M60/M62/M66 Simister Island Interchange

TR010064

7.4 TRANSPORT ASSESSMENT

APFP Regulation 5(2)(q)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

VOLUME 7

April 2024

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M60/M62/M66 Simister Island Interchange

Development Consent Order 202[ ]

TRANSPORT ASSESSMENT

Regulation Reference	Regulation 5(2)(q)
Planning Inspectorate Scheme Reference	TR010064
Application Document Reference	TR010064/APP/7.4
Author	M60/M62/M66 Simister Island Interchange Costain Jacobs Partnership Project Team & National Highways

Version	Date	Status of Version
P01	April 2024	DCO APPLICATION ISSUE

CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

1 Introduction

1.1 Purpose of Report

1.1.1 This Transport Assessment Report (this "Report") relates to an application made by National Highways (the "Applicant") to the Secretary of State for Transport via the Planning Inspectorate (the "Inspectorate") under section 37 of the Planning Act 2008 (the "2008 Act") for a Development Consent Order (DCO). If made, the DCO would grant consent for the M60/M62/M66 Simister Island Interchange (the "Scheme"). A detailed description of the Scheme is set out in Chapter 2: The Scheme of the Environmental Statement (TR010064/APP/6.1).

1.1.2 This Report comprises part of a suite of application documents and is included in compliance with Regulation (5)(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 which states:

(q) any other documents considered necessary to support the application.

1.1.3 The purpose of this Report is to provide information about the transport analysis undertaken as part of the development of the Scheme.

1.2 Existing Road Network

1.2.1 The existing M60 J18 Simister Island is a three-level roundabout interchange with the M60/M62 on the highest level and the M66/M60 on the lowest level, with a signal-controlled roundabout at mid-level. There are physically segregated links providing for left turn movements prior to each entry to the roundabout. M60 J18 provides the interchange between the M60, M62 and M66 to the northeast of Manchester. Figure 1-1 shows the existing layout of M60 J18.

Figure 1-1 M60 J18 Current Layout[1]

1.2.2 The M60, M62 and M66 connect important economic areas within Greater Manchester and Lancashire. Significantly, M60 J18 links Rossendale and Burnley to the north, Rochdale and Leeds to the east, and Warrington and Liverpool to the west via the M60 Manchester Outer Ring Road. There are a number of significant employment areas accessible from M60 J18 including Manchester's city centre / central business district, Bury Town Centre and the Pilsworth Road Industrial Estate as well as Heywood Distribution Park.

1.2.3 The M62 and M60 J18 to J12 form a large part of the strategic route presented in the South Pennines Route Strategy[2], connecting the cities of Leeds, Manchester and Liverpool. The M60 orbital ring road and arterial links cater for long-distance east–west traffic across the M62 as well as shorter commuting trips within Greater Manchester.

[1] Google Earth Pro (2021) M60 Simister Island, https://earth.google.com/web/

[2] South Pennines Route Strategy (March 2017), National Highways https://assets.publishing.service.gov.uk/media/5a82d343e5274a2e87dc32c1/South_Pennines_Final.pdf

1.3 Scheme Proposals

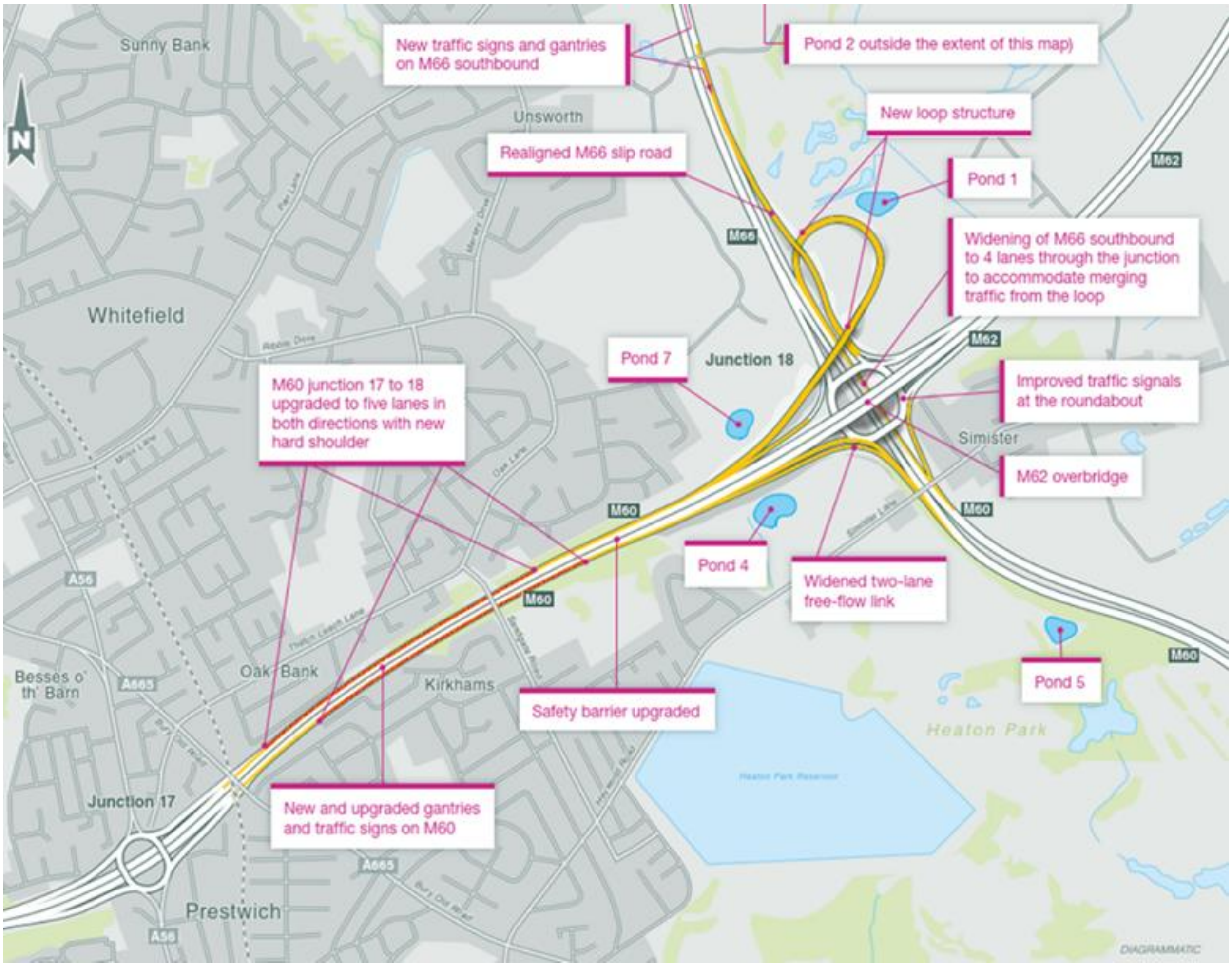
1.3.1 The Scheme consists of the following;

- M60/M62 Mainline J17-J18 – upgrade existing Smart Motorway to D5M (5-lane cross-section) with hard shoulder cross section
- M66/M60 Mainline – provide 4 lanes southbound through junction running
- M60 Eastbound to M60 Southbound – provide a free flow link (Northern Loop)
- M66 Southbound Diverge – provide a new 2-lane diverge
- M60 Eastbound to M66 Northbound – realign the existing free flow link diverge
- M60 Northbound to M60 Westbound – upgrade the existing free flow link to 2-lanes
- M62 Westbound to M60 Southbound – realign the existing free flow link
- J18 Circulatory Carriageway – upgrade the existing circulatory to accommodate reduced movements
- J17 Eastbound Merge – upgrade the existing eastbound merge to a lane gain
- J17 Westbound Diverge – upgrade the existing diverge to a lane drop

1.3.2 In addition to the changes in road layout there will also be renewal of traffic signals, signs, and street lighting at M60 J18 and its approaches, and new gantries on the M66 southbound.

1.3.3 A map of the Scheme is provided in Figure 1-2.

Figure 1-2 Scheme Map



1.3.4 Further details on the Scheme and how the design satisfies the objectives and addresses the issues, can be found in both Chapter 2: The Proposed Scheme of the Environmental Statement (TR010064/APP/6.1) and in the Case for the Scheme (TR010064/APP/7.1).

1.4 Report Structure

1.4.1 This Report has been prepared with the following structure:

- Chapter 1 – Introduction
- Chapter 2 – Baseline Data and Model Development
- Chapter 3 – Current Network Performance
- Chapter 4 – Future Network Performance – Scheme in Operation
- Chapter 5 – Future Network Performance – Scheme Under Construction
- Chapter 6 – Road Safety

- Chapter 7 – Walking Cycling and Horse-Riding Assessment
- Chapter 8 – Public Transport
- Chapter 9 – Summary and Conclusions

2 Baseline Data and Model Development

2.1 Overview

2.1.1 This chapter provides details of the baseline data collection and development of the highway assignment model used to assess the Scheme including:

- Model development process
- Forecast years and scenarios
- Local and national growth assumptions
- Local development

2.2 Existing Traffic Models & Datasets

2.2.1 A SATURN (Simulation and Assignment of Traffic to Urban Road Networks) model was developed during the Options Identification and Options Selection stages of the Scheme to assess the options. This was based on a version of Transport for Greater Manchester's (TfGM's) Greater Manchester SATURN model which was calibrated and validated to 2015 traffic conditions. This was used in conjunction with a version of the Greater Manchester Variable Demand Model (GMVDM) to develop forecasts.

2.2.2 Calibration of transport models involves manual and automated procedures to adjust model inputs so that the modelled travel patterns and traffic volumes replicate observed survey data.

2.2.3 The validation process attempts to quantify how accurately a transport model reproduces a set of Base Year conditions (such as traffic volumes and journey times) and is used, together with dynamic indicators of the responsiveness of the model to changes in inputs, to define the transport model's degree of 'fit-for-purpose'. The validation process should use data separate to that used in the model calibration.

2.2.4 As a starting point for the Scheme model development, an existing Greater Manchester SATURN model (developed for other national Highways studies in the Greater Manchester area) was inherited together with its associated Dynamic Integrated Assignment and DEmand Model (DIADEM) based Variable Demand Model (VDM). The inherited model had been updated to a 2018 base year using 2018 count and 2017 journey time data as well as 2018 Automatic Numberplate Recognition (ANPR) data to update the OD patterns of trips using any portion of the M60 between J8 and M62 J19.

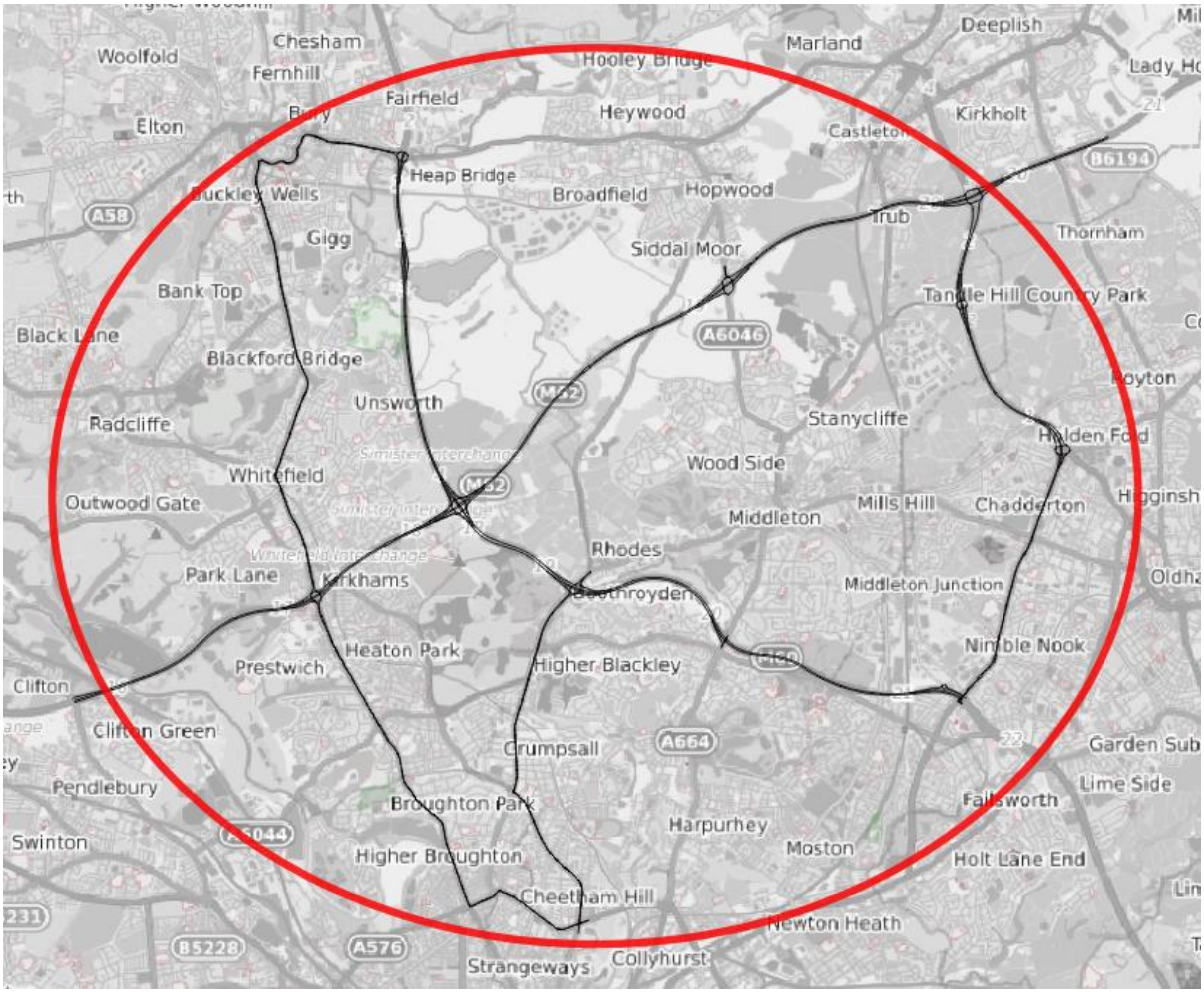
2.2.5 Given the inherited SATURN model represents the most recent base year available this was used as the basis for the Scheme's Preliminary Design model but with the network detail, calibration, and validation further refined in the Scheme area whilst retaining a 2018 base year. In addition to inheriting the existing traffic model as the starting point for the Scheme model, the associated traffic database was also adopted and further supplemented with additional data collected specifically for the Scheme area. The inherited traffic data was collated from a variety of sources which included data from National Highways' Traffic Information System (WebTRIS), Automatic Traffic Counts (ATCs) and other counts collected by Transport for Greater Manchester (TfGM).

2.2.6 Use of the models and datasets inherited from other National Highway studies represents an efficient use of existing information held by the Applicant rather than duplicating model development and data collection activities. The reminder of this section presents how the inherited traffic model and associated traffic data were supplemented to develop the Scheme traffic model.

2.3 Focused Study Area

2.3.1 Data was gathered around the focused area of the Scheme, see Figure 2-1. The focused area has been defined as two junctions either side of M60 J18 on the Strategic Road Network (SRN) and the local roads where most of the impact of the proposed Scheme is forecast to take place.

Figure 2-1 Focused Area



2.4 Baseline Data Collection

2.4.1 Baseline data is collected to understand the existing situation in the study area in terms of traffic patterns, volumes of vehicles and journey times. This data was used to inform the development of the SATURN traffic model.

2.4.2 This section presents details of the different existing datasets obtained from the following sources of baseline data:

- National Highways WebTRIS database;
- Department for Transport (DfT) traffic counts;
- Transport for Greater Manchester (TfGM) count database;
- Inherited traffic database; and
- Trans-Pennine South Regional Transport Model (TPS-RTM) database.

WebTRIS data

2.4.3 National Highways maintain and operate an online database, which contains traffic counts for various road types around the country both for the current year and previous years. This database contains traffic flow data collected from permanent ATC counters across the SRN. The road sensors used to collect this information includes Traffic Monitoring Unit (TMU), Motorway Incident Detection and Automatic Signalling (MIDAS) and legacy Traffic Flow Database System (TRADS) sites.

2.4.4 Processed WebTRIS data for 2018 covering the SRN across Greater Manchester was obtained from a number of the existing databases listed above.

2.4.5 After a review of the processed count data, it was evident that additional data was required to supplement and infill data gaps within the focused calibration and validation area for the Scheme.

2.4.6 For this, data has been extracted from the WebTRIS database for count sites on the M60, M62 and M66 for neutral Tuesdays to Thursdays in May 2018. Neutral periods avoid main and local holiday periods, local school holidays and other abnormal traffic periods.

2.4.7 Given the recent roadworks within the focused area associated with construction of the M60 J8 – M62 J20 Smart Motorway scheme, no May 2018 traffic data is available at certain survey locations, mainly west of junction 18 on the M60. Therefore, for these locations 2019 data was downloaded, processed and then factored to 2018 traffic volumes. The counts were compiled for the AM Peak (average hour 07:00 – 09:00), Inter Peak (IP) (average hour between 09:00 – 15:00) and the PM Peak (average hour 16:00 – 18:00) for all count locations.

2.4.8 Vehicles are classified as light vehicles (cars + LGVs) (vehicles up to 6.6m length), and heavy vehicles (HGVs) (vehicles more than 6.6m in length). Data is in 1-hour intervals or 15-minute intervals, depending on date and location.

Automatic Traffic Counts (ATCs)

2.4.9 ATCs record volumes of vehicles using a specific road by direction along with an indication of vehicle type based on vehicle length. Processed ATC data from a range of sites across the Local Road Network (LRN) was obtained from the databases listed above. These counts are typically from two week surveys undertaken in 2018 but also include some from previous years which have been factored to 2018 levels.

2.4.10 No additional ATC data was collected for the Scheme database as the previously collected data was considered sufficient.

Manual Classified Counts (MCCs)

2.4.11 MCCs record volumes of vehicles categorised by type using a specific road by direction. Processed MCC data from a range of sites across the

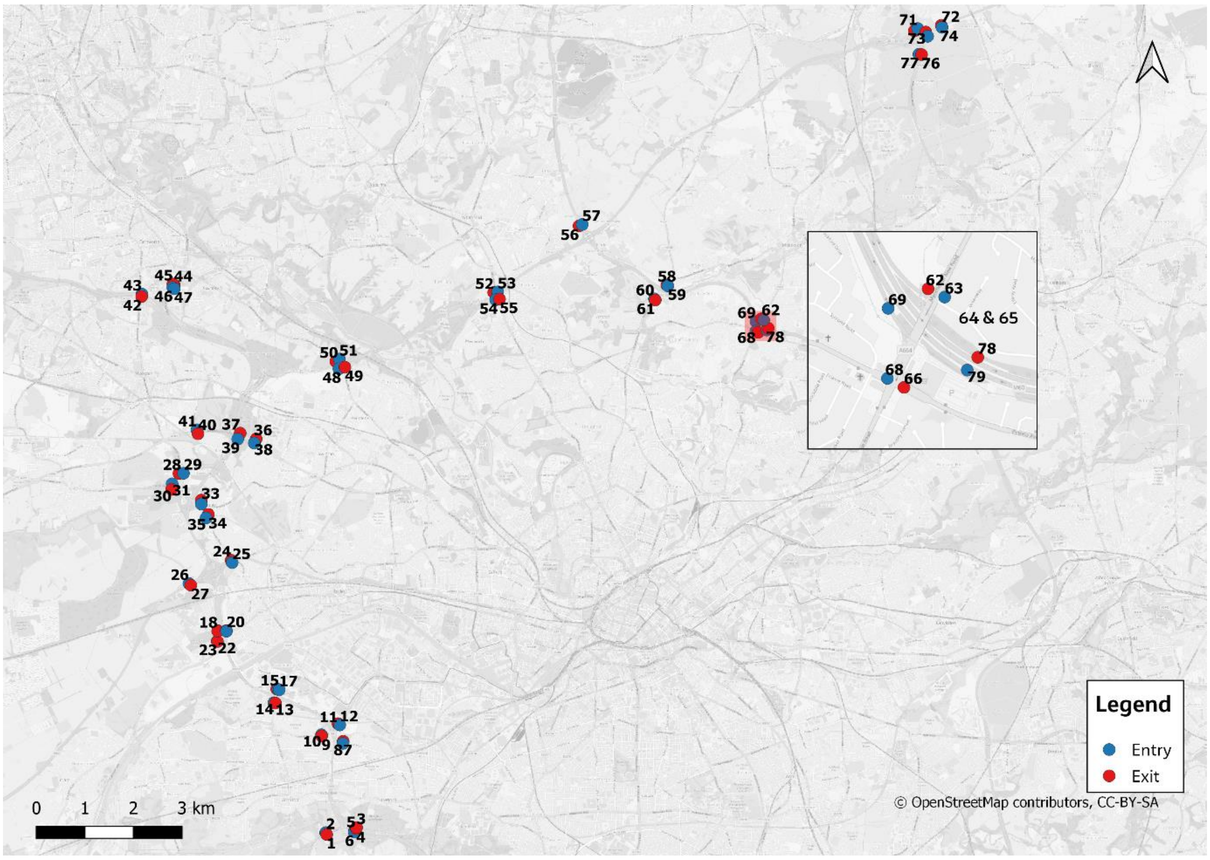
Local Road Network (LRN) was obtained from the databases listed above. These counts are typically from two day surveys undertaken in 2018 but again are supplemented with data from previous years.

Automatic Number Plate Recognition (ANPR) Surveys

2.4.12 ANPR surveys were undertaken to obtain detailed data concerning traffic movements through the M60 between junctions 8 and 20, The cameras were set up to create a “water-tight” cordon around the motorway network to establish the origin and destination junctions of vehicles travelling through it.

2.4.13 The ANPR surveys were undertaken at 14 junctions within the area and captured data over three consecutive days over 24 hours in May 2018. ATCs were located at each of the ANPR camera locations to provide total traffic flows for use in expanding the ANPR dataset to cover all vehicles. The 79 ANPR sites (41 entry and 38 exits) are shown in Figure 2-2. The ANPR dataset was cleaned and uplifted to daily traffic volumes.

Figure 2-2 ANPR Locations



2.4.14 The ANPR data was utilised to identify junction turning movements as well as vehicle type splits on the mainline and slip roads along the M60 within the focused area. In the first instance ANPR camera locations each side of J18 were combined to derive turning movements at the junction. The

ANPR camera data was then regrouped to estimate traffic volumes for all the on and off slip movements at each junction within the ANPR cordon. Once the on and off slip movements were calculated the mainline flows were then derived using the slip road movements, adding, and subtracting the on and off slip movements as required.

2.4.15 The observed ANPR total turning movements at M60 J18 were then factored using WebTRIS counts to ensure consistency between the observed WebTRIS counts surrounding M60 J18 and the turning movements at M60 J18. This factoring process ensured accuracy of observed turning movements at the roundabout, as not all vehicles are captured by the ANPR surveys. This effectively means that the percentage split of left and right turning traffic at the junction matches that observed during the ANPR surveys, but the overall traffic volumes are based on the total junction 18 off-slip observed count from WebTRIS.

2.4.16 Where there were no WebTRIS counts on the off-slips approaching the M60 J18 roundabout, counts prior to, and through, the junction were used to determine the total off-slip traffic.

Manual Classified Turning Counts (MCTCs)

2.4.17 MCTCs record the number of vehicles making each turning movement at junctions. An MCTC was available for M66 J3 and this was included within the baseline dataset.

Final Dataset

2.4.18 From analysing all the existing traffic data available it was concluded that there are no traffic data gaps within the focused area and therefore new traffic surveys were not required.

2.4.19 From existing sources the following dataset was adopted;

- 295 ATCs (including WebTRIS)
- 354 MCCs
- 1 MCTC
- 79 ANPR sites (Origin – Destination dataset)

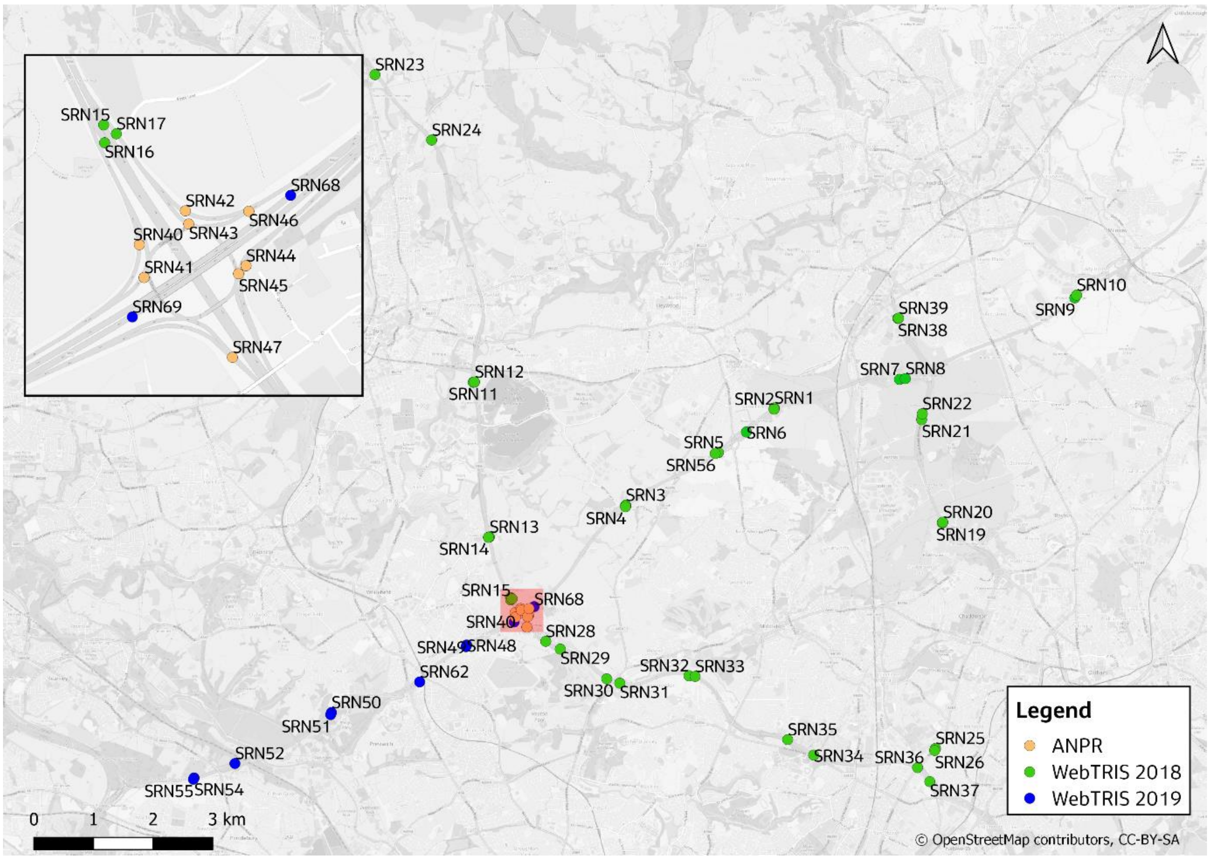
2.4.20 This was supplemented with the following datasets collated as part of the Scheme development:

- 38 ATCs obtained from WebTRIS for May 2018
- 11 ATCs obtained from WebTRIS for May 2019 and factored down to May 2018 traffic volumes.
- 8 turning counts derived from the ANPR surveys.
- 8 calculated counts based on adjacent count sites.

2.4.21 From this data 50 counts were used to calibrate and 15 counts to validate travel patterns and demand on SRN links and key routes within the focused study area of the SATURN highway model.

2.4.22 The locations of the traffic data obtained specifically for the Scheme study are presented in Figure 2-3.

Figure 2-3 Scheme Specific Count Site Locations

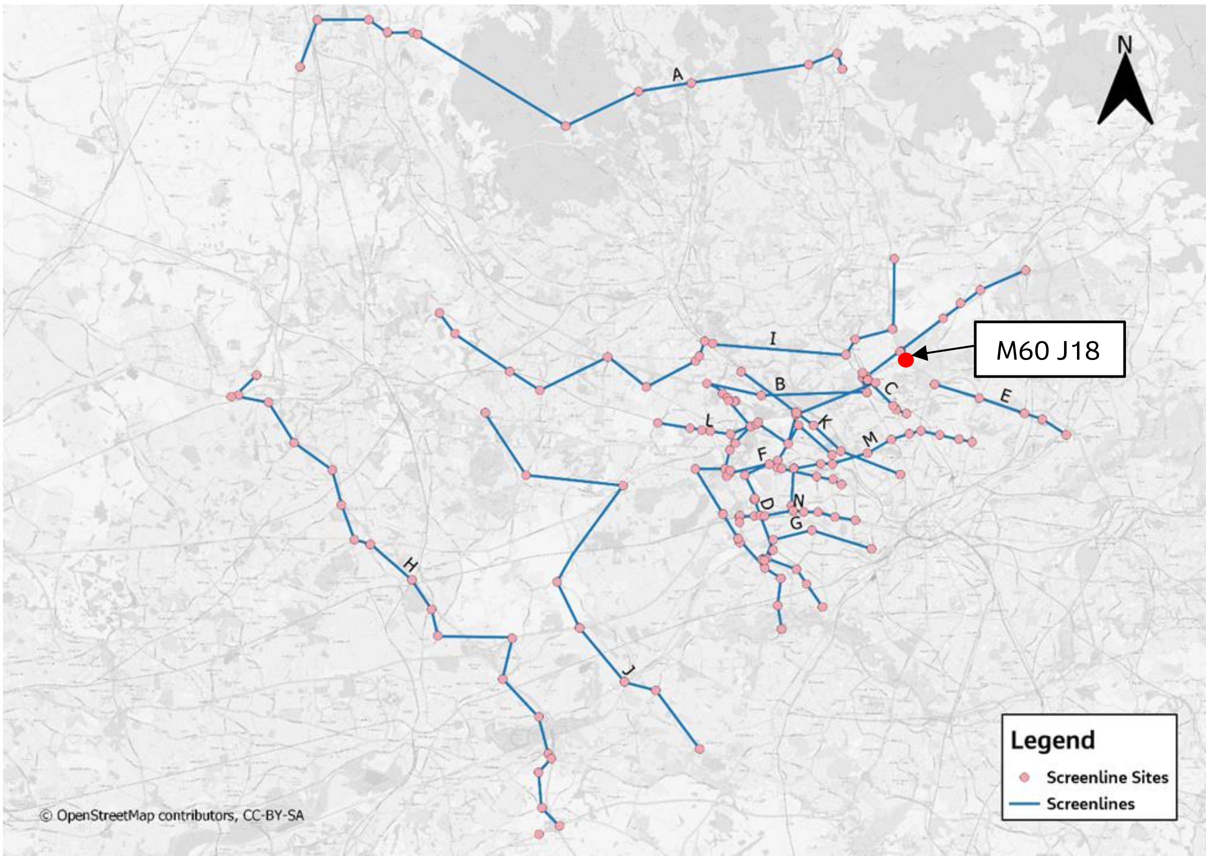


2.4.23 Using the above datasets 14 bi-directional screenlines were also developed across the wider model area to assess traffic flows between areas in the model.

2.4.24 A screenline is a grouping of traffic counts along a number of adjacent roads. These are used is to compare total modelled and observed flows between geographic areas as opposed to comparing modelled and observed flows on individual roads. This enables overall traffic flows between geographic areas (for example total trips travelling into and out of a city) in the model can be checked against observed count data.

2.4.25 The screenlines used for developing the model are presented in Figure 2-4.

Figure 2-4 Wider Model Counts and Screenlines



Journey Time Surveys

2.4.26 The purpose of journey time surveys is to capture the time taken to travel along key routes in the study area. By specifying 'timing points' on the journey time routes, it is possible to determine the extent of delays in different locations on the highway network.

2.4.27 The Trafficmaster database contains journey time and speed information obtained from journeys made by vehicles fitted with Trafficmaster GPS tracking devices (SmartNav) and is available by date in 15-minute intervals and by vehicle type. The datasets are then mapped to the Ordnance Survey Integrated Transport Network (ITN) to provide speed and travel time information on a link-by-link basis.

2.4.28 The data was processed to provide average AM Peak, Inter Peak, and PM Peak journey times for an average weekday in May and June 2018. The data was cleaned to avoid all bank and school holidays, the final dataset was then based on an average weekday. The day-to-day variability was also monitored on each link by using the recorded mean and standard deviation travel times for each ITN link for all vehicles, and any daily outliers with standard deviations greater than two from the mean were removed from the data set.

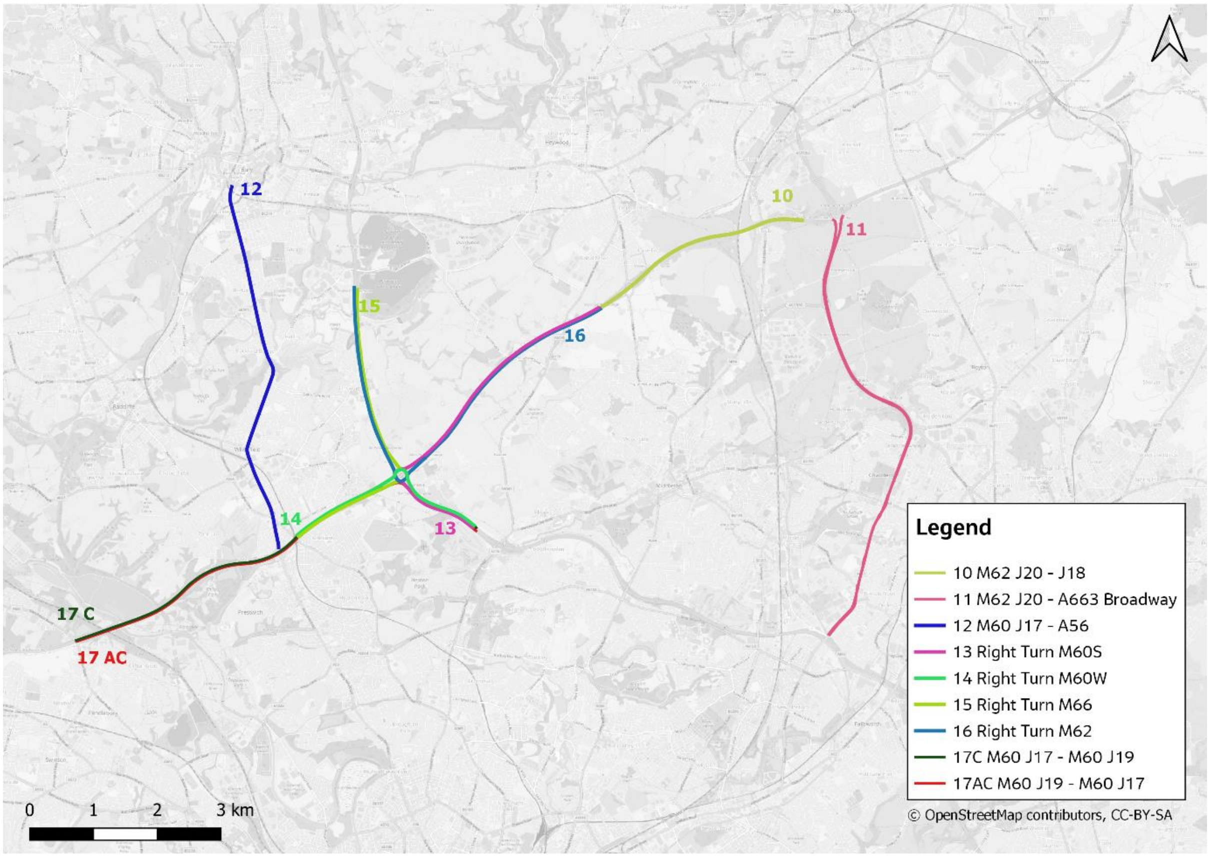
2.4.29 Eight journey time routes, as per Figure 2-5, were selected covering the geographical area of the Scheme with specific consideration to the routes where it is expected that traffic will be affected by the Scheme.

2.4.30 Table 2-1 provides the description of each journey time route broken down by direction.

Table 2-1 Journey Time Route Description

Route	Description
10E	M62 J18 Merge EB to M62 J20 Diverge
10W	M62 J20 Merge WB to M62 J18 Diverge
11S	A627(M)/A663 Broadway SB from M62 J20 to M60 J21
11N	A627(M)/A663 Broadway NB from M60 J21 to M62 J20
12S	A56 SB between Bury and M60 J17
12N	A56 NB between M60 J17 and Bury
13aN	M60S J19 Merge NB to M60 J18 diverge
13bN	M60 J18 Diverge right turn to M62 EB Merge
13cN	M62 J18 Merge EB to M62 J19 Diverge
14aE	M60 J17 Merge EB to M60 J18 Diverge
14bE	M60 J18 Diverge right turn to M60 J18 SB Merge
14cE	M60S J18 Merge SB to M60S J19 Diverge
15aS	M66 J3 Merge SB to M60 J18 Diverge
15bS	M66 J18 Diverge right turn to M60 J18 WB Merge
15cS	M60 J18 Merge WB to M60 J17 Diverge
16aW	M62 J19 Merge WB to M62 J18 Diverge
16bW	M62 J18 Diverge right turn to M66 Merge
16cW	M60 J18 Merge NB to M66 J3 Diverge
17C	M60 J16 Merge EB to M60S J19 Diverge
17AC	M60S J19 Merge NB to M60 J16 Diverge

Figure 2-5 Full Extent of Journey Time Routes



2.5 Base Model Development

2.5.1 This section sets out how the traffic model was developed to reflect the current conditions on a typical weekday in 2018 observed in the baseline data.

Model Structure

2.5.2 The Scheme traffic model has two main elements: Highway Assignment Model; and VDM which are discussed in turn below.

Highway Assignment Model

2.5.3 A highway network assignment model consists of a representation of the road network, including the characteristics of each road and junction, along with details of the demand for car travel between different areas of the model. The model then assigns the traffic onto the road network based on the relative cost in terms of travel times and distances of each route.

2.5.4 The Scheme traffic assignment model is a static equilibrium highway assignment model developed in SATURN (version 11.5.05H). SATURN operates as a highway assignment model and incorporates both simulation and assignment loops. The trips within the matrices are “assigned” by the SATURN modelling software onto the network. This is an iterative process, as links and junctions carrying high volumes of traffic experience travel time increases, in response to which drivers may transfer to other routes. Over successive iterations such transfers should decrease to the point where the flows are stable, whereby the model said to have “converged”.

Variable Demand Model (VDM)

2.5.5 DfT’s Transport Analysis Guidance (TAG), which provides guidance on transport modelling and appraisal, states that “any change to transport conditions will, in principle, cause a change in demand. The purpose of variable demand modelling is to predict and quantify these changes.”

2.5.6 DIADEM is a computer software package that was developed to assess variable demand for traffic models. DIADEM is used to model variable demand responses. TAG Unit M2 (Variable Demand Modelling) states that “The DIADEM framework controls iteration within assignment and between demand and assignment, to ensure that the calculations reach an acceptable equilibrium.”

2.5.7 The Scheme demand model uses the DIADEM software (version 7.0) issued on behalf of the DfT. DIADEM is an incremental hierarchical logit model and works by adjusting an input reference demand matrix according to changes between forecast travel costs and input reference travel costs. The VDM process consists of a series of iterations between DIADEM and SATURN (assignment model) during which demand matrices are assigned, skimmed cost matrices (i.e. information on travel time and distance between all the pairs of locations in the model) are extracted, and based on comparative travel costs, the demand matrices are updated. DIADEM provides a means of achieving convergence between the assignment (supply) and demand models. It is to be noted that equilibrium between the demand and supply models is not found exactly and therefore, a TAG specified convergence criterion is used to determine when the solution is close enough to equilibrium.

2.5.8 The VDM for the Scheme traffic model uses trip matrices in the Origin-Destination (OD) format. There are four variable demand mechanisms that have been applied in DIADEM, namely: trip frequency; mode choice; trip distribution; and time of day choice. For the Scheme model the “Time of day choice” has not been modelled for the car trip purposes “Commute” and “Business”. These trips are unlikely to have much flexibility to adjust their time of travel between the AM Peak, Inter-Peak and PM Peak.

2.5.9 Public transport data was provided by TfGM from the wider GMVDM04 model. This model includes data on time, cost and demand skims. These existing public transport data were taken and interpolated to produce the required inputs into the VDM for the mode choice response.

2.5.10 In line with TAG Unit M2-1 the Scheme VDM also has the application of “Cost Damping” which reduces the sensitivity of long-distance trips to demand responses. Cost Damping is a feature in travel demand models by which the marginal disutility of cost (and, possibly, of time) declines as journey lengths increase.

Spatial Detail

2.5.11 The traffic model covers the whole of the UK to capture the actual start and end of every trip but is more detailed in the area around Greater Manchester. The version of the model used for the Scheme is focused on the Manchester, Bury, Oldham and Rochdale Local Authority areas.

2.5.12 TAG Unit M3 (Highway Assignment Modelling) states that the geographic coverage of highway assignment models needs to:

- allow for the strategic re-routing impacts of interventions;
- ensure that areas outside the main area of interest, which are potential alternative destinations, are properly represented; and
- ensure that the full lengths of trips are represented for deriving costs.

2.5.13 In line with TAG Unit M3.1 the network makes use of a tiered structure with levels of detail reducing away from the centre of the study area. The breakdown of the network structure is outlined below.

- Internal Simulation Area: this area is characterised as being where junctions are modelled in detail and therefore the detail within the network and demand matrices is at its greatest. See Figure 2-6.
- External Buffer Area: the level of detail is at its lowest but includes any longer distance trips such as commuter, business trips and freight which may be impacted by the Scheme. See Figure 2-6 and Figure 2-7.

Figure 2-6 Full Simulation Area

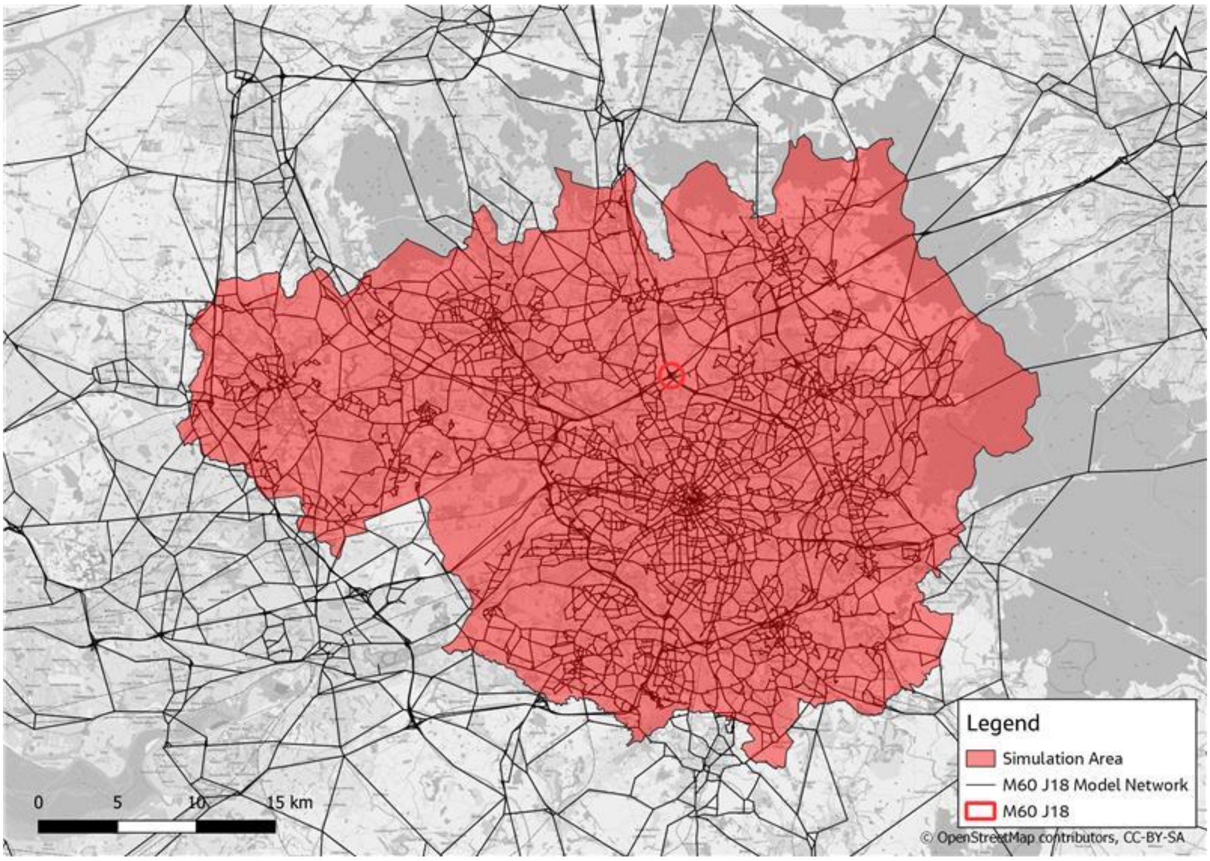
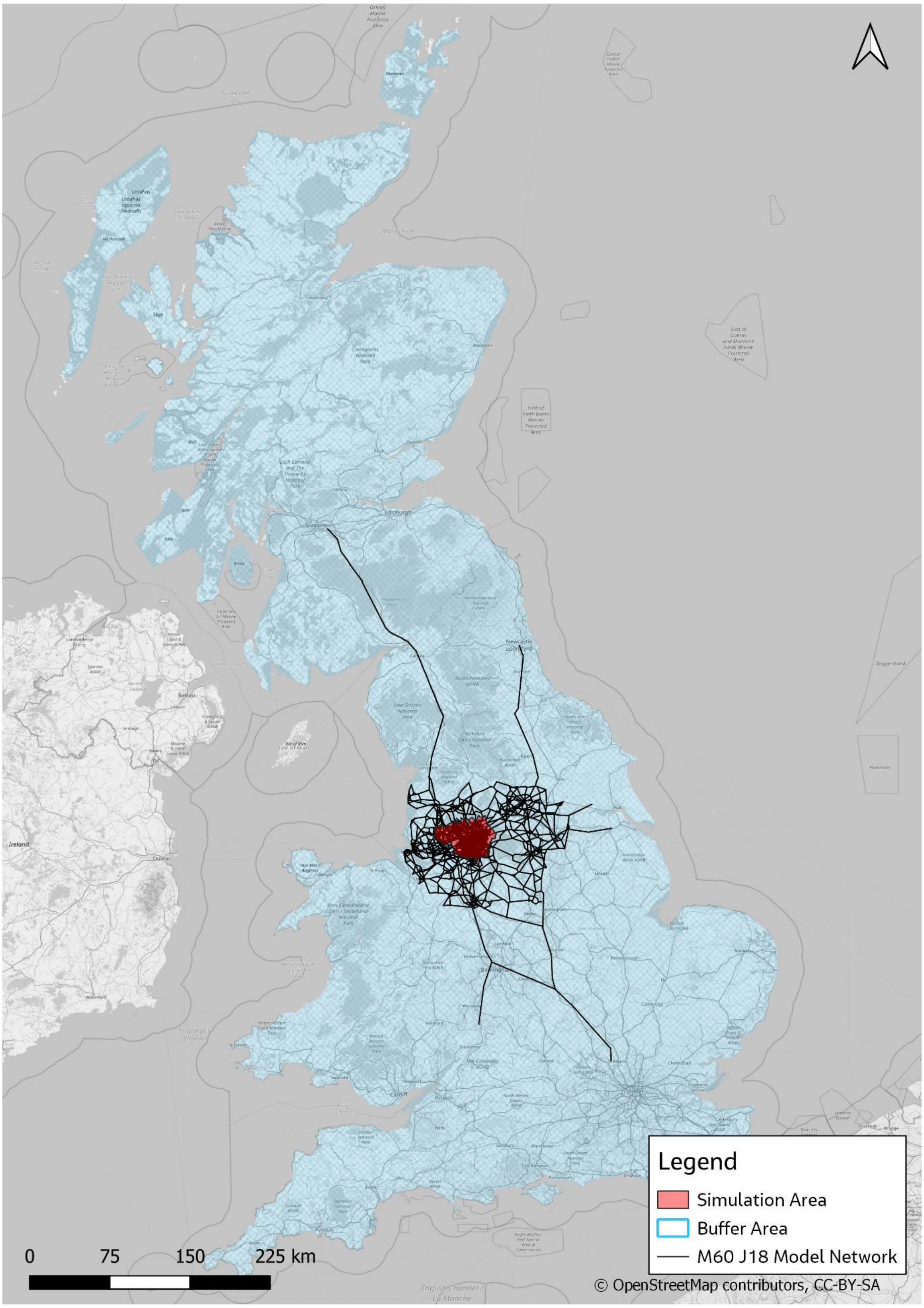


Figure 2-7 Full (Simulation and Buffer) Modelled Area



Zoning

2.5.14 In traffic models zones represent geographical areas at which journeys start or end.

2.5.15 As per TAG Unit M3-1 the zoning system follows the same tier structure as the network, with the smallest zones being within the fully modelled area then becoming increasingly coarse the further away from the core study area. Figure 2-8 and Figure 2-9 present the zone system for the simulation model area and the full model area. The Scheme model contains 1091 zones.

Figure 2-8 Model Zone Structure (Simulation Area)

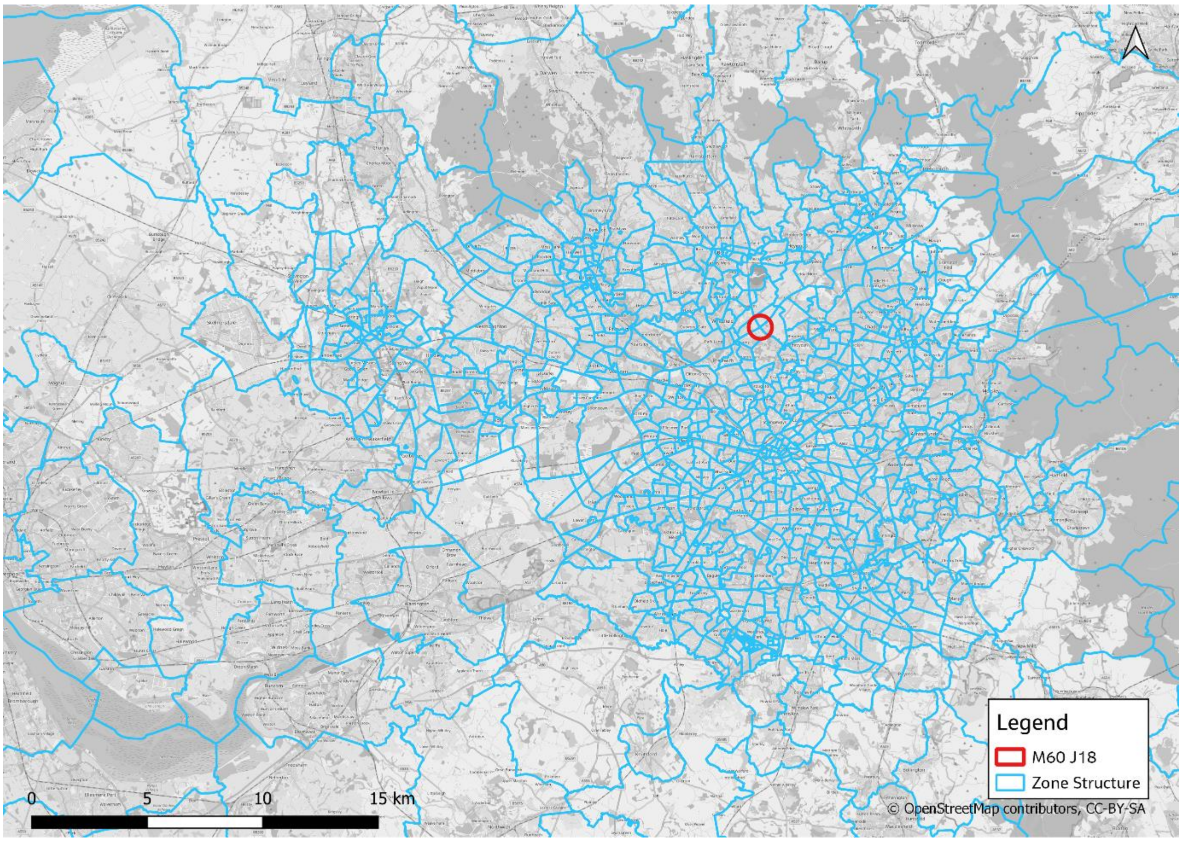
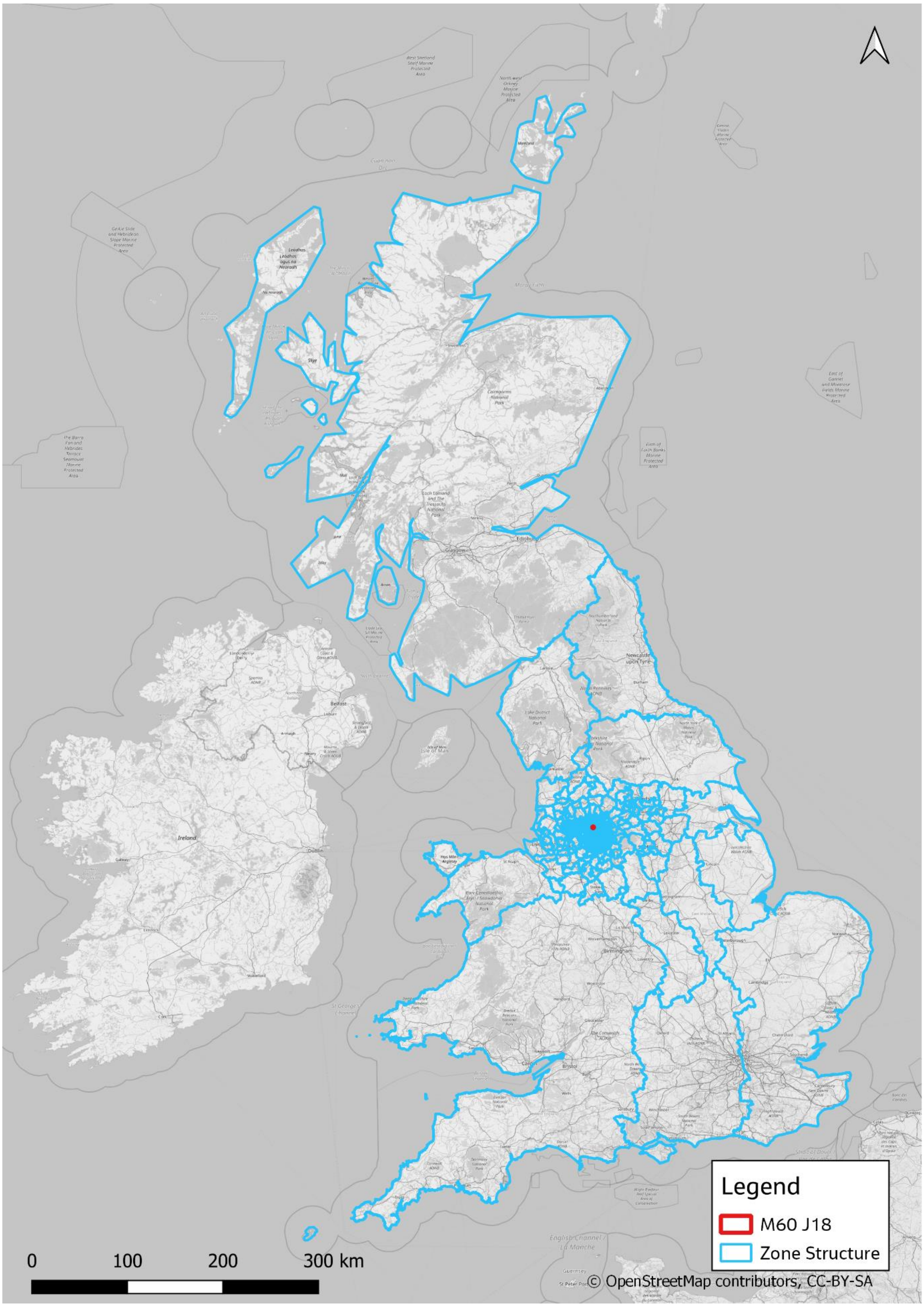


Figure 2-9 Model Zone Structure (GB)



Modelled Time Periods

2.5.16 Three time periods were used in the Scheme traffic model to represent the network performance in different periods of the day. These include the morning, inter-peak and evening peak hours, the details of which are given below:

- Morning Peak Hour: average of 07:00–09:00 hours;
- Inter-Peak Hour: average of 09:00-15:00 hours; and
- Evening Peak Hour: average of 16:00–18:00 hours.

Demand Segmentation

2.5.17 The Scheme traffic model represents the highway demand in three vehicle classes: cars; light goods vehicles (LGVs); and heavy goods vehicles (HGVs).

2.5.18 The car vehicle type is further split by journey purpose into commuting, employer's business and 'other' purpose trips to allow for the variation in perceived travel cost.

2.5.19 The resultant five demand segments used in the model are presented in Table 2-2.

Table 2-2 Demand Segmentation

User Class	Vehicle Type	Journey Purpose
1	Car	Commuting
2	Car	Employer's Business
3	Car	Other
4	Light Goods Vehicle	
5	Heavy Goods Vehicle	

Matrix Development

2.5.20 The highway demand matrices are built using a number of data sources. The information on where people are travelling to and from has been taken from analysis of the movement of a vast number of mobile phones in the UK. The mobile phone data are completely anonymous but provide details of the travel patterns of millions of mobile phones around the country. This information is scaled to match traffic counts in the area and then merged with other data sources to provide the travel patterns for cars, LGVs and HGVs.

2.5.21 The starting point for the prior demand matrices were provided as part of the Greater Manchester transport model handover. The matrices were originally obtained from TfGM and were updated as part of other National Highways studies by creating a sub-matrix using a watertight cordon of

ANPR cameras along portion of the M60. This included updated traffic information for trips travelling through the Scheme area.

2.5.22 The traffic model is then used to predict which routes vehicles will travel, considering:

- where people want to travel to and where they are coming from;
- people's preference between journey time and journey distance; and
- the actual speeds of vehicles on the road network.

2.5.23 During model calibration, the prior matrices were used as the starting point for the matrix estimation process, which further adjusts the traffic volumes to match observed count data.

Model Calibration and Validation

Highway Assignment Model

2.5.24 The Scheme assignment model has undergone a calibration and validation exercise, whereby modelled outputs are adjusted based on observed data (calibration) or compared against independent observed data not used for model adjustment (validation). The calibration and validation of the traffic model was focused on the area around the Scheme and used best practice guidance from the DfT's TAG.

2.5.25 The calibration and validation of a highway assignment model includes comparisons against observed data as follows:

- Assigned flow and count totals for screenlines or cordons, as a check on the quality of the trip matrices;
- Assigned flows and counts on individual links as a check on the quality of the assignment; and
- Modelled and observed journey times along routes, as a check on the quality of the network and the assignment.

2.5.26 The current best practice calibration and validation criteria and acceptability guidelines for each of these measures are set out below in Table 2-3 and Table 2-4.

Table 2-3 Trip Matrix Validation Guidelines

Criterion	Acceptability Guideline
Differences between modelled flows and counts should be less than 5% of the counts	All or nearly all screenlines

Table 2-4 Link Flow Guidelines

Criteria	Criteria Description	Acceptability Guideline
1	Individual flows within 100 veh/hr of counts for flows less than 700 veh/hr	> 85% of cases
	Individual flows within 15% of counts for flows from 700 to 2,700 veh/hr	> 85% of cases
	Individual flows within 400 veh/hr of counts for flows more than 2,700 veh/hr	> 85% of cases
2	GEH < 5 for individual flows	> 85% of cases

Source: Table 2, TAG Unit M3-1 Highway Assignment Modelling, DfT, 2014

2.5.27 The modelled traffic flows achieve a close match to the observed data in the focused area.

2.5.28 The modelled journey times were compared with observed journey time data for each of the journey time routes (by direction) across all three modelled time periods. The modelled journey times were found to meet the TAG M3.1 acceptability criteria. TAG M3.1 states modelled time along routes should be within 15% of observed times (or 1 minute, if higher than 15%) for more than 85% of routes.

Variable Demand Model

2.5.29 The VDM guidance within TAG Unit M2-1 prescribes that where VDM is assessed, the model parameters should be calibrated and realism tests should be carried out on the base year model to ensure that it behaves realistically to changes in travel costs and time, and the overall model response conforms to general guidelines.

2.5.30 TAG Unit M2 provides guidance on the calibration of demand models. It recommends a number of realism tests that should be carried out and provides a range of appropriate parameter values and expected responses from the model. It recommends that the following should be calculated from the model:

- Car fuel cost elasticities;
- Car journey time elasticities; and
- Public transport fare elasticities.

2.5.31 For the purposes of the Scheme model, calibration based on car fuel elasticities and car journey time elasticities have been considered. The public transport fare elasticities have been calculated in keeping with TAG guidance. However, as only the output skims from the Public Transport (PT) model aspect of GMVDM04 have been used rather than the full Public Transport model, the GMVDM04 PT parameters were retained rather than altered.

2.6 Forecast Model Development

Forecast Years

2.6.1 An important initial consideration in model design is the years for which forecasts will be produced. Future year traffic flows are required for the design of the Scheme and for economic and environmental assessment purposes.

2.6.2 The following forecast years have been used in the Scheme traffic model:

- 2029 – this is the Scheme opening year
- 2044 – Scheme design year (15 years after Scheme opening year)
- 2061 – this is the final year for which DfT has published traffic growth forecasts from its National Transport Model.

Traffic Growth

2.6.3 The overall level of growth in car trips from 2018 to the three future year scenarios is taken from the most recent DfT National Trip End Model (NTEM) forecasts, published in August 2022. The NTEM forecasts growth in trip origin-destinations (or productions-attractions) up to 2061 for use in transport modelling. The forecasts consider national projections of:

- population;
- employment;
- housing;
- car ownership; and
- trip rates.

2.6.4 Future year demand matrices have been produced following TAG guidance, using an Uncertainty Log of development sites for the spatial distribution of future year trip ends. Spatially distributed trip ends are then constrained or capped to NTEM (v8.0) trip growth to ensure forecast growth is in line with regional forecasts.

2.6.5 These forecasts are based on estimates from the Office for National Statistics (ONS) on the number of people living in each area. The number of car trips made per person varies according to factors such as age, employment status, car ownership and household size. This is then applied to the number of people forecast in the future for these categories to produce a forecast of the future number of car trips.

2.6.6 The growth in the number of trips made by LGVs and HGVs is taken from DfT National Road Traffic Projections, NRTP22, published in 2022.

Accounting for COVID-19

2.6.7 At the time of undertaking the traffic modelling for the Scheme, one of the constraints was the ongoing influence of the COVID-19 pandemic, which was affecting traffic flows across the road network. It was anticipated that COVID-19 may have a number of long-term impacts on traffic growth, traffic patterns and propensity to use public transport as a result of the impact on the economy and fundamental changes in travel behaviour that will remain beyond the pandemic such as increased home working. As such no operational observations could be undertaken, or new data collected during 2020-22 as it was atypical. The Preliminary Design model has a base year of 2018 and any associated traffic counts predate COVID-19. At the time of the traffic modelling DfT had not provided any guidance on how to reflect the long-term potential changes due to COVID.

2.6.8 In March 2023, the DfT published a Forthcoming Change to TAG Unit M4 (Forecasting and Uncertainty). This change stated that COVID-19 impacts should be accounted for in modelling and appraisal from May 2023 onwards. The Forthcoming Change was made official and incorporated into TAG Unit M4 on 31 May 2023. The change to guidance was issued in the context that national traffic volumes are yet to return to pre-COVID levels. Given the modelling work for the Scheme had already been completed prior to May 2023, application of the DfT guidance on COVID-19 impacts is not accounted for in the Core modelling of the Scheme.

2.6.9 However, following the release of the guidance, traffic volumes were reviewed at selected location in the vicinity of the Scheme to understand how traffic has changed between the pre-COVID period and the present year of 2023.

2.6.10 To undertake this comparison National Highways' WebTRIS database has been utilised. From this database, traffic data has been extracted for four count sites on each of the approaching links to M60 J18: M66 from north; M62 from east; M60 from south; and the M60 from the west. The counts were extracted for March, April, May for years 2019 and 2023. The counts were processed for Tuesday to Thursday (this is consistent with the base model) and excludes data for weekends and school holidays.

2.6.11 Table 2-5 presents the 2019-2023 traffic comparison for AM, IP, PM and a 24-hour comparison is also presented for the car user class. This indicates that overall traffic volumes in the Scheme area are similar in 2023 and 2019 with individual link level differences of around ±5%. This indicates that traffic levels in the Scheme area have been much less impacted by COVID than at the national level (TAG M4 suggests a 5% reduction between pre- and post-COVID car traffic).

Table 2-5 Traffic Volume (Cars) Comparison – 2019-2023

Time Period	Link	WebTRIS Site	Location	2023 Traffic	2019 Traffic	Factor
AM	M66 NORTH	4128A	M66 -J3 - J4	3,929	4,153	0.95
	M60 SOUTH	9327B	M60 - J19 - J18	3,456	3,584	0.96
	M62 EAST	1579B	M62 - J19 - J18	2,838	2,601	1.09
	M60 WEST	9308A	M60 - J17-J18	4,004	3,994	1.00
	AM Factor			14,227	14,332	0.99
IP	M66 NORTH	4128A	M66 -J3 - J4	2,245	2,230	1.01
	M60 SOUTH	9327B	M60 - J19 - J18	2,636	2,697	0.98
	M62 EAST	1579B	M62 - J19 - J18	3,218	3,155	1.02
	M60 WEST	9308A	M60 - J17-J18	3,244	3,126	1.04
	IP Factor			11,344	11,208	1.01
PM	M66 NORTH	4128A	M66 -J3 - J4	3,382	3,246	1.04
	M60 SOUTH	9327B	M60 - J19 - J18	4,499	4,793	0.94
	M62 EAST	1579B	M62 - J19 - J18	3,751	3,643	1.03
	M60 WEST	9308A	M60 - J17-J18	4,344	4,630	0.94
	PM Factor			15,976	16,312	0.98
24 hours	M66 NORTH	4128A	M66 -J3 - J4	41,886	42,274	0.99
	M60 SOUTH	9327B	M60 - J19 - J18	51,666	54,144	0.95
	M62 EAST	1579B	M62 - J19 - J18	52,197	50,733	1.03
	M60 WEST	9308A	M60 - J17-J18	59,224	58,362	1.02
	24 HOUR Factor			204,973	205,513	1.00

Local Development

2.6.12 Adjustments to the location of future car trips are also made by including certain planned housing developments, and other developments such as employment, retail, and leisure sites. A list of these developments (Uncertainty Log) was produced through inherited Uncertainty Logs created for other schemes planned in Greater Manchester, as well as discussions with local planning authorities in Manchester, Bury, Oldham and Rochdale.

2.6.13 For the main traffic forecasts used to inform the highway design and economic and environmental appraisals, known as the ‘core scenario’, only developments with planning permission (or for which planning applications have either been submitted or are expected to be submitted imminently) are specifically included in the traffic model, in accordance with TAG (unit M4, table A1). In addition, only developments over a certain size threshold are specifically included in the traffic model (because, for example, a development with 200 houses will have more of an impact on the road network than a single house extension).

2.6.14 Any developments which are not specifically modelled are instead accounted for by general background traffic growth applied at a local authority level. In order to ensure that there is not too much traffic created on the network, the overall level of growth has been constrained to NTEM totals.

2.6.15 Maps of the specific local developments included within the traffic model (i.e. large sites with planning permission or planning applications) that are within close proximity of the Scheme are presented in Figure 2-10. This shows housing sites greater than 400 dwellings labelled with the total number of dwellings at each site. Figure 2-11 shows the employment site locations.

Figure 2-10 Large Housing Sites Included in the Traffic Model (Annotation with number of dwellings)

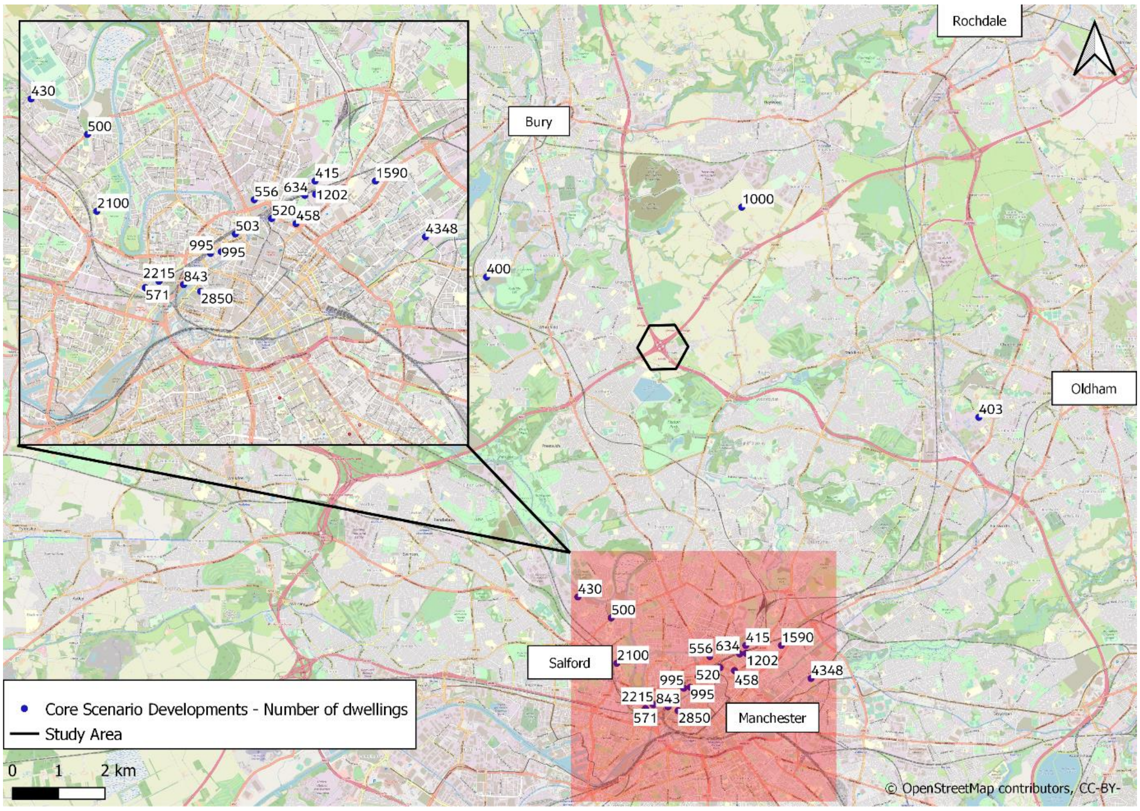
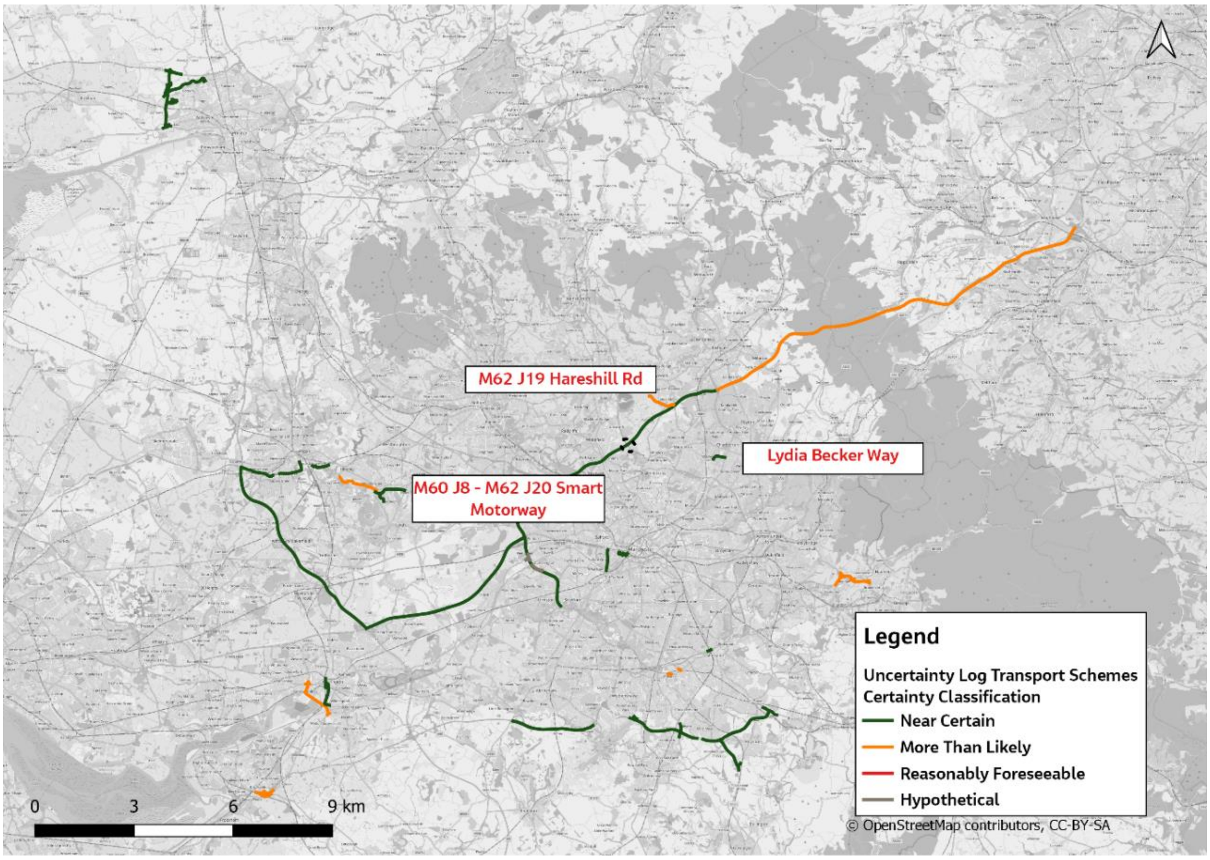


Figure 2-11 Large Employment sites Included in the Traffic Model

Highway Infrastructure Schemes

2.6.16 The road network in the transport model has also been updated to generate a ‘Do Minimum’ network for each of the forecast years. The Do Minimum includes the current network from the base year, together with any road schemes that are likely to be built, regardless of whether the Scheme is built or not. Road schemes that are considered too far away from M60 J18 to affect the Scheme or carry significant volumes of traffic that are expected to use M60 J18 have been omitted. This information has been provided by National Highways and local authorities in the area depending on which body is promoting the schemes. Figure 2-12 shows the proposed highway schemes included in the traffic model, with schemes in the vicinity of M60 J18 labelled.

Figure 2-12 Highway Infrastructure Schemes Included in the Traffic Model

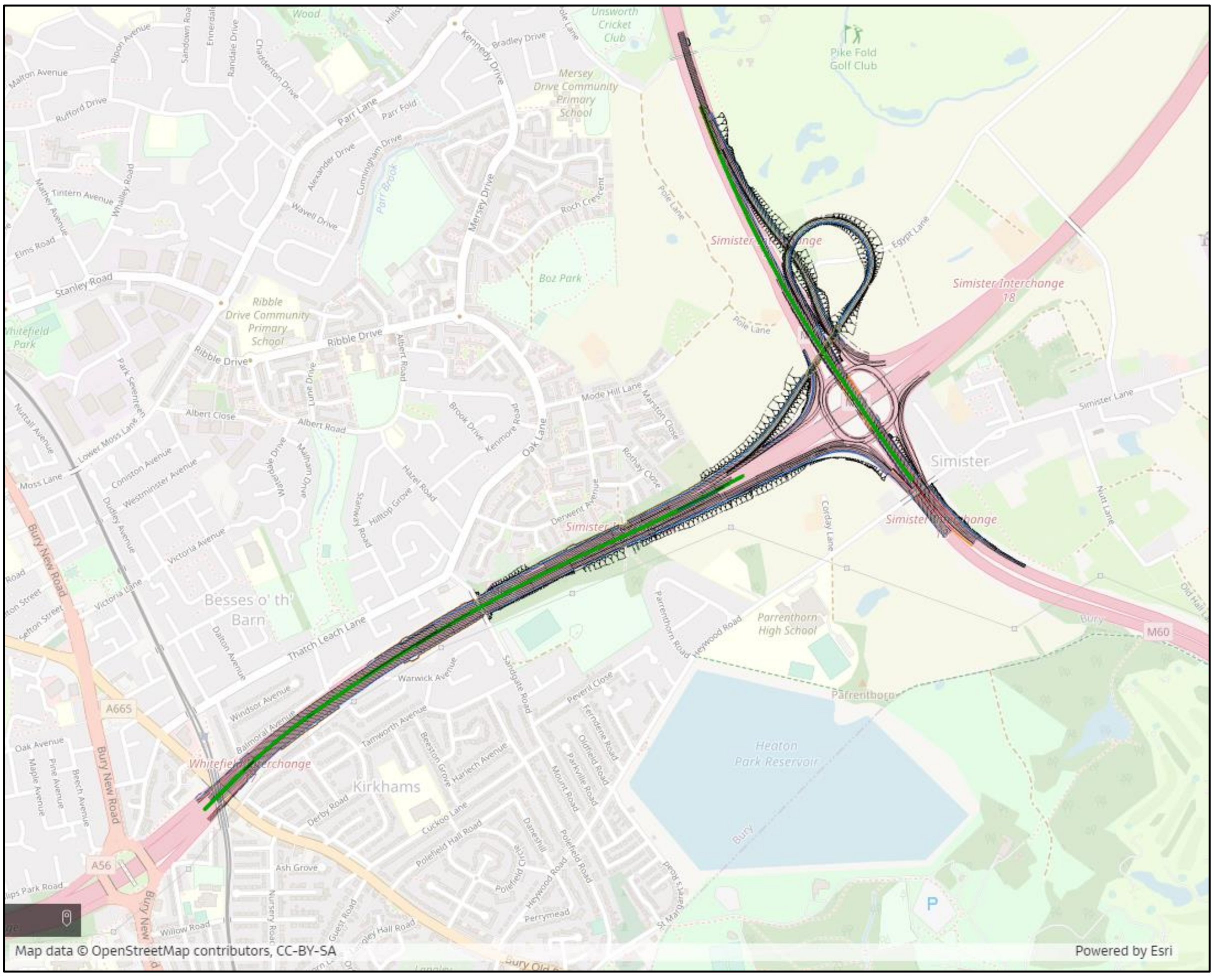


2.6.17 The Do Something networks have been prepared for each of the forecast years. The preferred route announcement identified the ‘Northern Loop’ option as the Scheme. To produce the Do Something models the ‘Northern Loop’ option was included in the model network based on the Scheme design layout in addition to the network changes from the Do Minimum scenario.

2.6.18 The Scheme involves the following elements and is shown in Figure 2-13:

- Creating a free-flow loop for M60 eastbound to southbound traffic with a realignment of the M66 southbound link, and junction 18 slip roads and associated merge and diverge modifications
- Upgrading the M60 northbound to M60 westbound free flow left turn lane from one to two lanes
- Provision of a dual 5 lane motorway with hard shoulder cross section alongside associated changes to the merges and diverges at each end between M60 J17 and J18.

Figure 2-13 Overview of the Northern Loop Option for the Scheme



3 Current Network Performance

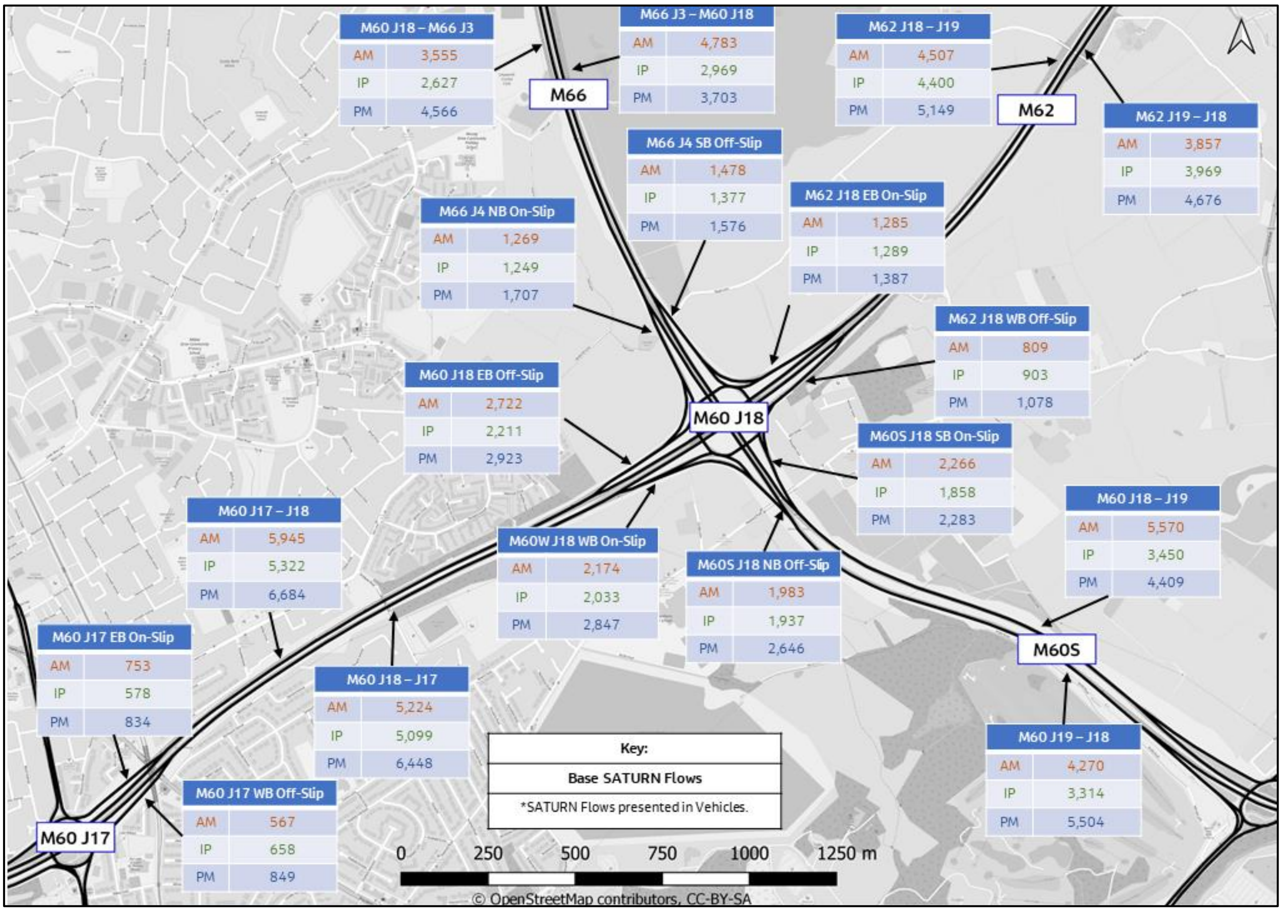
3.1 Overview

3.1.1 This chapter provides an outline of the base network operation and presents outputs from the 2018 base year SATURN model. It includes an overview of the base flows and journey times by AM, IP and PM peak periods.

3.2 Base Traffic Flows

3.2.1 Figure 3-1 presents the flows in vehicles for the modelled time periods for key SRN links in the vicinity of the Scheme area. The highest traffic volumes are observed along the M60 between J17 and J18 eastbound with hourly flows in excess of 5,900 vehicles in the AM period, 5,300 in the IP period, and in excess of 6,600 in the PM peak. Equally, the westbound direction has hourly traffic flows in excess of 5,100 in the AM and IP and 6,400 in the PM peak period. Peak traffic flows are also in excess of 3,500 vehicles per hour on the M66, M62 and M60S with lower flows in the IP periods.

Figure 3-1 Base Model SATURN Flows per hour



3.2.2 In addition, Figure A.1 in Appendix A *"M60 J18 Turning Flows – Base"*, presents the base year turning flows for AM, IP and PM periods at M60 J18. These provide further insight to the level of traffic for each turn at the junction. The following key points can be concluded from the base year turning flows:

- The largest traffic movements are M60 northbound to M60 westbound and for movements travelling from M60 eastbound to M60 southbound, which are in excess of 1,200 vehicles per hour for all time periods.
- The other major movements are on the dedicated left turn from M60 eastbound to M66 northbound and the right turn from M66 southbound to M60 westbound.

3.3 Journey Times and Speeds

Speeds

3.3.1 Speeds from the Trafficmaster database have been used to analyse the baseline average speeds of mainline and slip road traffic. Analysis was undertaken based on weekday traffic in May and June 2018.

3.3.2 Figure 3-2 and Figure 3-3 present the average speeds in the AM Peak, between 7am and 9am, and the PM Peak, between 4pm and 6pm.

Figure 3-2 AM Observed Trafficmaster Speeds

Figure 3-3 PM Observed Trafficmaster Speeds

3.3.3 Analysing the Trafficmaster speeds, there are significant delays in the westbound direction throughout the Scheme area on the M62 and M60, with speeds as low as 20mph in both AM and PM periods. This is due to a combination of the high volume of traffic using this section, the weaving and merging between junctions and downstream slow-moving traffic extending back from junction 15.

3.3.4 The eastbound movement along the mainline is more free flowing in the AM peak with speeds of 40-70mph.

3.3.5 Significant delays are shown around M60 J18 circulatory in both the AM and PM with speeds falling to 0-20mph. Furthermore, the approach arms to the roundabout experience low speeds as traffic queues at the signals.

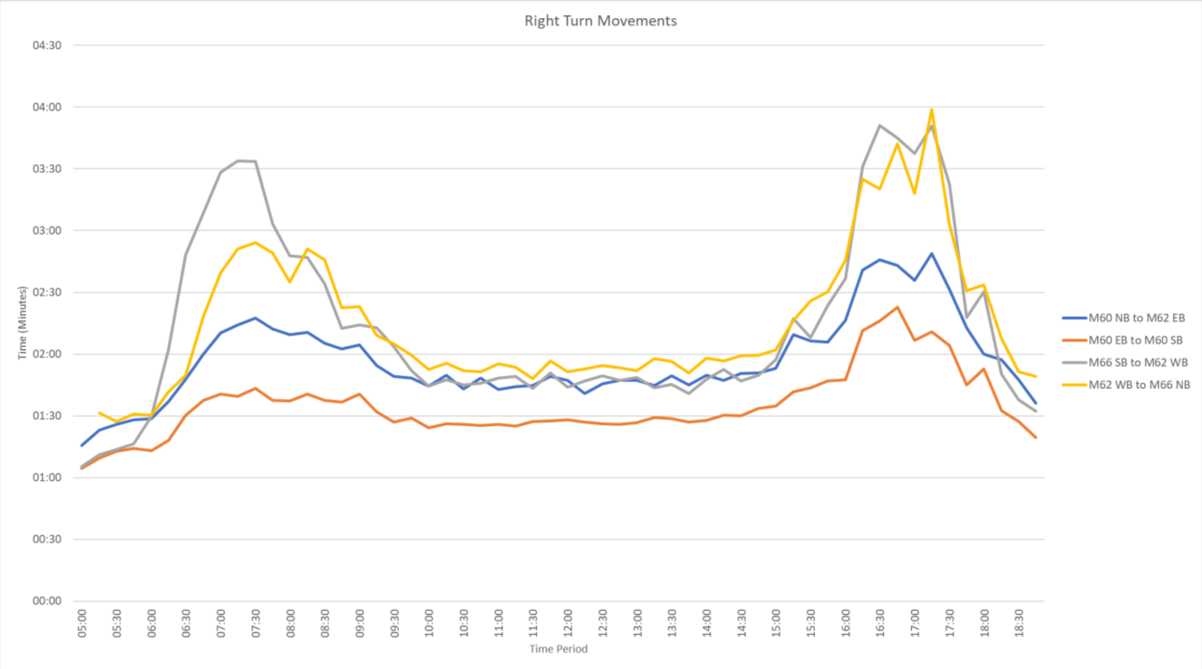
3.3.6 Significant delays occur on the merges and diverges at M60 J17 and M60 J18, particularly for westbound merging traffic at M60 J18 in both peak time periods. High flows on the mainline and joining the M60 in this location contribute to these delays.

3.3.7 In the PM peak period, there is a significant delay on the M60 northbound approach to M60 J18 with speeds of 30-40mph at M60 J19 and decreasing to 20-30mph on approach to M60 J18.

Journey Times

3.3.8 The Trafficmaster data was used to calculate the journey times for movements through the Scheme area. Firstly, Figure 3-4 shows the profile of travel times across the day for the right turn (i.e. non-free flow) movements through M60 J18.

Figure 3-4 Journey Times for Right Turning Movements at J18



3.3.9 All the right turning movements observe some delay in both the AM and PM time periods, with the M62 westbound (WB) to M66 northbound (NB) and the M66 southbound (SB) to M60 WB experiencing the largest delays of around 2.5 minutes compared with off peak travel times.

3.3.10 The M60 NB to M62 eastbound (EB) and M60 EB to M60 SB show some delay in both the AM and PM peak periods, with the highest in the PM peak of up to 1.5 minutes.

3.3.11 The travel times on the mainline sections through M60 J18 in all four directions starting and finishing at the adjacent junctions to M60 J18 are presented in Figure 3-5.

3.3.12 The through movements along the mainline between M60 J19 and M66 J3 as well the EB movement from M60 J17 to M62 J19 generally show minimal delay in the AM peak and a slightly higher delay in the PM peak of around 1.5 minutes. The highest delay is shown to be along the WB movement from M62 J19 to M60 J17 with a 6.5 minute delay at around 07:30 in the AM peak and a 3 minute delay in the PM at around 17:00.

Figure 3-5 Journey Times for Through Junction Movements at M60 J18

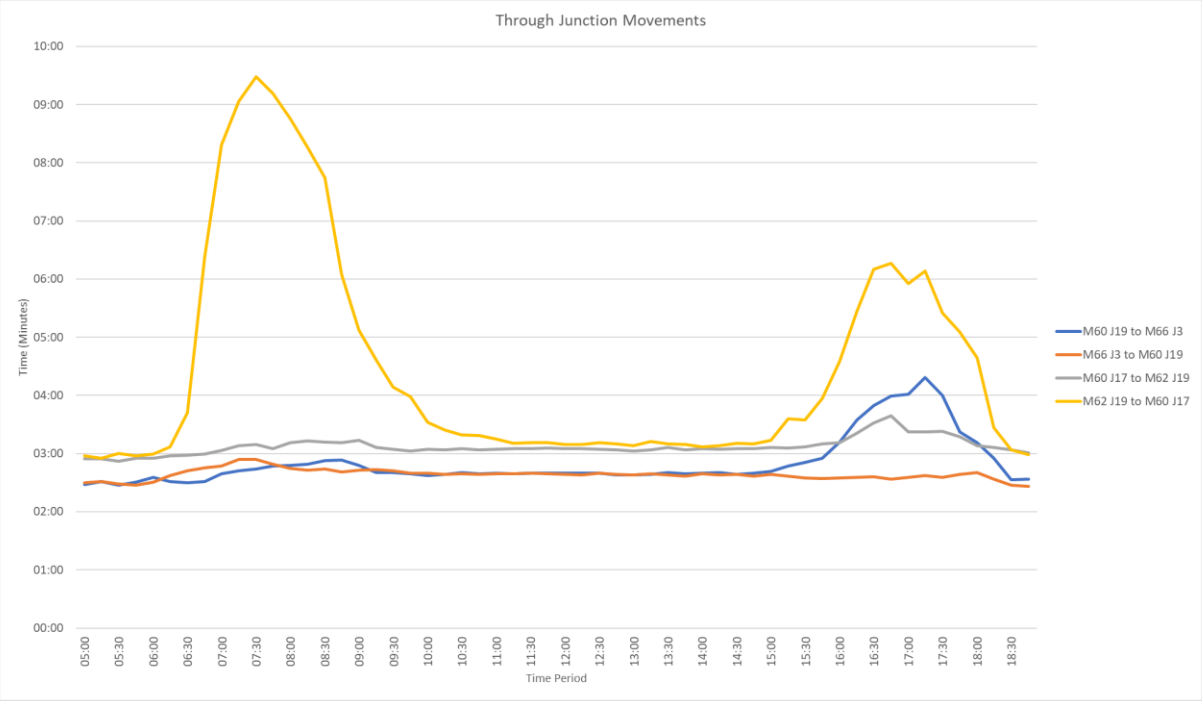
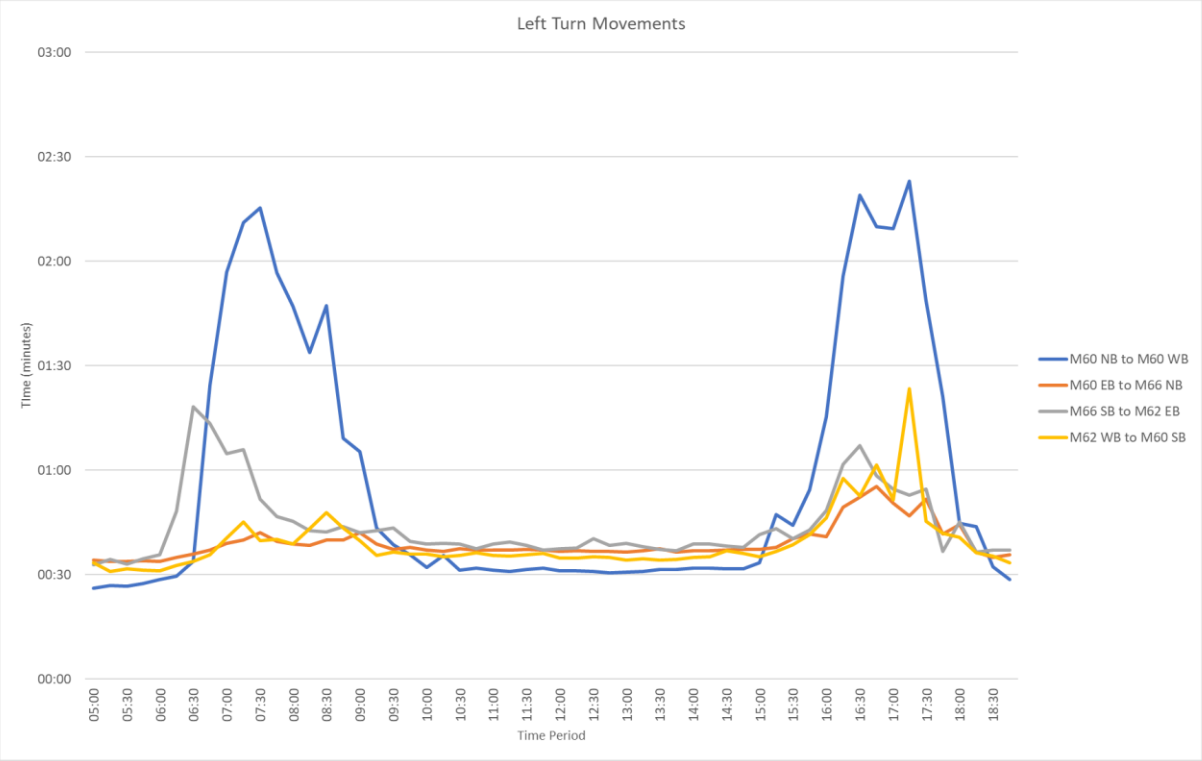


Figure 3-6 Journey Times for Left Turn Movements at J18



3.3.13 Figure 3-6 shows the journey times for the left turn movements at M60 J18. Although all left turn movements show some slight delays during either the AM or PM peak, the highest delay is experienced for trips travelling from the M60 NB to the M60 WB with a delay of up to 2 minutes in both the AM and PM peak periods. The higher delays for this movement results from the slow-moving traffic at the merge point which affects the operation of the slip road.

4 Future Network Performance – Scheme in Operation

4.1 Overview

4.1.1 Traffic forecasts have been prepared for three future years: 2029; 2044; and 2061 covering the three modelled time periods AM, IP and PM peak hours.

4.1.2 This chapter presents the traffic forecasting results and an assessment of the likely future traffic patterns and journey times in the forecast years. This includes an overview of future traffic patterns on key roads in the area and forecast journey times for the 2029 and 2044 forecast scenarios and time periods. The 2061 forecast year analysis has been excluded as it shows a similar picture to forecast years 2029 and 2044 with increased traffic flows and journey times without the Scheme in place.

4.2 Forecast Traffic Flows – With & Without Scheme

2029 Forecasts

4.2.1 Figure 4-1 to Figure 4-3 show the forecast traffic flows from SATURN for the 2029 forecast year for the AM, IP and PM peak periods with and without the Scheme.

Figure 4-1 2029 AM Hour SATURN Flows

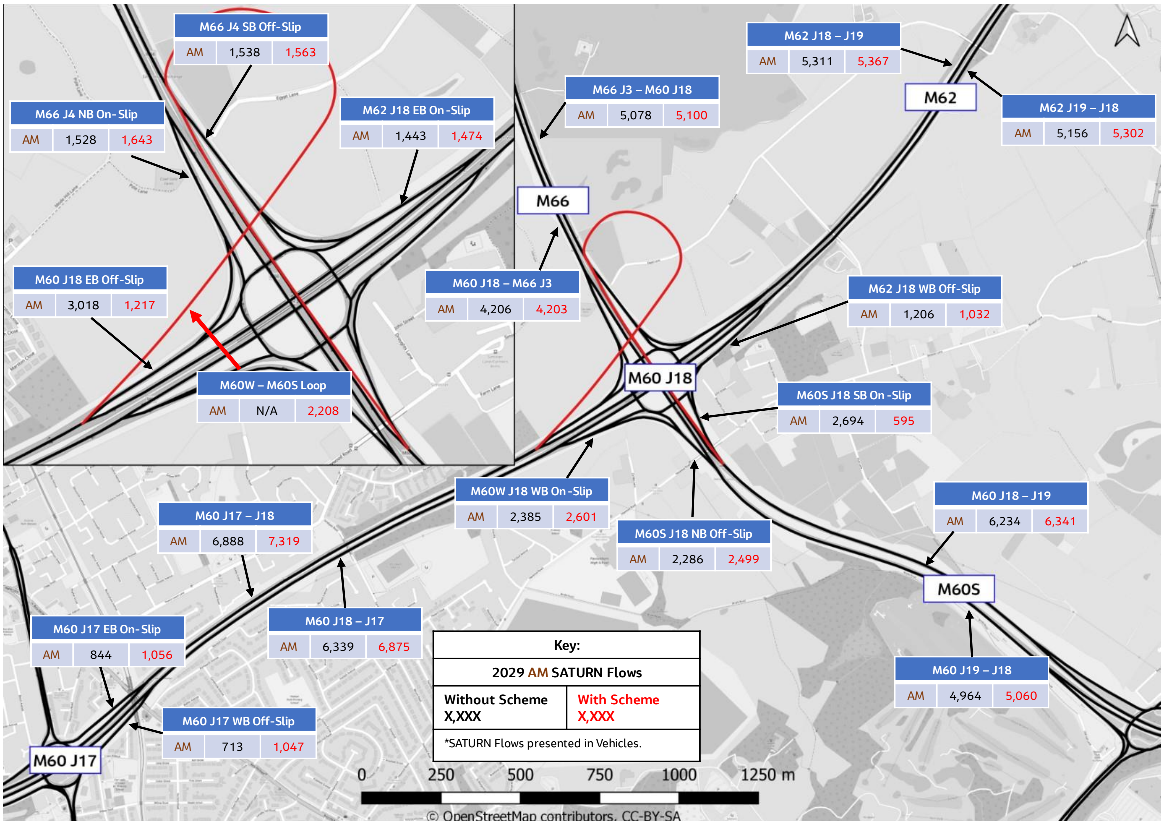


Figure 4-2 2029 IP Hour SATURN Flows

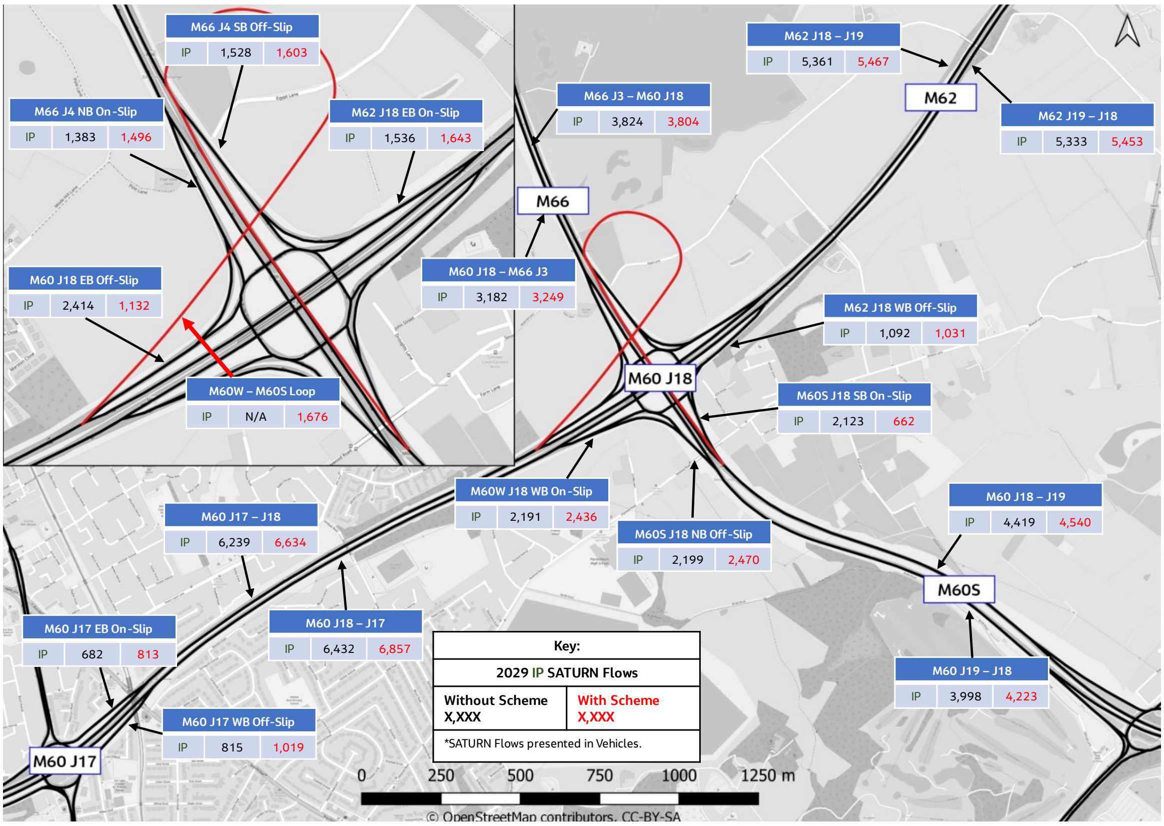
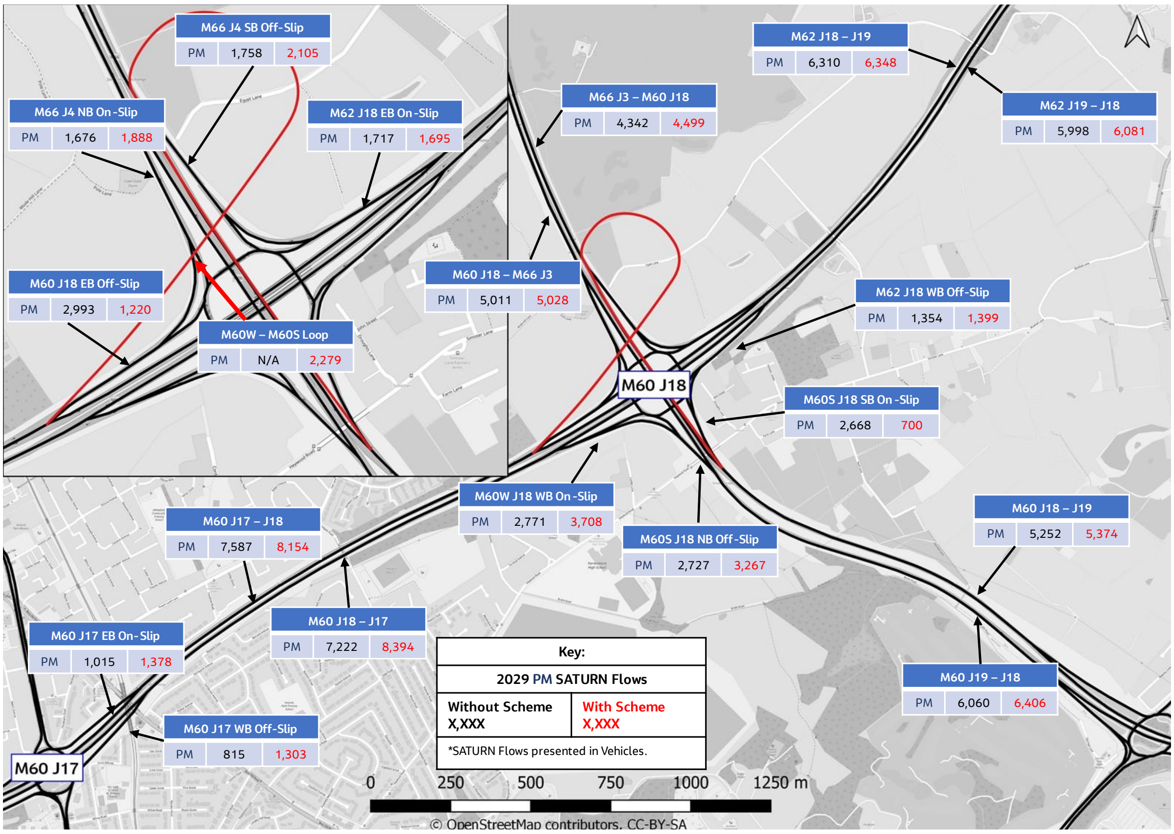


Figure 4-3 2029 PM Hour SATURN Flows



4.2.2 The forecasts show increased traffic levels from 2018 between M60 J17-18, in the AM and PM periods. For instance, the forecast eastbound flow between M60 J17-18 without the Scheme in place is approximately 7,600 vehicles per hour in the PM peak up from 6,600 in 2018.

4.2.3 With the Scheme in place traffic is forecast to increase above the levels in the without Scheme scenario, particular on the sections of network where capacity is constrained by congestion without the Scheme such as the M60 between M60 J18 and J17. In the westbound direction, the traffic volumes on this section are highest in the PM period, with more than 7,200 trips without the Scheme increasing to approximately 8,400 with the Scheme in place.

4.2.4 These increases in the 'with Scheme' scenario are primarily from reassignment as traffic seeks to take advantage of the extra capacity provided by the Scheme by switching from other routes. Secondly the removal of queuing traffic in the Scheme area increases the throughput in the peak periods and finally, the Scheme results in some induced traffic along this part of the network through VDM effects.

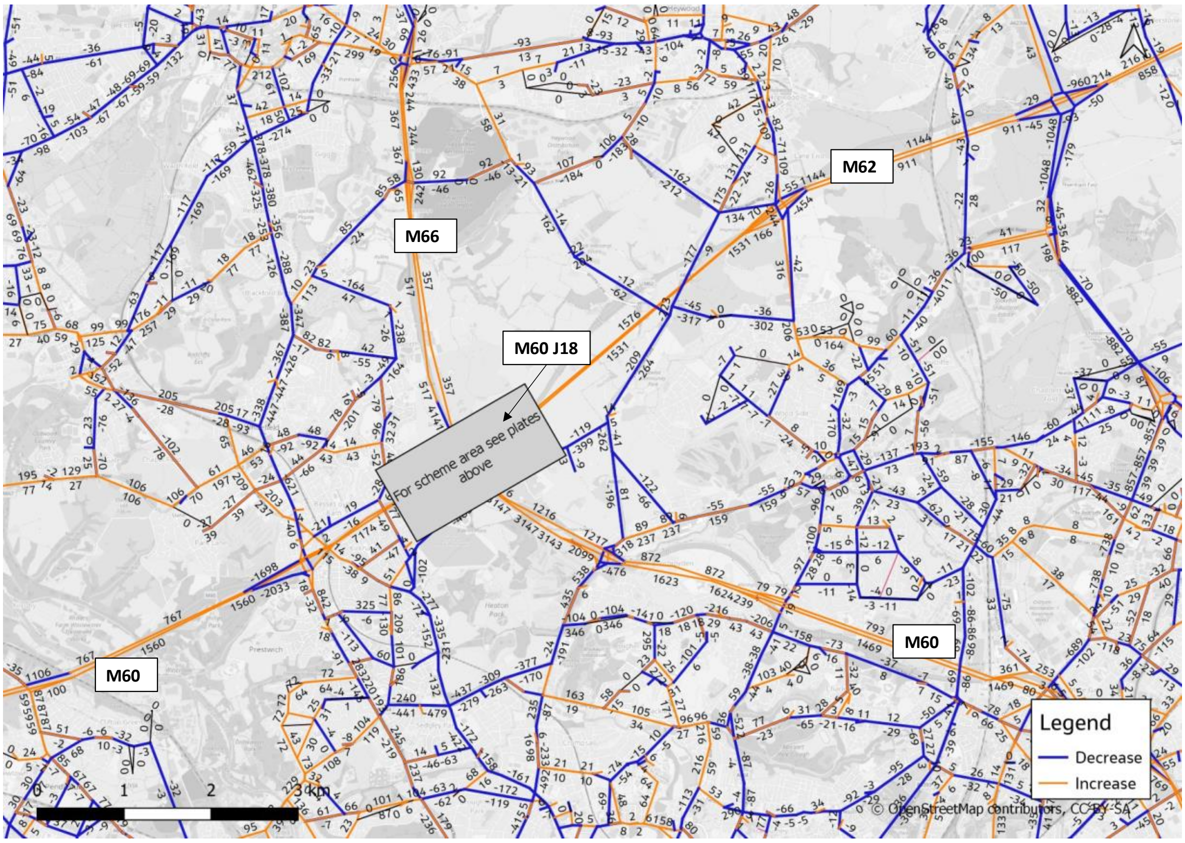
4.2.5 The Scheme results in changes in flows on the junction 18 links themselves, for example, in the scenario without the Scheme the traffic flow forecast on the M60 southbound on-slip at junction 18 is around 2,600 vehicles in the AM and PM peak periods but drops to around 600 vehicles with the Scheme in place. With the addition of the free flow loop in the Scheme scenario, traffic wanting to travel eastbound to southbound will use the loop instead of the M60 J18 circulatory significantly reducing traffic flows on the M60 J18 circulatory and the M60 southbound on-slip.

4.2.6 To more clearly show the change in traffic movements at M60 J18, Appendix B "*M60 J18 Turning Flows – 2029*" presents turning traffic volumes for AM, IP and PM periods, for forecast year 2029, with and without the Scheme. The movements that experience the most benefit due to the Scheme such as M60 eastbound to southbound, M66 southbound to M60 westbound and M60 northbound to M60 westbound have the largest increases in traffic from the without Scheme scenario for the reasons discussed in paragraph 4.2.4.

4.2.7 Furthermore, with the Scheme in place the removal of the M60 eastbound to southbound traffic from the circulatory means that the signal timings can be changed to allow more time and additional capacity for other turns.

4.2.8 To provide an overview of how daily traffic levels are forecast to change due to the Scheme across a wider area, Figure 4-4 presents the change in Annual Average Daily Traffic (AADT) from the 2029 models. As there isn't an exact correlation between links in the Do Minimum and Do Something scenarios in the immediate vicinity of M60 J18 due to the Scheme changes this area isn't displayed but has already been presented above.

Figure 4-4 2029 AADT Flow Change



4.2.9 The plot shows that some trips from the Bury area to/from Manchester now use the M66 and junctions 18/17 rather than the A56 due to the reduced delays on the SRN route. Due to this transfer of trips the A56 is forecast to experience a reduction in delay as discussed in the journey time section below.

4.2.10 Reductions in traffic flows, especially westbound, are also forecast along Simister Lane as local traffic, particularly to/from areas around Heaton Park, no longer uses this route to bypass congestion on the SRN with the Scheme in place. With the Scheme, this traffic remains on the SRN and exits at M60 J17, which is the cause of the increase in flow on the A56 southbound from M60 J17 and along Fairfax Road / Heys Road. This increase in traffic is relatively slight and is forecast to result in less than 10 seconds additional travel time on the A56 and Fairfax Road / Heys Road route.

4.2.11 An increase in traffic is forecast on the M60 northbound from M60 J19 to M60 J18. This is due to more of the traffic wishing to travel westbound on the SRN from areas around the A576 (inside the M60) joining the M60 at junction 19 rather than using LRN routes to work across to junction 17 and bypass junction 18. Whilst this effect reduces flows on some local roads an increase is seen on the A576 northbound towards M60 J19. This is not forecast to result in any significant delay issues on this route.

Junction 17 Impacts – 2029

4.2.12 After junction 18, the largest scheme impact in terms of flow change is forecast at M60 junction 17. Further review of junction 17 in the traffic models indicates that the west facing slip roads are forecast to experience a reduction in traffic demand due to the scheme, whereas an increase in traffic demand is forecast on the east facing slip roads. There is also a noticeable reduction in through movements on the north-south A56 corridor.

4.2.13 The previously presented Figure 4-1 to Figure 4-3 show the change in traffic demand on the east facing slip roads due to the Scheme. The highest change in traffic demand is observed in the PM peak period where the eastbound on-slip flow is forecast to increase by around 250 vehicles. This is due to the Scheme reducing the level of congestion at this merge point by converting this from a taper merge to a lane gain layout.

4.2.14 In the opposite direction the westbound off-slip also experiences increases in traffic flow of up to 500 additional vehicles in the PM peak. This is a result of a number of the effects discussed previously where traffic diverts from LRN routes, including the A56 and Simister Lane, onto the SRN to then exit at junction 17. In turn this contributes to a reduction in north – south A56 movements through junction 17.

4.2.15 The eastbound off-slip is forecast to experience a reduction in traffic demand with the Scheme in place. This is due to eastbound traffic opting to remain on the SRN to take advantage of the free flow loop to turn right at junction 18 and exit at junction 19 or junction 20 to access local areas rather than exiting at junction 17 and using the LRN to avoid the congestion at junction 18. The westbound on-slip is also forecast to experience a reduction in traffic partly due to the reasons discussed above but for the reverse traffic movements. It is to be noted that the junction 17 westbound merge onto the M60 is over capacity without the Scheme. However, the additional mainline traffic attracted to the area by the Scheme further increases the delay at this merge point resulting in some traffic rerouting away from J17 westbound merge elsewhere in the network.

4.2.16 The net effect of these increases and decreases in traffic flows on the performance of the M60 J17 roundabout is largely neutral with the increased flows on the westbound off-slip approach to the roundabout counterbalanced by lower flows on the circulatory meaning that the traffic signals can be adjusted to accommodate the extra off-slip traffic.

2044 Forecasts

4.2.17 Figure 4-5 to Figure 4-7 show the forecast traffic flows from SATURN for the 2044 forecast year for the AM, IP and PM peak periods with and without the Scheme.

Figure 4-5 2044 AM SATURN Flows

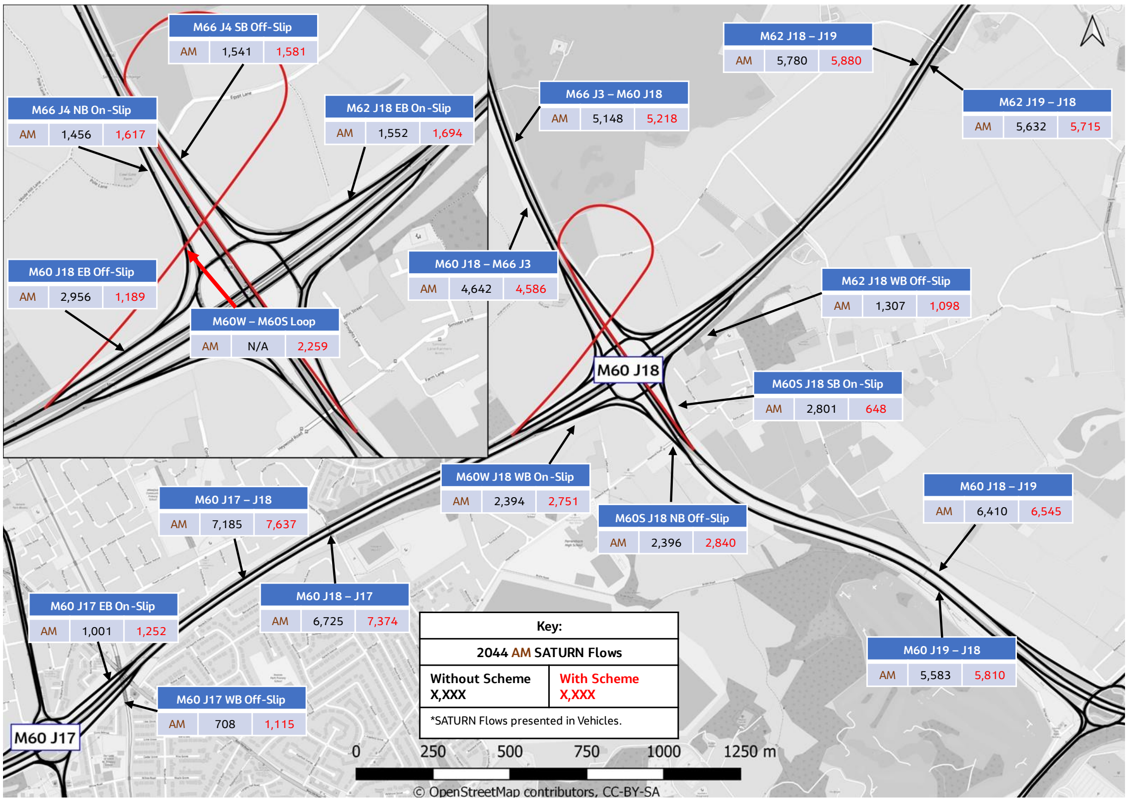


Figure 4-6 2044 IP SATURN Flows

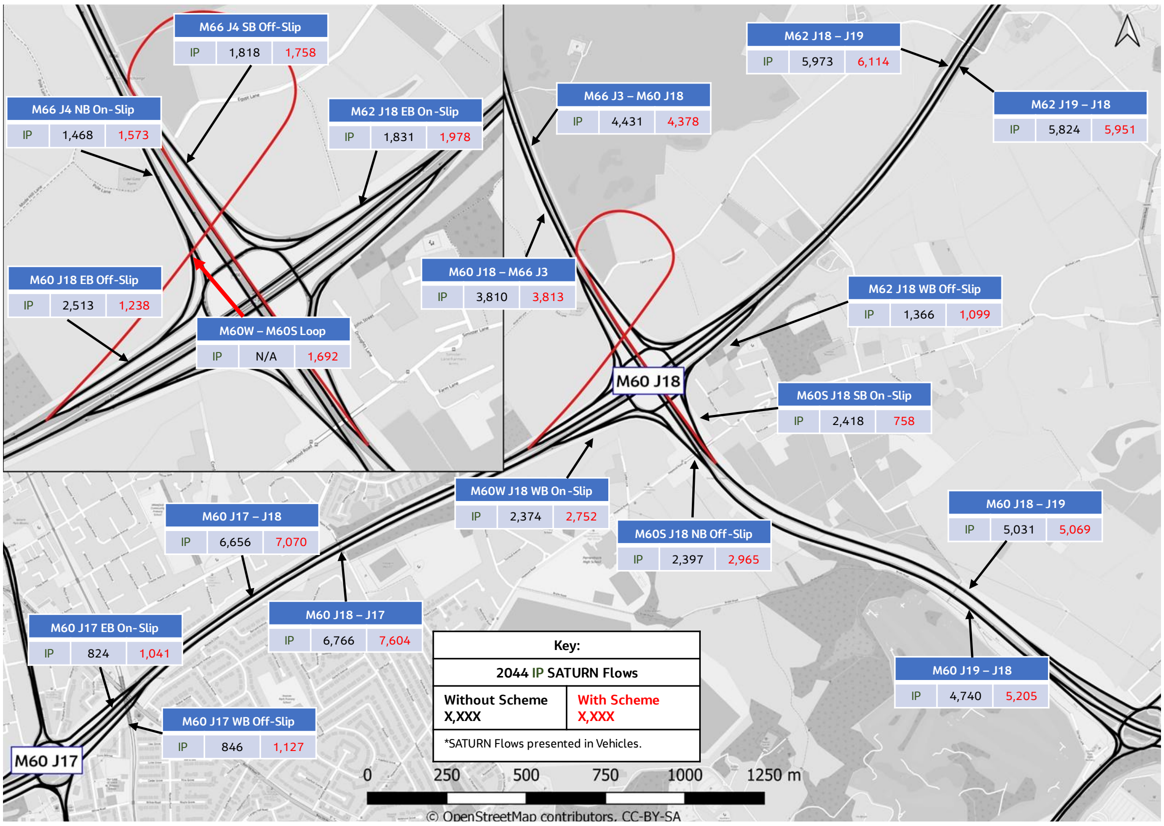
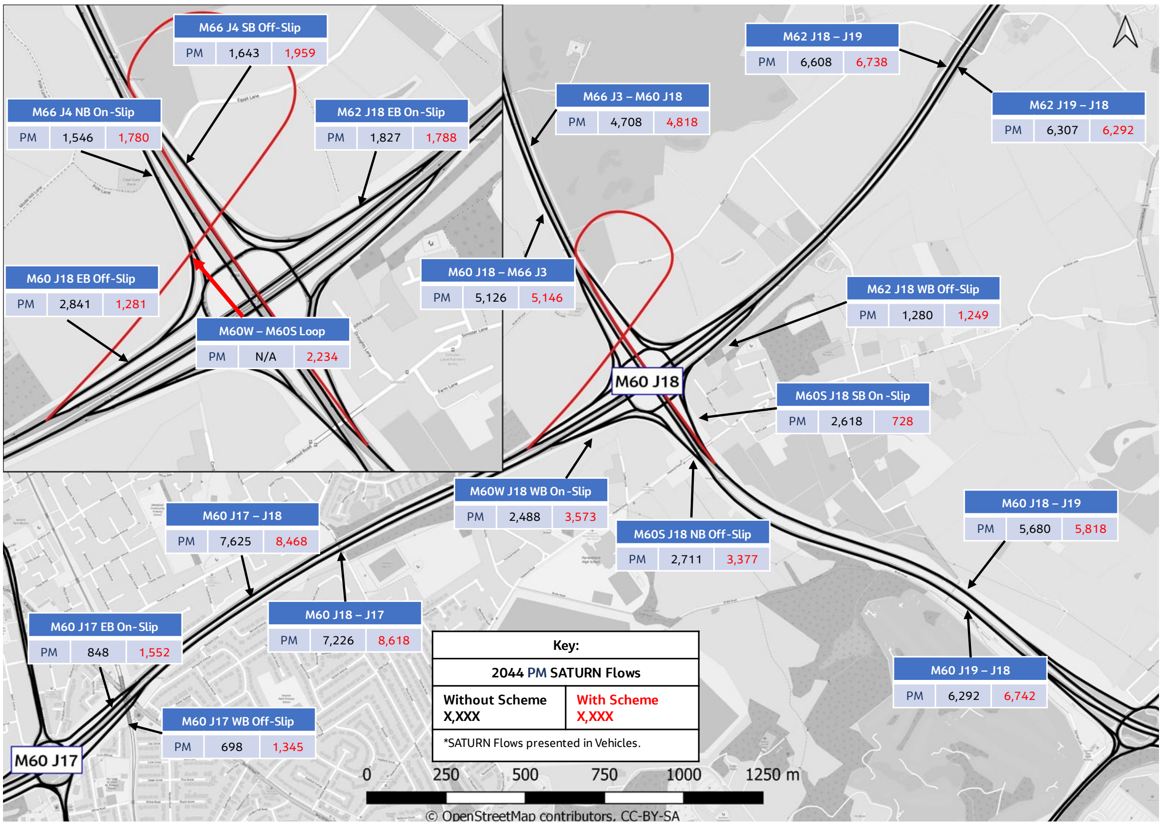


Figure 4-7 2044 PM SATURN Flows

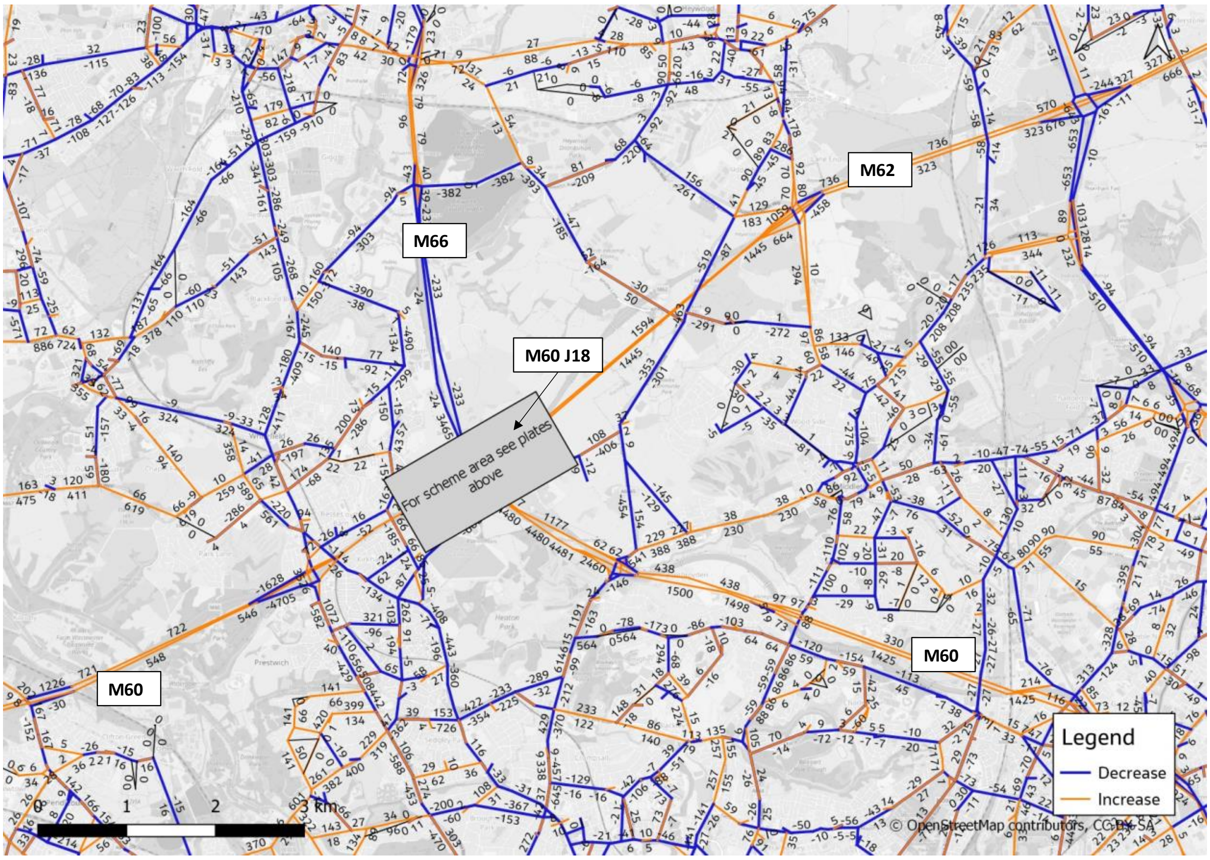


4.2.18 When comparing the flows from the scenario without the Scheme between 2029 and 2044, the forecasts indicate a further increase in traffic volumes on many sections of the Scheme area for all modelled peak periods. However, the amount of congestion in the area is limiting the amount of additional growth that can occur, for example on the M60 J18 - J17 westbound in the PM peak no growth is seen between 2029 and 2044.

4.2.19 In a similar way to the 2029 forecasts it can be seen that the Scheme enables higher traffic flows to be carried through the area in 2044 compared to the scenario without the Scheme in place. For example, the congestion constraining growth on the M60 J18 – J17 is alleviated with growth in traffic on this section seen in the PM peak between 2029 and 2044.

4.2.20 Figure 4-8 presents the forecast AADT changes due to the Scheme in 2044 which have a very similar pattern to that observed in 2029.

Figure 4-8 2044 AADT Flow Change



4.2.21 Appendix C "*M60 J18 Turning Flows – 2044*" presents turning traffic volumes at M60 J18 for AM, IP and PM periods, for forecast year 2044, with and without the Scheme.

4.2.22 When comparing the turning traffic volumes from the scenario without the Scheme between 2029 and 2044, the forecasts indicate a further increase in traffic volumes on many turns through the M60 J18 circulatory, for all modelled peak periods. However, the amount of congestion in the area is limiting the amount of additional growth that can occur, for example on the M60 eastbound to M60 southbound and M60 northbound to M60 westbound movements negligible, or even negative, growth is seen between 2029 and 2044.

4.2.23 The plot shows, similar to 2029, the highest changes in traffic movements due to the Scheme correlates with the movements that the Scheme improves such as M60 northbound to M60 westbound.

Junction 17 Impacts – 2044

4.2.24 The impacts of the Scheme on junction 17 in forecast year 2044 are similar to those in 2029. The westbound on-slip merge point is forecast to be further over capacity with associated increases in delays.

4.3 Forecast Journey Times – With & Without Scheme

4.3.1 Eight journey time routes, as presented in Figure 2-5, were selected covering a wide geographical area with specific consideration to routes which are likely to be impacted by the Scheme. Forecast journey times have been extracted from the SATURN model for these routes to identify the forecast Scheme impact on travel times.

4.3.2 It is to be noted that whilst the Base and Do Minimum journey times will be using the same routes and links in the model, some routes (e.g. route 14) will be using the network links that form the Scheme option (i.e. using the new loop links) in the Do Something scenario.

4.3.3 Table 4-1and Table 4-2 present the journey time analysis results by direction for the forecast years 2029 and 2044 respectively, for all modelled periods (AM, IP and PM). Additionally, the results are presented for the Do Minimum and Do Something scenarios. The Do Something – Do Minimum (DS-DM) column is the change in journey times due to the Scheme. A negative number in red indicates a journey time saving (i.e. reduction in journey time due to the Scheme). Figure 4-9 presents the journey time route plot from Figure 2-5 for ease of reference.

Figure 4-9 Journey Time Routes

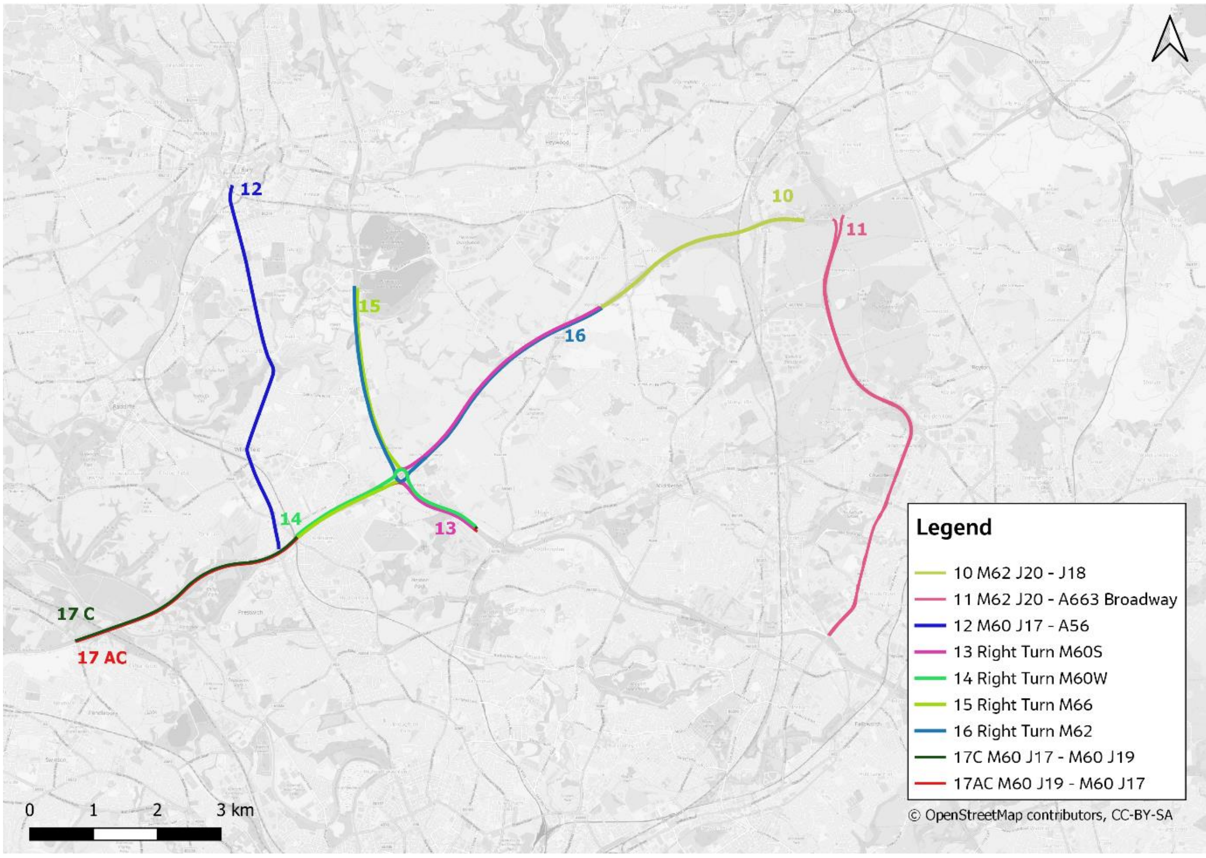


Table 4-1 2029 Journey Times (Seconds)

Route	AM			IP			PM		
	DM	DS	DS-DM	DM	DS	DS-DM	DM	DS	DS-DM
10E	335	349	14	358	377	19	385	397	11
10W	304	307	3	312	317	5	323	321	-2
11S	745	744	0	704	699	-5	775	777	2
11N	668	671	3	585	580	-5	728	726	-1
12S	806	801	-6	768	765	-3	861	837	-25
12N	873	879	6	757	754	-2	848	834	-14
13	324	305	-19	354	325	-30	376	366	-10
14	288	206	-81	238	171	-67	284	198	-86
15	334	297	-37	334	273	-61	453	308	-145
16	379	358	-21	363	348	-15	426	395	-31
17C	669	609	-61	544	494	-50	670	579	-91
17AC	549	520	-30	543	507	-36	763	688	-74

Table 4-2 2044 Journey Times (Seconds)

Route	AM			IP			PM		
	DM	DS	DS-DM	DM	DS	DS-DM	DM	DS	DS-DM
10E	385	401	16	419	437	18	415	435	20
10W	318	321	3	328	335	7	338	334	-4
11S	828	830	2	756	755	-1	823	823	0
11N	687	672	-14	591	588	-3	773	770	-3
12S	837	826	-11	792	779	-13	916	877	-39
12N	914	918	4	768	770	2	871	860	-11
13	376	331	-45	417	357	-60	433	392	-41
14	306	225	-81	254	184	-70	279	207	-72
15	357	301	-56	383	320	-63	534	356	-178
16	407	379	-28	387	378	-10	448	421	-27
17C	763	683	-80	618	561	-57	681	603	-78
17AC	630	595	-35	626	576	-51	875	793	-82

4.3.4 Almost all journey times are forecast to increase over time without the Scheme due to increased traffic demand in the area. However, with the Scheme in place, all journey times on all routes through the M60 J18 (routes 13-16) and along the M60 between M60 J17 and J18 (Route 17C and 17AC) are forecast to improve.

4.3.5 The largest increase in journey times without the Scheme is forecast on Route 17 clockwise and anti-clockwise with PM peak journey times forecast to increase by over 4 minutes from the base by 2044. The majority of this additional delay occurs at the M60 J18 WB on-slip at the merge point, which also affects route 15 which in turn increases by over 2.5 minutes in the 2044 PM peak.

4.3.6 With the Scheme, route 15 (M66 SB J18 off-slip right turn to M60W WB J18 on-slip) is forecast to experience a significant journey time saving of almost 2.5 minutes in 2029 and almost 3 minutes in the 2044 PM peak period. In addition to the reduction in junction 18 WB merge delay this movement benefits from the M60 clockwise traffic currently opposing this movement on the circulatory now using the free flow loop link. As a result the signal timings can be changed to allow more green time and additional capacity for traffic making the right turn from M66 SB to M60 WB.

4.3.7 Traffic using the new free flow loop (journey time route 14) save up to 1.5 minutes compared with the equivalent movement via the circulatory with the current layout.

4.3.8 The one route on the SRN that is forecast to consistently experience an increase in journey time due to the Scheme is route 10 between M60 J18 and M62 J20, especially in the eastbound direction. The slight increases of around 20 seconds are due to the additional traffic forecast to use this section of the network after being attracted to the Scheme area.

4.3.9 Of the two routes on the LRN, route 11 on the A663 is forecast to experience insignificant changes in journey times due to the Scheme, whilst route 12 on the A56 generally experiences journey time reductions as some traffic from the areas around Bury are forecast to switch from this route to the M66 to take advantage of the faster journey times through M60 J18 provided by the Scheme.

5 Future Network Performance – Scheme Under Construction

5.1 Overview

5.1.1 Traffic management measures during construction tend to result in changes to journey times and also changes in traffic flow on affected links.

5.1.2 The construction works for the Scheme will largely be on, or immediately adjacent to, existing parts of the road network and so traffic management measures will be required to ensure the safety of road workers and to provide space for the construction work. Traffic management measures typically consist of narrowed traffic lanes, closures of parts of the network and reduced speed limits. In developing the traffic management measures for the Scheme one of the key considerations has been to keep delays to traffic to a minimum.

5.1.3 This section describes the traffic modelling of the construction phases of the Scheme. This includes an overview of the impact on traffic flows and journey times for each of the construction phases. Specific details relating to construction sequences and traffic management phases can be found in the Outline Traffic Management Plan (TR010064/APP/7.5).

5.2 Construction Delay Assessment – Methodology

5.2.1 The estimation of the traffic management impacts have been determined using the SATURN modelling software. For the purposes of this assessment, only the traffic management requirements that will have a significant impact on traffic flows and delays have been considered. That is, only those elements that affect the road capacity, speed limits or numbers of lanes have been considered in the assessment.

5.2.2 For this assessment, the traffic management arrangements have been coded into SATURN to simulate the impact of the construction activities on the existing network. Fixed demand based on the 2029 Do Minimum post-VDM assignment has been used to model these scenarios. There has been no VDM undertaken for this assessment as each phase of the traffic management works don’t last long enough for the majority of VDM effects to start to occur.

5.2.3 Table 5-1 shows the combinations of traffic management references and durations of the five modelled phases. The descriptions of the individual Temporary Traffic Management references (TTM Ref) are shown in Table 5-2. It is assumed that the speed limit will be reduced to 50mph through all of these works extents.

Table 5-1 Modelled Traffic Management Phases

Phase	TTM Ref. Included	Modelled Start Date	Modelled End Date
1	7,35,24	Feb-26	Jun-26

2	7,36,45	Jul-26	Apr-27
3	11,18,39,45	May-27	Dec-27
4	11,35,38	Jan-28	Jun-28
5	32	Jul-28	Mar-29

Table 5-2 Traffic Management (TM) Schedule

TTM Ref	Work activity	TM requirements	TM start and end points	Start Date	End Date
7	**M60 J17 - 18 verge/hard shoulder Clockwise roadworks.** Includes widening works, drainage installation, SWC, pavements, VRS, gantry foundations, ducting, utilities etc.	24/7 closure of eastbound hard shoulder and partial lane 1 (designated M60/M66 diverge lane). Install narrow lanes and vehicle restraint barrier. Night time lane closures likely required throughout duration due to limited working room.	TM to start on M60 east bound approach to J17 and end east of M60 J18 on the M62 eastbound	05/02/2026	24/05/2027
11	**M60 J18 - 17 verge/hard shoulder Anti-Clockwise roadworks**. Includes widening works, drainage installation, SWC, pavements, VRS gantry foundations, ducting, utilities etc.	24/7 closure of westbound hard shoulder and partial lane 1. Install narrow lanes and vehicle restraint barrier. Night time lane closures likely required throughout duration due to limited working room.	TM to start on M602 westbound approach to J18 and end west of M60 J17 on the M60 westbound	03/03/2027	15/06/2028
32	**M60 J17-18 central reservation works.** Includes VRS removal, dig out and replace, drainage, barrier, gantries etc.	24/7 lane closure of offside lane on both M60 CW and ACW carriageways between M60 J17 and J18 to allow access into the central reservation. Hard shoulder running and narrow lanes required to facilitate this as well as reconfiguration of slip roads. Night time lane closures likely required throughout duration due to limited working room.	TM will be on both the M60 clockwise and anticlockwise carriageways. TM will run from west of J17 on the M60 through to the M62 east of M60 J18	01/07/2028	05/03/2029
35	**M66 Central reservation works.** Includes VRS removal, dig out and replace, drainage, barrier etc.	TTM Layout using hard shoulder running and narrow lanes. Likely some works required to slip road arrangements to facilitate. See TTM Layout 35. Night time lane closures will be required at times where necessary.	On the southbound, TM will start on M66 south of J3 and continue through to M60 clockwise J19. North bound will start on M60 anticlockwise J19 and continue to M66 J3.	05/02/2026	23/07/2026
36	**M66 NB verge TM for widening and Viaduct structure works**	24/7 closure of NB hard shoulder - contraflow system to maximise working room	TM will start on M60 anti-clockwise at J19, also TM required on M60	30/07/206	28/04/2027

TTM Ref	Work activity	TM requirements	TM start and end points	Start Date	End Date
		through junction. See TTM Layout 36.	anti-clockwise on approach to J18 off slip/free-flow link. TM will finish south of M66 J3.		
45	**M66 SB HS and Lane 1 closure for SB Diverge construction**	24/7 closure of SB hard shoulder, and lane 1 (Lane Gain) on approach to Junction. Reduction in capacity on approach to junction opening back up to full capacity at slip road diverge. See TTM Layout 45.	TM will start on M66 south of J3 and continue through to M60 clockwise J19.	22/07/2026	21/01/2028
18	**M66 SB verge TM for widening and Viaduct structure works.**	24/7 closure of SB hard shoulder - contraflow system to maximise working room through junction. See TTM Layout 18.	TM will start on M66 south of J3 and continue through to M60 clockwise J19.	13/05/2027	24/01/2028
38	**Southbound verge J3 - J4 - Northern Loop Tie In works**	Realignment of traffic over M66 Southbound Diverge and temporary verge closure for Northern Loop tie in works. See TTM Layout 38.	TM between Southbound Diverge and the Northern Loop	14/01/2028	13/09/2028
46	**M62 WB to M60 CW Slip rd / M60 CW mainline widening works**	Daytime HS closure with Night closures of the M62 WB - M60 SB free flow link plus one lane on the on-slip. See TTM 46.	TM will start on M62 approach to J18 and round the slip/free-flow link. Tm will continue to M60 J19.	06/08/2026	23/11/2026
39	**M60 J18 ACW link road & slip roads works -** widening on free flow link, realignment, surfacing, white lining, kerbing etc.			06/06/2027	01/12/2027
35	**M60 J18 Central Reservation**	Works will be undertaken under 24/7 hard shoulder closures (incl. hatched area) for nearside. Night time slip lanes/free flow link closures will be required for works that can't be undertaken from HS/verge	TM will start at M60 J19 and continue around free flow link and finish on M60 between J18 and J17.	24/01/2028	07/07/2028

5.3 Traffic Flow Impact

5.3.1 Table 5-3 presents a comparison of the traffic flows between M60 J17-18, which is the section most affected by the works, for the without Scheme scenario and the various construction phases for the peak weekday modelled time periods.

Table 5-3 Traffic Flow M60 J17 – EB/WB (vehs/hr)

Location	Without Scheme	Construction Phase				
		Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
AM						
M60 J17 – J18 Eastbound	7,918	7,571	7,570	7,907	7,907	7,429
M60 J18 – J17 Westbound	7,203	7,150	7,148	6,972	6,981	6,877
IP						
M60 J17 – J18 Eastbound	7,513	7,254	7,255	7,514	7,513	7,144
M60 J18 – J17 Westbound	7,425	7,397	7,394	7,192	7,195	7,116
PM						
M60 J17 – J18 Eastbound	8,243	7,793	7,796	8,212	8,194	7,429
M60 J18 – J17 Westbound	7,791	7,791	7,791	7,431	7,431	7,431

5.3.2 It is observed that based on the TMs included in each phase, there is change in traffic flow along the east and westbound movements on M60 J17-18 across all the time periods.

5.3.3 The decrease of traffic flow during the construction phases is due to the road capacity reducing through the roadworks which limits traffic throughput in the peak hours. Traffic that is then deterred from using the sections of network where the roadworks are located will seek other routes.

5.3.4 The AADT flow changes as a result of the traffic management for each of the five modelled phases are shown on the figures provided in Appendix D "*AADT Flow Change*". The main rerouting effects seen in these plots are as follows:

- Depending on the location of the roadworks in a given phase some traffic to/from areas around central Manchester will avoid travelling through the roadworks by switching their access point onto the M60 at either J17 or J19.

- In most phases there are some increases in traffic on the A6045, A56 Bury New Rd and A576 (around 500 additional 2-way trips per day) as some traffic is forecast to use these routes to avoid the roadworks.

5.4 Journey Time Impact

5.4.1 Information on travel times along the eight routes mentioned in Chapter 2 and repeated in Figure 5-1, was extracted from the construction phase models for all modelled time periods and compared with the scenario without roadworks. The results are presented in Table 5-4.

Figure 5-1 Full Extent of Journey Time Routes

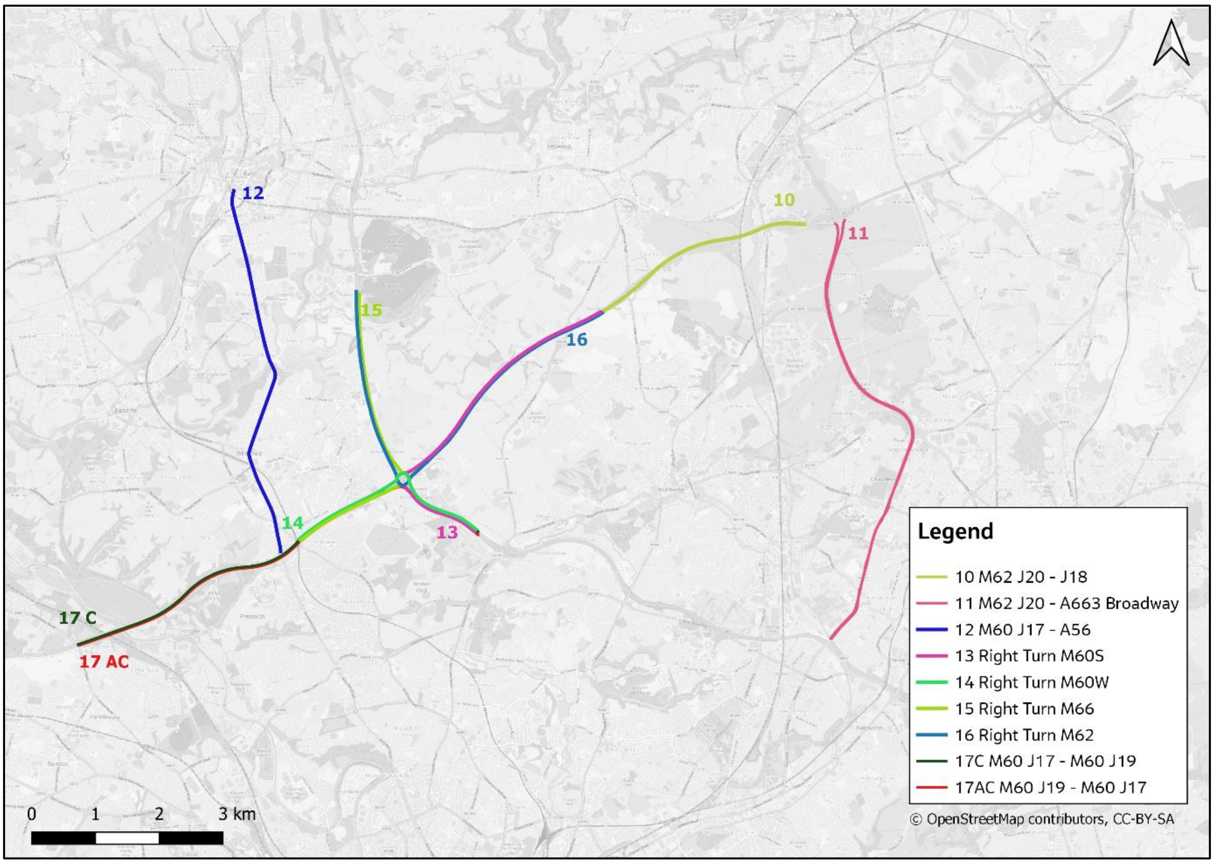


Table 5-4 Modelled Journey Times (secs) – Construction Phases

Peak	Route	Without TM (DM)	Phase 1	Diff (P1 - DM)	Phase 2	Diff (P2 - DM)	Phase 3	Diff (P3 - DM)	Phase 4	Diff (P4 - DM)	Phase 5	Diff (P5 - DM)
AM	10E	335	324	-11	324	-11	336	1	336	1	338	3
	10W	304	304	0	304	0	311	7	311	7	311	7
	11S	745	750	5	749	4	751	6	755	10	743	-2
	11N	668	672	4	670	2	670	2	669	1	667	-1
	12S	806	813	7	813	7	815	9	815	9	814	8
	12N	873	882	9	883	10	872	-1	871	-3	883	10
	13	324	323	-1	323	-1	327	3	327	3	325	1
	14	288	388	100	388	100	309	21	309	21	347	59
	15	334	347	13	347	13	384	50	375	41	354	20
	16	379	378	-1	377	-2	378	-1	378	-1	378	-1
	17C	669	741	72	741	72	686	17	686	17	742	73
	17AC	549	551	2	551	2	569	20	567	18	570	21

Peak	Route	Without TM (DM)	Phase 1	Diff (P1 - DM)	Phase 2	Diff (P2 - DM)	Phase 3	Diff (P3 - DM)	Phase 4	Diff (P4 - DM)	Phase 5	Diff (P5 - DM)
PM	10E	385	359	-26	359	-26	384	-1	384	-1	393	8
	10W	323	322	-1	322	-1	382	59	379	56	354	31
	11S	775	777	2	774	-1	774	-1	772	-3	766	-10
	11N	728	727	-1	744	16	724	-4	752	24	758	30
	12S	861	868	7	868	7	870	9	874	13	875	14
	12N	848	867	19	869	21	845	-3	845	-3	901	53
	13	376	374	-2	375	-2	378	2	378	2	386	10
	14	284	411	127	412	128	286	2	285	1	329	45
	15	453	428	-25	426	-27	508	55	495	42	467	14
	16	426	421	-5	421	-5	427	1	426	0	419	-7
	17C	670	757	87	759	89	668	-2	666	-5	719	49
	17AC	763	736	-27	734	-29	799	36	791	28	852	89

5.4.2 During the construction phases the most affected routes are route 14 (M60 J17 merge – M60S J19 diverge) and route 17C (M60 J17 to M60S J19), especially in Phases 1 and 2. This is due to the closure of the hard shoulder and narrowing of lanes on the M60 with the inclusion of reduced speed limits resulting in slow-moving traffic. Increased delays of one to two minutes are forecast in most phases on these routes. However, the forecast increase in journey time of two minutes would not be considered unreasonable in the context of the forecast benefits of the Scheme, or similar highway schemes elsewhere on the SRN.

5.4.3 Traffic management in place on the westbound M60 in Phases 3, 4 and 5 means there is additional delay on route 10 westbound and route 15.

6 Road Safety

6.1 Introduction

6.1.1 This section provides a summary of the existing road safety record around M60 J18, and the forecast impact of the Scheme on accidents over a period of 60 years.

6.1.2 Accident impacts resulting from the Scheme were assessed using the DfT's Cost and Benefit to Accidents – Light Touch (COBALT) program (version 2.4 which is the latest version available at the time of this study). This is the software that calculates the impact of accidents as part of the economic appraisal of a road scheme in line with TAG.

6.1.3 COBALT assesses the safety impacts of road schemes on the road links and junctions that would be affected by the Scheme. Model inputs include accident rates and forecast traffic volumes for the with and without Scheme scenarios from the SATURN traffic model.

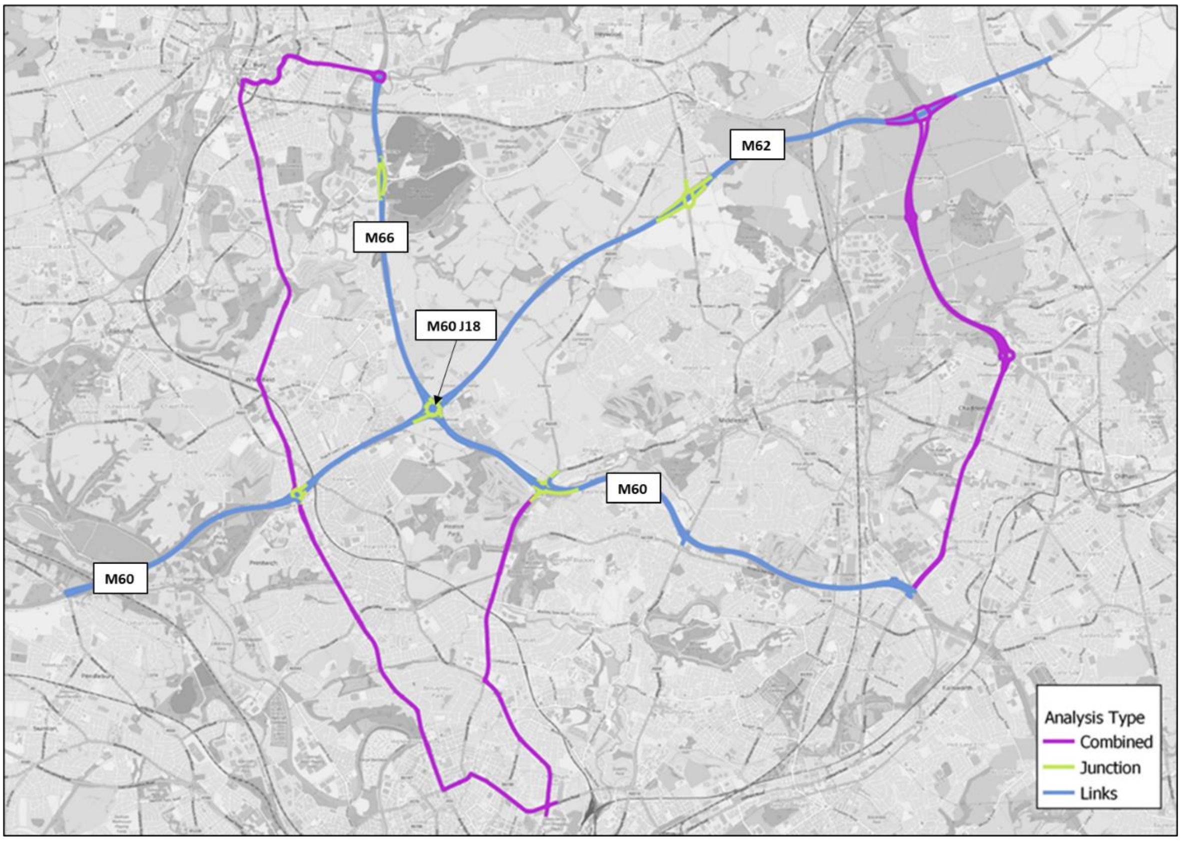
6.2 Affected Road Network

6.2.1 The accident appraisal was undertaken over a defined impact area as specified by TAG. The impact area was taken to be the roads on which the traffic flow changes due to the Scheme are of a sufficiently significant magnitude that a quantifiable change in accidents will occur.

6.2.2 The forecast change in traffic flows for the 'without Scheme' and 'with-Scheme' scenarios were used to determine the COBALT model area, to ensure that all links impacted as a result of the Scheme were included. Links where traffic flows are forecast to change by more than 5%, and where 'without-Scheme' AADT flows are greater than 1,000 vehicles were included in the COBALT model.

6.2.3 The COBALT network was constructed in GIS and is made up of a series of links and junctions, in accordance with the COBALT guidance manual produced by DfT. Part of the network was selected for more detailed analysis of links and junctions separately, based on the most likely routes to be impacted by the Scheme. This includes links and junctions on the M60, M62, M66 and surrounding roads. All additional links are analysed in the "combined" analysis where links and junctions are considered together. Figure 6-1 shows the extent of the COBALT study area and the links and junctions selected for combined or separate analysis. In addition, the new links and junctions from the schemes were analysed in the separate analysis.

Figure 6-1 COBALT Study Area

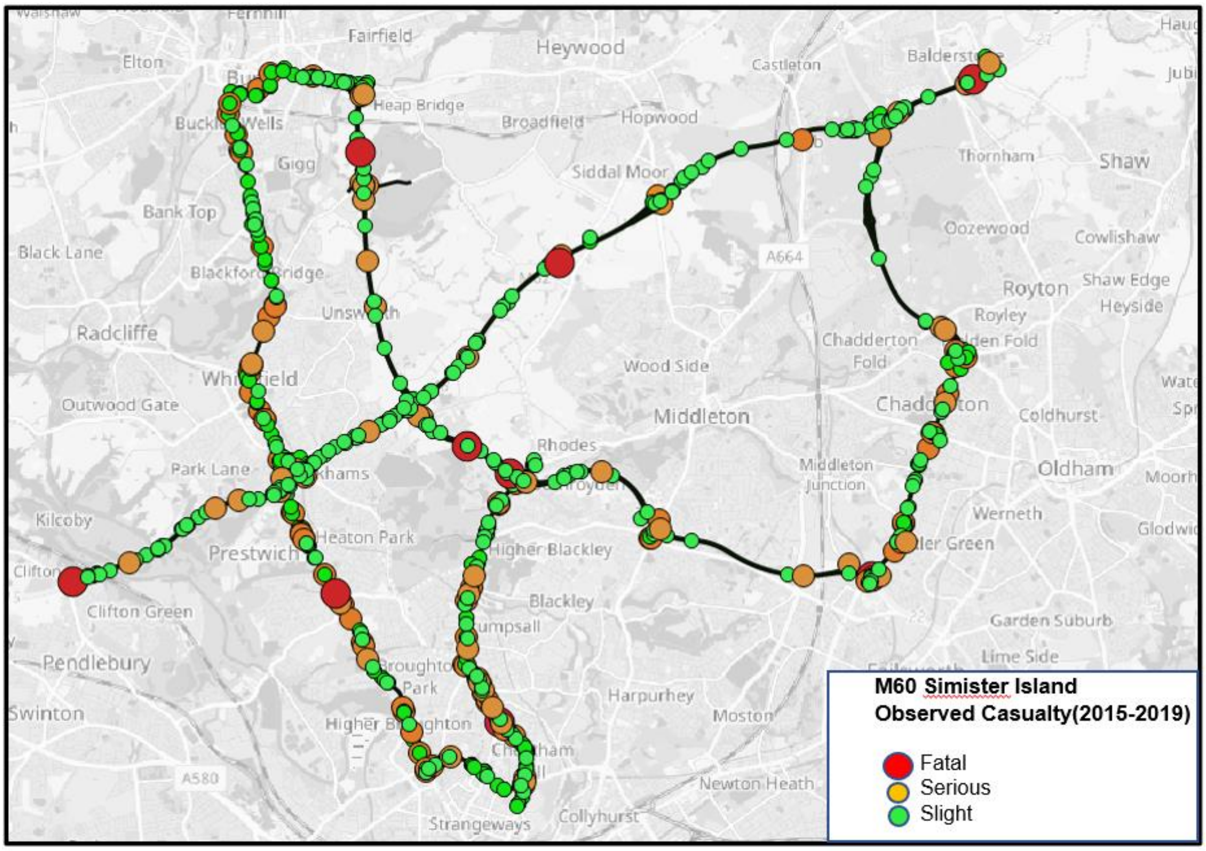


6.3 Existing Situation

6.3.1 STATS 19 Personal Injury Accident (PIA) data for the latest available complete pre-Covid five-year period between 2015-2019 was used to identify existing accidents in the study area. Whilst there were roadworks present up to mid-2018 for links within the M60 J8 to M62 J20 smart motorway scheme area the accident statistics don’t show a significant change during and post the roadworks so it is considered reasonable to use data for this period.

6.3.2 Figure 6-2 presents the observed accident data by severity for the assessment period (2015-2019) in the study area.

Figure 6-2 Observed Casualties by Severity (2015-2019)



6.3.3 Table 6-1 presents the yearly observed casualties by severity between 2015-2019

Table 6-1 Observed Yearly Casualties

Year	Fatal	Serious	Slight	Total	% Total
2015	2	21	119	142	17%
2016	1	20	122	143	17%
2017	1	32	160	193	23%
2018	2	33	132	167	20%
2019	3	22	159	184	22%
Total	9	128	692	829	100%
% Total	1%	15%	83%	100%	

6.3.4 Table 6-1 indicates that between 2015 and 2019 there were a total of 829 casualties, out of which 83% were slight, 15% serious and 1% were fatal casualties. The number of casualties per year are relatively consistent, on average 165 casualties occurred per year.

6.3.5 The following can be observed from the dataset for the fatal and serious accidents:

- 61 out of the 137 fatal and serious accidents, happened under streetlight conditions

- 45 out of 137 accidents occurred on wet and ground frost road conditions
- Around 12.2% of such casualties involved young male drivers who were less than 25 years of age.

6.3.6 Figure 6-3 presents the location of the accidents over the 2015 to 2019 period on the Scheme links. The locations of the accidents are spread around the M60 J18, M60 J17 and the mainline between M60 J17 and J18.

Figure 6-3 Observed Accident Locations (2015-2019)

Accident Rates

6.3.7 Within COBALT locally computed accident rates were derived for selected links in the vicinity of M60 J18 instead of using the TAG default national averages. The locally computed rates allows better reflection of any local deviations from national accident trends within the Scheme area. All new Do Something links and junctions used the default accident rates based on the link or junction type.

6.3.8 The Scheme involves converting a four lane Controlled Motorway between M60 J17 and J18 into a five lane with hard shoulder cross section, in both directions. Currently COBALT does not have default accident rates for either of these road types. Therefore, the assumption was made that the casualty rate and severity splits would be the same for 4 lane and 5 lane motorway sections.

6.4 Future Situation With and Without Scheme

6.4.1 Table 6-2 presents the accident summary over the 60-year appraisal period.

Table 6-2 Accident Impact

Scenario	2029	2044	2061	Appraisal Period (60 Years)
Without Scheme	188.4	183.8	190.5	11,264.6
With Scheme	188.1	183.6	190.4	11,255.3
Change in Total Accidents	-0.3	-0.2	-0.1	-9.3

6.4.2 The accidents saved by the Scheme are calculated as the difference between the number of accidents in the without and with Scheme scenarios. Table 6-2 indicates that over the 60-year appraisal period, the Scheme is forecast to lead to a reduction in 9 accidents over the 60 year appraisal period.

6.4.3 Table 6-3 presents a summary of the casualties for the with Scheme and without Scheme scenarios over the appraisal period.

Table 6-3 Casualties Impact

Scenario	Casualties						Change in Total Casualties		
	Without Scheme			With Scheme					
	Fatal	Serious	Slight	Fatal	Serious	Slight	Fatal	Serious	Slight
2029	1.84	21.23	243.40	1.85	21.23	243.31	0.01	-0.00	-0.09
2044	1.80	20.63	237.90	1.82	20.65	238.03	0.02	0.02	0.13
2061	1.87	21.38	246.69	1.89	21.41	247.01	0.02	0.02	0.32
Appraisal Period (60 Years)	110	1,264	14,577	111	1,265	14,590	0.96	1.16	12.66

6.4.4 It is observed that while there is a slight decrease in the overall volume of accidents (9 accidents in 60-year appraisal period) that occur, the number of fatal, serious and slight casualties increases slightly equivalent to 1.0, 1.2 and 12.7 additional fatal, serious and slight casualties over the 60-year appraisal period.

6.4.5 To understand the locations of the impacts on the network, Table 6-4 presents the change in Personal Injury Accidents (PIAs) over the 60-year appraisal period broken down by different sections along the COBALT network. Figure 6-4 presents the location of those sections geographically.

Figure 6-4 Benefit Section Locations

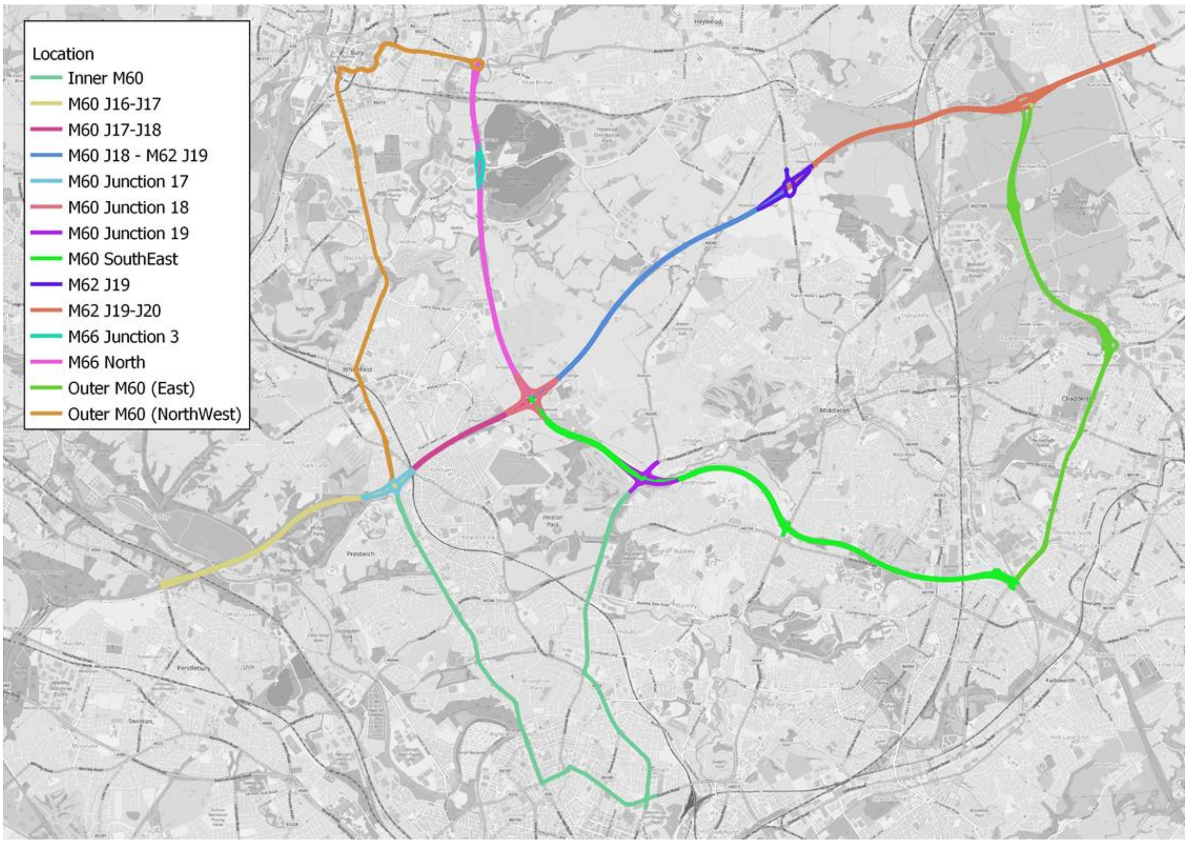


Table 6-4 PIA Impact by Location

Type	Location	Change in PIAs
Strategic road section	M60 J16-J17	8
	M60 J17-J18	31
	M66 North	16
	M60 SouthEast	12
	M60 J18 - M62 J19	3
	M62 J19-J20	4
Junctions	M60 J17	14
	M60 J18	-35
	M66 J3	-1
	M62 J19	-1
	M60 J19	1
Local Roads	Outer M60 (NorthWest)	-24
	Inner M60	-22
	Outer M60 (East)	-15
	Total	-9

6.4.6 Table 6-4 indicates that in general the SRN is forecast to experience increases in accidents as traffic flows increase across many sections in response to the Scheme. As much of this traffic has rerouted from the local road network, reductions in PIAs are forecast on local roads.

6.4.7 M60 J18 is forecast to experience 35 fewer PIAs over 60 years due to the Scheme removing traffic from the junction onto the free flow loop. Conversely the increased traffic flows using M60 J17 to take advantage of the Scheme results in additional PIAs forecast here.

Scheme Area Accident Rate Analysis

6.4.8 The absolute changes in both accidents and casualties don't identify whether the Scheme is improving or worsening road safety or whether it is primarily the change in traffic flows that is affecting the total number of accidents and casualties. For this reason forecast accidents and casualties have been calculated per billion vehicle kilometres across all COBALT links, these results are presented in Table 6-5 and Table 6-6.

Table 6-5 Accident Change per Billion VehKms

Scenario	2029	2044	2061
Without Scheme	80.8	71.3	71.1
With Scheme	78.0	69.0	68.7
Change	-2.8	-2.3	-2.4

6.4.9 Table 6-5 shows that as well as reducing the absolute number of accidents in the study area the Scheme is also forecast to reduce the accident rate thereby lowering the risk of accident for each individual driver.

Table 6-6 Change in Casualties per Billion VehKms

Scenario	Casualties per Billion VehKms						Change in Total Casualties		
	Without Scheme			With Scheme			per Billion VehKms		
	Fatal	Serious	Slight	Fatal	Serious	Slight	Fatal	Serious	Slight
2029	0.79	9.10	104.37	0.77	8.81	100.94	-0.02	-0.30	-3.43
2044	0.70	8.00	92.26	0.68	7.76	89.40	-0.02	-0.25	-2.86
2061	0.70	7.98	92.03	0.68	7.72	89.13	-0.02	-0.25	-2.89

6.4.10 Table 6-6 highlights that when casualties are considered within the context of traffic volumes, there is a reduction in the forecast rate of all casualty types in the With Scheme scenario. By implication, the Scheme is improving safety for the individual driver using the study area, both in terms of the likelihood of an accident, but also in terms of the likelihood of a personal injury accident. However, as a result of more drivers using the area, and the redistribution of traffic between routes, the absolute number of casualties is forecast to increase.

7 Walking Cycling and Horse-Riding Assessment

7.1.1 A Walking, Cycling and Horse-Riding (WCH) Assessment was undertaken at the start of the preliminary design stage. The aims of a WCH Assessment are:

- To gain an appropriate understanding of all relevant existing facilities for pedestrians, cyclists and equestrians (users) in the local area.
- To provide background user information that can be referred to throughout the development of the highway scheme.
- To identify opportunities for improvement for users.

7.1.2 As part of the assessment process, liaison was undertaken with stakeholders such as Bury Council and information was gathered about local walking, cycling and horse-riding routes. These include the Transport for Greater Manchester Cycle and Bee Networks and the Public Rights of Way network. The SRN through the Scheme only consists of motorways, which pedestrians, cyclists and equestrians are prohibited from using, but locations where they can cross the SRN were identified.

7.1.3 All existing walking, cycling and horse-riding routes across the motorways are being retained in their current form. Replacement routes are being provided for the existing public footpaths affected by the Scheme including where they are affected by new drainage ponds, wetlands or swales.

7.1.4 Effects on WCH from the Scheme are assessed in Chapter 13: Population and Human Health of the Environmental Statement (TR010064/APP/6.1).

8 Public Transport

8.1.1 There are no significant changes proposed to public transport routeing or facilities due to the Scheme. However, users on bus services that pass-through M60 J18, in particular the current X43 service, will benefit from improved journey times. Minor positive impacts on bus journey times on the LRN may also indirectly result from the Scheme as traffic reassigns away from these routes and onto the SRN. Furthermore, any other private coach services such as National Express will also benefit from improved journey times for services travelling through M60 J18.

9 Summary and Conclusions

9.1 Overview

9.1.1 This Report has presented the assessment results for the impact of the construction and operation of the Scheme on the strategic and local highway network, including an assessment of road safety impacts.

9.1.2 The Scheme will improve J18 of the M60 and facilitate the movement of traffic along the M60, M62 and M66 in the Scheme area, contributing to more reliable and safer journeys through the junction and along the SRN. In order to facilitate the new arrangements at M60 J18, the Scheme provides additional capacity between M60 J17-18 with the change to a dual 5 lane motorway with hard shoulder cross section. This will provide additional benefits to those already delivered through the Manchester smart motorways scheme and reduce delays through the improved junction as well as on the M60.

9.2 Network Performance

Base Performance

9.2.1 A 2018 base year SATURN traffic model has been developed for the Scheme area. This has been calibrated and validated to a dataset of traffic counts and journey times across Greater Manchester.

9.2.2 The Scheme model was developed for the AM, IP and PM peak hours using 3 vehicle classes (cars, light goods vehicles and heavy goods vehicles).

9.2.3 A VDM was also developed to forecast and quantify changes in travel demand due to changes in transport conditions. The VDM was calibrated using the guidance provided in TAG Unit M2.

9.2.4 The Scheme base SATURN model replicates the base conditions to a sufficient standard across the Scheme area in all modelled time periods.

9.2.5 The current base model indicates high traffic volumes on certain sections near the Scheme area, particularly between M60 J17-J18 for both the eastbound and westbound directions.

9.2.6 Trafficmaster speed data highlights that there are significant delays in the westbound direction throughout the Scheme area on the M62 and M60, with speeds as low as 20mph in both AM and PM periods. This is due to a combination of the high volume of traffic using this section, the weaving and merging between junctions and downstream slow-moving traffic from J15.

9.2.7 Movements through M60 J18 also experience delays on the approach to the roundabout and on the slip roads onto the motorway network. The delays at the junction are primarily caused by high flows on conflicting traffic movements through the junction, especially from M60 eastbound to M60 southbound and M66 southbound to M60 westbound.

Forecast Performance

9.2.8 With and without Scheme traffic forecasts were produced for forecast years 2029, 2044 and 2061.

9.2.9 Future year demand matrices were produced using trips from proposed development sites and overall NTEM (v8.0) trip growth constraints to ensure forecast growth is in line with regional forecasts.

9.2.10 The base model network was updated to generate a Do Minimum network for each of the forecast years. The Do Minimum includes the current network from the base year, together with any road schemes that are likely to be built.

9.2.11 To produce the Do Something models, the Northern Loop Scheme option was included in the model network in addition to the network changes in the Do Minimum scenario.

9.2.12 The forecast models indicate that increases in traffic are forecast throughout the study area over time. Without the Scheme the additional traffic results in increased journey times and delays.

9.2.13 With the Scheme in place a reduction in delay and journey time is forecast for routes through the Scheme area. In turn this attracts some additional traffic to the SRN around the Scheme. These increases are from a combination of reassignment from the LRN, traffic switching the junctions used to access the M60, and VDM effects as traffic seeks to take advantage of the extra capacity provided by the Scheme.

9.3 Traffic Management during Construction

9.3.1 The construction works for the Scheme will be largely on, or immediately adjacent to, existing parts of the road network and so traffic management measures will be required to ensure the safety of road workers and to provide space for the construction work. These traffic management measures will result in some reductions in capacity and additional delay on the network.

9.3.2 To understand the impacts, the traffic management arrangements have been phased and coded into the SATURN traffic model.

9.3.3 During construction, journey times are forecast to increase through the Scheme area by up to two minutes on certain routes. As a result, some traffic is forecast to divert onto other nearby routes to avoid these delays. However, the volumes of traffic changing route are not forecast to be significant enough to result in substantial changes in travel time on these alternative routes.

9.4 Road Safety

9.4.1 Accident changes resulting from the Scheme were assessed using the DfT’s COBALT program.

9.4.2 As the Scheme includes changing the M60 J17 – J18 section from a 4-lane Controlled Motorway to a 5-lane motorway with a hard shoulder, neither of which are included in COBALT, a bespoke assessment of the accident rates for these road types is required. As COBALT does not have parameters for a 5-lane motorway, and without any available analysis of 5-lane motorway sections, it was decided based on professional judgement that the observed accident rate for the existing 4-lane motorway section was used (per 1 billion vehicle km driven), i.e. the same COBALT parameters were used for M60 J17-J18 in both directions in the Do Minimum and Do Something scenarios.

9.4.3 Over the 60-year appraisal period, the Scheme is forecast to lead to a reduction in 9 accidents.

9.4.4 However, the number of fatal, serious and slight casualties are forecast to increase slightly. This is due to the accidents that do occur having more casualties as drivers reroute from local roads to higher speed strategic roads to take advantage of the Scheme benefits.

9.4.5 The casualties per billion vehicle kilometres have been calculated across the assessment area, this shows that the risk of accident and the risk of a personal injury accident is reduced for each driver due to the Scheme.

9.5 Walking Cycling and Horse-Riding

9.5.1 All existing walking, cycling and horse-riding routes across the motorways are being retained in their current form. Replacement routes are being provided for the existing public footpaths affected by the Scheme including where they are affected by new drainage ponds, wetlands or swales.

9.6 Public Transport

9.6.1 No significant changes proposed to public transport routeing or facilities as part of the Scheme.

9.7 Conclusions

9.7.1 The Scheme will help relieve traffic congestion and improve the journey experience for motorists at M60 J18. Traffic wanting to travel eastbound to southbound on the M60 will use the free flow loop instead of the M60 J18 circulatory thereby significantly reducing traffic flows on the M60 J18 circulatory and freeing up capacity for other movements at the junction.

9.7.2 In addition, the Scheme provides additional capacity between M60 J17-18 with the upgrade to a dual 5-lane motorway, providing five lanes in both directions and reducing delays associated with merging and diverging traffic.

9.7.3 As a result of the Scheme, M60 J18 is forecast to operate within capacity up to and beyond 2044.

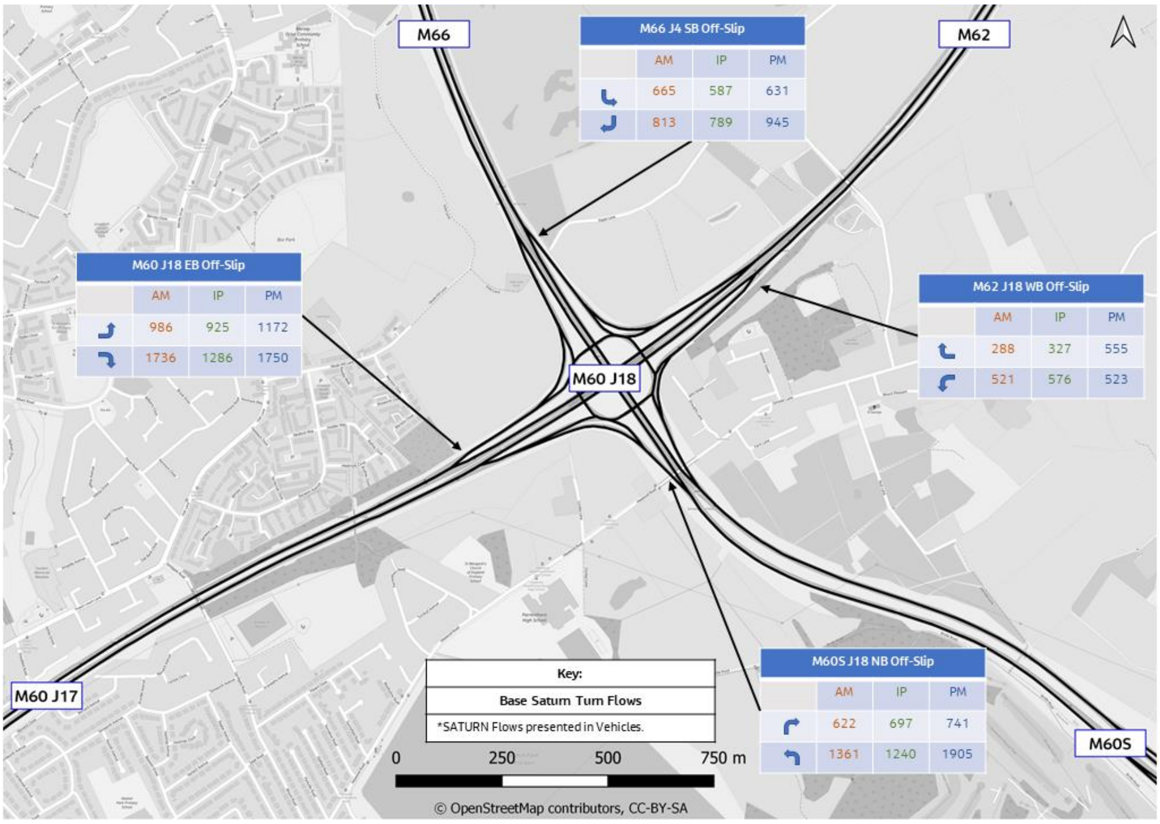
Acronyms

Abbreviation	Term
ADM	Area of Detailed Modelling
ATC	Automated Traffic Count
DCO	Development Consent Order
DfT	Department for Transport
EA	External Area
FMA	Fully Modelled Area
HGV	Heavy Goods Vehicle
ITN	Integrated Transport Network
LGV	Light Goods Vehicle
LRN	Local Road Network
LSOA	Lower Super Output Area
MCTC	Manual Classified Turning Count
MIDAS	Motorway Incident Detection and Automatic Signalling
NTEM	National Trip End Model
NRTP	National Road Traffic Projection
OD	Origins and Destinations
PA	Production-Attraction
SATURN	Simulation and Assignment of Traffic to Urban Road Networks (Software)
SRN	Strategic Road Network
TAG	Transport Appraisal Guidance
TfGM	Transport for Greater Manchester
TMU	Traffic Monitoring Unit
TRADS	Traffic Flow Data System
VDM	Variable Demand Model
VOT	Value of Time

Appendix A

A.1 M60 J18 Turning Flows – Base

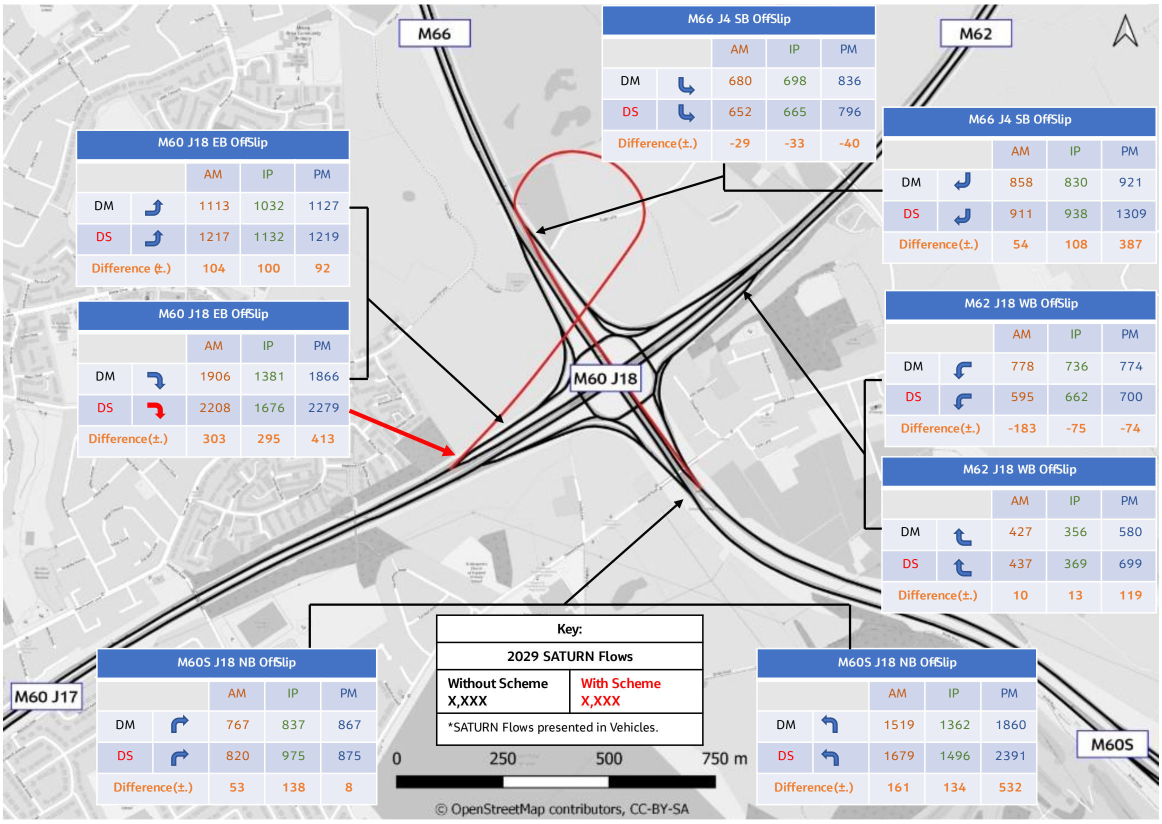
Figure A.1 Base Model SATURN Turning Flows per hour



Appendix B

B.1 M60 J18 Turning Flows – 2029

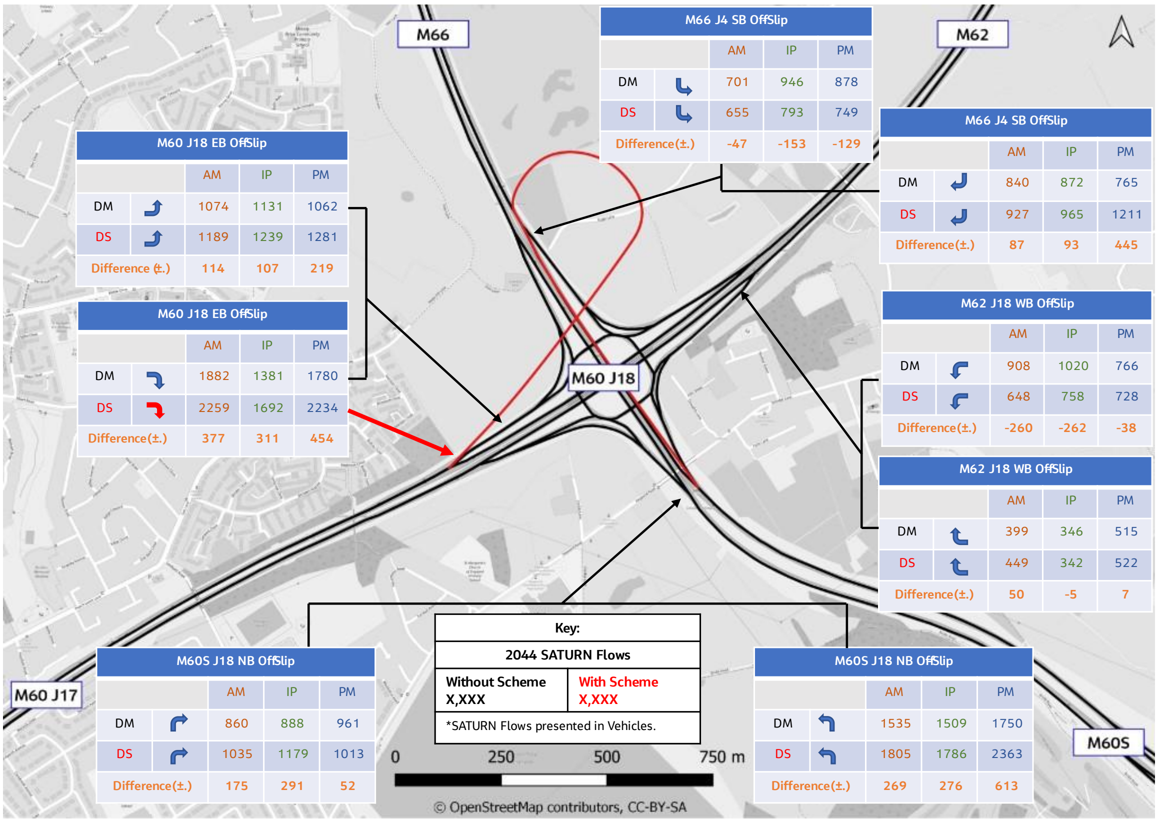
Figure B.1 Model SATURN Turning Flows – 2029 per hour



Appendix C

C.1 M60 J18 Turning Flows – 2044

Figure C.1 Model SATURN Turning Flows – 2044 per hour



Appendix D

D.1 AADT Flow Change

Figure D.1 Phase 1 – DM Traffic Management AADT Flow Change compared to DM (vehicles)

Figure D.2 TM Phase 2 – DM Traffic Management AADT Flow Change compared to DM (vehicles)

Figure D.3 TM Phase 3 – DM Traffic Management AADT Flow Change (vehicles)

Figure D.4 TM Phase 4 – Traffic Management AADT Flow Change compared to DM (vehicles)

Figure D.5 TM Phase 5 – DM - Traffic Management AADT Flow Change compared to DM (vehicles)