	1	25%
	A49 NB to Sandy Ln West	2	3	1	29%	2	3	1	25%	4	5	1	25%
	A49 NB to Cromwell Ave	2	3	1	29%	2	3	1	25%	4	5	1	25%
	Sandy Ln West to A49 NB	9	29	19	209%	7	29	22	293%	8	44	36	429%
	Sandy Ln West to Sandy Ln (U-turn	9	29	19	209%	7	29	22	293%	8	44	36	429%
	Sandy Ln West to A49 SB	9	29	19	209%	7	29	22	293%	8	44	36	429%
	Sandy Ln West to Cromwell Ave	9	29	19	209%	7	29	22	293%	8	44	36	429%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	2	13	11	483%	11	13	1	12%	16	20	3	21%
	A49 NB to Junction NINE Retail	2	13	11	483%	11	13	1	12%	16	20	3	21%
	Junction NINE Retail to A49 SB	6	6	0	-1%	6	6	0	-4%	6	6	0	-2%
	Junction NINE Retail to A49 NB	4	5	0	5%	5	5	0	1%	5	6	0	8%
	A49 SB	7	8	1	11%	8	8	0	1%	12	10	-2	-16%
	A49 SB to Junction NINE Retail	9	9	0	0%	10	11	1	8%	11	11	0	3%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	24	28	4	16%	32	27	-5	-17%	33	36	3	8%
	A49 SB to Long Lane	1	0	-1	-96%	0	0	0	1600%	0	0	0	-100%
	A49 SB	65	69	4	6%	71	65	-6	-8%	78	81	4	5%
	A49 NB to Hawleys Lane	13	9	-4	-29%	11	11	0	1%	13	15	2	17%
	A49 NB to Long Lane	6	6	0	1%	6	6	0	1%	6	6	1	13%
	A49 NB	13	9	-4	-29%	11	11	0	1%	13	15	2	17%
	Long Lane to A49 SB	9	22	13	134%	9	18	9	106%	14	41	27	191%
	Long Lane to Hawleys Lane	42	30	-12	-28%	23	31	8	38%	26	45	19	73%
	Long Lane to A49 NB	42	30	-12	-28%	23	31	8	38%	26	45	19	73%
	Hawleys Lane to Long Lane	7	6	0	-2%	6	7	0	1%	7	7	0	6%
	Hawleys Lane to A49 SB	7	6	0	-2%	6	7	0	1%	7	7	0	6%
	Hawleys Lane to A49 NB	3	4	1	28%	5	5	0	-3%	5	5	1	11%

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	17	29	12	71%	115	146	31	27%	170	205	35	21%
	A49 NB	17	29	12	71%	115	146	31	27%	170	205	35	21%
	A49 NB to Winwick Link Rd	17	29	12	71%	115	146	31	27%	170	205	35	21%
	Winwick Park Ave to A49 NB	4	4	0	1%	5	5	0	-1%	5	5	0	-4%
	Winwick Park Ave to Winwick Link Rd	4	4	0	1%	5	5	0	-1%	5	5	0	-4%
	Winwick Park Ave to A49 SB	4	4	0	1%	5	5	0	-1%	5	5	0	-4%
	A49 SB to Winwick Link Rd	75	58	-17	-23%	39	43	4	10%	40	57	17	42%
	A49 SB	75	58	-17	-23%	39	43	4	10%	40	57	17	42%
	A49 SB to Winwick Park Ave	75	58	-17	-23%	39	43	4	10%	40	57	17	42%
	Winwick Link Rd to A49 SB	2	2	0	-1%	3	3	0	-1%	4	4	0	11%
	Winwick Link Rd to Winwick Park Ave	3	3	0	-2%	5	5	0	-2%	6	9	3	43%
	Winwick Link Rd to A49 NB	3	3	0	-2%	5	5	0	-2%	6	9	3	43%
A49 Newton Road/ Delph Lane	A49 NB	21	20	-1	-3%	55	93	38	69%	106	209	104	98%
	A49 NB to Delp Ln	21	20	-1	-5%	56	94	38	69%	107	213	105	98%
	A49 SB	72	71	-2	-2%	68	63	-5	-8%	171	245	74	43%
	A49 SB to Delph Ln	13	24	12	92%	19	18	-1	-3%	47	119	72	153%
	Delph Ln to A49 NB	6	7	1	19%	7	6	0	-1%	8	8	0	2%
	Delph Ln to A49 SB	7	8	0	6%	7	7	0	2%	8	8	0	3%
M62 Junction 9	A49 NB to M62 WB	15	17	2	13%	16	22	6	38%	43	86	43	100%
	A49 NB	15	17	2	13%	16	22	6	38%	43	86	43	100%
	A49 NB to M62 EB	15	17	2	13%	16	22	6	38%	43	86	43	100%
	A49 NB to A49 SB (U-Turn)	15	17	2	13%	16	22	6	38%	43	86	43	100%
	M62 EB to A49 NB	25	22	-3	-13%	29	92	63	217%	87	249	162	187%
	M62 EB to A49 SB	25	22	-3	-13%	29	92	63	217%	87	249	162	187%
	A49 SB to M62 EB	49	53	4	8%	57	54	-3	-5%	64	63	-1	-2%
	A49 SB	49	53	4	8%	57	54	-3	-5%	64	63	-1	-2%
	A49 SB to M62 WB	49	53	4	8%	57	54	-3	-5%	64	63	-1	-2%
	M62 WB to A49 SB	15	14	-1	-5%	14	14	0	-1%	15	16	1	5%
	M62 WB to A49 NB	15	14	-1	-5%	14	14	0	-1%	15	16	1	5%

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-100%	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	18	77	59	330%
	A49 NB	0	0	0	-	0	0	0	-	18	77	59	330%
	A49 SB	8	0	-8	-100%	0	0	0	-	0	9	9	2168%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	251	109	-142	-57%	90	75	-15	-16%	194	216	22	11%
	A49 SB	251	109	-142	-57%	90	75	-15	-16%	194	216	22	11%
	A49 SB to Cromwell Ave	251	109	-142	-57%	90	75	-15	-16%	194	216	22	11%
	Cromwell Ave to A49 NB	12	15	3	28%	15	21	6	41%	34	39	5	16%
	Cromwell Ave to Sandy Ln West	19	24	5	28%	24	35	11	47%	53	62	9	18%
	Cromwell Ave to A49 SB	19	24	5	28%	24	35	11	47%	53	62	9	18%
	Cromwell Ave to Cromwell Ave (U-turn)	19	24	5	28%	24	35	11	47%	53	62	9	18%
	A49 NB	4	4	0	4%	5	6	1	15%	8	11	3	39%
	A49 NB to Sandy Ln West	4	4	0	4%	5	6	1	15%	8	11	3	39%
	A49 NB to Cromwell Ave	4	4	0	4%	5	6	1	15%	8	11	3	39%
	Sandy Ln West to A49 NB	18	85	68	384%	14	96	82	605%	17	205	188	1092%
	Sandy Ln West to Sandy Ln (U-turn	18	85	68	384%	14	96	82	605%	17	205	188	1092%
	Sandy Ln West to A49 SB	18	85	68	384%	14	96	82	605%	17	205	188	1092%
	Sandy Ln West to Cromwell Ave	18	85	68	384%	14	96	82	605%	17	205	188	1092%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	16	14	-2	-10%	18	20	2	10%	21	25	4	18%
	A49 NB to Junction NINE Retail	16	14	-2	-10%	18	20	2	10%	21	25	4	18%
	Junction NINE Retail to A49 SB	6	6	0	4%	6	6	0	-1%	6	6	0	0%
	Junction NINE Retail to A49 NB	5	5	0	6%	5	5	0	4%	5	6	0	6%
	A49 SB	31	49	18	58%	41	66	25	60%	152	139	-13	-9%
	A49 SB to Junction NINE Retail	12	13	0	3%	13	14	1	9%	14	14	0	-1%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	68	74	6	10%	77	69	-9	-11%	80	85	4	6%
	A49 SB to Long Lane	1	1	0	36%	0	0	0	-	0	0	0	-
	A49 SB	155	183	27	18%	176	161	-15	-9%	194	185	-8	-4%
	A49 NB to Hawleys Lane	19	17	-2	-12%	18	21	3	18%	24	29	5	19%
	A49 NB to Long Lane	9	12	3	27%	13	16	4	28%	14	19	5	38%
	A49 NB	19	17	-2	-12%	18	21	3	18%	24	29	5	19%
	Long Lane to A49 SB	18	59	41	221%	20	53	33	169%	28	106	77	272%
	Long Lane to Hawleys Lane	76	75	-2	-2%	42	74	32	75%	55	103	48	88%
	Long Lane to A49 NB	76	75	-2	-2%	42	74	32	75%	55	103	48	88%
	Hawleys Lane to Long Lane	9	9	0	3%	9	8	0	-2%	10	10	0	3%
	Hawleys Lane to A49 SB	9	9	0	3%	9	8	0	-2%	10	10	0	3%
	Hawleys Lane to A49 NB	5	6	1	16%	6	6	0	8%	7	7	0	5%

		09:00-09:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	11	12	1	10%	43	63	20	46%	94	174	80	85%
	A49 NB	11	12	1	10%	43	63	20	46%	94	174	80	85%
	A49 NB to Winwick Link Rd	11	12	1	10%	43	63	20	46%	94	174	80	85%
	Winwick Park Ave to A49 NB	3	3	0	1%	3	3	0	1%	4	4	0	4%
	Winwick Park Ave to Winwick Link Rd	3	3	0	1%	3	3	0	1%	4	4	0	4%
	Winwick Park Ave to A49 SB	3	3	0	1%	3	3	0	1%	4	4	0	4%
	A49 SB to Winwick Link Rd	67	65	-1	-2%	36	41	5	13%	28	32	5	17%
	A49 SB	67	65	-1	-2%	36	41	5	13%	28	32	5	17%
	A49 SB to Winwick Park Ave	67	65	-1	-2%	36	41	5	13%	28	32	5	17%
	Winwick Link Rd to A49 SB	2	2	0	-4%	3	3	0	4%	3	3	0	1%
	Winwick Link Rd to Winwick Park Ave	3	2	0	-5%	4	4	0	2%	4	6	2	48%
	Winwick Link Rd to A49 NB	3	2	0	-5%	4	4	0	2%	4	6	2	48%
A49 Newton Road/ Delph Lane	A49 NB	20	18	-2	-9%	27	41	14	52%	57	178	121	212%
	A49 NB to Delp Ln	20	18	-2	-12%	27	41	14	53%	58	182	124	214%
	A49 SB	51	38	-13	-26%	33	33	0	-1%	39	92	53	134%
	A49 SB to Delph Ln	13	17	4	31%	17	18	1	5%	19	47	28	146%
	Delph Ln to A49 NB	6	7	1	11%	7	7	0	5%	8	8	0	1%
	Delph Ln to A49 SB	8	8	0	4%	7	7	0	3%	8	9	1	9%
M62 Junction 9	A49 NB to M62 WB	10	11	1	15%	12	13	1	10%	17	50	33	193%
	A49 NB	10	11	1	15%	12	13	1	10%	17	50	33	193%
	A49 NB to M62 EB	10	11	1	15%	12	13	1	10%	17	50	33	193%
	A49 NB to A49 SB (U-Turn)	10	11	1	15%	12	13	1	10%	17	50	33	193%
	M62 EB to A49 NB	20	18	-2	-12%	43	68	25	59%	107	406	300	281%
	M62 EB to A49 SB	20	18	-2	-12%	43	68	25	59%	107	406	300	281%
	A49 SB to M62 EB	37	42	5	13%	42	40	-2	-4%	43	43	1	1%
	A49 SB	37	42	5	13%	42	40	-2	-4%	43	43	1	1%
	A49 SB to M62 WB	37	42	5	13%	42	40	-2	-4%	43	43	1	1%
	M62 WB to A49 SB	13	13	-1	-4%	13	13	0	-1%	14	14	0	-1%
	M62 WB to A49 NB	13	13	-1	-4%	13	13	0	-1%	14	14	0	-1%

		09:00-09:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	1	45	44	3680%
	A49 NB	0	0	0	-	0	0	0	-	1	45	44	3680%
	A49 SB	15	0	-15	-100%	0	0	0	-	6	1	-5	-90%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	190	43	-148	-77%	32	53	21	67%	181	178	-3	-2%
	A49 SB	190	43	-148	-77%	32	53	21	67%	181	178	-3	-2%
	A49 SB to Cromwell Ave	190	43	-148	-77%	32	53	21	67%	181	178	-3	-2%
	Cromwell Ave to A49 NB	10	10	1	6%	10	12	2	21%	27	32	5	20%
	Cromwell Ave to Sandy Ln West	15	16	1	8%	16	20	3	21%	43	50	8	18%
	Cromwell Ave to A49 SB	15	16	1	8%	16	20	3	21%	43	50	8	18%
	Cromwell Ave to Cromwell Ave (U-turn)	15	16	1	8%	16	20	3	21%	43	50	8	18%
	A49 NB	2	2	-1	-28%	2	2	0	-8%	3	6	3	106%
	A49 NB to Sandy Ln West	2	2	-1	-28%	2	2	0	-8%	3	6	3	106%
	A49 NB to Cromwell Ave	2	2	-1	-28%	2	2	0	-8%	3	6	3	106%
	Sandy Ln West to A49 NB	12	43	31	261%	9	60	51	556%	12	247	235	1919%
	Sandy Ln West to Sandy Ln (U-turn	12	43	31	261%	9	60	51	556%	12	247	235	1919%
	Sandy Ln West to A49 SB	12	43	31	261%	9	60	51	556%	12	247	235	1919%
	Sandy Ln West to Cromwell Ave	12	43	31	261%	9	60	51	556%	12	247	235	1919%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	24	14	-10	-42%	15	12	-3	-21%	14	20	6	45%
	A49 NB to Junction NINE Retail	24	14	-10	-42%	15	12	-3	-21%	14	20	6	45%
	Junction NINE Retail to A49 SB	6	6	0	-1%	6	6	0	-1%	6	6	0	-1%
	Junction NINE Retail to A49 NB	4	5	0	8%	5	5	0	1%	5	6	0	4%
	A49 SB	105	44	-60	-58%	18	40	22	120%	228	172	-56	-24%
	A49 SB to Junction NINE Retail	12	13	1	9%	12	12	0	4%	13	14	1	7%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	71	72	1	2%	53	53	0	1%	85	80	-5	-6%
	A49 SB to Long Lane	0	0	0	-	0	0	0	-	0	0	0	-
	A49 SB	180	139	-40	-22%	112	128	16	14%	201	193	-8	-4%
	A49 NB to Hawleys Lane	11	8	-3	-24%	9	12	3	41%	10	12	1	14%
	A49 NB to Long Lane	5	8	2	42%	7	11	3	42%	7	9	2	28%
	A49 NB	11	8	-3	-24%	9	12	3	41%	10	12	1	14%
	Long Lane to A49 SB	16	90	74	476%	16	80	64	407%	35	124	88	250%
	Long Lane to Hawleys Lane	69	100	31	44%	44	100	56	127%	64	126	61	95%
	Long Lane to A49 NB	69	100	31	44%	44	100	56	127%	64	126	61	95%
	Hawleys Lane to Long Lane	8	9	1	10%	8	8	0	-5%	8	9	1	9%
	Hawleys Lane to A49 SB	8	9	1	10%	8	8	0	-5%	8	9	1	9%
	Hawleys Lane to A49 NB	3	4	1	30%	5	5	0	-3%	5	5	1	14%

PM AVERAGE QUEUE LENGTH COMPARISON

		16:00-17:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	11	11	0	1%	12	12	0	-2%	13	13	0	2%
	A49 NB	11	11	0	1%	12	12	0	-2%	13	13	0	2%
	A49 NB to Winwick Link Rd	11	11	0	1%	12	12	0	-2%	13	13	0	2%
	Winwick Park Ave to A49 NB	1	2	1	172%	1	1	0	4%	1	2	1	148%
	Winwick Park Ave to Winwick Link Rd	1	2	1	172%	1	1	0	4%	1	2	1	148%
	Winwick Park Ave to A49 SB	1	2	1	172%	1	1	0	4%	1	2	1	148%
	A49 SB to Winwick Link Rd	16	16	1	3%	18	19	1	6%	19	20	0	2%
	A49 SB	16	16	1	3%	18	19	1	6%	19	20	0	2%
	A49 SB to Winwick Park Ave	16	16	1	3%	18	19	1	6%	19	20	0	2%
	Winwick Link Rd to A49 SB	1	1	0	5%	2	2	0	2%	2	2	0	0%
	Winwick Link Rd to Winwick Park Ave	2	2	0	6%	4	4	0	3%	4	4	0	3%
	Winwick Link Rd to A49 NB	2	2	0	6%	4	4	0	3%	4	4	0	3%
A49 Newton Road/ Delph Lane	A49 NB	38	48	10	27%	40	76	36	91%	59	74	15	25%
	A49 NB to Delp Ln	37	48	11	29%	39	76	37	94%	59	74	14	24%
	A49 SB	16	16	0	2%	18	20	2	9%	22	28	7	30%
	A49 SB to Delph Ln	10	14	3	32%	11	10	-1	-11%	14	11	-3	-19%
	Delph Ln to A49 NB	17	20	3	16%	23	24	1	4%	27	29	2	6%
	Delph Ln to A49 SB	15	18	2	16%	21	22	1	6%	24	26	2	8%
M62 Junction 9	A49 NB to M62 WB	11	12	2	14%	11	14	3	28%	12	17	5	38%
	A49 NB	11	12	2	14%	11	14	3	28%	12	17	5	38%
	A49 NB to M62 EB	11	12	2	14%	11	14	3	28%	12	17	5	38%
	A49 NB to A49 SB (U-Turn)	11	12	2	14%	11	14	3	28%	12	17	5	38%
	M62 EB to A49 NB	20	58	38	184%	24	64	40	164%	27	92	65	242%
	M62 EB to A49 SB	20	58	38	184%	24	64	40	164%	27	92	65	242%
	A49 SB to M62 EB	26	25	-1	-2%	32	31	0	-1%	34	42	8	24%
	A49 SB	26	25	-1	-2%	32	31	0	-1%	34	42	8	24%
	A49 SB to M62 WB	26	25	-1	-2%	32	31	0	-1%	34	42	8	24%
	M62 WB to A49 SB	7	9	2	25%	8	9	2	20%	8	11	3	37%
	M62 WB to A49 NB	7	9	2	25%	8	9	2	20%	8	11	3	37%

16:00-17:00															
		2022				2027				2032					
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference			
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%		
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-		
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-		
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	1	1	-		
	A49 NB	0	0	0	-	0	0	0	-	0	1	1	-		
	A49 SB	0	0	0	-	0	1	1	-	0	28	27	91567%		
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	30	45	15	52%	73	90	16	22%	91	175	84	93%		
	A49 SB	30	45	15	52%	73	90	16	22%	91	175	84	93%		
	A49 SB to Cromwell Ave	30	45	15	52%	73	90	16	22%	91	175	84	93%		
	Cromwell Ave to A49 NB	7	8	1	21%	8	9	1	18%	8	10	2	22%		
	Cromwell Ave to Sandy Ln West	10	13	3	26%	12	15	3	21%	13	16	4	28%		
	Cromwell Ave to A49 SB	10	13	3	26%	12	15	3	21%	13	16	4	28%		
	Cromwell Ave to Cromwell Ave (U-turn)	10	13	3	26%	12	15	3	21%	13	16	4	28%		
	A49 NB	19	22	3	15%	25	42	16	65%	49	59	10	19%		
	A49 NB to Sandy Ln West	19	22	3	15%	25	42	16	65%	49	59	10	19%		
	A49 NB to Cromwell Ave	19	22	3	15%	25	42	16	65%	49	59	10	19%		
	Sandy Ln West to A49 NB	41	86	45	108%	15	143	128	859%	21	171	150	712%		
	Sandy Ln West to Sandy Ln (U-turn	41	86	45	108%	15	143	128	859%	21	171	150	712%		
	Sandy Ln West to A49 SB	41	86	45	108%	15	143	128	859%	21	171	150	712%		
	Sandy Ln West to Cromwell Ave	41	86	45	108%	15	143	128	859%	21	171	150	712%		
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	21	35	14	67%	24	45	21	85%	43	43	0	0%		
	A49 NB to Junction NINE Retail	21	35	14	67%	24	45	21	85%	43	43	0	0%		
	Junction NINE Retail to A49 SB	21	30	9	45%	18	32	14	80%	19	25	6	34%		
	Junction NINE Retail to A49 NB	18	27	9	50%	16	30	14	89%	17	23	6	35%		
	A49 SB	35	15	-20	-58%	61	44	-18	-29%	35	48	13	36%		
	A49 SB to Junction NINE Retail	10	12	3	29%	10	17	6	62%	12	15	3	28%		
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	21	16	-5	-24%	25	20	-5	-20%	21	20	-1	-5%		
	A49 SB to Long Lane	17	1	-17	-97%	14	3	-10	-75%	2	1	-2	-76%		
	A49 SB	167	124	-42	-25%	169	148	-20	-12%	154	164	10	7%		
	A49 NB to Hawleys Lane	35	40	5	15%	51	59	7	14%	63	139	76	120%		
	A49 NB to Long Lane	10	11	2	16%	10	16	5	54%	12	42	30	260%		
	A49 NB	35	40	5	15%	51	59	7	14%	63	139	76	120%		
	Long Lane to A49 SB	9	24	15	166%	11	28	17	146%	15	36	21	137%		
	Long Lane to Hawleys Lane	46	50	3	8%	47	54	6	13%	50	65	15	30%		
	Long Lane to A49 NB	46	50	3	8%	47	54	6	13%	50	65	15	30%		
	Hawleys Lane to Long Lane	26	28	2	7%	30	32	2	8%	30	38	8	28%		
	Hawleys Lane to A49 SB	26	28	2	7%	30	32	2	8%	30	38	8	28%		
	Hawleys Lane to A49 NB	19	20	1	5%	22	25	3	14%	24	30	5	23%		

		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	11	12	1	6%	12	12	0	1%	13	14	2	13%
	A49 NB	11	12	1	6%	12	12	0	1%	13	14	2	13%
	A49 NB to Winwick Link Rd	11	12	1	6%	12	12	0	1%	13	14	2	13%
	Winwick Park Ave to A49 NB	1	3	2	190%	1	1	0	-1%	1	4	2	161%
	Winwick Park Ave to Winwick Link Rd	1	3	2	190%	1	1	0	-1%	1	4	2	161%
	Winwick Park Ave to A49 SB	1	3	2	190%	1	1	0	-1%	1	4	2	161%
	A49 SB to Winwick Link Rd	18	19	1	7%	20	22	2	10%	22	50	28	125%
	A49 SB	18	19	1	7%	20	22	2	10%	22	50	28	125%
	A49 SB to Winwick Park Ave	18	19	1	7%	20	22	2	10%	22	50	28	125%
	Winwick Link Rd to A49 SB	1	1	0	-3%	10	19	9	97%	23	104	81	358%
	Winwick Link Rd to Winwick Park Ave	2	2	0	4%	12	11	-1	-7%	10	65	55	545%
	Winwick Link Rd to A49 NB	2	2	0	4%	12	11	-1	-7%	10	65	55	545%
A49 Newton Road/ Delph Lane	A49 NB	36	45	9	25%	45	56	11	24%	45	94	49	109%
	A49 NB to Delp Ln	36	45	9	25%	45	56	11	25%	45	94	49	108%
	A49 SB	20	21	1	6%	81	82	1	1%	159	292	133	83%
	A49 SB to Delph Ln	9	11	3	32%	10	10	0	2%	10	48	39	402%
	Delph Ln to A49 NB	56	61	5	9%	86	96	10	11%	103	103	-1	-1%
	Delph Ln to A49 SB	53	57	5	9%	83	93	10	12%	100	99	-1	-1%
M62 Junction 9	A49 NB to M62 WB	12	13	1	11%	12	16	4	33%	16	31	15	97%
	A49 NB	12	13	1	11%	12	16	4	33%	16	31	15	97%
	A49 NB to M62 EB	12	13	1	11%	12	16	4	33%	16	31	15	97%
	A49 NB to A49 SB (U-Turn)	12	13	1	11%	12	16	4	33%	16	31	15	97%
	M62 EB to A49 NB	17	49	31	180%	22	46	24	108%	21	84	63	298%
	M62 EB to A49 SB	17	49	31	180%	22	46	24	108%	21	84	63	298%
	A49 SB to M62 EB	37	37	0	0%	65	59	-6	-9%	72	96	24	33%
	A49 SB	37	37	0	0%	65	59	-6	-9%	72	96	24	33%
	A49 SB to M62 WB	37	37	0	0%	65	59	-6	-9%	72	96	24	33%
	M62 WB to A49 SB	8	10	2	31%	13	14	1	7%	19	39	20	103%
	M62 WB to A49 NB	8	10	2	31%	13	14	1	7%	19	39	20	103%

17:00-18:00

Junction/ Movement		2022				2027				2032			
		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	4	4	42400%
	A49 NB	0	0	0	-	0	0	0	-	0	4	4	42400%
	A49 SB	2	1	-1	-41%	102	96	-6	-5%	156	280	123	79%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	121	103	-17	-14%	314	325	11	3%	353	429	76	22%
	A49 SB	121	103	-17	-14%	314	325	11	3%	353	429	76	22%
	A49 SB to Cromwell Ave	121	103	-17	-14%	314	325	11	3%	353	429	76	22%
	Cromwell Ave to A49 NB	8	9	1	16%	8	10	1	17%	9	11	2	28%
	Cromwell Ave to Sandy Ln West	12	14	2	20%	13	16	3	22%	14	19	5	34%
	Cromwell Ave to A49 SB	12	14	2	20%	13	16	3	22%	14	19	5	34%
	Cromwell Ave to Cromwell Ave (U-turn)	12	14	2	20%	13	16	3	22%	14	19	5	34%
	A49 NB	17	15	-2	-9%	23	31	8	33%	52	72	20	40%
	A49 NB to Sandy Ln West	17	15	-2	-9%	23	31	8	33%	52	72	20	40%
	A49 NB to Cromwell Ave	17	15	-2	-9%	23	31	8	33%	52	72	20	40%
	Sandy Ln West to A49 NB	113	127	14	12%	17	254	236	1371%	30	258	228	758%
	Sandy Ln West to Sandy Ln (U-turn	113	127	14	12%	17	254	236	1371%	30	258	228	758%
	Sandy Ln West to A49 SB	113	127	14	12%	17	254	236	1371%	30	258	228	758%
	Sandy Ln West to Cromwell Ave	113	127	14	12%	17	254	236	1371%	30	258	228	758%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	28	27	0	-1%	32	37	5	15%	37	46	9	25%
	A49 NB to Junction NINE Retail	28	27	0	-1%	32	37	5	15%	37	46	9	25%
	Junction NINE Retail to A49 SB	37	52	15	41%	30	71	40	133%	29	43	14	49%
	Junction NINE Retail to A49 NB	35	50	15	44%	28	68	40	144%	27	41	14	51%
	A49 SB	196	74	-122	-62%	204	173	-31	-15%	184	200	16	9%
	A49 SB to Junction NINE Retail	12	14	2	17%	11	20	9	83%	13	14	1	8%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	35	27	-8	-24%	33	28	-5	-14%	30	22	-9	-29%
	A49 SB to Long Lane	76	23	-53	-70%	68	41	-27	-40%	22	0	-22	-100%
	A49 SB	248	227	-22	-9%	252	247	-5	-2%	248	249	1	0%
	A49 NB to Hawleys Lane	27	27	-1	-3%	43	45	2	5%	44	239	195	448%
	A49 NB to Long Lane	8	10	1	12%	9	14	4	45%	9	142	133	1421%
	A49 NB	27	27	-1	-3%	43	45	2	5%	44	239	195	448%
	Long Lane to A49 SB	9	34	25	287%	11	44	33	299%	22	50	28	124%
	Long Lane to Hawleys Lane	30	74	43	142%	33	82	49	150%	80	94	14	18%
	Long Lane to A49 NB	30	74	43	142%	33	82	49	150%	80	94	14	18%
	Hawleys Lane to Long Lane	52	51	-2	-3%	58	54	-4	-6%	51	64	13	27%
	Hawleys Lane to A49 SB	52	51	-2	-3%	58	54	-4	-6%	51	64	13	27%
	Hawleys Lane to A49 NB	37	39	2	5%	40	41	1	3%	41	49	8	20%

		18:00-18:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	10	9	-1	-8%	11	11	0	3%	11	22	11	95%
	A49 NB	10	9	-1	-8%	11	11	0	3%	11	22	11	95%
	A49 NB to Winwick Link Rd	10	9	-1	-8%	11	11	0	3%	11	22	11	95%
	Winwick Park Ave to A49 NB	1	4	2	190%	1	1	0	16%	1	4	2	172%
	Winwick Park Ave to Winwick Link Rd	1	4	2	190%	1	1	0	16%	1	4	2	172%
	Winwick Park Ave to A49 SB	1	4	2	190%	1	1	0	16%	1	4	2	172%
	A49 SB to Winwick Link Rd	17	18	1	8%	19	21	2	10%	20	78	58	289%
	A49 SB	17	18	1	8%	19	21	2	10%	20	78	58	289%
	A49 SB to Winwick Park Ave	17	18	1	8%	19	21	2	10%	20	78	58	289%
	Winwick Link Rd to A49 SB	1	1	0	6%	33	21	-12	-37%	103	268	164	159%
	Winwick Link Rd to Winwick Park Ave	2	2	0	6%	40	27	-14	-34%	58	223	165	284%
	Winwick Link Rd to A49 NB	2	2	0	6%	40	27	-14	-34%	58	223	165	284%
A49 Newton Road/ Delph Lane	A49 NB	23	27	4	18%	24	32	9	36%	27	47	20	73%
	A49 NB to Delp Ln	21	26	5	22%	23	32	9	40%	27	47	20	76%
	A49 SB	17	17	0	2%	130	131	2	1%	267	443	176	66%
	A49 SB to Delph Ln	8	10	2	27%	9	44	35	375%	40	159	119	301%
	Delph Ln to A49 NB	16	19	2	13%	36	67	31	87%	104	119	16	15%
	Delph Ln to A49 SB	15	17	2	15%	33	64	31	93%	100	116	16	16%
M62 Junction 9	A49 NB to M62 WB	9	9	1	8%	9	11	2	17%	10	15	5	48%
	A49 NB	9	9	1	8%	9	11	2	17%	10	15	5	48%
	A49 NB to M62 EB	9	9	1	8%	9	11	2	17%	10	15	5	48%
	A49 NB to A49 SB (U-Turn)	9	9	1	8%	9	11	2	17%	10	15	5	48%
	M62 EB to A49 NB	13	26	13	101%	14	26	12	89%	15	45	30	203%
	M62 EB to A49 SB	13	26	13	101%	14	26	12	89%	15	45	30	203%
	A49 SB to M62 EB	30	28	-2	-6%	57	56	-1	-2%	73	93	20	28%
	A49 SB	30	28	-2	-6%	57	56	-1	-2%	73	93	20	28%
	A49 SB to M62 WB	30	28	-2	-6%	57	56	-1	-2%	73	93	20	28%
	M62 WB to A49 SB	7	11	4	51%	10	14	4	34%	11	23	12	103%
	M62 WB to A49 NB	7	11	4	51%	10	14	4	34%	11	23	12	103%

18:00-18:30															
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	0	0	-
	A49 NB	0	0	0	-	0	0	0	-	0	0	0	-
	A49 SB	3	4	2	54%	85	81	-4	-4%	142	216	74	52%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	131	66	-64	-49%	363	344	-19	-5%	440	436	-4	-1%
	A49 SB	131	66	-64	-49%	363	344	-19	-5%	440	436	-4	-1%
	A49 SB to Cromwell Ave	131	66	-64	-49%	363	344	-19	-5%	440	436	-4	-1%
	Cromwell Ave to A49 NB	7	8	1	18%	7	8	1	18%	8	10	2	20%
	Cromwell Ave to Sandy Ln West	11	13	2	21%	11	13	2	21%	13	16	3	24%
	Cromwell Ave to A49 SB	11	13	2	21%	11	13	2	21%	13	16	3	24%
	Cromwell Ave to Cromwell Ave (U-turn)	11	13	2	21%	11	13	2	21%	13	16	3	24%
	A49 NB	5	5	0	7%	7	8	1	8%	8	12	4	56%
	A49 NB to Sandy Ln West	5	5	0	7%	7	8	1	8%	8	12	4	56%
	A49 NB to Cromwell Ave	5	5	0	7%	7	8	1	8%	8	12	4	56%
	Sandy Ln West to A49 NB	45	47	3	6%	9	167	159	1796%	12	251	240	2068%
	Sandy Ln West to Sandy Ln (U-turn	45	47	3	6%	9	167	159	1796%	12	251	240	2068%
	Sandy Ln West to A49 SB	45	47	3	6%	9	167	159	1796%	12	251	240	2068%
	Sandy Ln West to Cromwell Ave	45	47	3	6%	9	167	159	1796%	12	251	240	2068%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	25	23	-2	-8%	29	21	-7	-26%	25	26	2	8%
	A49 NB to Junction NINE Retail	25	23	-2	-8%	29	21	-7	-26%	25	26	2	8%
	Junction NINE Retail to A49 SB	13	19	6	43%	11	34	23	212%	13	18	5	38%
	Junction NINE Retail to A49 NB	10	16	6	61%	9	31	23	254%	11	16	5	47%
	A49 SB	163	42	-121	-74%	154	133	-21	-14%	136	123	-13	-9%
	A49 SB to Junction NINE Retail	10	13	3	32%	12	19	6	51%	14	18	5	35%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	44	28	-16	-36%	25	26	0	0%	27	22	-4	-15%
	A49 SB to Long Lane	81	19	-61	-76%	79	48	-31	-39%	15	0	-15	-100%
	A49 SB	230	146	-84	-37%	242	235	-7	-3%	234	231	-3	-1%
	A49 NB to Hawleys Lane	18	13	-5	-27%	21	15	-6	-28%	17	19	3	16%
	A49 NB to Long Lane	9	8	-1	-9%	9	10	1	11%	8	9	1	9%
	A49 NB	18	13	-5	-27%	21	15	-6	-28%	17	19	3	16%
	Long Lane to A49 SB	9	27	18	205%	10	41	32	327%	16	52	36	221%
	Long Lane to Hawleys Lane	23	45	22	94%	21	66	45	213%	53	83	30	56%
	Long Lane to A49 NB	23	45	22	94%	21	66	45	213%	53	83	30	56%
	Hawleys Lane to Long Lane	32	35	3	8%	37	46	9	24%	36	51	16	44%
	Hawleys Lane to A49 SB	32	35	3	8%	37	46	9	24%	36	51	16	44%
	Hawleys Lane to A49 NB	22	23	1	7%	25	38	13	51%	28	43	16	56%

AM MAXIMUM QUEUE LENGTH COMPARISON

		07:00-08:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	94	110	16	17%	119	140	21	17%	130	171	41	31%
	A49 NB	94	110	16	17%	119	140	21	17%	130	171	41	31%
	A49 NB to Winwick Link Rd	94	110	16	17%	119	140	21	17%	130	171	41	31%
	Winwick Park Ave to A49 NB	28	30	2	8%	33	33	0	0%	31	31	-1	-2%
	Winwick Park Ave to Winwick Link Rd	28	30	2	8%	33	33	0	0%	31	31	-1	-2%
	Winwick Park Ave to A49 SB	28	30	2	8%	33	33	0	0%	31	31	-1	-2%
	A49 SB to Winwick Link Rd	175	176	2	1%	146	156	9	6%	134	151	18	13%
	A49 SB	175	176	2	1%	146	156	9	6%	134	151	18	13%
	A49 SB to Winwick Park Ave	175	176	2	1%	146	156	9	6%	134	151	18	13%
	Winwick Link Rd to A49 SB	32	33	1	2%	36	33	-3	-9%	37	36	0	-1%
	Winwick Link Rd to Winwick Park Ave	32	33	1	2%	40	33	-7	-17%	41	38	-3	-8%
	Winwick Link Rd to A49 NB	32	33	1	2%	40	33	-7	-17%	41	38	-3	-8%
A49 Newton Road/ Delph Lane	A49 NB	128	146	18	14%	129	150	21	16%	140	163	23	16%
	A49 NB to Delp Ln	132	151	18	14%	134	155	21	16%	145	167	23	16%
	A49 SB	196	230	33	17%	238	228	-10	-4%	256	273	16	6%
	A49 SB to Delph Ln	73	110	37	51%	109	82	-27	-25%	86	123	37	43%
	Delph Ln to A49 NB	46	45	0	-1%	42	43	2	4%	46	52	6	12%
	Delph Ln to A49 SB	43	42	-1	-2%	38	40	2	4%	42	48	6	13%
M62 Junction 9	A49 NB to M62 WB	83	112	29	35%	97	102	5	5%	102	106	4	4%
	A49 NB	83	112	29	35%	97	102	5	5%	102	106	4	4%
	A49 NB to M62 EB	83	112	29	35%	97	102	5	5%	102	106	4	4%
	A49 NB to A49 SB (U-Turn)	83	112	29	35%	97	102	5	5%	102	106	4	4%
	M62 EB to A49 NB	141	195	53	38%	90	213	123	137%	93	218	125	134%
	M62 EB to A49 SB	141	195	53	38%	90	213	123	137%	93	218	125	134%
	A49 SB to M62 EB	154	161	6	4%	161	165	4	2%	165	166	0	0%
	A49 SB	154	161	6	4%	161	165	4	2%	165	166	0	0%
	A49 SB to M62 WB	154	161	6	4%	161	165	4	2%	165	166	0	0%
	M62 WB to A49 SB	93	97	4	5%	93	95	2	2%	102	105	3	3%
	M62 WB to A49 NB	93	97	4	5%	93	95	2	2%	102	105	3	3%

		07:00-08:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	0	3	3	-
	A49 NB	0	0	0	-	0	0	0	-	0	3	3	-
	A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	347	259	-88	-25%	267	278	12	4%	322	385	63	20%
	A49 SB	347	259	-88	-25%	267	278	12	4%	322	385	63	20%
	A49 SB to Cromwell Ave	347	259	-88	-25%	267	278	12	4%	322	385	63	20%
	Cromwell Ave to A49 NB	82	98	16	19%	89	101	12	14%	122	124	2	2%
	Cromwell Ave to Sandy Ln West	82	98	16	19%	89	101	12	14%	122	124	2	2%
	Cromwell Ave to A49 SB	82	98	16	19%	89	101	12	14%	122	124	2	2%
	Cromwell Ave to Cromwell Ave (U-turn)	82	98	16	19%	89	101	12	14%	122	124	2	2%
	A49 NB	76	98	22	29%	73	95	23	31%	105	117	12	11%
	A49 NB to Sandy Ln West	76	98	22	29%	73	95	23	31%	105	117	12	11%
	A49 NB to Cromwell Ave	76	98	22	29%	73	95	23	31%	105	117	12	11%
	Sandy Ln West to A49 NB	90	211	121	135%	82	215	133	164%	84	273	190	227%
	Sandy Ln West to Sandy Ln (U-turn	90	211	121	135%	82	215	133	164%	84	273	190	227%
	Sandy Ln West to A49 SB	90	211	121	135%	82	215	133	164%	84	273	190	227%
	Sandy Ln West to Cromwell Ave	90	211	121	135%	82	215	133	164%	84	273	190	227%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	58	138	81	139%	134	140	5	4%	147	160	13	9%
	A49 NB to Junction NINE Retail	58	138	81	139%	134	140	5	4%	147	160	13	9%
	Junction NINE Retail to A49 SB	26	27	1	5%	27	27	0	-1%	28	29	2	5%
	Junction NINE Retail to A49 NB	23	25	1	6%	25	24	0	-1%	25	27	2	7%
	A49 SB	109	111	1	1%	103	113	10	10%	133	120	-13	-10%
	A49 SB to Junction NINE Retail	55	56	1	2%	57	62	5	9%	59	59	0	1%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	237	257	20	9%	254	234	-21	-8%	262	278	16	6%
	A49 SB to Long Lane	86	7	-79	-92%	3	18	16	599%	1	1	-1	-51%
	A49 SB	279	306	28	10%	304	290	-13	-4%	318	320	2	1%
	A49 NB to Hawleys Lane	157	152	-5	-3%	181	176	-4	-2%	176	211	35	20%
	A49 NB to Long Lane	61	62	1	2%	64	67	3	4%	64	68	3	5%
	A49 NB	157	152	-5	-3%	181	176	-4	-2%	176	211	35	20%
	Long Lane to A49 SB	89	153	64	73%	88	142	55	62%	120	154	33	28%
	Long Lane to Hawleys Lane	139	148	9	6%	127	148	21	16%	131	148	18	13%
	Long Lane to A49 NB	139	148	9	6%	127	148	21	16%	131	148	18	13%
	Hawleys Lane to Long Lane	44	45	1	2%	50	50	0	-1%	58	62	4	7%
	Hawleys Lane to A49 SB	44	45	1	2%	50	50	0	-1%	58	62	4	7%
	Hawleys Lane to A49 NB	48	48	0	-1%	53	53	0	0%	54	63	9	16%

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	106	156	50	47%	244	287	44	18%	295	305	11	4%
	A49 NB	106	156	50	47%	244	287	44	18%	295	305	11	4%
	A49 NB to Winwick Link Rd	106	156	50	47%	244	287	44	18%	295	305	11	4%
	Winwick Park Ave to A49 NB	36	37	1	3%	36	36	0	0%	38	37	-2	-4%
	Winwick Park Ave to Winwick Link Rd	36	37	1	3%	36	36	0	0%	38	37	-2	-4%
	Winwick Park Ave to A49 SB	36	37	1	3%	36	36	0	0%	38	37	-2	-4%
	A49 SB to Winwick Link Rd	178	176	-2	-1%	161	161	0	0%	151	160	8	6%
	A49 SB	178	176	-2	-1%	161	161	0	0%	151	160	8	6%
	A49 SB to Winwick Park Ave	178	176	-2	-1%	161	161	0	0%	151	160	8	6%
	Winwick Link Rd to A49 SB	31	29	-2	-5%	41	38	-4	-9%	36	56	20	55%
	Winwick Link Rd to Winwick Park Ave	31	29	-1	-4%	49	38	-11	-22%	107	155	49	46%
	Winwick Link Rd to A49 NB	31	29	-1	-4%	49	38	-11	-22%	107	155	49	46%
A49 Newton Road/ Delph Lane	A49 NB	131	161	30	23%	210	270	60	29%	319	394	75	23%
	A49 NB to Delp Ln	136	166	30	22%	215	264	49	23%	323	398	75	23%
	A49 SB	291	289	-2	-1%	320	269	-50	-16%	399	434	36	9%
	A49 SB to Delph Ln	117	197	81	69%	179	147	-32	-18%	279	379	100	36%
	Delph Ln to A49 NB	46	47	2	3%	43	42	-1	-2%	42	46	4	10%
	Delph Ln to A49 SB	40	42	2	6%	41	39	-2	-4%	40	43	2	6%
M62 Junction 9	A49 NB to M62 WB	124	120	-4	-3%	131	124	-7	-5%	155	204	49	31%
	A49 NB	124	120	-4	-3%	131	124	-7	-5%	155	204	49	31%
	A49 NB to M62 EB	124	120	-4	-3%	131	124	-7	-5%	155	204	49	31%
	A49 NB to A49 SB (U-Turn)	124	120	-4	-3%	131	124	-7	-5%	155	204	49	31%
	M62 EB to A49 NB	98	164	66	67%	146	314	168	115%	316	495	179	57%
	M62 EB to A49 SB	98	164	66	67%	146	314	168	115%	316	495	179	57%
	A49 SB to M62 EB	165	169	4	2%	168	168	0	0%	171	171	0	0%
	A49 SB	165	169	4	2%	168	168	0	0%	171	171	0	0%
	A49 SB to M62 WB	165	169	4	2%	168	168	0	0%	171	171	0	0%
	M62 WB to A49 SB	88	81	-6	-7%	82	80	-2	-3%	86	87	2	2%
	M62 WB to A49 NB	88	81	-6	-7%	82	80	-2	-3%	86	87	2	2%

		08:00-09:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	1	0	-1	-100%	0	0	0	-	0	1	1	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	1	7	6	448%	89	212	123	138%
	A49 NB	0	0	0	-	1	7	6	448%	89	212	123	138%
	A49 SB	76	0	-76	-100%	0	0	0	-	19	65	46	238%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	436	386	-50	-12%	316	332	15	5%	423	442	19	4%
	A49 SB	436	386	-50	-12%	316	332	15	5%	423	442	19	4%
	A49 SB to Cromwell Ave	436	386	-50	-12%	316	332	15	5%	423	442	19	4%
	Cromwell Ave to A49 NB	97	124	28	28%	119	128	10	8%	131	131	1	0%
	Cromwell Ave to Sandy Ln West	97	124	28	28%	119	128	10	8%	131	131	1	0%
	Cromwell Ave to A49 SB	97	124	28	28%	119	128	10	8%	131	131	1	0%
	Cromwell Ave to Cromwell Ave (U-turn)	97	124	28	28%	119	128	10	8%	131	131	1	0%
	A49 NB	85	95	9	11%	105	101	-4	-4%	127	151	24	19%
	A49 NB to Sandy Ln West	85	95	9	11%	105	101	-4	-4%	127	151	24	19%
	A49 NB to Cromwell Ave	85	95	9	11%	105	101	-4	-4%	127	151	24	19%
	Sandy Ln West to A49 NB	115	286	171	148%	110	293	182	165%	123	295	172	140%
	Sandy Ln West to Sandy Ln (U-turn	115	286	171	148%	110	293	182	165%	123	295	172	140%
	Sandy Ln West to A49 SB	115	286	171	148%	110	293	182	165%	123	295	172	140%
	Sandy Ln West to Cromwell Ave	115	286	171	148%	110	293	182	165%	123	295	172	140%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	150	139	-10	-7%	156	163	7	4%	163	173	10	6%
	A49 NB to Junction NINE Retail	150	139	-10	-7%	156	163	7	4%	163	173	10	6%
	Junction NINE Retail to A49 SB	27	28	1	3%	27	27	0	1%	30	33	3	9%
	Junction NINE Retail to A49 NB	25	25	1	3%	25	25	0	1%	28	31	3	10%
	A49 SB	201	241	40	20%	225	224	-1	0%	350	297	-53	-15%
	A49 SB to Junction NINE Retail	61	63	1	2%	64	68	4	6%	69	65	-3	-5%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	316	326	9	3%	320	312	-8	-3%	320	325	5	1%
	A49 SB to Long Lane	38	34	-4	-11%	0	0	0	-	0	0	0	-
	A49 SB	327	334	7	2%	325	325	0	0%	334	329	-5	-1%
	A49 NB to Hawleys Lane	174	176	1	1%	177	211	34	19%	220	235	15	7%
	A49 NB to Long Lane	75	103	28	37%	106	131	25	24%	114	150	36	31%
	A49 NB	174	176	1	1%	177	211	34	19%	220	235	15	7%
	Long Lane to A49 SB	136	164	28	20%	147	175	28	19%	153	185	32	21%
	Long Lane to Hawleys Lane	160	160	-1	0%	150	169	19	13%	152	176	24	16%
	Long Lane to A49 NB	160	160	-1	0%	150	169	19	13%	152	176	24	16%
	Hawleys Lane to Long Lane	66	61	-5	-7%	58	66	9	15%	75	73	-3	-3%
	Hawleys Lane to A49 SB	66	61	-5	-7%	58	66	9	15%	75	73	-3	-3%
	Hawleys Lane to A49 NB	58	54	-5	-8%	53	65	12	23%	75	70	-5	-6%

		09:00-09:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	78	97	19	25%	189	221	32	17%	259	307	48	18%
	A49 NB	78	97	19	25%	189	221	32	17%	259	307	48	18%
	A49 NB to Winwick Link Rd	78	97	19	25%	189	221	32	17%	259	307	48	18%
	Winwick Park Ave to A49 NB	25	25	0	1%	27	27	0	0%	27	27	-1	-2%
	Winwick Park Ave to Winwick Link Rd	25	25	0	1%	27	27	0	0%	27	27	-1	-2%
	Winwick Park Ave to A49 SB	25	25	0	1%	27	27	0	0%	27	27	-1	-2%
	A49 SB to Winwick Link Rd	175	174	-1	0%	142	158	16	11%	100	139	40	40%
	A49 SB	175	174	-1	0%	142	158	16	11%	100	139	40	40%
	A49 SB to Winwick Park Ave	175	174	-1	0%	142	158	16	11%	100	139	40	40%
	Winwick Link Rd to A49 SB	25	26	0	1%	27	28	1	5%	30	31	1	3%
	Winwick Link Rd to Winwick Park Ave	29	26	-3	-11%	27	28	1	5%	31	66	35	115%
	Winwick Link Rd to A49 NB	29	26	-3	-11%	27	28	1	5%	31	66	35	115%
A49 Newton Road/ Delph Lane	A49 NB	135	149	14	10%	149	245	96	65%	259	373	114	44%
	A49 NB to Delp Ln	140	154	14	10%	152	249	97	63%	263	377	114	43%
	A49 SB	245	202	-43	-18%	161	170	9	6%	233	332	99	43%
	A49 SB to Delph Ln	88	73	-15	-17%	84	96	12	14%	100	217	117	117%
	Delph Ln to A49 NB	47	40	-7	-14%	40	40	0	0%	44	49	5	12%
	Delph Ln to A49 SB	44	38	-6	-13%	36	36	0	0%	40	45	5	13%
M62 Junction 9	A49 NB to M62 WB	77	94	17	22%	93	99	6	7%	110	156	46	42%
	A49 NB	77	94	17	22%	93	99	6	7%	110	156	46	42%
	A49 NB to M62 EB	77	94	17	22%	93	99	6	7%	110	156	46	42%
	A49 NB to A49 SB (U-Turn)	77	94	17	22%	93	99	6	7%	110	156	46	42%
	M62 EB to A49 NB	82	135	53	65%	136	232	96	70%	285	506	221	78%
	M62 EB to A49 SB	82	135	53	65%	136	232	96	70%	285	506	221	78%
	A49 SB to M62 EB	157	164	7	5%	159	161	2	1%	164	162	-2	-1%
	A49 SB	157	164	7	5%	159	161	2	1%	164	162	-2	-1%
	A49 SB to M62 WB	157	164	7	5%	159	161	2	1%	164	162	-2	-1%
	M62 WB to A49 SB	64	64	0	1%	72	69	-2	-3%	74	74	0	0%
	M62 WB to A49 NB	64	64	0	1%	72	69	-2	-3%	74	74	0	0%

09:00-09:30															
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	1	0	-1	-100%	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	0	0	-	19	158	138	711%
	A49 NB	0	0	0	-	0	0	0	-	19	158	138	711%
	A49 SB	57	0	-57	-100%	0	0	0	-	42	20	-22	-53%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	349	200	-149	-43%	166	254	88	53%	382	417	35	9%
	A49 SB	349	200	-149	-43%	166	254	88	53%	382	417	35	9%
	A49 SB to Cromwell Ave	349	200	-149	-43%	166	254	88	53%	382	417	35	9%
	Cromwell Ave to A49 NB	77	87	10	13%	87	97	11	12%	123	129	6	5%
	Cromwell Ave to Sandy Ln West	77	87	10	13%	87	97	11	12%	123	129	6	5%
	Cromwell Ave to A49 SB	77	87	10	13%	87	97	11	12%	123	129	6	5%
	Cromwell Ave to Cromwell Ave (U-turn)	77	87	10	13%	87	97	11	12%	123	129	6	5%
	A49 NB	60	59	-1	-2%	59	49	-9	-16%	75	97	22	29%
	A49 NB to Sandy Ln West	60	59	-1	-2%	59	49	-9	-16%	75	97	22	29%
	A49 NB to Cromwell Ave	60	59	-1	-2%	59	49	-9	-16%	75	97	22	29%
	Sandy Ln West to A49 NB	91	209	118	130%	78	254	176	225%	95	293	198	208%
	Sandy Ln West to Sandy Ln (U-turn	91	209	118	130%	78	254	176	225%	95	293	198	208%
	Sandy Ln West to A49 SB	91	209	118	130%	78	254	176	225%	95	293	198	208%
	Sandy Ln West to Cromwell Ave	91	209	118	130%	78	254	176	225%	95	293	198	208%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	129	110	-19	-15%	112	103	-8	-7%	103	125	23	22%
	A49 NB to Junction NINE Retail	129	110	-19	-15%	112	103	-8	-7%	103	125	23	22%
	Junction NINE Retail to A49 SB	25	27	1	5%	25	25	1	3%	27	30	4	14%
	Junction NINE Retail to A49 NB	23	24	1	6%	22	23	1	3%	24	28	4	15%
	A49 SB	249	224	-25	-10%	133	164	31	24%	345	363	18	5%
	A49 SB to Junction NINE Retail	53	56	4	7%	53	57	4	7%	65	58	-7	-10%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	298	298	0	0%	294	261	-33	-11%	315	323	8	3%
	A49 SB to Long Lane	1	1	0	55%	0	0	0	-	0	0	0	-
	A49 SB	315	310	-5	-2%	311	295	-16	-5%	334	328	-6	-2%
	A49 NB to Hawleys Lane	122	103	-19	-16%	120	138	17	14%	125	142	17	14%
	A49 NB to Long Lane	47	60	13	28%	60	80	20	33%	56	81	25	44%
	A49 NB	122	103	-19	-16%	120	138	17	14%	125	142	17	14%
	Long Lane to A49 SB	131	171	40	31%	115	181	66	57%	158	192	34	22%
	Long Lane to Hawleys Lane	166	165	-1	-1%	139	173	34	24%	153	183	30	19%
	Long Lane to A49 NB	166	165	-1	-1%	139	173	34	24%	153	183	30	19%
	Hawleys Lane to Long Lane	48	51	3	6%	48	41	-7	-14%	47	55	8	18%
	Hawleys Lane to A49 SB	48	51	3	6%	48	41	-7	-14%	47	55	8	18%
	Hawleys Lane to A49 NB	35	39	3	9%	46	43	-4	-8%	43	47	4	9%

PM MAXIMUM QUEUE LENGTH COMPARISON

		16:00-17:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	102	98	-4	-4%	127	110	-17	-13%	112	126	13	12%
	A49 NB	102	98	-4	-4%	127	110	-17	-13%	112	126	13	12%
	A49 NB to Winwick Link Rd	102	98	-4	-4%	127	110	-17	-13%	112	126	13	12%
	Winwick Park Ave to A49 NB	10	18	8	74%	10	11	1	5%	10	18	8	73%
	Winwick Park Ave to Winwick Link Rd	10	18	8	74%	10	11	1	5%	10	18	8	73%
	Winwick Park Ave to A49 SB	10	18	8	74%	10	11	1	5%	10	18	8	73%
	A49 SB to Winwick Link Rd	73	90	16	22%	79	96	17	21%	82	94	12	14%
	A49 SB	73	90	16	22%	79	96	17	21%	82	94	12	14%
	A49 SB to Winwick Park Ave	73	90	16	22%	79	96	17	21%	82	94	12	14%
	Winwick Link Rd to A49 SB	27	27	0	-1%	27	28	1	4%	29	29	0	0%
	Winwick Link Rd to Winwick Park Ave	27	27	0	-1%	27	28	1	4%	29	29	0	0%
	Winwick Link Rd to A49 NB	27	27	0	-1%	27	28	1	4%	29	29	0	0%
A49 Newton Road/ Delph Lane	A49 NB	244	290	46	19%	260	365	106	41%	311	328	16	5%
	A49 NB to Delp Ln	248	294	46	19%	264	370	106	40%	316	332	16	5%
	A49 SB	131	140	9	7%	139	162	23	17%	156	188	33	21%
	A49 SB to Delph Ln	60	82	22	37%	66	60	-6	-10%	79	71	-8	-10%
	Delph Ln to A49 NB	89	100	11	12%	108	111	4	4%	127	132	5	4%
	Delph Ln to A49 SB	85	96	11	13%	104	108	4	4%	124	128	5	4%
M62 Junction 9	A49 NB to M62 WB	108	123	14	13%	114	136	21	19%	103	126	23	22%
	A49 NB	108	123	14	13%	114	136	21	19%	103	126	23	22%
	A49 NB to M62 EB	108	123	14	13%	114	136	21	19%	103	126	23	22%
	A49 NB to A49 SB (U-Turn)	108	123	14	13%	114	136	21	19%	103	126	23	22%
	M62 EB to A49 NB	124	265	142	115%	134	268	134	99%	146	318	173	119%
	M62 EB to A49 SB	124	265	142	115%	134	268	134	99%	146	318	173	119%
	A49 SB to M62 EB	154	153	-1	-1%	159	161	1	1%	163	166	2	1%
	A49 SB	154	153	-1	-1%	159	161	1	1%	163	166	2	1%
	A49 SB to M62 WB	154	153	-1	-1%	159	161	1	1%	163	166	2	1%
	M62 WB to A49 SB	50	74	24	48%	52	78	26	49%	53	82	28	53%
	M62 WB to A49 NB	50	74	24	48%	52	78	26	49%	53	82	28	53%

		16:00-17:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	1	6	5	376%	0	18	18	-
	A49 NB	0	0	0	-	1	6	5	376%	0	18	18	-
	A49 SB	0	0	0	-	0	16	16	-	4	239	235	6389%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	180	293	113	63%	330	373	44	13%	337	492	155	46%
	A49 SB	180	293	113	63%	330	373	44	13%	337	492	155	46%
	A49 SB to Cromwell Ave	180	293	113	63%	330	373	44	13%	337	492	155	46%
	Cromwell Ave to A49 NB	65	76	11	17%	72	80	8	12%	69	85	16	23%
	Cromwell Ave to Sandy Ln West	65	76	11	17%	72	80	8	12%	69	85	16	23%
	Cromwell Ave to A49 SB	65	76	11	17%	72	80	8	12%	69	85	16	23%
	Cromwell Ave to Cromwell Ave (U-turn)	65	76	11	17%	72	80	8	12%	69	85	16	23%
	A49 NB	208	212	4	2%	218	247	29	13%	265	270	5	2%
	A49 NB to Sandy Ln West	208	212	4	2%	218	247	29	13%	265	270	5	2%
	A49 NB to Cromwell Ave	208	212	4	2%	218	247	29	13%	265	270	5	2%
	Sandy Ln West to A49 NB	176	292	117	67%	145	294	148	102%	166	296	130	78%
	Sandy Ln West to Sandy Ln (U-turn	176	292	117	67%	145	294	148	102%	166	296	130	78%
	Sandy Ln West to A49 SB	176	292	117	67%	145	294	148	102%	166	296	130	78%
	Sandy Ln West to Cromwell Ave	176	292	117	67%	145	294	148	102%	166	296	130	78%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	225	220	-5	-2%	232	251	19	8%	242	260	18	7%
	A49 NB to Junction NINE Retail	225	220	-5	-2%	232	251	19	8%	242	260	18	7%
	Junction NINE Retail to A49 SB	61	90	29	48%	50	98	47	94%	60	78	17	29%
	Junction NINE Retail to A49 NB	59	88	29	50%	48	95	47	98%	58	75	17	30%
	A49 SB	249	154	-96	-38%	353	255	-98	-28%	247	288	41	17%
	A49 SB to Junction NINE Retail	48	65	16	33%	54	85	31	58%	64	71	7	11%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	137	118	-19	-14%	192	183	-9	-5%	211	160	-51	-24%
	A49 SB to Long Lane	69	35	-34	-50%	82	66	-16	-19%	37	30	-7	-18%
	A49 SB	337	328	-10	-3%	337	335	-2	-1%	333	338	4	1%
	A49 NB to Hawleys Lane	332	346	14	4%	382	413	32	8%	421	504	83	20%
	A49 NB to Long Lane	148	158	10	7%	153	241	88	57%	206	388	182	88%
	A49 NB	332	346	14	4%	382	413	32	8%	421	504	83	20%
	Long Lane to A49 SB	94	151	57	61%	120	154	34	29%	135	153	18	13%
	Long Lane to Hawleys Lane	137	143	6	4%	141	149	8	6%	145	148	4	3%
	Long Lane to A49 NB	137	143	6	4%	141	149	8	6%	145	148	4	3%
	Hawleys Lane to Long Lane	120	124	4	4%	122	126	4	3%	121	126	5	4%
	Hawleys Lane to A49 SB	120	124	4	4%	122	126	4	3%	121	126	5	4%
	Hawleys Lane to A49 NB	120	128	7	6%	126	131	5	4%	127	132	5	4%

		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	97	104	7	7%	117	111	-5	-5%	111	134	23	21%
	A49 NB	97	104	7	7%	117	111	-5	-5%	111	134	23	21%
	A49 NB to Winwick Link Rd	97	104	7	7%	117	111	-5	-5%	111	134	23	21%
	Winwick Park Ave to A49 NB	12	26	14	123%	11	12	2	14%	13	27	14	104%
	Winwick Park Ave to Winwick Link Rd	12	26	14	123%	11	12	2	14%	13	27	14	104%
	Winwick Park Ave to A49 SB	12	26	14	123%	11	12	2	14%	13	27	14	104%
	A49 SB to Winwick Link Rd	78	96	18	23%	81	104	22	27%	96	151	55	57%
	A49 SB	78	96	18	23%	81	104	22	27%	96	151	55	57%
	A49 SB to Winwick Park Ave	78	96	18	23%	81	104	22	27%	96	151	55	57%
	Winwick Link Rd to A49 SB	26	24	-1	-5%	135	143	9	6%	257	458	201	78%
	Winwick Link Rd to Winwick Park Ave	26	24	-1	-5%	151	89	-63	-41%	126	363	237	189%
	Winwick Link Rd to A49 NB	26	24	-1	-5%	151	89	-63	-41%	126	363	237	189%
A49 Newton Road/ Delph Lane	A49 NB	222	302	79	36%	278	324	46	17%	297	373	76	26%
	A49 NB to Delp Ln	227	306	79	35%	283	329	46	16%	301	378	76	25%
	A49 SB	140	148	8	6%	320	305	-16	-5%	429	483	55	13%
	A49 SB to Delph Ln	49	67	18	37%	60	90	31	51%	68	185	117	171%
	Delph Ln to A49 NB	181	183	2	1%	189	188	-2	-1%	188	188	0	0%
	Delph Ln to A49 SB	177	179	2	1%	185	184	-2	-1%	184	184	0	0%
M62 Junction 9	A49 NB to M62 WB	112	117	5	5%	116	135	19	17%	151	160	9	6%
	A49 NB	112	117	5	5%	116	135	19	17%	151	160	9	6%
	A49 NB to M62 EB	112	117	5	5%	116	135	19	17%	151	160	9	6%
	A49 NB to A49 SB (U-Turn)	112	117	5	5%	116	135	19	17%	151	160	9	6%
	M62 EB to A49 NB	104	241	137	132%	127	226	99	78%	120	268	147	123%
	M62 EB to A49 SB	104	241	137	132%	127	226	99	78%	120	268	147	123%
	A49 SB to M62 EB	161	161	-1	0%	171	168	-3	-2%	175	179	4	2%
	A49 SB	161	161	-1	0%	171	168	-3	-2%	175	179	4	2%
	A49 SB to M62 WB	161	161	-1	0%	171	168	-3	-2%	175	179	4	2%
	M62 WB to A49 SB	53	80	27	50%	73	89	16	21%	93	143	50	53%
	M62 WB to A49 NB	53	80	27	50%	73	89	16	21%	93	143	50	53%

		17:00-18:00											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	3	2	-1	-31%	0	5	5	-	3	33	31	1121%
	A49 NB	3	2	-1	-31%	0	5	5	-	3	33	31	1121%
	A49 SB	28	37	9	31%	419	384	-35	-8%	465	507	43	9%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	390	390	0	0%	485	510	25	5%	512	513	1	0%
	A49 SB	390	390	0	0%	485	510	25	5%	512	513	1	0%
	A49 SB to Cromwell Ave	390	390	0	0%	485	510	25	5%	512	513	1	0%
	Cromwell Ave to A49 NB	68	76	9	13%	71	80	9	12%	70	87	18	26%
	Cromwell Ave to Sandy Ln West	68	76	9	13%	71	80	9	12%	70	87	18	26%
	Cromwell Ave to A49 SB	68	76	9	13%	71	80	9	12%	70	87	18	26%
	Cromwell Ave to Cromwell Ave (U-turn)	68	76	9	13%	71	80	9	12%	70	87	18	26%
	A49 NB	192	177	-15	-8%	221	230	9	4%	261	261	0	0%
	A49 NB to Sandy Ln West	192	177	-15	-8%	221	230	9	4%	261	261	0	0%
	A49 NB to Cromwell Ave	192	177	-15	-8%	221	230	9	4%	261	261	0	0%
	Sandy Ln West to A49 NB	262	292	31	12%	142	293	151	106%	178	293	114	64%
	Sandy Ln West to Sandy Ln (U-turn	262	292	31	12%	142	293	151	106%	178	293	114	64%
	Sandy Ln West to A49 SB	262	292	31	12%	142	293	151	106%	178	293	114	64%
	Sandy Ln West to Cromwell Ave	262	292	31	12%	142	293	151	106%	178	293	114	64%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	225	210	-15	-7%	232	238	5	2%	244	255	12	5%
	A49 NB to Junction NINE Retail	225	210	-15	-7%	232	238	5	2%	244	255	12	5%
	Junction NINE Retail to A49 SB	90	116	26	28%	80	150	71	89%	88	113	25	28%
	Junction NINE Retail to A49 NB	88	113	26	29%	77	148	71	91%	86	111	25	29%
	A49 SB	396	282	-114	-29%	416	419	3	1%	422	439	16	4%
	A49 SB to Junction NINE Retail	59	63	4	6%	57	95	38	67%	63	65	2	3%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	302	260	-42	-14%	274	273	0	0%	305	168	-137	-45%
	A49 SB to Long Lane	105	139	35	33%	173	104	-68	-40%	35	1	-34	-98%
	A49 SB	340	339	-1	0%	343	338	-6	-2%	340	341	1	0%
	A49 NB to Hawleys Lane	283	294	11	4%	334	396	62	19%	381	509	128	34%
	A49 NB to Long Lane	75	105	29	39%	100	158	58	58%	90	502	411	455%
	A49 NB	283	294	11	4%	334	396	62	19%	381	509	128	34%
	Long Lane to A49 SB	83	154	71	85%	113	154	40	36%	150	154	4	3%
	Long Lane to Hawleys Lane	141	150	9	6%	140	149	9	6%	149	151	2	1%
	Long Lane to A49 NB	141	150	9	6%	140	149	9	6%	149	151	2	1%
	Hawleys Lane to Long Lane	126	126	1	0%	126	127	0	0%	127	126	-1	-1%
	Hawleys Lane to A49 SB	126	126	1	0%	126	127	0	0%	127	126	-1	-1%
	Hawleys Lane to A49 NB	132	133	1	1%	132	133	0	0%	133	132	-1	-1%

		18:00-18:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Newton Road/ A49 Winwick Link Road/ Winwick Park Avenue	A49 NB to Winwick Park Ave	77	72	-6	-7%	84	94	10	12%	87	138	51	58%
	A49 NB	77	72	-6	-7%	84	94	10	12%	87	138	51	58%
	A49 NB to Winwick Link Rd	77	72	-6	-7%	84	94	10	12%	87	138	51	58%
	Winwick Park Ave to A49 NB	12	25	13	103%	11	13	2	18%	11	23	12	107%
	Winwick Park Ave to Winwick Link Rd	12	25	13	103%	11	13	2	18%	11	23	12	107%
	Winwick Park Ave to A49 SB	12	25	13	103%	11	13	2	18%	11	23	12	107%
	A49 SB to Winwick Link Rd	68	85	17	24%	75	90	15	19%	77	166	90	117%
	A49 SB	68	85	17	24%	75	90	15	19%	77	166	90	117%
	A49 SB to Winwick Park Ave	68	85	17	24%	75	90	15	19%	77	166	90	117%
	Winwick Link Rd to A49 SB	22	24	2	7%	174	138	-36	-21%	292	512	220	75%
	Winwick Link Rd to Winwick Park Ave	22	24	2	7%	166	159	-7	-4%	235	511	276	117%
	Winwick Link Rd to A49 NB	22	24	2	7%	166	159	-7	-4%	235	511	276	117%
A49 Newton Road/ Delph Lane	A49 NB	133	153	21	16%	131	202	71	54%	148	241	93	63%
	A49 NB to Delp Ln	136	158	22	16%	136	207	71	52%	153	246	93	61%
	A49 SB	120	134	14	12%	283	296	13	5%	390	488	98	25%
	A49 SB to Delph Ln	39	46	7	19%	45	138	93	205%	107	247	141	132%
	Delph Ln to A49 NB	84	94	10	12%	141	172	31	22%	182	182	0	0%
	Delph Ln to A49 SB	80	90	10	12%	137	168	31	23%	178	178	0	0%
M62 Junction 9	A49 NB to M62 WB	76	88	12	16%	88	97	9	10%	90	105	15	16%
	A49 NB	76	88	12	16%	88	97	9	10%	90	105	15	16%
	A49 NB to M62 EB	76	88	12	16%	88	97	9	10%	90	105	15	16%
	A49 NB to A49 SB (U-Turn)	76	88	12	16%	88	97	9	10%	90	105	15	16%
	M62 EB to A49 NB	77	182	105	136%	87	179	93	107%	89	203	114	127%
	M62 EB to A49 SB	77	182	105	136%	87	179	93	107%	89	203	114	127%
	A49 SB to M62 EB	145	151	6	4%	163	166	2	1%	168	172	4	2%
	A49 SB	145	151	6	4%	163	166	2	1%	168	172	4	2%
	A49 SB to M62 WB	145	151	6	4%	163	166	2	1%	168	172	4	2%
	M62 WB to A49 SB	44	71	26	60%	60	70	11	18%	54	94	40	74%
	M62 WB to A49 NB	44	71	26	60%	60	70	11	18%	54	94	40	74%

		18:00-18:30											
		2022				2027				2032			
Junction/ Movement		Length (metres)		Difference		Length (metres)		Difference		Length (metres)		Difference	
Junction	Approach	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%	DoMin	DoSom	Actual (metres)	%
A49 Winwick Rd/ Birch Ave	A49 SB to Birch Ave	0	0	0	-	0	0	0	-	0	0	0	-
	Birch Rd to A49 SB	0	0	0	-	0	0	0	-	0	0	0	-
A49 Winwick Road @ Poplars Avenue	A49 NB to Woburn Rd	0	0	0	-	0	3	3	-	0	4	4	-
	A49 NB	0	0	0	-	0	3	3	-	0	4	4	-
	A49 SB	42	34	-8	-19%	321	296	-25	-8%	422	487	65	15%
A49 Winwick Road/ A574 Cromwell Avenue/ Sandy Lane West	A49 SB to Sandy Ln West	323	263	-59	-18%	485	494	10	2%	510	510	0	0%
	A49 SB	323	263	-59	-18%	485	494	10	2%	510	510	0	0%
	A49 SB to Cromwell Ave	323	263	-59	-18%	485	494	10	2%	510	510	0	0%
	Cromwell Ave to A49 NB	61	69	7	12%	60	71	11	19%	66	75	9	13%
	Cromwell Ave to Sandy Ln West	61	69	7	12%	60	71	11	19%	66	75	9	13%
	Cromwell Ave to A49 SB	61	69	7	12%	60	71	11	19%	66	75	9	13%
	Cromwell Ave to Cromwell Ave (U-turn)	61	69	7	12%	60	71	11	19%	66	75	9	13%
	A49 NB	115	99	-16	-14%	119	112	-7	-6%	106	145	39	37%
	A49 NB to Sandy Ln West	115	99	-16	-14%	119	112	-7	-6%	106	145	39	37%
	A49 NB to Cromwell Ave	115	99	-16	-14%	119	112	-7	-6%	106	145	39	37%
	Sandy Ln West to A49 NB	185	239	54	29%	87	292	205	236%	106	292	186	176%
	Sandy Ln West to Sandy Ln (U-turn	185	239	54	29%	87	292	205	236%	106	292	186	176%
	Sandy Ln West to A49 SB	185	239	54	29%	87	292	205	236%	106	292	186	176%
	Sandy Ln West to Cromwell Ave	185	239	54	29%	87	292	205	236%	106	292	186	176%
A49 Winwick Road @ Junction NINE Retail Park	A49 NB	190	155	-34	-18%	183	165	-19	-10%	134	172	38	28%
	A49 NB to Junction NINE Retail	190	155	-34	-18%	183	165	-19	-10%	134	172	38	28%
	Junction NINE Retail to A49 SB	41	61	20	49%	37	92	55	151%	39	56	17	42%
	Junction NINE Retail to A49 NB	38	58	20	52%	34	90	55	161%	37	54	17	45%
	A49 SB	386	192	-194	-50%	377	330	-46	-12%	321	328	7	2%
	A49 SB to Junction NINE Retail	41	56	15	36%	52	68	16	32%	54	65	11	21%
A49 Winwick Road/ Hawleys Lane/ A50 Long Lane	A49 SB to Hawleys Lane	240	223	-17	-7%	128	207	79	62%	157	135	-23	-14%
	A49 SB to Long Lane	138	117	-20	-15%	138	137	0	0%	35	0	-35	-100%
	A49 SB	339	328	-11	-3%	339	336	-3	-1%	334	335	1	0%
	A49 NB to Hawleys Lane	169	144	-25	-15%	194	167	-27	-14%	171	219	48	28%
	A49 NB to Long Lane	76	72	-4	-6%	83	94	11	14%	78	75	-2	-3%
	A49 NB	169	144	-25	-15%	194	167	-27	-14%	171	219	48	28%
	Long Lane to A49 SB	81	146	66	81%	75	153	78	103%	115	154	39	34%
	Long Lane to Hawleys Lane	98	132	34	35%	94	142	48	51%	138	143	5	4%
	Long Lane to A49 NB	98	132	34	35%	94	142	48	51%	138	143	5	4%
	Hawleys Lane to Long Lane	108	116	8	8%	116	123	8	7%	121	125	4	3%
	Hawleys Lane to A49 SB	108	116	8	8%	116	123	8	7%	121	125	4	3%
	Hawleys Lane to A49 NB	108	119	11	10%	121	130	9	8%	126	131	5	4%

APPENDIX D:

JOURNEY TIME DATA

AM Journey Time (s) - 07:00-08:00

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	64	71	7	11%	79	88	9	11%	82	92	10	12%
2 NB	98	103	5	5%	106	113	7	7%	109	120	11	10%
3 NB	79	82	3	4%	80	83	2	3%	82	86	4	5%
4 NB	80	91	11	14%	88	93	5	6%	94	99	5	5%
5 NB	86	78	-9	-10%	79	79	1	1%	81	84	3	4%
	408	425	17.26	4%	431	455	23.86	6%	447	480	33.03	7%

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	69	70	0	1%	61	65	4	7%	59	63	4	7%
2 SB	95	95	0	0%	92	96	3	3%	95	98	2	3%
3 SB	144	120	-24	-17%	117	121	4	3%	123	131	8	7%
4 SB	112	118	6	5%	117	115	-3	-2%	123	124	1	0%
5 SB	62	63	2	3%	63	64	1	1%	64	65	1	2%
	482	466	-15.69	-3%	451	460	8.8	2%	464	480	16.43	4%

PM Journey Time (s) - 16:00-17:00

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	54	55	1	2%	59	60	1	1%	60	62	2	3%
2 NB	119	124	5	4%	119	132	13	11%	127	132	5	4%
3 NB	84	87	3	4%	84	89	5	5%	84	88	4	5%
4 NB	93	103	10	11%	98	111	13	14%	111	115	4	3%
5 NB	90	94	4	5%	100	103	3	3%	105	138	33	32%
	439	462	23.1	5%	460	494	34.93	8%	488	535	47.39	10%

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	55	56	1	1%	56	57	1	2%	57	57	1	1%
2 SB	84	85	1	1%	88	90	2	3%	89	97	8	9%
3 SB	124	131	6	5%	140	148	8	6%	145	184	39	27%
4 SB	181	151	-30	-16%	202	179	-23	-11%	178	190	12	7%
5 SB	60	62	2	4%	60	63	3	4%	62	63	1	1%
	505	485	-19.44	-4%	545	536	-9.18	-2%	532	592	59.71	11%

AM Journey Time (s) - 08:00-09:00

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	93	106	13	13%	145	149	4	3%	157	165	8	5%
2 NB	106	116	9	9%	196	235	39	20%	270	366	96	36%
3 NB	84	86	2	2%	85	89	4	5%	105	159	54	52%
4 NB	95	93	-2	-2%	95	98	3	3%	101	104	4	4%
5 NB	89	84	-5	-6%	84	88	3	4%	89	93	4	4%
	467	484	16.77	4%	606	659	52.72	9%	721	887	166.25	23%

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	101	86	-15	-15%	68	72	5	7%	70	91	21	31%
2 SB	114	113	-1	-1%	111	110	-2	-2%	145	173	28	20%
3 SB	195	136	-59	-30%	129	127	-2	-2%	159	169	10	6%
4 SB	154	172	18	12%	165	161	-4	-2%	194	179	-15	-8%
5 SB	64	65	2	3%	64	65	1	2%	65	66	1	2%
	627	571	-55.67	-9%	537	535	-2.14	0%	632	678	45.66	7%

PM Journey Time (s) - 17:00-18:00

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	55	57	2	4%	58	61	3	6%	66	66	0	0%
2 NB	116	122	6	5%	121	128	7	6%	138	138	0	0%
3 NB	84	87	3	3%	84	90	6	7%	95	95	0	0%
4 NB	96	97	1	1%	101	105	4	4%	117	118	0	0%
5 NB	88	87	-1	-1%	97	97	0	0%	162	162	0	0%
	438	449	10.77	2%	461	482	20.25	4%	578	579	0.95	0%

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	55	56	2	3%	56	58	2	4%	112	113	1	1%
2 SB	92	94	1	1%	137	136	-1	-1%	318	320	2	1%
3 SB	161	152	-9	-6%	275	262	-14	-5%	340	341	1	0%
4 SB	282	217	-65	-23%	290	270	-20	-7%	281	282	1	0%
5 SB	63	63	0	0%	63	64	0	0%	64	64	0	0%
	653	583	-70.37	-11%	822	790	-31.8	-4%	1114	1119	4.67	0%

AM Journey Time (s) - 09:00-09:30

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	73	74	1	1%	97	101	4	4%	114	126	12	10%
2 NB	99	105	6	6%	122	137	15	12%	153	224	71	46%
3 NB	81	82	1	1%	81	85	4	4%	84	119	34	41%
4 NB	109	92	-17	-15%	91	89	-3	-3%	89	102	13	14%
5 NB	84	77	-7	-8%	76	81	4	6%	79	80	1	2%
	445	429	-15.77	-4%	467	491	24.08	5%	520	652	131.34	25%

Section	AM 2022				AM 2027				AM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	87	82	-5	-5%	62	66	4	6%	57	63	5	9%
2 SB	104	101	-4	-4%	95	96	1	1%	96	113	17	18%
3 SB	182	115	-67	-37%	111	119	8	7%	156	157	1	1%
4 SB	193	150	-43	-22%	130	144	14	10%	205	192	-14	-7%
5 SB	62	65	3	4%	63	65	2	3%	65	66	1	1%
	628	512	-116.06	-18%	462	489	27.69	6%	580	590	10.5	2%

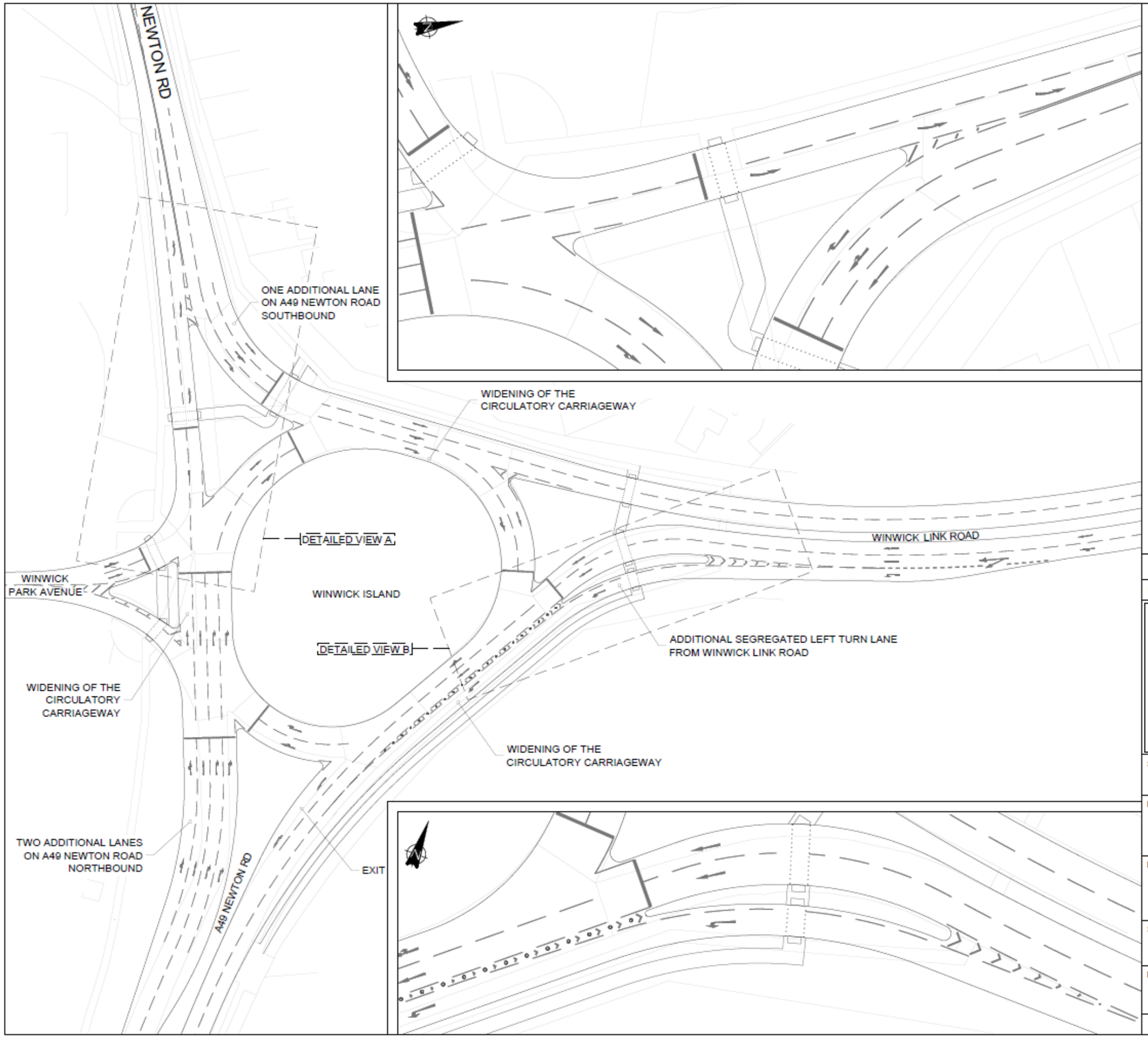
PM Journey Time (s) - 18:00-18:30

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 NB	51	53	2	5%	56	57	2	3%	75	75	0	0%
2 NB	110	113	3	3%	111	116	5	5%	129	129	0	0%
3 NB	82	86	4	5%	82	87	5	6%	88	88	0	0%
4 NB	92	94	3	3%	96	94	-2	-2%	96	97	1	1%
5 NB	84	78	-6	-7%	86	80	-6	-7%	82	82	0	0%
	419	425	5.91	1%	431	435	3.78	1%	470	471	1.15	0%

Section	PM 2022				PM 2027				PM 2032			
	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%	Do Min	Do Som	Diff	%
1 SB	55	55	0	0%	55	56	2	3%	153	153	-1	0%
2 SB	86	87	1	1%	131	130	0	0%	349	350	1	0%
3 SB	157	132	-24	-16%	258	251	-7	-3%	297	297	0	0%
4 SB	258	162	-95	-37%	263	245	-18	-7%	239	240	1	0%
5 SB	63	63	0	1%	63	63	0	1%	64	64	0	0%
	618	499	-118.21	-19%	768	745	-22.7	-3%	1103	1104	1.05	0%

APPENDIX E:

MITIGATION DESIGNS



NOTES:

Rev:	Description:	Date:	By:	Chkd:
A	Existing lines rendered under proposed	29/02/16	DD	KY

curtins

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Birmingham - Bristol - Cardiff - Douglas - Edinburgh - Kendal - Leeds - Liverpool - London - Manchester - Nottingham

Status: PRELIMINARY

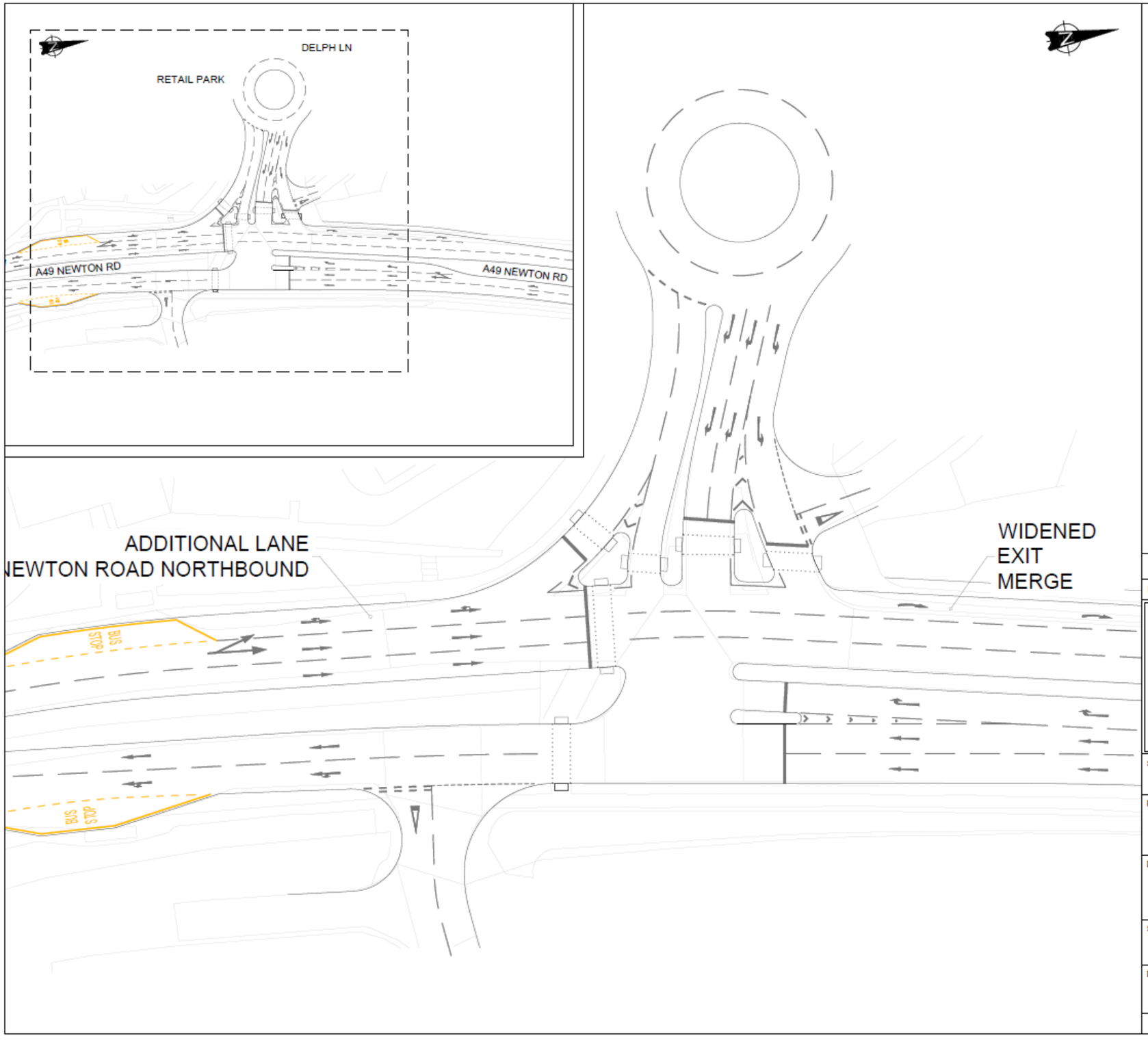
Project: PARKSIDE PHASE I

Drg Title: JUNCTION IMPROVEMENT PROPOSAL JUNCTION 3 - WINWICK ISLAND

Scale:	Size:	First Issue:	Drawn:	Checked:
1:1000	A3	16/02/16	DD	JG

Drg No: TPMA1389-103

Rev: A



NOTES:

Rev:	Description:	Date:	By:	Chkd:
A	Existing lines rendered under proposed	29/02/16	DD	NY

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Status: PRELIMINARY

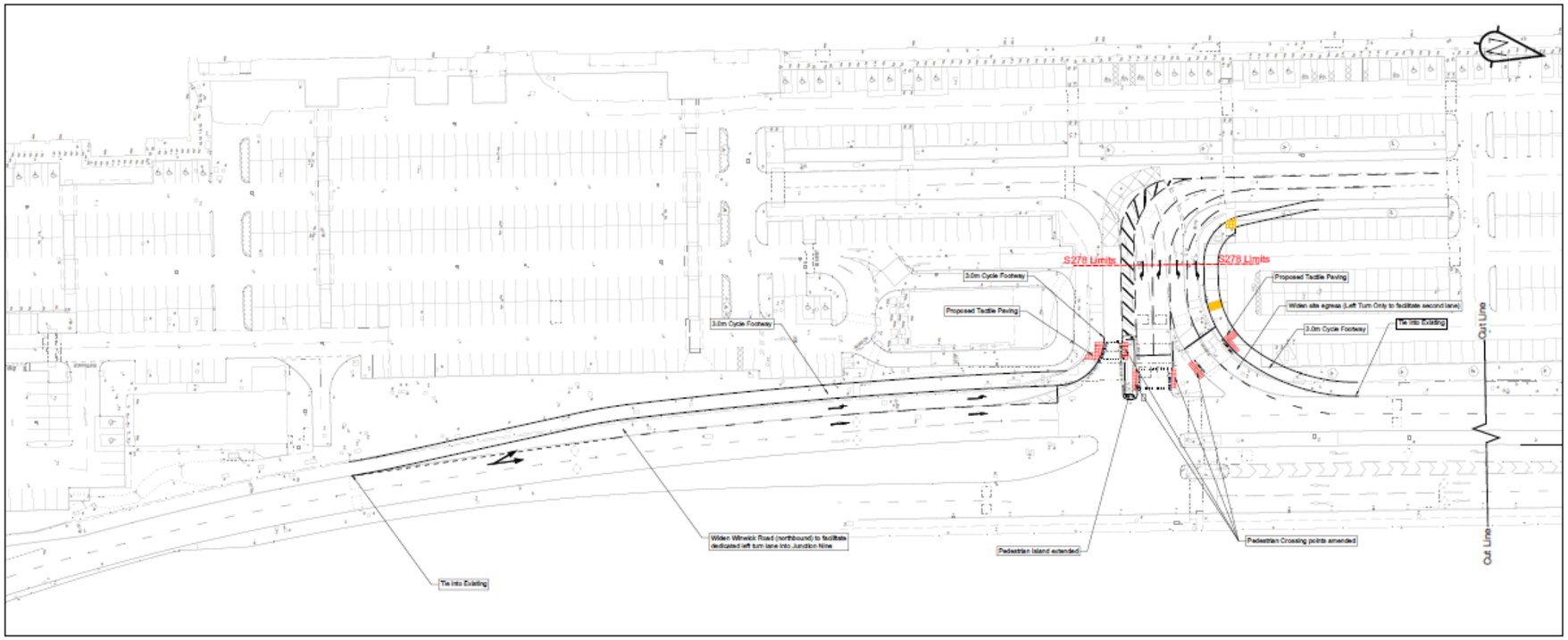
Project: PARKSIDE PHASE I

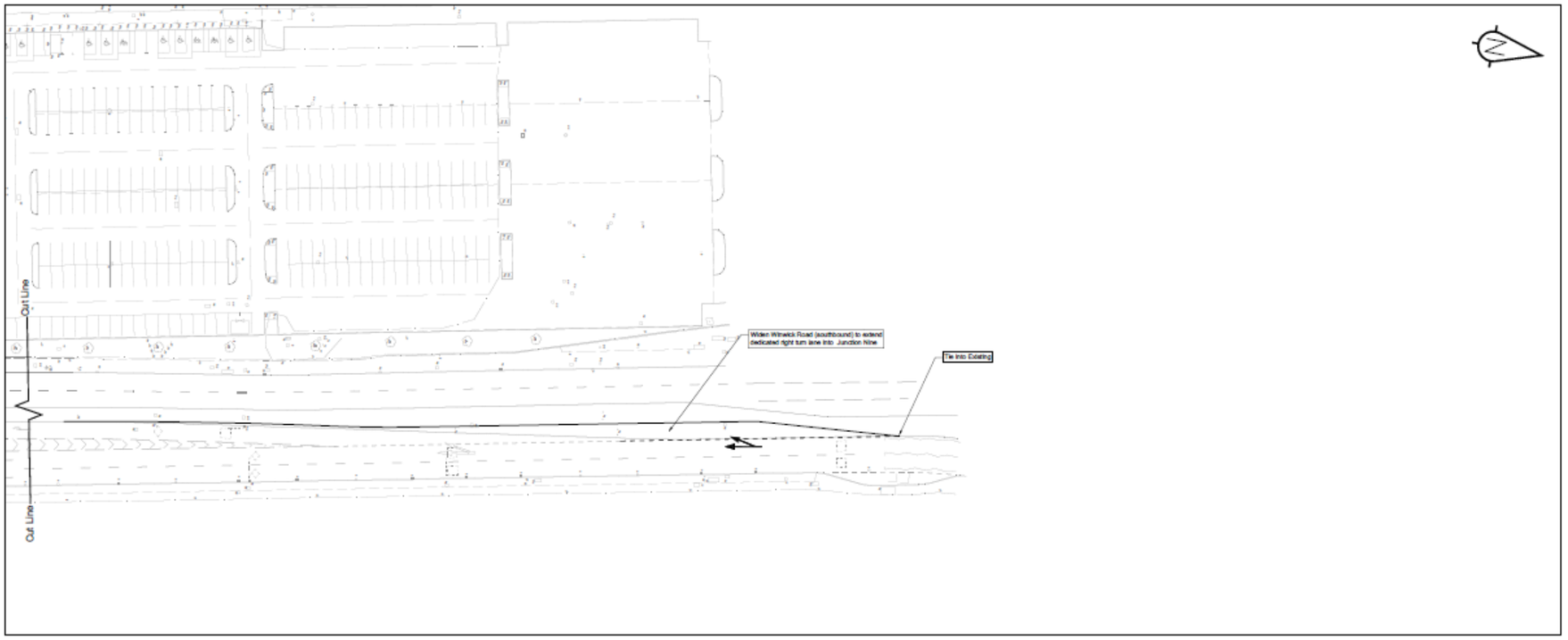
Drg Title: JUNCTION IMPROVEMENT PROPOSAL JUNCTION 2 - DELPH LANE

Scale:	Size:	First Issue:	Drawn:	Checked:
1:500	A3	16/02/16	DD	JG

Drg No: TPMA1389-102

Rev: A





- Sanderson Associates (Consulting Engineers) Ltd ("the consultant"), has not checked or verified, and shall have no liability whatsoever for any inaccuracies which may be attributable to any data, reports, base plan(s) and drawings provided by the client, or purchased by the consultant on the client's behalf, that may have been utilised within this drawing.
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- The locations of utilities apparatus, if shown, is reproduced from plans supplied to the consultant, although care has been taken when duplicating this information. These locations are approximate only and no guarantee can be given for their accuracy. It is the client's or it's appointed agent/contractors responsibility to verify the exact locations on site by hand dug trial holes or other appropriate means prior to mechanical excavation.
- Service connections are not shown but their presence should be anticipated.
- Reference to any third party equipment shown on this drawing was only relevant at the time the drawing was prepared.
- It is the client's responsibility to ensure that any equipment ordered meets the design.

Rev	Amendment	Drawn	Date	Checked

sanderson associates (consulting engineers) ltd
Highways | Waste | Transportation | Water

Client
DERWENT CONSTRUCTION LIMITED

Project Title
JUNCTION NINE RETAIL PARK
WARRINGTON

Drawing Title
WINWICK ROAD S278 WORKS
GENERAL ARRANGEMENT

Scale: 1:500	Drawn By: DH
Drawing Size: A1	Checked By: PJM
Date: 19.02.19	Approved By: PJM

Drawing Number: 10733-100-001
Rev:

FILE REF:

NOTES:

North arrow indicative.

PRELIMINARY

ISSUE	REASON FOR REVISION	DATE
-	-	-

PROJECT:
PEEL HALL
WARRINGTON

CLIENT:
SATNAM MILLENNIUM LTD

PROJECT REFERENCE:	DRAWING NUMBER:	SCALE:
1901	08	1:500 @ A3

HighgateTransportation
www.highgatetransportation.co.uk
First Floor, 43-45 Park Street
Bristol BS1 5NL
07973 375 937 / 07595 892 217

TITLE:
PROPOSED A49 / GOLBOURNE ROAD
JUNCTION IMPROVEMENTS

DATE:	DRAWN BY:	CHECKED:
04/03/20	BGS	FB

NOTES

Revn.	Revision Details	Rev.by	Chk.by	Date:

WARRINGTON
Borough Council
Environment and Transport Directorate
New Town House, Buttermarket Street, Warrington WA1 2NH

Project
NORTH_WARRINGTON_AREA
INJURY_COLLISION_SEARCH

Drawing Title
INJURY_COLLISION_PLOT
5YRS_TO_SEPT_2019

Drawn by	JFISHER	e-mail	JFISHER@WARRINGTON.GOV.UK		
Approved by	MTUNE	Telephone	01925 442938		
Date	JAN2020	Fax	01925 44FAX	Sheet	1 of 1
Scales	NTS	Drawing No.	TMRS/CS734/001	Phase / Revision	A

AutoCAD File Ref: Drawing1.dwg

CS734 North Warrington Area 5yrs PIAs to Sept 2019

ACCIDENT SEVERITY UPTO 2019

	2014	2015	2016	2017	2018	2019	Total
Fatal	0	0	0	1	1	1	3
Serious	2	7	7	12	15	4	47
Slight	14	56	58	60	46	28	262
Damage	0	0	0	0	0	0	0
Total	16	63	65	73	62	33	312

ACCIDENTS BY MONTH AND YEAR UPTO 2019

	2014	2015	2016	2017	2018	2019	Total
January	0	4	6	5	6	6	27
February	0	5	8	5	2	1	21
March	0	5	5	8	4	2	24
April	0	3	7	4	3	9	26
May	0	5	6	8	4	6	29
June	0	4	1	7	7	1	20
July	0	5	6	7	7	5	30
August	0	7	2	7	3	0	19
September	0	6	7	4	7	3	27
October	5	6	6	3	7	0	27
November	7	6	4	7	8	0	32
December	4	7	7	8	4	0	30
Total	16	63	65	73	62	33	312
%	5%	20%	21%	23%	20%	11%	100%

ACCIDENTS BY DAY AND TIME

	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Midnight - 00:59	0	0	0	0	0	0	0	0
01:00 - 01:59	0	0	0	0	0	0	0	0
02:00 - 02:59	1	0	0	0	0	0	0	1
03:00 - 03:59	1	0	0	0	0	1	0	2
04:00 - 04:59	0	0	0	1	0	0	0	1
05:00 - 05:59	0	0	0	0	0	0	0	0
06:00 - 06:59	0	1	0	3	0	1	1	6
07:00 - 07:59	0	3	3	3	1	3	1	14
08:00 - 08:59	0	6	5	5	5	1	0	22
09:00 - 09:59	1	3	8	2	6	3	1	24
10:00 - 10:59	2	2	2	1	1	3	1	12
11:00 - 11:59	2	2	3	2	1	3	3	16
12:00 - 12:59	3	2	2	1	7	1	3	19
13:00 - 13:59	2	4	1	5	1	5	2	20
14:00 - 14:59	1	5	4	4	2	3	6	25
15:00 - 15:59	3	8	2	2	4	4	1	24
16:00 - 16:59	1	7	4	6	5	2	1	26
17:00 - 17:59	4	1	5	10	5	5	5	35
18:00 - 18:59	3	6	0	1	2	3	2	17
19:00 - 19:59	3	3	2	2	4	2	0	16
20:00 - 20:59	0	2	1	1	2	2	2	10
21:00 - 21:59	1	2	2	0	2	2	0	9
22:00 - 22:59	1	2	2	1	0	0	2	8
23:00 - 23:59	1	1	1	1	0	1	0	5
Total	30	60	47	51	48	45	31	312
%	10%	19%	15%	16%	15%	14%	10%	100%

CS734 North Warrington Area 5yrs PIAs to Sept 2019

JUNCTION DETAIL	Number	%
SLIP ROAD	3	1
OTHER JUNCTION	8	3
CROSS ROADS	11	4
NOT AT JUNCTION	93	30
PRIVATE DRIVE	9	3
ROUNDABOUT AND MINI	88	28
T OR STAGGERED	100	32
TOTAL	**312**	

JUNCTION CONTROLS	Number	%
AUTOMATIC TRAFFIC SIG	51	16
GIVE WAY SIGN	168	54
NOT AT JUNCTION	93	30
TOTAL	**312**	

SPEED LIMIT	Number	%
20 MPH	32	10
30 MPH	193	62
40 MPH	55	18
50 MPH	16	5
60 MPH	9	3
70 MPH	7	2
TOTAL	**312**	

ROAD CLASS	Number	%
A	159	51
B	4	1
C	44	14
Unclassified	105	34
TOTAL	**312**	

NUMBER OF ACCIDENTS INVOLVING PEDESTRIANS	Number	%
	42	13

NUMBER OF ACCIDENTS INVOLVING SKIDDING	Number	%
	44	14

WEATHER	Number	%
FINE	252	81
RAIN	40	13
SNOW	1	0
FINE WIND	4	1
RAIN WIND	2	1
FOG MIST	2	1
OTHER	3	1
UNKNOWN	8	3
TOTAL	**312**	

ROAD SURFACE	Number	%
DRY	215	69
WET	94	30
ICE	3	1
TOTAL	**312**	

LIGHT CONDITIONS	Number	%
Light	237	76
Dark	75	24
TOTAL	**312**	

CASUALTY SEVERITY UPTO 2019

	2014	2015	2016	2017	2018	2019	Total
Fatal	0	0	0	1	1	1	3
Serious	2	7	7	12	17	4	49
Slight	18	79	63	76	71	39	346
Total	20	86	70	89	89	44	398
%	5%	22%	18%	22%	22%	11%	100%

CASUALTIES BY MONTH AND YEAR UPTO 2019

	2014	2015	2016	2017	2018	2019	Total
January	0	6	6	6	8	8	34
February	0	10	8	5	5	1	29
March	0	8	5	11	8	3	35
April	0	3	9	4	4	13	33
May	0	6	7	8	5	6	32
June	0	6	1	7	11	1	26
July	0	6	7	8	12	5	38
August	0	8	2	8	4	0	22
September	0	6	7	7	8	7	35
October	8	9	6	5	11	0	39
November	7	8	4	9	9	0	37
December	5	10	8	11	4	0	38
Total	20	86	70	89	89	44	398
%	5%	22%	18%	22%	22%	11%	100%

CASUALTIES BY DAY AND TIME

	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Midnight - 00:59	0	0	0	0	0	0	0	0
01:00 - 01:59	0	0	0	0	0	0	0	0
02:00 - 02:59	3	0	0	0	0	0	0	3
03:00 - 03:59	1	0	0	0	0	1	0	2
04:00 - 04:59	0	0	0	1	0	0	0	1
05:00 - 05:59	0	0	0	0	0	0	0	0
06:00 - 06:59	0	1	0	3	0	1	1	6
07:00 - 07:59	0	4	3	4	1	3	3	18
08:00 - 08:59	0	7	5	6	5	1	0	24
09:00 - 09:59	1	3	9	2	7	3	1	26
10:00 - 10:59	2	3	3	1	3	5	1	18
11:00 - 11:59	5	2	5	2	4	3	5	26
12:00 - 12:59	5	3	2	1	9	1	4	25
13:00 - 13:59	2	5	2	8	1	7	2	27
14:00 - 14:59	1	6	6	5	3	3	7	31
15:00 - 15:59	8	10	3	3	5	5	1	35
16:00 - 16:59	1	11	5	12	5	2	1	37
17:00 - 17:59	4	1	6	11	5	6	6	39
18:00 - 18:59	3	9	0	1	2	4	4	23
19:00 - 19:59	4	3	3	4	4	2	0	20
20:00 - 20:59	0	2	1	1	2	2	2	10
21:00 - 21:59	1	2	2	0	3	3	0	11
22:00 - 22:59	1	3	2	2	0	0	2	10
23:00 - 23:59	2	1	1	1	0	1	0	6
Total	44	76	58	68	59	53	40	398
%	11%	19%	15%	17%	15%	13%	10%	100%

CS734 North Warrington Area 5yrs PIAs to Sept 2019

CASUALTIES BY TYPE AND AGE GROUPING

	Unknown Age	0 to 4	5 to 15	16 to 19	20 to 29	30 to 59	60 Plus	Total	%
Pedestrian	0	0	25	0	3	11	4	**43**	11
Pedal Cyclist	0	0	13	8	19	33	5	**78**	20
PTW Rider	1	0	0	7	21	15	1	**45**	11
Pillion Passenger	0	0	0	0	2	0	0	**2**	1
Car Driver	0	0	0	4	31	85	17	**137**	34
Car Passenger	0	4	17	7	14	23	7	**72**	18
Goods Driver	0	0	0	0	2	3	2	**7**	2
Goods Passenger	0	0	0	0	2	0	0	**2**	1
PSV Driver	0	0	0	0	0	1	0	**1**	0
PSV Passenger	0	0	1	0	0	0	3	**4**	1
Hack/PRI Passenger	0	0	0	1	5	0	0	**6**	2
Others/Unknown	0	0	0	0	0	0	1	**1**	0
TOTAL	**1**	**4**	**56**	**27**	**99**	**171**	**40**	**398**	
%	0	1	14	7	25	43	10		

Number of Casualties with unknown age: 1

VEHICLES INVOLVED BY TYPE AND AGE OF DRIVER

	1 to 15	16 to 19	20 to 29	30 to 59	60 Plus	Unknown	Total	%
Pedal Cycle	12	9	19	35	6	1	**82**	14
PTW	0	7	22	15	1	4	**49**	8
Car	0	13	86	185	46	74	**404**	69
Minibus	0	0	1	0	0	0	**1**	0
PSV	0	0	0	4	1	0	**5**	1
Goods < 3.5T	0	0	9	10	2	10	**31**	5
Goods > 3.5T	0	0	0	5	2	0	**7**	1
Hackney/Private	0	0	0	6	0	1	**7**	1
Other/Unknown	0	0	0	0	1	2	**3**	1
TOTAL	**12**	**29**	**137**	**260**	**59**	**92**	**589**	
%	2	5	23	44	10	16		

VEHICLE MANOEUVRES

	Number	%
CHANGING LANE TO LEFT	3	1
CHANGING LANE TO RIGHT	11	2
GOING AHEAD LEFT HAND BEND	13	2
GOING AHEAD OTHER	259	44
GOING AHEAD RIGHT HAND BEND	12	2
STARTING	46	8
OVERTAKING MOVING VEHICLE ON ITS OFFSIDE	8	1
OVERTAKING ON NEARSIDE	7	1
OVERTAKING MOVING VEHICLE ON ITS NEARSIDE	2	0
PARKED	18	3
REVERSING	6	1
STOPPING	46	8
TURNING LEFT	29	5
TURNING RIGHT	53	9
U TURN	6	1
WAITING TO GO AHEAD BUT HELD UP	57	10
WAITING TO TURN LEFT	8	1
WAITING TO TURN RIGHT	5	1
TOTAL	**589**	

CS734 North Warrington Area 5yrs PIAs to Sept 2019

BREATH TEST	Number	%
NOT APPLICABLE	36	6
POSITIVE	5	1
NEGATIVE	197	33
NOT REQUESTED	158	27
REFUSED TO PROVIDE	1	0
DRIVER NOT CONTACTED	174	30
MEDICAL REASONS	18	3
TOTAL	**589**	

1. Option B Access Strategy – VISSIM Modelling Summary

1.1. Modelling Group Ltd has previously developed a base-year microsimulation model of the A49 corridor and some surrounding areas to the north of Warrington. For further detailed information relating to this exercise, please refer to 'MG0123 A49 Warrington Corridor Base Modelling Report_v1.2'.

1.2. The aim of this model has been to provide a robust platform on which the proposed development (Peel Hall) can be tested and impact upon the highway network assessed in the future years 2022, 2027 and 2032.

1.3. Following on from the base-year model development, a comparative modelling and analysis study was then carried out for the proposed scheme Option A Access Strategy. The aim of this analysis was to assess the potential impacts of the proposed scheme in the stated future year flow scenarios, comparing a 'Do Minimum' reference case, with a 'Do Something' proposed development case.

1.4. During the development of the Option A Access Strategy Do Something models, various optimisations and mitigations were also tested in order to assess to what level any potential impacts could be compensated for. Details of this study can be found in 'MG0123 A49 Warrington Corridor Option A Modelling Report_v2'.

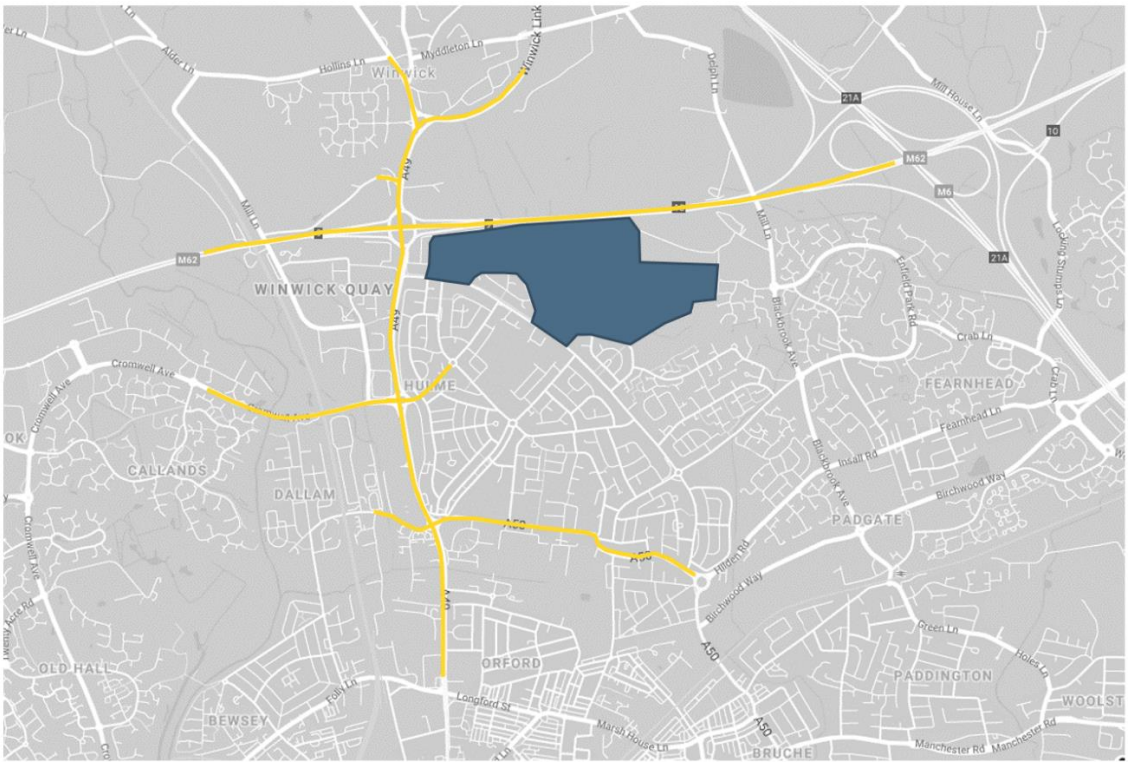


FIGURE 1.1: NETWORK EXTENTS AND APPROXIMATE LOCATION OF DEVELOPMENT

2. Technical Note Purpose

2.1. Option B Access Strategy has also been proposed. This note documents the use of the developed VISSIM model platform for the testing and analysis of potential impacts arising from those proposals.

3. Scheme Analysis Details

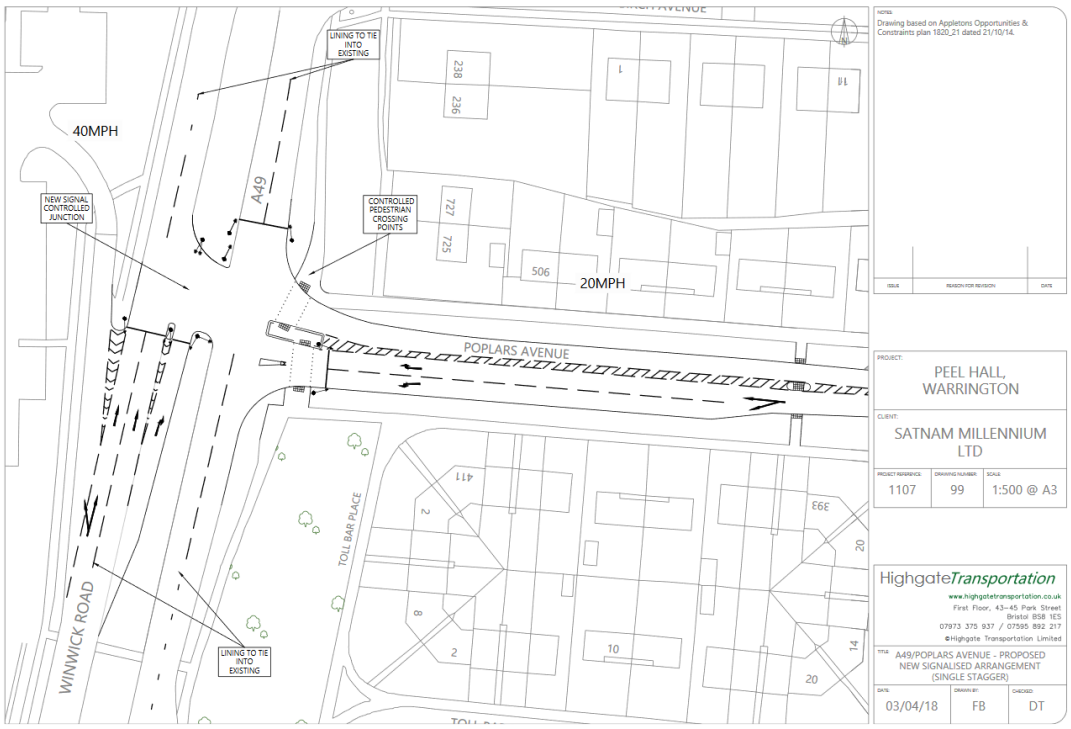


FIGURE 3.1: A49/ POPLARS AVENUE PROPOSED JUNCTION

3.1. Central to Option B is the creation of a larger, all-movements signalised junction at the intersection between A49 Winwick Road/ Poplars Avenue. This would involve the widening of the northbound carriageway of the A49 to allow a dedicated right-turn filter lane into Poplars Avenue. The proposed design would also include the widening of Poplars Avenue, creating dedicated left and right-turn lanes.

3.2. Although there is currently a junction at A49/ Poplars Avenue, it is a small left-in, left-out, priority-controlled junction. As a result, the new layout required the development and testing of new signal plans before being modelled in VISSIM.

3.3. The creation and testing of signal plans was initially carried out in LinSig, which is a dedicated software platform for the creation and analysis of signal strategies. However, it was very quickly clear that this proposal was likely to cause issues – although different approaches and cycle times were tested, acceptable levels of queuing and DoS (Degree of Saturation) appeared to be a long way from achievable. See Appendix A for further details regarding the LinSig testing.

3.4. LinSig does not model in the level of detail available in VISSIM though – linkage between junctions is less obvious, queuing happens vertically and are generally output as hourly averages, so results can require more interpretation. As a result, it was decided that it was still worth testing in VISSIM in order to be able to visualise the scheme in the context of the surrounding network and see the detailed impact.

4. VISSIM Modelling

4.1. Testing was started with the AM 2022 Do Something scenario. Using a DWG file of the scheme drawing, the link structure and associated physical changes were created to scale in the VISSIM scenario. Flows and routing were added from the spreadsheet '*Peel Hall Access Strategy B – Flow Diagram Spreadsheet – REISSUE 210120*', provided by Highgate Transportation Ltd.

4.2. Once the model was ready, a signal controller was created, along with associated signal heads, to replicate the LinSig model timings. The same range of cycle times were used, and it was found that keeping the cycle times as low as was possible had the best overall effect.

4.3. However, there were four main issues which couldn't be overcome, even with the 2022 flows, given the constraints of the scheme. These were:

- Ensuring that traffic from Poplars Avenue gets enough green time to stop large queues forming on Poplars Avenue – As a result of the constant need to give the A49 traffic phases so much priority in an attempt to stop the occurrence of exit-arm blocking on the southern arm of M62 junction 9.

- Ensuring that northbound right-turners from the A49 into Poplars Avenue get enough green time to stop large queues forming on the A49 northbound – As above, the conflicting demands of needing to give high priority to the A49 southbound to ensure smooth running of the M62 junction 9 and M62 mainline, as well as trying to give traffic on Poplars Avenue anything like enough green time to stop major delays there.

- The interaction with M62 junction 9 to the north – Even in 2022, there are high volumes of traffic travelling between these two junctions, and these volumes will only get larger in the further future scenarios. Added to this the very small distance between these junctions (approx. 150m). The result is very little tolerance for any delay at either junction before the other junction is also affected. Unfortunately, with the tested AM 2022 scenario, there is the added effect of delays further south (see below). This can lead to southbound queuing from the A49/ Sandy Lane West/ Cromwell Avenue roundabout reaching back to the proposed junction at Poplars Avenue, causing exit-arm blocking for southbound traffic which, as a result of the high traffic volumes, causes a rapidly escalating delay which can very quickly reach back to the M62 mainline.

- The interaction with the A49 junction with Sandy Lane West and Cromwell Avenue to the south – Testing has proven that this junction is very sensitive to traffic growth. This often results in long queues forming on all arms, even if only temporarily, in future year scenarios. Of particular relevance is the tendency – particularly in AM peak models, for long queues to form on the A49 southbound. This occasionally causes exit-arm blocking back through the proposed Poplars Avenue junction and even as far as M62 junction 9. Additionally, as a result of the high volume of northbound right-turning traffic at the proposed Poplars Avenue junction, queuing sometimes also reaches back as far as the A49/ Sandy Lane West/ Cromwell Avenue roundabout, affecting northbound traffic there.

5. Results

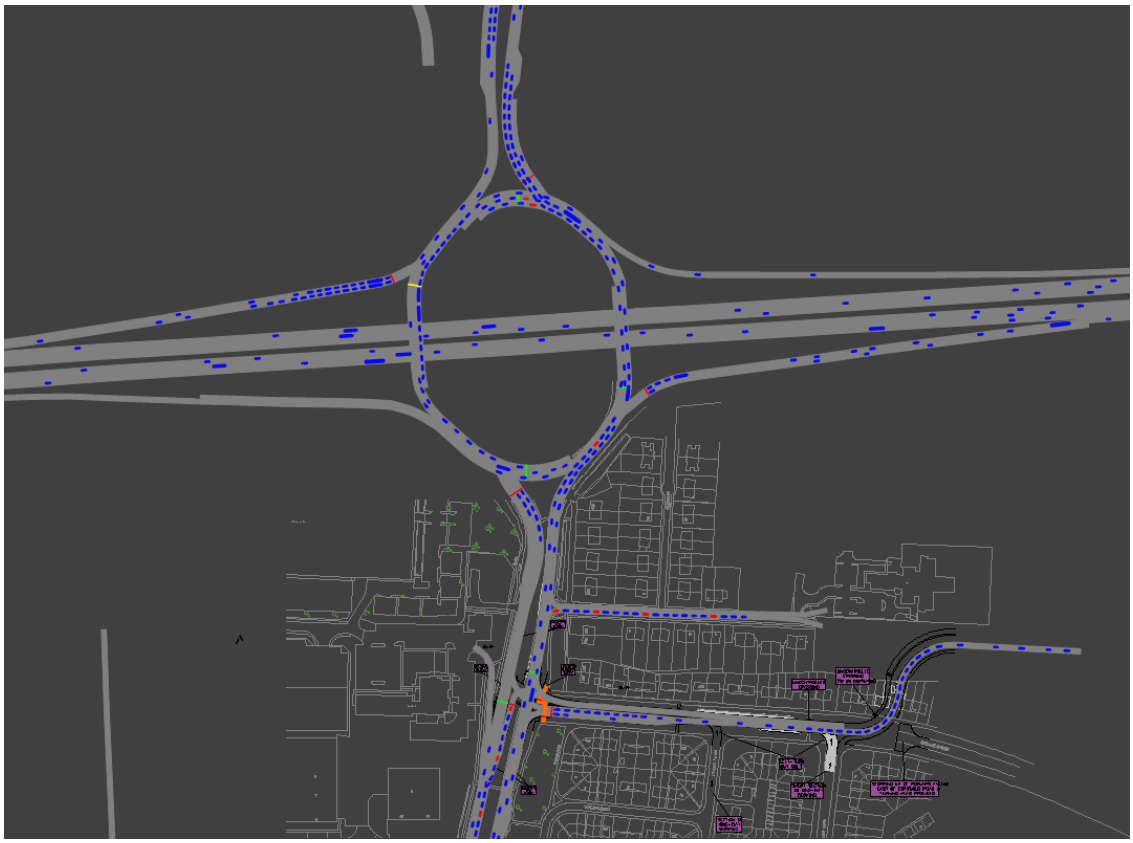


FIGURE 5.1: IMPACT FROM POPLAR AVENUE JUNCTION PROPOSAL – AM 2022

08:00-09:00

	Average Per/Vehicle				Total Network Statistics								
	Delay	Stops	Speed	Stopped Delay	Distance	Travel Time	Delay Time	Stops	Stopped Delay	Vehicles Active	Vehicles Arrived	Latent Delay	Latent Demand
AM DoMin 2022	138	8	27	55	62824	5203267	2354196	133077	939669	1298	15736	885	0
AM Option A 2022	167	9	24	64	64182	5955184	2974860	153729	1137841	1513	16303	28663	43
AM Option B 2022	227	10	21	129	61457	6796758	3977008	183882	2240162	1982	15740	524861	499

TABLE 5.1: NETWORK PERFORMANCE DATA – AM 2022

5.1. As it was clear that the model was completely congested, even in 2022, the analysis wasn't completed for all future years and peak models. As a result of southbound queuing blocking the exit from it, M62 junction 9 becomes overly congested very quickly, as can be seen in Figure 5.1 above. This quickly leads to queuing on all approach arms, meaning blocking back onto the motorway, as well as for traffic on the northbound approach to M62 junction 9.

5.2. Once there is northbound queuing, this then immediately blocks back to the proposed Poplars Avenue junction, further aggravating the congested conditions.

5.3. As can be seen in Table 5.1 above, stopped delay is over twice as bad as that found in the Do Minimum and Option A Do Something 2022 AM models, as a result of the creation of localised 'gridlocked' conditions.

5.4. There are also high levels of Latent Demand (vehicle demand unable to enter the network due to congestion) and associated Latent Delay (delay experience by vehicles trapped outside of the network due to congestion).

6. Summary

6.1. Option B proposals centre around the creation of a new signalised junction between A49 and Poplars Avenue. This was tested first in the junction modelling software, LinSig, in order to design and refine a signal strategy and optimise signal plan/s as needed.

6.2. The design and associated signal controller were then tested in the existing VISSIM micro-simulation network of the A49 and surrounding area to assess the validity and wider impacts of the proposal.

6.3. In both LinSig and VISSIM, it was quickly obvious that the impact was unacceptable levels of delay, creating widespread queuing and delay. As a result of high levels of delay, degree of saturation levels far over 100%, congestion reaching the M62 mainline etc. all within a 2022 model scenario, it was decided that there would be no value to completing the modelling of other future year scenarios where there would only be higher traffic volumes and greater network sensitivity.

APPENDIX A

- **LinSig Modelling Report**

Mobile 07870 983386 Website www.modelling.group
Email luke@modelling.group
Registered Office Crosby Court, 28 George St, Birmingham B3 1QG

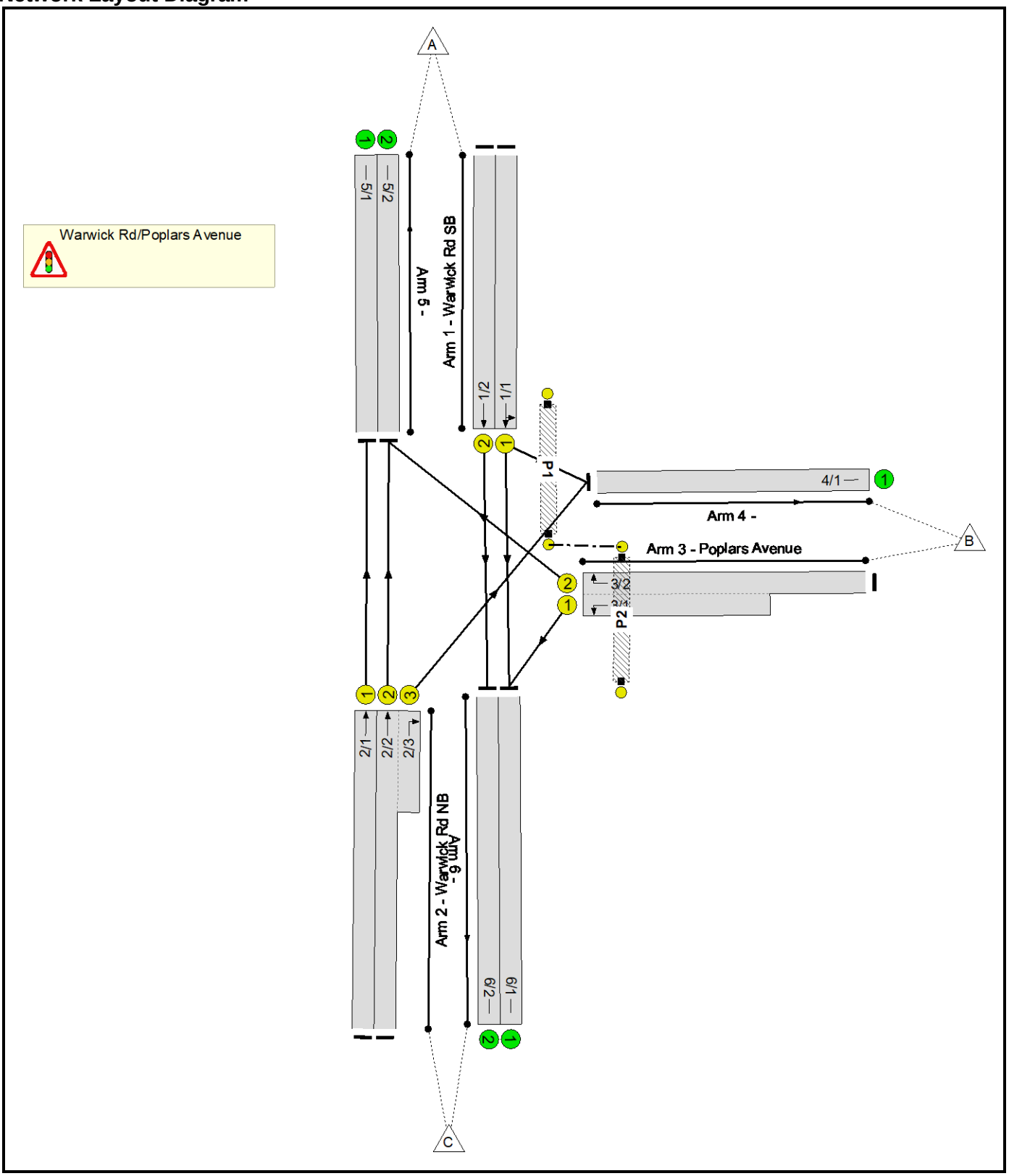
Full Input Data And Results

User and Project Details

Project:	
Title:	
Location:	
Additional detail:	
File name:	Option B Layout.lsg3x
Author:	
Company:	
Address:	

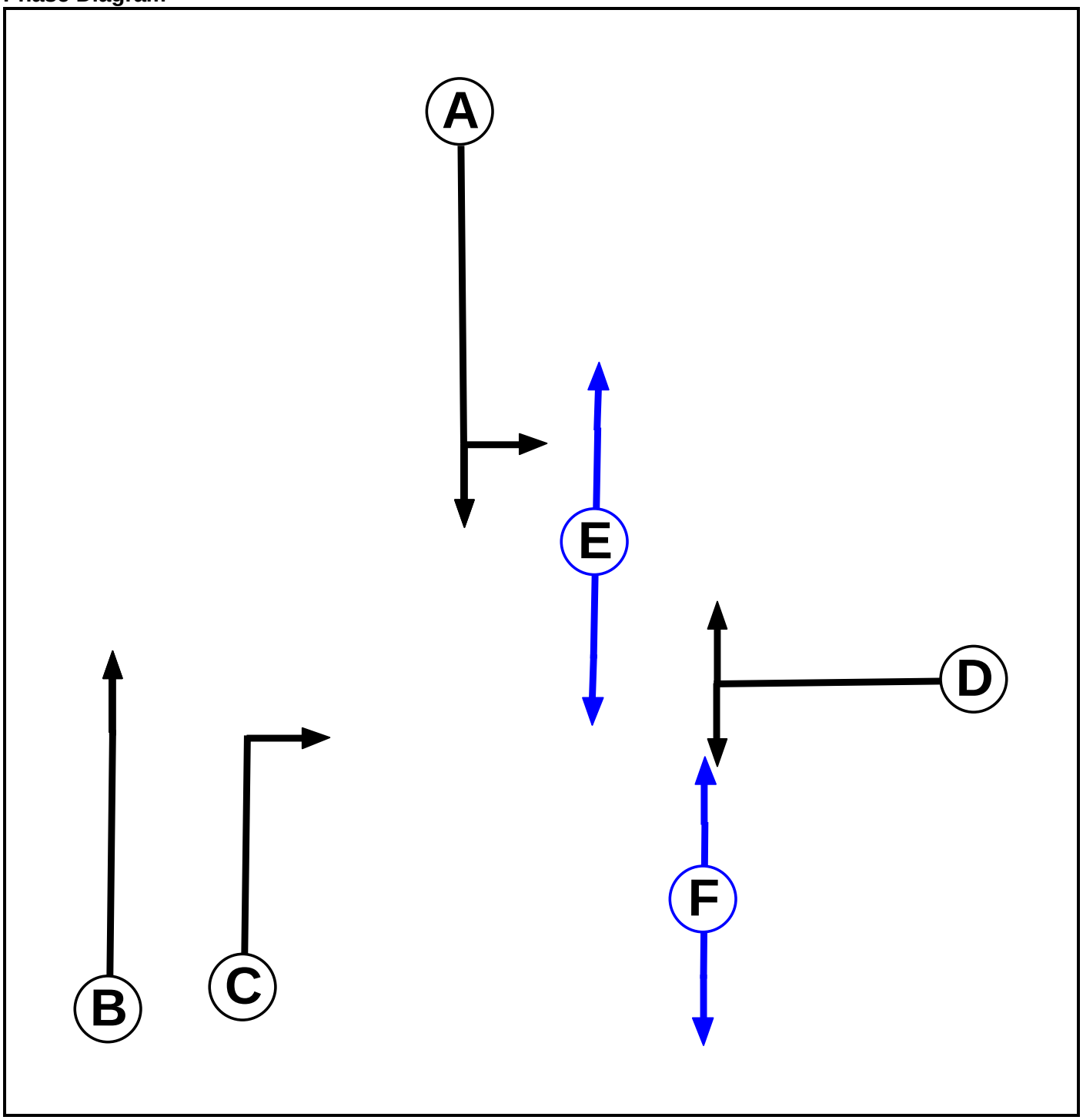
Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Phase Diagram



Phase Input Data

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

Full Input Data And Results

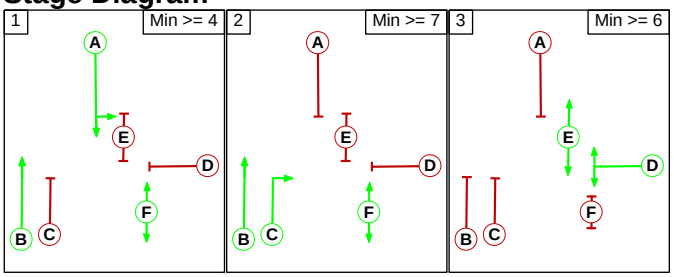
Phase Intergreens Matrix

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

Phases in Stage

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

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
2	3	B	Losing	4	4
2	3	C	Losing	3	3
3	1	D	Losing	4	4

Prohibited Stage Change

From Stage	To Stage		
	1	2	3
1		6	9
2	6		10
3	12	9	

Full Input Data And Results

Give-Way Lane Input Data

Junction: Warwick Rd/Poplars Avenue
There are no Opposed Lanes in this Junction

Full Input Data And Results

Lane Input Data

Junction: Warwick Rd/Poplars Avenue												
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
1/1 (Warwick Rd SB)	U	A	2	3	60.0	Geom	-	4.50	0.00	Y	Arm 4 Left	20.00
											Arm 6 Ahead	Inf
1/2 (Warwick Rd SB)	U	A	2	3	60.0	Geom	-	4.50	0.00	N	Arm 6 Ahead	Inf
2/1 (Warwick Rd NB)	U	B	2	3	60.0	Geom	-	3.60	0.00	Y	Arm 5 Ahead	Inf
2/2 (Warwick Rd NB)	U	B	2	3	60.0	Geom	-	3.60	0.00	N	Arm 5 Ahead	Inf
2/3 (Warwick Rd NB)	U	C	2	3	7.0	Geom	-	3.60	0.00	Y	Arm 4 Right	20.00
3/1 (Poplars Avenue)	U	D	2	3	12.9	Geom	-	3.60	0.00	Y	Arm 6 Left	20.00
3/2 (Poplars Avenue)	U	D	2	3	60.0	Geom	-	3.60	0.00	Y	Arm 5 Right	20.00
4/1	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
5/2	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/2	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2032 AM Do Something'	08:00	09:00	01:00	
2: '2032 PM Do Something'	17:00	18:00	01:00	

Scenario 1: '2032 AM Do Something 60s CT' (FG1: '2032 AM Do Something', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	Tot.	0	0	0	0

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 1: 2032 AM Do Something 60s CT
Junction: Warwick Rd/Poplars Avenue	
1/1	1013
1/2	990
2/1	675
2/2 (with short)	938(In) 671(Out)
2/3 (short)	267
3/1 (short)	374
3/2 (with short)	840(In) 466(Out)
4/1	416
5/1	675
5/2	1137
6/1	1238
6/2	990

Lane Saturation Flows

Junction: Warwick Rd/Poplars Avenue

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Warwick Rd SB)	4.50	0.00	Y	Arm 4 Left	20.00	14.7 %	2042	2042
				Arm 6 Ahead	Inf	85.3 %		
1/2 (Warwick Rd SB)	4.50	0.00	N	Arm 6 Ahead	Inf	100.0 %	2205	2205
2/1 (Warwick Rd NB)	3.60	0.00	Y	Arm 5 Ahead	Inf	100.0 %	1975	1975
2/2 (Warwick Rd NB)	3.60	0.00	N	Arm 5 Ahead	Inf	100.0 %	2115	2115
2/3 (Warwick Rd NB)	3.60	0.00	Y	Arm 4 Right	20.00	100.0 %	1837	1837
3/1 (Poplars Avenue)	3.60	0.00	Y	Arm 6 Left	20.00	100.0 %	1837	1837
3/2 (Poplars Avenue)	3.60	0.00	Y	Arm 5 Right	20.00	100.0 %	1837	1837
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
5/2	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

Scenario 2: '2032 PM Do Something 60s CT' (FG2: '2032 PM Do Something', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	Tot.	0	0	0	0

Traffic Lane Flows

Lane	Scenario 2: 2032 PM Do Something 60s CT
Junction: Warwick Rd/Poplars Avenue	
1/1	1076
1/2	1048
2/1	844
2/2 (with short)	1184(In) 840(Out)
2/3 (short)	344
3/1 (short)	264
3/2 (with short)	717(In) 453(Out)
4/1	460
5/1	844
5/2	1293
6/1	1224
6/2	1048

Full Input Data And Results

Lane Saturation Flows

Junction: Warwick Rd/Poplars Avenue								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Warwick Rd SB)	4.50	0.00	Y	Arm 4 Left	20.00	10.8 %	2048	2048
				Arm 6 Ahead	Inf	89.2 %		
1/2 (Warwick Rd SB)	4.50	0.00	N	Arm 6 Ahead	Inf	100.0 %	2205	2205
2/1 (Warwick Rd NB)	3.60	0.00	Y	Arm 5 Ahead	Inf	100.0 %	1975	1975
2/2 (Warwick Rd NB)	3.60	0.00	N	Arm 5 Ahead	Inf	100.0 %	2115	2115
2/3 (Warwick Rd NB)	3.60	0.00	Y	Arm 4 Right	20.00	100.0 %	1837	1837
3/1 (Poplars Avenue)	3.60	0.00	Y	Arm 6 Left	20.00	100.0 %	1837	1837
3/2 (Poplars Avenue)	3.60	0.00	Y	Arm 5 Right	20.00	100.0 %	1837	1837
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
5/2	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf

Scenario 3: '2032 AM Do Something 72s CT' (FG1: '2032 AM Do Something', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	Tot.	0	0	0	0

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 3: 2032 AM Do Something 72s CT
Junction: Warwick Rd/Poplars Avenue	
1/1	1013
1/2	990
2/1	675
2/2 (with short)	938(In) 671(Out)
2/3 (short)	267
3/1 (short)	374
3/2 (with short)	840(In) 466(Out)
4/1	416
5/1	675
5/2	1137
6/1	1238
6/2	990

Lane Saturation Flows

Junction: Warwick Rd/Poplars Avenue

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Warwick Rd SB)	4.50	0.00	Y	Arm 4 Left	20.00	14.7 %	2042	2042
				Arm 6 Ahead	Inf	85.3 %		
1/2 (Warwick Rd SB)	4.50	0.00	N	Arm 6 Ahead	Inf	100.0 %	2205	2205
2/1 (Warwick Rd NB)	3.60	0.00	Y	Arm 5 Ahead	Inf	100.0 %	1975	1975
2/2 (Warwick Rd NB)	3.60	0.00	N	Arm 5 Ahead	Inf	100.0 %	2115	2115
2/3 (Warwick Rd NB)	3.60	0.00	Y	Arm 4 Right	20.00	100.0 %	1837	1837
3/1 (Poplars Avenue)	3.60	0.00	Y	Arm 6 Left	20.00	100.0 %	1837	1837
3/2 (Poplars Avenue)	3.60	0.00	Y	Arm 5 Right	20.00	100.0 %	1837	1837
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
5/2	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

Scenario 4: '2032 PM Do Something 72s CT' (FG2: '2032 PM Do Something', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	Tot.	0	0	0	0

Traffic Lane Flows

Lane	Scenario 4: 2032 PM Do Something 72s CT
Junction: Warwick Rd/Poplars Avenue	
1/1	1076
1/2	1048
2/1	844
2/2 (with short)	1184(In) 840(Out)
2/3 (short)	344
3/1 (short)	264
3/2 (with short)	717(In) 453(Out)
4/1	460
5/1	844
5/2	1293
6/1	1224
6/2	1048

Full Input Data And Results

Lane Saturation Flows

Junction: Warwick Rd/Poplars Avenue								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Warwick Rd SB)	4.50	0.00	Y	Arm 4 Left	20.00	10.8 %	2048	2048
				Arm 6 Ahead	Inf	89.2 %		
1/2 (Warwick Rd SB)	4.50	0.00	N	Arm 6 Ahead	Inf	100.0 %	2205	2205
2/1 (Warwick Rd NB)	3.60	0.00	Y	Arm 5 Ahead	Inf	100.0 %	1975	1975
2/2 (Warwick Rd NB)	3.60	0.00	N	Arm 5 Ahead	Inf	100.0 %	2115	2115
2/3 (Warwick Rd NB)	3.60	0.00	Y	Arm 4 Right	20.00	100.0 %	1837	1837
3/1 (Poplars Avenue)	3.60	0.00	Y	Arm 6 Left	20.00	100.0 %	1837	1837
3/2 (Poplars Avenue)	3.60	0.00	Y	Arm 5 Right	20.00	100.0 %	1837	1837
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
5/2	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf

Scenario 5: '2032 AM Do Something 90s CT' (FG1: '2032 AM Do Something', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	Tot.	0	0	0	0

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 5: 2032 AM Do Something 90s CT
Junction: Warwick Rd/Poplars Avenue	
1/1	1013
1/2	990
2/1	675
2/2 (with short)	938(In) 671(Out)
2/3 (short)	267
3/1 (short)	374
3/2 (with short)	840(In) 466(Out)
4/1	416
5/1	675
5/2	1137
6/1	1238
6/2	990

Lane Saturation Flows

Junction: Warwick Rd/Poplars Avenue

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Warwick Rd SB)	4.50	0.00	Y	Arm 4 Left	20.00	14.7 %	2042	2042
				Arm 6 Ahead	Inf	85.3 %		
1/2 (Warwick Rd SB)	4.50	0.00	N	Arm 6 Ahead	Inf	100.0 %	2205	2205
2/1 (Warwick Rd NB)	3.60	0.00	Y	Arm 5 Ahead	Inf	100.0 %	1975	1975
2/2 (Warwick Rd NB)	3.60	0.00	N	Arm 5 Ahead	Inf	100.0 %	2115	2115
2/3 (Warwick Rd NB)	3.60	0.00	Y	Arm 4 Right	20.00	100.0 %	1837	1837
3/1 (Poplars Avenue)	3.60	0.00	Y	Arm 6 Left	20.00	100.0 %	1837	1837
3/2 (Poplars Avenue)	3.60	0.00	Y	Arm 5 Right	20.00	100.0 %	1837	1837
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
5/2	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

Scenario 6: '2032 PM Do Something 90s CT' (FG2: '2032 PM Do Something', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	Tot.	0	0	0	0

Traffic Lane Flows

Lane	Scenario 6: 2032 PM Do Something 90s CT
Junction: Warwick Rd/Poplars Avenue	
1/1	1076
1/2	1048
2/1	844
2/2 (with short)	1184(In) 840(Out)
2/3 (short)	344
3/1 (short)	264
3/2 (with short)	717(In) 453(Out)
4/1	460
5/1	844
5/2	1293
6/1	1224
6/2	1048

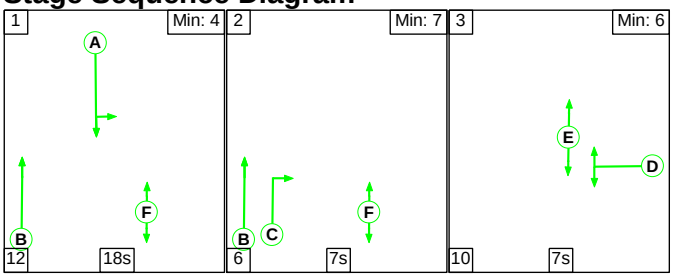
Full Input Data And Results

Lane Saturation Flows

Junction: Warwick Rd/Poplars Avenue								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Warwick Rd SB)	4.50	0.00	Y	Arm 4 Left	20.00	10.8 %	2048	2048
				Arm 6 Ahead	Inf	89.2 %		
1/2 (Warwick Rd SB)	4.50	0.00	N	Arm 6 Ahead	Inf	100.0 %	2205	2205
2/1 (Warwick Rd NB)	3.60	0.00	Y	Arm 5 Ahead	Inf	100.0 %	1975	1975
2/2 (Warwick Rd NB)	3.60	0.00	N	Arm 5 Ahead	Inf	100.0 %	2115	2115
2/3 (Warwick Rd NB)	3.60	0.00	Y	Arm 4 Right	20.00	100.0 %	1837	1837
3/1 (Poplars Avenue)	3.60	0.00	Y	Arm 6 Left	20.00	100.0 %	1837	1837
3/2 (Poplars Avenue)	3.60	0.00	Y	Arm 5 Right	20.00	100.0 %	1837	1837
4/1	Infinite Saturation Flow						Inf	Inf
5/1	Infinite Saturation Flow						Inf	Inf
5/2	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf

Scenario 1: '2032 AM Do Something 60s CT' (FG1: '2032 AM Do Something', Plan 1: 'Network Control Plan 1')

Stage Sequence Diagram

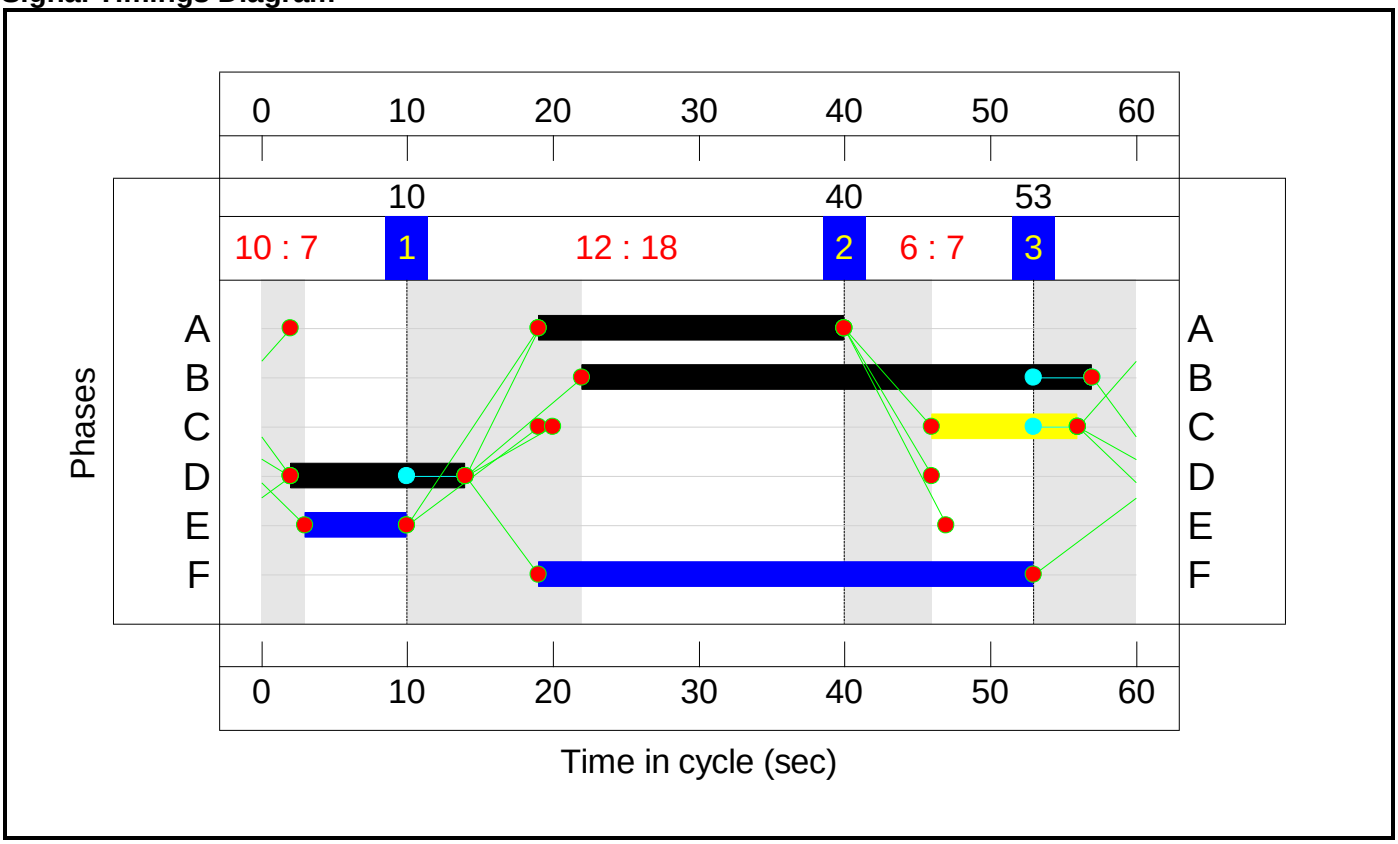


Stage Timings

Stage	1	2	3
Duration	18	7	7
Change Point	10	40	53

Full Input Data And Results

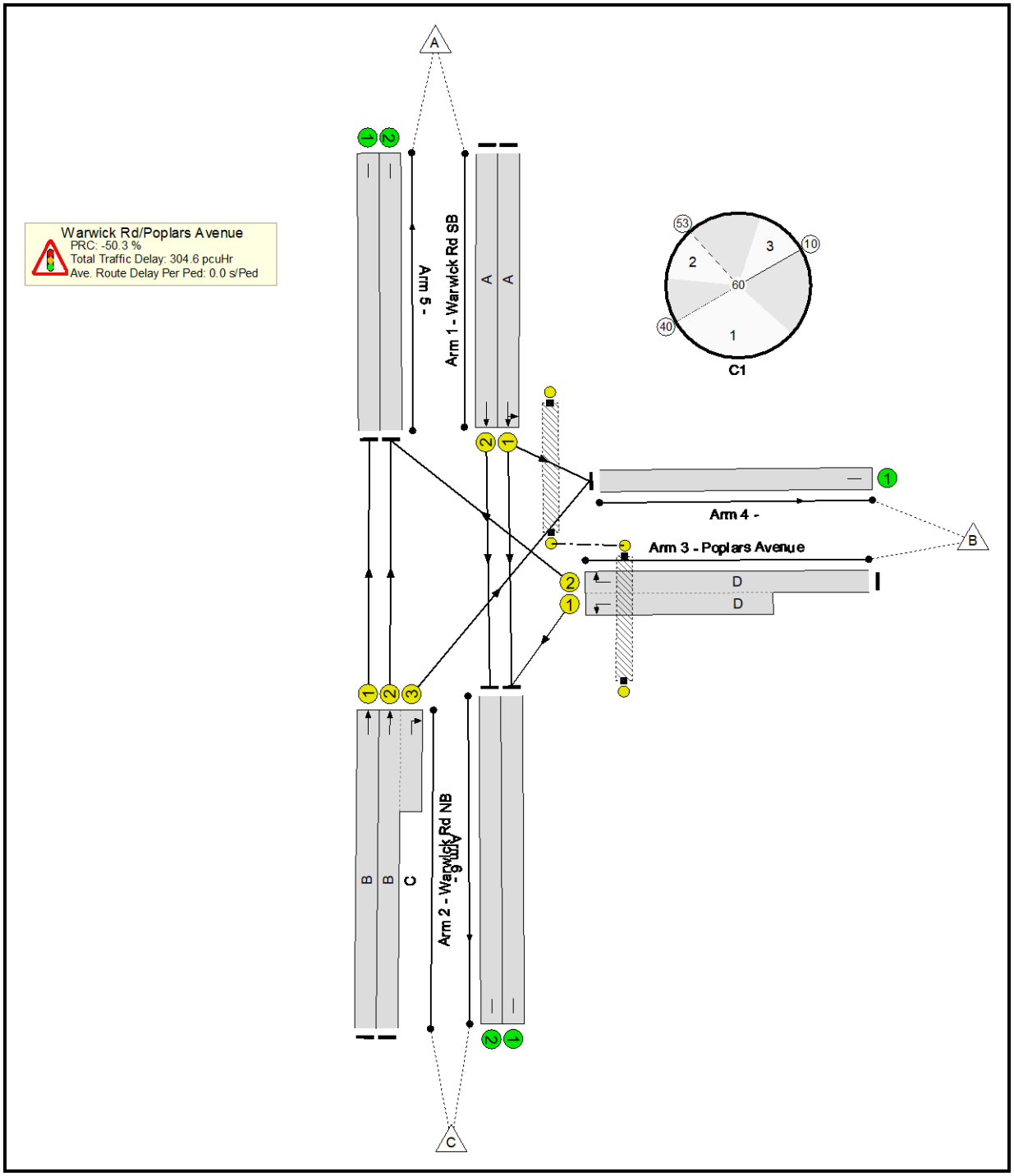
Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram

Full Input Data And Results



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**135.3%**
Warwick Rd/Poplars Avenue	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**135.3%**
1/1	Warwick Rd SB Left Ahead	U	N/A	N/A	A		1	21	-	1013	2042	749	135.3%
1/2	Warwick Rd SB Ahead	U	N/A	N/A	A		1	21	-	990	2205	808	122.4%
2/1	Warwick Rd NB Ahead	U	N/A	N/A	B		1	35	-	675	1975	1185	57.0%
2/2+2/3	Warwick Rd NB Right Ahead	U	N/A	N/A	B C		1	35:10	-	938	2115:1837	846+337	79.3 : 79.3%
3/2+3/1	Poplars Avenue Right Left	U	N/A	N/A	D		1	12	-	840	1837:1837	398+398	117.1 : 94.0%
4/1		U	N/A	N/A	-		-	-	-	416	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	675	Inf	Inf	0.0%
5/2		U	N/A	N/A	-		-	-	-	1137	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	1238	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	990	Inf	Inf	0.0%
Ped Link: P1	Unnamed Ped Link	-	N/A	-	E		1	7	-	0	-	0	0.0%
Ped Link: P2	Unnamed Ped Link	-	N/A	-	F		1	34	-	0	-	0	0.0%

Full Input Data And Results

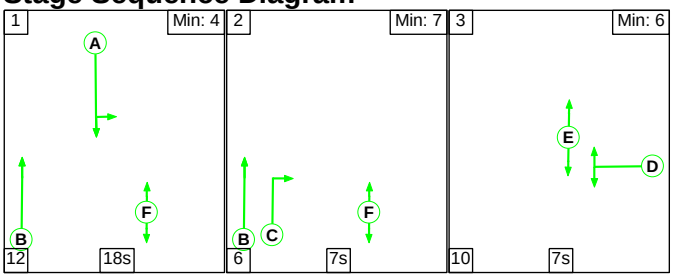
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**0**	**0**	**0**	**33.5**	**271.2**	**0.0**	**304.6**	**-**	**-**	**-**	**-**
Warwick Rd/Poplars Avenue	**-**	**-**	**0**	**0**	**0**	**33.5**	**271.2**	**0.0**	**304.6**	**-**	**-**	**-**	**-**
1/1	1013	749	-	-	-	11.8	134.0	-	145.9	518.4	21.3	134.0	155.3
1/2	990	809	-	-	-	9.7	93.4	-	103.1	374.9	19.5	93.4	112.9
2/1	675	675	-	-	-	1.4	0.7	-	2.0	10.8	6.7	0.7	7.4
2/2+2/3	938	938	-	-	-	3.0	1.9	-	4.9	18.9	6.5	1.9	8.4
3/2+3/1	840	772	-	-	-	7.5	41.2	-	48.7	208.8	8.9	41.2	50.1
4/1	377	377	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	675	675	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	1069	1069	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	1013	1013	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	809	809	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
Ped Link: P1	0	0	-	-	-	-	-	-	-	-	-	-	-
Ped Link: P2	0	0	-	-	-	-	-	-	-	-	-	-	-

C1 PRC for Signalled Lanes (%): -50.3 Total Delay for Signalled Lanes (pcuHr): 304.62 Cycle Time (s): 60
PRC Over All Lanes (%): -50.3 Total Delay Over All Lanes(pcuHr): 304.62

Full Input Data And Results

Scenario 2: '2032 PM Do Something 60s CT' (FG2: '2032 PM Do Something', Plan 1: 'Network Control Plan 1')

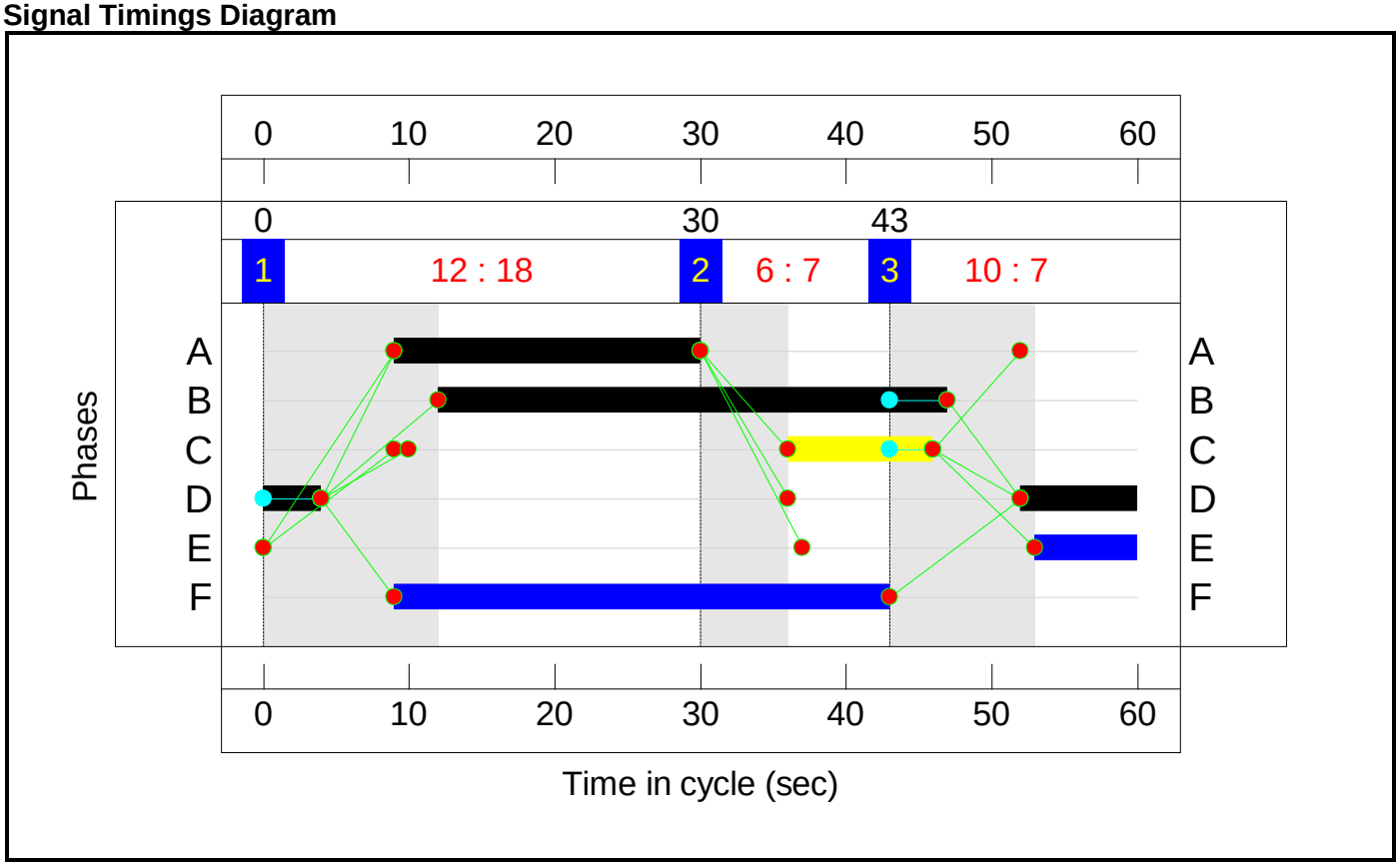
Stage Sequence Diagram



Stage Timings

Stage	1	2	3
Duration	18	7	7
Change Point	0	30	43

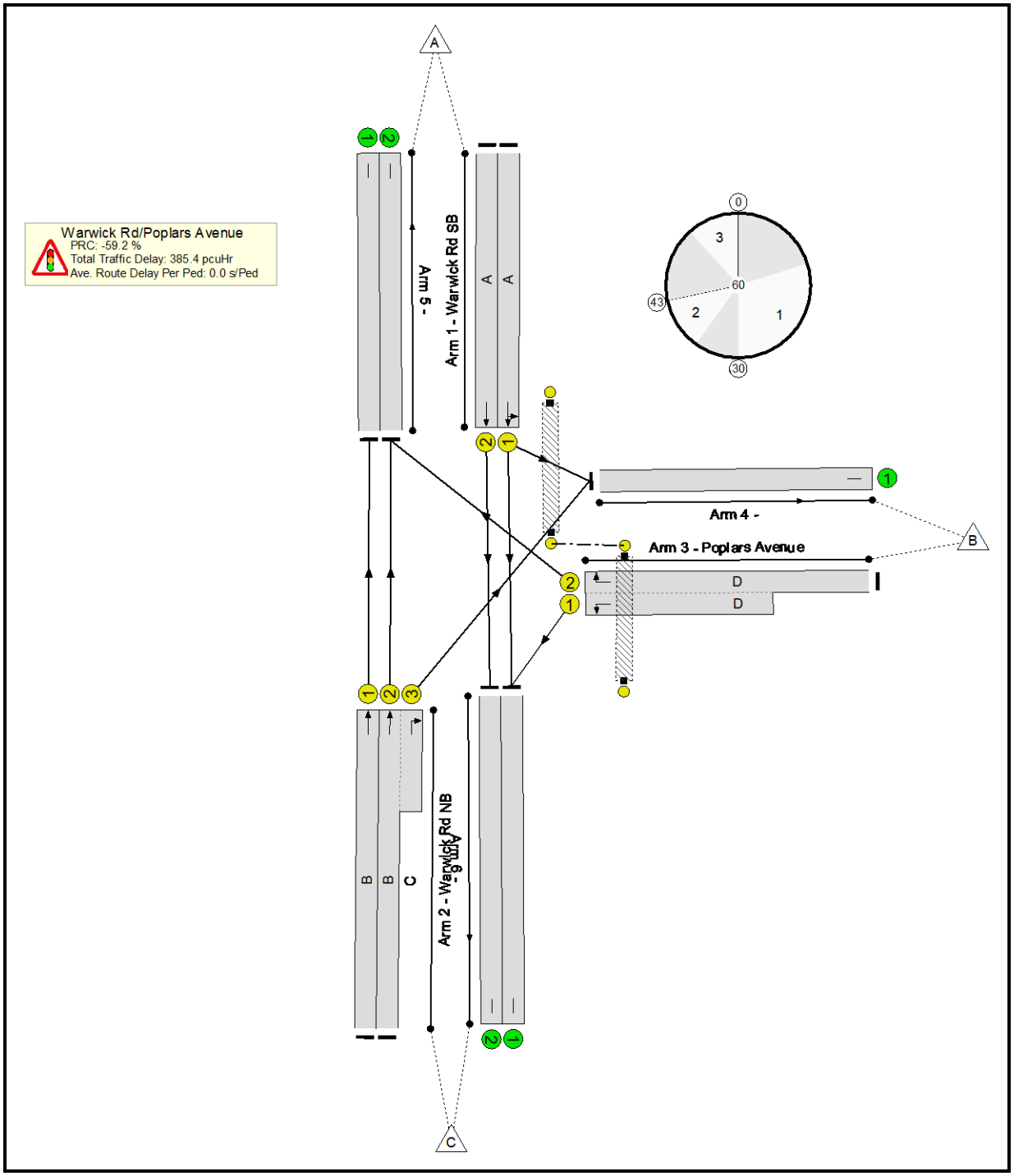
Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram

Full Input Data And Results



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**143.3%**
Warwick Rd/Poplars Avenue	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**143.3%**
1/1	Warwick Rd SB Left Ahead	U	N/A	N/A	A		1	21	-	1076	2048	751	143.3%
1/2	Warwick Rd SB Ahead	U	N/A	N/A	A		1	21	-	1048	2205	808	129.6%
2/1	Warwick Rd NB Ahead	U	N/A	N/A	B		1	35	-	844	1975	1185	71.2%
2/2+2/3	Warwick Rd NB Right Ahead	U	N/A	N/A	B C		1	35:10	-	1184	2115:1837	822+337	102.1 : 102.1%
3/2+3/1	Poplars Avenue Right Left	U	N/A	N/A	D		1	12	-	717	1837:1837	398+285	113.8 : 92.6%
4/1		U	N/A	N/A	-		-	-	-	460	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	844	Inf	Inf	0.0%
5/2		U	N/A	N/A	-		-	-	-	1293	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	1224	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	1048	Inf	Inf	0.0%
Ped Link: P1	Unnamed Ped Link	-	N/A	-	E		1	7	-	0	-	0	0.0%
Ped Link: P2	Unnamed Ped Link	-	N/A	-	F		1	34	-	0	-	0	0.0%

Full Input Data And Results

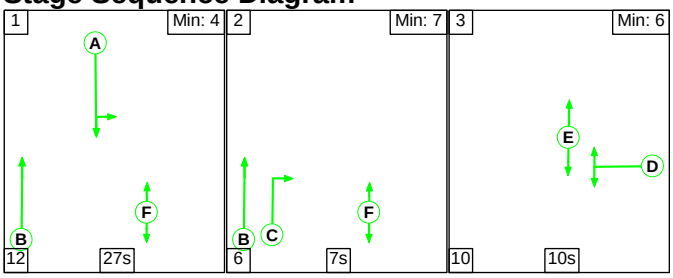
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**0**	**0**	**0**	**38.8**	**346.7**	**0.0**	**385.4**	**-**	**-**	**-**	**-**
Warwick Rd/Poplars Avenue	**-**	**-**	**0**	**0**	**0**	**38.8**	**346.7**	**0.0**	**385.4**	**-**	**-**	**-**	**-**
1/1	1076	751	-	-	-	14.6	164.2	-	178.7	598.0	23.4	164.2	187.5
1/2	1048	809	-	-	-	12.1	121.9	-	134.0	460.2	21.5	121.9	143.4
2/1	844	844	-	-	-	2.0	1.2	-	3.2	13.6	9.6	1.2	10.8
2/2+2/3	1184	1177	-	-	-	4.4	24.5	-	28.9	87.9	11.9	24.5	36.4
3/2+3/1	717	662	-	-	-	5.7	34.9	-	40.6	203.8	7.9	34.9	42.7
4/1	418	418	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	844	844	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	1238	1238	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	934	934	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	809	809	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
Ped Link: P1	0	0	-	-	-	-	-	-	-	-	-	-	-
Ped Link: P2	0	0	-	-	-	-	-	-	-	-	-	-	-

C1 PRC for Signalled Lanes (%): -59.2 Total Delay for Signalled Lanes (pcuHr): 385.42 Cycle Time (s): 60
PRC Over All Lanes (%): -59.2 Total Delay Over All Lanes(pcuHr): 385.42

Full Input Data And Results

Scenario 3: '2032 AM Do Something 72s CT' (FG1: '2032 AM Do Something', Plan 1: 'Network Control Plan 1')

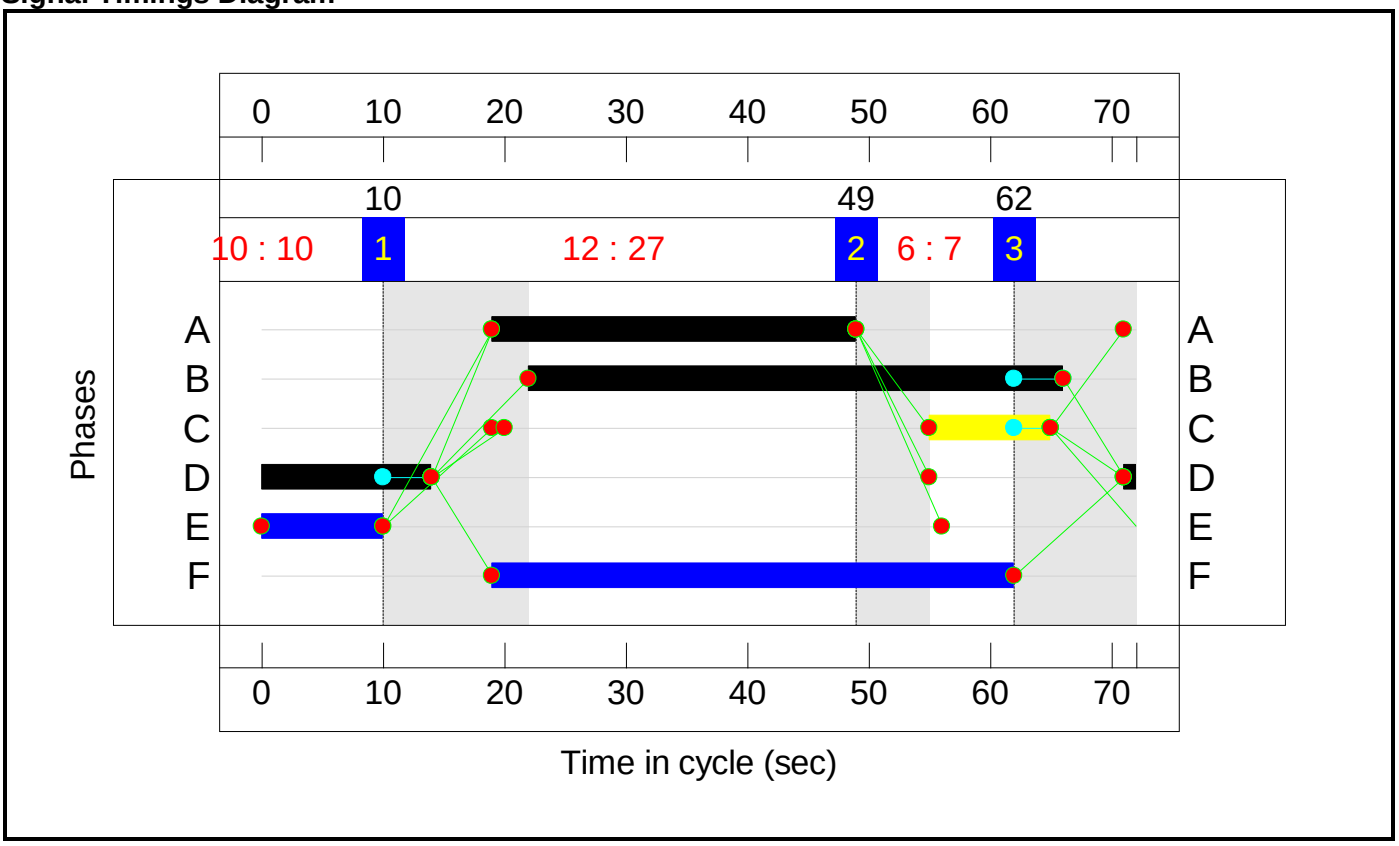
Stage Sequence Diagram



Stage Timings

Stage	1	2	3
Duration	27	7	10
Change Point	10	49	62

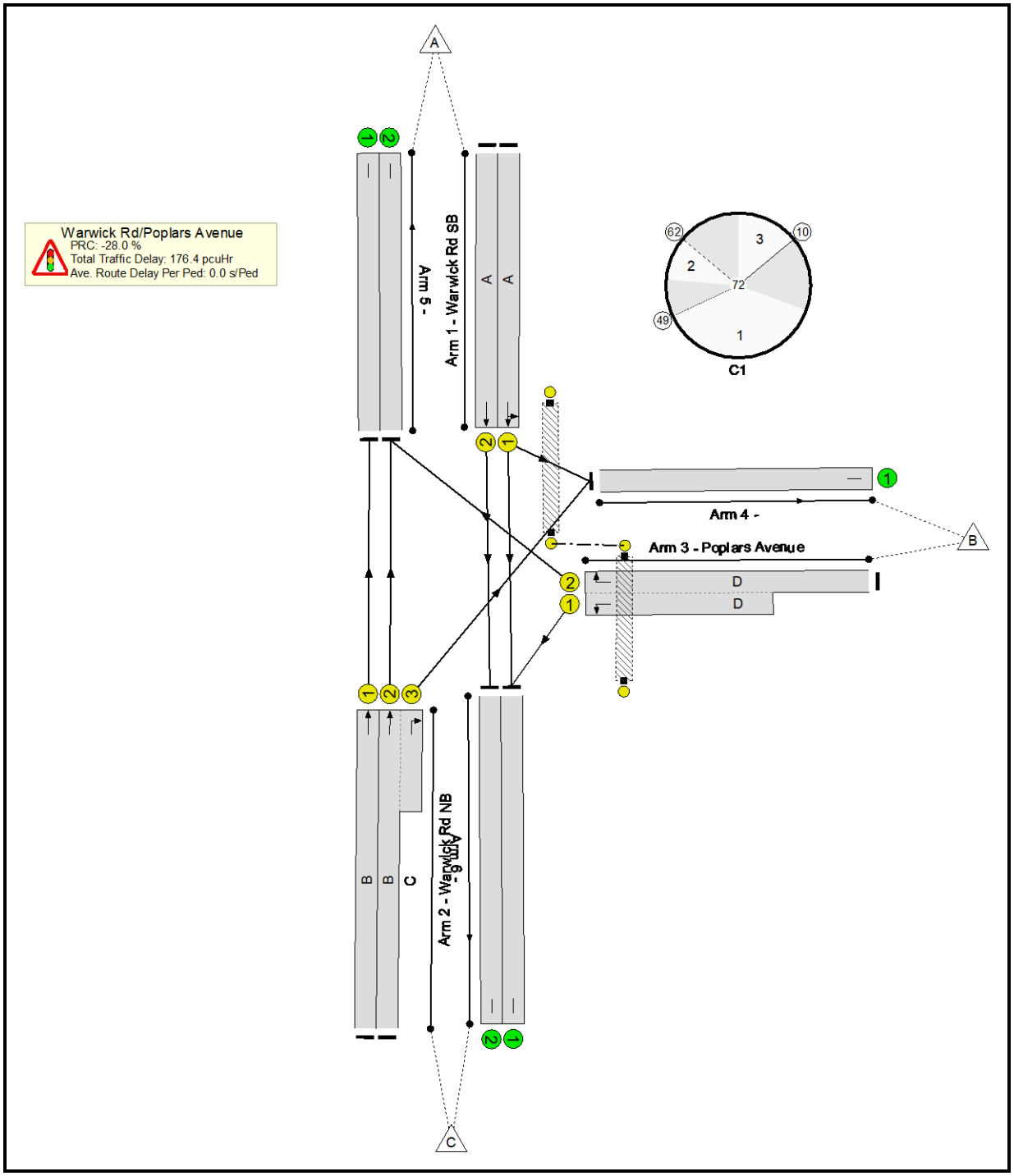
Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram

Full Input Data And Results



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**115.2%**
Warwick Rd/Poplars Avenue	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**115.2%**
1/1	Warwick Rd SB Left Ahead	U	N/A	N/A	A		1	30	-	1013	2042	879	115.2%
1/2	Warwick Rd SB Ahead	U	N/A	N/A	A		1	30	-	990	2205	949	104.3%
2/1	Warwick Rd NB Ahead	U	N/A	N/A	B		1	44	-	675	1975	1234	54.7%
2/2+2/3	Warwick Rd NB Right Ahead	U	N/A	N/A	B C		1	44:10	-	938	2115:1837	705+281	95.1 : 95.1%
3/2+3/1	Poplars Avenue Right Left	U	N/A	N/A	D		1	15	-	840	1837:1837	408+408	114.2 : 91.6%
4/1		U	N/A	N/A	-		-	-	-	416	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	675	Inf	Inf	0.0%
5/2		U	N/A	N/A	-		-	-	-	1137	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	1238	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	990	Inf	Inf	0.0%
Ped Link: P1	Unnamed Ped Link	-	N/A	-	E		1	10	-	0	-	0	0.0%
Ped Link: P2	Unnamed Ped Link	-	N/A	-	F		1	43	-	0	-	0	0.0%

Full Input Data And Results

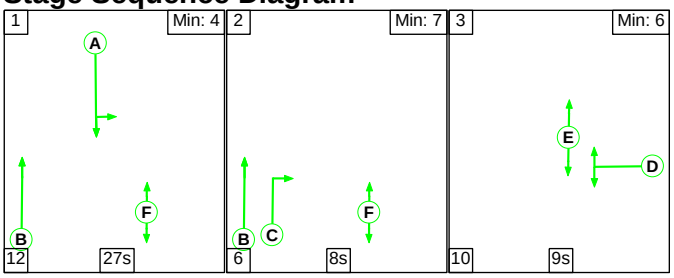
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**0**	**0**	**0**	**30.3**	**146.1**	**0.0**	**176.4**	**-**	**-**	**-**	**-**
Warwick Rd/Poplars Avenue	**-**	**-**	**0**	**0**	**0**	**30.3**	**146.1**	**0.0**	**176.4**	**-**	**-**	**-**	**-**
1/1	1013	879	-	-	-	9.8	70.5	-	80.3	285.3	22.9	70.5	93.4
1/2	990	949	-	-	-	6.9	28.9	-	35.7	130.0	20.6	28.9	49.5
2/1	675	675	-	-	-	1.4	0.6	-	2.0	10.9	7.7	0.6	8.3
2/2+2/3	938	938	-	-	-	3.6	7.5	-	11.1	42.5	7.8	7.5	15.2
3/2+3/1	840	782	-	-	-	8.6	38.6	-	47.3	202.6	10.5	38.6	49.1
4/1	396	396	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	675	675	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	1079	1079	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	1124	1124	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	949	949	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
Ped Link: P1	0	0	-	-	-	-	-	-	-	-	-	-	-
Ped Link: P2	0	0	-	-	-	-	-	-	-	-	-	-	-

C1 PRC for Signalled Lanes (%): -28.0 Total Delay for Signalled Lanes (pcuHr): 176.43 Cycle Time (s): 72
PRC Over All Lanes (%): -28.0 Total Delay Over All Lanes(pcuHr): 176.43

Full Input Data And Results

Scenario 4: '2032 PM Do Something 72s CT' (FG2: '2032 PM Do Something', Plan 1: 'Network Control Plan 1')

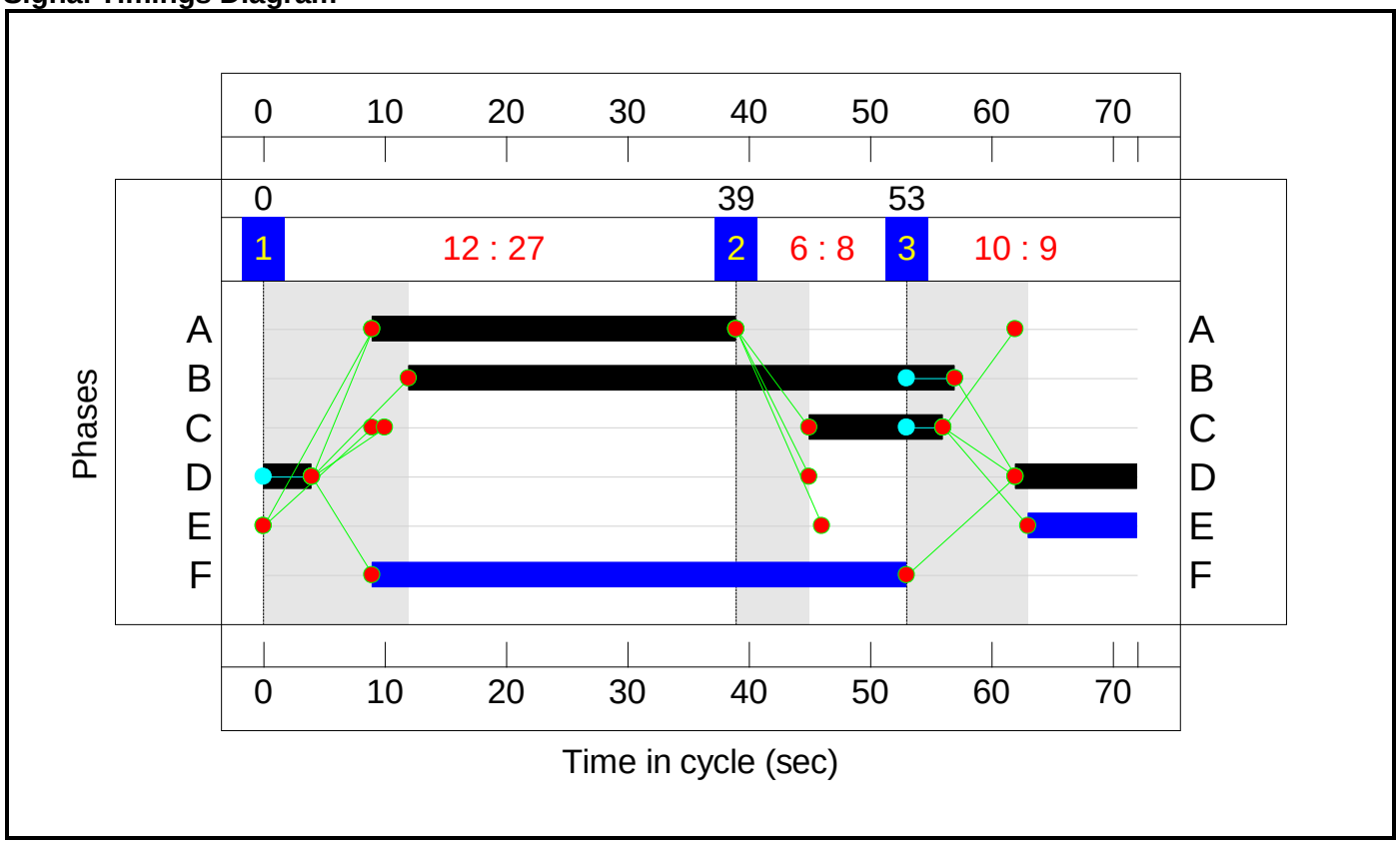
Stage Sequence Diagram



Stage Timings

Stage	1	2	3
Duration	27	8	9
Change Point	0	39	53

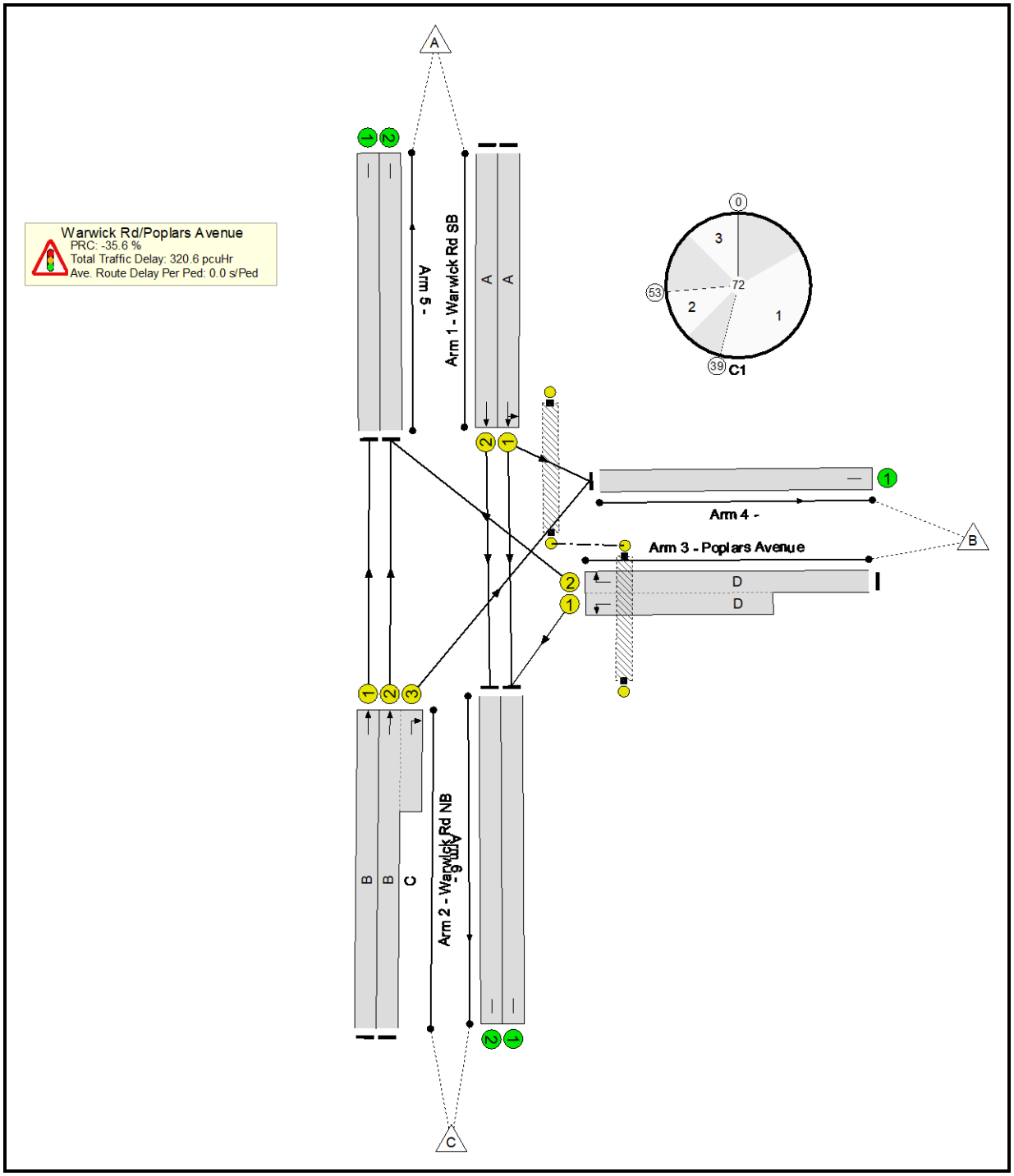
Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram

Full Input Data And Results



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**122.0%**
Warwick Rd/Poplars Avenue	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**122.0%**
1/1	Warwick Rd SB Left Ahead	U	N/A	N/A	A		1	30	-	1076	2048	882	122.0%
1/2	Warwick Rd SB Ahead	U	N/A	N/A	A		1	30	-	1048	2205	949	110.4%
2/1	Warwick Rd NB Ahead	U	N/A	N/A	B		1	45	-	844	1975	1262	66.9%
2/2+2/3	Warwick Rd NB Right Ahead	U	N/A	N/A	B C		1	45:11	-	1184	2115:1837	748+306	112.4 : 112.4%
3/2+3/1	Poplars Avenue Right Left	U	N/A	N/A	D		1	14	-	717	1837:1837	383+223	118.4 : 118.4%
4/1		U	N/A	N/A	-		-	-	-	460	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	844	Inf	Inf	0.0%
5/2		U	N/A	N/A	-		-	-	-	1293	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	1224	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	1048	Inf	Inf	0.0%
Ped Link: P1	Unnamed Ped Link	-	N/A	-	E		1	9	-	0	-	0	0.0%
Ped Link: P2	Unnamed Ped Link	-	N/A	-	F		1	44	-	0	-	0	0.0%

Full Input Data And Results

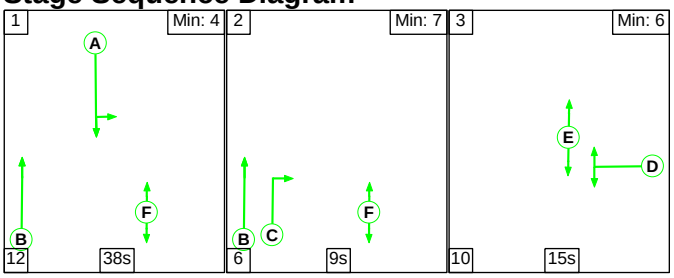
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**0**	**0**	**0**	**37.5**	**283.0**	**0.0**	**320.6**	**-**	**-**	**-**	**-**
Warwick Rd/Poplars Avenue	**-**	**-**	**0**	**0**	**0**	**37.5**	**283.0**	**0.0**	**320.6**	**-**	**-**	**-**	**-**
1/1	1076	882	-	-	-	12.5	99.8	-	112.3	375.7	25.4	99.8	125.2
1/2	1048	949	-	-	-	9.2	54.2	-	63.4	217.6	22.9	54.2	77.1
2/1	844	844	-	-	-	1.9	1.0	-	2.9	12.5	10.5	1.0	11.6
2/2+2/3	1184	1053	-	-	-	6.2	69.4	-	75.6	229.8	13.3	69.4	82.6
3/2+3/1	717	647	-	-	-	7.7	58.7	-	66.4	333.4	10.4	58.7	69.0
4/1	401	401	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	844	844	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	1130	1130	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	1051	1051	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	949	949	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
Ped Link: P1	0	0	-	-	-	-	-	-	-	-	-	-	-
Ped Link: P2	0	0	-	-	-	-	-	-	-	-	-	-	-

C1 PRC for Signalled Lanes (%): -35.6 Total Delay for Signalled Lanes (pcuHr): 320.56 Cycle Time (s): 72
PRC Over All Lanes (%): -35.6 Total Delay Over All Lanes(pcuHr): 320.56

Full Input Data And Results

Scenario 5: '2032 AM Do Something 90s CT' (FG1: '2032 AM Do Something', Plan 1: 'Network Control Plan 1')

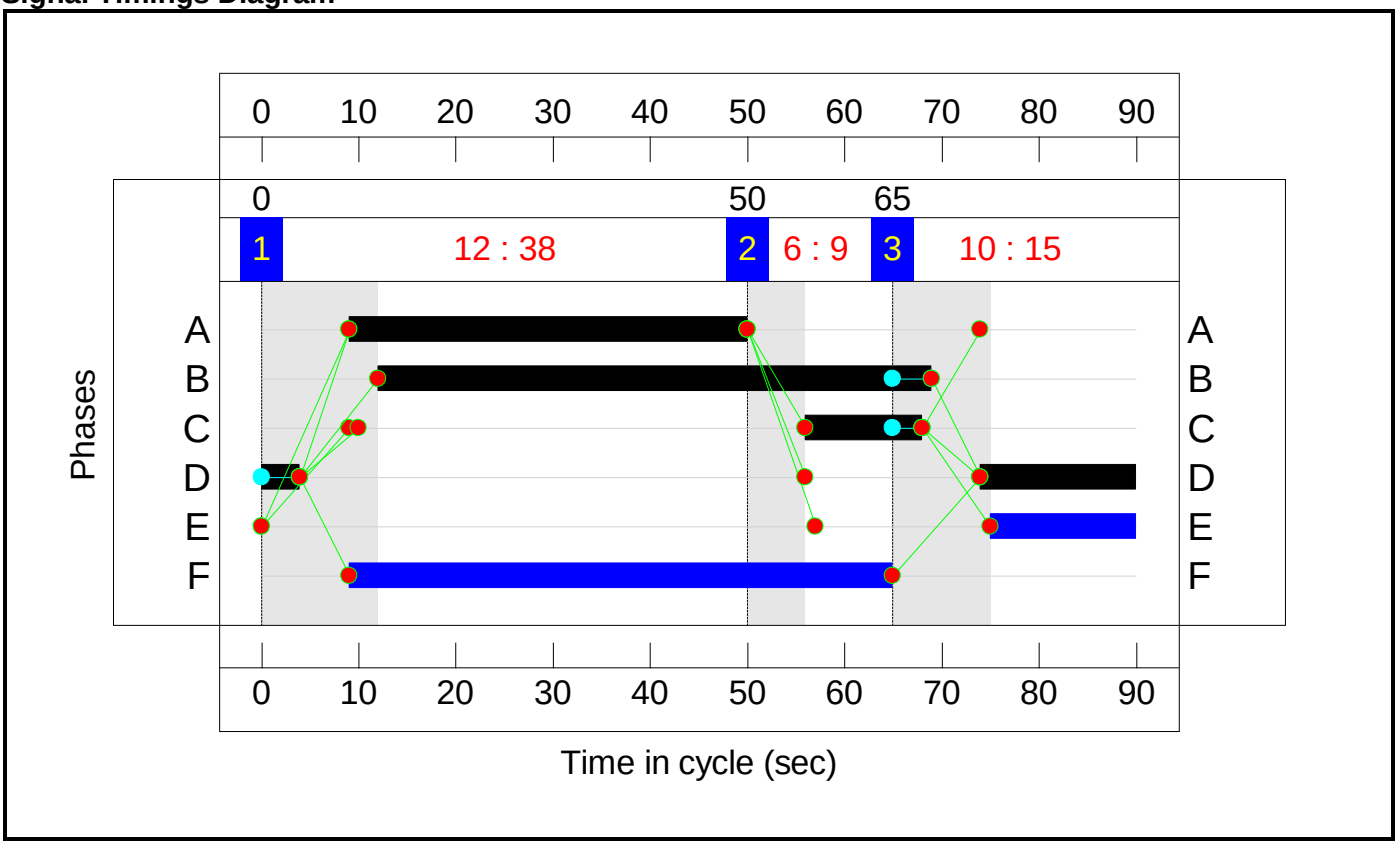
Stage Sequence Diagram



Stage Timings

Stage	1	2	3
Duration	38	9	15
Change Point	0	50	65

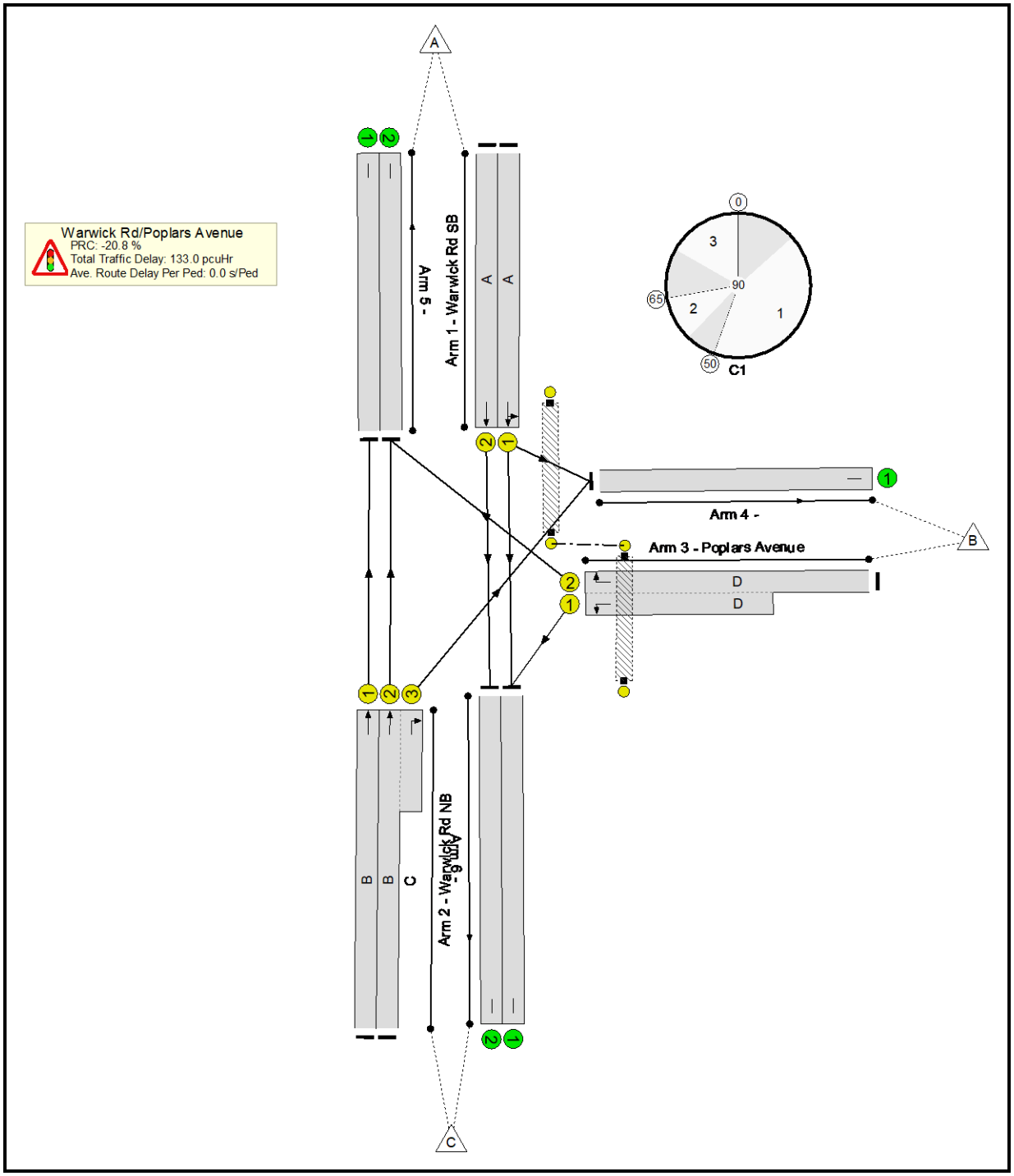
Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram

Full Input Data And Results



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**108.7%**
Warwick Rd/Poplars Avenue	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**108.7%**
1/1	Warwick Rd SB Left Ahead	U	N/A	N/A	A		1	41	-	1013	2042	953	106.3%
1/2	Warwick Rd SB Ahead	U	N/A	N/A	A		1	41	-	990	2205	1029	96.2%
2/1	Warwick Rd NB Ahead	U	N/A	N/A	B		1	57	-	675	1975	1273	53.0%
2/2+2/3	Warwick Rd NB Right Ahead	U	N/A	N/A	B C		1	57:12	-	938	2115:1837	667+265	100.6 : 100.6%
3/2+3/1	Poplars Avenue Right Left	U	N/A	N/A	D		1	20	-	840	1837:1837	429+344	108.7 : 108.7%
4/1		U	N/A	N/A	-		-	-	-	416	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	675	Inf	Inf	0.0%
5/2		U	N/A	N/A	-		-	-	-	1137	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	1238	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	990	Inf	Inf	0.0%
Ped Link: P1	Unnamed Ped Link	-	N/A	-	E		1	15	-	0	-	0	0.0%
Ped Link: P2	Unnamed Ped Link	-	N/A	-	F		1	56	-	0	-	0	0.0%

Full Input Data And Results

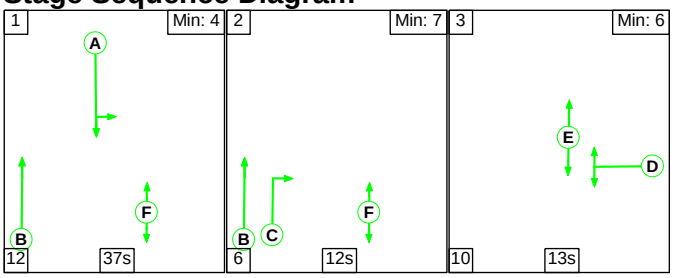
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**0**	**0**	**0**	**30.9**	**102.1**	**0.0**	**133.0**	**-**	**-**	**-**	**-**
Warwick Rd/Poplars Avenue	**-**	**-**	**0**	**0**	**0**	**30.9**	**102.1**	**0.0**	**133.0**	**-**	**-**	**-**	**-**
1/1	1013	953	-	-	-	9.2	36.9	-	46.1	163.9	26.8	36.9	63.7
1/2	990	990	-	-	-	6.4	8.8	-	15.1	55.1	23.9	8.8	32.7
2/1	675	675	-	-	-	1.6	0.6	-	2.2	11.7	9.0	0.6	9.6
2/2+2/3	938	936	-	-	-	4.5	16.8	-	21.3	81.8	10.1	16.8	27.0
3/2+3/1	840	803	-	-	-	9.2	39.1	-	48.2	206.7	12.0	39.1	51.0
4/1	406	406	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	675	675	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	1100	1100	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	1187	1187	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	990	990	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
Ped Link: P1	0	0	-	-	-	-	-	-	-	-	-	-	-
Ped Link: P2	0	0	-	-	-	-	-	-	-	-	-	-	-

C1 PRC for Signalled Lanes (%): -20.8 Total Delay for Signalled Lanes (pcuHr): 133.01 Cycle Time (s): 90
PRC Over All Lanes (%): -20.8 Total Delay Over All Lanes(pcuHr): 133.01

Full Input Data And Results

Scenario 6: '2032 PM Do Something 90s CT' (FG2: '2032 PM Do Something', Plan 1: 'Network Control Plan 1')

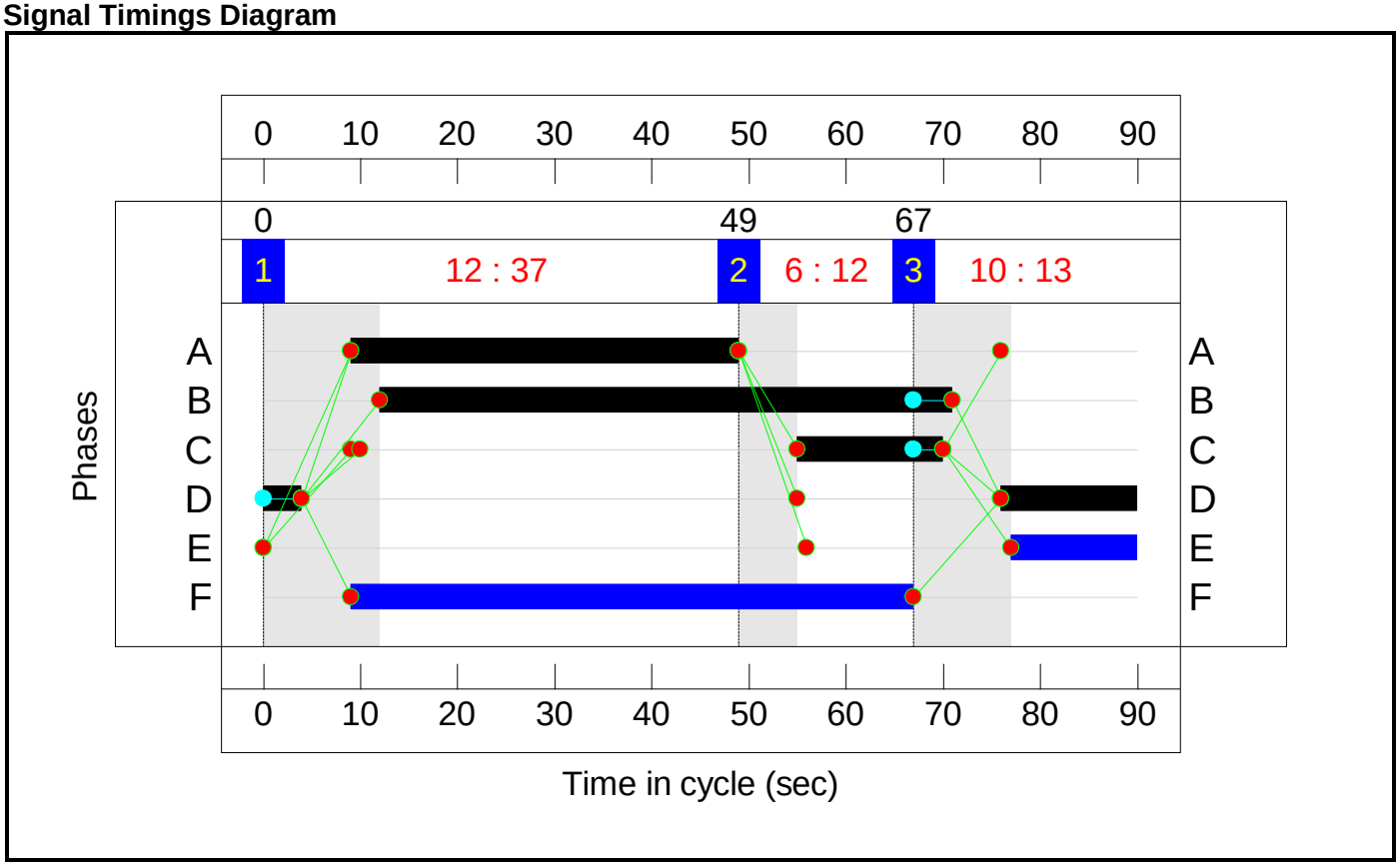
Stage Sequence Diagram



Stage Timings

Stage	1	2	3
Duration	37	12	13
Change Point	0	49	67

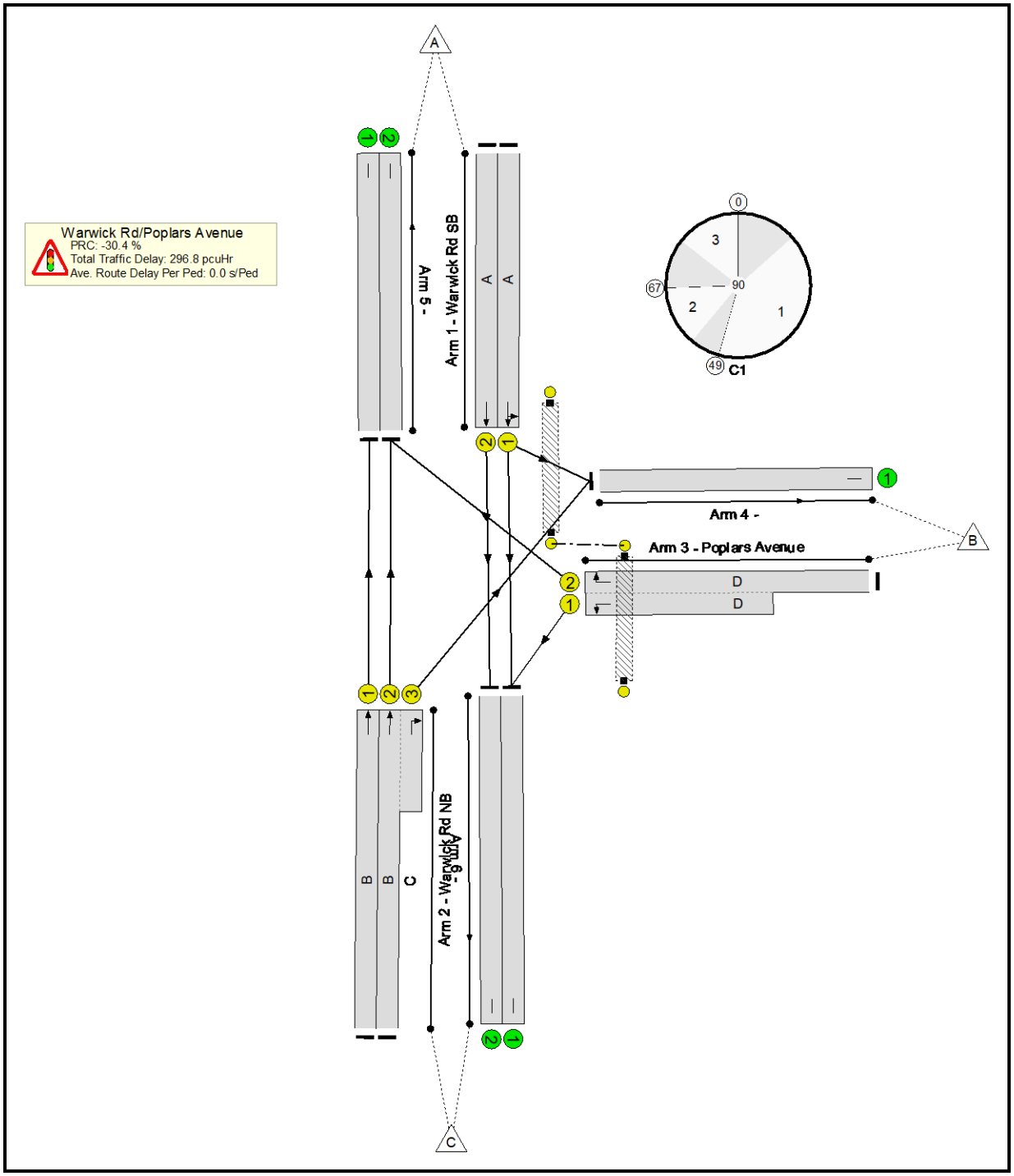
Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram

Full Input Data And Results



Full Input Data And Results

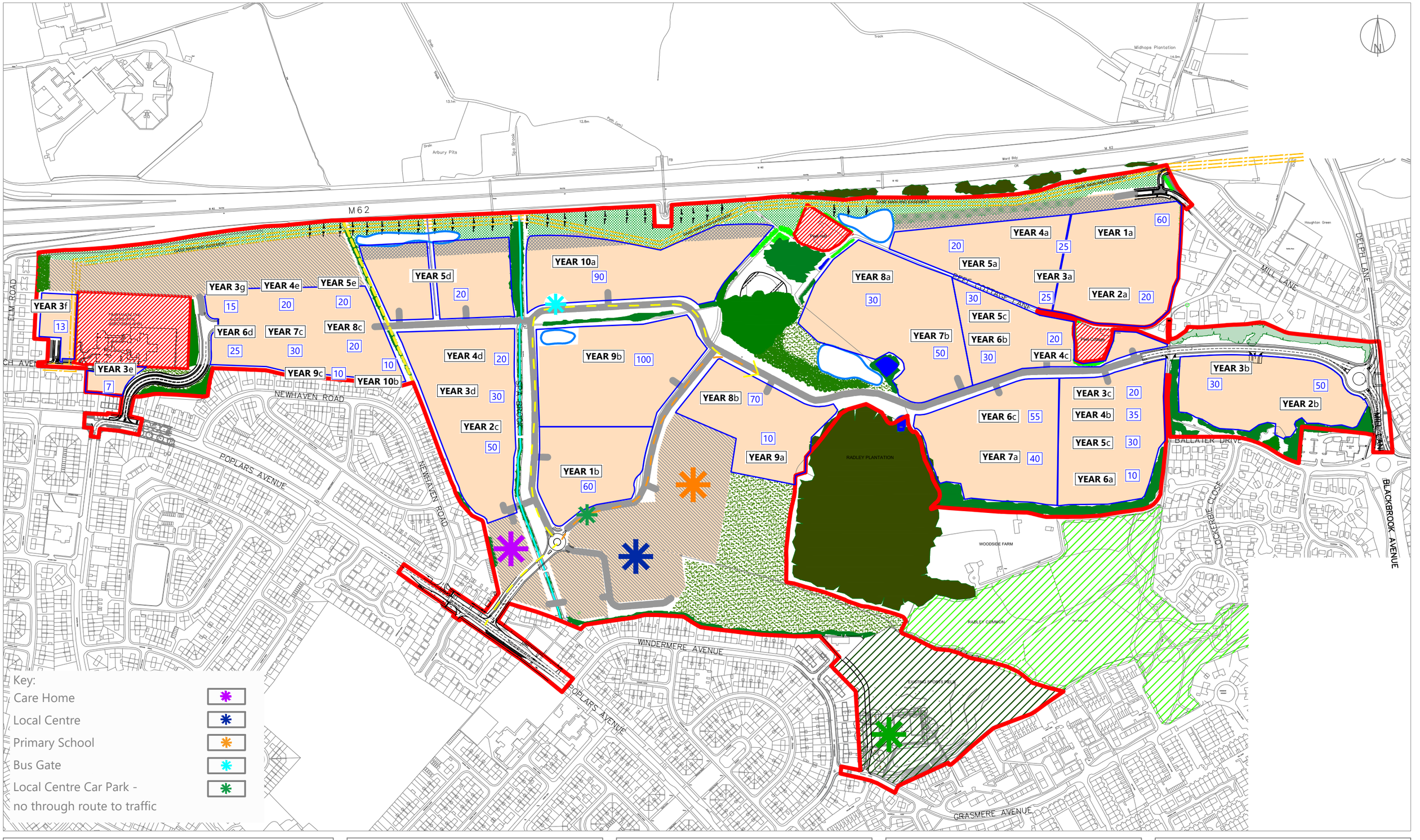
Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**117.4%**
Warwick Rd/Poplars Avenue	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**117.4%**
1/1	Warwick Rd SB Left Ahead	U	N/A	N/A	A		1	40	-	1076	2048	933	115.3%
1/2	Warwick Rd SB Ahead	U	N/A	N/A	A		1	40	-	1048	2205	1005	104.3%
2/1	Warwick Rd NB Ahead	U	N/A	N/A	B		1	59	-	844	1975	1317	64.1%
2/2+2/3	Warwick Rd NB Right Ahead	U	N/A	N/A	B C		1	59:15	-	1184	2115:1837	716+293	117.4 : 117.4%
3/2+3/1	Poplars Avenue Right Left	U	N/A	N/A	D		1	18	-	717	1837:1837	388+226	116.8 : 116.8%
4/1		U	N/A	N/A	-		-	-	-	460	Inf	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	844	Inf	Inf	0.0%
5/2		U	N/A	N/A	-		-	-	-	1293	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	1224	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	1048	Inf	Inf	0.0%
Ped Link: P1	Unnamed Ped Link	-	N/A	-	E		1	13	-	0	-	0	0.0%
Ped Link: P2	Unnamed Ped Link	-	N/A	-	F		1	58	-	0	-	0	0.0%

Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**0**	**0**	**0**	**44.7**	**252.1**	**0.0**	**296.8**	**-**	**-**	**-**	**-**
Warwick Rd/Poplars Avenue	**-**	**-**	**0**	**0**	**0**	**44.7**	**252.1**	**0.0**	**296.8**	**-**	**-**	**-**	**-**
1/1	1076	933	-	-	-	13.2	75.1	-	88.3	295.5	30.5	75.1	105.6
1/2	1048	1005	-	-	-	8.9	30.4	-	39.3	135.0	27.3	30.4	57.7
2/1	844	844	-	-	-	2.0	0.9	-	2.9	12.5	12.2	0.9	13.1
2/2+2/3	1184	1009	-	-	-	10.9	90.9	-	101.8	309.5	32.1	90.9	122.9
3/2+3/1	717	648	-	-	-	9.6	54.9	-	64.4	323.4	13.3	54.9	68.2
4/1	394	394	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	844	844	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	1103	1103	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	1092	1092	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	1005	1005	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
Ped Link: P1	0	0	-	-	-	-	-	-	-	-	-	-	-
Ped Link: P2	0	0	-	-	-	-	-	-	-	-	-	-	-

C1 PRC for Signalled Lanes (%): -30.4 Total Delay for Signalled Lanes (pcuHr): 296.76 Cycle Time (s): 90
PRC Over All Lanes (%): -30.4 Total Delay Over All Lanes(pcuHr): 296.76



NOTES:
Reproduced from Appletons Peel Hall Parameters Plan

KEY:
Indicative Year Numbering — YEAR 8b
Indicative Number of units Completed at Year End — 12
Initial Bus Link
End Bus Link

Phasing subject to detailed phasing plan to be submitted at Reserved Matters stage

ISSUE	REASON FOR REVISION	DATE

DATE: 06/03/20 | DRAWN BY: FB | CHECKED: FB

PROJECT: PEEL HALL, WARRINGTON

CLIENT: SATNAM MILLENNIUM LTD

TITLE: INDICATIVE HIGHWAYS BUILD OUT PLAN

PROJECT REFERENCE:	DRAWING NUMBER:	SCALE:
1901	09	NOT TO SCALE

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