



Chapter 06

(Traffic & Transport)
Appendices

Galway Cross-City Link

Transport Modelling Report

March 2022

TRANSPORT MODELLING REPORT

GALWAY CROSS-CITY LINK

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LIST OF ABBREVIATIONS

RMS: Regional Modelling System
 WRM: West Regional Model
 GCCL: Galway Cross-City Link
 GTS: Galway Transport Strategy
 LAM: Local Area Model
 PT: Public Transport
 EIAR: Environmental Impact Assessment Report

1. INTRODUCTION

This Transport Modelling Report is an appendix to Chapter 6 of the Environmental Impact Assessment Report (EIAR) which has considered the potential traffic & transport impacts associated with the Construction and Operational Phases of the BusConnects Galway Cross-City Link (University Road to Dublin Road) Scheme (hereafter referred to as the Proposed Scheme).

The Proposed Scheme has an overall length of approximately 6.7km, and routes along University Road, St. Vincent's Avenue, St. Francis Street, Eglinton Street, Eyre Square, Forster Street, College Road and Dublin Road and also encompasses numerous roads within the city centre.

The Proposed Scheme includes an upgrade of the existing bus priority alongside changes to pedestrian and cycle facilities. The Proposed Scheme includes constitutes a substantial increase in the level of bus priority in Galway, including the provision of additional lengths of bus lane.

ARUP, on behalf of the National Transport Authority, commissioned SYSTRA to perform the modelling to assess the transport impact of the proposed scheme. This report summarises the methodology and results of the modelling study.

1.1 Report Structure

The following outlines each Chapter of this Modelling Report:

- Chapter 2 summarises the modelling methodology
- Chapter 3 provides an overview of the NTA's Regional Modelling System (RMS)
- Chapter 4 describes the forecast land use assumptions used in the modelling
- Chapter 5 describes the individual modelled scenarios
- Chapter 6 outlines the main WRM results
- Chapter 7 focuses on the Local Area Model and its results

2. MODELLING METHODOLOGY AND ASSUMPTIONS

This section gives a high-level overview of the modelling methodology and modelling assumptions and references the relevant Chapters that discuss each aspect in more detail.

2.1 Modelling Methodology

The modelling methodology can be summarised as follows:

- Modelling is based on use of the NTA's Regional Modelling System (RMS). Please see Chapter 3 for description of RMS and its components.
- Modelling was undertaken for three forecast years (2019, 2023 and 2038). Please see Chapter 4 for description of the land use assumptions that were used to generate individual forecasts.
- Modelling was done for three scenarios (Base Year, Do-Minimum and Do-Something). Please see Chapter 5 for a description of the modelled scenarios and Chapter 0 for the overview of the modelling results.
- A Highway Local Area Model (LAM) has been developed, calibrated and validated for the base and two forecast years. Please see Chapter 7 for a description of the calibration and validation process.

Figure 2-1 illustrates the overall modelling process undertaken.

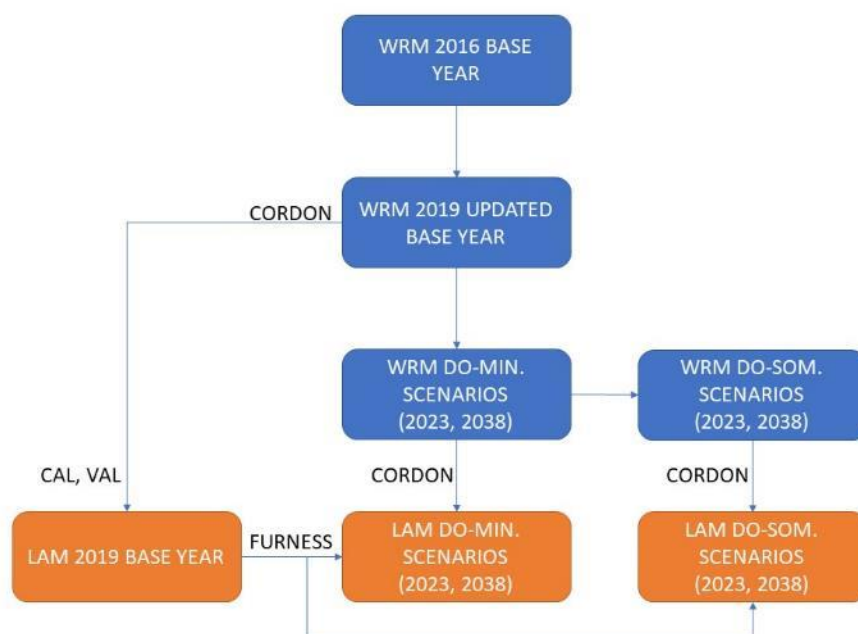


Figure 2-1: Overall modelling process undertaken for the study

3. NTA REGIONAL MODELLING SYSTEM

3.1 Introduction

This section provides an overview of the NTA Regional Modelling System (RMS).

The NTA Regional Modelling System comprises five regional transport models covering the Republic of Ireland and centred on the five main cities of Dublin, Cork, Galway, Limerick, and Waterford (as summarised in Table 3-1 below).

Regional Modelling System	Abbreviation	Counties Covered
Eastern Regional Model	ERM	Louth, Monaghan, Cavan, Longford, Westmeath, Meath, Offaly, Laois, Kildare, Dublin, Wicklow, Carlow & Northern Wexford
South East Regional Model	SERM	Wexford, Kilkenny, Waterford & Tipperary South
South West Regional Model	SWRM	Cork & Kerry
Mid-West Regional Model	MWRM	Limerick, Clare & North Tipperary
Western Regional Model	WRM	Galway, Mayo, Roscommon, Sligo, Donegal & Leitrim

Table 3-1: Regional Modelling System

Each regional model has the following key attributes:

- Full geographic coverage of the relevant region;
- A detailed representation of the road network;
- A detailed representation of the public transport network & services;
- A representation of all major transport modes including active modes (walking and cycling);
- A detailed representation of travel demand, e.g. by journey purpose, car ownership/availability, mode of travel, person types, user classes & socio-economic classes, and representation of five time periods (AM, Lunch Time, School Ride, PM and Off-Peak);
- A prediction of changes in trip destination in response to changing traffic conditions, transport provision and/or policy; and
- A prediction of mode-choice in response to changing traffic conditions.

Figure 3-1 illustrates the geographical extent of each of the Regional Models.

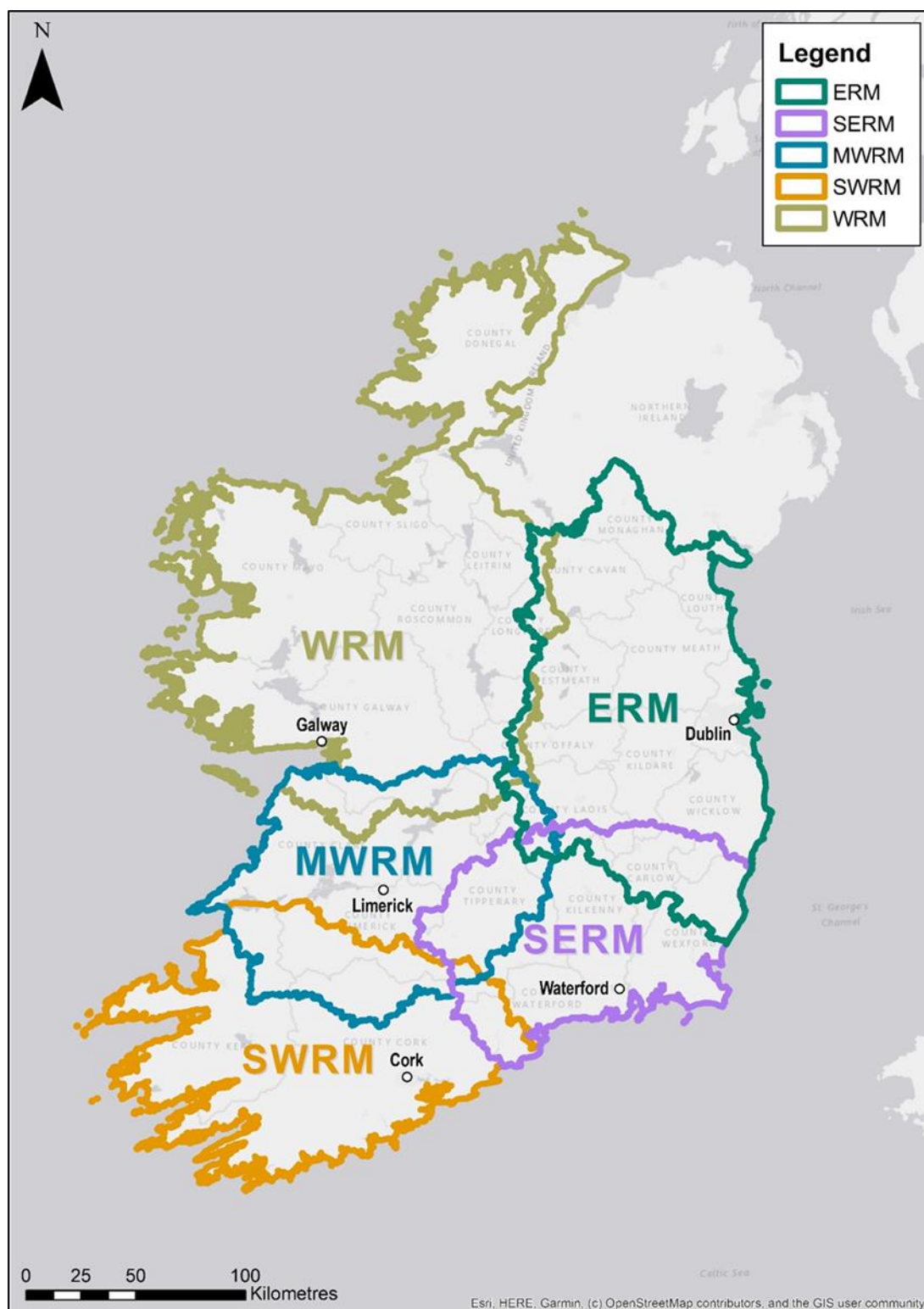


Figure 3-1: Regional Modelling Systems – Areas of Coverage

The West Regional Model (WRM), which is centred around Galway City and covers Donegal, Leitrim, Sligo, Roscommon and Mayo, has been used to support the demand analysis for the Galway-Athenry Capacity Study.

3.2 RMS Overarching Structure

All the regional models, including the WRM, include 3 core modelling processes (i.e. Demand Model, Road Assignment Model, Public Transport Assignment Model) which receive inputs from the National Demand Forecast Model (NDFM) and provide outputs for transport appraisal and secondary analysis. This process is shown in Figure 3-2.

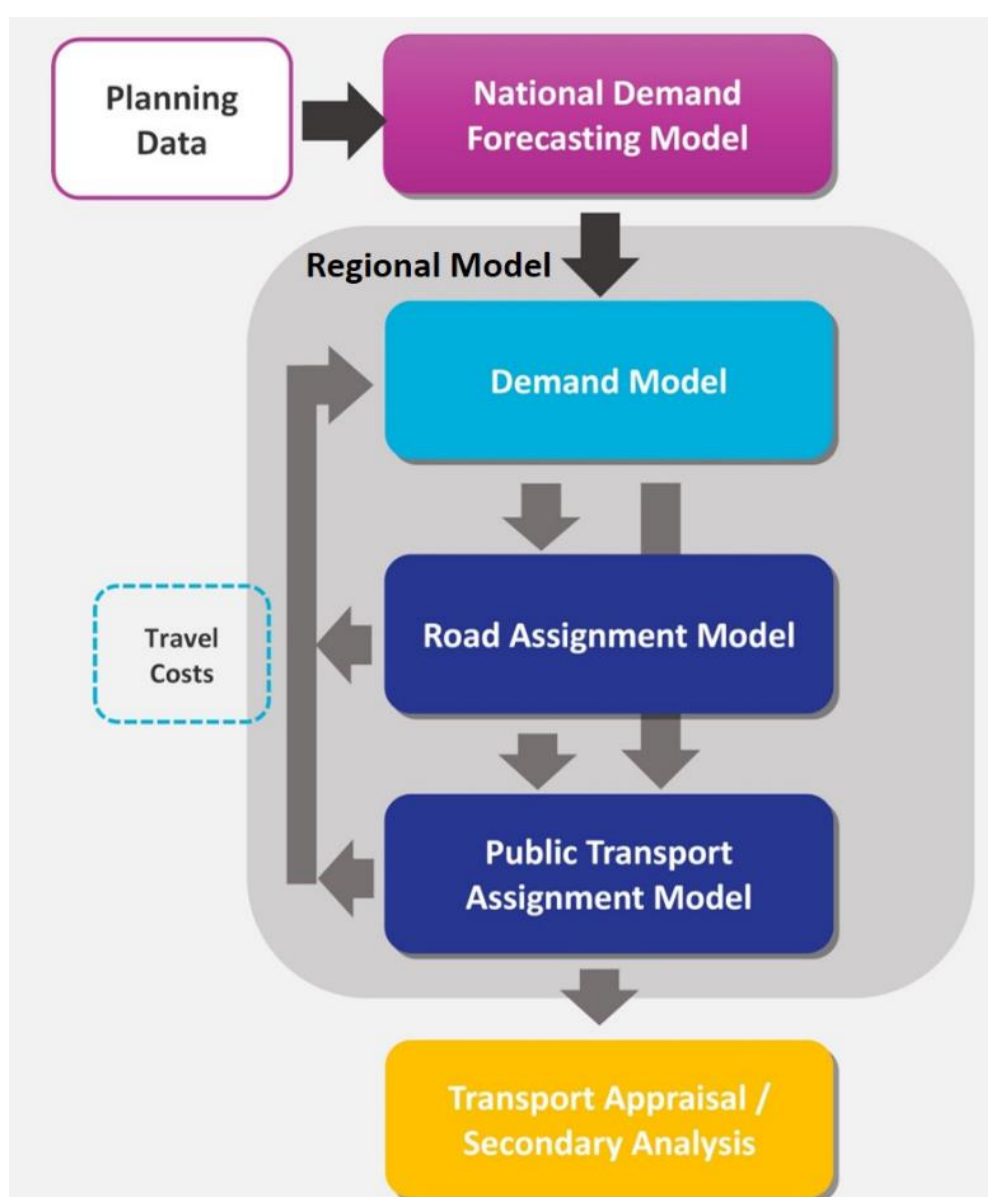


Figure 3-2: Regional Modelling System Structure

The two main RMS components (NDFM and Regional Model) are discussed in more detail in Sections 3.3 and 3.4.

3.3 National Demand and Forecasting Model (NDFM)

The NDFM is a separate modelling system that estimates the total quantity of travel demand generated by and attracted to every Census Small Area (CSA) daily. The level of demand from, and to, each CSA (referred to as trip ends) is related to characteristics such as population, number of employees and land-use data. Trip ends are then used by Regional Models to create travel demand matrices for the internal area of each of the Regional Models.

Additionally, the NDFM also estimates the inter-regional demand (demand crossing the boundary of each of the Regional Models), which then forms the external demand for each of the Regional Models.

The NDFM consists of five interoperating components, as follows:

- Planning Data Adjustment Tool (PDAT) – prepares the planning data forecasts, which are then used by other applications within the NDFM suite.
- Car Ownership / Car Competition Models (COCMP) – forecasts car competition for each Census Small Area (proportion of households with no cars, with fewer cars than adults and with the same number or more cars than adults).
- National Trip End Model (NTEM) – provides a forecast on the numbers of trips to and from each CSA in Ireland for a typical weekday. NTEM derives trip ends by journey purpose based on various attributes of each CSA, such as levels of employment and population.
- Long Distance Model (LDM) – provides a forecast on the number of long-distance trips (trips longer than 20km) which are made on a typical weekday across Ireland and Northern Ireland.
- Regional Model System Integration Tool (RMSIT) – converts the long-distance trips generated by the LDM into external demand entering/exiting each Regional Model, with entry and exit points represented by route zones.

A high-level overview of the NDFM is shown in Figure 3-3.

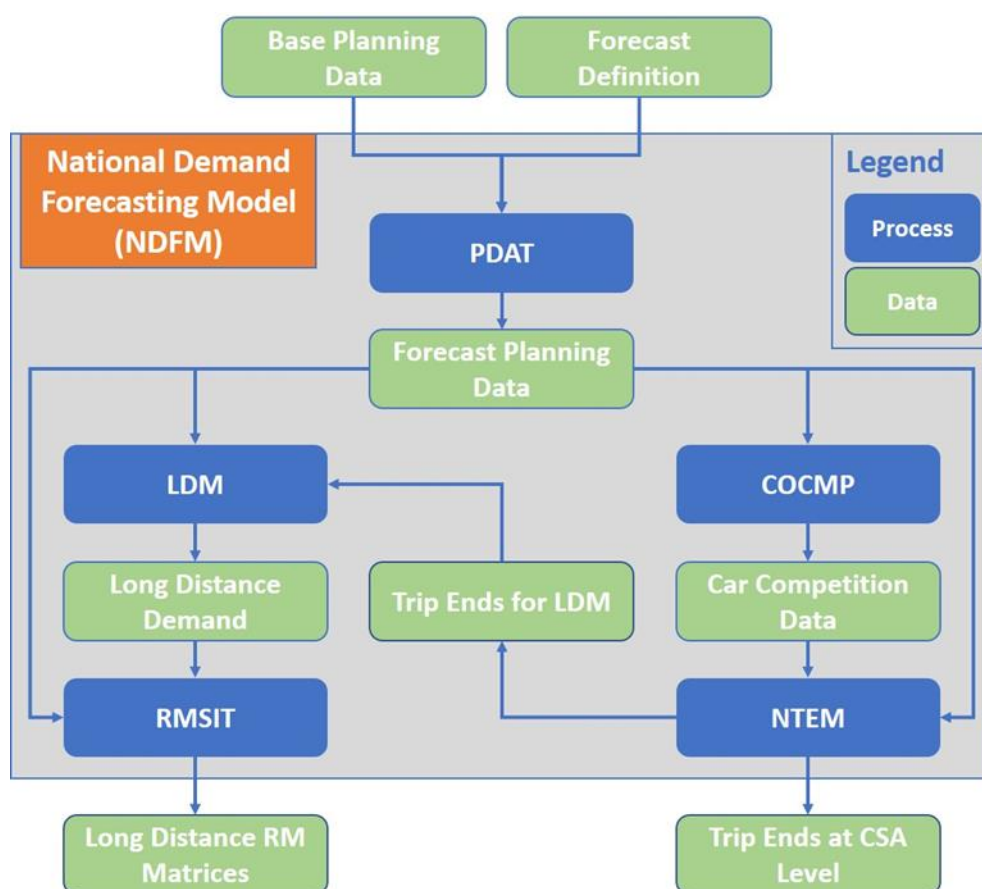


Figure 3-3: NDFM Structure

The Planning Data shown in Figure 3-3, represents a key input into the NDFM. It is a national database of 114 demographic and spatial variables for each of the 18,641 CSAs in the state. The main categories of planning data are:

- Spatial definitions (CSA/DED/NUTS names, area types etc.);
- Production related variables – demographic data about residents living in each CSA (e.g. total population living in each CSA, age bands, gender, employment status etc.);
- Attraction related variables – data related to employment and education in each CSA (e.g. number of jobs within each CSA, number of education places etc.).

Further details about the NDFM structure, its components and calibration can be requested from the NTA via the NTA's website¹

¹ <https://www.nationaltransport.ie/planning-and-investment/transport-modelling/regional-modelling-system/ndfm-overview-rtm/>

3.4 West Regional Model (WRM)

3.4.1 Model Dimensions

The WRM dimensions are defined in terms of:

- Zone system;
- Modes of travel represented;
- Base year;
- Time-periods; and
- Demand segmentation.

3.4.1.1 Zone System

The zone system definitions for each of the regional models were based on Census Small Area (CSA) boundaries and Electoral Districts (EDs). The 2016 CSAs are the core base layer for each zoning system. The criteria used for developing zone boundaries for the WRM and other regional models included:

- Population, Employment and Education – maximum values were specified for zone population, number of jobs and persons in education;
- Activity Levels – limits were applied to zone activity levels ensuring that zones with either very low, or very high, levels of trips were not created;
- Intra-zonal Trips – threshold values were applied to the proportion of intra-zonal trips, within each zone, to avoid an underestimation of flow, congestion and delay on the network;
- Land Use – zones were created with homogeneous land use and socio-economic characteristics where possible;
- Zone Size/Shape – thresholds were applied to zone size, and irregularity of shape, to avoid issues with inaccurate representation of route choice;
- Political Geography – zone boundaries do not intersect ED boundaries;
- Special Generators/Attractors – large generators/attractors of traffic such as Airports, Hospitals, shopping centres etc. were allocated to separate zones.

The West Regional model includes 693 internal zones as follows:

- Galway City: 138
- Galway County: 201
- Donegal County: 108
- Leitrim County: 27
- Sligo County: 46
- Roscommon County: 48
- Mayo County: 123
- Special Zones: 2 (Knock Airport and Donegal Airport)

Figure 3-4 shows the WRM Zone System.

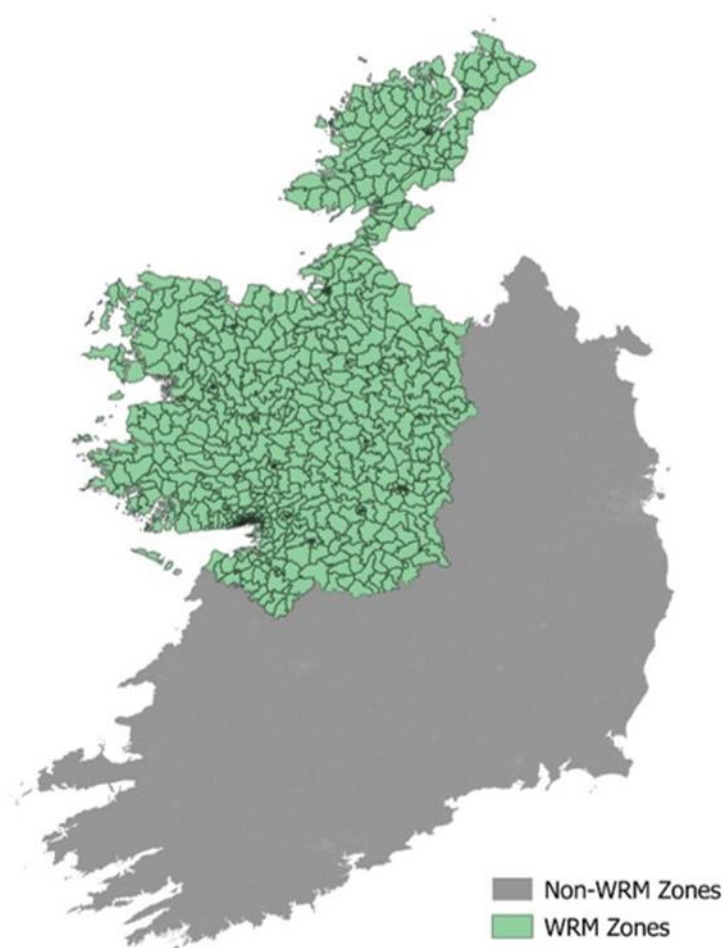


Figure 3-4: WRM Zone System

External zones represent demand from areas across the country to / from the West Regional Model study area. This demand is provided by the Long Distance Model, part of the NDFM. The LDM is a national model designed to provide external trips for each of the Regional Models, this includes both Road and PT demand. This demand is assigned to the WRM through route zones representing entry/exit points into the WRM study area by major roads and rail. There are 35 route zones in the WRM. Further information on the WRM Zone System can be found in the WRM zone system development report².

² https://www.nationaltransport.ie/wp-content/uploads/2018/06/WRM_Zone_System_Development_Report-1.pdf

3.4.1.2 Modes of Travel

The regional model covers all surface access modes for personal travel and goods vehicles:

- Private vehicles – taxis and cars;
- Public transport – bus, rail, Luas, BRT, Metro;
- Active modes – walking and cycling; and
- Goods vehicles – light goods vehicles and heavy goods vehicles.

3.4.1.3 Base Year

The base year of each regional model is 2016 with a nominal month of April. This is largely driven by the date of the Census (POWSCAR) and the National Household Travel Survey (NHTS).

3.4.1.4 Time Periods

The regional model represents an average weekday. The day is split into five time periods as detailed in Table 3-2 below. The periods allow the relative difference in travel cost between time periods to be represented.

Period Name	Demand Model Period	Assignment Period
AM Peak	07:00-10:00	08:00-09:00
Morning Inter Peak – Lunch Time (LT)	10:00-13:00	12:00-13:00
Afternoon Inter Peak – School Run (SR)	13:00-16:00	15:00-16:00
PM Peak	16:00-19:00	17:00-18:00
Off Peak	19:00-07:00	20:00-21:00

Table 3-2: Time Periods

3.4.2 Core Modelling Processes

The WRM includes the following core modelling processes:

- Demand Model;
- Road Assignment Model;
- Public Transport Assignment Model; and
- Active Modes Model

3.4.2.1 Demand Model

The Demand Model processes all-day travel demand from the NDFM through a series of choice models to represent combined mode, time of day, destination and parking decision making. The outputs of the demand model are a set of trip matrices which are assigned using the Road Assignment Model and Public Transport Assignment Model to determine the route-choice and generalised costs.

The demand model consists of several components:

- Macro Time of Day;
- Mode Choice;
- Destination Choice;
- Parking; and
- Tours and One-Way.

A simple representation of the model structure is shown in Figure 3-5.

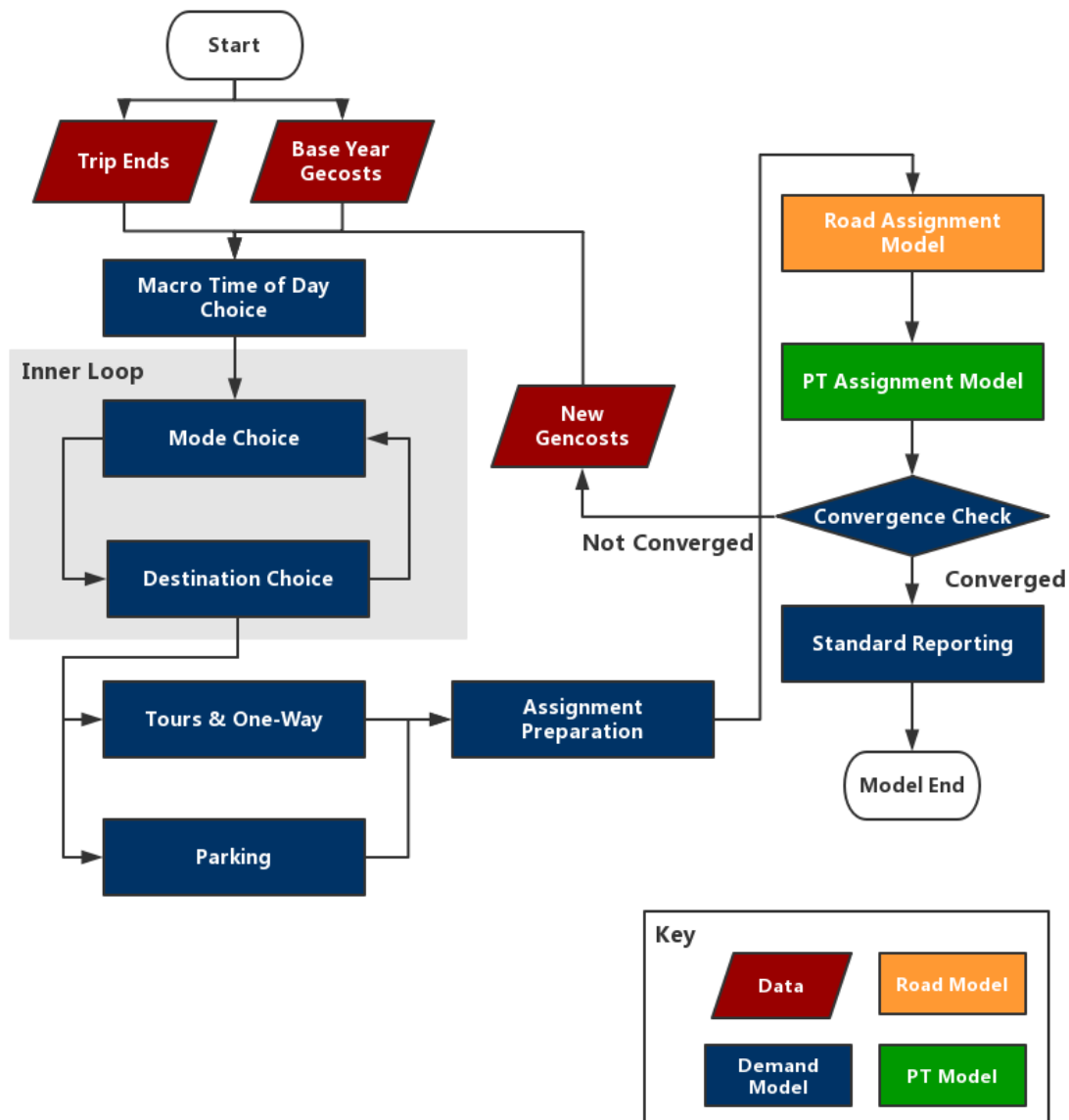


Figure 3-5: Demand Model Structure

3.4.2.2 Road Assignment Model

The main purpose of the Road Assignment Model (RDAM) is to assign road users to routes between their origin and destination zones. The RDAM is implemented in SATURN road assignment software and includes capacity restraint whereby travel times are recalculated in response to changes in assigned flows.

The inputs to the Road Assignment Model from the Demand Model are the road assignment matrices. The outputs from the Road Assignment Model back to the Demand Model consist of generalised cost of travel by time period.

3.4.2.3 Public Transport Assignment Model

To generate costs to update the Demand Model processes, a PT assignment must be undertaken to establish new generalised costs. The Public Transport Assignment Model (PTAM) is used to allocate PT users to services between their origin and destination zones. The model includes a representation of the public transport network and services for existing and planned modes within the modelled area. In addition, the PTAM network includes walk links to provide for improved permeability and access.

The model includes:

- Heavy Rail;
- Light Rail;
- Urban Bus;
- Inter-Urban Bus; and
- Bus Rapid Transit (BRT).

The outputs from the Public Transport Assignment Model for the Demand Model processes consist of the assigned networks which are passed on to the Active Modes Model and generalised cost skim matrices by user class for each of the assigned time periods that feed back into the main Mode and Destination choice demand model loop. An overview of the PTAM process is shown in Figure 3-6.

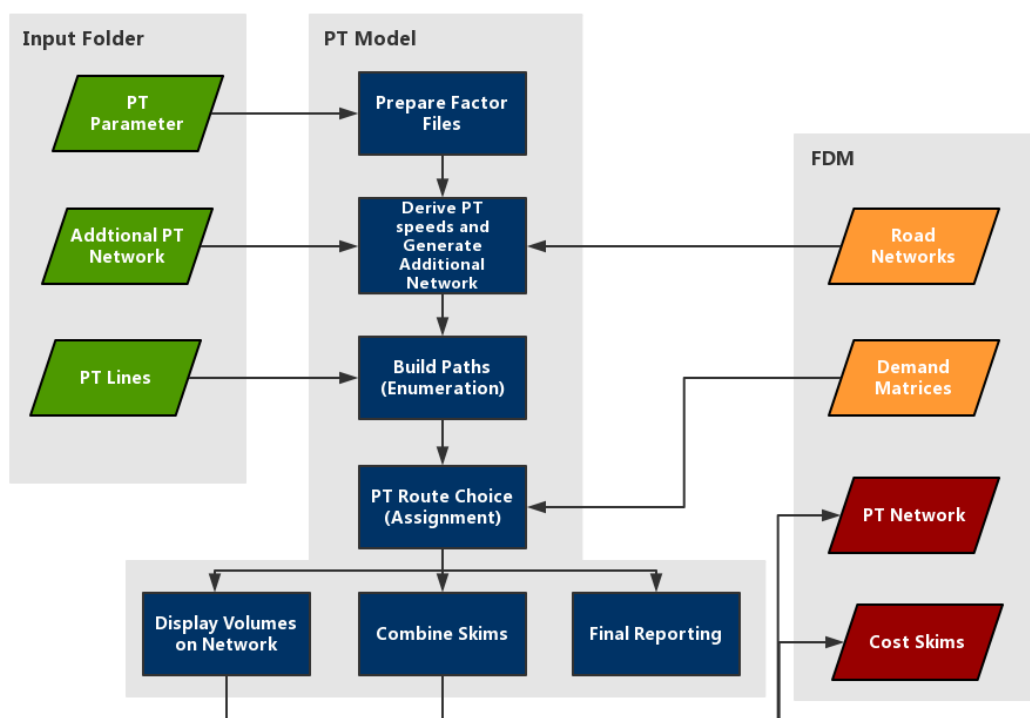


Figure 3-6: PT Model Process

3.4.2.4 Active Modes Model

The active modes assignment is run after the PTAM using the PT network with rail and motorway links removed. The active mode assignment is a shortest path assignment and does not include delays or crowding.

The inputs for the active assignment model are the output CUBE format PT networks, the demand model produced assignment matrices and separate input pedestrian only links and cycle lanes. The outputs of this process include an assigned network with walk and cycle flows by user class, and a set of generalised cost skims. The active assignment is a CUBE-based lowest cost path assignment model with no junction modelling based purely on distance and a constant speed by mode.

3.5 Suitability of West Regional Model

3.5.1 Model Calibration and Validation

The WRM has been subject to a comprehensive calibration and validation process in line with best practice guidelines whereby a substantial amount of observed data has been incorporated into both the demand model and the assignment models as presented in Table 3-3.

Demand Model	Assignment Models
Tour proportions	Road traffic volumes
Generalised cost distributions	Road journey times
Travel distance distributions	Road trip length distribution
Modal share	Public transport in-vehicle time factors
Journey time distribution	Public transport fares and ticket types
	Public transport passenger flows
	Public transport boardings and alightings
	Public transport journey times
	Public transport interchange/transfers

Table 3-3: Observed data used for Model Calibration and Validation

The calibration and validation process ensures that the WRM accurately reflects existing conditions and ‘costs’ associated with travel. This allows changes in the transport demand and impacts of strategic transport infrastructure schemes and transport policies to be modelled and tested using the WRM. Further details on the WRM calibration can be found in the Model Development and Calibration Reports available on the NTA’s website³.

3.5.2 Use of WRM for Strategic Transport Planning

The model has many strengths and features that make it the ideal tool to aid the strategic planning process. The WRM has been developed from first principles making best use of the most recently available data (POWSCAR and NHTS) to replicate travel choices and transport network conditions as accurately as possible.

Several distinct journey purposes and characteristics including car availability, employment status, and education level are considered within the model to evaluate travel choices more accurately. This carries through to forecasting whereby specific person type demand can be forecast to derive appropriate trip distributions and future year travel conditions.

³ <https://www.nationaltransport.ie/planning-and-investment/transport-modelling/regional-modelling-system/regional-multi-modal-models/west-regional-model/>

The model utilises a tour-based approach which allows for more accurate mode choice modelling and consideration of travel costs.

Four main modes of travel are included in the model: private car, public transport, walking, and cycling. Each mode has been calibrated individually, for each journey purpose, to replicate observed trip cost distributions.

The use of SATURN software in the road model allows for junction modelling to be included in the model which improves network representation in congested areas. Link speeds and delays are transferred to the public transport model which allows journey times of on-street modes (Bus, BRT) to reflect real traffic conditions rather than being based strictly on timetables.

3.5.3 Summary

The West Regional Model provides a comprehensive representation of travel patterns across the Galway Cross City Link Study area and it is a suitable tool for assessing the effects of the proposed scheme.

4. FORECAST LAND-USE ASSUMPTIONS

4.1 Introduction

This Chapter describes the land use assumptions used in development of forecasts for the individual forecast years and present population and employment growth within the study area.

The land use forecasts have been prepared by the NTA for the required forecast years (2019, 2023 and 2038). Reference to the individual NTA's NDFM forecast scenarios is shown in Table 4-1.

Forecast Year	NDFM Forecast Scenario	NDFM Version
2019	D19	NDFM_V045
2023	D22	
2038	D37	

Table 4-1: NDFM Forecast Scenarios

Forecasts of population, employment and education data are defined by the National Transport Authority at the Census Small Area (CSA) level for standard reference years of 2024 and 2040. The National Demand Forecasting Model converts planning data forecasts to trip forecasts (in total productions and attractions per zone) for input to the WRM. The assessment years for this project (i.e. 2023 and 2038) are derived by linear interpolation from the NTA's 2040 NPF reference case planning sheet and the 2016 Census based planning sheet.

4.2 Population Growth

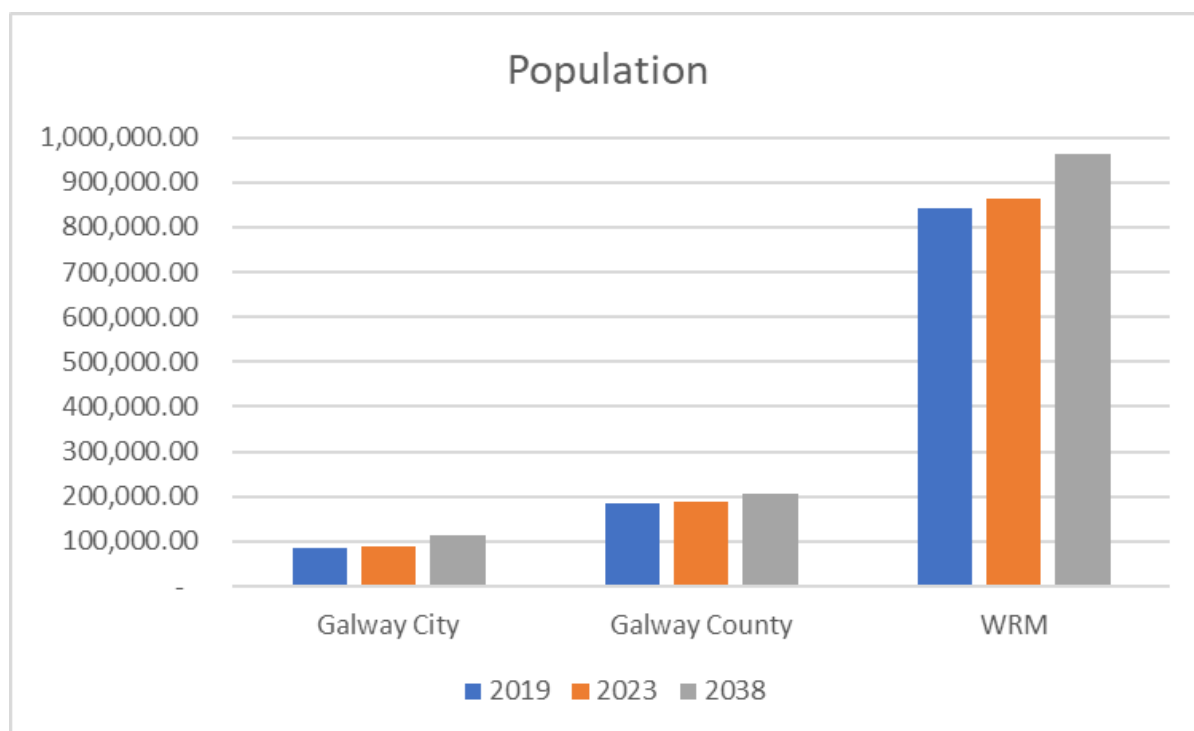


Figure 4-1: Population Growth

As can be seen from Figure 4-1, the population is expected to grow substantially in the future both in Galway City/County and across the WRM region.

Galway City will see an increase from approximately 83,700 in the Base Year to 88,700 in 2023 and 113,700 in 2038. This represents a 36% increase between 2019 and 2038.

The population in Galway County is expected to grow by 13% between 2019 and 2038 and by 14% across the WRM region.

4.3 Employment Growth

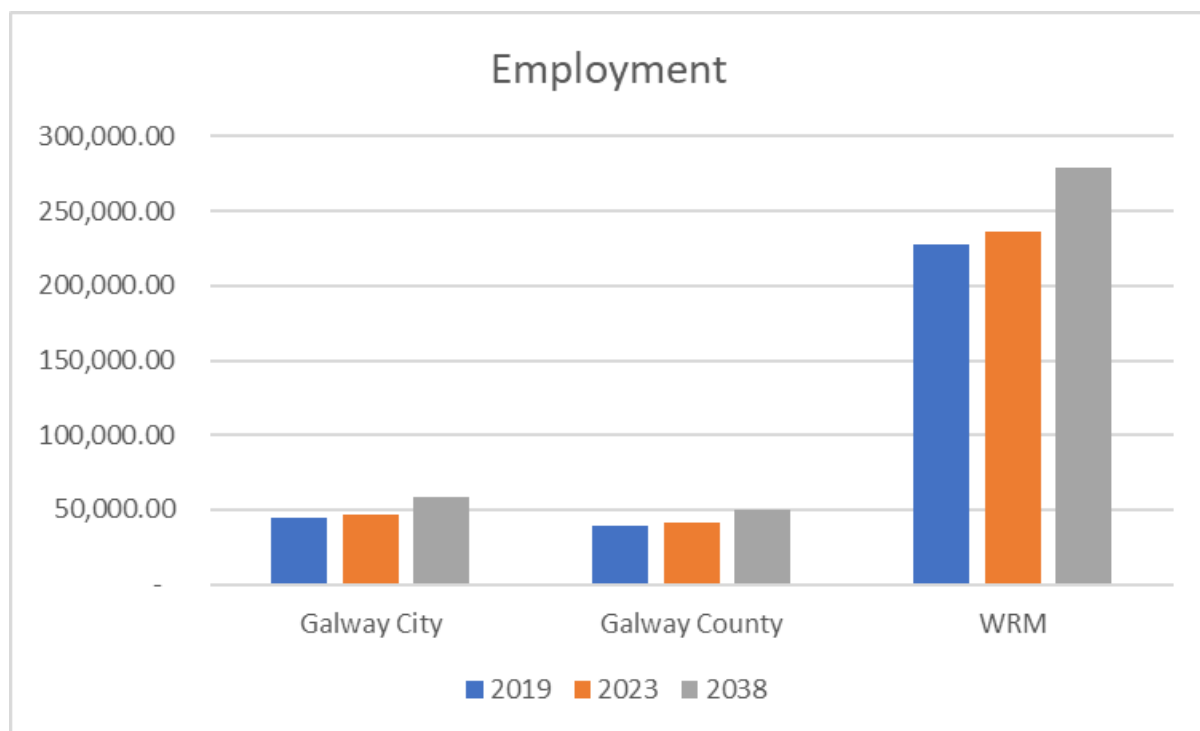


Figure 4-2: Employment Growth

As can be seen from Figure 4-2, the number of jobs is expected to grow substantially in line with the population in both Galway and across the WRM region.

Galway City will see an increase in jobs from approximately 44,300 in the 2019 Base Year to 46,600 in 2023 and 58,000 in 2038. This represents a 31% increase between 2019 and 2038.

The employment figures in Galway County are expected to grow by 28% between 2019 and 2038 and by 22% across the WRM region.

5. MODELLED SCENARIOS

5.1 Overview

Three scenarios types have been tested in the WRM to assess the impact of the scheme. These were:

- Do Minimum – committed schemes only; and
- Do Something – committed schemes and Proposed Scheme.

Each scenario has been tested in two forecast years: 2023 and 2038.

Along with these, a 2019 Base Year has been prepared to provide a comparison accounting for recent infrastructure development and growth since the 2016 Base Year. The 2019 Base Year has also been the starting scenario for calibrating and validating the Base Year Local Area Model (LAM), which is described in Chapter 7.

5.2 Base Year

The 2019 Base Year has been developed to take into consideration recent infrastructure developments that were not included in the 2016 calibrated WRM model. The new base year has also been the starting point for the calibration and validation of the Local Area Model Base Year, which will be discussed later in this report.

The 2019 WRM Base Year has been built starting from the calibrated 2016 WRM with the addition of the pieces of infrastructure listed in Table 5-1.

SCHEME	DESCRIPTION
Parkmore Widening	Widening of Ballybrit Cres in the direction of Parkmore Road
Kirwan Roundabout	Upgrade from a roundabout to two signalised junctions
M17-M18	M17 and M18 motorways between Gort and Tuam with connection to the M6
Right Turn Bans	Right Turn bans at Moneenageisha Cross and Threadneedle/Taylors Hill

Table 5-1: Additional infrastructure included in the 2019 Base Year

Galway Cross-City Link	300826
Transport Modelling Report	30/03/2022

5.3 Do Minimum

The Do Minimum networks have been coded on top of the 2019 Base Year scenario and included the committed schemes to be implemented post-2019. Do Minimum networks have been coded for the future years 2023 and 2038.

The 2023 Do-Minimum scenario includes the set of road and public transport schemes listed in Table 5-2.

SCHEME	DESCRIPTION	COMMITTED SCHEME	GTS SCHEME
Martin Junction	Upgrade from a roundabout to a signalised junction	X	
GTS Bus Services	Brown, red, blue, green and yellow bus routes to replace existing local bus services 401-412 and 414.		X

Table 5-2: schemes included in the 2023 Do-Minimum Scenario

The 2038 Do-Minimum networks have been coded on top of the 2023 Do Minimum Model and included the set of road and public transport schemes listed in Table 5-3.

SCHEME	DESCRIPTION	COMMITTED SCHEME	GTS SCHEME
Galway Outer Bypass	N6 to R336 Barna Road	X	
Skerlett Rbt Signalisation	Upgrade from a roundabout to a signalised junction.		X
N59 Dangan Upgrade	Speed limit increase		X
W4 BC2 - Tuam Road Bus Corridor	It is proposed to install an outbound shared bus/cycle lane from the junction with Wellpark Rd/Connolly Av, north to the		X

SCHEME	DESCRIPTION	COMMITTED SCHEME	GTS SCHEME
	junction with the Tuam Rd and east to the junction with Bothar na dTreabh		
W6 BC4 - Father Griffin Road Corridor	It is proposed to reduce vehicle speeds to advertise the presence of pedestrians and cyclists.		X
W7 BC5 - Monivea Road Scheme	Add an on-road bus priority to allow buses to travel to the Briarhill Junction.		X
W9 BC7 - Western Distributor Road Corridor	It is proposed to transform Blake and Athy roundabouts into signalised junctions and add bus lanes in both direction along the road.		X
W11 BC9 - Ragoon Road Bus Lane	Adding an inbound bus lane from Ragoon Cemetery to the junction with Seamus Quirke Road.		X
W13 BC11 - Galway Bus Connects	It is proposed to install bus corridors all along Dublin Rd from Martin Roundabout to Moneenageisha Junction (about 4km long) in both directions.		X
GTS Bus Services	Brown, red, blue, green and yellow bus routes to replace existing local bus services 401-412 and 414.		X

Table 5-3: schemes included in the 2038 Do-Minimum Scenario

5.4 Do Something

The Do Something network has been coded on top of the Do Minimum scenarios and includes the Proposed Scheme in both 2023 and 2038.

This includes traffic restrictions for general traffic on Salmon Weir Bridge, St. Vincent's Avenue, Eglinton Street, Eyre Square and Forster Street. A Bus Gate is also introduced on College Road, at the western end of the scheme.

Approaching the junction at Moneenageisha, outbound bus lanes are introduced between Lough Atalia Road and the signalised junction, while outbound bus lanes are introduced on Dublin Road.

To aid traffic management, Bóthar Bhreandain Uí Eithir, Prospect Hill and Gaol Road are converted to two-way traffic routes.

Figure 5-1 shows an overview of the GCCL scheme. Scheme drawings are included in the Appendix.

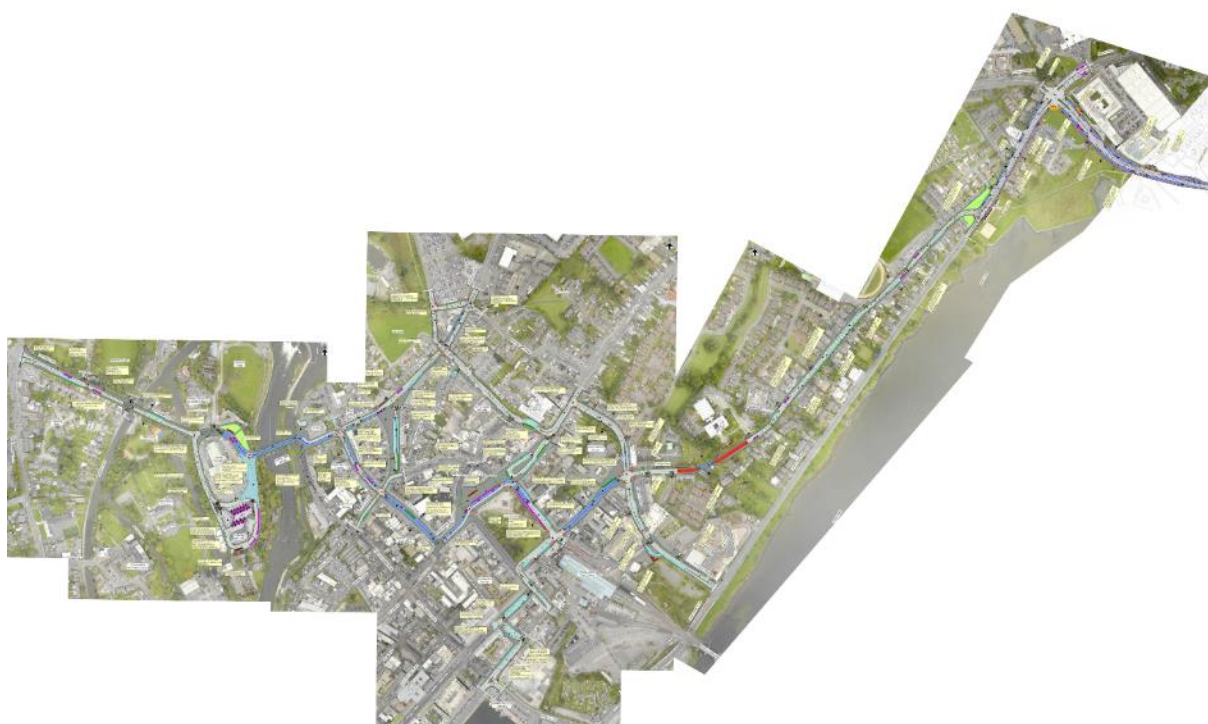


Figure 5-1: Overview of the GCCL scheme

5.5 Public Transport

The new bus routes proposed as part of the Proposed Scheme are included in both the Do Minimum and Do Something scenarios (in 2023 and 2038) as the aim is to evaluate the impact of the Proposed Scheme only.

Figure 5-2 shows the routing of the new bus routes. These lines are coded as indicated in Table 5-4.

As outlined in section 6.3.4.2 of the EIAR, bus journey time data for the Proposed Scheme was provided by the NTA from the Automatic Vehicle Location (AVL) dataset used to monitor bus performance. The data provides information on bus travel time and dwell times at existing bus stops and has been used to inform the development of the transport models used to assess the impacts of the Proposed Scheme. Time factors have been applied to the new bus routes in the Do Minimum scenarios to reflect the AVL data.

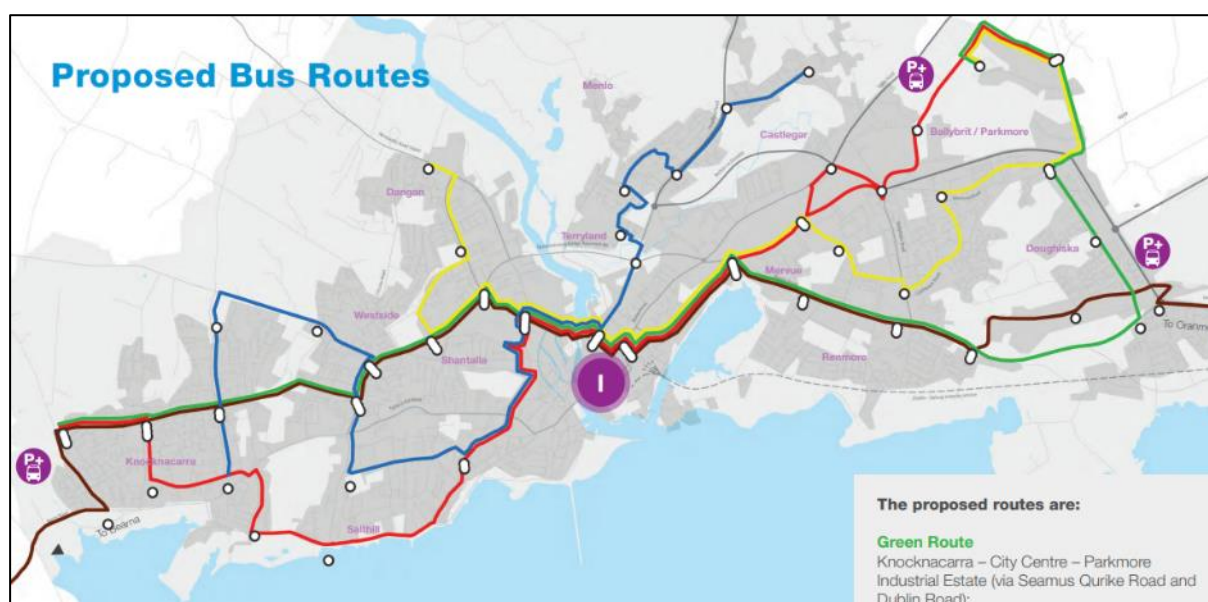


Figure 5-2: Galway Bus Connects bus routes

SERVICE	NAME	ROUTE	HEADWAYS [MIN]	TIME FACTORS (DM ONLY)
8001	Brown	Bearna-Oranmore: Eastbound	AM: 20 LT: 20 SR: 20 PM: 15 OP: 20	AM:1.11 LT:1.11 SR:1.00 PM:1.15 OP:1.00
8002	Brown	Bearna-Oranmore: Westbound	AM: 20 LT: 20 SR: 20 PM: 15 OP: 20	AM:1.09 LT:1.09 SR:1.00 PM:1.15 OP:1.00
8003	Red	Salthill - Parkmore: Eastbound	AM: 10 LT: 10 SR: 10 PM: 10 OP: 10	AM:1.12 LT:1.12 SR:1.00 PM:1.20 OP:1.00
8004	Red	Salthill - Parkmore: Westbound	AM: 10 LT: 10 SR: 10 PM: 10	AM:1.11 LT:1.11 SR:1.00 PM:1.19

SERVICE	NAME	ROUTE	HEADWAYS [MIN]	TIME FACTORS (DM ONLY)
			OP: 10	OP:1.00
8005	Blue	Knocknacarra - Tirellan: Eastbound	AM: 15 LT: 15 SR: 15 PM: 15 OP: 15	AM:1.05 LT:1.05 SR:1.00 PM:1.08 OP:1.00
8006	Blue	Knocknacarra - Tirellan: Westbound	AM: 15 LT: 15 SR: 15 PM: 15 OP: 15	AM:1.02 LT:1.02 SR:1.00 PM:1.05 OP:1.00
8007	Green	Knocknacarra - Parkmore: Eastbound	AM: 10 LT: 10 SR: 10 PM: 10 OP: 10	AM:1.15 LT:1.15 SR:1.00 PM:1.23 OP:1.00
8008	Green	Knocknacarra - Parkmore: Westbound	AM: 10 LT: 10 SR: 10 PM: 10 OP: 10	AM:1.12 LT:1.12 SR:1.00 PM:1.21 OP:1.00
8009	Yellow	Dangan - Parkmore: Eastbound	AM: 15 LT: 15 SR: 15 PM: 15 OP: 15	AM:1.12 LT:1.12 SR:1.00 PM:1.19 OP:1.00
8010	Yellow	Dangan - Parkmore: Westbound	AM: 15 LT: 15 SR: 15 PM: 15 OP: 15	AM:1.09 LT:1.09 SR:1.00 PM:1.16 OP:1.00

Table 5-4: new bus lines coded in the modelling scenarios

6. RESULTS

This section outlines the results of the modelling, listing the following key statistics for each modelled scenario:

- Number of trips and mode shares for Cycling, Walking, PT and Car;
- Public Transport Flows, Boardings and Journey Times
- Car Flows

6.1 Trips and Mode Shares

This section outlines the number of trips over 24 hours and mode shares. Results are shown for the 2019 Base Year, the 2023 and 2038 Do-Minimum and Do-Something scenarios. Light and heavy goods vehicles are not included. As the impact of the Proposed Scheme varies according to the geographical extent of the area modelled, results are reported for both the entire WRM region and the area limited to Galway City. In the WRM, Galway City includes zones belonging to sectors 1 to 5, as shown in Figure 6-1.

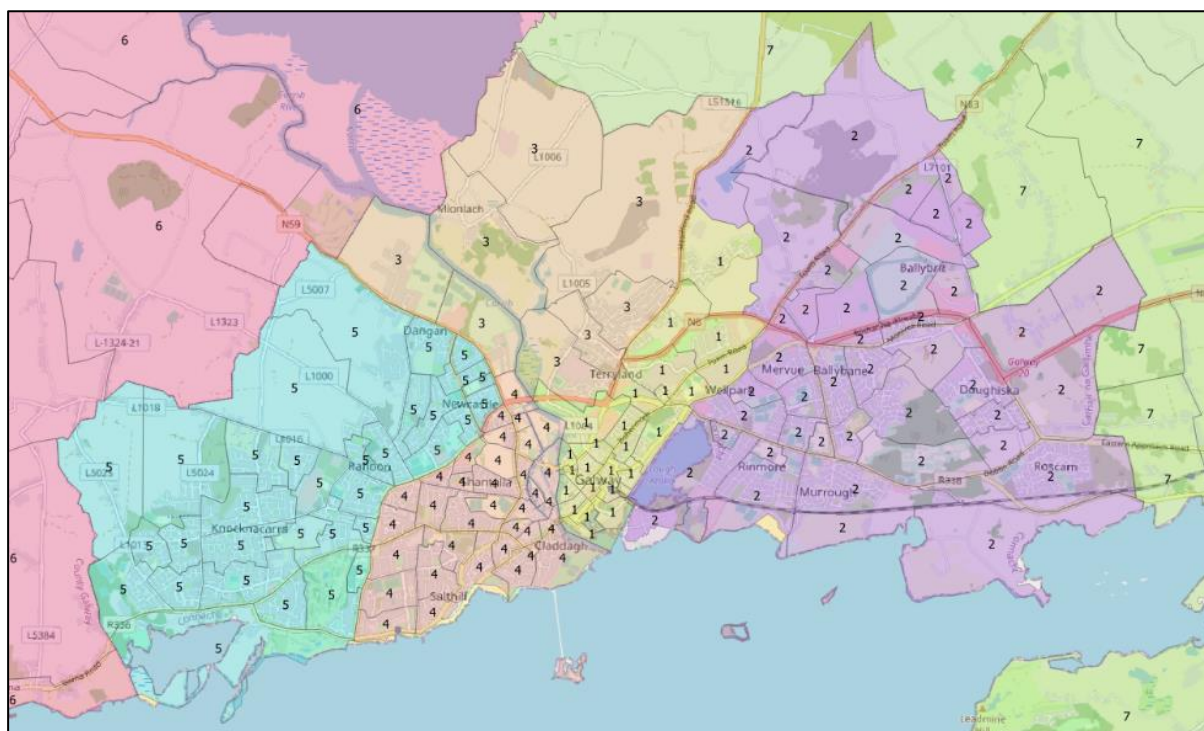


Figure 6-1: Sectoring System for Galway City

The number of trips, mode shares and variations within the WRM region are shown in Figure 6-2, Figure 6-3 and **Error! Reference source not found.** respectively. The same indicators limited to Galway City are reported in Figure 6-4, Figure 6-5 and 6. The first observation is that the number of trips made by car reduces consistently in all scenarios, while walking, cycling and PT increases. Mode shares for

sustainable modes also increase across all scenarios (with the exception of walking between the 2019 Base Year and 2023 Do Minimum, share of trips likely taken over by the newly introduced bus lines). This is even more evident by looking at the values limited to Galway City, and due to the limited geographic extent of the scheme it is worth focusing attention on these.

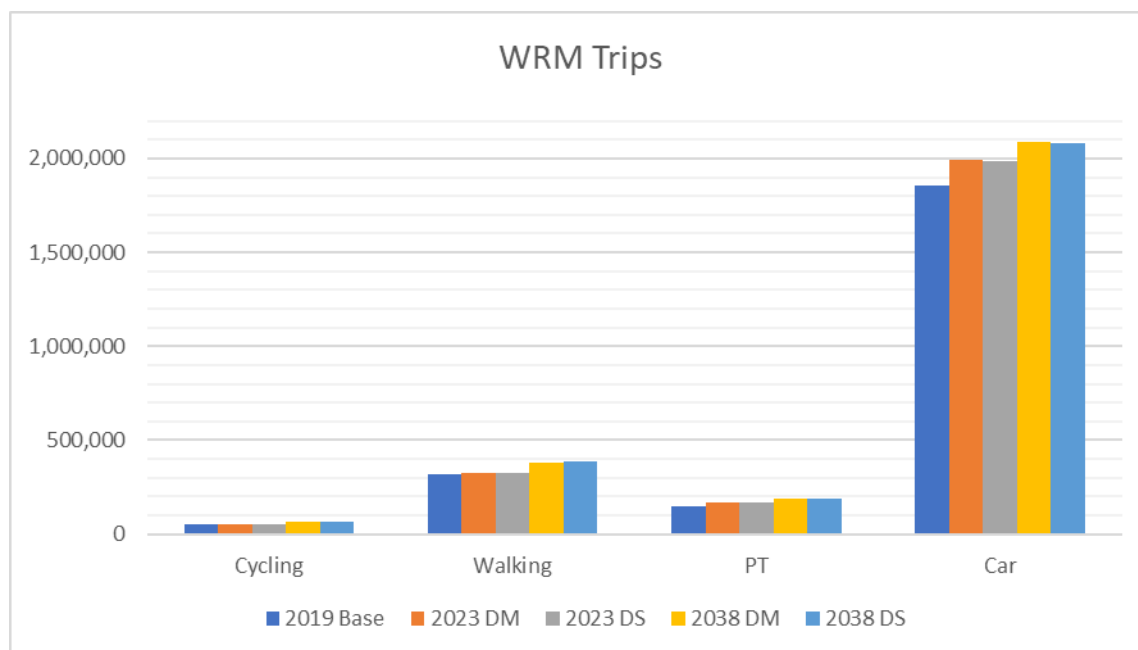


Figure 6-2: Number of trips by mode within the WRM region

As can be seen from Figure 6-2, car trips are growing between the forecast years due to the projected population growth. However, the number of car trips see a slight decrease between the Do Minimum and the Do Something scenarios in both 2023 and 2038 as a result of the Proposed Scheme. At the same time the number of walking and cycling trips across the WRM is increasing slightly.

The number of public transport trips is increasing slightly between the Do Minimum and the Do Something scenarios as a result of the Proposed Scheme.

Overall, the car remains the most dominant mode of transport, followed by walking, public transport and cycling.

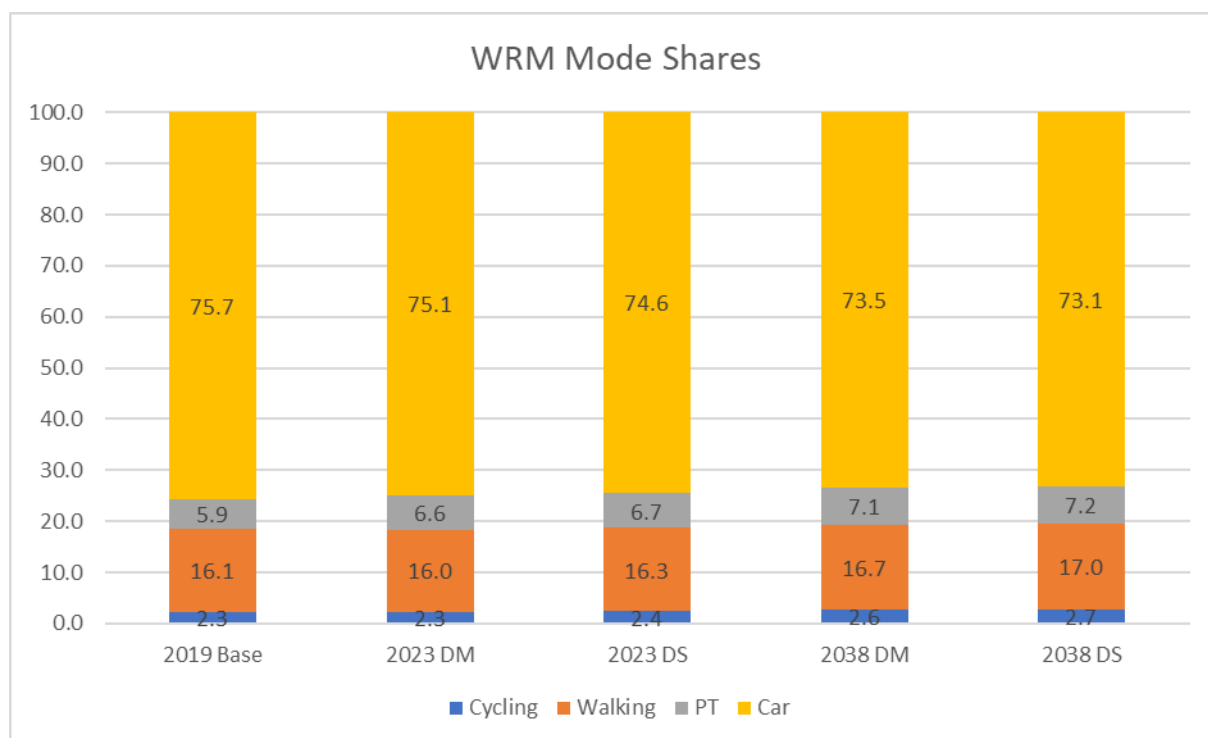


Figure 6-3: mode shares within the WRM region

Figure 6-3 above shows the mode share percentages in the different scenarios within the WRM region. As can be seen from the figure, the car mode share decreases from 75.7% in the Base year to 75.1% in the 2023 Do Minimum scenario. However, as a result of the Proposed Scheme, the percentage drops to 74.6% in the Do Something scenario in 2023 and from 73.5% to 73.1% in 2038 despite the expected significant population growth.

The mode share for public transport increases from 5.9% in the Base Year to 6.6% in the Do Minimum and 6.7% in the Do Something scenario. The figures for 2038 are slightly higher with a similar percentage increase.

Walking and cycling are also projected to increase slightly as a result of the Proposed Scheme.

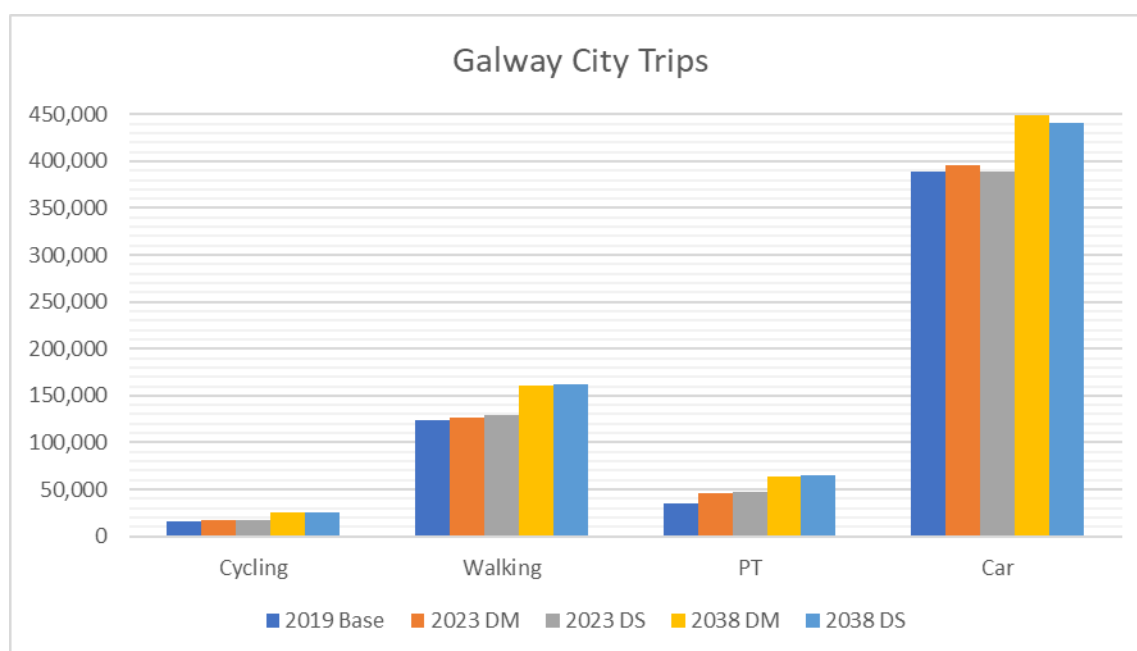


Figure 6-4: Number of trips by mode within Galway City

Figure 6-4 shows the number of trips by mode within Galway City. This shows similar trends to Figure 6-2 which covered the entire WRM region. This is mainly the increase in cycling, walking and public transport trips as well as a decrease in car trips as a result of the Proposed Scheme.

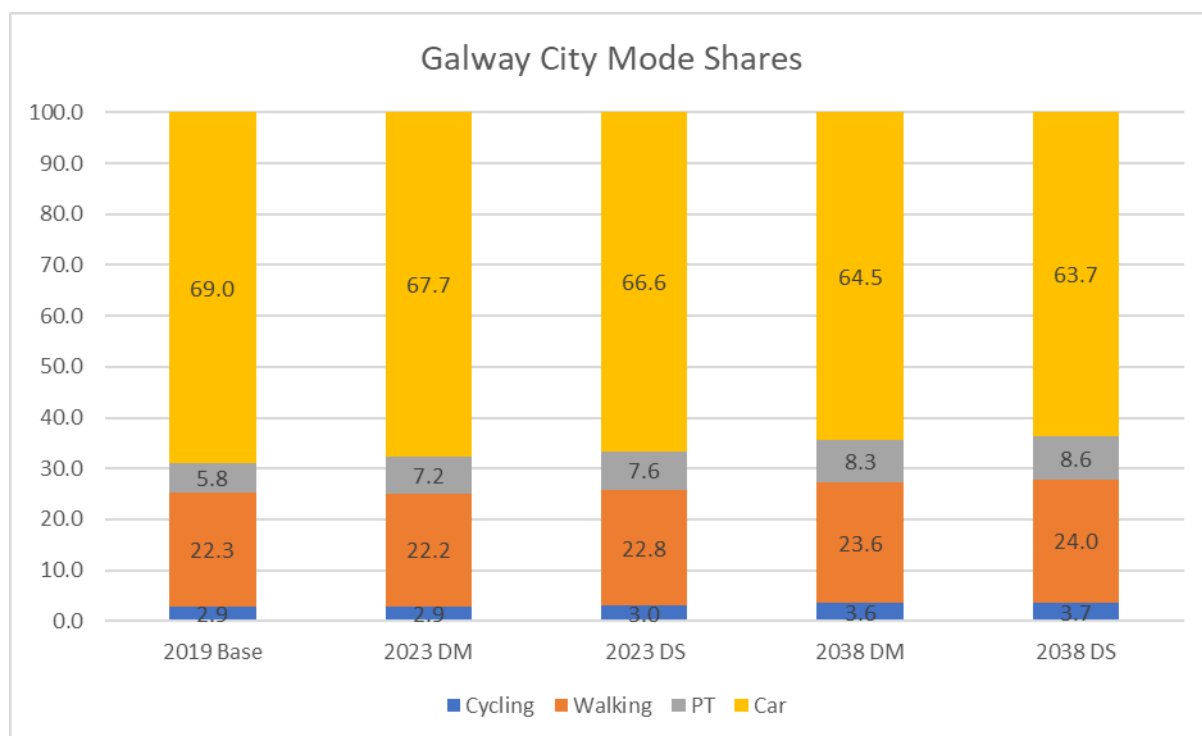


Figure 6-5: Mode shares within Galway City

Figure 6-5 above shows the percentages of mode shares in different scenarios within Galway City. Car usage decreases from 69.0% in the Base Year to 67.7% in the 2023 Do Minimum scenario. As a result of the Proposed Scheme, this drops to 66.6% in the Do Something scenario in 2023 and from 64.5% to 63.7% in 2038.

Public transport mode shares are projected to grow from 7.2% to 7.6% in 2023 and from 8.3% to 8.6% in 2038. However, it should be noted that the GTS bus routes are included in both the Do Minimum and the Do Something scenarios. Looking at the public transport mode share in the Base (5.8%), it should be noted that this increases substantially between the Base and the Do Minimum scenario despite the exclusion of the Proposed Scheme.

Walking is also projected to increase from 22.2% in the Do Minimum to 22.8% in the Do Something scenario in 2023 with a similar increase projected for 2038. Cycling mode shares are also projected to increase slightly as a result of the Proposed Scheme.

6.2 Public Transport Journey Times

Service	Name	Route	AM				PM			
			2023	2023	2038	2038	2023	2023	2038	2038
			DM	DS	DM	DS	DM	DS	DM	DS
8001	Brown	Bearna-Oranmore: Eastbound	75.3	67.5	53.5	47.8	80.0	69.1	56.3	49.0
8002	Brown	Bearna-Oranmore: Westbound	75.4	68.7	55.1	50.3	76.2	65.9	53.2	45.6
8003	Red	Salthill - Parkmore: Eastbound	50.0	43.8	53.8	47.6	48.6	40.0	60.8	46.9
8004	Red	Salthill - Parkmore: Westbound	44.1	39.7	55.1	49.2	47.4	39.9	64.7	48.1
8005	Blue	Knocknacarra - Tirellan: Eastbound	41.6	40.1	44.3	42.9	42.5	39.7	43.5	41.0
8006	Blue	Knocknacarra - Tirellan: Westbound	42.1	41.7	43.7	44.1	44.0	42.3	44.3	43.5
8007	Green	Knocknacarra - Parkmore: Eastbound	54.4	46.8	50.6	43.4	59.0	47.3	53.8	42.9
8008	Green	Knocknacarra - Parkmore: Westbound	56.3	50.0	54.4	47.9	57.4	47.0	55.9	45.3
8009	Yellow	Dangan - Parkmore: Eastbound	48.9	43.2	49.2	43.2	50.9	42.4	50.1	41.7
8010	Yellow	Dangan - Parkmore: Westbound	51.7	47.0	54.3	49.4	53.2	45.7	52.0	44.5

Figure 6-7: Bus Journey Times (Minutes)

Figure 6-7 above shows the bus journey times per GTS bus service during the AM and PM peak periods in 2023 and 2038 for both the Do Minimum and Do Something scenarios. Bus journey times vary significantly due to different route lengths.

Figure 6-8 below highlights the differences in bus journey times as a result of the Proposed Scheme. As can be seen from this table, all GTS bus services see a maximum reduction in journey times in 2023 of 7 minutes along the entire route in the AM and 11 minutes during the PM period. The green and red services see the greatest reduction in bus journey times in 2023. The smallest increase can be seen on the blue route in both directions.

Note that journey times in the DM are representative of an average journey time per the AVL data; however, these data also show significant variability in journey time, with buses often taking far longer than the average due to congestion. It is expected, and has been shown using the micro-simulation modelling, the variability of journey time in the DS would be far lower, as a result of the protection offered by the scheme to buses traversing the relevant corridor.

As previously shown in Figure 5-2, the brown, red, green and yellow bus routes are routed via Eyre Square whilst the blue route is using the Headford Road corridor.

The bus journey time reductions are similar in 2038 with some greater reductions in the PM peak period. The only notable difference is a slight increase of 0.4min westbound for the blue route during the AM peak period. The slight increase has been caused by a junction delay at Headford Road/Bothar Na Dige/St. Brendan's Avenue Junction.

Service	Name	Route	AM				PM			
			2023	2023	2038	2038	2023	2023	2038	2038
			DS-DM	DS-DM	DS-DM	DS-DM	DS-DM	DS-DM	DS-DM	DS-DM
8001	Brown	Bearna-Oranmore: Eastbound	-7.8	-10.4%	-5.8	-10.8%	-10.8	-13.5%	-7.3	-13.0%
8002	Brown	Bearna-Oranmore: Westbound	-6.7	-8.9%	-4.8	-8.7%	-10.3	-13.5%	-7.6	-14.2%
8003	Red	Salthill - Parkmore: Eastbound	-6.2	-12.5%	-6.3	-11.6%	-8.6	-17.6%	-13.9	-22.8%
8004	Red	Salthill - Parkmore: Westbound	-4.4	-10.0%	-5.9	-10.8%	-7.4	-15.7%	-16.6	-25.7%
8005	Blue	Knocknacarra - Tirellan: Eastbound	-1.4	-3.5%	-1.3	-3.0%	-2.8	-6.5%	-2.5	-5.7%
8006	Blue	Knocknacarra - Tirellan: Westbound	-0.3	-0.8%	0.4	1.0%	-1.7	-3.8%	-0.8	-1.8%
8007	Green	Knocknacarra - Parkmore: Eastbound	-7.6	-14.0%	-7.2	-14.2%	-11.7	-19.9%	-10.9	-20.2%
8008	Green	Knocknacarra - Parkmore: Westbound	-6.3	-11.2%	-6.6	-12.1%	-10.4	-18.1%	-10.6	-19.0%
8009	Yellow	Dangan - Parkmore: Eastbound	-5.7	-11.6%	-5.9	-12.1%	-8.5	-16.7%	-8.4	-16.8%
8010	Yellow	Dangan - Parkmore: Westbound	-4.7	-9.0%	-4.9	-9.0%	-7.4	-14.0%	-7.5	-14.4%

Figure 6-8: Bus Journey Time Differences (Minutes)

6.3 Public Transport Flows

In this section the number of Bus Passengers on the two main corridors linked to the GCCL schemes is reported. Figure 6-9 shows the route of the two corridors considered.

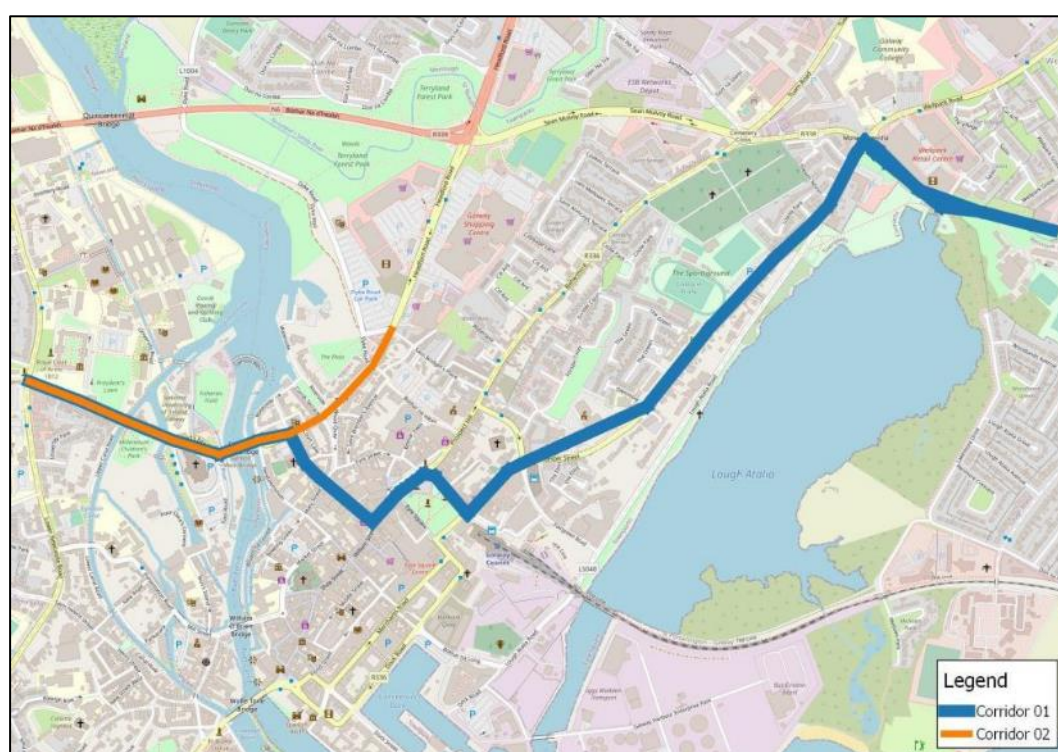


Figure 6-9: routes of the two Bus Corridors

Table 6-1 and Table 6-2 report the hourly numbers of Bus Passengers on the two corridors in the forecast years 2023 and 2038 (in the AM and PM peak hours).

Overall, bus passengers increase steadily between the Do-Something and Do-Minimum scenarios in both corridors, in both directions and in both forecast years. The highest flows are observed on Corridor 1, where in 2038 a peak of 1240 passengers per hour is forecasted, with an increase +23% in the AM peak hour.

	AM			PM		
	DM	DS	Diff	DM	DS	Diff
Corridor 1 WB	810	910	12%	460	530	15%
Corridor 2 WB	460	510	11%	300	350	17%
Corridor 1 EB	650	710	9%	640	750	17%
Corridor 2 EB	440	470	7%	380	430	13%

Table 6-1: 2023 AM and PM hourly Bus Passengers in the two corridors in both directions

	AM			PM		
	DM	DS	Diff	DM	DS	Diff
Corridor 1 WB	1240	1520	23%	600	710	18%
Corridor 2 WB	600	650	8%	450	500	11%
Corridor 1 EB	790	860	9%	910	1050	15%
Corridor 2 EB	630	670	6%	470	510	9%

Table 6-2: 2038 AM and PM hourly Bus Passengers in the two corridors in both directions

6.4 Highway Flows

The following sections shows highway flow difference plots for both 2023 and 2038. Blue indicates a decrease in flows whilst green shows an increase.

6.4.1 AM Peak

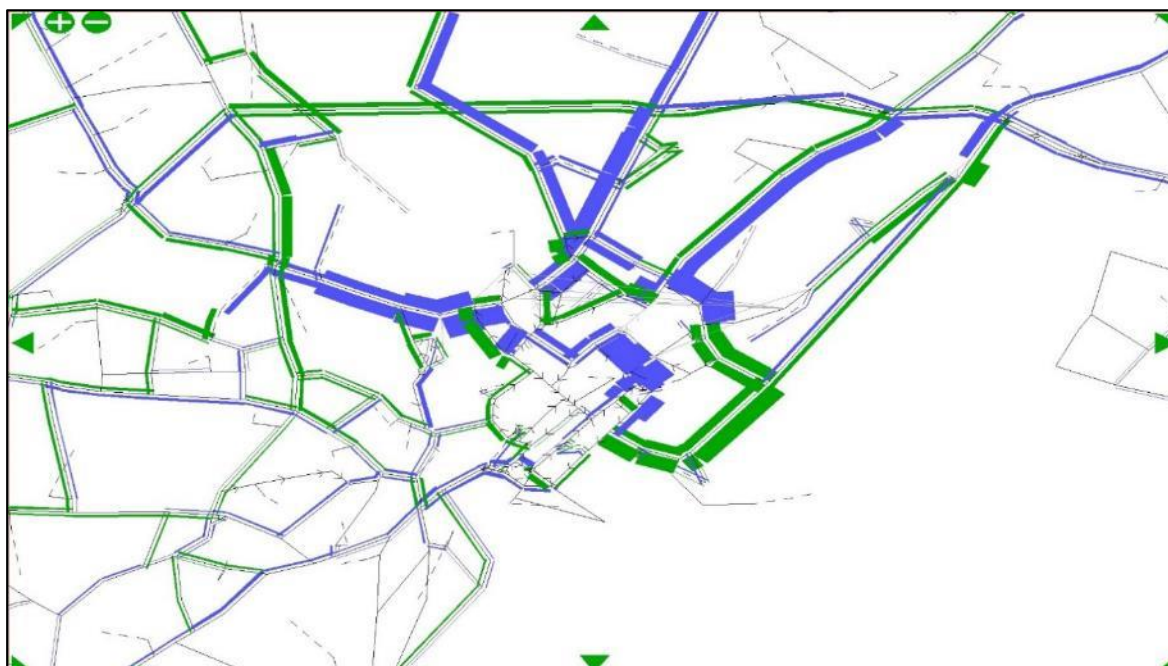


Figure 6-10: 2023 flow difference between DS and DM in Galway City during the AM Peak

Figure 6-10 shows the highway flow difference in 2023 during the AM peak period. As a result of the traffic restrictions implemented as part of the Proposed Scheme, significant rerouting has been identified. This includes a significant reduction in both eastbound and westbound flows on Salmon-Weir-Bridge due to the bus gate, on Eyre Square, Headford Road, Bohermore (inbound) College Road and Bothar Na Dige (inbound).

At the same time, traffic is routing onto the City Centre Access Network with flow increases on the N6 including Quincentenary Bridge, Lower Newcastle, Lough Atalia Road and Fairgreen Road.

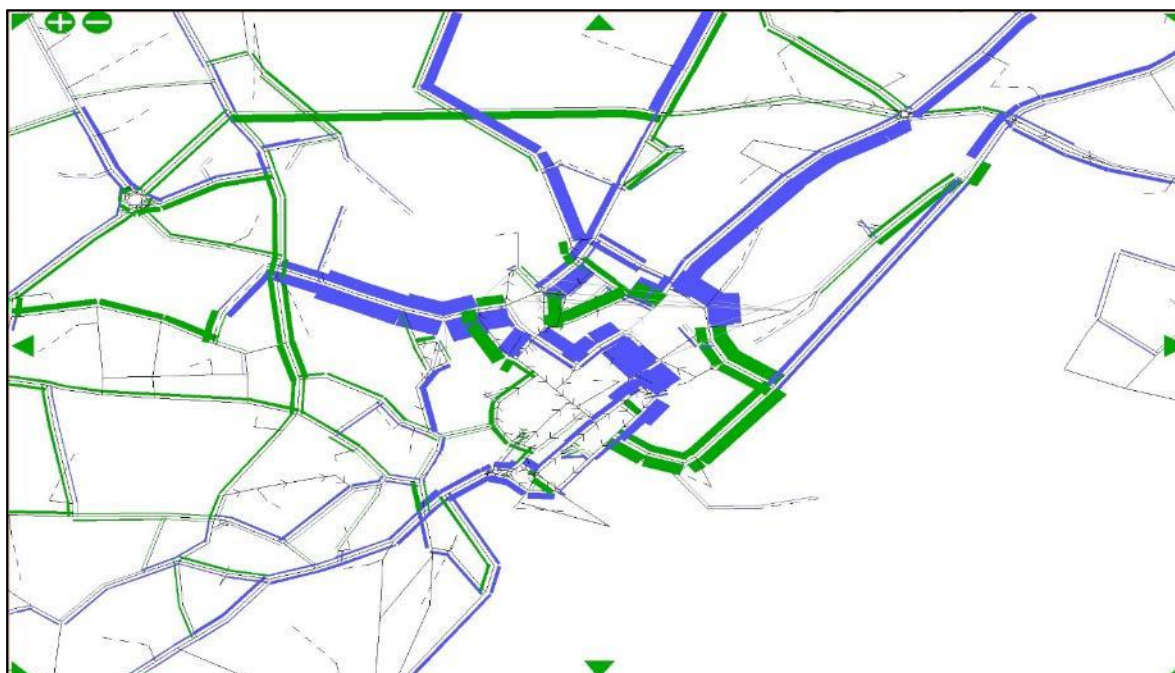


Figure 6-11: 2038 flow difference between DS and DM in Galway City during the AM Peak

The flow differences for 2038 shown in Figure 6-11 are similar to 2023 with the exception of more strategic rerouting due to the inclusion of Galway Outer Bypass. This can be seen from Figure 6-13.

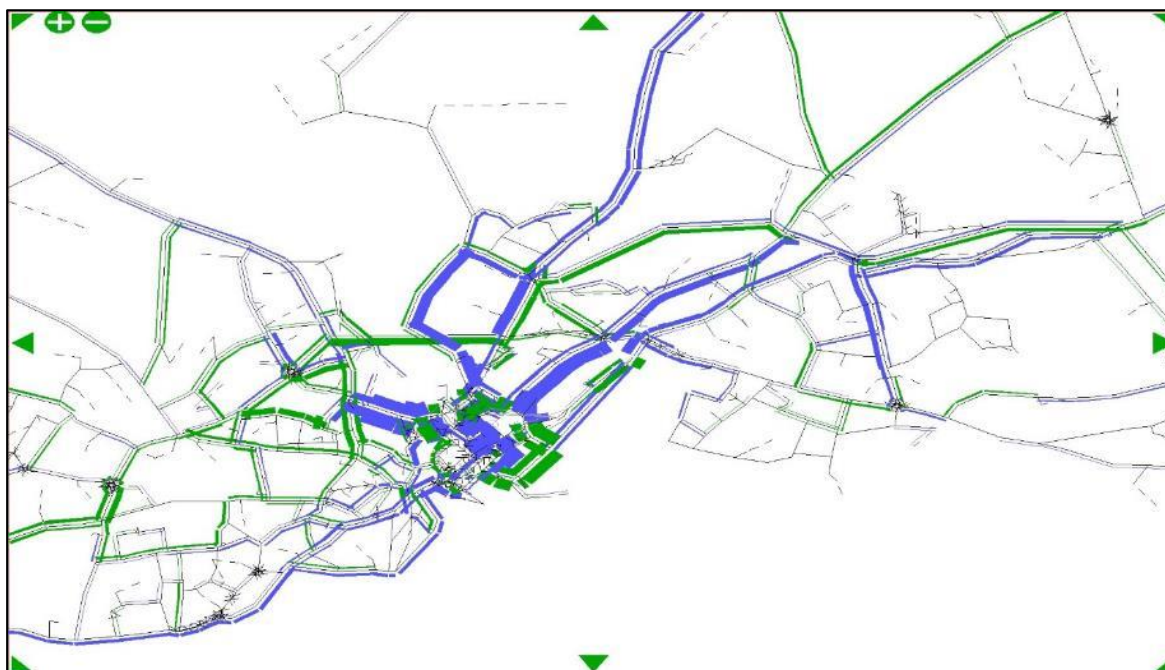


Figure 6-12: 2023 flow difference between DS and DM in Galway City and surroundings during the AM Peak

Figure 6-12 shows the wider strategic rerouting within Galway City due to the Proposed Scheme. As can be seen from the plot, The N84 road, Ballybane Road (R865), Tuam Road (R336) and Wellpark Road (R339) as well as Grattan Road/Seapoint Promenade/Upper Salthill Road in the Salthill Area are expected to see flow decreases.

Further flow increases are expected on the N83 road and the Western Distributor Road.



Figure 6-13: 2038 flow difference between DS and DM in Galway City and surroundings during the AM Peak

Figure 6-13 shows the wider strategic rerouting in the Galway City Area in 2038. In addition to the flow changes described in the city centre, it can be seen that more traffic is rerouted onto the Galway Outer Bypass.

6.4.2 PM Peak

Figure 6-14 to Figure 6-17 show the flow differences during the PM peak period in both 2023 and 2038. The impacts of the Proposed Scheme on highway flows are in line with those seen during the AM peak period outlined in section 6.4.1.

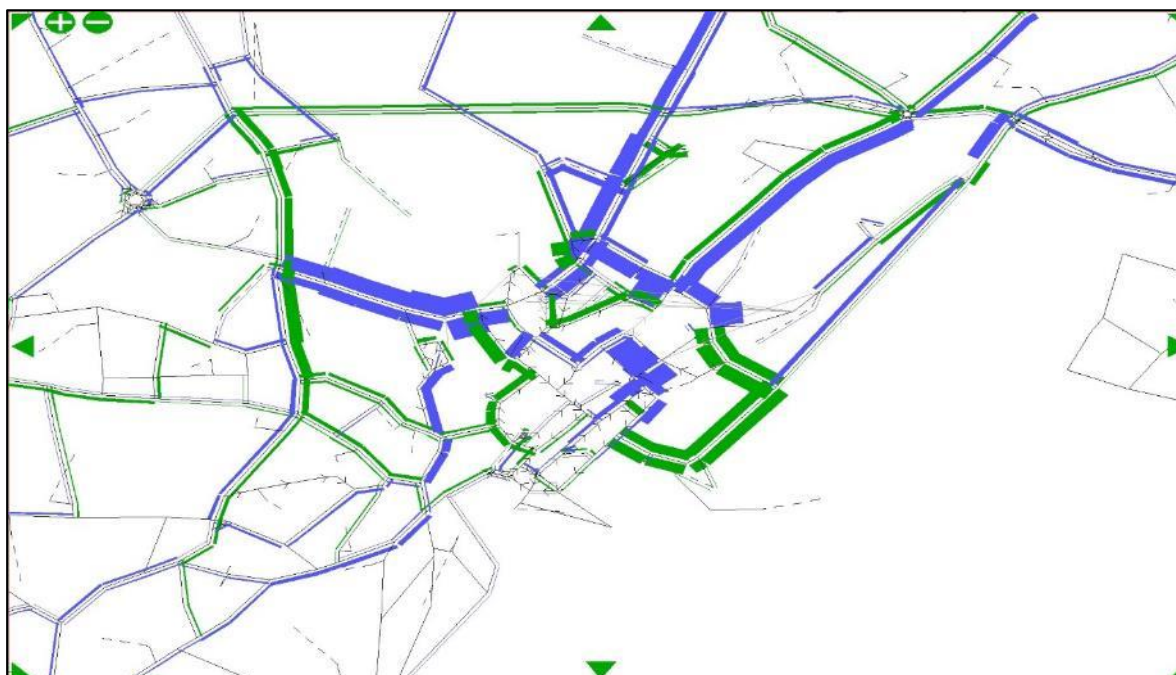


Figure 6-14: 2023 flow difference between DS and DM in Galway City during the PM Peak

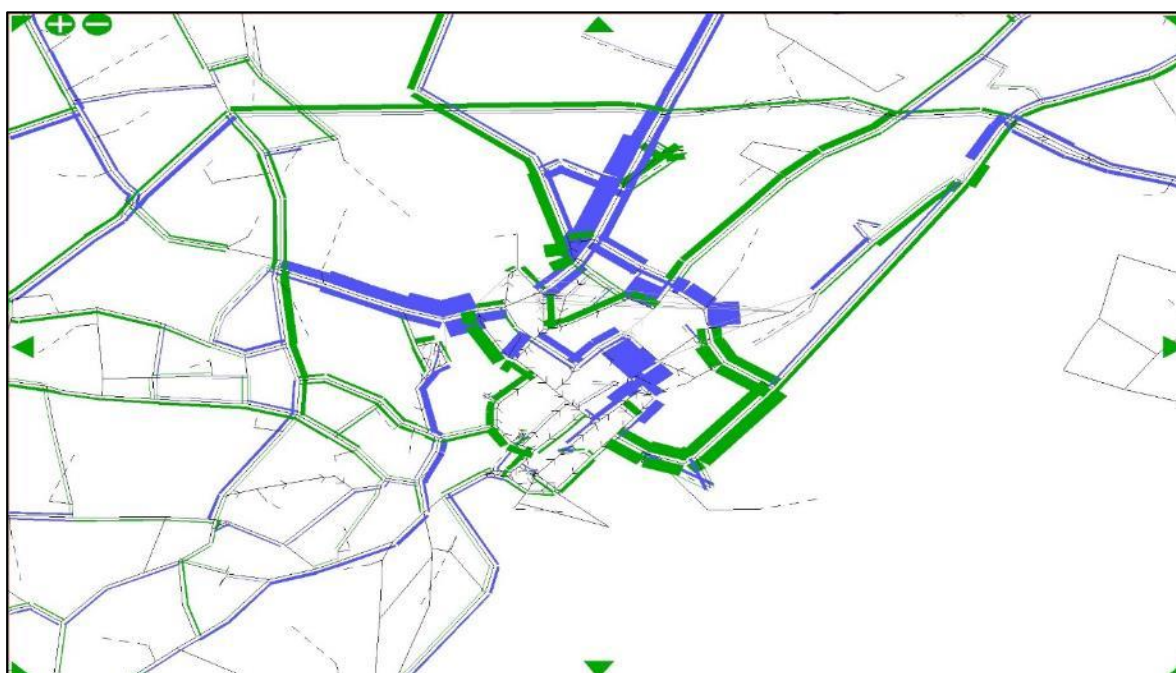


Figure 6-15: 2038 flow difference between DS and DM in Galway City during the PM Peak

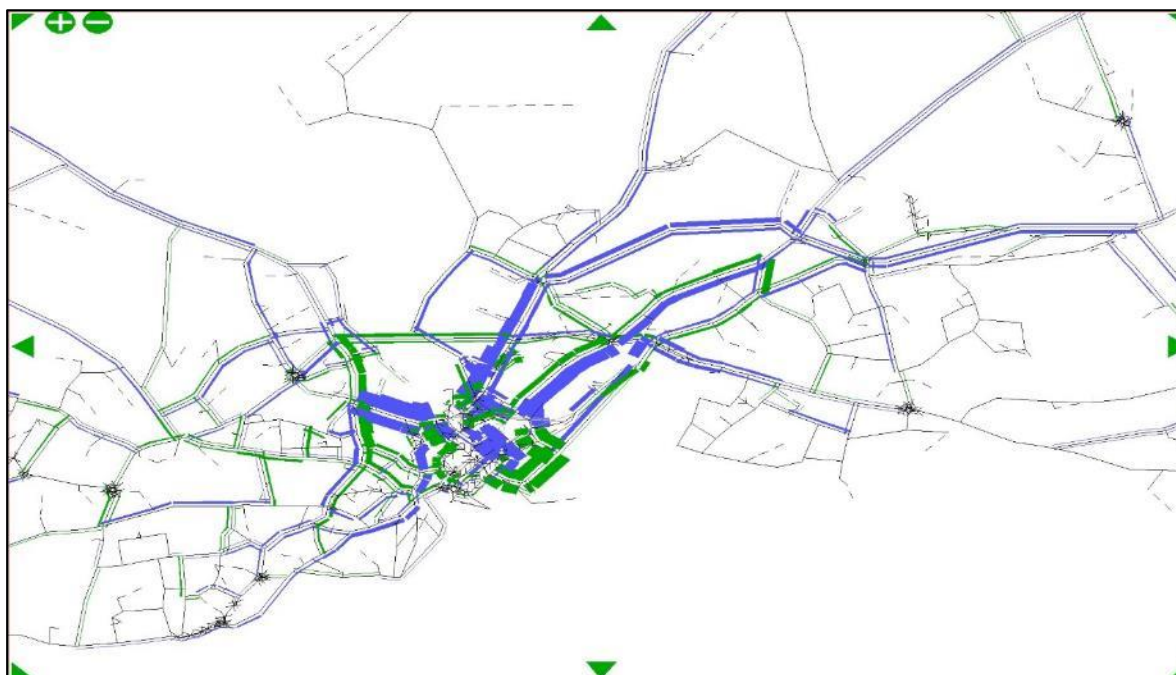


Figure 6-16: 2023 flow difference between DS and DM in Galway City and surroundings during the PM Peak

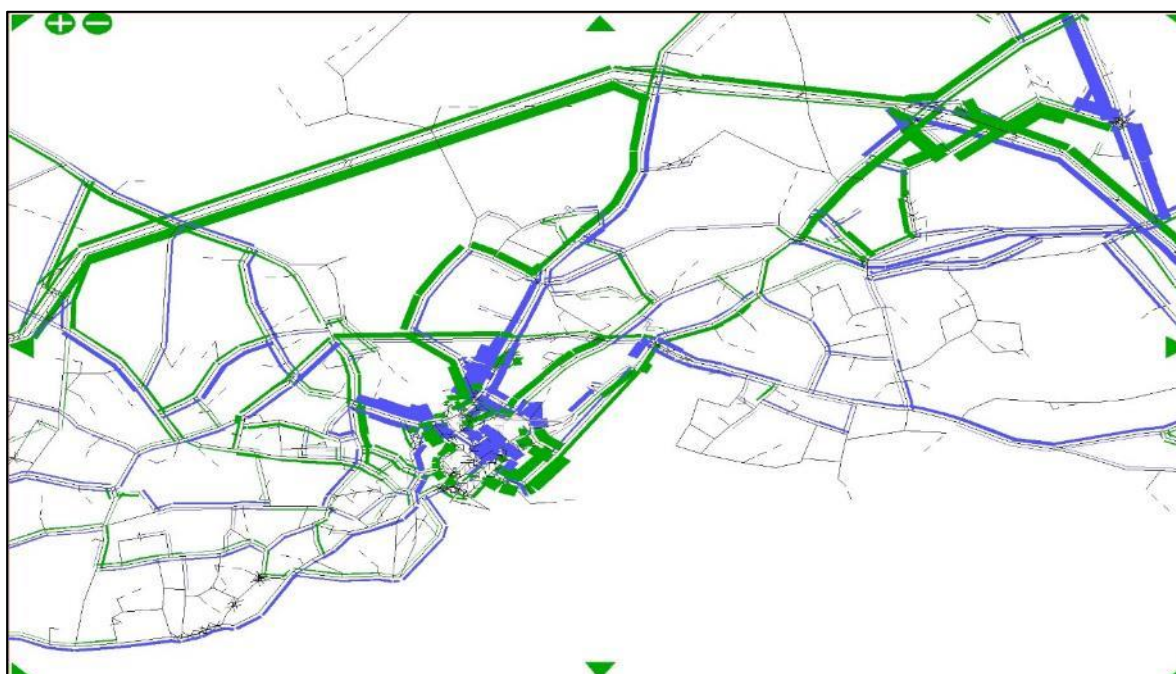


Figure 6-17: 2038 flow difference between DS and DM in Galway City and surroundings during the PM Peak

7. GALWAY LOCAL AREA MODEL

7.1 Introduction

The analysis undertaken within the WRM regional model provided a valuable measure of the impact that the Proposed Scheme has on transport within Galway City and environs, in particular to evaluate the effects on public transport and active modes. However, for more detailed analysis, a Local Area Model (LAM) is more suitable to assess traffic impacts caused by the new scheme on the highway network. LAMs provide an additional level of confidence in the assessments due to the greater detail and updated calibration of the road network. The LAM for example has been developed from the larger regional model with additional focus on the accuracy of e.g. signal times, turning flows and delays.

This Chapter describes the steps undertaken to develop, calibrate and validate a Base Year LAM. It then explains how the future year LAM scenarios have been produced by combining the cordoned WRM networks with future demand, the latest obtained by pivoting the Base Year matrix using the Furness Method. Finally, the main results of the local area modelling are reported. This Chapter is structured as follows:

- **Methodology:** Chapter 7.2 provides an overview of the methodology used to develop, calibrate and validate the Base Year LAM.
- **Model Specification:** Chapter 7.3 presents information on the Galway LAM specification including the defined model area, demand segmentation, time periods modelled, model software and key assignment parameters.
- **Traffic Data:** Chapter 7.4 outlines the traffic data used to facilitate the calibration and validation of the Galway LAM.
- **Road Network and Zone System Development:** Chapter 7.5 describes the development of the LAM road network and zone system to ensure that it provides an accurate representation of existing conditions.
- **Model Calibration Process and Results:** Chapter 7.6 outlines the calibration process adopted and the results achieved to ensure that the LAM is meeting relevant Transport Infrastructure Ireland (TII) and NTA guidelines.
- **Model Validation:** Chapter 7.7 presents the validation process and results, which demonstrate that the model is a suitable and robust tool to be used to assess the impact of the Galway Cross-City Link within the boundary area.
- **Future Year Scenarios:** Chapter 7.8 outlines the steps undertaken for developing the future year scenarios.
- **Results:** Chapter 7.9 presents the main results obtained from the future year LAM scenarios.

7.2 Methodology

The methodology for developing the Galway LAM from the RMS is illustrated in Figure 7-1.

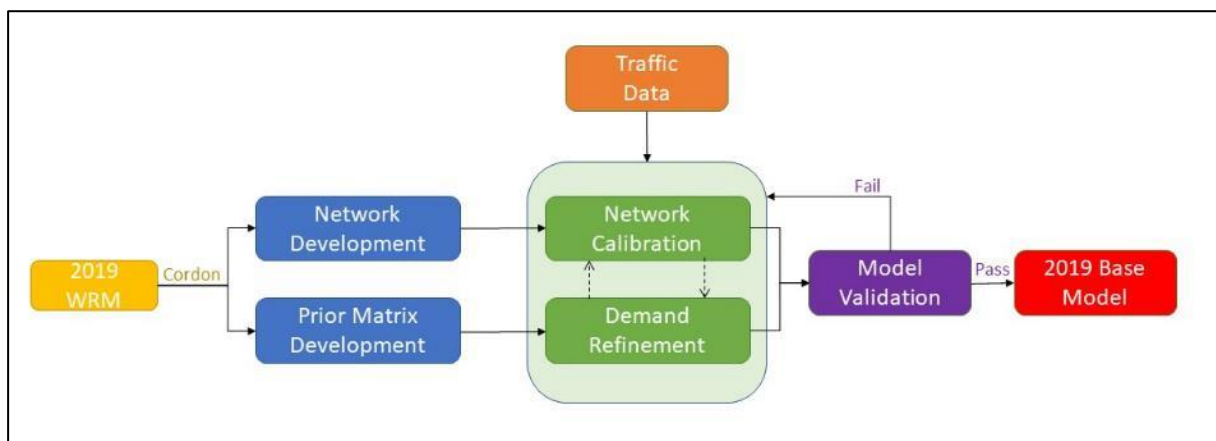


Figure 7-1: Galway LAM Development Methodology

In Summary:

- **2019 WRM Run:** the WRM has been run with 2019 NTA planning data using inputs from the 2016 model and the addition of recent infrastructure developments as reported in section 5.2.
- **WRM Cordon:** the 2019 WRM road assignment was cordoned to extract the initial network and traffic matrix covering the Galway LAM extent.
- **Network and Prior Matrix Development:** the initial WRM cordoned road network was reviewed in greater detail for the study area for items including junction layouts, network speeds, missing links etc. The zone system from the WRM was maintained. Further details on the network and zone system development are provided in section 7.5.
- **Traffic Data:** due to the Covid-19 pandemic, it has not been possible to collect traffic data specifically for this project. However, 2019 traffic counts data was available from a data collection campaign conducted by Galway County Council and it was used to calibrate and validate the LAM (refer to section 7.4 for further information).
- **Calibration:** calibration is the process of adjusting the model to better represent observed data. This is normally undertaken in two steps:
 - **Network Calibration:** adjustments to the road network based on observations extracted from traffic survey data e.g. altering turning capacities at junctions, updating link speeds etc.; and
 - **Demand Refinement:** adjustments to the prior matrix to better represent observed travel movements from count data.

The Galway LAM was calibrated in-line with Transport Infrastructure Ireland's (TII) Project Appraisal Guidelines (PAG) and the UK Department for Transport (DfT) TAG guidance, and further information is provided in Chapter 7.6.

- **Validation:** validation is the assessment of the validity of the calibrated model and its robustness in representing observed traffic conditions. Calibration and validation is an iterative process. If the results of the validation checks are unsatisfactory, then adjustments will be made as required in order to achieve a better representation of reality. The Galway LAM was validated in-line with TII and TAG guidance, and further information is provided in section 7.7 of this report.

7.3 Model Specification

This section provides an overview of the key parameters that define the Galway LAM, with specific reference to the following aspects:

- Model Area;
- Model Time Periods;
- Demand Segmentation;
- Model Software; and
- Assignment Parameters.

7.3.1 Model Area

The area to be analysed in detail in the Galway LAM is illustrated in Figure 7-2, and was identified through the following:

- Review of all major roads and alternative routing options in event of the level crossings being closed to vehicular traffic;
- Internal discussions with ARUP; and
- An Area of Impact Assessment to analyse the impact of the Proposed Scheme on flows in the surrounding network using the WRM.



Figure 7-2: LAM Extension

7.3.2 Model Time Periods

The analysis of existing traffic data allowed to identify the typical profile of traffic demand within the study area throughout an average weekday. The results follow a typical trend with peaks in traffic volumes in the morning and evening. The ATC data suggests that the hours experiencing the highest levels of traffic are from 08:00-09:00 in the AM, and 17:00-18:00 in the PM.

Therefore, the Galway LAM was developed, calibrated and validated to represent the following time periods:

- AM Morning peak : 08:00 to 09:00
- Average IP (Interpeak) Period: 10:00 to 16:00
- PM Evening peak: 17:00 to 18:00

7.3.3 Demand Segmentation

The prior travel demand for the Galway LAM was derived from the NTA's WRM. The WRM assignment matrices contain the following ten user classes:

- Car Employer's Business (in work time)

- Car Commute (travel to/from work);
- Car Other (other non-work purposes such as shopping, visiting friends, etc);
- Car Education (travel to/from school);
- Car Retired;
- Taxi;
- Light Goods Vehicles (LGV);
- Other Goods Vehicles (OGV) 1;
- OGV2 Permit Holder (5 or more axles and allowed drive in Dublin city centre – not used in WRM); and
- OGV2 (5 or more axles and not allowed drive in Dublin city centre).

Each user class has its own defined set of generalised cost parameters based on a price per kilometre and a price per minute. To ensure consistency with the larger strategic WRM, the ten user classes and their associated generalised cost parameters were retained for the Galway LAM.

The ten assigned user classes were then grouped in to three broader vehicle classes, based on the availability of disaggregated survey data. The three vehicle classes represented are:

- All Car;
- LGV; and
- All other Goods Vehicles.

7.3.4 Model Software

The model software used to develop the Galway LAM is the SATURN (Simulation Assignment of Traffic to Urban Road Networks) suite of transportation modelling programs.

SATURN has 6 basic functions:

1. As a combined traffic simulation and assignment model for the analysis of road-investment schemes ranging from traffic management schemes over relatively localised networks (typically of the order of 100 to 200 nodes) through to major infrastructure improvements where models with over 1,000 junctions are not infrequent;
2. As a “conventional” traffic assignment model for the analysis of much larger networks (e.g., up to 6,000 links in the standard PC version, 37,500 in the largest);
3. As a simulation model of individual junctions;
4. As a network editor, database and analysis system;
5. As a matrix manipulation package for the production of, for example, trip matrices; and
6. As a trip matrix demand model covering the basic elements of trip distribution, modal split, etc.

7.3.5 Assignment Parameters

The Galway LAM was developed in SATURN and the model was calibrated and validated using release version 11.4.07H MC of the software. The SATURN application SATNET was used to build the various data files in to an assignable road network (UFN) file.

Matrices were then assigned to the network using the SATALL application, where it iterates through assignment and simulation loops until the user defined levels of convergence are reached (RSTOP and STPGAP), or the model reaches the user defined maximum number of assignment and simulation loops (MASL). SATALL uses a converged equilibrium assignment method to assign the traffic to the road network over successive iterations, until user defined convergence criteria are achieved.

The key convergence criteria are presented in Table 7-1.

VARIABLE	DESCRIPTION	VALUE
MASL	Maximum number of assignment / simulation loops.	150
PCNEAR	Percentage change in flows judged to be “near” in successive assignments	1%
RSTOP	The assignment / simulation loops stop if RSTOP % of link flows change by less than PCNEAR % in successive assignments	98%
NISTOP	Number of successive loops which must satisfy the RSTOP criteria for convergence	4
STPGAP	Critical gap value (%) used to terminate assignment / simulation loops	0.05

Table 7-1: SATURN Convergence Criteria

7.4 Traffic Data

This Chapter provides an overview of the traffic count data used to facilitate calibration and validation of the Galway LAM. Due to the Covid-19 pandemic, it has not been possible to collect traffic data specifically for this project, therefore the latest existing count data available from November 2019 was used instead.

7.4.1 Junction Turning Counts (JTCs)

The JTCs are 24-hour counts broken down into 15-minute segments over a full day. All main junctions within the study area have been included and provide information on the volume, and types of vehicles, making turning movements at each location. This data is utilised within the models to ensure that the flow of vehicles through the main junctions on the network is being represented accurately.

The locations of the 74 JTCs collected in 2019 and used for this study are displayed in Figure 7-3 .

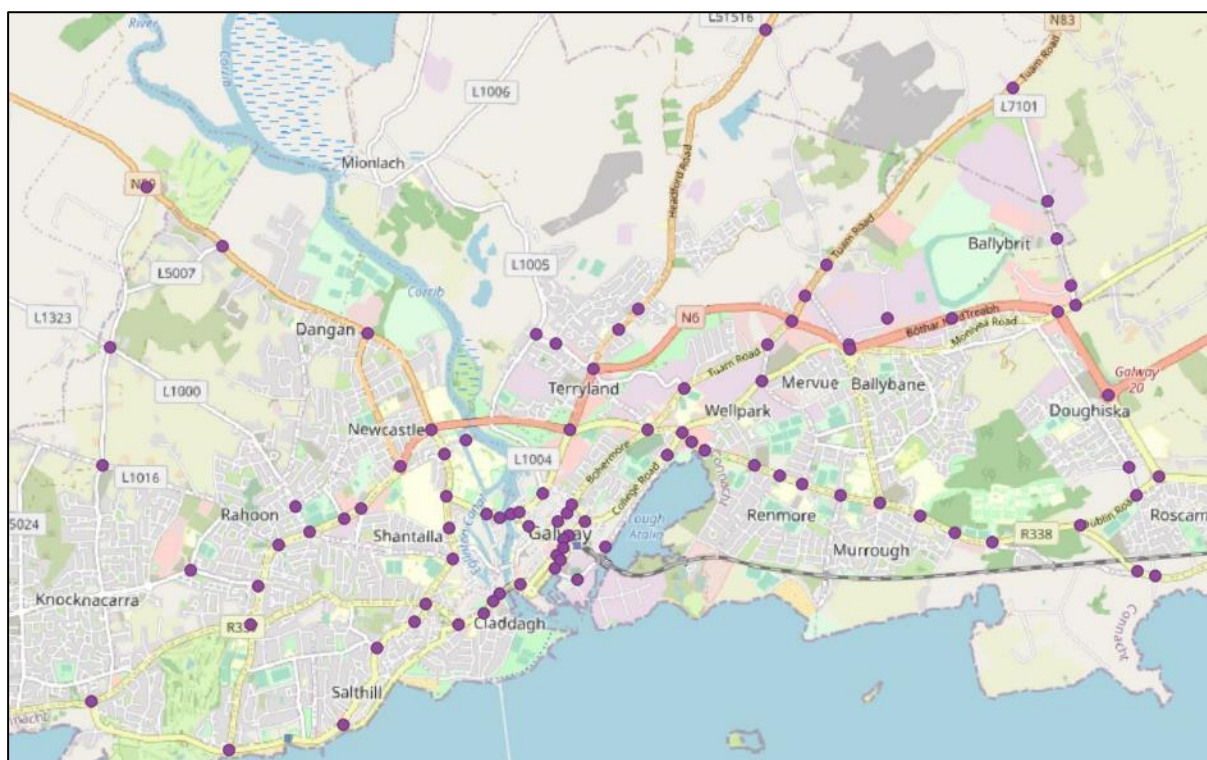


Figure 7-3: Location of the JTC counts

7.4.2 Automatic Traffic Counts (ATCs)

The ATC data provides information on:

- The daily and weekly profile of traffic along the Proposed Scheme; and
- Busiest time periods and locations of highest traffic demand on the network.

The ATCs were taken for an entire week.

In Figure 7-4 the location of the 19 ATCs collected in 2019 and used for this study isare displayed.

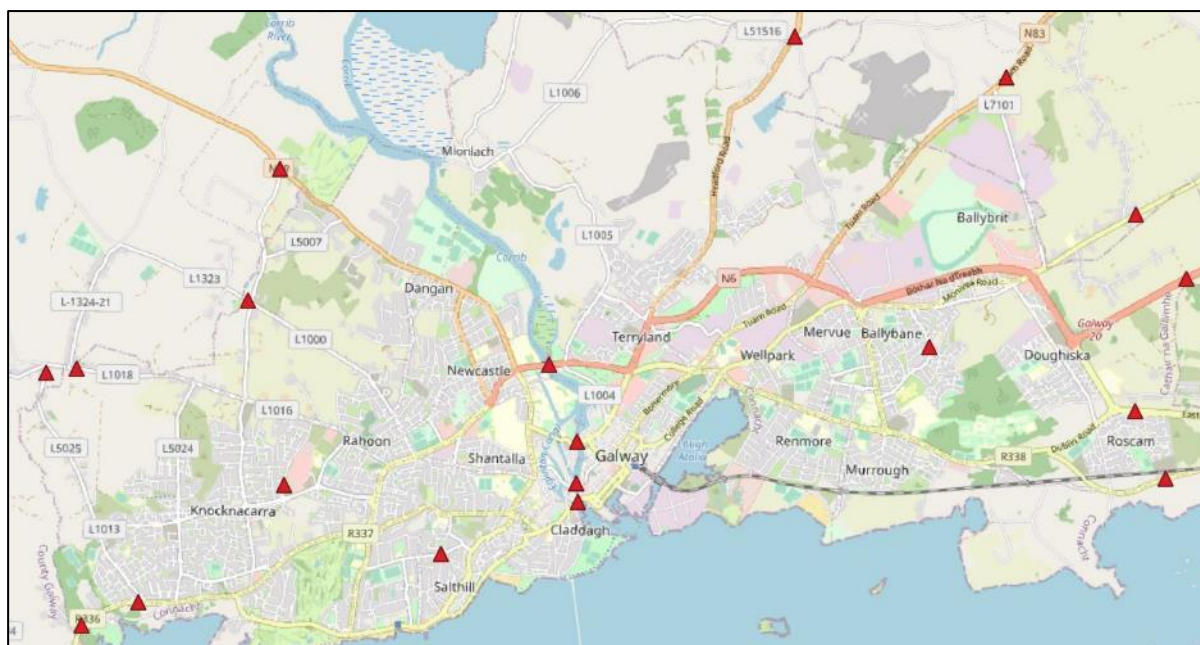


Figure 7-4: Location of the ATC counts

7.4.3 TomTom Road Journey Time Data

Road Journey time data for the Proposed Scheme models has been sourced from TomTom, who calculate journey times using vehicle position data from GPS-enabled devices and provide this on a commercial basis to a number of different users. The NTA purchased a license to access the anonymised Custom Area Analysis dataset through the TomTom TrafficStats portal. The NTA has an agreement with TomTom to provide travel time information covering six areas of Ireland and for certain categories of road.

The data is provided in the form of a GIS shapefile and accompanying travel time database file. The shapefile contains topographical details for each road segment, which is linked to the travel time database via a unique link ID. The database file then contains average and median travel time, average and median speed, the standard deviation for speed, the number of observations and percentile speeds ranging from 5 to 95 for each link.

7.5 Road Network and Zone System Development

7.5.1 Network Development

The NTA's WRM was utilised as a base for generating the highway network for the Galway LAM. The base WRM network was developed from the HERE mapping layer which provides a detailed representation of all National Primary, Secondary, Regional and local roads in Ireland.

The Galway LAM road network, extracted from a cordon of the WRM, is illustrated in Figure 7-5 overleaf. A detailed review was undertaken of all model coding in the study area using digital mapping systems such as Google Earth to ensure it represented, as accurately as possible, the existing road network. This included aspects such as network speed limits, availability of bus lanes, junction layouts, pedestrian crossing points etc.

Junction capacities and saturation flows were adopted from the Network Coding Guidelines developed for the NTA as part of the RMS development, and were further reviewed during the calibration process. Where required, additional detail was added to ensure that traffic was loading onto the road network at the correct locations.

As illustrated in Figure 7-5, the WRM provides a detailed representation of all significant roads within the study area. To ensure full network coverage and route choice, all roads have been considered, from the national primary routes to minor residential streets. The short dead-end links in Figure 7-5 are "spigots" used to load traffic from the zones accurately onto the network, and reflect the further developed zone system that is outlined in section 7.5.2 below.

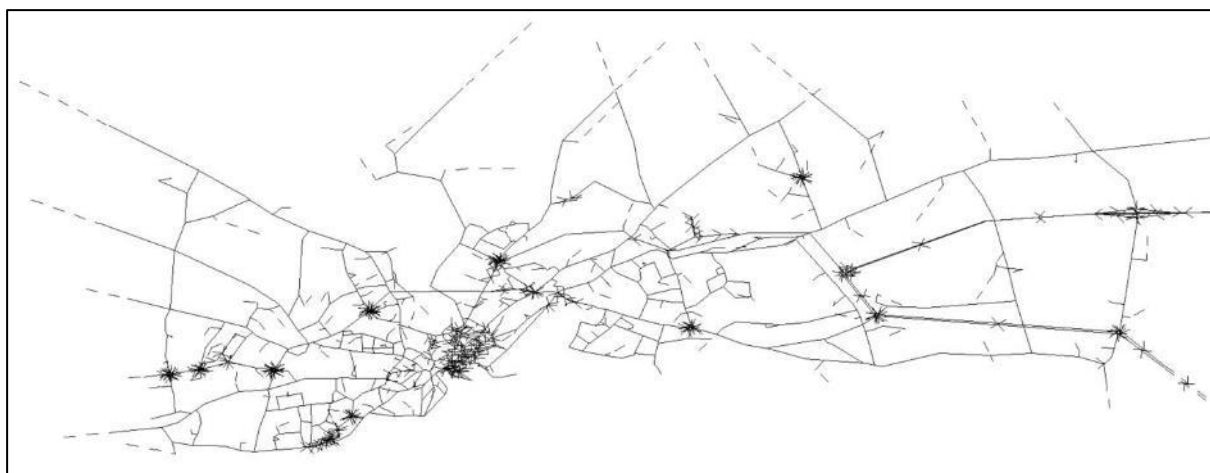


Figure 7-5: Galway LAM highway network

7.5.2 Zone System Development

Similarly to the road network described previously, the base Galway LAM zone system was adopted from the WRM. The WRM zone system was developed using the Census Small Area Population Statistics (SAPS) and Place of Work, School or College Census of Anonymised Records (POWSCAR) to get detailed information on population, employment and education centres across the model area. Other data sources such as MyPlan and Geo Directory were also used to obtain information on specified land-use zoning and location of commercial development. The following rules were then applied to generate the zone system:

- **Population, Employment and Education** – the number of zones with values of population, number of jobs and persons in education above a certain threshold should be minimised;
- **Activity Levels** – the number of zones with activity levels that have very low or very high levels of trips should be minimised;
- **Intra-zonal Trips** – threshold values should be applied to the proportion of intra-zonal trips within each zone, to avoid an underestimation of flow, congestion and delay on the network;
- **Land Use** – zones should be created with homogeneous land use and socio-economic characteristics where possible;
- **Zone Size/Shape** – zone size and the regularity of zone shape should be considered in order to avoid issues with inaccurate representation of route choice;
- **Political Geography** – it should be possible to aggregate all zones to ED level i.e. zone boundaries do not intersect ED boundaries; and
- **Special Generators/Attractors** – large generators/attractors of traffic such as Airports, Hospitals, shopping centres etc. should be allocated to separate zones.

Figure 7-6 illustrates the base WRM zone system within the study area. As the area of interest is relatively close to Galway City Centre, the zones are represented in quite a high level of detail. The WRM zones become larger and more aggregate in nature around the city centre primarily due to the low levels of activity (population and employment) in these areas.

It has been agreed that the WRM zoning system provided sufficient level of detail for the purpose of this study and therefore, no zone disaggregation was performed for the LAM.

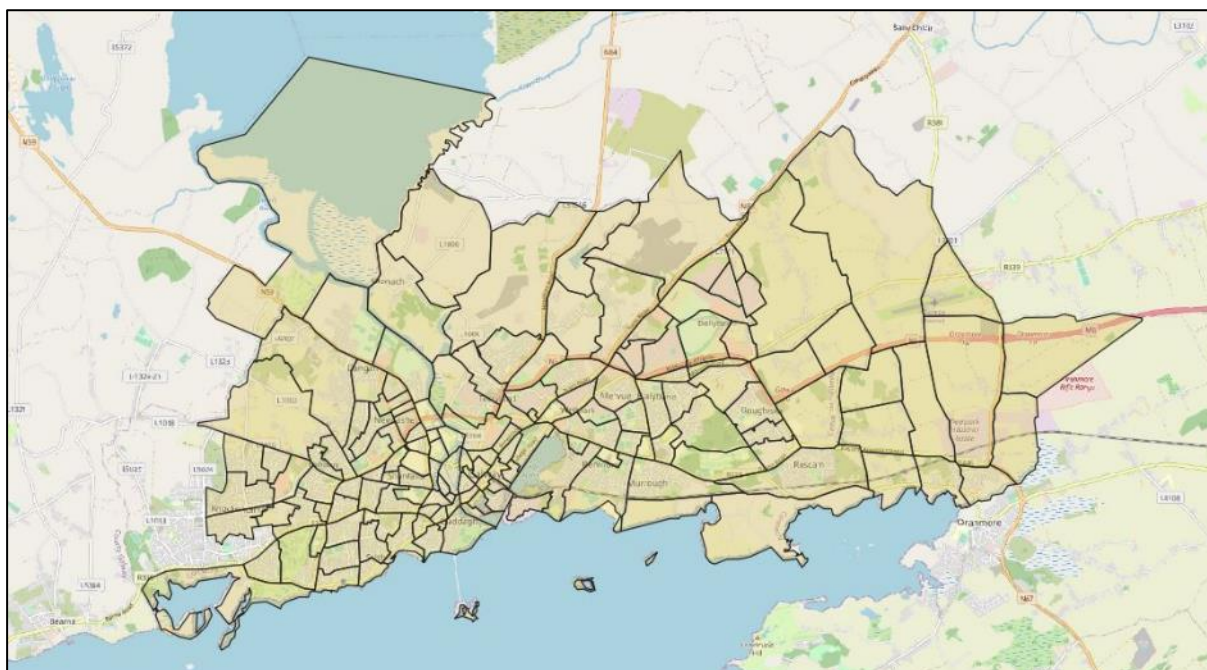


Figure 7-6: LAM zones derived from the WRM

7.6 Model Calibration Process and Results

7.6.1 Introduction

Calibration is the process of adjusting the LAM network and demand to ensure that it provides a robust estimate of assignment when compared to 2019 observed traffic characteristics. Generally, the components of the model that may be adjusted on the demand side are trip distribution and trip production/generation levels, and this usually involves trip ‘Matrix Estimation’.

On the supply side (network), modelled junction and link characteristics may be altered if sufficient new information is available to justify changes to the existing network.

The Galway LAM was calibrated and validated in accordance with Transport Infrastructure Ireland’s (TII) *Project Appraisal Guidelines (PAG) for National Roads Unit 5.1 – Construction of Transport Models (October 2016)*. This is a widely accepted standard in Ireland that provides robust calibration and validation criteria to which certain types of highway models should adhere. Additionally, the LAM development has followed guidance from the UK’s Department for Transport’s Transport Analysis Guidance (TAG) unit M3-1, particularly in terms of matrix estimation controls.

The method for the calibration of the Galway LAM is illustrated in Figure 7-7 overleaf, and comprises of the following key elements:

- **Network and Zone System Development:** As outlined in section 7.5, the initial LAM network and zone system is derived from the ERM with further detail added where necessary to provide an accurate representation of existing conditions;
- **Network Adjustments:** A detailed review is undertaken of the road network coding taking cognisance of surveyed traffic volumes and network speeds with adjustments made where necessary;
- **Prior Matrix:** The initial prior matrix is extracted from a cordon of the WRM;
- **Calibration Criteria Check:** The LAM is then assessed against guideline calibration criteria in terms of modelled versus observed traffic volumes;
- **Matrix Estimation:** If the model is not passing the initial calibration check, a process known as 'Matrix Estimation' is undertaken to adjust the trip demand in order to provide an improved correlation between counts and modelled flows;
- **Post-Estimation Calibration Check:** The model is then re-tested against the calibration criteria with a focus on correlation between modelled and observed flows, along with an analysis of the demand changes introduced by 'Matrix Estimation'; and
- **Validation:** Once all the calibration criteria have been achieved, the model is passed forward to validation.

The following sections of this Chapter provide an overview of the steps outlined above along with the calibration guidelines for LAM development.

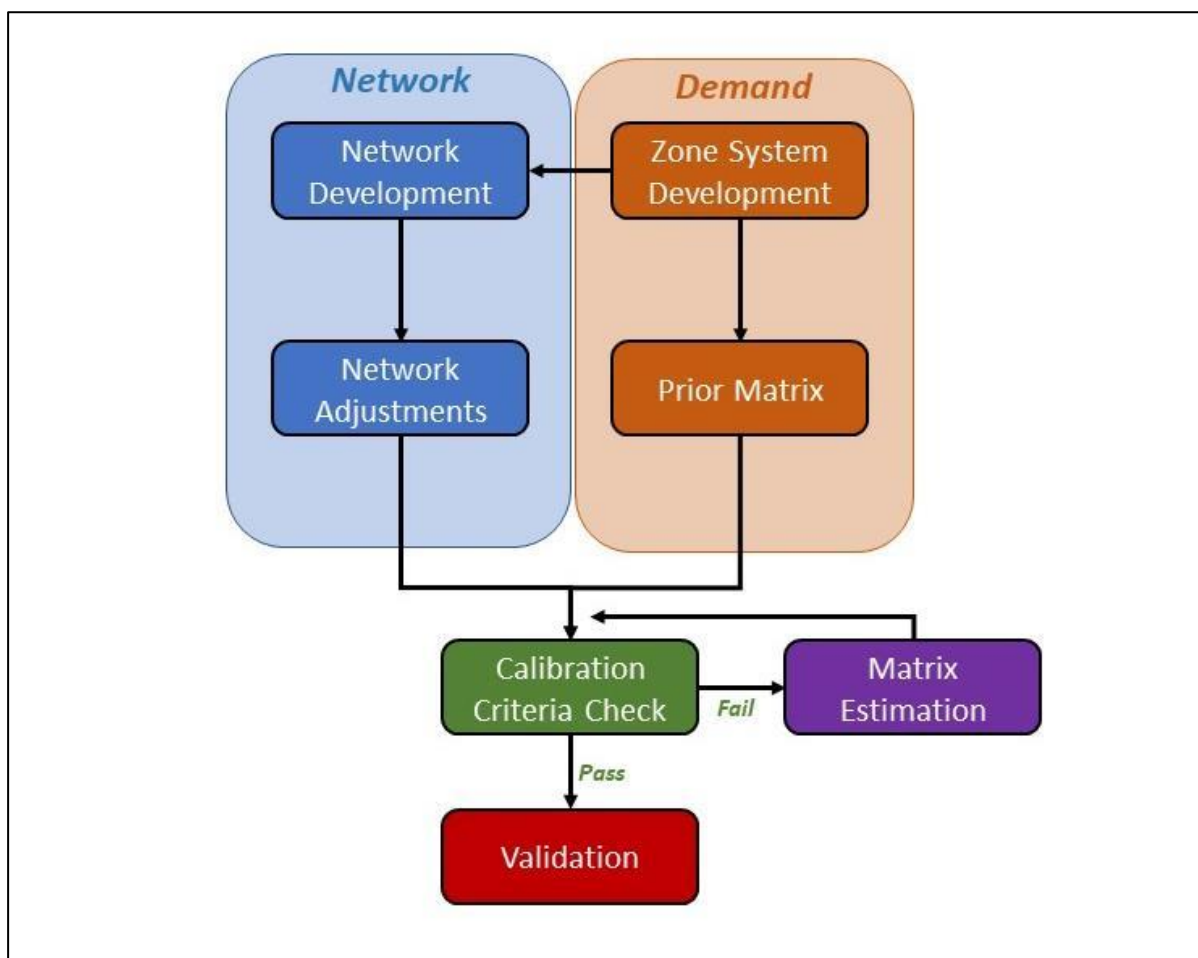


Figure 7-7: LAM calibration process

7.6.2 Calibration Criteria

The guidelines for calibration of the Galway LAM have been taken from the following:

- Transport Infrastructure Ireland's (TII) Project Appraisal Guidelines (PAG) for National Roads Unit 5.1 - Construction of Transport Models;
- UK Department for Transport (DfT) TAG Unit M3.1 Highway Assignment Modelling; and
- NTA guidance on LAM development from Regional Models.

The TII guidelines are a widely accepted standard in Ireland and have been developed in cognisance with the UK DfT TAG guidance. They focus on correlations between modelled and observed traffic flows at an individual count level, and at a Screenline level, along with monitoring of demand changes introduced by 'Matrix Estimation'.

7.6.2.1 Traffic Flow Calibration

Table 7-2 outlines the TII PAG criteria for permissible differences between observed and modelled traffic flows. The guidelines are measured as absolute and percentage differences at various link flows, and also make use of the Geoffrey E. Havers (GEH) statistic.

The GEH statistic is a measure that considers both absolute and proportional differences in flows. Thus, for high levels of traffic volumes a low GEH may only be achieved if the percentage difference in flow is small. For lower flows, a low GEH may be achieved even if the percentage difference is relatively large. GEH is formulated as:

$$GEH = \sqrt{\frac{(Observed - Modelled)^2}{0.5 \times (Observed + Modelled)}}$$

The reason for introducing such a statistic is the inability of either the absolute difference or the relative difference to cope over a wide range of flows. For example, an absolute difference of 100 passenger car units per hour (pcu/h) may be considered a big difference if the flows are of the order of 100 pcu/h, but would be unimportant for flows in the order of several thousand pcu/h. Equally a 10% error in 100 pcu/h would not be important, whereas a 10% error in, say, 3000 pcu/h might mean the difference between adding capacity to a road or not.

In general, the GEH parameter is less sensitive to the above statistical biases since a modeller would probably feel that an error of 20 in 100 would be roughly as bad as an error of 90 in 2,000, and both would have a GEH statistic of roughly 2.

As a rule of thumb in comparing assigned volumes with observed flows, a GEH parameter of 5 or less would be an acceptable fit, while GEH parameters greater than 10 would require closer attention.

CRITERIA	ACCEPTABILITY GUIDELINE
Individual flows within 100 v/h for flows less than 700 v/h	>85% of cases
Individual flows within 15% for flows between 700 & 2,700 v/h	
Individual flows within 400 v/h for flows greater than 2,700 v/h	
Individual flows – GEH < 5	>85% of cases

Table 7-2: Model Flow Calibration Criteria

Screenline Analysis

Screenlines represent an amalgamation of count sites that capture key movements across the model network. TII guidelines suggest that an additional check on the quality of trip matrices should be undertaken by comparing modelled and observed flows across screenlines by vehicle type and modelled time period using the following criteria:

CRITERIA	ACCEPTABILITY GUIDELINE
Total screen line flows (> 5 links) to be within 5%	> 85% of cases
GEH statistic: screenline totals < 4	> 85% of cases
Notes: Screenlines containing high flow routes (such as motorways) should be presented both with and without such routes	

Table 7-3: Screenline Calibration Criteria



Figure 7-8: Screenlines

7.6.2.2 Analysis of Trip Matrix Changes

Regression Analysis

As noted previously, 'Matrix Estimation' was used to adjust the prior trip matrix in order to provide a better correlation between modelled and observed flows. However, both TII and TAG guidance suggest that caution should be taken when using estimation, and that the changes introduced should be monitored to ensure that the original matrices are not overly distorted, thus providing irregular movement patterns.

Table 7-4 outlines the matrix estimation change criteria, as specified in WebTAG Unit M3-1, Section 8.3, Table 5. The guidelines use regression analysis to identify the correlation/relationship between the demand pre and post 'Matrix Estimation', and suggest careful monitoring by the following means:

- Scatter plots of matrix zonal cell values, prior to and post matrix estimation, with regression statistics (slopes, intercepts and R^2 values); and
- Scatter plots of zonal trip ends, prior to and post matrix estimation, with regression statistics (slopes, intercepts and R^2 values).

MEASURE	SIGNIFICANCE CRITERIA
Matrix zonal cell value	Slope within 0.98 and 1.02; Intercept near zero; R2 in excess of 0.95
Matrix zonal trip ends	Slope within 0.99 and 1.01; Intercept near zero; R2 in excess of 0.98.

Table 7-4: Significance of Matrix Estimation Changes

Trip Length Distribution Analysis

A further calibration step recommended by TII guidance is to compare trip length distributions for the prior and post calibrated matrices to ensure they have not been overly distorted by the ‘Matrix Estimation’ process.

‘Matrix Estimation’ can sometimes generate increased short distance trips to match count information, thus distorting the profile of trip making on the network. PAG suggests that the coincidence ratio⁴ should be used to compare trip length distributions before and after estimation, with a desirable range between 0.7 and 1.0

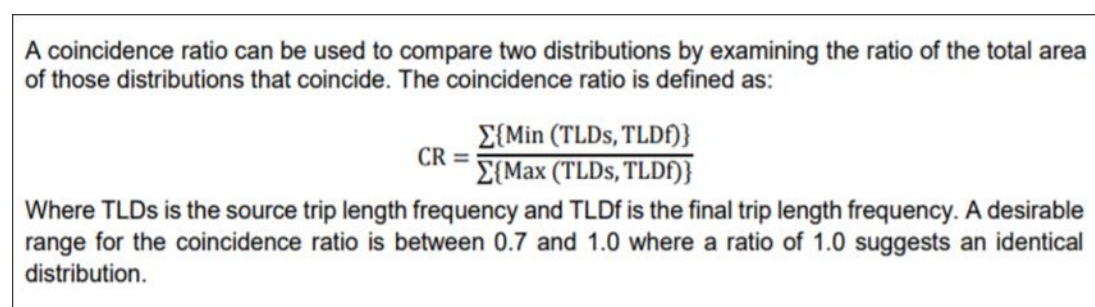


Figure 7-9: Coincidence Ratio Calculation – TII PAG Page 20

⁴ The coincidence ratio is a calculation used to examine the how the total area under different distributions coincide, with a value of 1 representing an identical distribution.

7.6.3 Network Adjustments

The Galway LAM was coded based on best practice approaches developed during the NTA Regional Model Scoping Process, and as such, the model provided an accurate and up-to date representation of the existing road network.

When the traffic survey data was processed and analysed, the network coding was re-checked with the following edits undertaken where there was a clear justification for doing so:

- **Junction Capacity:** The SATURN software flags an error where a junction has insufficient modelled capacity to achieve the observed traffic flow. All these instances were reviewed in detail and remedial action was taken where required. This included:
 - Adjusting Signal Timings (mostly synthesised within the model area);
 - Adding/removing flared lanes;
 - Adding/removing approach lanes; and
 - Adjusting saturation flows through junctions.
- **Network Speeds:** The capacity and speeds of modelled links were checked to ensure they were broadly in line with survey information;
- **Zone Connectors:** A review was undertaken on the location of zone connectors in close proximity to count sites to ensure they were providing an accurate representation of traffic loading onto the road network.

7.6.4 Prior Matrix Development

As noted previously in Chapter 3, the Full Demand Model carries out mode and trip destination choice for all zones within the WRM. The FDM has been calibrated using Census data, and hence, provides a robust and accurate representation of trip distributions across the model network. In order to generate prior matrices for the Galway LAM, a cordon was extracted from a run of the WRM, which has been updated to include 2019 planning data. The cordon function within SATURN, facilitates the extraction of trip matrices for a subset area of the WRM whilst still maintaining route and destination choice from the full model.

Since the LAM used the same zoning system of the WRM, there was no need to disaggregate the demand.

7.6.5 Pre-Estimation Calibration Check

The prior matrix was assigned to the updated road network to determine how well the Galway LAM replicated observed traffic volumes, and the total results are outlined in Table 7-5. Detailed results divided by Vehicle Class can be found in Appendix 8.1.1.

Galway Cross-City Link	300826
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CRITERIA	AM	IP	PM
Individual flows within 100 v/h for flows less than 700 v/h			
Individual flows within 15% for flows between 700 & 2,700 v/h	61%	72%	65%
Individual flows within 400 v/h for flows greater than 2,700 v/h			
Individual flows – GEH < 5	54%	64%	56%

Table 7-5: Total Traffic Count Calibration Statistics (pre Matrix Estimation)

The results indicate quite a good performance in terms of flow criteria and GEH for both LGV and HGVs. However, the car demand is falling outside guideline recommendations. In particular, the percentage of total traffic at all count locations with a GEH less than 5 is modest in the AM, IP and PM peaks at 54%, 64% and 56% respectively.

Therefore, further calibration adjustments including ‘Matrix Estimation’ were carried out on the AM, IP and PM prior matrices to improve the fit between model flows and observed traffic volumes.

7.6.6 Matrix Estimation

‘Matrix Estimation’ is a process used to adjust trip demand so that there is an improved correlation between counts and modelled flows. The base prior matrix is fed into a SATURN programme called SATME2. SATME2 then adjusts origin-destination patterns to produce a trip demand matrix that better replicates traffic counts when assigned to the network.

The prior matrix is adjusted only after all options for improving the network are exhausted. Any matrix adjustment must significantly improve the match between observed and modelled flows, and not introduce more trips into a zone than could realistically be expected. Controls are placed on zones to ensure that the trip demand generated is sensible and in line with census population and employment statistics.

The algorithm driving the SATME2 estimation process tends to reduce long trips in place of chains of short trips, especially when counts are spread over the entire area, which may not fully reflect reality. Constraints are therefore placed on the adjustment process to protect the number of movements and distribution of the through trips contained within the original car trip matrix. By restricting such long through trips, the matrix adjustment algorithm is forced to create or re-distribute short trips.

7.6.7 Post-Estimation Calibration

The post 'Matrix Estimation' model was then re-tested against the TII and TAG calibration criteria to assess performance. This was undertaken in an iterative process, with adjustments made to the road network where necessary to facilitate a better correspondence between model and observed flows e.g. altering junction capacity to facilitate count demand, fixing routing issues and rat-running etc.

A calibration and validation dashboard was created to identify areas of the network requiring adjustment/improvement and not meeting the calibration guidelines. Once all options for network improvement were exhausted, 'Matrix Estimation' was re-run to try and achieve a better match between modelled and observed flows. The iteration between network alterations and 'Matrix Estimation' was carried out until the calibration criteria had been achieved.

7.6.7.1 Traffic Flow and GEH Calibration Results

Table 7-6 summarises the traffic flow and GEH calibration results for the Galway LAM after the matrix estimation process, for each of the modelled time periods.

CRITERIA		AM	IP	PM
Individual flows within 100 v/h for flows less than 700 v/h				
Individual flows within 15% for flows between 700 & 2,700 v/h	>85% of cases	86%	92%	93%
Individual flows within 400 v/h for flows greater than 2,700 v/h				
Individual flows – GEH < 5	>85% of cases	84%	88%	89%

Table 7-6: Total Traffic Count Calibration Statistics (Post Matrix Estimation)

The results in Table 7-6 demonstrate that a satisfactory calibration has been achieved in the model for the IP and PM peak periods, with GEH values falling well within TII standards. The morning peak shows a lower level of performance with the GEH criteria just below the admissible threshold. This indicates that the Galway LAM represents an acceptable match between modelled flows and observed traffic count data.

The full list of flow calibration results for each traffic count location are presented in Appendix 8.1.2.

Galway Cross-City Link	300826
Transport Modelling Report	30/03/2022

7.6.7.2 Screenline Flows

As noted in Section 4.4 previously, counts have been grouped into screenlines covering movements across four screenlines. The comparison between modelled and observed traffic flows at each of the screenlines is presented in Table 7-7 and

Table 7-8 for the AM and PM peak hours.

Table 7-7 AM Screenline Calibration Statistics (Post-Estimation) – Total Flows

Screenline	Observed Flow	Modelled Flow	% Difference	GEH
1 River Eastbound	3,867	3,758	3%	1.8
1 River Westbound	3,088	3,127	-1%	0.7
2 West Inbound	4,876	4,959	-2%	1.2
2 West Outbound	2,661	2,554	4%	2.1
3 East Inbound	3,068	2,687	14%	7.1
3 East Outbound	2,521	2,518	0%	0.1
4 West Outer Inbound	6,275	6,071	3%	2.6
4 West Outer Outbound	4,003	3,733	7%	4.3

Table 7-8 PM Screenline Calibration Statistics (Post-Estimation) – Total Flows

Screenline	Observed Flow	Modelled Flow	% Difference	GEH
1 River Eastbound	2,821	2,625	7%	3.8
1 River Westbound	3,175	3,156	1%	0.4
2 West Inbound	3,121	2,638	18%	9.0
2 West Outbound	4,241	4,121	3%	1.9
3 East Inbound	2,423	2,254	7%	3.5
3 East Outbound	2,491	1,989	25%	10.6
4 West Outer Inbound	4,317	3,929	10%	6.1
4 West Outer Outbound	6,591	5,983	10%	7.7

Table 7-9 Screenline Calibration Criteria Check

TIME PERIOD	SCREENLINES WITHIN 5%	SCREENLINES WITHIN 10%	GEH <4
AM	75%	88%	75%
PM	25%	75%	50%

The results in Table 7-7-**Error! Reference source not found.** indicate that no time period achieves TAG's recommended criterion of all or nearly all screenlines within 5% of observed levels, although relaxing the criteria to 10% shows the AM periods with more than 85% achieves this looser measure.

Considering the performance of individual screenlines, screenline 1 along the River Corrib performs well in both time periods although the percentage difference is slightly too high in the eastbound direction during the PM peak.

Away from Galway city centre, the West screenline performs well in the AM time period and the outbound direction in the PM time period. However, observed flows are 18% higher than the modelled flows in the inbound direction during the PM peak.

The East screenline performs well in the outbound direction during the AM and the inbound direction during the PM time period. However, modelled flows are too low in the opposing directions.

Modelled flows on the West Outer Screenline are too low apart from the inbound direction during the AM peak period. However, this screenline is at the edge of the Local Area Model and does not cover flows within the model.

Overall, when applying the relaxed criteria of 10%, most screenlines provide an accurate representation of key traffic movements within the model area in the AM and PM peak hours. In particular, the model represents cross river movements very well which is especially important given the nature of changes to be tested as part of the Proposed Scheme i.e. closing Salmon-Weir-Bridge for general traffic.

7.6.7.3 Analysis of Trip Matrix Changes - Regression

As noted in Chapter 7.6.7 previously, both TII and TAG model development guidance recommend that care is taken when applying 'Matrix Estimation', and stringent checks should be carried out to ensure that the model demand is not overly distorted.

Pre and Post 'Matrix Estimation' matrices were plotted and the slope, and R^2 measure of goodness of fit were calculated for car trips. The results of this analysis are outlined in Table 7-10 and Table 7-11 below, and Figure 7-10, Figure 7-11 and Figure 7-12.

Within the WRM, the Goods Vehicle matrices are not calculated as accurately as for car traffic as they are not generated by the Full Demand Model. As such, SATME2 was allowed to make more changes to the prior Goods Vehicle matrices to match traffic count data. Constraints were applied to restrict unrealistic Goods Vehicle movement patterns. However, the changes made to the prior Goods Vehicle matrix were not restricted to adhere with DfT TAG guidance.

MEASURE	SIGNIFICANCE CRITERIA	AM	IP	PM
R ²	R ² in excess of 0.95	0.794	0.837	0.813
Slope	Within 0.98 and 1.02	0.983	0.958	0.932
Intercept	Intercept near zero	0.007	0.837	0.071

Table 7-10: AM, IP and PM Matrix Zonal Cell Regression Analysis

MEASURE	SIGNIFICANCE CRITERIA	AM	IP	PM
R ²	R ² in excess of 0.98	0.972	0.959	0.98
Slope	Within 0.99 and 1.01	0.893	0.991	0.962
Intercept	Intercept near zero	14.33	7.49	7.883

Table 7-11: AM, IP and PM Matrix Trip End Regression Analysis (Origin and Destination)

The regression statistics indicate that the calibration struggles to achieve a satisfactory level of correlation between the post calibrated and prior matrices for car trips. Various reasons can be associated to this.

Firstly, the 2019 Base Model has been developed based on the WRM Base Model which has been calibrated to 2016. A number of network changes have been included in the 2019 WRM, creating substantial discrepancies compared to the original 2016 WRM Base Year. Moreover, the WRM uses synthetic matrices which do not necessarily describe real behaviour, but they are the result of mathematical modelling instead. Count data for a total of 58 count sites have been processed as part of the calibration for this Base Year LAM. However, compared to the WRM donor model, many count sites are more localised and differ from those in the WRM.

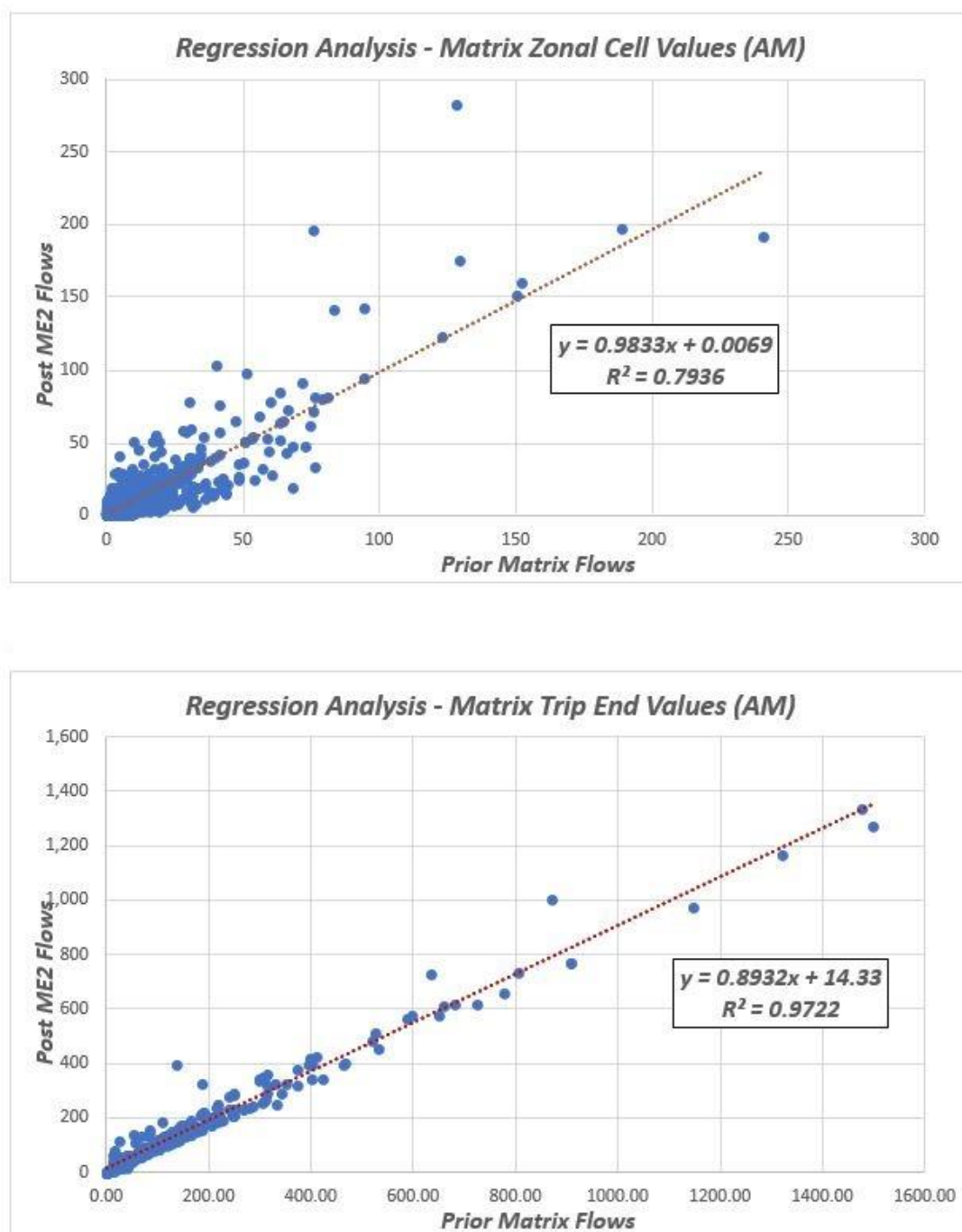


Figure 7-10: AM regression analysis – Matrix Zonal cell values (above) and Origin/Destination Trips ends (below)

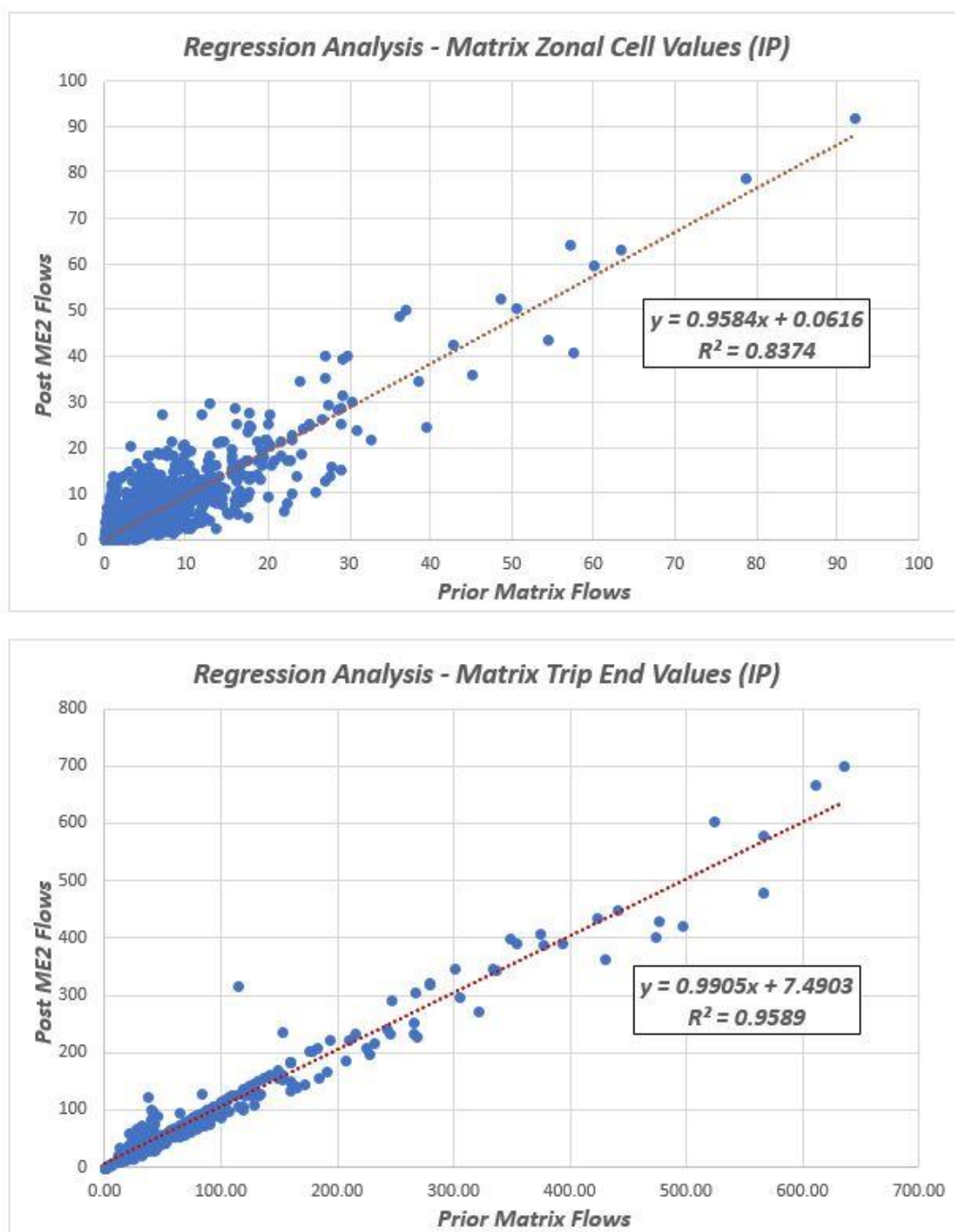


Figure 7-11: IP regression analysis – Matrix Zonal cell values (above) and Origin/Destination Trips ends (below)

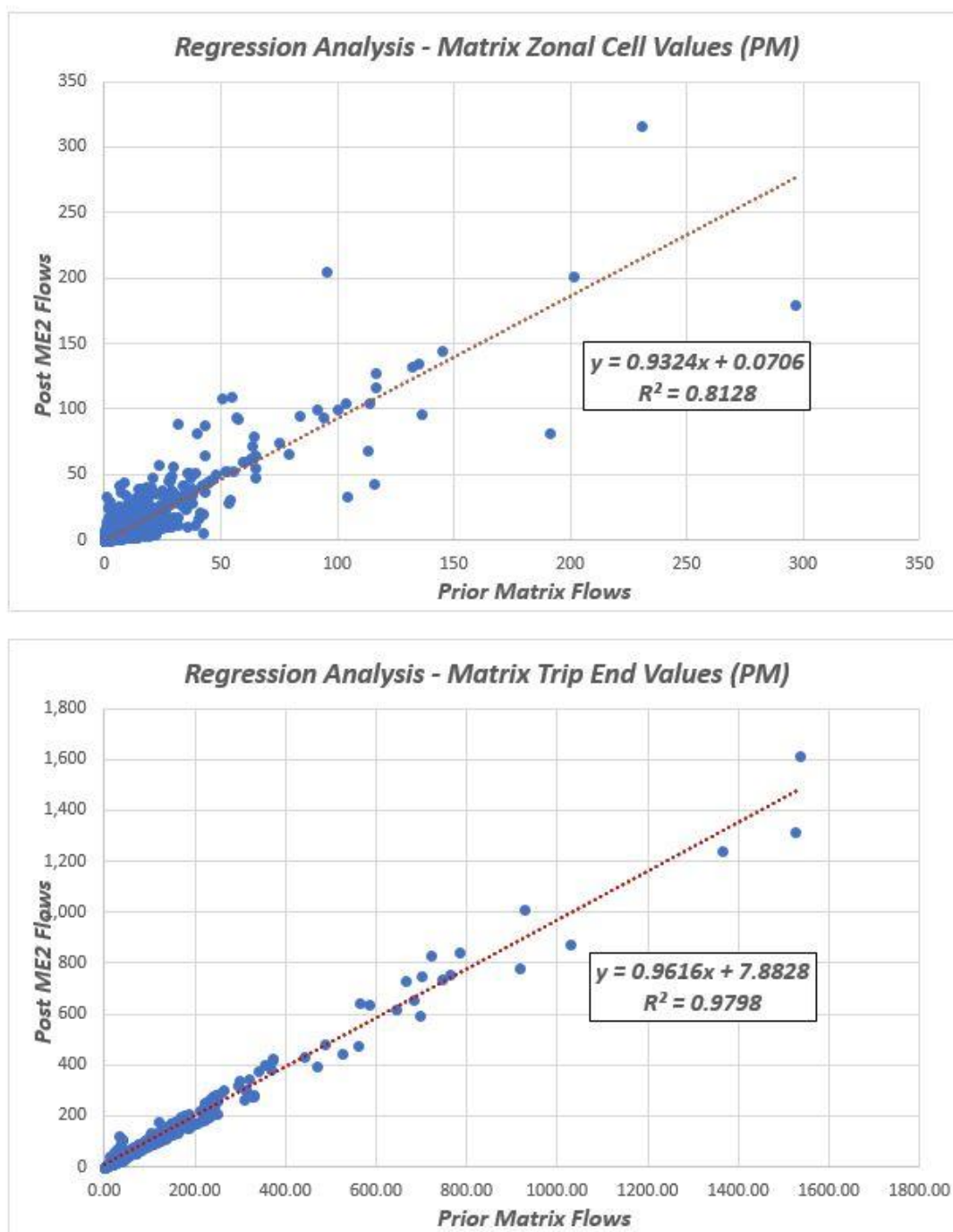


Figure 7-12: PM regression analysis – Matrix Zonal cell values (above) and Origin/Destination Trips ends (below)

7.6.7.4 Analysis of Trip Matrix Changes – Trip Length Distribution

TII guidance recommends comparing trip length distributions for the prior and post calibrated matrices to ensure they have not been overly distorted by the ‘Matrix Estimation’ process.

The ‘Matrix Estimation’ programme SATME2 can sometimes generate increased short distance trips to match count information, thus distorting the profile of trip making on the network. PAG suggests that the coincidence ratio should be used to compare trip length distributions before and after estimation, with a desirable range between 0.7 and 1.0.

Table 7-12 below outlines the coincidence ratios for each of the calibrated LAM time periods. The coincidence ratios suggest that there has been some minor distortion of trip lengths but that it is within acceptable bounds.

MEASURE	SIGNIFICANCE CRITERIA	AM	LT	PM
Coincidence Ratio	Between 0.7 and 1.0	0.9	0.95	0.92

Table 7-12: Trip Length Analysis - Coincidence Ratios

The trip length distributions illustrated in Figure 7-13, Figure 7-14 and Figure 7-15 below display the proportion of trips travelling various distances for both the pre and post estimation matrices. The results indicate that there have been some changes, however, the general shape of the distributions are similar. The changes overall are not large, and therefore, it is considered that ‘Matrix Estimation’ has not overly distorted the overall trip length distribution inherited from the WRM.

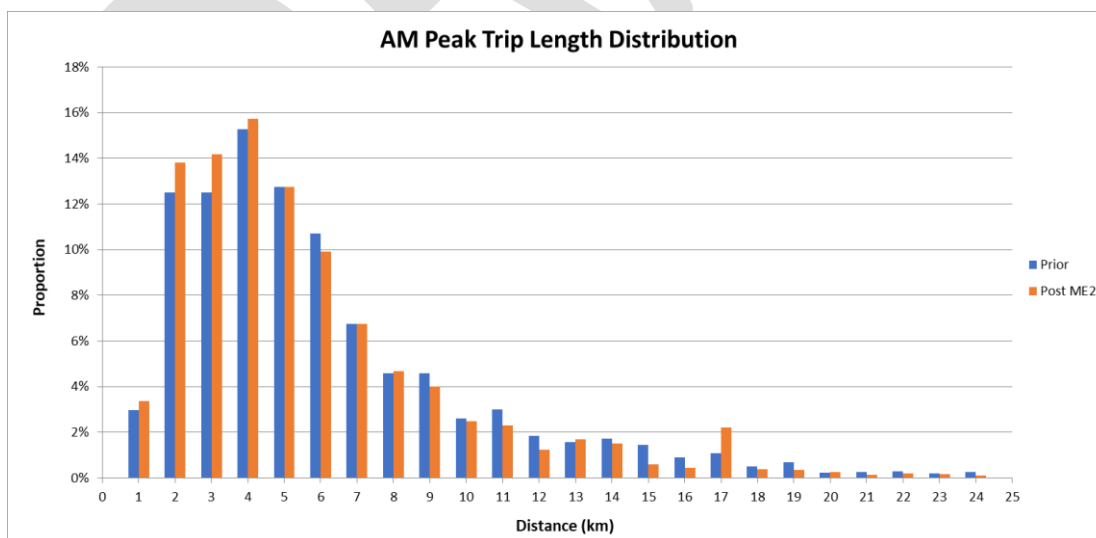


Figure 7-13: AM Peak Trip Length Distribution

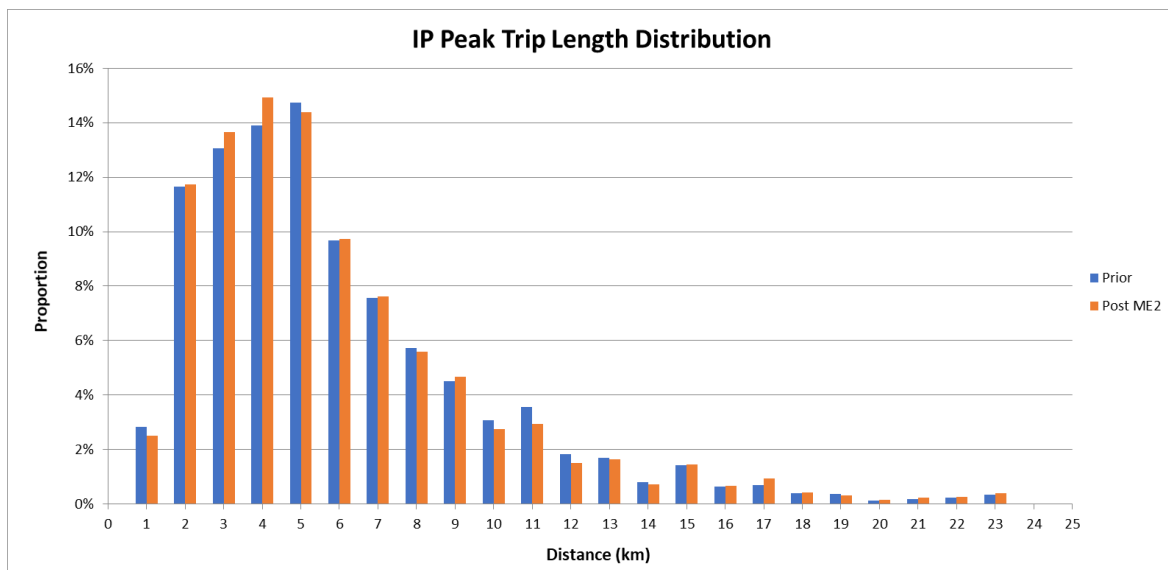


Figure 7-14: IP Peak Trip Length Distribution

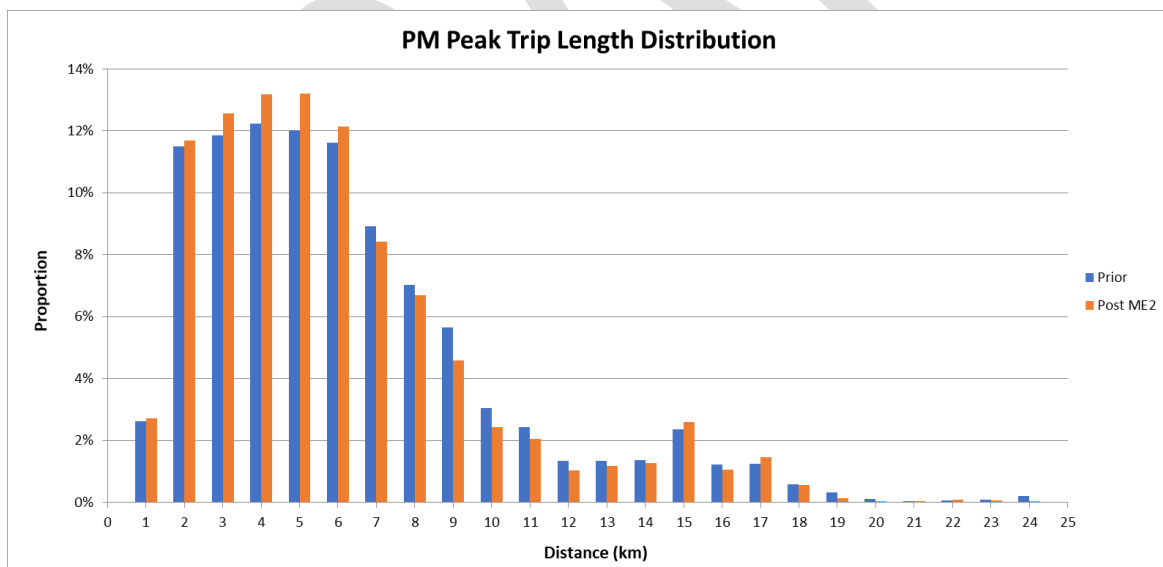


Figure 7-15: PM Peak Trip Length Distribution

7.6.8 Calibration Summary

The previous sections of this Chapter have outlined the methodology used to calibrate the Galway LAM to better reflect observed traffic survey data. In summary:

- A combination of network edits and 'Matrix Estimation' have been used to provide a better correlation between modelled and observed traffic flows;
- The model meets a satisfactory level of calibration following TII and DfT TAG criteria regarding GEH and individual link flows;
- The Screenline Analysis shows that when applying the 'relaxed' 10% criteria, key traffic movements are accurately represented within the study area, in particular the cross-river movements;
- Analysis of 'Matrix Estimation' changes to the prior matrices (derived from the WRM), show some differences, but this is to be expected given the different year of observed count data (2016 in WRM vs 2019 in the LAM), furthermore these changes are a function of short-duration traffic counts used in one model versus the other which would be expected to fluctuate from one day to the next and over time; and
- The coincidence ratio is well within TII guidelines and, as such, it is considered that 'Matrix Estimation' has not overly distorted the overall trip length distribution inherited from the WRM.

7.7 Model Validation

7.7.1 Introduction

The validation of the model uses additional comparative measures against which the robustness of the calibrated model may be judged. Calibration and validation are separate concepts, however, in reality these two elements are part of an iterative process. If the results of the validation checks are not satisfactory, then the modeller will review the inputs and coding within the model and adjust as required in order to achieve a better representation of reality.

It is important that the information used in calibrating the model, including count data for matrix estimation, is kept separate from that used for validation if it is to be a true independent test of the model. As such two main data sources were used in the validation of the Galway LAM:

- Junction turning counts not utilised during model calibration; and
- Observed journey times on key routes.

The guidelines for model validation are very similar to those described previously for calibration in Chapter 7.6.2, and are outlined in Table 7-13.

CRITERIA	ACCEPTABILITY GUIDELINE
<u>Assigned hourly flows compared with observed flows</u>	
Individual flows within 100 v/h for flows less than 700 v/h	>85% of cases
Individual flows within 15% for flows between 700 & 2,700 v/h	
Individual flows within 400 v/h for flows greater than 2,700 v/h	
Individual flows – GEH < 5	>85% of cases
<u>Modelled journey times compared with observed times</u>	
Times within 15% or 1 minute if higher	>85% of cases

Table 7-13: Validation Criteria

The following sections of this Chapter present the results of the validation checks carried out on the Galway LAM to ensure that it is providing a robust representation of existing traffic conditions within the model area.

7.7.2 Traffic Flow Validation

Traffic flow validation was carried out for link and turning counts not initially included within calibration (89 link and 74 turning counts). Table 7-14 summarises the traffic flow and GEH validation results for the Galway LAM for each of the modelled time periods. The list of full Validation results can be found in Appendix 8.2.

The validation results show a reasonable level of agreement between model and observed, albeit with lower results than obtained for calibration, but within acceptable levels. The GEH results for individual flow less than five exhibits around a 60% match. It is noted that around 74% of flows agree with the other criteria, indicating that broadly speaking the model validates well especially for links with higher levels of traffic. Finally, the description of the flow calibration results reported in Chapter 7.6.7.1 provides reasons for the low level of validation achieved.

CRITERIA		AM	IP	PM
Individual flows within 100 v/h for flows less than 700 v/h				
Individual flows within 15% for flows between 700 & 2,700 v/h	>85% of cases	72%	75%	74%
Individual flows within 400 v/h for flows greater than 2,700 v/h				
Individual flows – GEH < 5	>85% of cases	62%	61%	59%

Table 7-14: Traffic Count Validation Statistics

7.7.3 Journey Time Validation

As outlined in Table 7-13, TII guidelines recommend that modelled journey times should be within +/- 15% of the observed time, or 1 minute if higher, in more than 85% of cases. Journey Times have been validated comparing Joy Ride Journey Times extracted from Saturn with TomTom data on nine different routes (in both directions).

The 9 routes can be seen in Figure 7-16 while Table 7-15 and Table 7-16 report the validation results for the 18 routes (nine for each direction). Overall, the LAM achieves good journey time validation results with 13 out of 18 routes falling within the +/-15% TII criteria in the AM and 15 in the PM.

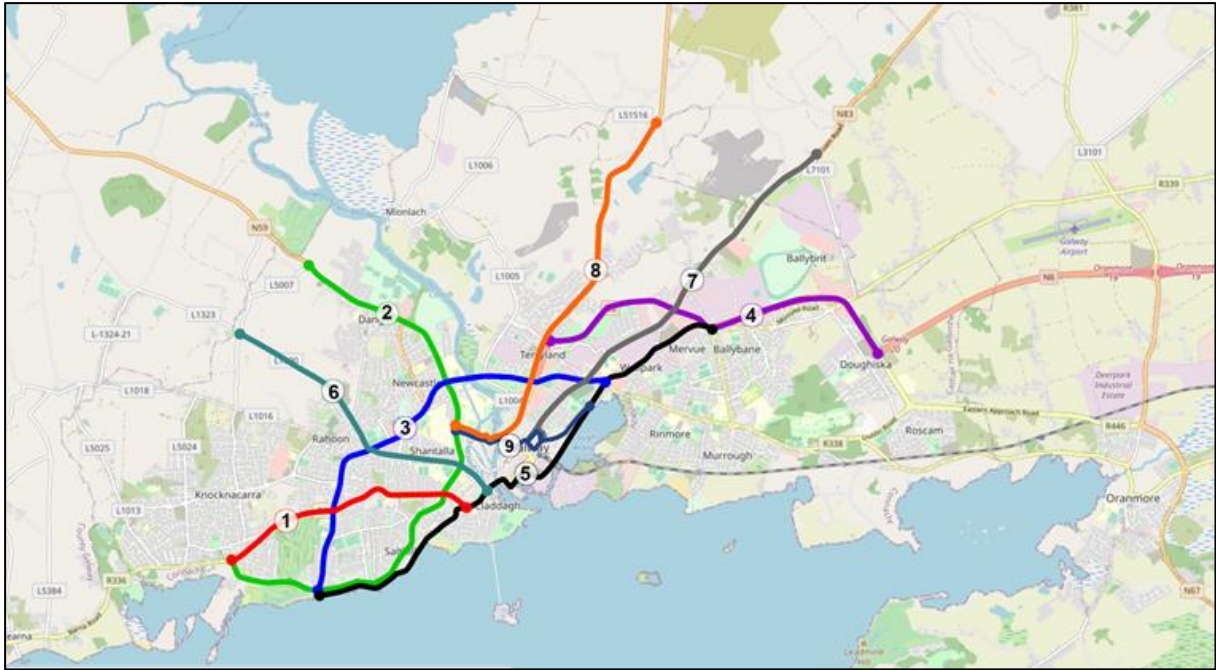


Figure 7-16: the nine routes used for Journey Time Validation

Route	Direction	Modelled	Observed	Diff	% Diff	Pass/Fail
1	Eastbound	485	431	54	13%	Pass
1	Westbound	465	562	-97	-17%	Fail
2	Northbound	898	945	-47	-5%	Pass
2	Southbound	1035	947	88	9%	Pass
3	Eastbound	812	714	98	14%	Pass
3	Westbound	769	854	-85	-10%	Pass
4	Westbound	432	473	-42	-9%	Pass
4	Eastbound	450	393	57	15%	Pass
5	Westbound	771	678	93	14%	Pass
5	Eastbound	875	779	96	12%	Pass
6	Southbound	732	604	128	21%	Fail
6	Northbound	624	471	153	32%	Fail
7	Southbound	587	525	62	12%	Pass
7	Northbound	725	587	138	24%	Fail
8	Southbound	648	572	76	13%	Pass
8	Northbound	713	684	29	4%	Pass
9	Westbound	521	462	59	13%	Pass
9	Eastbound	507	418	89	21%	Fail

Table 7-15: validation results for the 9 routes in the AM peak

Route	Direction	Modelled	Observed	Diff	% Diff	Pass/Fail
1	Eastbound	441	404	37	9%	Pass
1	Westbound	480	431	49	11%	Pass
2	Northbound	941	1009	-68	-7%	Pass
2	Southbound	1017	1026	-9	-1%	Pass
3	Eastbound	737	703	34	5%	Pass
3	Westbound	884	852	32	4%	Pass
4	Westbound	442	420	22	5%	Pass
4	Eastbound	453	440	13	3%	Pass
5	Westbound	849	754	95	13%	Pass
5	Eastbound	902	882	20	2%	Pass
6	Southbound	588	574	14	2%	Pass
6	Northbound	619	528	91	17%	Fail
7	Southbound	642	669	-27	-4%	Pass
7	Northbound	645	679	-34	-5%	Pass
8	Southbound	639	819	-180	-22%	Fail
8	Northbound	600	687	-87	-13%	Pass
9	Westbound	506	597	-91	-15%	Fail
9	Eastbound	523	544	-21	-4%	Pass

Table 7-16: validation results for the 9 routes in the PM peak

Route 9 is the one covering the path of the proposed scheme and it can be seen in Figure 7-17 and Figure 7-18. The full set of charts for all routes is available in Appendix 8.2.

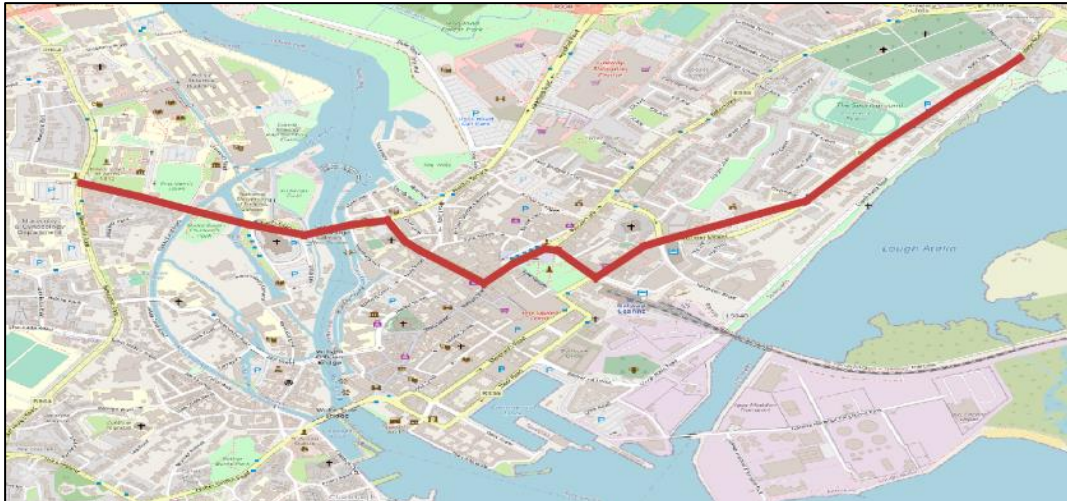


Figure 7-17: route 9 westbound for Journey Time Validation

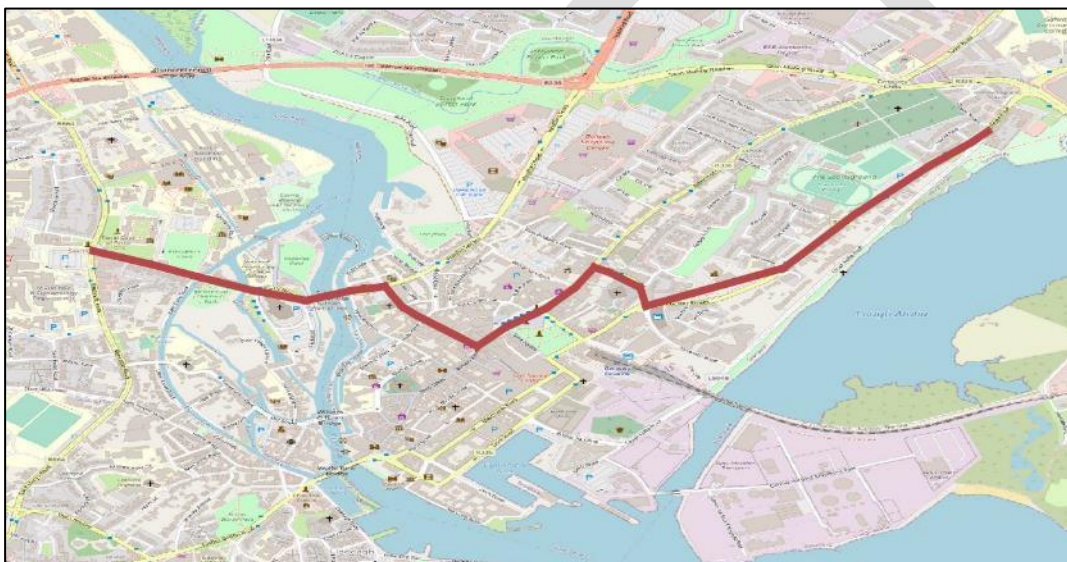


Figure 7-18: route 9 eastbound for Journey Time Validation

AM Results

Figure 7-19 and Figure 7-20 illustrate the comparison between modelled and observed journey times for route 9 inbound and outbound in the AM peak.

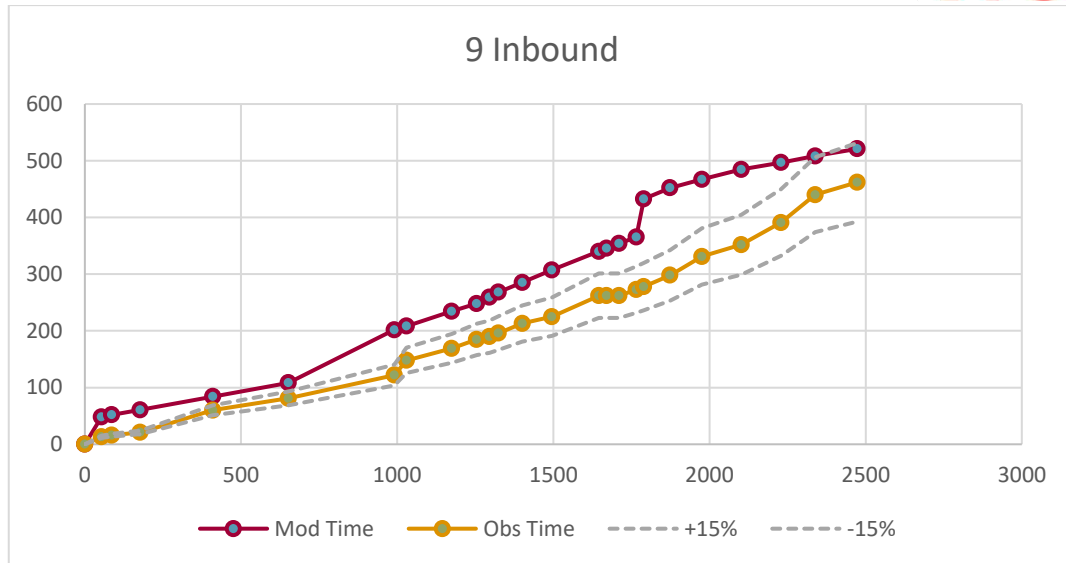


Figure 7-19: Journey Time Validation Plot - Route 9 Westbound AM

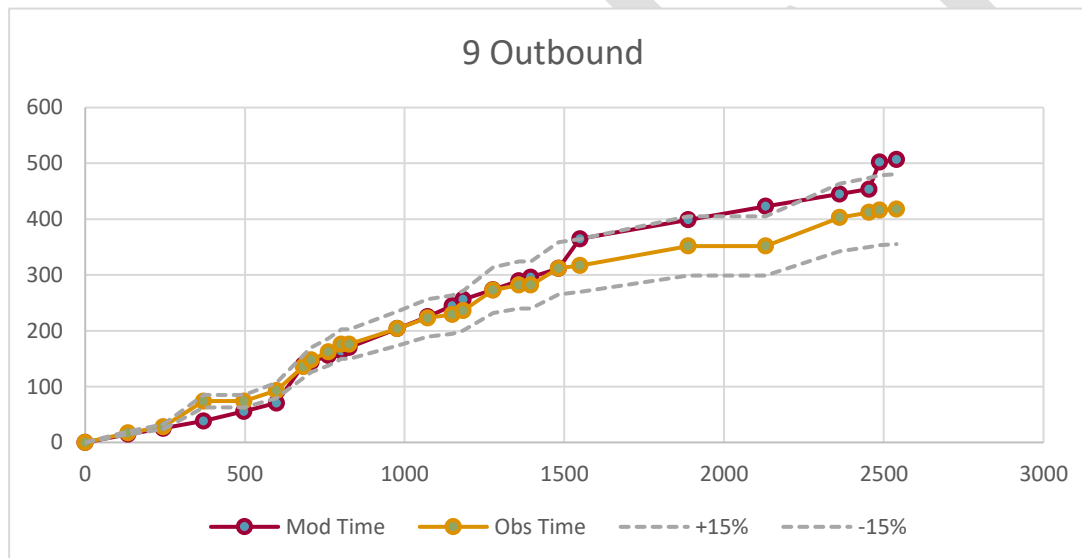


Figure 7-20: Journey Time Validation Plot - Route 9 Eastbound AM

The results indicate that the model is slightly overestimating delay along this route in the AM peak hour. However, in this instance the journey time validation is deemed acceptable as the difference between modelled and observed flows of 13% falls within the TII guidelines. The outbound route, on the other hand, fails the validation as the difference is at 21%.

PM Results

Figure 7-21 and Figure 7-22 illustrate the comparison between modelled and observed journey times for route 9 inbound and outbound in the PM peak.

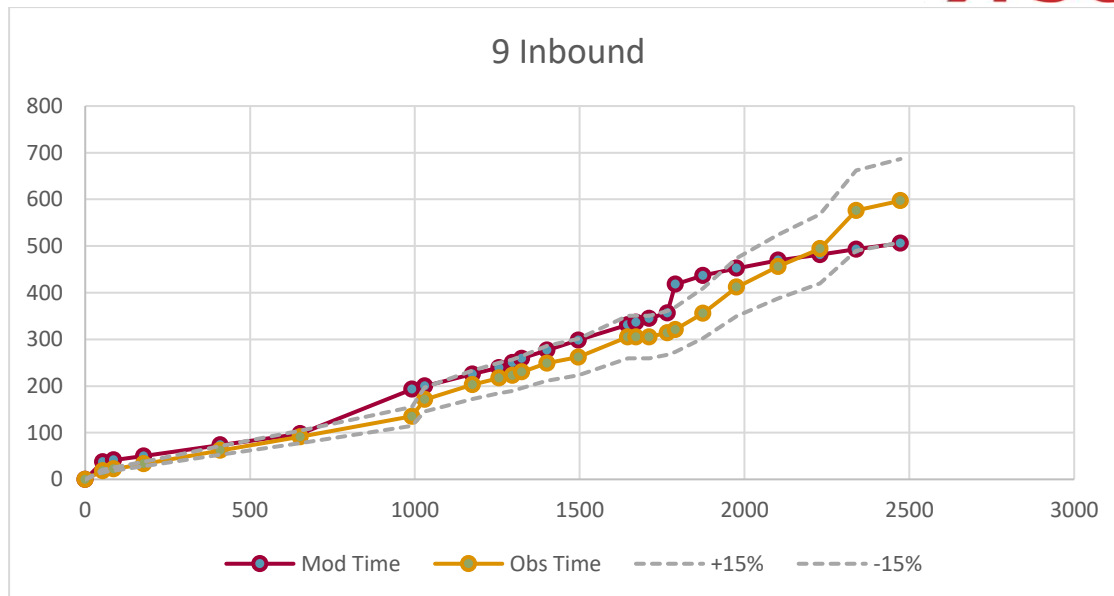


Figure 7-21: Journey Time Validation Plot - Route 9 Westbound PM

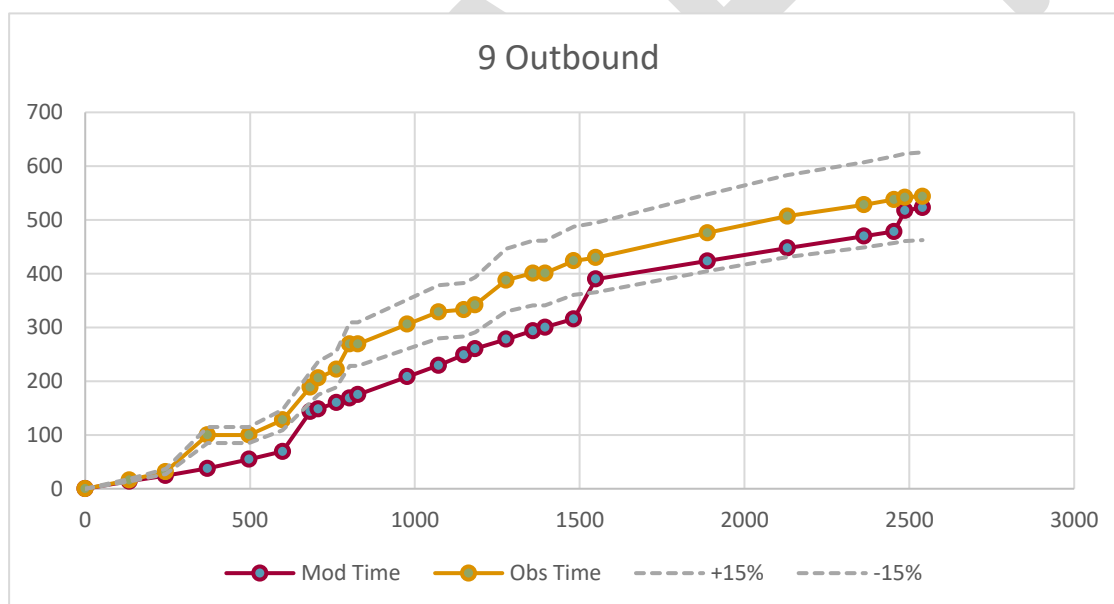


Figure 7-22: Journey Time Validation Plot - Route 9 Eastbound PM

The results indicate that the model is underestimating journey time along the outbound route in the PM peak hour. However, in this instance the journey time validation is deemed acceptable as the difference between modelled and observed flows of 15% is on the edge of the TII guidelines. The inbound route, on the other hand, performs positively with a difference of only 4% with the observed journey time data.

7.7.4 Validation Summary

The previous sections of this Chapter have outlined the validation checks undertaken to assess the robustness of the calibrated LAM. Overall, the Galway LAM does not meet all TII and DfT TAG validation criteria regarding GEH and individual link flows, however a good correlation has been achieved between modelled and observed journey times in both the AM and PM peaks.

7.8 Future Year Scenarios

The first section of this report has described the process to model future years scenarios within the WRM. The analysis provided valuable insights on the effects of the proposed scheme on Public Transport and Active Modes. Impacts on the highway network offered an indication of the extent to which the scheme caused major changes in terms of traffic flows and mode share at regional level. However, for a more detailed analysis of the effect that the GCCL scheme will have within the study area, a Base Year Local Area Model was produced, and the previous sections provided details for its calibration and validation process.

The main reason for producing a Base Year LAM was to have a solid reference to build the scenarios on. In terms of future year LAM networks, these were cordoned from the WRM scenarios and improved where needed to increase realism. In terms of Demand, on the other hand, this is more tricky. One could possibly use the cordoned Demand coming from the future year WRM scenarios, however, a more recent calibrated Base Year LAM would provide a stronger starting point to derive future year demand. For this reason, the Furness Method was used to “Pivot” the Base Year demand to the required future years by applying growth factors derived from the WRM scenarios. The pivoted demand is then assigned to the LAM networks.

In this section the process followed to obtain the future year LAM scenarios is presented.

7.8.1 Future Year Demand – Furness Method

The Furness Method (also known as *Doubly Constrained Growth Factor Method* – or as *Fratat* in the US) is an iterative process typically used when the future number of trips originating and terminating in each zone is known. The method calculates “a set of intermediate correction factors which are then applied to cell entries in each row or column as appropriate. After applying these corrections to say, each row, the totals for each column are calculated and compared with the target values. If the differences are significant, new correction coefficients are calculated and applied as necessary” (Modelling Transport, Ortuzar, Willumsen, 2011).

Figure 7-23 provides an overview of the Furness method applied to produce the Galway Future Year LAM demand. The steps on the left side of the diagram represent the process of calibrating the Base Year LAM as reported in Chapter 7.6. The first two rectangles on the right side of the diagram refer to the cordoning of the WRM forecast scenarios which results in a cordoned forecast demand matrix (Forecast Year LAM Prior).

The procedure involves the calculation of growth factors at origin and destination level between the 2019 Prior and the Forecast Year Prior. These factors are then applied to the 2019 Calibrated Base Year

LAM (2019 LAM Post) in an iterative process that “pivots” the 2019 demand to match the growth trends observed between the two prior matrices. This results in a final pivoted Forecast Year matrix.

This process has been performed using the Software Cube Voyager and its “FRATAR” program, which performs the Furnessing procedure with an internal algorithm. Before running through this process, the matrices produced by SATURN (which are in .UFM format) have been converted into .MAT first. The final matrices resulting from the Furnessing procedure are then converted back into .UFM to allow the new Demand to be assigned to the LAM network.

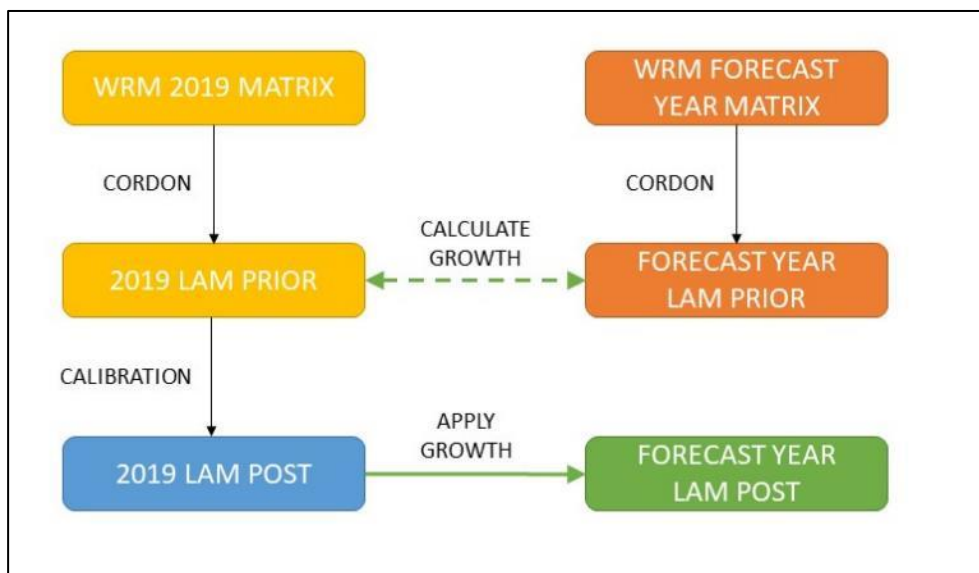


Figure 7-23: Overview of the Furnessing method for the Galway LAM

Before assigning the forecast demand to the LAM network, a detailed analysis of the total Trip Ends was performed to ensure the growth trends of the demand remained consistent across all zones.

The entire process has been repeated for all forecast scenarios in both 2023 and 2038.

7.8.2 Future Year LAM Networks

The WRM provides a detailed representation of all significant roads within the study area and with the cordoning of the forecast scenarios the highway schemes coded in the regional model have been brought into the LAM.

The cordoned network was then revised by adding additional details to refine the model quality and realism. In an iterative process, adjustments were made to improve assignment convergence by reducing congestion, delays and blocking back. Main interventions involved the optimization of signal times, variation of the saturation flows (in particular for spigots connecting to centroids with high demand) and the introduction of new zone connectors.

7.8.3 Construction Scenario

7.9 Results

7.9.1 Network Performance Indicators

Network performance indicators for the LAM network were extracted for all modelled scenarios in the AM, Inter-peak and PM peak hours and are presented in Table 7-17. It is important to note that the results presented cover the full LAM network, therefore the impact of transport scenarios along the Cross-City corridor may be viewed as relatively marginal in consideration of the entire network. For each scenario the following network statistics are presented:

- Transient Queues: this is expressed in total pcu.hours which is essentially the volume of vehicles on the network multiplied by the time spent in transient queues and it represents time spent in queues at junctions which are not over capacity (e.g. at a signalised junction where the queue is able to clear during a single cycle).
- Over-capacity queues: expressed in total pcu.hours, this occurs where the volume of turning movements exceeds junction capacity, such that a permanent queue builds (e.g. at a signalised junction where a queue is unable to clear in a single cycle).
- Average Speed: represents the average speed of all vehicles travelling on the network within the modelled time period measured in km/h.
- Total Travel Distance: represents the total distance travelled by vehicles on the road network in the modelled period measured in pcu.km.
- Total Travel Time: represents the total time travelled by vehicles on the road network in the modelled period measured in pcu.kmhr.

Overall, transient and over capacity queues increase across all scenarios in all time periods. The rise of population and consequent higher number of car trips, joined with the network changes provided by the GCCL and GTS, are likely the cause of the traffic deterioration within the study area. The average speed sees a decrease between the base and the 2023 scenarios, while it increase again in 2038, likely due to the introduction of the outer bypass. The increase in total travel distance and travel time are also a consequence of the measure introduced within the city of Galway which causes significant traffic re-routing around the city centre.

	Time Period	Transient Queues [pcu-hrs]	Over Capacity Queues [pcu-hrs]	Average Speed [km/h]	Total Travel Distance [pcu-km]	Total Travel Time [pcu-hrs]
2019 BASE YEAR	AM	1,256	195	29	146,422	5,045
	IP	805	8	32	111,412	3,466
	PM	1,105	422	29	142,731	4,930
2023 DO-MIN	AM	1,620	360	27	163,751	5,998
	IP	919	20	31	117,204	3,749
	PM	1,412	567	28	159,617	5,799
2023 DO-SOM	AM	1,968	866	24	162,364	6,800
	IP	1,050	24	30	118,461	3,906
	PM	1,594	788	26	158,625	6,187
2038 DO-MIN	AM	2,169	417	30	229,532	7,547
	IP	1,353	57	35	172,583	5,008
	PM	2,046	1,190	27	216,062	7,891
2038 DO SOM	AM	2,471	964	28	233,640	8,406
	IP	1,508	110	33	175,565	5,275
	PM	2,320	1,554	26	218,068	8,553

Table 7-17: LAM network performance indicators

7.9.2 Highway Flows

Figure 7-24 shows the combined two-way highway flow differences in 2023 during the AM peak period. The figure shows only flow increases on links if they are greater than 100 Passenger Car Units (PCUs) or decreases of greater than 100 PCUs.

As a result of the traffic restrictions implemented as part of the Proposed Scheme, significant rerouting has been identified. This includes a significant reduction in flows on Salmon-Weir-Bridge due to the bus gate, on Eyre Square, Headford Road, Tuam Road, College Road, Thomas Hynes Road and Bothar Na Dige.

At the same time, traffic is routing onto the City Centre Access Network with flow increases on the N6 including Quincentenary Bridge, Lower Newcastle, Lough Atalia Road and Fairgreen Road.

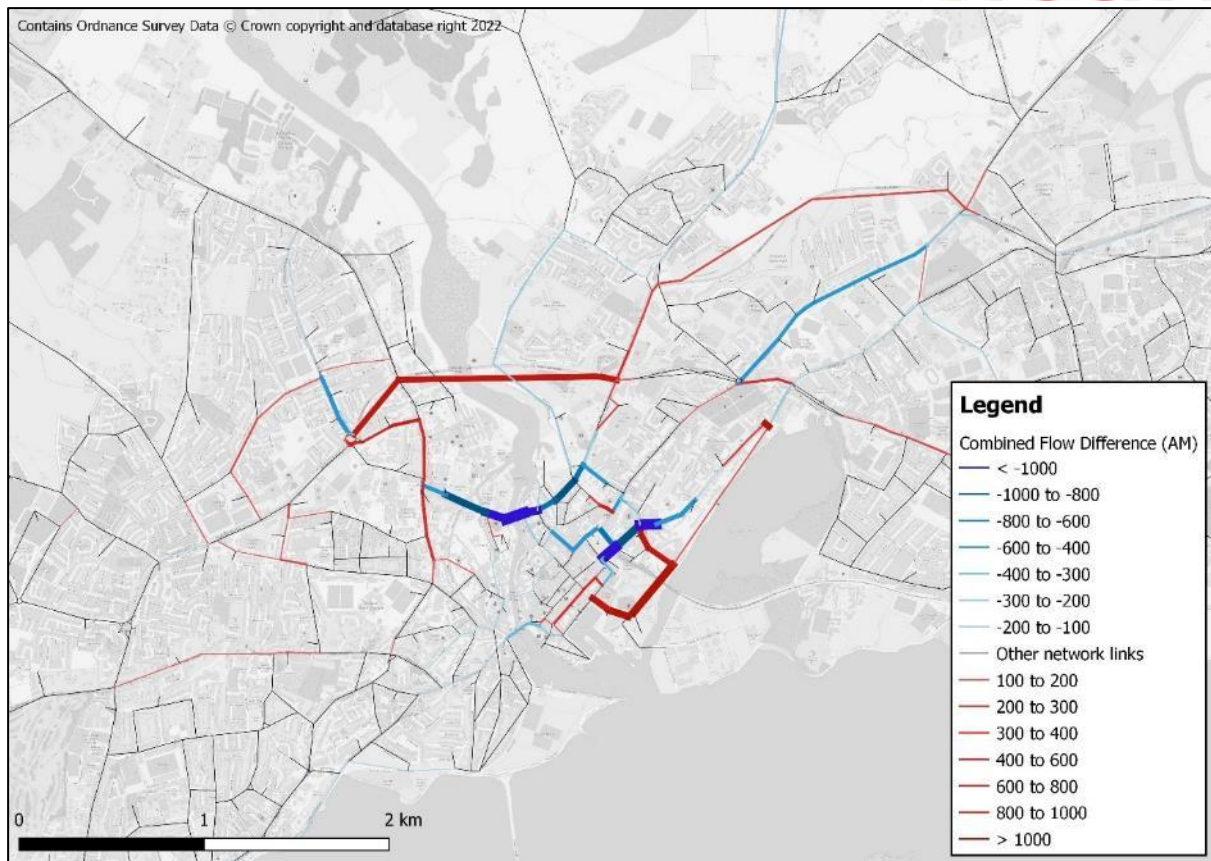


Figure 7-24: 2023 Combined Flow Differences AM

Figure 7-25 shows the flow differences as a result of the Proposed Scheme in 2038 during the AM peak period. The impacts are similar to those identified for 2023 with generally stronger increases and decreases due to higher traffic volumes in 2038. However, Galway Other Bypass, which can be seen in the northern section of the map, will remove some traffic from the city centre as a result of the Proposed Scheme.

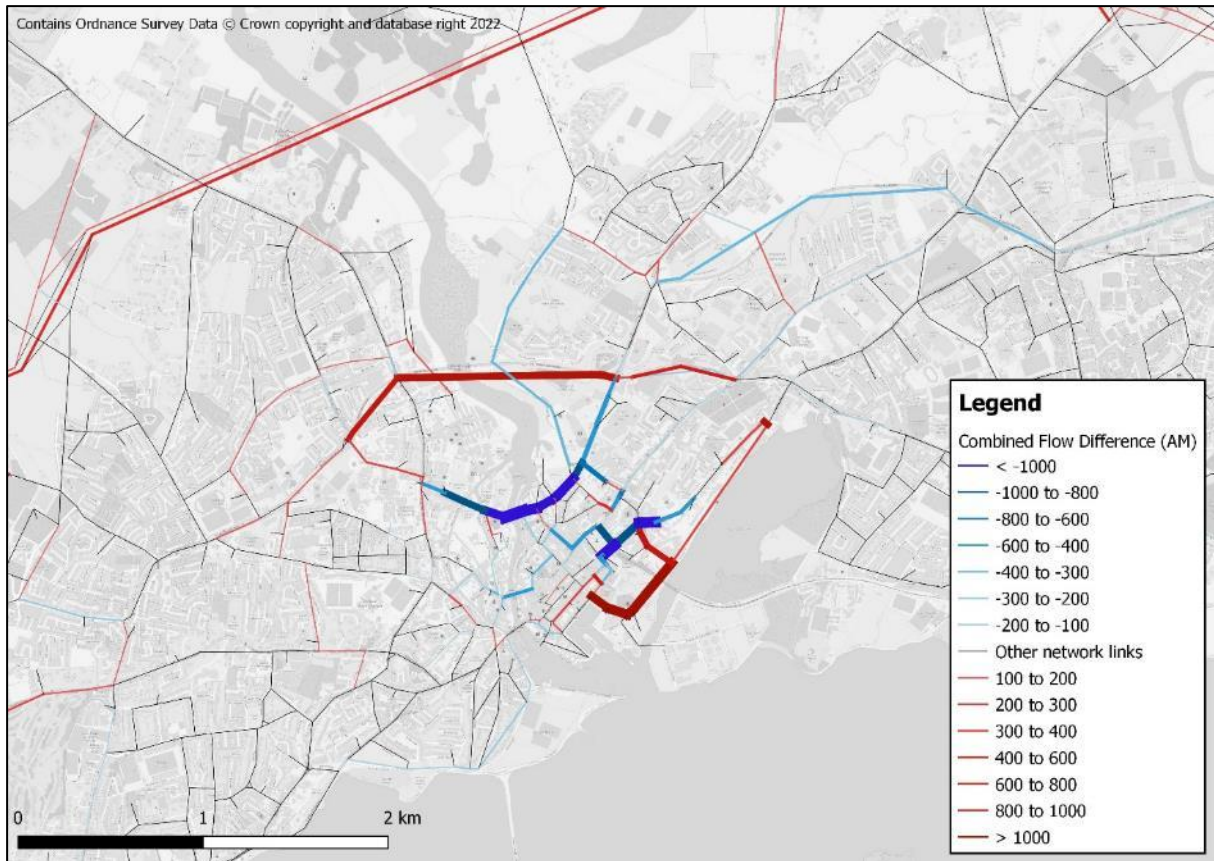


Figure 7-25: 2038 Combined Flow Differences AM

Figure 7-26 shows the combined two-way highway flow differences in 2023 during the PM peak period.

Similar to the AM peak period, a significant reduction in flows has been identified on Salmon-Weir-Bridge due to the bus gate, on Eyre Square, Headford Road, College Road and Bothar Na Dige.

As a result of the Proposed Scheme, traffic is routing onto the City Centre Access Network with flow increases on the Quincentenary Bridge, Lower Newcastle, Lough Atalia Road and Fairgreen Road. Unlike the AM peak period, there are no significant flow increases on the N6 apart from Quincentenary Bridge.

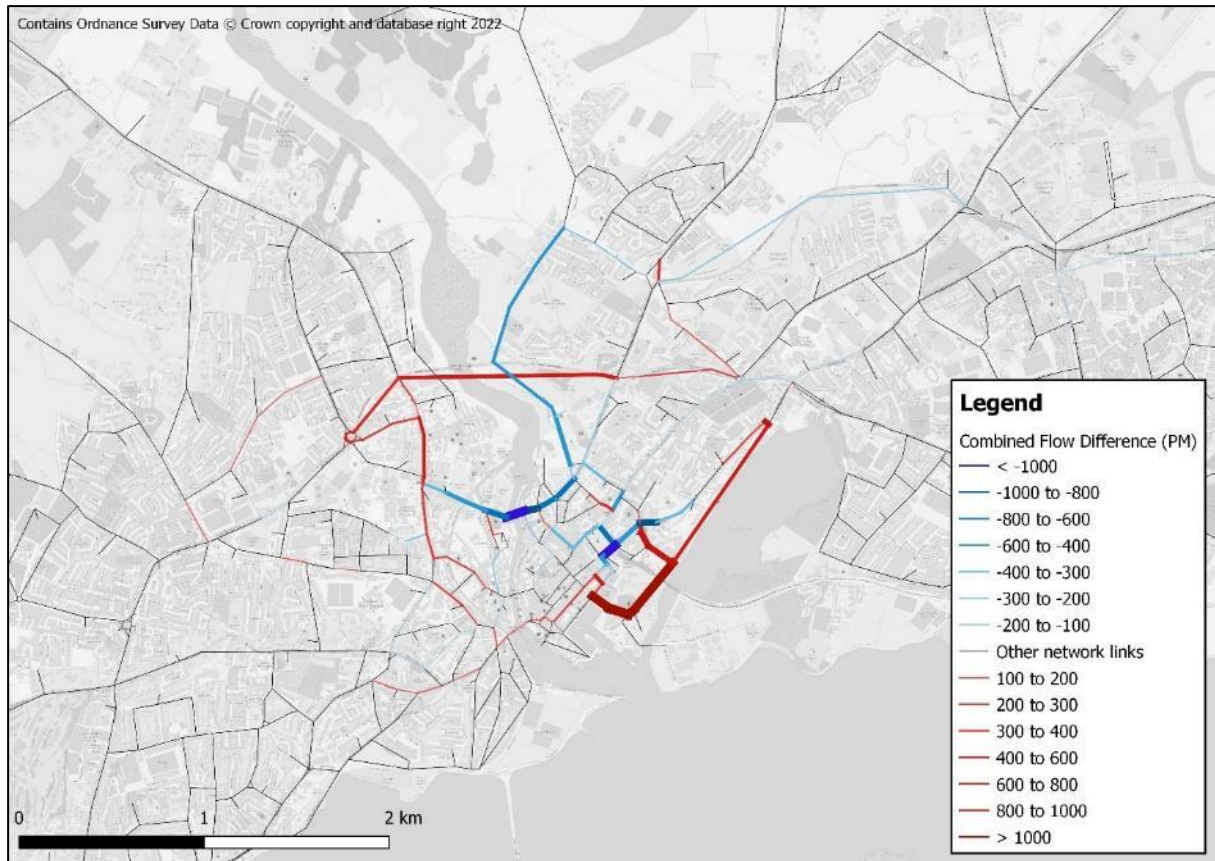


Figure 7-26: 2023 Combined Flow Differences PM

Figure 7-27 below shows the flow differences as a result of the Proposed Scheme in 2038 during the PM peak period. The impacts are similar to those identified for 2023 with generally stronger increases and decreases due to higher traffic volumes in 2038. However, Galway Other Bypass, which can be seen in the northern section of the map, will remove some traffic from the city centre as a result of the Proposed Scheme.

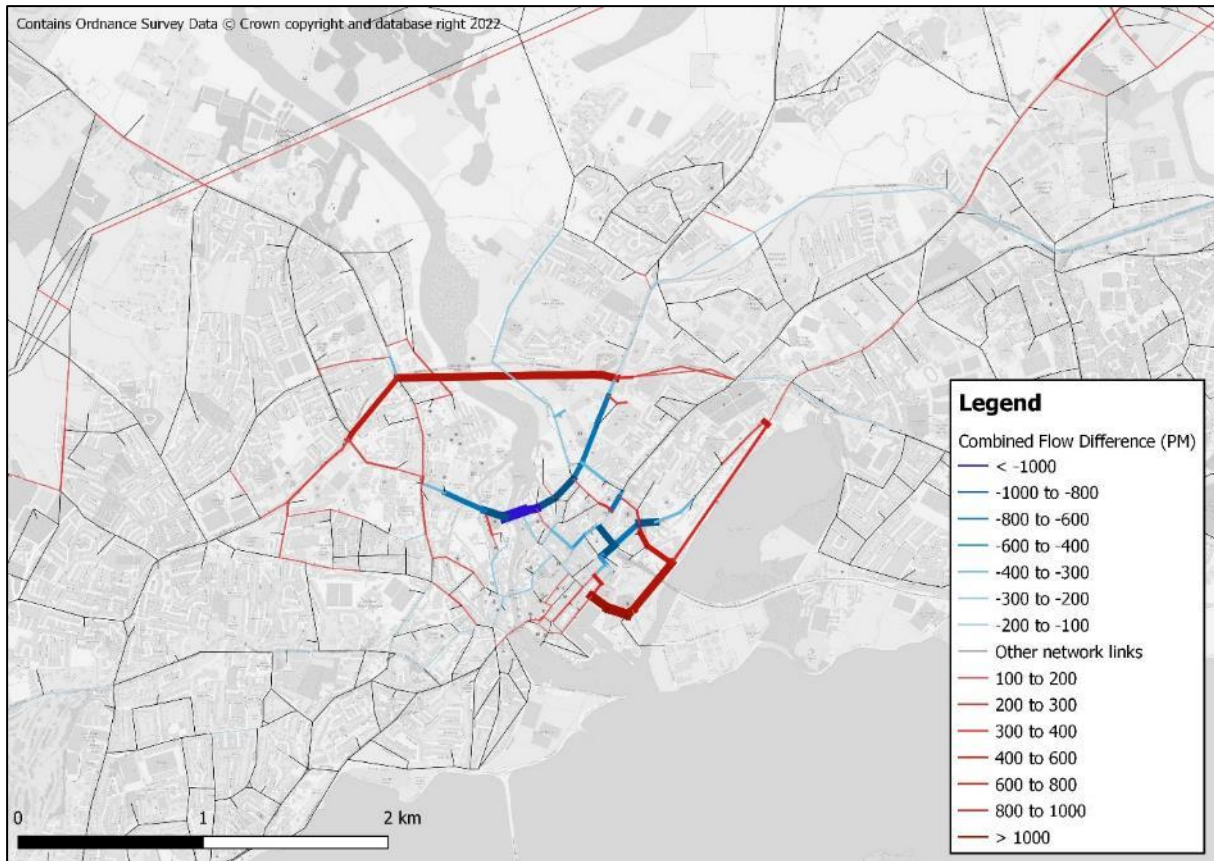


Figure 7-27: 2038 Combined Flow Differences PM

7.10 Construction Scenario

7.10.1 Assumptions

As highlighted in section 6.5.5 of the EIAR, a Construction Scenario has been developed to assess the traffic impacts of temporary traffic management measures that construction of the Proposed Scheme will have during the construction phase.

The Proposed Scheme has been divided into the following three principal sections, and multiple sub-sections, in relation to construction:

- Section A - University Road to Eyre Square, Woodquay and Headford Road:
 - Section A1 – University Road
 - Section A2 – Goal Road & Galway Cathedral
 - Section A3 – Salmon Weir Bridge
 - Section A4 – Newtownsmith / Waterside
 - Section A5 – St Vincent’s Avenue / Walsh’s Terrace
 - Section A6 – Dyke Road / Headford Road
 - Section A7 - St. Francis Street/Eglinton Street/Williamsgate Street
 - Section A8 - Woodquay/Daly’s Place/Mary Street
- Section B - Eyre Square to Dock Road, Bothar na Mban to College Road
 - Section B1 - Bóthar nam Ban/St. Brendan’s Avenue
 - Section B2 - Prospect Hill
 - Section B3 - Eyre Square North/Eyre Square East/Eyre Square South
 - Section B4 - Victoria Place/Merchant’s Road/Queen Street
 - Section B5 - Forster Street
 - Section B6 - College Road/Forster Street/Fairgreen Road/Bóthar Uí hÉithir junction
 - Section B7 - Bóthar Uí hÉithir
 - Section B8 - Fairgreen Road
- Section C - College Road to Dublin Road
 - Section C1 - College Road (Forster Street to Lough Atalia Road)
 - Section C2 - College Road/Lough Atalia Road junction
 - Section C3 - College Road (to junction at Moneenageisha)
 - Section C4 - Moneenageisha junction
 - Section C5 - R338 Dublin Road

The location of each principal section and the various sub-sections can be seen in Figure 7-28 to Figure 7-30.

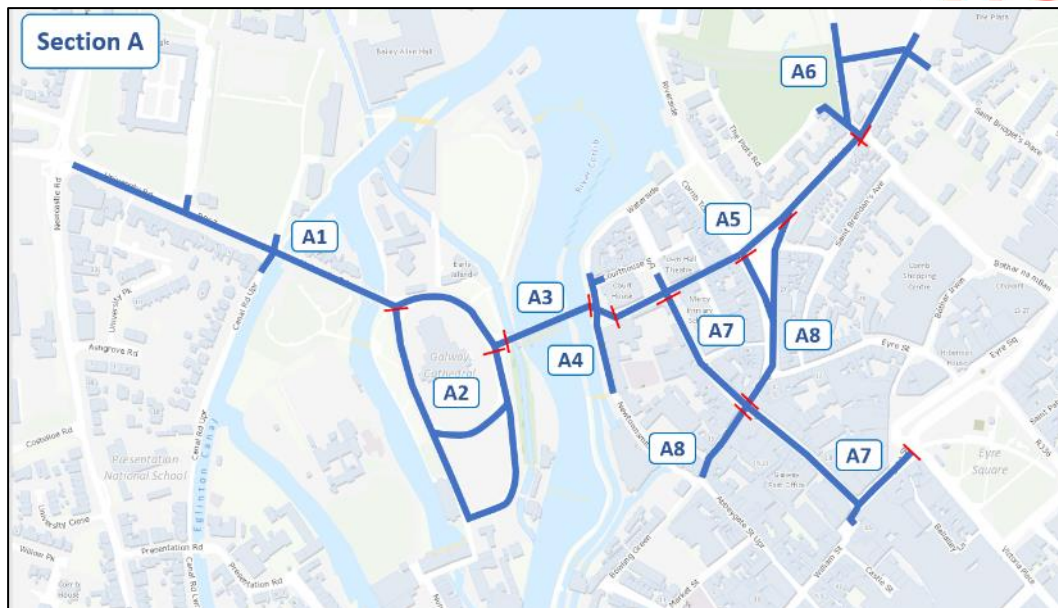


Figure 7-28: Proposed Sub Sections of Construction Phase – Section A



Figure 7-29: Proposed Sub Sections of Construction Phase – Section B

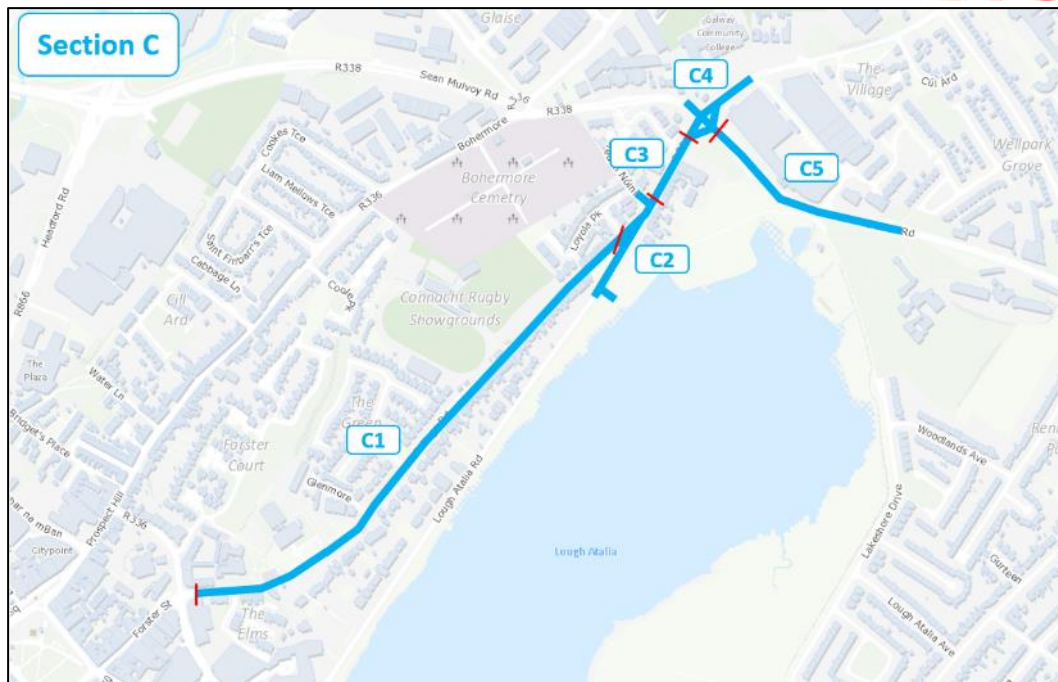


Figure 7-30: Proposed Sub Sections of Construction Phase – Section C

Following discussions with ARUP, it has been decided to model traffic restrictions during months 4 and 5 before the traffic restrictions as part of the Proposed Scheme are being implemented. This includes the following measures:

Section A6 - Dyke Road/Headford Road

- Phase 1 – Closure of the road connecting Dyke Road to Headford Road adjacent to the Dyke Road car-park and completion of the widening on the northern side of this road and the footpath widening on the southern side of the road.

Section B1 - Bóthar na mBan/St. Brendan's Avenue

- Phase 2 – On Bóthar na mBan, works on Eastern lane, traffic reduced to single lane in each direction and realigned in narrow lanes to the West.
- Phase 3 – On Bóthar na mBan, works on Western lane, traffic reduced to single lane in each direction and realigned in narrow lanes to the East.

Section C3 - College Road (to junction at Moneenageisha)

- Phase 1 – Works on western side, traffic reduced to single lane in each direction and realigned in narrow lanes to the east.
- Phase 2 – Works on eastern side, traffic reduced to single lane in each direction and realigned in narrow lanes to the East.
- Phase 3 – Road surfacing works in the carriageway, traffic reduced to single lane in each direction and realigned as required to complete the works.

Phases 2 and 3 in section B1 can be seen as identical from a modelling perspective. The same applied to Phases 1, 2 and 3 in section C1. The 2022 Do Minimum Local Area Model has been used as a starting point for the Construction Scenario.

7.10.2 Results

Figure 7-28 below shows the flow differences during the AM peak period as a result of the temporary traffic management measures. Due to the closure of Dyke Road, traffic has been rerouted onto Bothar Na Dige. However, due to delays at Bothar Na Dige/Headford Road Junction, southbound traffic is also rerouting to Headford Road.

The reduction to a single lane between College Road and junction at Moneenageisha, traffic is rerouting from College Road and Lough Atalia Road to Bohermore.

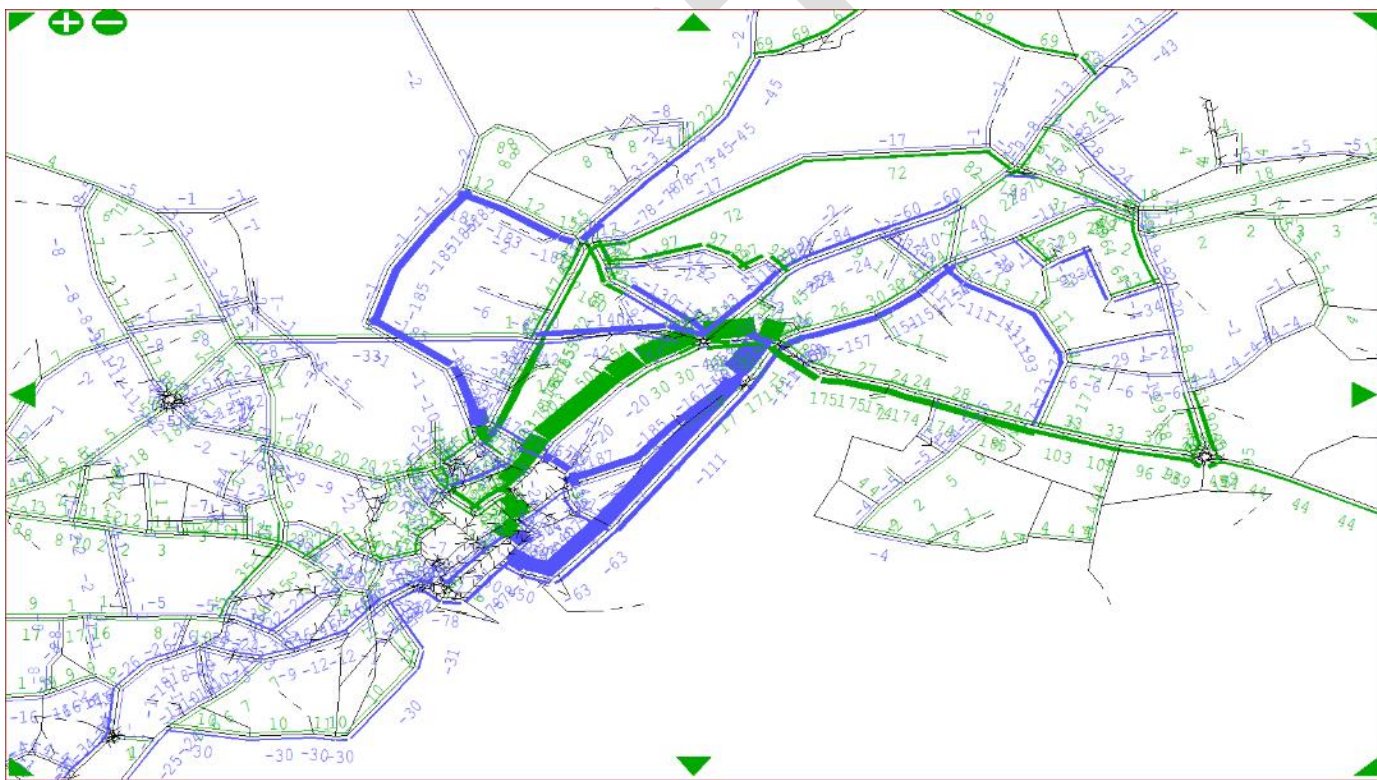


Figure 7-31: 2022 Flow Differences Construction Scenario minus Do Minimum (AM)

Figure 7-29 below shows the impacts of the Construction Scenario compared to the Do Minimum scenario during the PM peak period. This scenario shows similar trend to the AM peak period but significantly fewer levels of rerouting due to lower traffic levels and delays during the PM peak period.

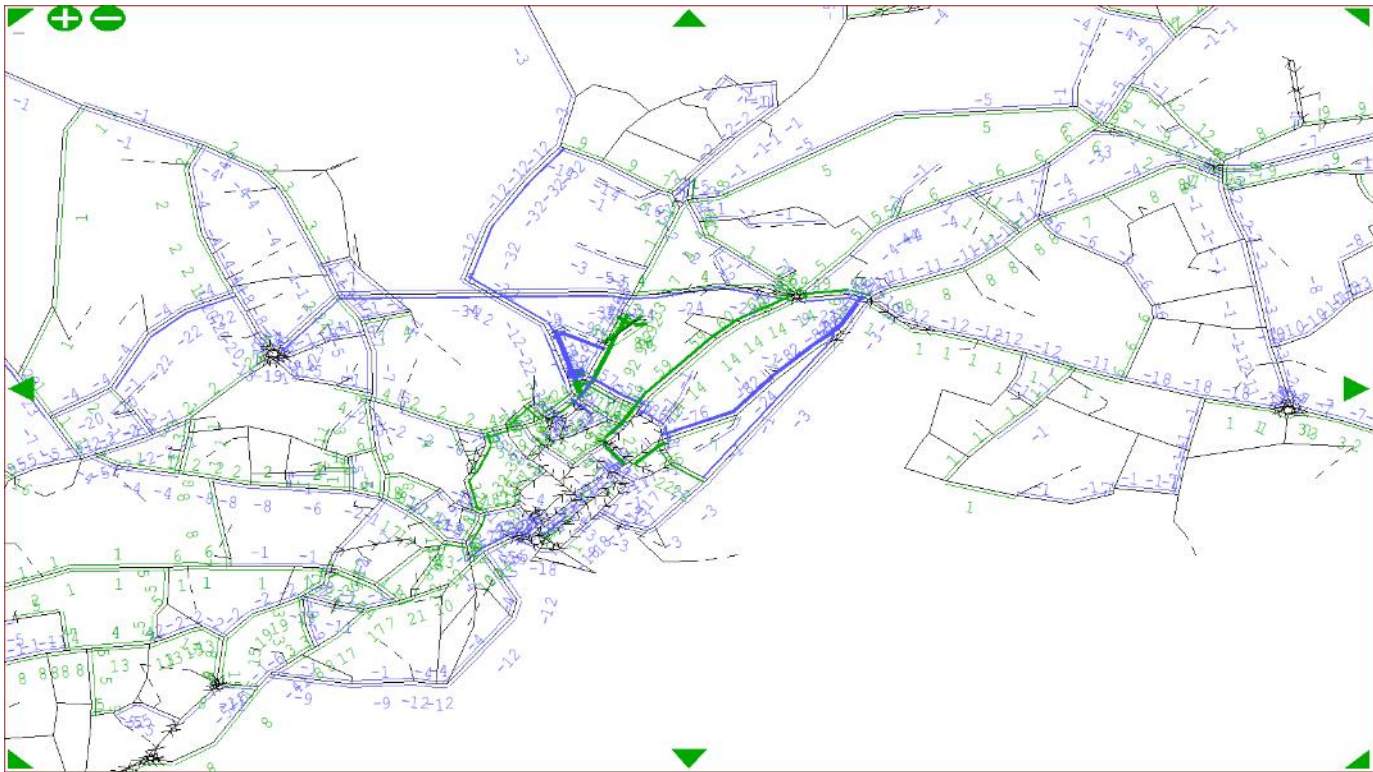


Figure 7-32: 2022 Flow Differences Construction Scenario minus Do Minimum (PM)

Overall, the temporary traffic management measures as part of the Construction Scenario have mainly local impacts and do not cause strategic rerouting.

8. APPENDIX

8.1 Flow Calibration

8.1.1 Prior

Links		AMCar	AMLGV	AMHGV	AMTOT	LTCar	LTLGV	LTHGV	LTTOT	PMCar	PMLGV	PMHGV	PMTOT
WebTAG	Count Pass	96	162	162	95	116	162	162	110	104	162	162	101
	Count Fail	66	0	0	69	46	0	0	53	58	0	0	62
	Total	162	162	162	164	162	162	162	163	162	162	162	163
	% Pass	59.3%	100.0%	100.0%	58%	72%	100%	100%	67%	64%	100%	100%	62%
	% Fail	40.7%	0.0%	0.0%	42%	28%	0%	0%	33%	36%	0%	0%	38%
> 85% of cases?		NO	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES	NO
GEH Criteria	Count GEH<5	88	146	141	88	109	147	144	106	94	144	155	96
	Count GEH>=5	76	18	23	76	55	17	20	58	70	20	9	68
	Total	164	164	164	164	164	164	164	164	164	164	164	164
	% GEH<5	53.7%	89.0%	86.0%	54%	66%	90%	88%	65%	57%	88%	95%	59%
	% GEH>=5	46.3%	11.0%	14.0%	46%	34%	10%	12%	35%	43%	12%	5%	41%
> 85% of cases?		NO	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES	NO
Turns		AMCar	AMLGV	AMHGV	AMTOT	LTCar	LTLGV	LTHGV	LTTOT	PMCar	PMLGV	PMHGV	PMTOT
WebTAG	Count Pass	31	41	41	30	38	41	41	36	30	41	41	31
	Count Fail	10	0	0	11	3	0	0	5	11	0	0	10
	Total	41	41	41	41	41	41	41	41	41	41	41	41
	% Pass	75.6%	100.0%	100.0%	73%	93%	100%	100%	88%	73%	100%	100%	76%
	% Fail	24.4%	0.0%	0.0%	27%	7%	0%	0%	12%	27%	0%	0%	24%
> 85% of cases?		NO	YES	YES	NO	YES	YES	YES	YES	NO	YES	YES	NO
GEH Criteria	Count GEH<5	23	38	40	22	25	38	41	25	19	40	40	18
	Count GEH>=5	18	3	1	19	16	3	0	16	22	1	1	23
	Total	41	41	41	41	41	41	41	41	41	41	41	41
	% GEH<5	56.1%	92.7%	97.6%	54%	61%	93%	100%	61%	46%	98%	98%	44%
	% GEH>=5	43.9%	7.3%	2.4%	46%	39%	7%	0%	39%	54%	2%	2%	56%
> 85% of cases?		NO	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES	NO

8.1.2 Post

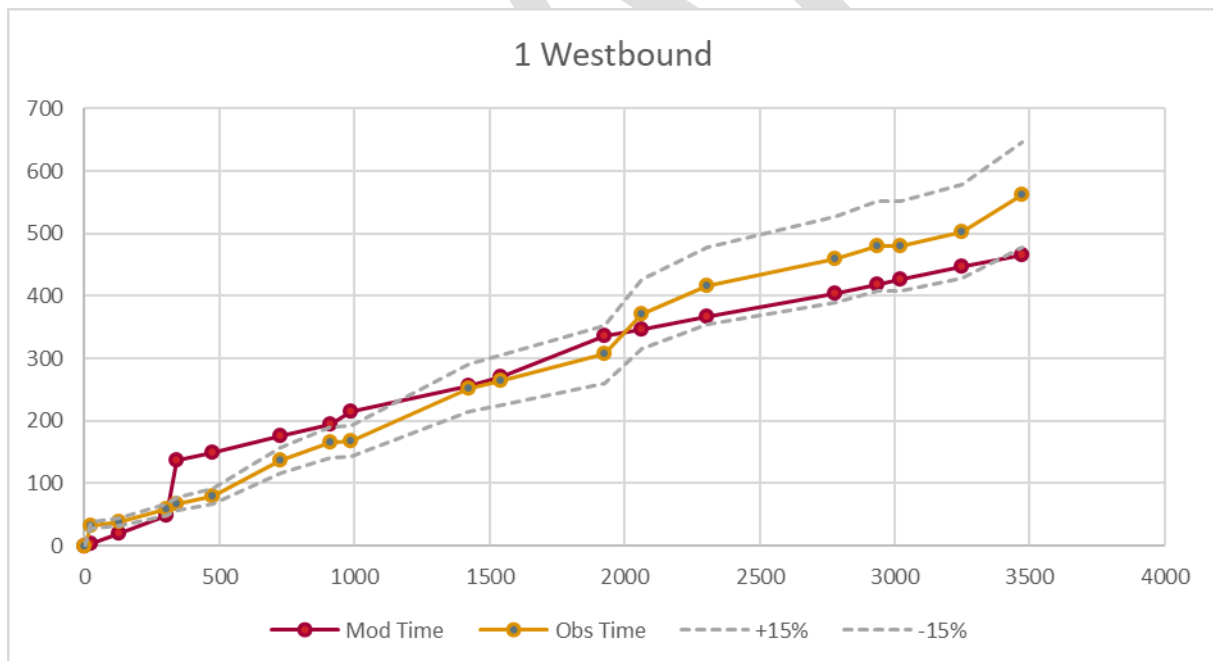
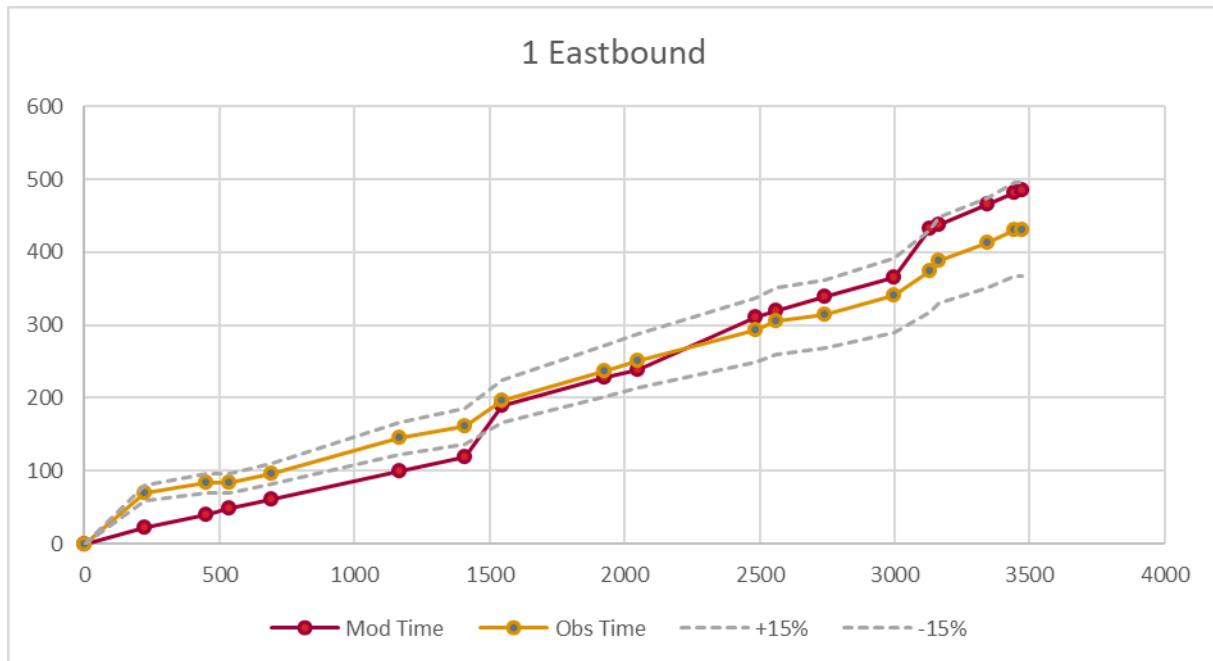
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WebTAG	Count Pass	149	162	162	146	150	162	162	148	154	162	162	154
	Count Fail	13	0	0	18	12	0	0	15	8	0	0	9
	Total	162	162	162	164	162	162	162	163	162	162	162	163
	% Pass	92%	100%	100%	89%	93%	100%	100%	91%	95%	100%	100%	94%
	% Fail	8%	0%	0%	11%	7%	0%	0%	9%	5%	0%	0%	6%
> 85% of cases?		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
GEH Criteria	Count GEH<5	145	160	155	143	149	161	159	146	150	161	159	150
	Count GEH>=5	19	4	9	21	15	3	5	18	14	3	5	14
	Total	164	164	164	164	164	164	164	164	164	164	164	164
	% GEH<5	88%	98%	95%	87%	91%	98%	97%	89%	91%	98%	97%	91%
	% GEH>=5	12%	2%	5%	13%	9%	2%	3%	11%	9%	2%	3%	9%
> 85% of cases?		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Turns		AMCar	AMLGV	AMHGV	AMTOT	LTCar	LTLGV	LTHGV	LTTOT	PMCar	PMLGV	PMHGV	PMTOT
WebTAG	Count Pass	31	41	41	31	40	41	41	40	36	41	41	36
	Count Fail	10	0	0	10	1	0	0	1	5	0	0	5
	Total	41	41	41	41	41	41	41	41	41	41	41	41
	% Pass	76%	100%	100%	76%	98%	100%	100%	98%	88%	100%	100%	88%
	% Fail	24%	0%	0%	24%	2%	0%	0%	2%	12%	0%	0%	12%
> 85% of cases?		NO	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES
GEH Criteria	Count GEH<5	29	38	41	29	34	41	41	35	32	41	41	32
	Count GEH>=5	12	3	0	12	7	0	0	6	9	0	0	9
	Total	41	41	41	41	41	41	41	41	41	41	41	41
	% GEH<5	71%	93%	100%	71%	83%	100%	100%	85%	78%	100%	100%	78%
	% GEH>=5	29%	7%	0%	29%	17%	0%	0%	15%	22%	0%	0%	22%
> 85% of cases?		NO	YES	YES	NO	NO	YES	YES	YES	NO	YES	YES	NO

8.2 Flow validation

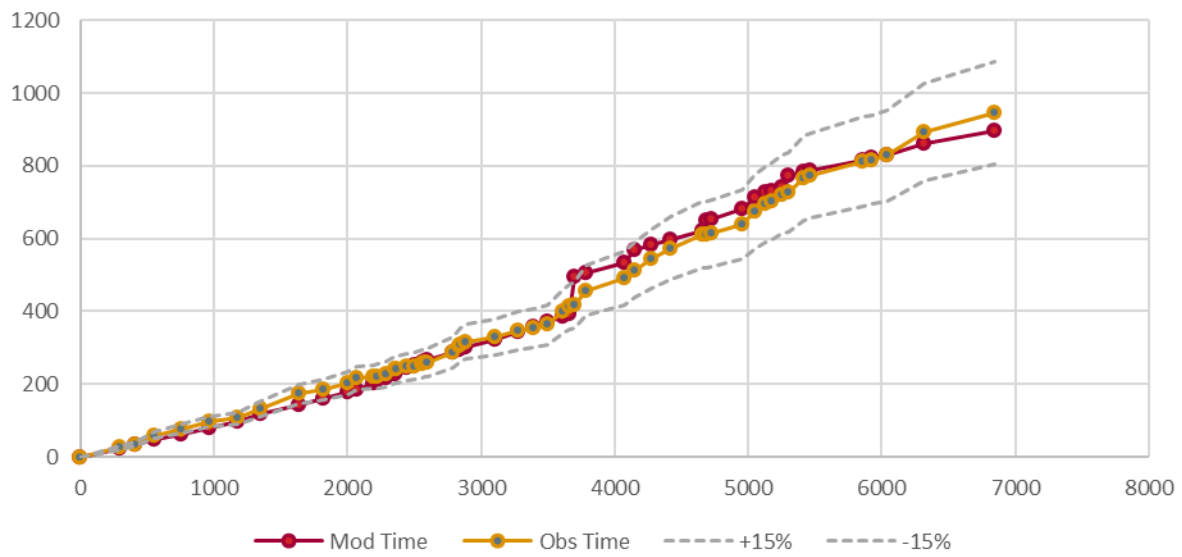
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WebTAG	Count Pass	60	89	89	60	63	89	89	63	60	89	89	61
	Count Fail	29	0	0	29	26	0	0	26	29	0	0	28
	Total	89	89	89	89	89	89	89	89	89	89	89	89
	% Pass	67%	100%	100%	67%	71%	100%	100%	71%	67%	100%	100%	69%
	% Fail	33%	0%	0%	33%	29%	0%	0%	29%	33%	0%	0%	31%
	> 85% of cases?	NO	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES	NO
GEH Criteria	Count GEH<5	58	83	74	60	62	83	82	60	56	83	87	55
	Count GEH>=5	31	6	15	29	27	6	7	29	33	6	2	34
	Total	89	89	89	89	89	89	89	89	89	89	89	89
	% GEH<5	65%	93%	83%	67%	70%	93%	92%	67%	63%	93%	98%	62%
	% GEH>=5	35%	7%	17%	33%	30%	7%	8%	33%	37%	7%	2%	38%
	> 85% of cases?	NO	YES	NO	NO	NO	YES	YES	NO	NO	YES	YES	NO
Turns		AMCar	AMLGV	AMHGV	AMTOT	LTCar	LTLGV	LTHGV	LTTOT	PMCar	PMLGV	PMHGV	PMTOT
WebTAG	Count Pass	61	74	74	58	65	74	74	59	62	74	74	60
	Count Fail	13	0	0	16	9	0	0	15	12	0	0	14
	Total	74	74	74	74	74	74	74	74	74	74	74	74
	% Pass	82%	100%	100%	78%	88%	100%	100%	80%	84%	100%	100%	81%
	% Fail	18%	0%	0%	22%	12%	0%	0%	20%	16%	0%	0%	19%
	> 85% of cases?	NO	YES	YES	NO	YES	YES	YES	NO	NO	YES	YES	NO
GEH Criteria	Count GEH<5	39	64	68	41	42	69	73	39	40	70	73	41
	Count GEH>=5	35	10	6	33	32	5	1	35	34	4	1	33
	Total	74	74	74	74	74	74	74	74	74	74	74	74
	% GEH<5	52.7%	86.5%	91.9%	55.4%	56.8%	93.2%	98.6%	52.7%	54.1%	94.6%	98.6%	55.4%
	% GEH>=5	47.3%	13.5%	8.1%	44.6%	43.2%	6.8%	1.4%	47.3%	45.9%	5.4%	1.4%	44.6%
	> 85% of cases?	NO	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES	NO

8.3 Journey Time Validation Charts

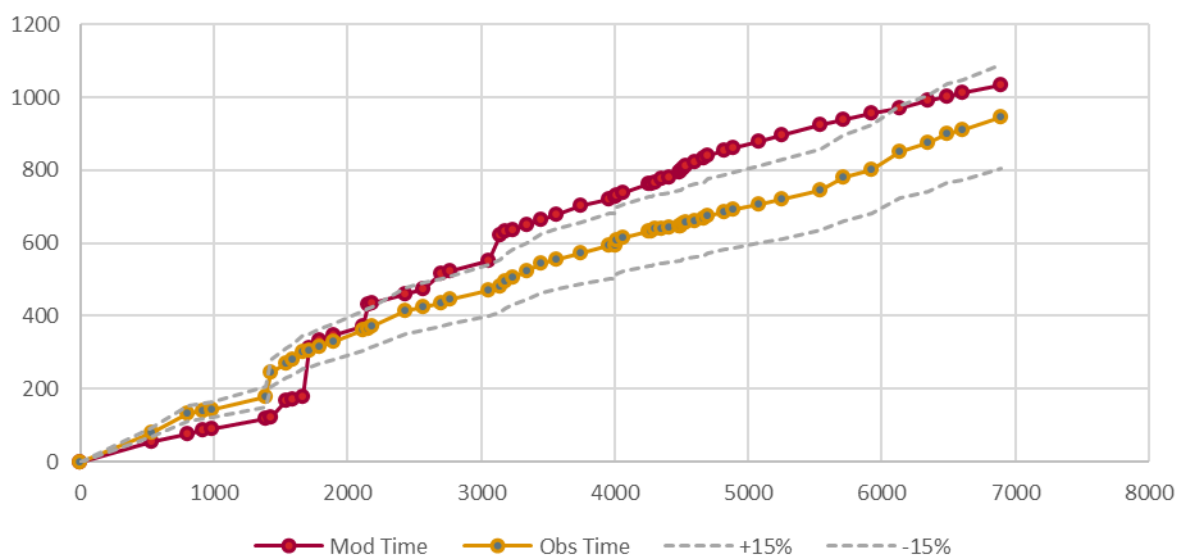
8.3.1 AM Peak



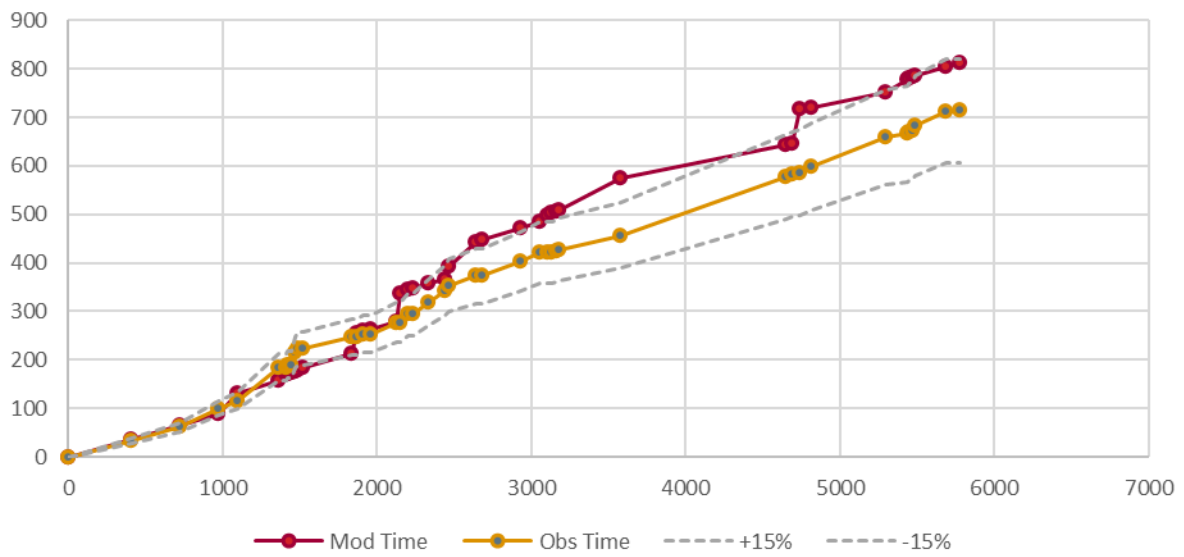
2 Northbound



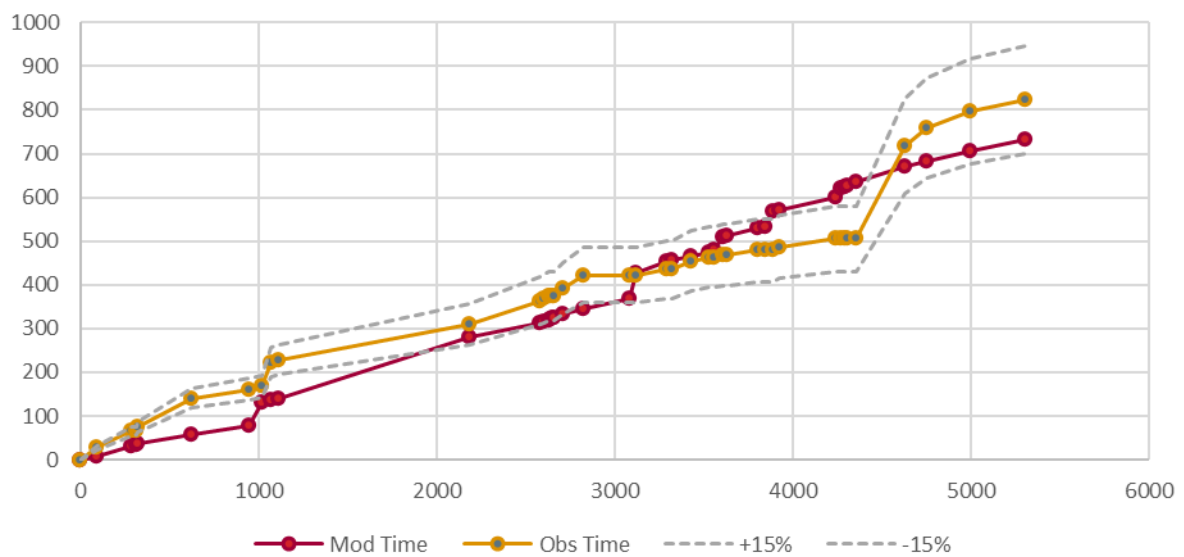
2 Southbound

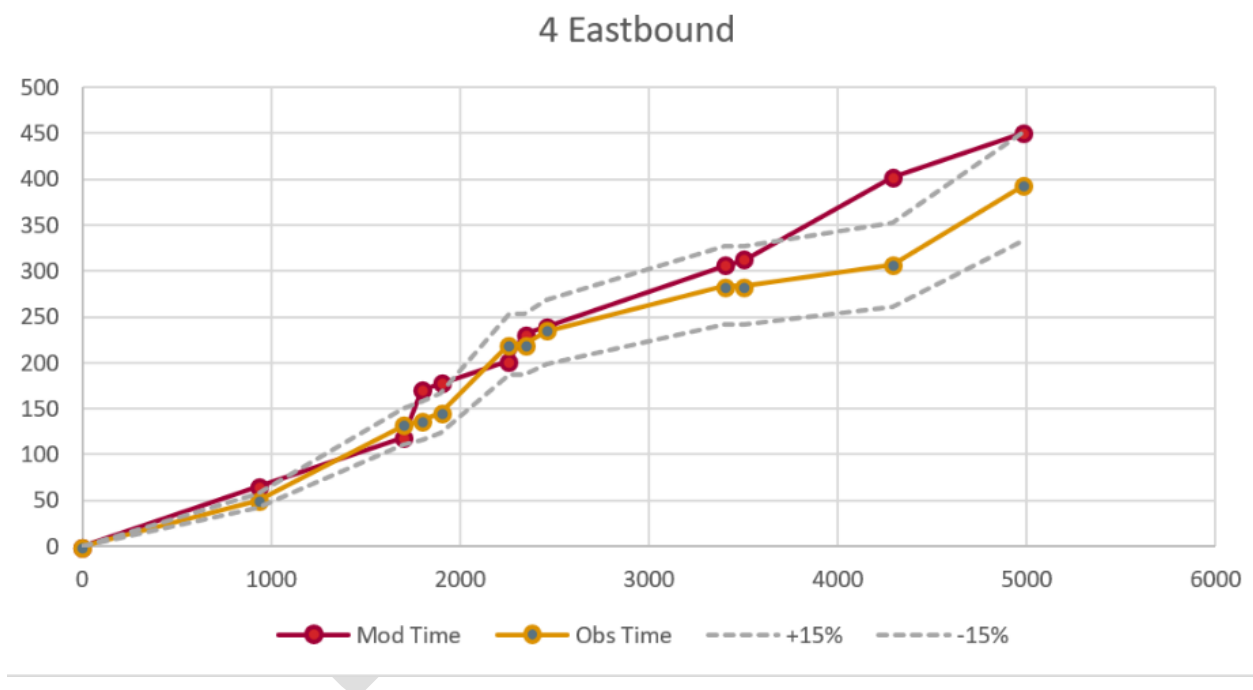
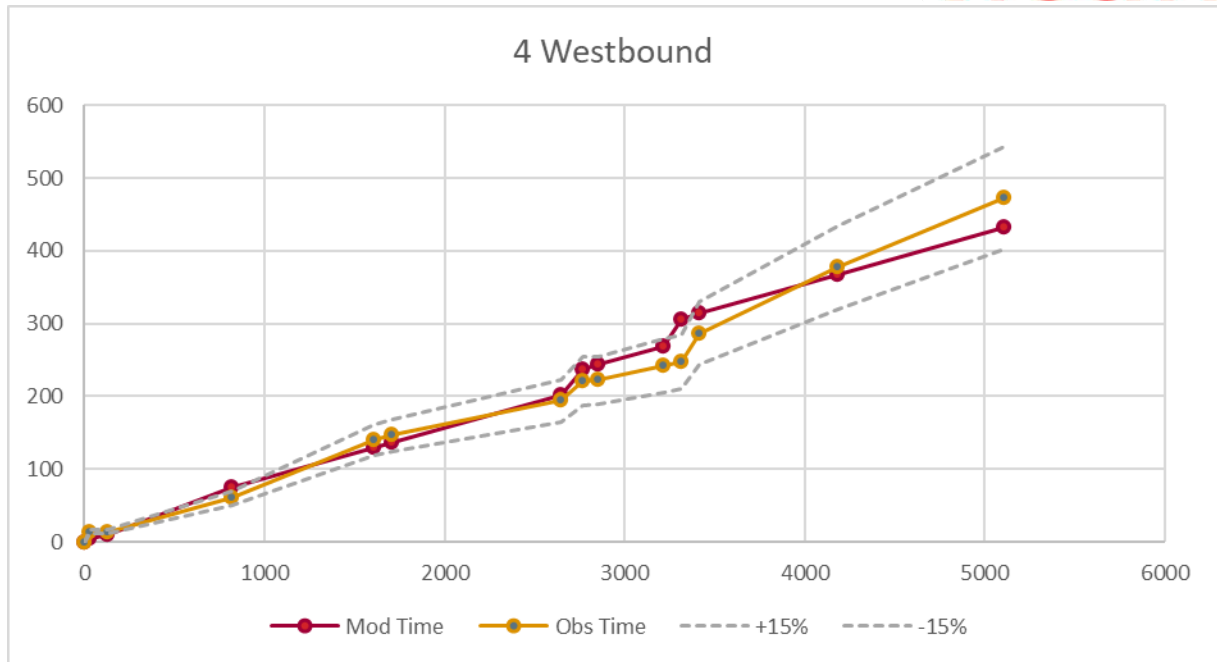


3 Eastbound

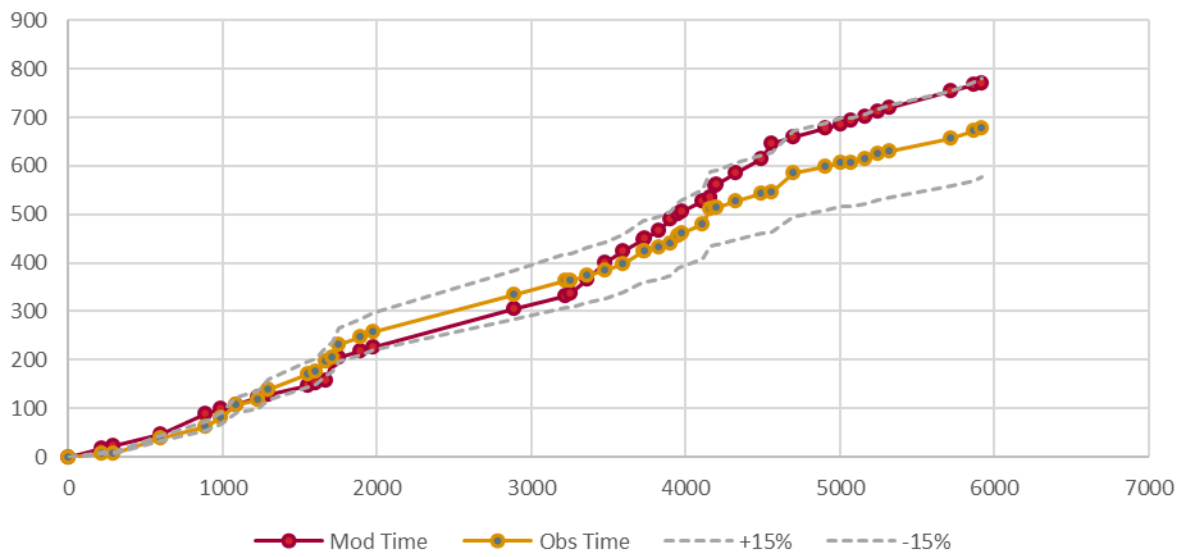


3 Westbound

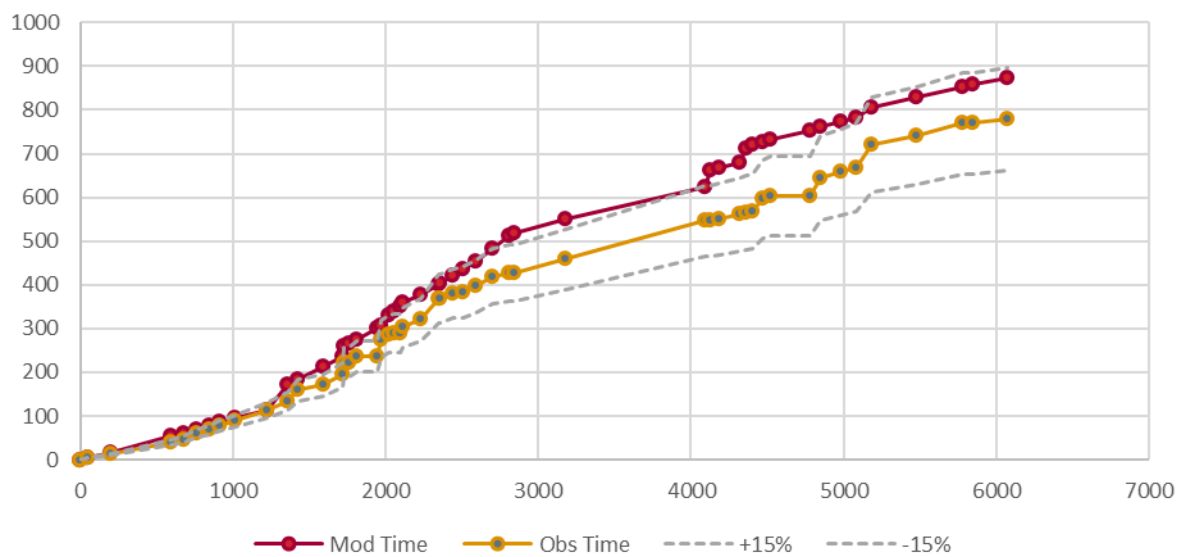




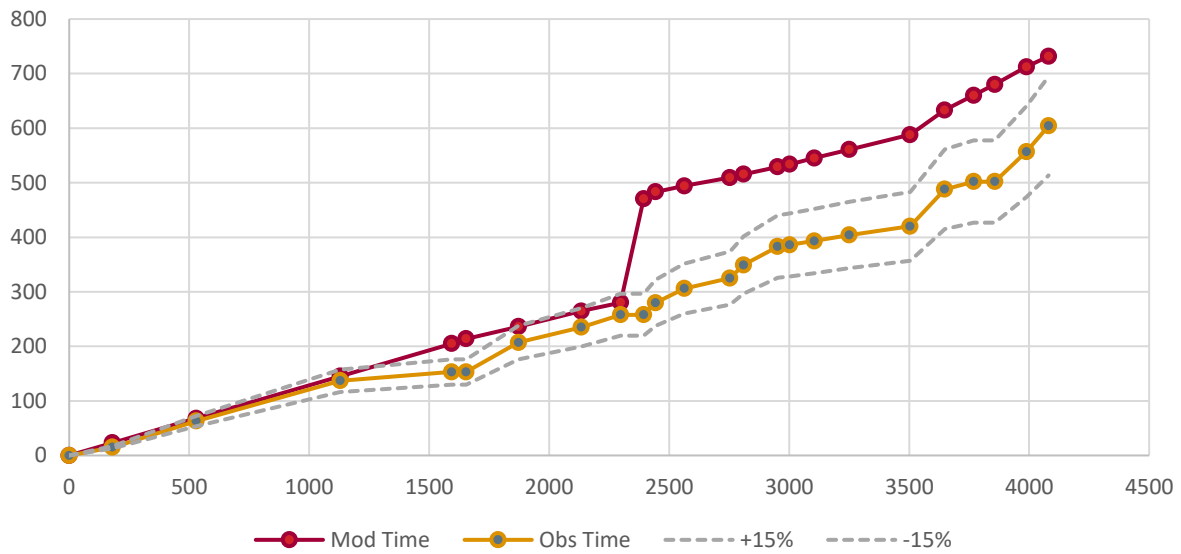
5 Westbound



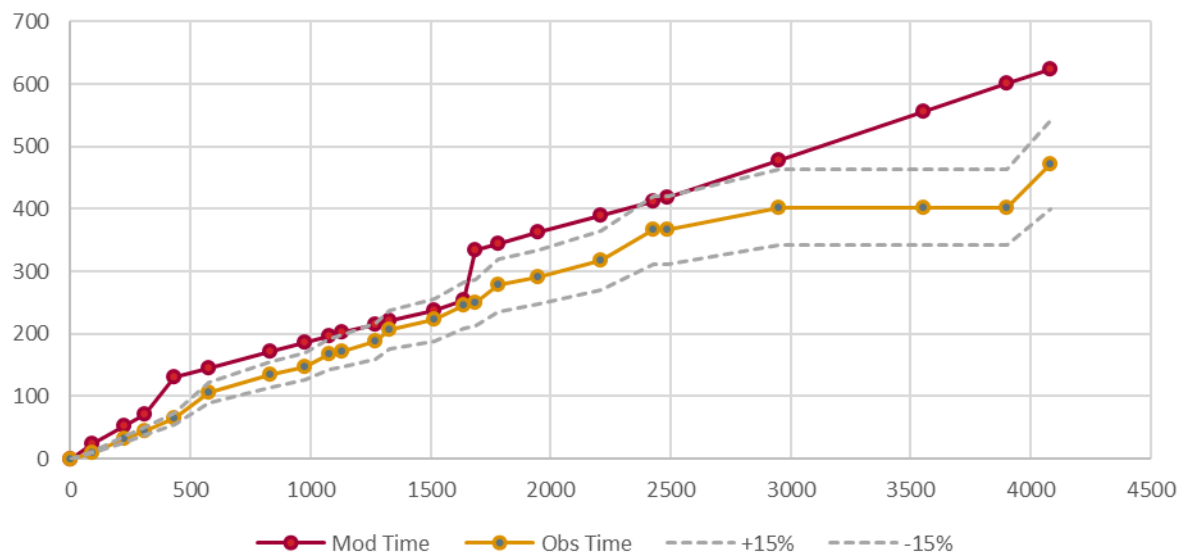
5 Eastbound

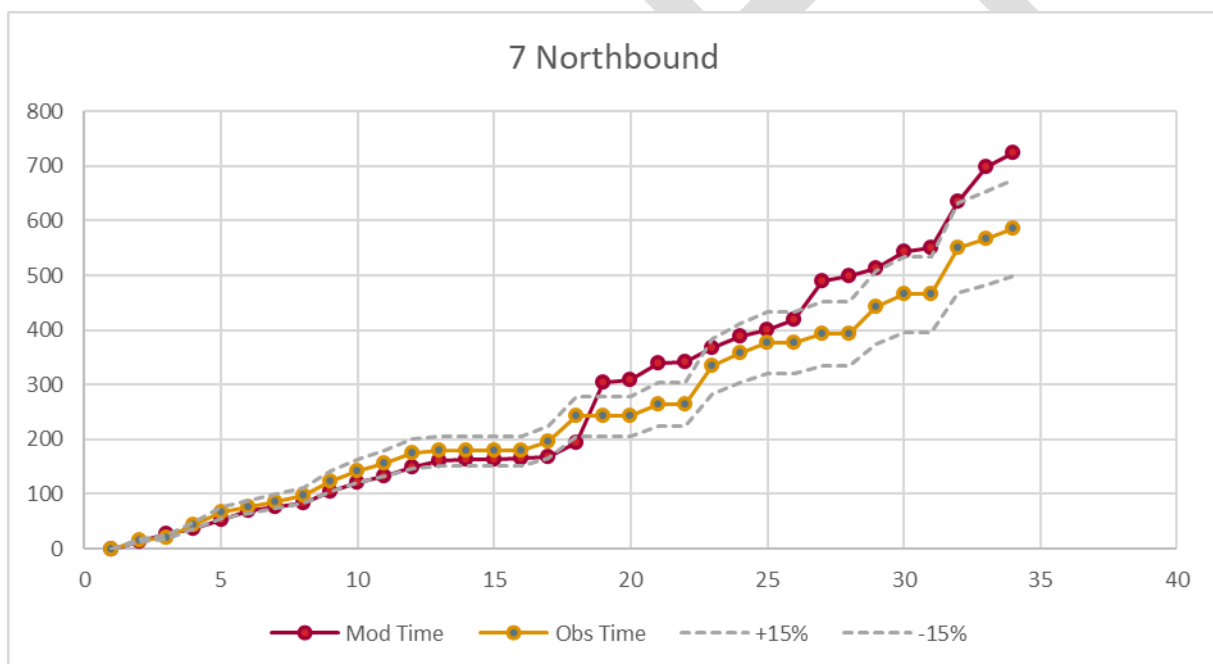
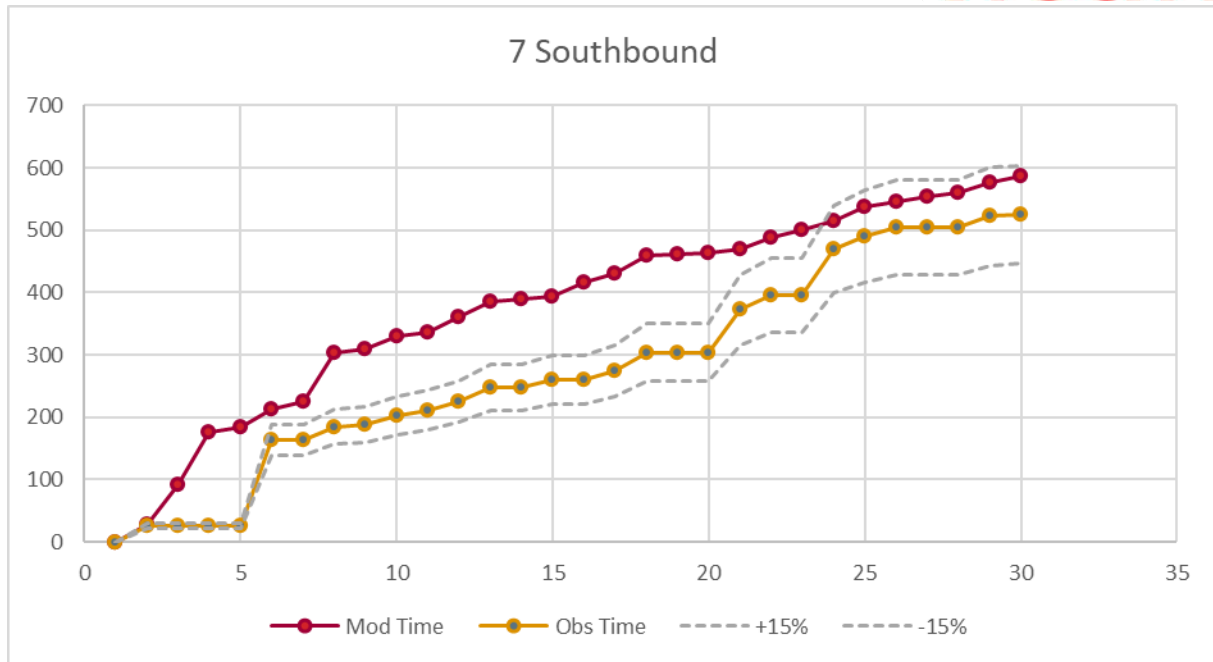


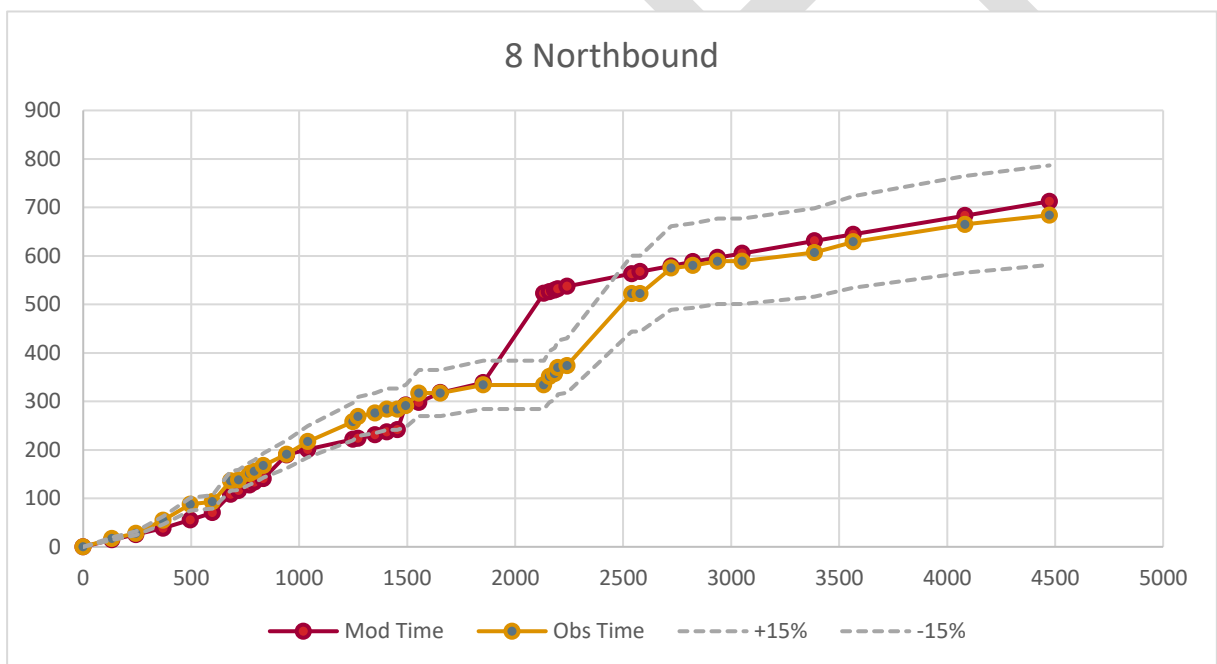
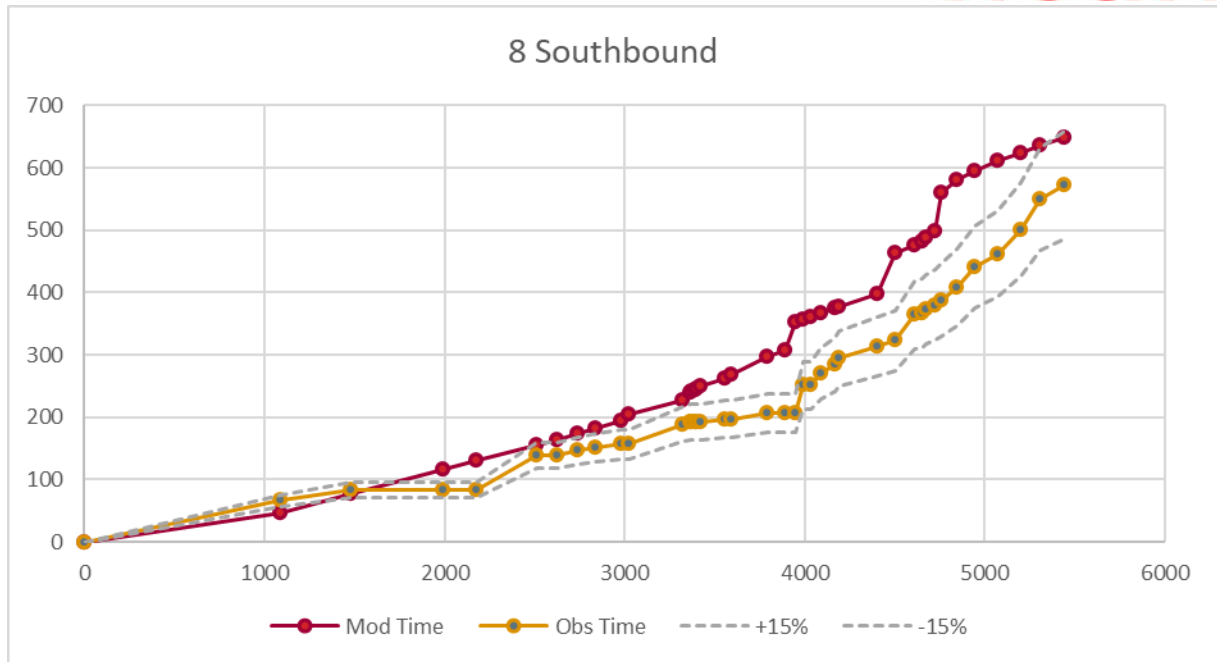
6 Southbound

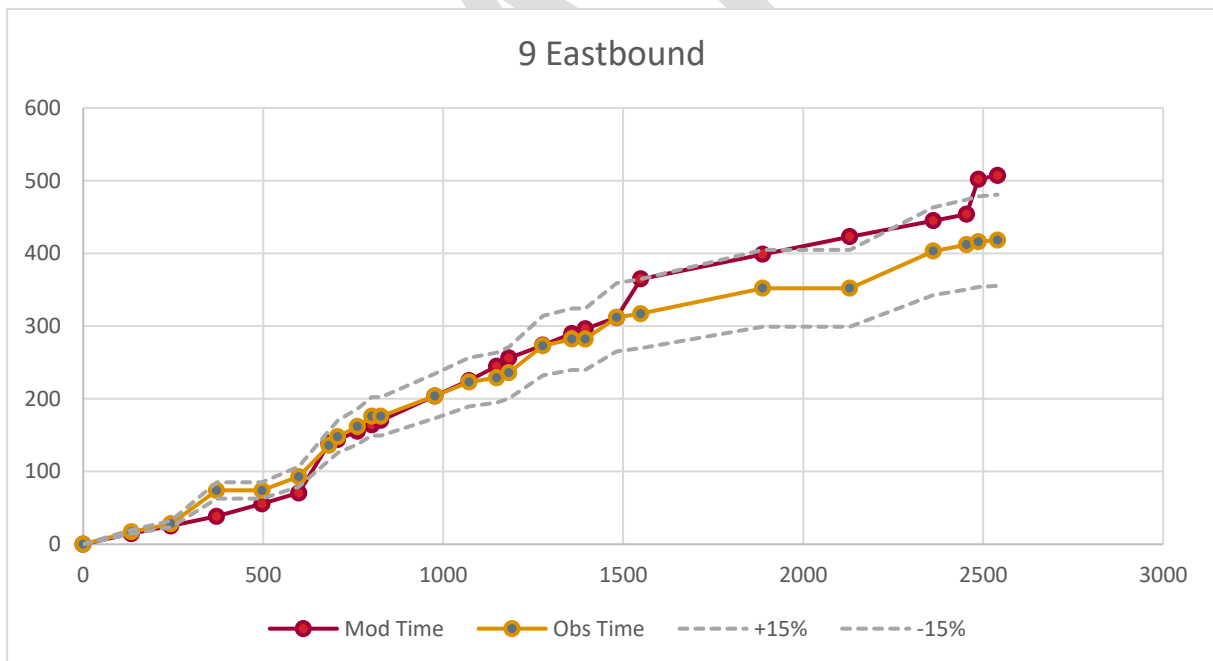
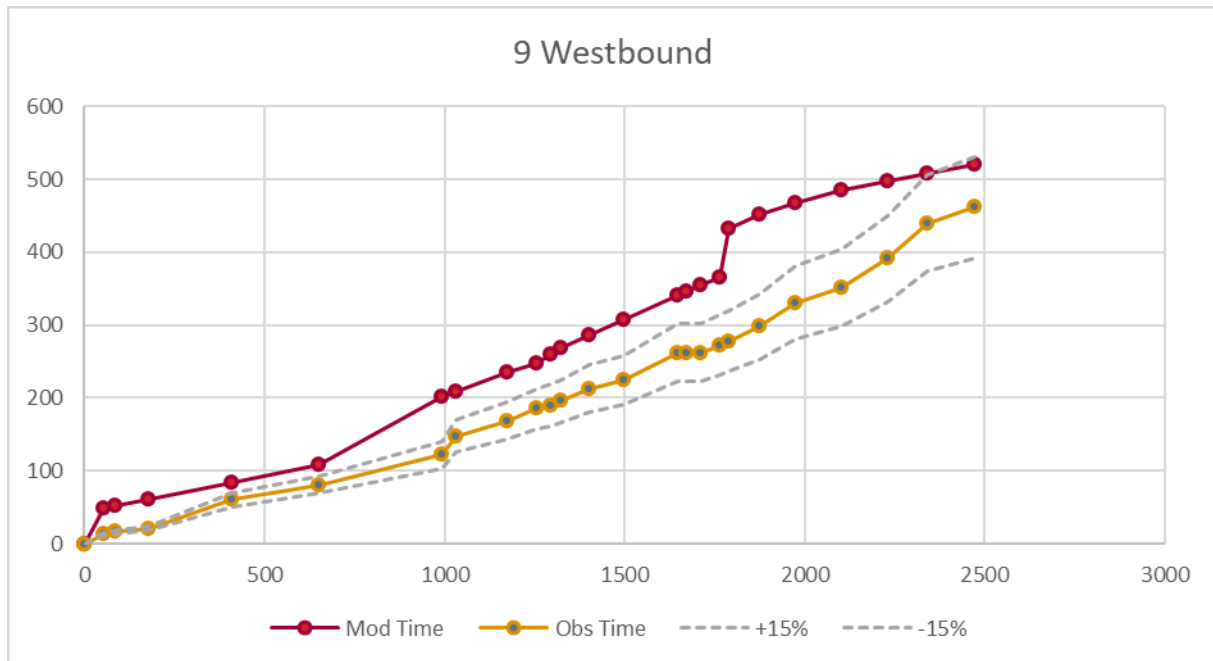


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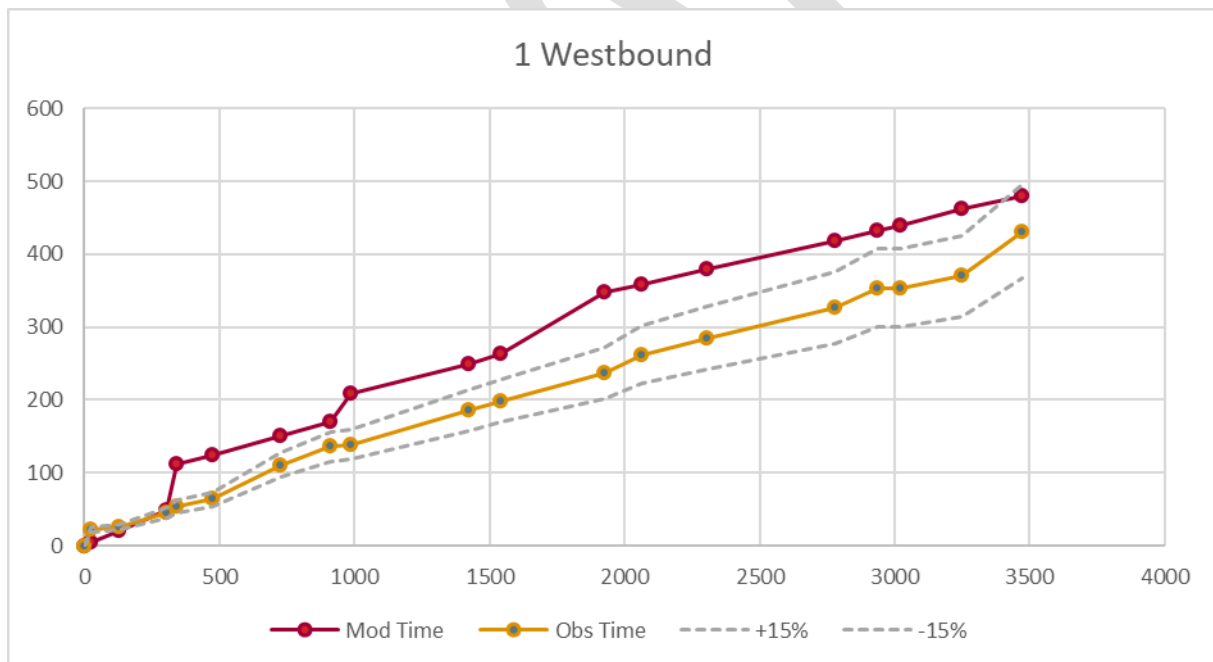
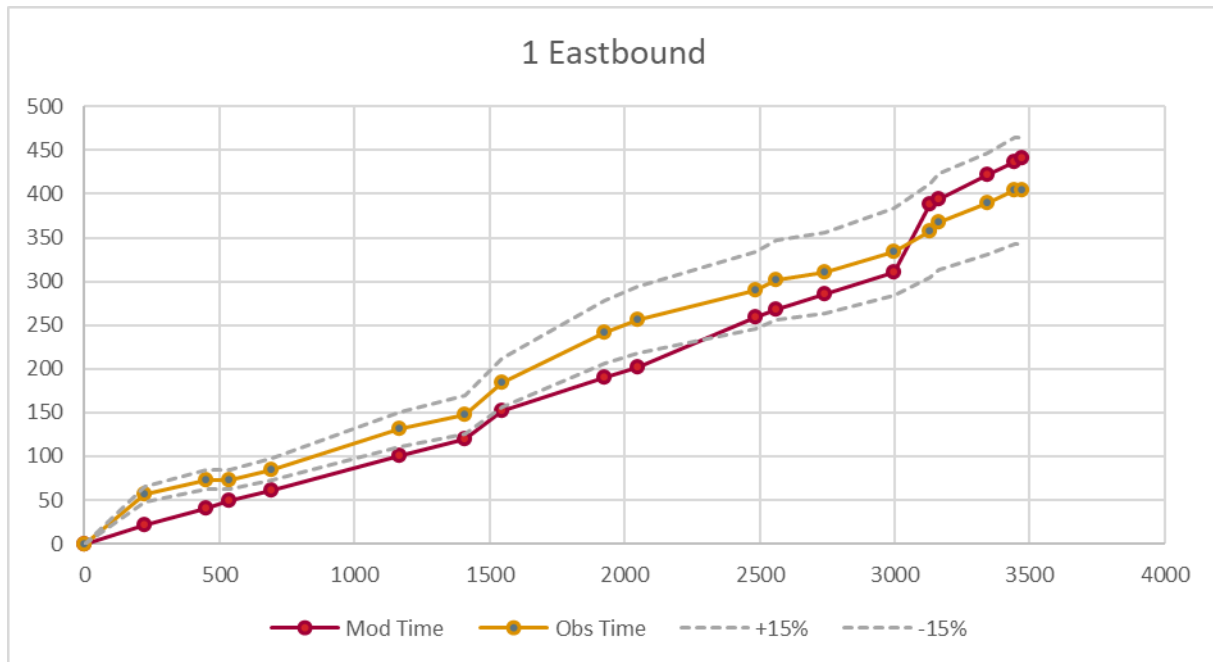




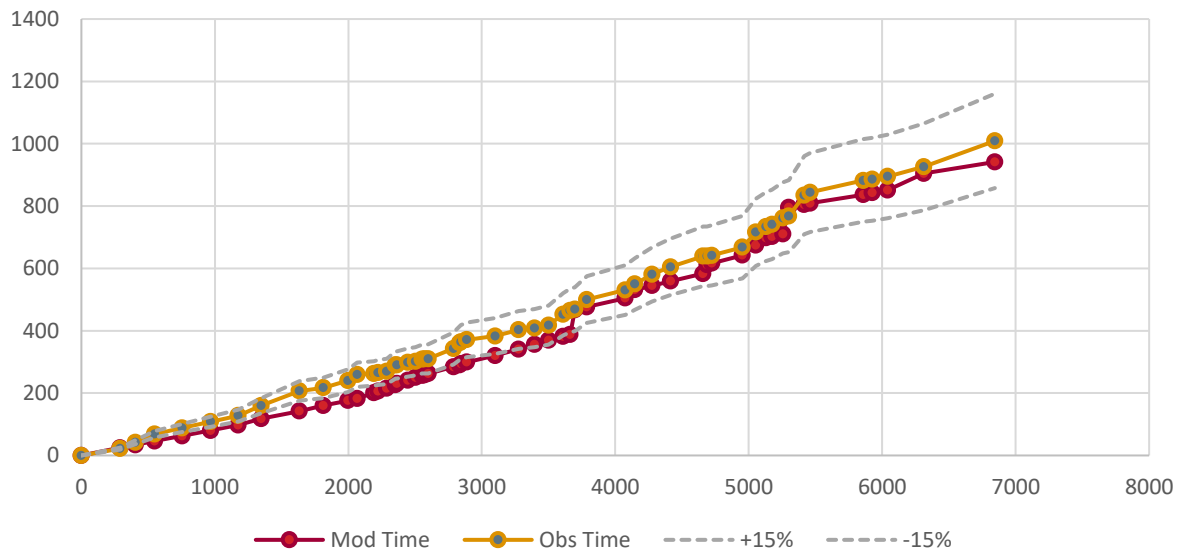




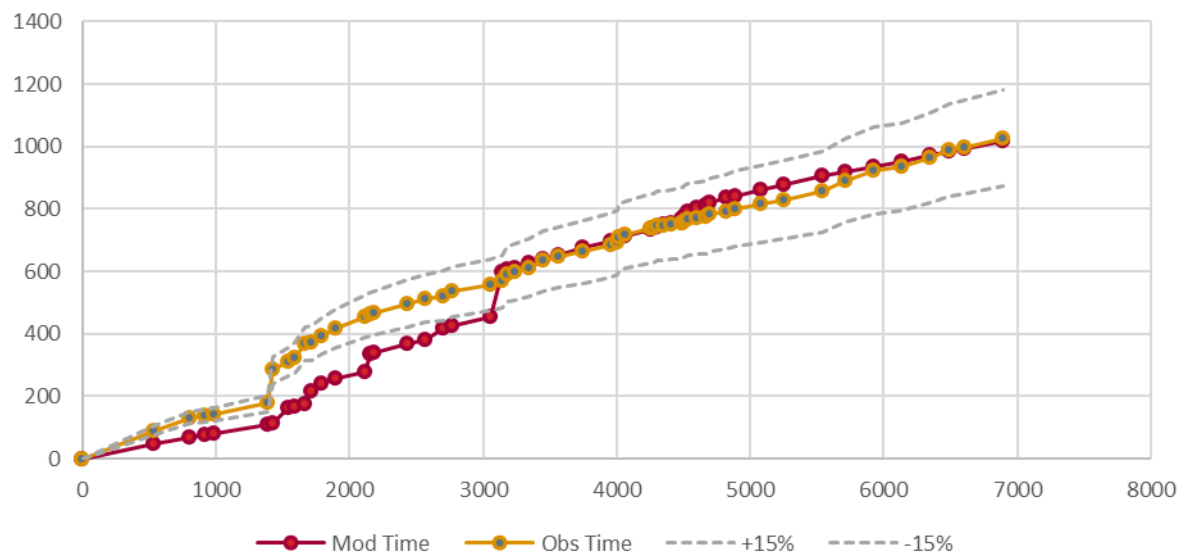
8.3.2 PM Peak



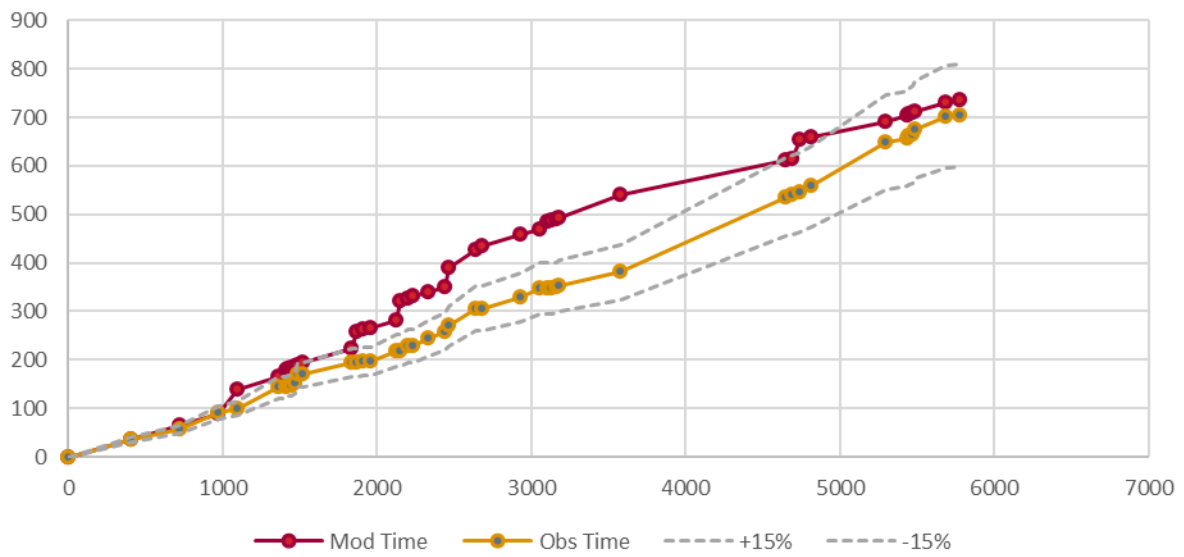
2 Northbound



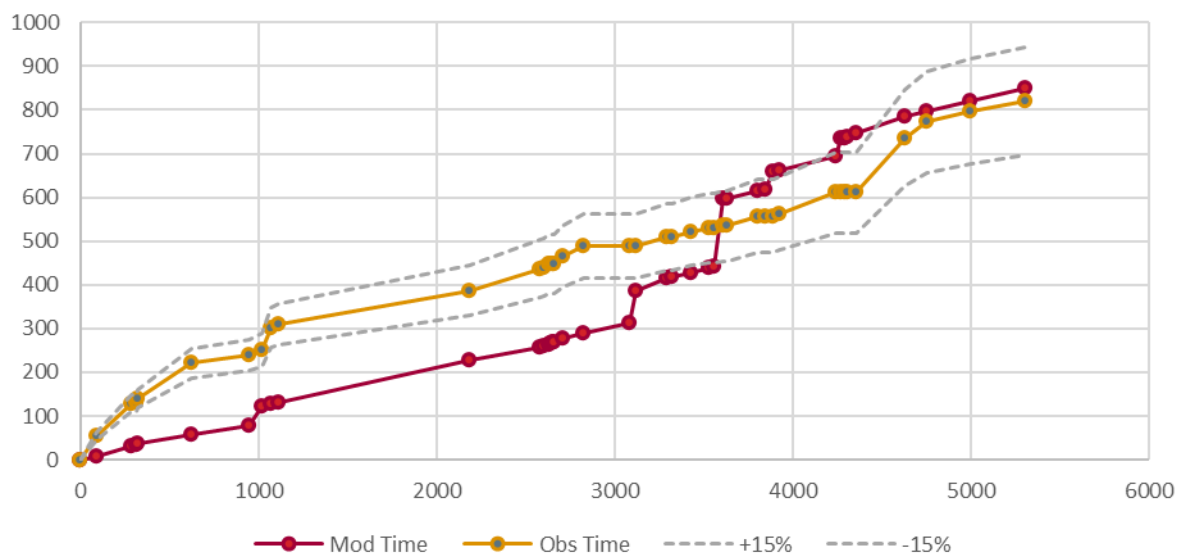
2 Southbound

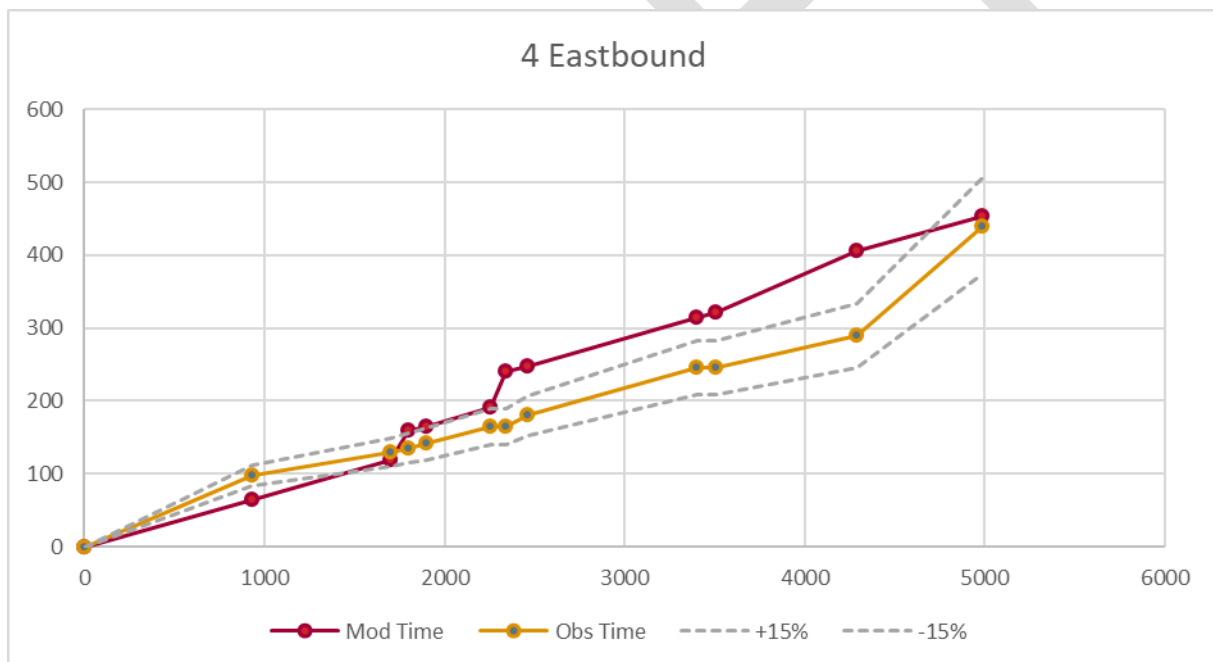
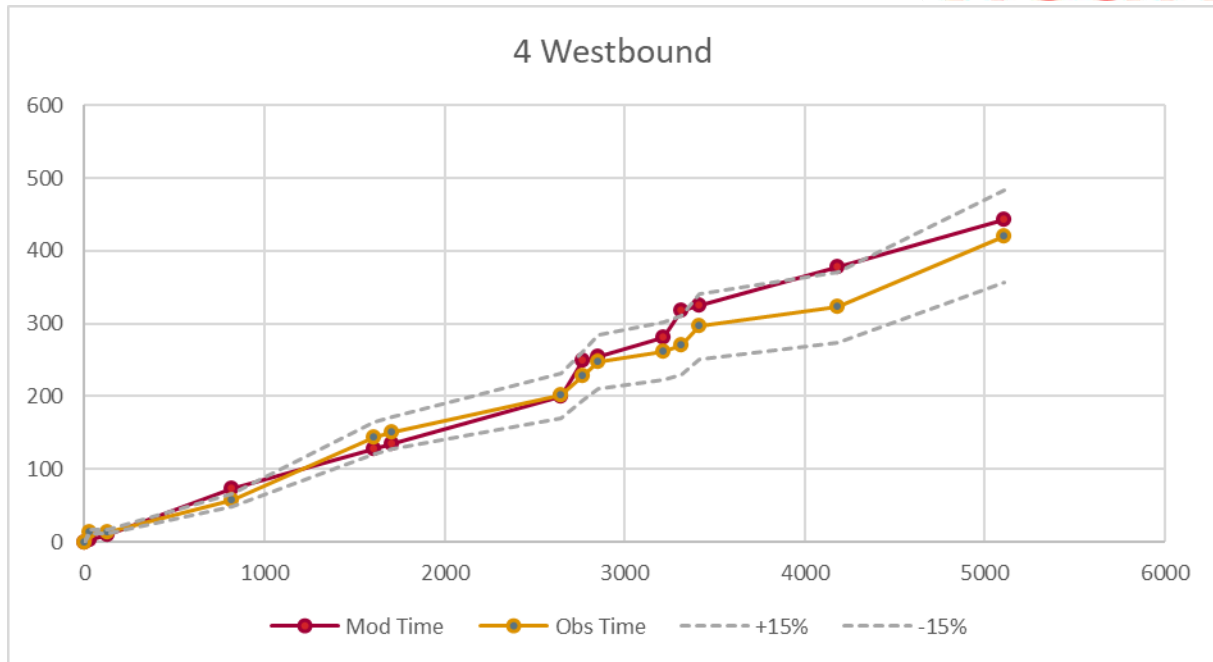


3 Eastbound

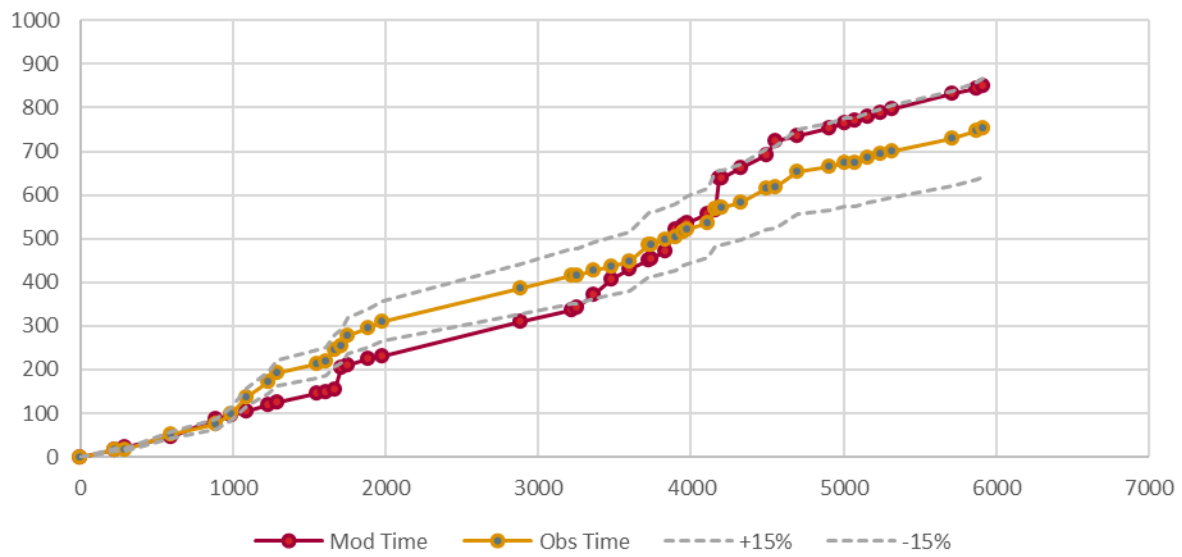


3 Westbound

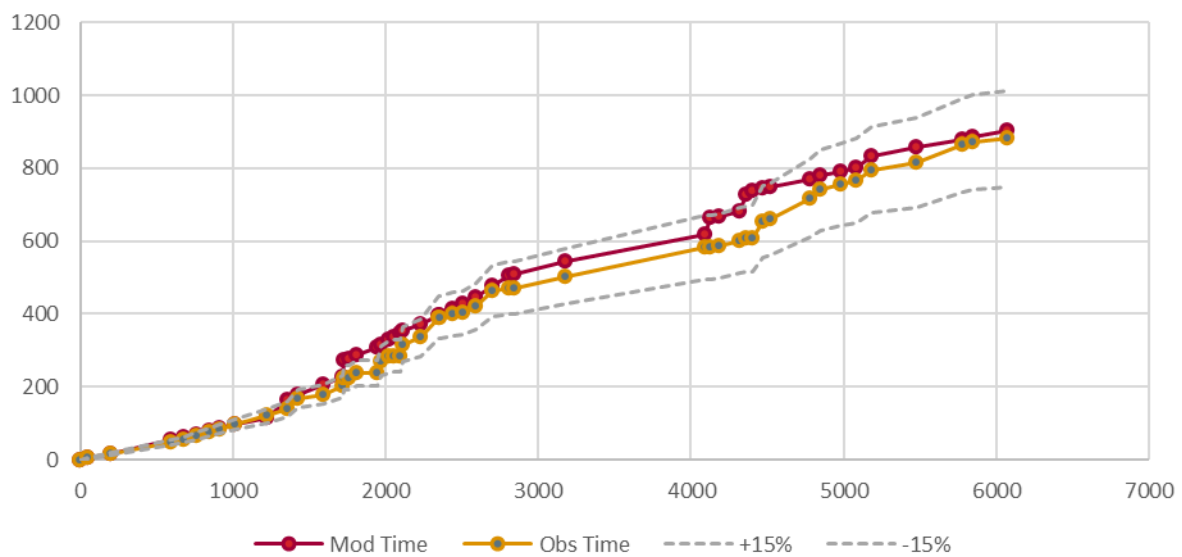




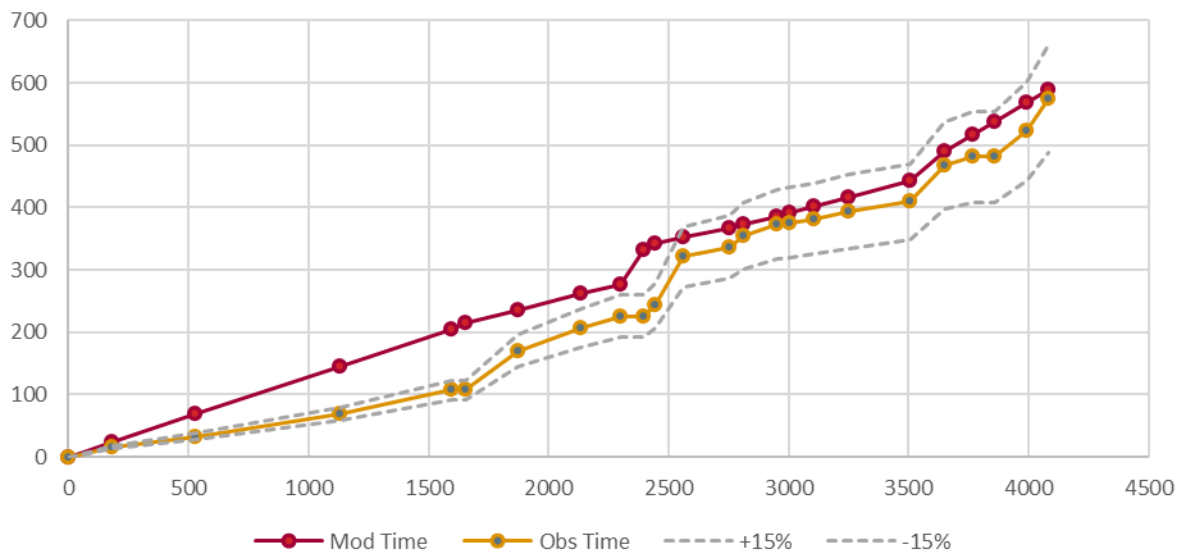
5 Westbound



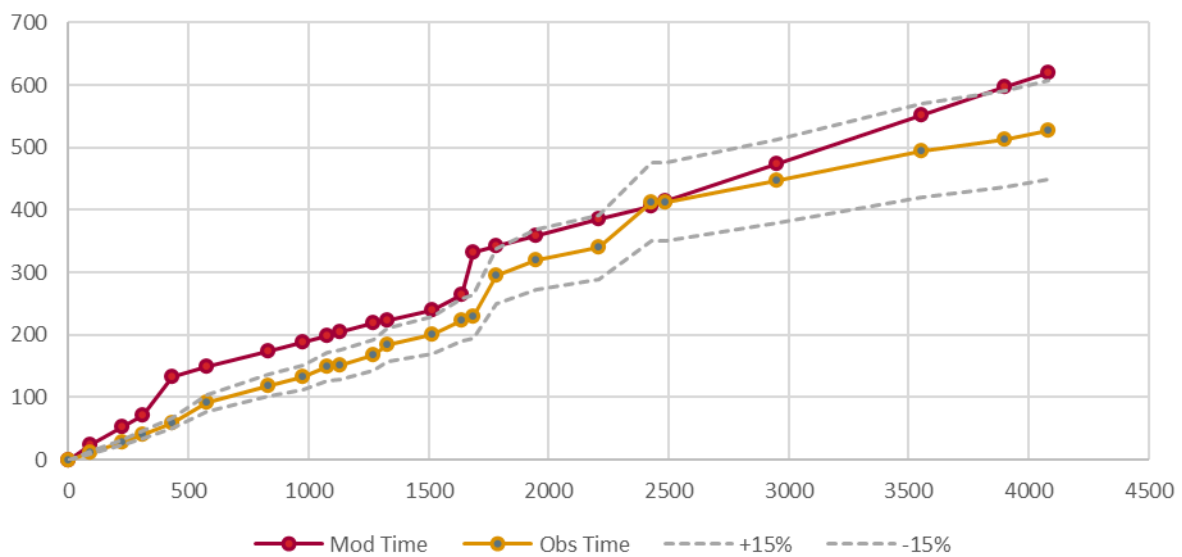
5 Eastbound



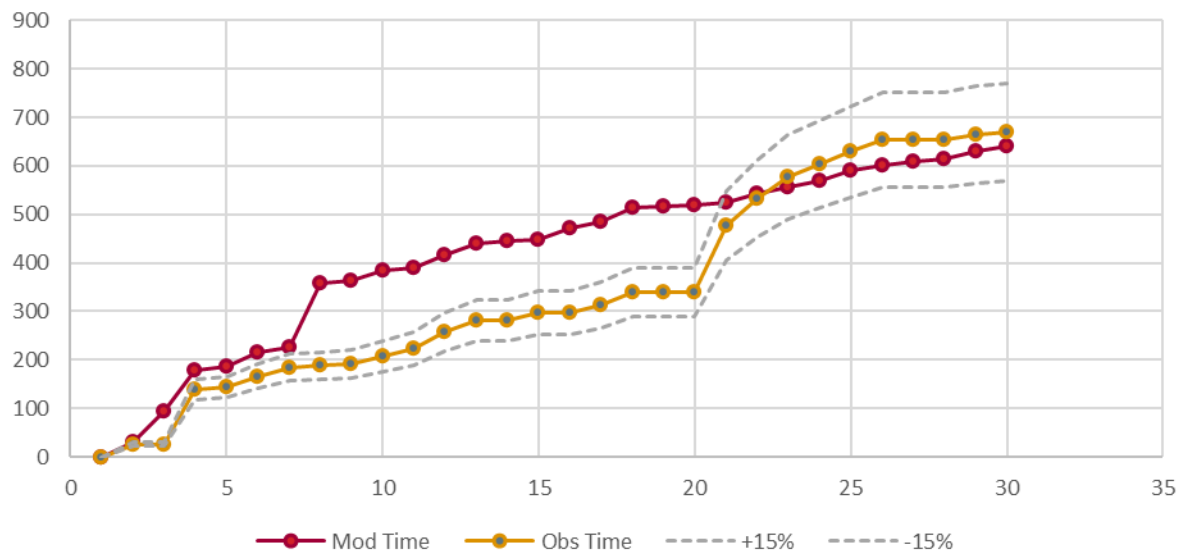
6 Southbound



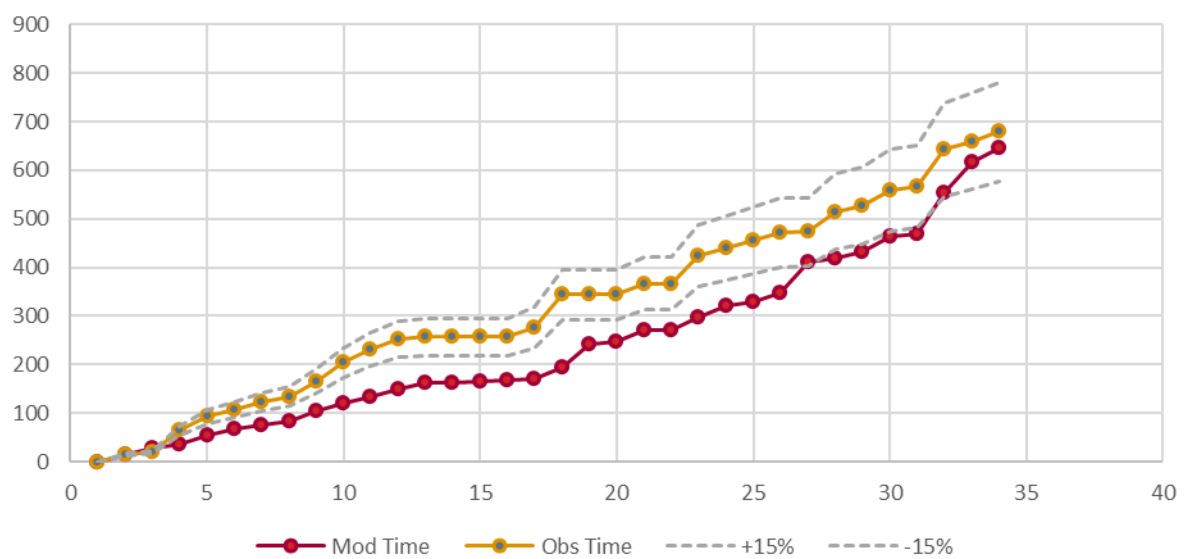
6 Northbound



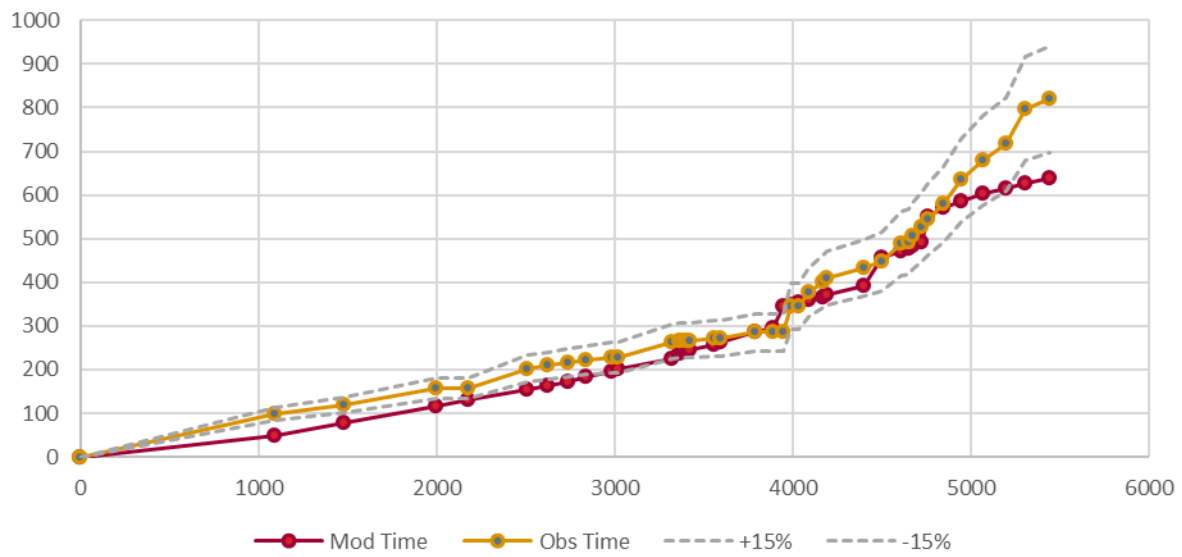
7 Southbound



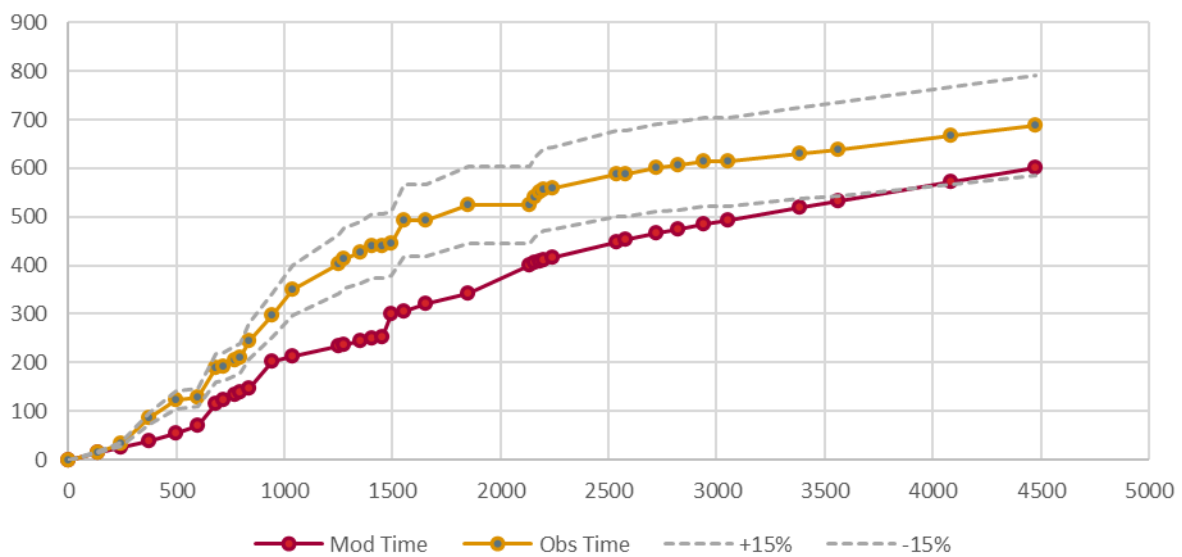
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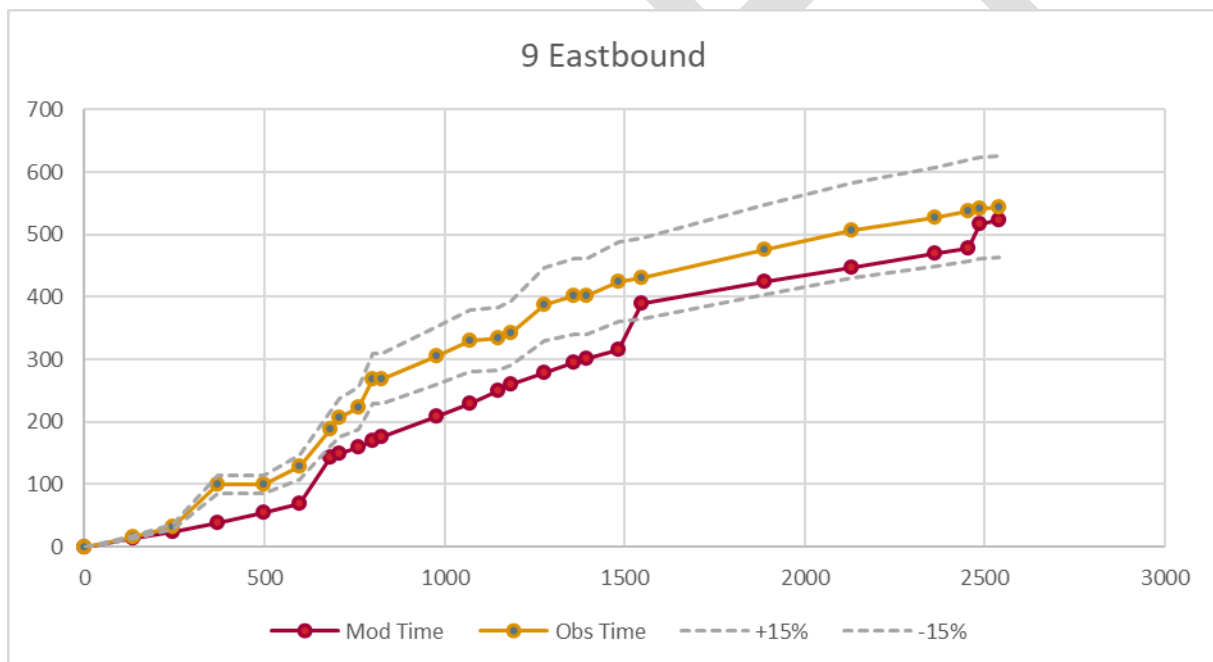
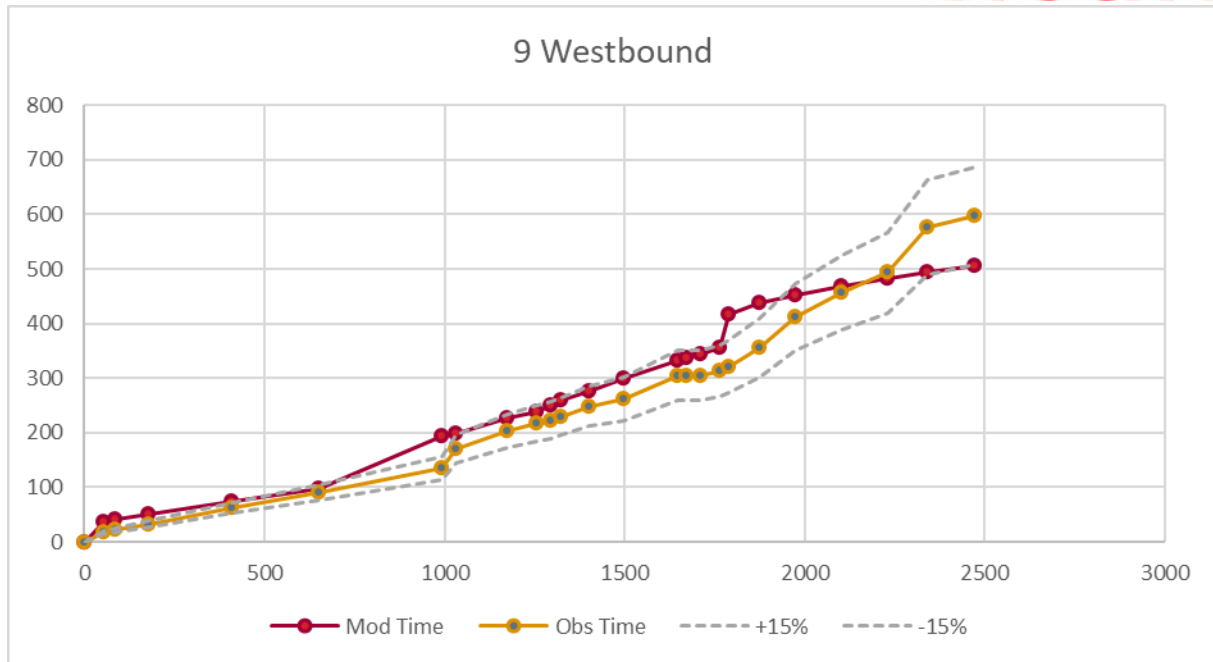


8 Southbound



8 Northbound





Galway City Council

**BusConnects Galway - Cross City
Link**

**Chapter 6 Traffic and Transport -
Appendix 6.2 Impact Assessments**

235532-04-03-02

Issue | 12 August 2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 235532

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ARUP

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6 Appendix A6.2 Impact Assessments

6.1 Pedestrian Infrastructure

Junctions	Criteria	Do Minimum		Do Something		Impact	Sensitivity	Significance of Effect
		Comment	Criteria Met	Comment	Criteria Met			
Section 1								
University Road / NUIG (southwest to President's Lawn) Uncontrolled JCT	Pedestrian Routing:	Uncontrolled crossing on NUIG arm, no crossings available on University Road	✗	Signalised crossing will be provided on University Road (east) arm alongside raised entry treatment at NUIG arm.	✓	Low	High	Positive Moderate and Long-Term
	Pedestrian Directness:	Crossing is in one stage.	✓	Crossing will be in one stage.	✓			
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✓	Junction will be raised at NUIG entry and signalised with dropped kerbs at University Road arm. Tactile paving on both arms	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 3m wide. Crossings width is 2m wide.	✓	Existing footpath width to be retained. Crossing width to be provided up to standard.	✓			
	Overall LoS	3 indicators met	B	4 indicators met	A			
University Road / Canal Road Upper Uncontrolled JCT	Pedestrian Routing:	No crossings present.	✗	Raised table and crossing will be provided at all arms	✓	High	High	Positive Profound and Long-Term
	Pedestrian Directness:	No crossings present.	✗	Crossing will be in one stage.	✓			
	Accessibility:	No tactile paving or road markings available. Dropped kerbs present.	✗	Junction will be raised with tactile paving	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 2.4m wide. Crossings width is 1.2 wide.	✗	Crossing width to be provided up to standard.	✓			
	Overall LoS	0 indicators met	E	4 indicators met	A			
University Road / NUIG (north of Galwav	Pedestrian Routing:	No crossings available	✗	Similar to do minimum	✗	Low	High	Positive Moderate

Junctions	Criteria	Do Minimum		Do Something		Impact	Sensitivity	Significance of Effect
		Comment	Criteria Met	Comment	Criteria Met			
Cathedral) Uncontrolled JCT	Pedestrian Directness:	No crossings available	✗	Crossing will be in 1 stage.	✓			and Long-Term
	Accessibility:	No tactile paving, dropped kerbs and road markings at existing crossing points. However, the footpath is continuous where pedestrians take the priority.	✓	Junction will be raised with tactile paving	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 2.4m wide.	✓	Similar to do minimum	✓			
	Overall LoS	2 indicators met	C	3 indicators met	B			
University Road / Gaol Road Signalised JCT	Pedestrian Routing:	Signalised crossings available on southern arm (Gaol Road) only.	✗	Signalised crossing will be retained at University Road and existing southern arm (Gaol Road) will be transformed into pedestrian plaza.	✓	Medium	High	Positive Very Significant and Long-Term
	Pedestrian Directness:	Crossings are in one stage.	✓	Crossings will be in one stage at University Road. Crossings at Gaol Road will be abandoned.	✓			
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✓	Existing southern arm (Gaol Road) will be transformed into pedestrian plaza, junction north from the Cathedral will be raised and with tactile paving and signalized junction before the bridge will be raised and have tactile paving.	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 2.4m wide on the narrower side. Crossings are 1.6m wide.	✗	Fully compliant footpath and crossing widths will be provided.	✓			
	Overall LoS	2 indicators met	C	4 indicators met	A			
Gaol Road (Southeast of Galway Cathedral) Uncontrolled JCT	Pedestrian Routing:	No crossings available	✗	Non signalised raised entry treatment will be provided at crossing.	✗	Medium	Low	Positive Moderate and Long-Term
	Pedestrian Directness:	No crossings available.	✗	Crossings will be in one stage	✓			
	Accessibility:	No tactile paving, dropped kerbs and road markings for crossing at the junction.	✗	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			

Junctions	Criteria	Do Minimum		Do Something		Impact	Sensitivity	Significance of Effect
		Comment	Criteria Met	Comment	Criteria Met			
	Footpath and Crossing Widths:	Existing footpaths are approximately 3m wide. Crossings width not specified.	✖	Kerb will be realigned to provide wider footpaths and improved pedestrian facilities.	✓			
	Overall LoS	0 indicators met	E	3 indicators met	B			
Gaol Road (Southwest of Galway Cathedral) Uncontrolled JCT	Pedestrian Routing:	No crossings available	✖	Non signalised raised entry treatment will be provided at crossing.	✖	Low	Low	Positive Slight and Long-Term
	Pedestrian Directness:	No crossings available	✖	Crossings will be staggered in two stages	✖			
	Accessibility:	No tactile paving, dropped kerbs and road markings for crossing at the junction.	✖	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 3m wide. Crossings width not specified.	✖	Splitter island will be provided in the middle of the carriageway. Existing footpath to be set back with fully compliant crossings width.	✓			
	Overall LoS	0 indicators met	E	2 indicators met	C			
Section 2								
St Vincent's Avenue / St Francis Street / Courthouse Square Signalised JCT	Pedestrian Routing:	Signalised crossings available on all arms.	✓	Similar to do minimum	✓	Low	High	Positive Moderate and Long-Term
	Pedestrian Directness:	Crossings are in one stage.	✓	Similar to do minimum	✓			
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✓	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 1.6m wide. Crossings are 2m wide.	✖	Junction will be realigned with improved pedestrian facilities	✓			
	Overall LoS	3 indicators met	B	4 indicators met	A			
St Francis Street / Dalys Place / Eglinton Street / Mary Street Uncontrolled JCT	Pedestrian Routing:	Crossing points available on all four arms.	✓	Signalised crossing will be available on one arm (St. Vincent's Road), while the junction will be raised with tactile paving.	✓	Medium	High	Positive Very Significant and Long-Term
	Pedestrian Directness:	Crossings are in one stage.	✓	Similar to do minimum	✓			

Junctions	Criteria	Do Minimum		Do Something		Impact	Sensitivity	Significance of Effect
		Comment	Criteria Met	Comment	Criteria Met			
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✓	Similar to do minimum	✓			
	Footpath and Crossing Widths:	Existing footpaths and crossings are approximately 1.6m wide.	✖	Fully compliant footpath and crossing widths will be provided.	✓			
	Overall LoS	3 indicators met	B	4 indicators met	A			
Section 3								
Williamsgate Street / Rosemary Avenue/ Eyre Square Uncontrolled JCT & Signalised Crossing (QGIS ID: 21)	Pedestrian Routing:	Signalised crossing available on Williamsgate Street and uncontrolled crossing of Rosemary Avenue.	✓	Existing signalised crossing at Williamsgate Street will be moved to NW exit of Eyre Square and improved.	✓	Negligible	High	Not Significant and Long-Term
	Pedestrian Directness:	Crossings are in one stage	✓	Crossings will be in one stage	✓			
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✓	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths and crossings are approximately 3m wide.	✓	Similar geometry to DoMinimum.	✓			
	Overall LoS	4 indicators met	A	4 indicators met	A			
Eyre Square / Forster Street / Station Road / Frenchville Lane Signalised JCT (QGIS ID: 24)	Pedestrian Routing:	Signalised crossing available on eastern, western and northern arms	✖	Signalised crossing available on all arms.	✓	High	High	Profound and Long-Term
	Pedestrian Directness:	Crossings are in one stage	✓	Crossings will be in one stage	✓			
	Accessibility:	Adequate tactile paving, dropped kerbs present but inadequate road markings at existing crossing point on Frenchville Lane.	✖	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 2m wide. Crossings are 1.2m wide on southern arm.	✖	New geometry to be fully compliant with design standard.	✓			
	Overall LoS	1 indicator met	D	4 indicators met	A			
Eyre Square / Victoria Place	Pedestrian Routing:	Signalised crossing available on two arms	✖	Same as DoMinimum	✖	Negligible	Medium	Not Significant and Long-Term
	Pedestrian Directness:	Crossings are in one stage	✓	Same as DoMinimum	✓			

Junctions	Criteria	Do Minimum		Do Something		Impact	Sensitivity	Significance of Effect
		Comment	Criteria Met	Comment	Criteria Met			
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✘	Same as DoMinimum	✘			
	Footpath and Crossing Widths:	Existing footpaths and crossings are approximately 2.4m wide.	✓	Same as DoMinimum	✓			
	Overall LoS	2 indicators met	C	2 indicators met	C			
Eyre Square / Prospect Hill Signalised JCT	Pedestrian Routing:	Signalised crossing available on all arms.	✓	Signalised crossing available on all arms.	✓	Low	High	Positive Moderate and Long-Term
	Pedestrian Directness:	Crossings are staggered in two stages on all arms.	✘	Crossings will be in one stage	✓			
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✓	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths and crossings are approximately 2.4m wide.	✓	Kerb will be realigned to provide wider footpaths and improved pedestrian facilities.	✓			
	Overall LoS	3 indicators met	B	4 indicators met	A			
Section 5								
College Road / Loyola Park / Lough Atalia Road Signalised JCT	Pedestrian Routing:	Signalised crossing on College Road and Lough Atalia Road, no crossings available on Loyola Park	✘	The junction will be rationalised and a separate priority controlled junction links to Loyola Park. Signalised crossing available on both arms.	✓	Medium	Low	Positive Moderate and Long-Term
	Pedestrian Directness:	Crossings are staggered in two to three stages.	✘	Crossings are in one stage	✓			
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✓	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths and crossings are approximately 2m wide.	✓	New geometry to be fully compliant with design standard.	✓			
	Overall LoS	2 indicators met	C	4 indicators met	A			
Section 6								
College Road / Moneenageisha Road / Wellpark Road / Old Dublin Road Signalised JCT	Pedestrian Routing:	Signalised crossing on all arms	✓	Signalised crossing on all arms	✓	Negligible	Low	Not Significant and Long-Term
	Pedestrian Directness:	Crossings are staggered in two stages on Moneenageisha Road and three stages on other arms.	✘	Crossings are staggered in two stages on all arms.	✘			

Junctions	Criteria	Do Minimum		Do Something		Impact	Sensitivity	Significance of Effect
		Comment	Criteria Met	Comment	Criteria Met			
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✓	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths and crossings are approximately 2.4m wide.	✓	New geometry to be fully compliant with design standard.	✓			
	Overall LoS	3 indicators met	B	3 indicators met	B			
Old Dublin Road / Sáilín Uncontrolled JCT	Pedestrian Routing:	Uncontrolled crossing on Sáilín arm, no crossings available on Old Dublin Road	✗	Toucan crossing available on Old Dublin Road and raised entry treatment with tactile paving available on Sáilín	✓	High	High	Positive Profound and Long-Term
	Pedestrian Directness:	Crossings are staggered in two stages due to presence of island	✗	Crossings are in one stage on Old Dublin Road and staggered in two stages on Sáilín	✓			
	Accessibility:	Tactile paving and dropped kerbs present. No road markings at existing crossing points on Sáilín.	✗	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 2m wide. Crossings are 1.6m wide.	✓	New geometry to be fully compliant with design standard.	✓			
	Overall LoS	1 indicator met	D	4 indicators met	A			
Section 8								
Prospect Hill / Bóthar Bhreandain Uí Eithir Uncontrolled JCT	Pedestrian Routing:	Uncontrolled crossing provided on all arms.	✓	Signalised crossing will be available on all arms.	✓	Low	Medium	Positive Moderate and Long-Term
	Pedestrian Directness:	Crossings are staggered in two stages due to presence of an island.	✗	Crossings will be in one stage on all arms.	✓			
	Accessibility:	Tactile paving and dropped kerbs present and road markings present on all arms.	✓	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 2m wide.	✓	Existing footpath width to be retained. Crossing width to be provided up to standard.	✓			
	Overall LoS	3 indicators met	B	4 indicators met	A			
Bóthar Bhreandain Uí Eithir / Forster Street /	Pedestrian Routing:	Signalised crossing available on all arms.	✓	Similar to do minimum	✓	Low	Medium	Positive Moderate

Junctions	Criteria	Do Minimum		Do Something		Impact	Sensitivity	Significance of Effect
		Comment	Criteria Met	Comment	Criteria Met			
Fairgreen Road Signalised JCT	Pedestrian Directness:	Crossings are in one stage on northern and eastern arms, staggered in two stages on southern arm and three stages on western arm.	✘	Crossings will be in one stage on all arms.	✓			and Long-Term
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✓	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths and crossings are approximately 2m wide.	✓	Kerb will be realigned to provide wider footpaths and improved pedestrian facilities.	✓			
	Overall LoS	3 indicators met	B	4 indicators met	A			
Section 9								
Bóthar Na mBan / Prospect Hill / Bohemore Road Uncontrolled JCT	Pedestrian Routing:	Crossing available on the Bóthar Na mBan arm only. Prospect Hill and Bohemore Road do not contain crossings.	✘	Signalised crossing will be provided on Bóthar Na mBan and raised entry treatment will be provided on Prospect Hill.	✓	Medium	Medium	Positive Significant and Long-Term
	Pedestrian Directness:	Crossings are staggered in two stages due to presence of an island.	✘	Crossings will be in one stage	✓			
	Accessibility:	Tactile paving and dropped kerbs present and road markings present on all arms.	✓	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 3m wide. Crossings are 2m wide.	✓	New geometry to be fully compliant with design standard.	✓			
	Overall LoS	2 indicators met	C	4 indicators met	A			
Headford Road / St Brendan's Avenue / Dyke Road Signalised JCT	Pedestrian Routing:	Signalised crossings available on all arms.	✓	Similar to do minimum	✓	Low	High	Positive Moderate and Long-Term
	Pedestrian Directness:	Crossings are in one stage.	✓	Similar to do minimum	✓			
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✓	Similar to do minimum	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 1m wide. Crossings are 1.6m wide.	✘	Existing footpaths to be improved. New footpath provided; junction will be realigned with improved pedestrian facilities.	✓			

Junctions	Criteria	Do Minimum		Do Something		Impact	Sensitivity	Significance of Effect
		Comment	Criteria Met	Comment	Criteria Met			
	Overall LoS	3 indicators met	B	4 indicators met	A			
Dyke Road / Headford Road / St Bridget's Place Uncontrolled JCT	Pedestrian Routing:	Uncontrolled crossings on Dyke Road and St Bridget's Place arms only.	✘	Signalised pedestrian crossings will be available on northern, eastern and southern arms.	✘	Negligible	High	Not Significant and Long-Term
	Pedestrian Directness:	Crossings are direct.	✓	Crossings will be in one stage.	✓			
	Accessibility:	Tactile paving and dropped kerbs provided. Road markings present	✓	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 1.6m wide and crossings are only 1.2m wide.	✘	Crossing width to be provided up to standard. Footpath constraints on northern side of St Brigdet's Place.	✘			
	Overall LoS	2 indicators met	C	2 indicators met	C			
Dyke Road/ Dyke Road Uncontrolled JCT	Pedestrian Routing:	No crossings provided.	✘	Signalised crossing will be available on all arms.	✓	High	Low	Positive Moderate and Long-Term
	Pedestrian Directness:	No crossings provided.	✘	Crossings will be in one stage on all arms.	✓			
	Accessibility:	No crossings provided.	✘	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	No crossings provided. No footpath on eastern side of Dyke Road (south).	✘	Existing footpath width to be widened. Crossing width to be provided up to standard.	✓			
	Overall LoS	0 indicator met	E	4 indicators met	A			
Section 10								
Headford Road at Headford Road / Riverside Signalised Pedestrian Crossing	Pedestrian Routing:	Signalised crossings available on Headford Road but not Woodquay Street.	✘	Existing signalised pedestrian crossing on Headford Road will be retained. New raised table junction with tactile paving will be provided on Woodquay Street.	✓	Medium	High	Positive Very Significant and Long-Term
	Pedestrian Directness:	Crossings are in one stage.	✓	Crossings will be in one stage on all arms.	✓			
	Accessibility:	Adequate tactile paving, dropped kerbs and road markings at existing crossing points.	✓	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			

Junctions	Criteria	Do Minimum		Do Something		Impact	Sensitivity	Significance of Effect
		Comment	Criteria Met	Comment	Criteria Met			
	Footpath and Crossing Widths:	Existing footpaths are approximately 1.6m wide. Crossings are 2.4m wide.	✖	Widening works proposed to the 1.6m wide footpath along Headford Road eastbound	✓			
	Overall LoS	2 indicators met	C	4 indicators met	A			
Section 11								
Merchants Road / Forthill Street Uncontrolled JCT	Pedestrian Routing:	Uncontrolled crossing on Forthill Street, no crossings available on Merchants Street	✖	Signalised crossing available on Forthill Street and raised entry treatment available on Merchants Street (east)	✓	Medium	Medium	Positive Significant and Long-Term
	Pedestrian Directness:	Crossing is in one stage	✓	Crossings are in one stage	✓			
	Accessibility:	Adequate tactile paving dropped kerbs present. Road markings suitable.	✖	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 1.6m wide. Crossings are 1.2m wide.	✓	New geometry to be fully compliant with design standard.	✓			
	Overall LoS	2 indicators met	C	4 indicators met	A			
Forthill Street / Queen Street Uncontrolled JCT	Pedestrian Routing:	No crossings present.	✖	Signalised crossing available on Forthill Street and raised entry treatment available on Queen Street	✓	High	Low	Positive Moderate and Long-Term
	Pedestrian Directness:	No crossings present.	✖	Crossings are in one stage	✓			
	Accessibility:	Tactile paving and dropped kerbs present on one side of the road only.	✖	Fully compliant tactile paving, dropped kerbs, road markings at all crossing points.	✓			
	Footpath and Crossing Widths:	Existing footpaths are approximately 2m wide. Crossings are 1.2m wide.	✖	New geometry to be fully compliant with design standard.	✓			
	Overall LoS	0 indicators met	E	4 indicators met	A			

6.2 Cycling Infrastructure

Location	Cyclist Impact	Do Minimum		Do Something		Impact	Sensitivity of Environment	Significance of Effect
		Description	LoS	Description	LoS			
Section 1								
University Road /Newcastle Road to University Road / Gaol Road (east)	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	Medium	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			
Goal Road / Goal Road (incorporating orbital route)	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	Low	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			
Salmon Weir Bridge to Waterside	Segregation	No specific bicycle facilities	D	Bicycles share traffic or bus lanes	C	Medium	Medium	Positive Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities at junctions.	D			
	Overall		D		B			
Newtownsmith from Corrib Bridge to Waterside	Segregation	No specific bicycle facilities	D	High degree of separation. Minimal delay	A+	Medium	Low	Positive Moderate and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each one-way cycle lane has capacity for cycling one cyclist only (1.25m, 1+0)	C			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities at junctions.	D			
	Overall		D		B			
St Vincent’s Ave from Waterside to St Francis St	Segregation	No specific bicycle facilities	D	Bicycles share traffic or bus lanes	C	Medium	High	Positive Very Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+			

Location	Cyclist Impact	Do Minimum		Do Something		Impact	Sensitivity of Environment	Significance of Effect
		Description	LoS	Description	LoS			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities at junctions.	D			
	Overall		D		B			
Section 2								
St Francis St from Courthouse Square to Dalys Place	Segregation	No specific bicycle facilities	D	Bicycles share traffic or bus lanes	C	Medium	High	Positive Very Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities at junctions.	D			
	Overall		D		B			
Eglinton / Williamsgate St from Mary St to Eyre Square	Segregation	No specific bicycle facilities	D	Bicycles share traffic or bus lanes	C	Medium	High	Positive Very Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities at junctions.	D			
	Overall		D		B			
Section 3								
An Fhaiche Mhor from Rosemary Ave to Eyre St	Segregation	No specific bicycle facilities	D	Bicycles share traffic or bus lanes	C	Medium	High	Positive Very Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities at junctions.	D			
	Overall		D		B			
Williamsgate Street / Eglinton Street to Prospect Hill / Bothar Na mBan	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	High	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			
Eyre Square East	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	High	

Location	Cyclist Impact	Do Minimum		Do Something		Impact	Sensitivity of Environment	Significance of Effect
		Description	LoS	Description	LoS			
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			Not Significant and Long-Term
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			
Eyre Square West	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	High	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			
Eyre Square / Forster St from Victoria Pl to Fairgreen Rd	Segregation	No specific bicycle facilities	D	Bicycles share traffic or bus lanes	C	Medium	High	Positive Very Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities at junctions.	D			
	Overall		D		B			
Section 4								
Forster St/ College Rd from Fairgreen Rd to / Lough Atalia Rd	Segregation	No specific bicycle facilities	D	Carriageway designated as ‘quiet cycle route’	B	Medium	Medium	Positive Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities at junctions.	D			
	Overall		D		B			
Section 5								
College Rd from Lough Atalia Rd to Old Dublin Rd	Segregation	No specific bicycle facilities	D	Bicycles share bus lane for Eastbound direction, while Westbound direction has segregated one-way cycle lane	B	Medium	Low	Positive Moderate and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Bikes sharing Bus Lane have more than 2,5m, while cycle lane is circa	B			

Location	Cyclist Impact	Do Minimum		Do Something		Impact	Sensitivity of Environment	Significance of Effect
		Description	LoS	Description	LoS			
				1,5m wide for one-way cycling only.				
	Junction Treatment	No specific bicycle facilities	D	Toucan crossings at signalised junctions for cyclists along CBC / Protected junctions not already classified as A+ for junction treatment.	A			
	Overall		D		B			
Section 6								
Old Dublin Road from College Road to Sáilín	Segregation	No specific bicycle facilities	D	On Old Dublin Road there are fully segregated one-way cycle lanes for both Northbound and Southbound directions.	A+	High	Low	Positive Moderate and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+			
	Junction Treatment	No specific bicycle facilities	D	Toucan crossings at signalised junctions for cyclists along CBC / Protected junctions not already classified as A+ for junction treatment.	A			
	Overall		D		A+			
Section 7								
Bóthar Bhreandain Uí Eithir / Forster Street to Fairegeen Road / Lough Atalia Road	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	Medium	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			
Section 8								
Bóthar na mBan / Prospect Hill to Prospect Hill / Bóthar Bhreandain Uí Eithir	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	Medium	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			

Location	Cyclist Impact	Do Minimum		Do Something		Impact	Sensitivity of Environment	Significance of Effect
		Description	LoS	Description	LoS			
	Overall		D		D			
Prospect Hill / Bóthar Bhreandain Uí Eithir to Bóthar Bhreandain Uí Eithir / Forster	Segregation	Bicycles share traffic or bus lanes	C	Bicycles share traffic or bus lanes	C	Negligible	Medium	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+			
	Junction Treatment	No specific bicycle facilities at junctions.	D	No specific bicycle facilities at junctions.	D			
	Overall		B		B			
Section 9								
Headford Road / St Brendan’s Avenue / Dyke Road to Bothar na mBan/ Prospect Hill	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	Low	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			
Headford Rd from St Brendan’s Ave to St Bridget’s Place	Segregation	No specific bicycle facilities	D	Bicycles share traffic or bus lanes	C	Medium	High	Positive Very Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities at junctions.	D			
	Overall		D		B			
Dyke Road to Dyke Road	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	Low	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			
Dyke Road from St Brendan’s Avenue to Dyke Road	Segregation	No specific bicycle facilities	D	Well separated at mid-link with some conflict at intersections and parking alongside cycle lane	A	Medium	Medium	Positive Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each cycle lane has capacity for cycling two abreast and / or overtaking (1.75, 1+1)	B			

Location	Cyclist Impact	Do Minimum		Do Something		Impact	Sensitivity of Environment	Significance of Effect
		Description	LoS	Description	LoS			
	Junction Treatment	No specific bicycle facilities	D	Cyclists share green time with general traffic with cycle facilities (advanced stacking locations / cycle lanes) available up to the junction but don't continue through.	C			
	Overall		D		B			
Headford Road / St Brendan's Avenue / Dyke Road to The Plots Road	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	Medium	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			
Section 10								
St Vincent's Ave / Headford Rd from St Francis St to Dyke Rd	Segregation	No specific bicycle facilities	D	Bicycles share traffic or bus lanes	C	Medium	High	Positive Very Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each cycle lane has capacity for cycling two abreast and / or overtaking (>= 2.5m, 2+1)	A+			
	Junction Treatment	No specific bicycle facilities	D	Cyclists share green time with general traffic with cycle facilities (advanced stacking locations / cycle lanes) available up to the junction but don't continue through.	C			
	Overall		D		B			
Mary St / Woodquay Street from Newtownsmith to Headford Rd	Segregation	No specific bicycle facilities	D	Well separated at mid-link with some conflict with parked vehicles and at intersections	A	Medium	Low	Positive Moderate and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	Each one-way cycle lane has capacity for cycling one cyclist only (<=1.25m, 1+0)	D			
	Junction Treatment	No specific bicycle facilities	D	Cyclists share green time with general traffic with cycle facilities (advanced stacking locations / cycle lanes) available up to the junction but don't continue through.	C			
	Overall		D		B			

Location	Cyclist Impact	Do Minimum		Do Something		Impact	Sensitivity of Environment	Significance of Effect
		Description	LoS	Description	LoS			
Section 11								
Victoria Place / Eyre Square to Queen Street / Bóthar Na nDuganna / Dock Road	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	Medium	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			
Victoria Place / Merchant's Road to Merchant's Road	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	Low	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			
Merchants Road / Forthill Street to Queen Street / Forthill Street	Segregation	No specific bicycle facilities	D	No specific bicycle facilities	D	Negligible	Medium	Not Significant and Long-Term
	Number of Adjacent Cyclists / Width	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Junction Treatment	No specific bicycle facilities	D	No specific bicycle facilities	D			
	Overall		D		D			

6.3 General Traffic Redistribution – Junction Assessment

6.3.1 2023 AM

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Headford Road	Headford Road / Bothar Na Dtreabh	Negligible	306	101.6	106.9	Negligible	Imperceptible
Headford Road	Headford Road / Dun Na Coiribe	Low	306	64.3	67.2	Negligible	Not Significant
Quincentenary Bridge	Quincentenary Bridge Approach Road / Headford Road	Low	729	100.8	113.7	Negligible	Not Significant
Quincentenary Bridge	Quincentenary Bridge Approach Road / Upper Newcastle Road	Low	729	104.1	112.1	Negligible	Not Significant
Quincentenary Bridge	Thomas Hynes Road / Seamus Quirke Road	Low	729	98.0	110.7	Medium	Negative Moderate
Circular Road	Circular Road / Siabhan Mckenna Road	Medium	145	65.6	67.3	Negligible	Not Significant
Circular Road	Rahoon Road / Circular Road	Low	145	105.9	109.6	Negligible	Not Significant
Bushypark	Bushypark / Corcullen Road	High	110	10.9	10.9	Negligible	Not Significant
Bushypark	Upper Clybaun Road / Corcullen Road	High	110	73.2	92.0	Low	Negative Moderate
Western Distributor Road	Rahoon Road / Unnamed	Medium	102	35.2	42.3	Negligible	Not Significant
Western Distributor Road	Unnamed / Galway West Business Park	High	102	16.9	24.0	Negligible	Not Significant
Bothar Le Cheile	Bothar Le Cheile / Seamus Quirke Road	Low	175	100.1	105.2	Negligible	Not Significant
Siobhan Mckenna Road	Bothar Le Cheile / Siabhan Mckenna Road	High	228	62.5	67.8	Negligible	Not Significant
Siobhan Mckenna Road	Siobhan Mckenna Road / Thomas Hynes Road	Low	228	94.5	68.5	Low Positive	Positive Slight
Moyola Park	Moyola Park / Upper Newcastle Road	Low	109	47.9	101.7	High	Negative Moderate
Moyola Park	Thomas Hynes Road / Moyola Park	Low	109	23.8	21.7	Negligible	Not Significant
N83 Tuam Road	N83 Tuam Road / Bothar Na Mine	Negligible	164	67.4	70.5	Negligible	Imperceptible
N83 Tuam Road	N83 Tuam Road / Parkmore Road	Negligible	164	99.2	93.7	Negligible	Imperceptible
Wellpark	Tuam Road / Wellpark	Low	123	112.1	107.6	Negligible	Not Significant
Wellpark	Wellpark Road / Connolly Avenue	Medium	123	91.3	58.0	Low Positive	Positive Moderate

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Ballybane Road	Ballybane Road / Beechwood Park	Low	228	43.8	42.4	Negligible	Not Significant
Ballybane Road	Ballybane Road / Castlepark Road	Low	228	33.2	29.0	Negligible	Not Significant
Ballybane Road	Ballybane Road / Glasan	Low	228	41.7	52.4	Negligible	Not Significant
Ballybane Road	Ballybane Road / Monivea Road	Low	228	35.7	41.0	Negligible	Not Significant
Ballybane Road	Ballybane Road / Rahylin Glebe	Low	228	52.5	52.4	Negligible	Not Significant
Dublin Road	Dublin Road / Ballybane Road	Low	235	59.1	66.9	Negligible	Not Significant
Dublin Road	Dublin Road / Ballyloughane Road	Low	235	51.4	54.6	Negligible	Not Significant
Dublin Road	Dublin Road / Michael Collins Road	Low	235	97.4	79.3	Low Positive	Positive Slight
Dublin Road	Dublin Road / Renmore Park	Low	235	75.2	91.3	Low	Negative Slight
Dublin Road	Dublin Road / Renmore Road	Low	235	96.6	96.2	Negligible	Not Significant
Moneenageisha Road	Moneenageisha Road / Wellpark Road	Low	301	109.1	99.0	Negligible	Not Significant
Bohermore	Bohermore / Cookes Terrace	Low	136	35.4	54.9	Negligible	Not Significant
Bohermore	Bohermore / Saint Anthonys Terrace	High	136	39.5	49.2	Negligible	Not Significant
Lough Atalia Road	Fairgreen Road / Lough Atalia Road	Low	944	53.8	102.8	High	Negative Moderate
Lough Atalia Road	Lough Atalia Road / Bothar Na Long	Low	944	42.2	109.4	High	Negative Moderate
Lough Atalia Road	Lough Atalia Road / College Road	Low	944	50.3	100.7	High	Negative Moderate
Bothar Na Long	Bothar Na Long / Dock Road	Low	869	34.4	103.5	High	Negative Moderate
Bothar Na Long	Bothar Na Long / Queen Street	Low	869	68.2	102.9	High	Negative Moderate
Fairgreen Road	Fairgreen Road / Station Road	High	719	14.4	32.2	Negligible	Not Significant
Fairgreen Road	Forster Street / Bothar Bhreandan Ui Eithir	Low	719	78.8	95.0	Low	Negative Slight
Bothar Na Mban	Bothar Na Mban / Bothar Irwin	High	434	14.5	37.6	Negligible	Not Significant
Forthill Street	Forthill Street / Queen Street	Low	313	100.1	76.8	Medium Positive	Positive Moderate
Forthill Street	Merchants Road / Forthill Street	Low	313	44.5	70.6	Negligible	Not Significant
Merchants Road (Saint Nicholas St - Forthill St)	Merchants Road / Lower Abbeygate Street	Low	305	22.6	30.6	Negligible	Not Significant

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Merchants Road (Saint Nicholas St - Forthill St)	New Dock Street / Merchants Road	Low	305	65.0	97.2	Low	Negative Slight
New Dock Street	New Dock Street / Dock Road	Low	175	27.7	29.6	Negligible	Not Significant
Flood Street	Flood Street / New Dock Street	Low	219	73.4	84.2	Negligible	Not Significant
Flood Street	Wolfe Tone Bridge / Spanish Parade	Low	219	86.6	90.7	Negligible	Not Significant
Taylor's Hill Road	Taylor's Hill Road / Ardmore	Low	146	30.7	32.9	Negligible	Not Significant
Taylor's Hill Road	Taylor's Hill Road / Bishop O'Donnell Road	Low	146	100.2	100.3	Negligible	Not Significant
Taylor's Hill Road	Taylor's Hill Road / Maunsell's Road	Low	146	65.3	83.4	Negligible	Not Significant
Taylor's Hill Road	Taylor's Hill Road / Rosary Lane	Low	146	89.9	97.8	Negligible	Not Significant
Rahoon Road	Rahoon Road / Highfield Park	Medium	122	28.6	35.7	Negligible	Not Significant
Rahoon Road	Rahoon Road / Seamus Quirke Road	Low	122	64.3	72.6	Negligible	Not Significant
Old Seamus Quirke Road	Old Seamus Quirke Road / Ashe Road	High	249	16.2	30.3	Negligible	Not Significant
Old Seamus Quirke Road	Old Seamus Quirke Road / Weatherly Lodge	High	249	14.7	17.1	Negligible	Not Significant
Old Seamus Quirke Road	Seamus Quirke Road / Old Seamus Quirke Road	Low	249	91.8	89.3	Negligible	Not Significant
Ashe Road	Ashe Road / Costello Road	High	120	5.5	13.4	Negligible	Not Significant
Shantalla Road	Rahoon Road / Old Seamus Quirke Road	Medium	250	45.8	81.9	Negligible	Not Significant
Shantalla Road	Shantalla Road / Colmcille Road	Medium	250	46.9	52.8	Negligible	Not Significant
Shantalla Road	Shantalla Road / Mc Dara Road	Medium	250	47.5	53.9	Negligible	Not Significant
Shantalla Road	Shantalla Road / Rahoon Road	Medium	250	91.9	89.9	Negligible	Not Significant
Seamus Quirke Road (Lower Newcastle Rd - Browne Rbt)	Seamus Quirke Road / Lower Newcastle Road	Medium	411	76.5	82.2	Negligible	Not Significant
Seamus Quirke Road (Lower Newcastle Rd - Browne Rbt)	Seamus Quirke Road / Snipe Lawn	High	411	29.4	32.2	Negligible	Not Significant
Lower Newcastle Road (University Rd - Seamus Quirke Road)	Lower Newcastle Road / Newcastle Avenue	Medium	373	58.3	48.9	Negligible	Not Significant
Lower Newcastle Road (University Rd - Seamus Quirke Road)	Newcastle Road / University Road	Medium	373	95.8	97.5	Negligible	Not Significant

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Newcastle Road	Costello Road / Newcastle Road	Medium	372	49.5	65.4	Negligible	Not Significant
Newcastle Road	Newcastle Road / Presentation Road	Medium	372	23.9	57.8	Negligible	Not Significant
Newcastle Road	St Mary'S Road / Shantalla Road	Medium	372	56.1	69.5	Negligible	Not Significant
St Mary'S Road	St Mary'S Road / Palmyra Avenue	Medium	104	26.8	32.4	Negligible	Not Significant
St Mary'S Road	The Crescent / Lower Salthill Road	Low	104	90.7	96.7	Negligible	Not Significant
Gaol Road (South Of University Rd)	Gaol Road / Gaol Road	High	172	22.4	17.1	Negligible	Not Significant
Gaol Road (South Of University Rd)	University Road / Gaol Road	Medium	172	35.3	12.2	Negligible	Not Significant
Presentation Road	Presentation Road / New Road	High	148	12.5	14.1	Negligible	Not Significant
Presentation Road	Presentation Road / Parkavara	High	148	13.8	11.4	Negligible	Not Significant
Bothar Na Dtreabh (N83-N84)	Bothar Na Dtreabh / Glenburren Park	Negligible	273	148.6	150.7	Negligible	Imperceptible
Bothar Na Dtreabh (N83-N84)	Bothar Na Dtreabh / Tuam Road	Negligible	273	103.3	101.4	Negligible	Imperceptible

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Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Quincentenary Bridge	Quincentenary Bridge Approach Road / Headford Road	Low	486	102.1	122.3	Negligible	Not Significant
Quincentenary Bridge	Quincentenary Bridge Approach Road / Upper Newcastle Road	Low	486	96.4	97.4	Negligible	Not Significant
Quincentenary Bridge	Thomas Hynes Road / Seamus Quirke Road	Low	486	71.5	96.7	Low	Negative Slight
Circular Road	Circular Road / Siabhan Mckenna Road	Medium	132	86.3	85.4	Negligible	Not Significant
Circular Road	Rahoon Road / Circular Road	Low	132	104.8	95.0	Low Positive	Positive Slight
Siobhan Mckenna Road	Bothar Le Cheile / Siabhan Mckenna Road	High	119	30.0	54.6	Negligible	Not Significant
Siobhan Mckenna Road	Siobhan Mckenna Road / Thomas Hynes Road	Low	119	49.1	65.9	Negligible	Not Significant
N84 Headford Road	Headford Road / Bothar Na Dtreabh	Negligible	307	110.4	107.3	Negligible	Imperceptible
N84 Headford Road	N84 Headford Road / Ballinfoile Park	Negligible	307	69.8	63.8	Negligible	Imperceptible

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
N84 Headford Road	N84 Headford Road / Bothar An Choiste	Negligible	307	51.8	49.3	Negligible	Imperceptible
N84 Headford Road	N84 Headford Road / Brookdale	Negligible	307	62.2	58.6	Negligible	Imperceptible
N84 Headford Road	N84 Headford Road / Monument Road	Negligible	307	72.2	70.2	Negligible	Imperceptible
N84 Headford Road	N84 Headford Road / Tirellan Heights	Negligible	307	61.6	58.3	Negligible	Imperceptible
Doughiska Road	Doughiska Road / An Fiodan	High	113	23.9	31.4	Negligible	Not Significant
Doughiska Road	Doughiska Road / Dublin Road	Low	113	107.6	103.8	Negligible	Not Significant
Doughiska Road	Doughiska Road / Fearann Ri	High	113	48.7	53.5	Negligible	Not Significant
Doughiska Road	Doughiska Road / Merlin Park Lane	High	113	22.3	18.1	Negligible	Not Significant
Sandy Road	Sandy Road / Glen Na Tra	High	182	34.3	36.8	Negligible	Not Significant
Sandy Road	Sandy Road / Gort Na Glaise	High	182	13.2	23.1	Negligible	Not Significant
Sandy Road	Sandy Road / Maldron Hotel	High	182	20.0	33.8	Negligible	Not Significant
Lough Atalia Road	Fairgreen Road / Lough Atalia Road	Low	1,111	44.4	99.8	Low	Negative Slight
Lough Atalia Road	Lough Atalia Road / College Road	Low	1,111	37.0	93.8	Low	Negative Slight
College Road (Lough Atalia Rd - Dublin Rd)	Moneenageisha Road / Wellpark Road	Low	100	87.4	101.0	Medium	Negative Moderate
Bothar Na Long	Bothar Na Long / Dock Road	Low	1,179	28.6	102.3	High	Negative Moderate
Bothar Na Long	Bothar Na Long / Queen Street	Low	1,179	56.6	103.0	High	Negative Moderate
Bothar Na Long	Lough Atalia Road / Bothar Na Long	Low	1,179	50.3	172.3	High	Negative Moderate
Fairgreen Road	Fairgreen Road / Station Road	High	760	10.8	28.2	Negligible	Not Significant
Fairgreen Road	Forster Street / Bothar Bhreandan Ui Eithir	Low	760	69.5	79.7	Negligible	Not Significant
Bothar Bhreandan Ui Eithir	Bothar Bhreandan Ui Eithir / Foster Court	Low	158	24.0	25.4	Negligible	Not Significant
Bothar Bhreandan Ui Eithir	Prospect Hill / Bothar Bhreandan Ui Eithir	Low	158	36.6	92.4	Low	Negative Slight
Bothar Na Mban	Bothar Na Mban / Bothar Irwin	High	335	11.6	19.7	Negligible	Not Significant
Forthill Street	Forthill Street / Queen Street	Low	502	92.6	71.9	Low Positive	Positive Slight
Forthill Street	Merchants Road / Forthill Street	Low	502	21.6	63.5	Negligible	Not Significant

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Merchants Road (Saint Nicholas St - Forthill St)	Merchants Road / Lower Abbeygate Street	Low	230	24.1	26.0	Negligible	Not Significant
Merchants Road (Saint Nicholas St - Forthill St)	New Dock Street / Merchants Road	Low	230	35.5	48.8	Negligible	Not Significant
St Francis Street	St Francis Street / Mary Street	Medium	119	74.0	33.0	Negligible	Not Significant
St Francis Street	St Vincents Avenue / Saint Francis Street	Medium	119	71.5	83.4	Negligible	Not Significant
New Dock Street	New Dock Street / Dock Road	Low	173	30.6	34.1	Negligible	Not Significant
Wolfe Tone Bridge	Father Griffin Road / Claddagh Quay	Low	171	54.3	52.6	Negligible	Not Significant
Flood Street	Flood Street / New Dock Street	Low	225	41.0	55.2	Negligible	Not Significant
Flood Street	Wolfe Tone Bridge / Spanish Parade	Low	225	94.4	93.5	Negligible	Not Significant
Shantalla Road	Rahoon Road / Old Seamus Quirke Road	Medium	165	51.8	41.5	Negligible	Not Significant
Shantalla Road	Shantalla Road / Colmcille Road	Medium	165	32.8	34.4	Negligible	Not Significant
Shantalla Road	Shantalla Road / Mc Dara Road	Medium	165	30.7	32.0	Negligible	Not Significant
Shantalla Road	Shantalla Road / Rahoon Road	Medium	165	39.7	40.6	Negligible	Not Significant
Seamus Quirke Road (Lower Newcastle Rd - Browne Rbt)	Seamus Quirke Road / Snipe Lawn	High	295	19.8	28.4	Negligible	Not Significant
Lower Newcastle Road (Seamus Quirke Road - Snipe Av)	Lower Newcastle Road / Distillery Road	Medium	203	97.4	86.7	Negligible	Not Significant
Lower Newcastle Road (University Rd - Seamus Quirke Road)	Lower Newcastle Road / Newcastle Avenue	Medium	406	33.7	49.1	Negligible	Not Significant
Lower Newcastle Road (University Rd - Seamus Quirke Road)	Newcastle Road / University Road	Medium	406	93.7	96.0	Negligible	Not Significant
Lower Newcastle Road (University Rd - Seamus Quirke Road)	Seamus Quirke Road / Lower Newcastle Road	Medium	406	48.5	59.0	Negligible	Not Significant
Newcastle Road	Costello Road / Newcastle Road	Medium	287	62.1	38.0	Negligible	Not Significant
Newcastle Road	Newcastle Road / Presentation Road	Medium	287	30.3	66.0	Negligible	Not Significant
Newcastle Road	St Mary'S Road / Shantalla Road	Medium	287	59.3	69.2	Negligible	Not Significant

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Gaol Road (South Of University Rd)	Gaol Road / Gaol Road	High	220	28.8	22.6	Negligible	Not Significant
Gaol Road (South Of University Rd)	University Road / Gaol Road	Medium	220	30.1	17.1	Negligible	Not Significant
Father Griffin Road	Father Griffin Road / Father Burke Road	Low	163	33.3	35.2	Negligible	Not Significant
Father Griffin Road	Father Griffin Road / Father Griffin Avenue	Low	163	42.3	53.6	Negligible	Not Significant
Father Griffin Road	Father Griffin Road / Grattan Court	High	163	15.8	21.9	Negligible	Not Significant
Father Griffin Road	Father Griffin Road / Lower Salthill Road	Medium	163	32.3	61.9	Negligible	Not Significant
Father Griffin Road	Father Griffin Road / Munster Avenue	Low	163	31.7	33.8	Negligible	Not Significant
Father Griffin Road	Father Griffin Road / Whitestrand Road	Medium	163	23.5	35.3	Negligible	Not Significant
Presentation Road	Presentation Road / New Road	High	232	12.1	15.1	Negligible	Not Significant
Presentation Road	Presentation Road / Parkavara	High	232	11.2	13.8	Negligible	Not Significant
Mill Street	Mill Street / Presentation Road	High	153	15.7	16.5	Negligible	Not Significant
Henry Street	Henry Street / William Street West	Medium	257	39.2	52.5	Negligible	Not Significant
Henry Street	St Helen's Street / New Road	Medium	257	17.9	18.8	Negligible	Not Significant
Lower Road Fairhill	Dominick Street Upper / Lower Fairhill Road	Medium	181	41.1	61.4	Negligible	Not Significant
Lower Road Fairhill	Father Griffin Road / Lower Fairhill Road	Low	181	88.1	76.7	Negligible	Not Significant

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Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Headford Road	Headford Road / Bothar Na Dtreabh	Negligible	306	100.7	100.6	Negligible	Imperceptible
Headford Road	Headford Road / Dun Na Coiribe	Low	306	57.9	57.2	Negligible	Not Significant
Quincentenary Bridge	Quincentenary Bridge Approach Road / Headford Road	Low	729	96.4	106.4	Medium	Negative Moderate
Quincentenary Bridge	Quincentenary Bridge Approach Road / Upper Newcastle Road	Low	729	101.8	119.9	Negligible	Not Significant
Quincentenary Bridge	Thomas Hynes Road / Seamus Quirke Road	Low	729	105.3	121.3	Negligible	Not Significant
Circular Road	Circular Road / Siabhan Mckenna Road	Medium	145	55.6	51.2	Negligible	Not Significant
Circular Road	Rahoon Road / Circular Road	Low	145	103.6	103.4	Negligible	Not Significant
Bushypark	Bushypark / Corcullen Road	High	110	12.0	12.0	Negligible	Not Significant
Bushypark	Upper Clybaun Road / Corcullen Road	High	110	34.7	38.3	Negligible	Not Significant
Western Distributor Road	Rahoon Road / Unnamed	Medium	102	31.3	38.2	Negligible	Not Significant
Western Distributor Road	Unnamed / Galway West Business Park	High	102	23.9	25.7	Negligible	Not Significant
Bothar Le Cheile	Bothar Le Cheile / Seamus Quirke Road	Low	175	49.7	88.5	Low	Negative Slight
Siobhan Mckenna Road	Bothar Le Cheile / Siabhan Mckenna Road	High	228	46.2	44.8	Negligible	Not Significant
Siobhan Mckenna Road	Siobhan Mckenna Road / Thomas Hynes Road	Low	228	109.9	125.6	Negligible	Not Significant
Moyola Park	Moyola Park / Upper Newcastle Road	Low	109	15.4	11.6	Negligible	Not Significant
Moyola Park	Thomas Hynes Road / Moyola Park	Low	109	44.4	46.3	Negligible	Not Significant
N83 Tuam Road	N83 Tuam Road / Bothar Na Mine	Negligible	164	52.8	52.8	Negligible	Imperceptible
N83 Tuam Road	N83 Tuam Road / Parkmore Road	Negligible	164	85.8	84.3	Low Positive	Not Significant
Wellpark	Tuam Road / Wellpark	Low	123	76.0	72.0	Negligible	Not Significant
Wellpark	Wellpark Road / Connolly Avenue	Medium	123	56.0	59.2	Negligible	Not Significant
Ballybane Road	Ballybane Road / Beechwood Park	Low	228	47.5	50.6	Negligible	Not Significant
Ballybane Road	Ballybane Road / Castlepark Road	Low	228	40.0	33.9	Negligible	Not Significant

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Ballybane Road	Ballybane Road / Glasan	Low	228	35.2	41.8	Negligible	Not Significant
Ballybane Road	Ballybane Road / Monivea Road	Low	228	42.3	40.5	Negligible	Not Significant
Ballybane Road	Ballybane Road / Rahylin Glebe	Low	228	62.2	57.9	Negligible	Not Significant
Dublin Road	Dublin Road / Ballybane Road	Low	235	84.3	88.1	Low	Negative Slight
Dublin Road	Dublin Road / Ballyloughane Road	Low	235	53.5	49.2	Negligible	Not Significant
Dublin Road	Dublin Road / Michael Collins Road	Low	235	94.9	99.9	Negligible	Not Significant
Dublin Road	Dublin Road / Renmore Park	Low	235	96.9	88.0	Negligible	Not Significant
Dublin Road	Dublin Road / Renmore Road	Low	235	98.8	98.4	Negligible	Not Significant
Moneenageisha Road	Moneenageisha Road / Wellpark Road	Low	301	98.0	100.7	Medium	Negative Moderate
Bohermore	Bohermore / Cookes Terrace	Low	136	48.4	58.2	Negligible	Not Significant
Bohermore	Bohermore / Saint Anthonys Terrace	High	136	43.3	53.0	Negligible	Not Significant
Lough Atalia Road	Fairgreen Road / Lough Atalia Road	Low	944	50.5	109.9	High	Negative Moderate
Lough Atalia Road	Lough Atalia Road / Bothar Na Long	Low	944	48.4	147.7	High	Negative Moderate
Lough Atalia Road	Lough Atalia Road / College Road	Low	944	47.0	110.1	High	Negative Moderate
Bothar Na Long	Bothar Na Long / Dock Road	Low	869	30.5	153.4	High	Negative Moderate
Bothar Na Long	Bothar Na Long / Queen Street	Low	869	64.4	102.9	High	Negative Moderate
Fairgreen Road	Fairgreen Road / Station Road	High	719	14.5	30.4	Negligible	Not Significant
Fairgreen Road	Forster Street / Bothar Bhreandan Ui Eithir	Low	719	79.9	101.6	High	Negative Moderate
Bothar Na Mban	Bothar Na Mban / Bothar Irwin	High	434	13.8	33.6	Negligible	Not Significant
Forthill Street	Forthill Street / Queen Street	Low	313	100.1	85.7	Low Positive	Positive Slight
Forthill Street	Merchants Road / Forthill Street	Low	313	38.9	78.0	Negligible	Not Significant
Merchants Road (Saint Nicholas St - Forthill St)	Merchants Road / Lower Abbeygate Street	Low	305	33.8	30.1	Negligible	Not Significant
Merchants Road (Saint Nicholas St - Forthill St)	New Dock Street / Merchants Road	Low	305	65.2	96.3	Low	Negative Slight
New Dock Street	New Dock Street / Dock Road	Low	175	25.9	28.7	Negligible	Not Significant

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Flood Street	Flood Street / New Dock Street	Low	219	74.3	78.0	Negligible	Not Significant
Flood Street	Wolfe Tone Bridge / Spanish Parade	Low	219	82.1	93.9	Low	Negative Slight
Taylor's Hill Road	Taylor's Hill Road / Ardmore	Low	146	20.3	20.8	Negligible	Not Significant
Taylor's Hill Road	Taylor's Hill Road / Bishop O'Donnell Road	Low	146	102.8	101.4	Negligible	Not Significant
Taylor's Hill Road	Taylor's Hill Road / Maunsell's Road	Low	146	42.7	48.2	Negligible	Not Significant
Taylor's Hill Road	Taylor's Hill Road / Rosary Lane	Low	146	90.7	86.8	Negligible	Not Significant
Rahoon Road	Rahoon Road / Highfield Park	Medium	122	43.1	44.6	Negligible	Not Significant
Rahoon Road	Rahoon Road / Seamus Quirke Road	Low	122	85.2	86.4	Negligible	Not Significant
Old Seamus Quirke Road	Old Seamus Quirke Road / Ashe Road	High	249	37.9	40.3	Negligible	Not Significant
Old Seamus Quirke Road	Old Seamus Quirke Road / Weatherly Lodge	High	249	15.8	20.9	Negligible	Not Significant
Old Seamus Quirke Road	Seamus Quirke Road / Old Seamus Quirke Road	Low	249	90.6	98.9	Negligible	Not Significant
Ashe Road	Ashe Road / Costello Road	High	120	34.5	33.5	Negligible	Not Significant
Shantalla Road	Rahoon Road / Old Seamus Quirke Road	Medium	250	68.1	84.8	Negligible	Not Significant
Shantalla Road	Shantalla Road / Colmcille Road	Medium	250	57.4	56.9	Negligible	Not Significant
Shantalla Road	Shantalla Road / Mc Dara Road	Medium	250	58.7	58.4	Negligible	Not Significant
Shantalla Road	Shantalla Road / Rahoon Road	Medium	250	94.8	96.3	Negligible	Not Significant
Seamus Quirke Road (Lower Newcastle Rd - Browne Rbt)	Seamus Quirke Road / Lower Newcastle Road	Medium	411	60.4	96.1	Low	Negative Moderate
Seamus Quirke Road (Lower Newcastle Rd - Browne Rbt)	Seamus Quirke Road / Snipe Lawn	High	411	9.1	7.8	Negligible	Not Significant
Lower Newcastle Road (University Rd - Seamus Quirke Road)	Lower Newcastle Road / Newcastle Avenue	Medium	373	102.7	105.3	Negligible	Not Significant
Lower Newcastle Road (University Rd - Seamus Quirke Road)	Newcastle Road / University Road	Medium	373	100.2	96.2	Low Positive	Positive Moderate
Newcastle Road	Costello Road / Newcastle Road	Medium	372	87.4	88.0	Negligible	Not Significant
Newcastle Road	Newcastle Road / Presentation Road	Medium	372	72.9	64.2	Negligible	Not Significant

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Newcastle Road	St Mary'S Road / Shantalla Road	Medium	372	93.3	93.7	Negligible	Not Significant
St Mary'S Road	St Mary'S Road / Palmyra Avenue	Medium	104	33.5	33.9	Negligible	Not Significant
St Mary'S Road	The Crescent / Lower Salthill Road	Low	104	99.1	98.7	Negligible	Not Significant
Gaol Road (South Of University Rd)	Gaol Road / Gaol Road	High	172	25.6	23.7	Negligible	Not Significant
Gaol Road (South Of University Rd)	University Road / Gaol Road	Medium	172	33.1	12.6	Negligible	Not Significant
Presentation Road	Presentation Road / New Road	High	148	29.0	16.9	Negligible	Not Significant
Presentation Road	Presentation Road / Parkavara	High	148	25.9	13.8	Negligible	Not Significant
Bothar Na Dtreabh (N83-N84)	Bothar Na Dtreabh / Glenburren Park	Negligible	273	56.1	45.8	Negligible	Imperceptible
Bothar Na Dtreabh (N83-N84)	Bothar Na Dtreabh / Tuam Road	Negligible	273	102.1	100.8	Negligible	Imperceptible

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Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Quincentenary Bridge	Quincentenary Bridge Approach Road / Headford Road	Low	486	109.6	118.7	Negligible	Not Significant
Quincentenary Bridge	Quincentenary Bridge Approach Road / Upper Newcastle Road	Low	486	97.2	104.1	Medium	Negative Moderate
Quincentenary Bridge	Thomas Hynes Road / Seamus Quirke Road	Low	486	62.3	104.7	High	Negative Moderate
Circular Road	Circular Road / Siabhan Mckenna Road	Medium	132	101.1	100.4	Negligible	Not Significant
Circular Road	Rahoon Road / Circular Road	Low	132	102.3	100.9	Negligible	Not Significant
Siobhan Mckenna Road	Bothar Le Cheile / Siabhan Mckenna Road	High	119	46.1	74.1	Negligible	Not Significant
Siobhan Mckenna Road	Siobhan Mckenna Road / Thomas Hynes Road	Low	119	70.1	82.3	Negligible	Not Significant
N84 Headford Road	Headford Road / Bothar Na Dtreabh	Negligible	307	96.3	103.0	Medium	Not Significant
N84 Headford Road	N84 Headford Road / Ballinfoile Park	Negligible	307	102.6	107.9	Negligible	Imperceptible
N84 Headford Road	N84 Headford Road / Bothar An Choiste	Negligible	307	79.5	89.2	Low	Not Significant
N84 Headford Road	N84 Headford Road / Brookdale	Negligible	307	75.9	85.5	Low	Not Significant

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
N84 Headford Road	N84 Headford Road / Monument Road	Negligible	307	94.6	92.9	Negligible	Imperceptible
N84 Headford Road	N84 Headford Road / Tirellan Heights	Negligible	307	65.4	71.3	Negligible	Imperceptible
Doughiska Road	Doughiska Road / An Fiodan	High	113	33.7	31.4	Negligible	Not Significant
Doughiska Road	Doughiska Road / Dublin Road	Low	113	107.1	107.8	Negligible	Not Significant
Doughiska Road	Doughiska Road / Fearann Ri	High	113	56.5	54.7	Negligible	Not Significant
Doughiska Road	Doughiska Road / Merlin Park Lane	High	113	17.6	18.3	Negligible	Not Significant
Sandy Road	Sandy Road / Glen Na Tra	High	182	31.5	31.8	Negligible	Not Significant
Sandy Road	Sandy Road / Gort Na Glaise	High	182	2.8	2.7	Negligible	Not Significant
Sandy Road	Sandy Road / Maldron Hotel	High	182	39.1	38.4	Negligible	Not Significant
Lough Atalia Road	Fairgreen Road / Lough Atalia Road	Low	1,111	57.3	104.5	High	Negative Moderate
Lough Atalia Road	Lough Atalia Road / College Road	Low	1,111	35.5	103.7	High	Negative Moderate
College Road (Lough Atalia Rd - Dublin Rd)	Moneenageisha Road / Wellpark Road	Low	100	100.3	95.8	Low Positive	Positive Slight
Bothar Na Long	Bothar Na Long / Dock Road	Low	1,179	24.8	142.1	High	Negative Moderate
Bothar Na Long	Bothar Na Long / Queen Street	Low	1,179	53.8	98.7	Low	Negative Slight
Bothar Na Long	Lough Atalia Road / Bothar Na Long	Low	1,179	80.5	228.3	High	Negative Moderate
Fairgreen Road	Fairgreen Road / Station Road	High	760	18.3	33.5	Negligible	Not Significant
Fairgreen Road	Forster Street / Bothar Bhreandan Ui Eithir	Low	760	70.4	99.9	Low	Negative Slight
Bothar Bhreandan Ui Eithir	Bothar Bhreandan Ui Eithir / Foster Court	Low	158	22.5	24.1	Negligible	Not Significant
Bothar Bhreandan Ui Eithir	Prospect Hill / Bothar Bhreandan Ui Eithir	Low	158	43.1	86.8	Low	Negative Slight
Bothar Na Mban	Bothar Na Mban / Bothar Irwin	High	335	11.7	18.1	Negligible	Not Significant
Forthill Street	Forthill Street / Queen Street	Low	502	71.5	80.2	Negligible	Not Significant
Forthill Street	Merchants Road / Forthill Street	Low	502	32.0	73.4	Negligible	Not Significant
Merchants Road (Saint Nicholas St - Forthill St)	Merchants Road / Lower Abbeygate Street	Low	230	39.7	32.6	Negligible	Not Significant
Merchants Road (Saint Nicholas St - Forthill St)	New Dock Street / Merchants Road	Low	230	41.6	52.3	Negligible	Not Significant

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
St Francis Street	St Francis Street / Mary Street	Medium	119	93.9	33.0	Low Positive	Positive Moderate
St Francis Street	St Vincents Avenue / Saint Francis Street	Medium	119	75.1	58.6	Negligible	Not Significant
New Dock Street	New Dock Street / Dock Road	Low	173	28.1	33.9	Negligible	Not Significant
Wolfe Tone Bridge	Father Griffin Road / Claddagh Quay	Low	171	53.7	53.1	Negligible	Not Significant
Flood Street	Flood Street / New Dock Street	Low	225	51.3	62.4	Negligible	Not Significant
Flood Street	Wolfe Tone Bridge / Spanish Parade	Low	225	90.3	89.6	Negligible	Not Significant
Shantalla Road	Rahoon Road / Old Seamus Quirke Road	Medium	165	52.7	62.7	Negligible	Not Significant
Shantalla Road	Shantalla Road / Colmcille Road	Medium	165	48.8	52.2	Negligible	Not Significant
Shantalla Road	Shantalla Road / Mc Dara Road	Medium	165	62.5	61.6	Negligible	Not Significant
Shantalla Road	Shantalla Road / Rahoon Road	Medium	165	56.2	59.5	Negligible	Not Significant
Seamus Quirke Road (Lower Newcastle Rd - Browne Rbt)	Seamus Quirke Road / Snipe Lawn	High	295	5.3	5.3	Negligible	Not Significant
Lower Newcastle Road (Seamus Quirke Road - Snipe Av)	Lower Newcastle Road / Distillery Road	Medium	203	104.0	104.5	Negligible	Not Significant
Lower Newcastle Road (University Rd - Seamus Quirke Road)	Lower Newcastle Road / Newcastle Avenue	Medium	406	34.8	45.8	Negligible	Not Significant
Lower Newcastle Road (University Rd - Seamus Quirke Road)	Newcastle Road / University Road	Medium	406	95.5	97.2	Negligible	Not Significant
Lower Newcastle Road (University Rd - Seamus Quirke Road)	Seamus Quirke Road / Lower Newcastle Road	Medium	406	53.0	64.0	Negligible	Not Significant
Newcastle Road	Costello Road / Newcastle Road	Medium	287	54.1	40.0	Negligible	Not Significant
Newcastle Road	Newcastle Road / Presentation Road	Medium	287	34.9	57.2	Negligible	Not Significant
Newcastle Road	St Mary'S Road / Shantalla Road	Medium	287	66.5	78.1	Negligible	Not Significant
Gaol Road (South Of University Rd)	Gaol Road / Gaol Road	High	220	35.9	41.6	Negligible	Not Significant
Gaol Road (South Of University Rd)	University Road / Gaol Road	Medium	220	40.7	20.4	Negligible	Not Significant

Road Name	Junction Name	Junction Sensitivity	Flow Change	Max VoC (%)		Magnitude of Impact	Significance of Effects
				DM	DS		
Father Griffin Road	Father Griffin Road / Father Burke Road	Low	163	15.8	15.3	Negligible	Not Significant
Father Griffin Road	Father Griffin Road / Father Griffin Avenue	Low	163	73.9	78.5	Negligible	Not Significant
Father Griffin Road	Father Griffin Road / Grattan Court	High	163	8.1	9.1	Negligible	Not Significant
Father Griffin Road	Father Griffin Road / Lower Salthill Road	Medium	163	30.5	31.9	Negligible	Not Significant
Father Griffin Road	Father Griffin Road / Munster Avenue	Low	163	15.8	17.8	Negligible	Not Significant
Father Griffin Road	Father Griffin Road / Whitestrand Road	Medium	163	17.1	20.1	Negligible	Not Significant
Presentation Road	Presentation Road / New Road	High	232	20.6	20.4	Negligible	Not Significant
Presentation Road	Presentation Road / Parkavara	High	232	17.1	16.9	Negligible	Not Significant
Mill Street	Mill Street / Presentation Road	High	153	19.4	16.1	Negligible	Not Significant
Henry Street	Henry Street / William Street West	Medium	257	40.3	46.4	Negligible	Not Significant
Henry Street	St Helen's Street / New Road	Medium	257	38.3	32.6	Negligible	Not Significant
Lower Road Fairhill	Dominick Street Upper / Lower Fairhill Road	Medium	181	41.5	51.9	Negligible	Not Significant
Lower Road Fairhill	Father Griffin Road / Lower Fairhill Road	Low	181	76.3	94.3	Low	Negative Slight

Galway City Council
BusConnects Galway:
Cross-City Link
Preliminary Parking Survey
Report

Issue | 8 August 2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 253352-00

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Appendices

Appendix A

Scheme Section Map

Appendix B

Existing Land Use

1 Introduction

1.1 Background

The BusConnects Cross City Link aims to transform Galway's Public transport System, so that journeys by bus will be fast, reliable, punctual, convenient and affordable. A key aspect of the Cross City Link proposal is the provision of a public transport priority corridor, encompassing pedestrian crossings, upgraded footpaths, enhanced cycle facilities and additional bus priority measures, from University Road to Dublin Road (east of the Moneenageisha junction). Provision of high-quality footpaths, cycle tracks and bus lanes involve some local road widening, but also necessarily requires reallocation of road space where corridor width is heavily constrained by adjacent buildings. In some cases, reallocation of road space involves removal of on-street parking bays. This report investigates the impact on local parking activity and supply associated with the proposed scheme. The impact on loading / unloading activities is also assessed.

This Preliminary Parking Survey Report is a high-level desktop study to understand the impacts of BusConnects in terms of parking along the Cross-City Link - University Road to Dublin Road. Parking duration surveys were originally planned to assist in parking investigations; however, the COVID-19 outbreak and associated restrictions on movement meant that any surveys carried out during this period would not reflect typical parking patterns. A 'desktop' study was therefore carried out to assess the impact of the BusConnects Cross City Link infrastructure proposals on parking.

The purpose of this Preliminary Parking Survey Report is hence to:

- Quantify the current and proposed on-street parking bays;
- Identify the current parking regulations;
- Establish the dominant local land uses and expected parking characteristics; and
- Assess the potential impact of the Cross City Link on parking supply and activity.

The report contains separate analyses of a number of 'self-contained' corridor sections, where groups of parking bays can be considered to provide a local parking supply. The change in on-street parking supply has been identified and assessed in the context of the local needs and adjacent land uses. The local off-street parking supply and characteristics have also been noted. The self-contained sections where changes are proposed to parking supply are listed below and are illustrated in Appendix A:

- University Road (Newcastle Road to Salmon Weir Bridge);
- Salmon Weir Bridge to Forster Street;
- College Road and Dublin Road;
- Lough Atalia Road to Headford road;

- Galway Cathedral;
- Woodquay and Newtownsmith;
- Eyre Square North and Prospect Hill; and
- Merchants Road / Dock Road

1.2 Assumptions and Approach

The approach adopted to quantifying and assessing parking impacts is based on utilising the design team's knowledge of the (including historical data from local authority, site visits and observations) typical parking behaviours to identify the current scale of parking activity. Although detailed parking surveys have not been undertaken due to the atypical parking activity during the Covid-19 pandemic, the approach adopted provides a robust basis for an assessment of the effect of changes to on-street parking supply as a result of the Cross City Link. Key assumptions in the assessment are:

- That the existing parking regulations at each group of parking spaces will continue to apply to parking spaces provided at or close to the same location in the Proposed Scheme.

It should be noted that this report does not include consideration of cycle parking; this will be addressed during the scheme design development. It should also be noted the operation of bus lanes as '24 hour' lanes or for a lesser period of the day has not been considered in this study.

2 Methodology

2.1 Introduction

The approach adopted to quantifying and assessing parking impacts is based on utilising the design team's knowledge of the scheme area (including site visits and observations) and typical parking behaviours to identify the current scale of parking activity. The approach adopted involves identifying both the baseline parking situation and the future parking provision with the Proposed Scheme infrastructure in place, and comparing the two scenarios in respect of the number of spaces available. A qualitative assessment of the impact was then carried out and associated mitigations identified.

2.2 Baseline Parking and Loading

In order to understand the baseline parking situation along the proposed Cross City Link, the following information was collated via desktop analysis (making use of both local authority data on parking regulations, using 'street view' images from online resources and examination of topographical survey information):

- On-street parking regulations and spaces along the Cross City Link corridor;
- Location of time-limited bus lanes/cycle lanes which allow parking during unregulated periods;
- Loading bays; and
- On-street parking regulations and spaces on the side.

The existing parking regulations for each group of parking bays were classified as follows:

- Designated Paid Parking;
- Disabled Permit Parking;
- Designated Loading Bays;
- Designated Taxi Ranks; and
- Informal / Unregulated Parking (free parking).

For both the existing and future parking supply, where continuous multiple parallel parking spaces are present, it has been assumed that parking bays are 6m in length. Illegal parking, where observed, has been noted where it appears to occur on a regular basis but has not been included in the baseline parking supply.

Land uses on and surrounding the Cross City Link have also been reviewed in order to fully understand local parking characteristics, and off-street parking provision noted where relevant.

2.3 Future Parking and Loading

The future on-street parking supply with the Proposed Scheme in place has been identified from the final scheme drawings. For the purposes of this report, it has been assumed that the existing parking regulations at each group of parking spaces will continue to apply to parking spaces provided at or close to the same location in the Proposed Scheme.

3 Parking Impact on University Road (Newcastle Road to Salmon Weir Bridge)

3.1 Baseline Parking and Loading Analysis

3.1.1 Corridor On-Street Parking Bays and Regulation

This section begins at University Road to the east of the junction with Newcastle Road and continues along University Road to the Salmon Weir Bridge.

This section of the route contains 17 designated paid parking spaces at the following locations:

- Approximately 12 pay and display spaces on the southern side of the road between the James Mitchell Geology Museum and opposite the entrance to NUI Galway with a restriction of up to 2 hours. These parking spaces are available from 08:30 to 18:30 from Monday to Saturday ; and
- Approximately 5 pay and display spaces on the northern side of the road on the approach to Goal Road and opposite the Millennium Children's Park and Playground, with a restriction of up to 2 hours. These parking spaces are available from 08:30 to 18:30 from Monday to Saturday.

The designated Pay & Display parking spaces above have a tariff of €2.00 per hour with a restriction of up to two hours, and a minimum charge of 50c.

The route also contains 1 Loading Bay (3 spaces) in the vicinity of the James Mitchell Geology Museum.

University Road between Newcastle Road and the Salmon Weir Bridge does not have a bus lane in either direction, there are currently an inbound and outbound bus stop on University Road located on either side of the entrance to NUI Galway.

A summary of existing parking and loading supply on University Road, from Newcastle Road to the Salmon Weir Bridge is presented in **Table 1**.

Table 1: Existing On-Street Parking and Loading Spaces on University Road

Sub-section	Existing Parking / Loading Facilities	Number of Spaces
University Road (Newcastle Road to Salmon Weir Bridge)	Designated Paid Parking	17 spaces
	Loading Bay	1 bay (3 spaces)

3.1.2 Loading Bays

As shown in **Table 1**, there is a total 1 loading bay with space for approximately three cars or vans in this section of the corridor, located on University Road in the

vicinity of the James Mitchell Geology Museum. This is designated as a loading bay from 06:30 to 08:30 from Monday to Saturday with a maximum duration of stay being 30 minutes.

3.1.3 On-Street Parking Bays and Regulation on Local Side Streets

There are a small number of side streets and some off-street surface car-parking which are able to be used by local residents and visitors/businesses. These spaces are likely to be utilised by visitors to premises along University Road, as well as NUI Galway, as an alternative to parking on the corridor itself.

There are designated Pay & Display parking spaces with approximately 39 spaces (1 of which is designated disabled parking) on the local side streets, within 200m from the corridor and in the vicinity of the on-street parking directly on the corridor, which are located on Ash Grove, University Park, Canal Road Upper.

The designated Pay & Display parking spaces above have a tariff of €2.00 per hour with a restriction of up to two hours, and a minimum charge of 50c. These parking spaces are available from 08:30 to 18:30 from Monday to Saturday.

However, it should be noted that there would also be informal parking on local side streets where there are no double yellow lines in place.

There is a large off street surface carpark to the west of the University Road and Newcastle Road junction at University Hospital Galway. This Carpark is visitors only with 172 spaces, including 6 disabled parking bays.

There are also a number of visitors only parking spaces on the premises of NUI Galway, which are intended for use of visitors to the University only.

3.1.4 Land Use and Parking Demand

University Road from Newcastle Road to the Salmon Weir Bridge is a corridor that has a range of land uses illustrated in **Appendix B**. University Road has some large sites with private parking within their premises, such as:

- NUI Galway;
- NUIG Rowing Club;
- Inland Fisheries Ireland; and
- Galway Cathedral.

There is also a shop and a museum located on the west of the road and a restaurant located at the junction with Canal Road Upper for which on-street parking activities may be limited.

3.2 Cross City Link Parking Proposals

3.2.1 Proposed On-Street Parking and Loading Bay Supply

With BusConnects Cross City Link infrastructure in place, there is an associated need to remove some parking spaces to provide improved facilities for pedestrians, cyclists, and buses. The planned changes in on-street parking on University Road are illustrated in **Figure 1** and **Figure 2**, and summarised in **Table 2**.

The overall proposed design of BusConnects along University Road (between Newcastle Road and The Salmon Weir Bridge) has resulted in the retention of approximately 13 designated parking spaces, all in the vicinity of existing parking spaces.

Table 2: Existing and Proposed Parking and Loading Supply Summary (University Road)

Sub-section	Parking / Loading Facilities	Existing	Proposed	Loss of Parking / Loading
University Road (Newcastle Road to Salmon Weir Bridge)	Designated Paid Parking	17 spaces	13 spaces	-4 spaces
	Designated Loading Bay	1 bay (3 spaces)	1 bay (3 spaces)	0

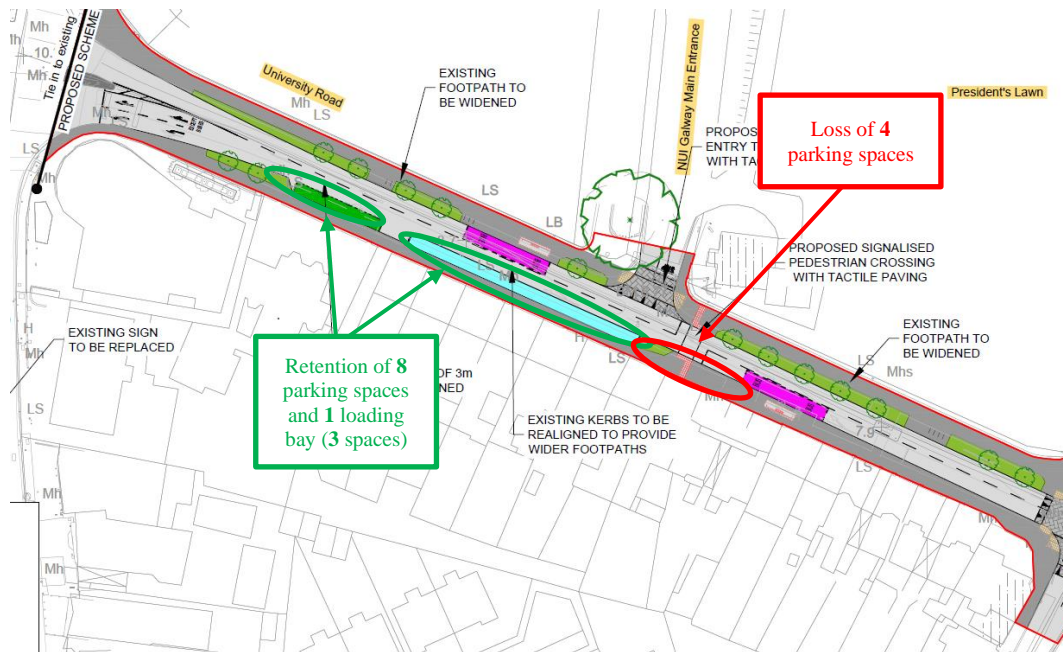


Figure 1: Proposed scheme design on University Road (opposite NUI Galway)

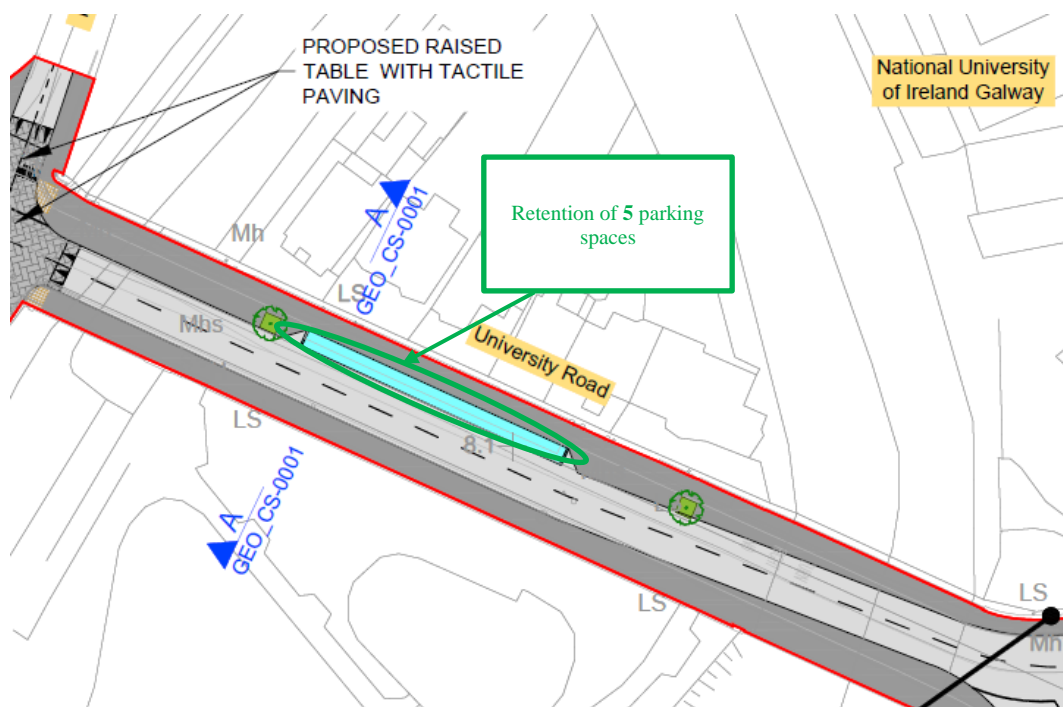


Figure 2: Proposed scheme design on University Road (opposite Millennium Children's Park and Playground)

3.3 Overall Parking Impact

A summary of the parking impact with respect to the change in overall parking supply on the Proposed Scheme corridor at (University Road) is shown in **Table 3**, which includes consideration of spaces on adjacent streets within an approximate 200m distance.

Table 3: Impact of Parking and Loading Changes for University Road

Location	Type of Parking		No. of Spaces		
			Baseline	Scheme	Change
University Road	Pay and Display	Residential	17	13	-4
University Road	Loading Bay	Commercial	3	3	0
Approx. adjacent parking of type within 200m			211	211	0
Total			231	227	-4

A summary of existing parking and loading supply the Salmon Weir Bridge and Forster Street is presented in **Table 4**.

Table 4: Existing On-Street Parking Supply Salmon Weir Bridge to Forster Street

Sub-section	Existing Parking / Loading Facilities	Number of Spaces
Eglinton Street (between St. Francis Street and Williamsgate Street)	Loading Bay / Clearway	1 Bay (6 spaces)
	Informal Parking	1 Clearway (9 spaces)
Williamsgate Street (between Eglinton Street and Eyre Square North)	Loading Bay / Clearway	1 Bay (3 spaces)
Eyre Square east (between Eyre Square north and Forster Street)	Loading Bay / Taxi Rank	2 Bays (6 spaces)
	Taxi Rank	2 Bays (8 spaces)
	Bus Set Down	1 Bay (5 spaces)
Forster Street (Between Eyre Square and College Road)	Designated Paid Parking	8 spaces
	Designated Disabled Parking	2 spaces
	Loading Bay / Taxi Rank	6 spaces

4.1.2 Loading Bays

As shown in **Table 4**, there are a number of loading bays throughout this section of the scheme.

Eglinton Street (between St. Francis Street and Williamsgate Street) has one designated loading bay on the northern aspect of the street in the vicinity of the Eglinton Casino and a number of restaurants and shops which can potentially fit up to 6 vehicles and operates from 6:00 to 11:00 Monday to Saturday and as a clearway from 11:00 to 19:30 Monday to Saturday.

Williamsgate Street (between Eglinton Street and Eyre Square North) has a loading bay / Clearway located in the vicinity of Logues and the GBC Galway Bakery Company which can potentially fit 3 vehicles and operates as a loading bay from 06:00 to 11:00 Monday to Saturday and as a clearway from 11:00 to 19:30 Monday to Saturday.

The eastern aspect Eyre Square east (between Eyre Square north and Forster Street) is predominantly made up of two sections of designated loading bay and taxi rank which can fit up to 14 spaces in total.

The first of which is located on the northern half of the route of which 3 spaces operates as a loading bay from 06:00 to 11:00 Monday to Sunday and all 8 spaces operates as a taxi rank from 11:00 to 06:00 Monday to Sunday. The second is located on the southern half of the route, of which 3 spaces operate as a loading bay from 06:00 to 18:00 Monday to Friday and all 8 spaces operate as a taxi rank from 18:30 to 06:00 Monday to Sunday. The western aspect of the road is predominantly made up of a Bus set down zone spanning approximately 90 metres.

Forster Street (Between Eyre Square and College Road) has a designated loading / taxi bay on the western aspect of the road opposite the Park House Hotel with a maximum stay duration of 30 minute which is in operation 08:30 to 15:30 Monday to Saturday.

4.1.3 On-Street Parking Bays and Regulation on Local Side Streets

There are several side streets which are able to be used by local residents and visitors/businesses. These spaces are likely to be utilised by visitors to premises along the route between The Salmon Weir Bridge and Forster Street due to the lack of available parking directly on the corridor, or visitors to Galway City in general. There are 1298 designated Pay & Display parking spaces with on the local side streets and designated car-parks, within 200m from the corridor, such as:

- Newtownsmith - 10 spaces, 2hr 8:30 to 18:30 Monday to Saturday, 13:00 to 16:00 Sunday;
- Newtownsmith Surface Car-Park – 40 spaces, Mon-Sat 08:30-18:30, Sun 13:00-18:00, 1 Hour €2.00, Max €20.00, Free outside these hours
- Waterside - 4 designated disabled, 21 pay and display 2hr 08:30- 18:30 Mon-Sat + 6 unsigned / Court Avenue - 5 unsigned / Court Lane - 8 pay and display 2hr 08:30- 18:30 Mon-Sat 13:00-18:00 Sun
- Market Street; 7 pay and display 2hr 08:30- 18:30 Mon-Sat 13:00-18:00 Sun, 2 designated disabled
- Market Street Surface Car-Park – 87 spaces, Mon-Sun - All day, 1 Hour €2.70, 24 Hours €20.00, Overnight €10.00 (In after 18:00 Out by 09:00)
- Eyre Street; 12 pay and display 2hr 08:30- 18:30 Mon-Sat 13:00-18:00 Sun + 2 designated disabled
- St. Patrick's Avenue; 9 spaces (possibly unsigned, Google street view doesn't display any signs)
- Corrib Centre Car-Park - 576 spaces Mon-Sun - All day, 10 Mins Free, 1 Hour €2.40, 2 Hours €4.80, 3 Hours €7.20, 4 Hours €9.60, 5 Hours €12.00, 10 Hours €15.00, 24 Hours €20.00. Opening Times Mon-Wed, Sat 08:30-19:00, Thu-Fri 08:30-21:00, Sun 10:30-18:30
- Frenchville Lane - 11 spaces 2hr 8:30 to 18:30 Monday to Saturday, 7 spaces unregulated/informal

- Fairgreen Road Car-Park – 410 spaces, Mon-Sun - All day, 1 Hour €2.70, 24 Hours €20.00, Overnight €10.00 (In after 18:00 Out by 09:00), Week €84.00, 4 Weeks €95.00, Quarter €300.00, 6 Months €600.00, Year €1150.00.
Opening Times Mon-Sun All day
- Ceannt Station Car-Park – 90 spaces, Mon-Sun - All day 24 Hours €6.50 (Customers Only)

4.1.4 Land Use and Parking Demand

The route from the Salmon Weir Bridge to Forster Street contains a large range of land uses illustrated in Appendix B. There is a site which has surface level off street parking for residents on their premises to the south of Galway Circuit Court. There is also off street parking at the Parish of Saint Patrick Church.

The route runs through large trip attractors in Galway City Centre, some of which include the following:

- Galway Courthouse;
- Town Hall Theatre;
- Mercy Primary School;
- Franciscan Abbey;
- Financial Institutions;
- Multiple Hotels, Bars and Restaurants;
- St. Patricks Church

The route from the Salmon Weir Bridge to Forster Street has a range of shops, restaurants/takeaways, pubs/bars located and other commercial and residential properties throughout the route through Galway City Centre.

4.2 Bus Corridor Parking Proposals

4.2.1 Proposed On-Street Parking and Loading Bay Supply

With BusConnects Cross City Link infrastructure in place, there is an associated need to remove some parking spaces to provide improved facilities for pedestrians, cyclists, and buses. The planned changes in on-street parking on this section of the route between the Salmon Weir Bridge and Forster Street are illustrated in **Figure 3** to **Figure 6****Error! Reference source not found.**, and summarised in **Table 5**.

Table 5: Existing and Proposed Parking Supply Summary (Salmon Weir Bridge to Forster Street)

Sub-section	Parking / Loading Facilities	Existing	Proposed	Loss of Parking / Loading
Eglinton Street (between St. Francis Street and Williamsgate Street)	Loading Bay / Clearway	1 Bay (6 spaces)	1 Bay (4 spaces)	-2 spaces
	Informal Parking	1 Clearway (9 spaces)	0	-9 spaces
Williamsgate Street (between Eglinton Street and Eyre Square North)	Loading Bay / Clearway	1 Bay (3 spaces)	1 Bay (3 spaces)	0
Eyre Square east (between Eyre Square north and Forster Street)	Loading Bay / Taxi Rank	2 Bays (6 spaces)	2 Bays (12 spaces)	+6 spaces
	Taxi Rank	2 Bays (8 spaces)	0	-8 spaces
	Bus Set Down	1 Bay (5 spaces)	1 Bay (5 spaces)	0
Forster Street (Between Eyre Square and College Road)	Designated Paid Parking	8 spaces	0	-8 spaces
	Designated Disabled Parking	2 spaces	0	-2 spaces
	Loading Bay	1 bay (6 spaces)	1 bay (6 spaces)	0

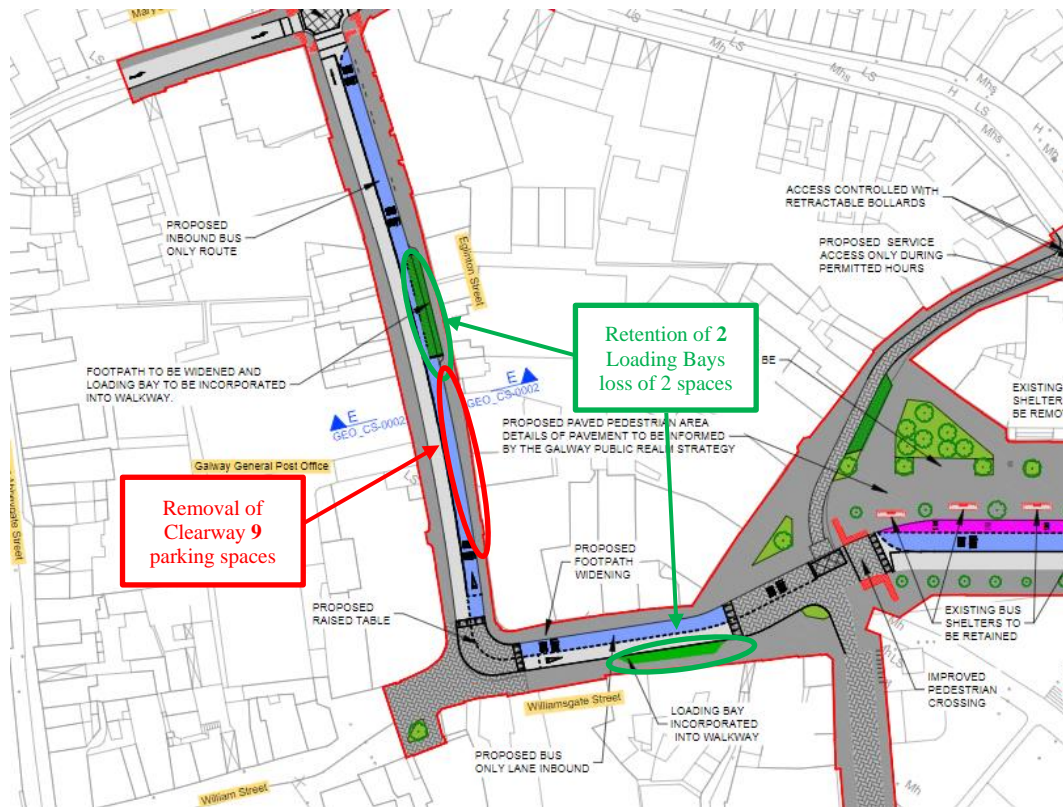


Figure 3: Proposed scheme design on Eglinton Street and Williamsgate Street

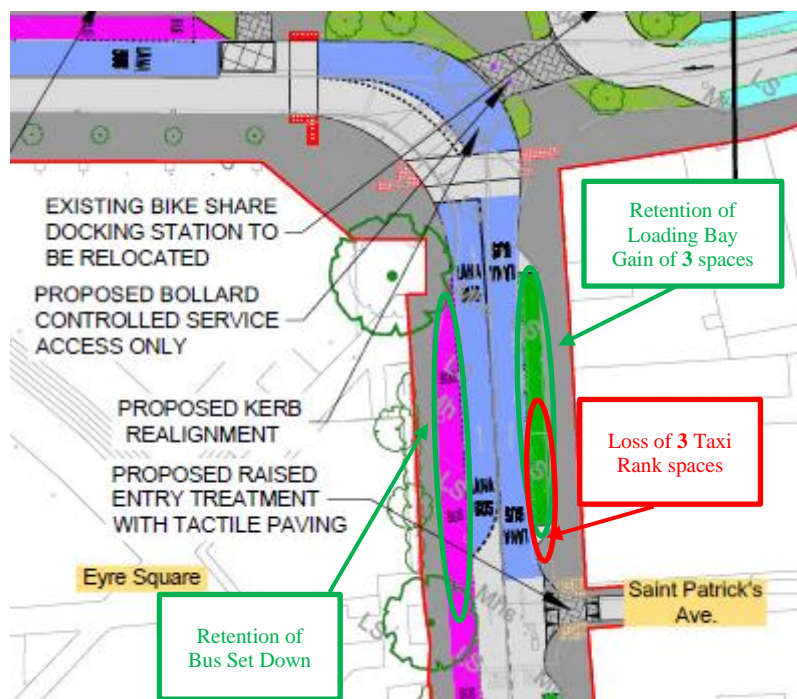


Figure 4: Proposed scheme design Eyre Square East

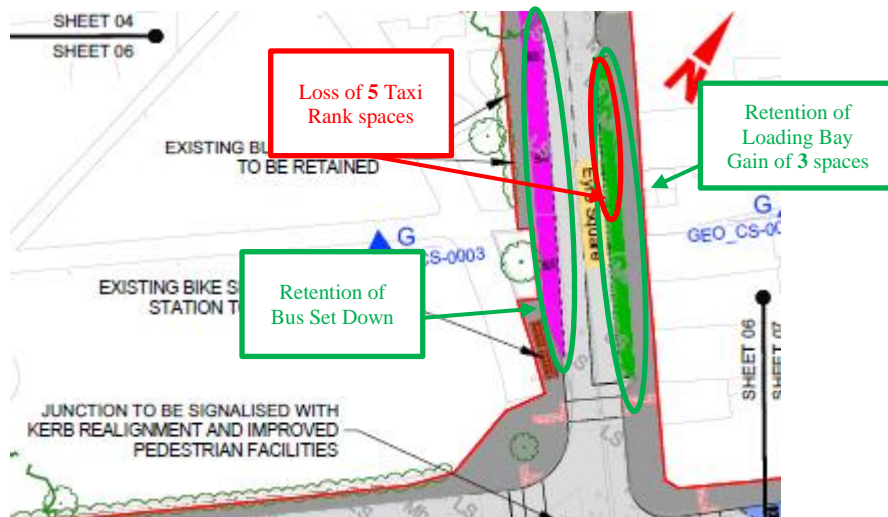


Figure 5: Proposed scheme design Eyre Square East

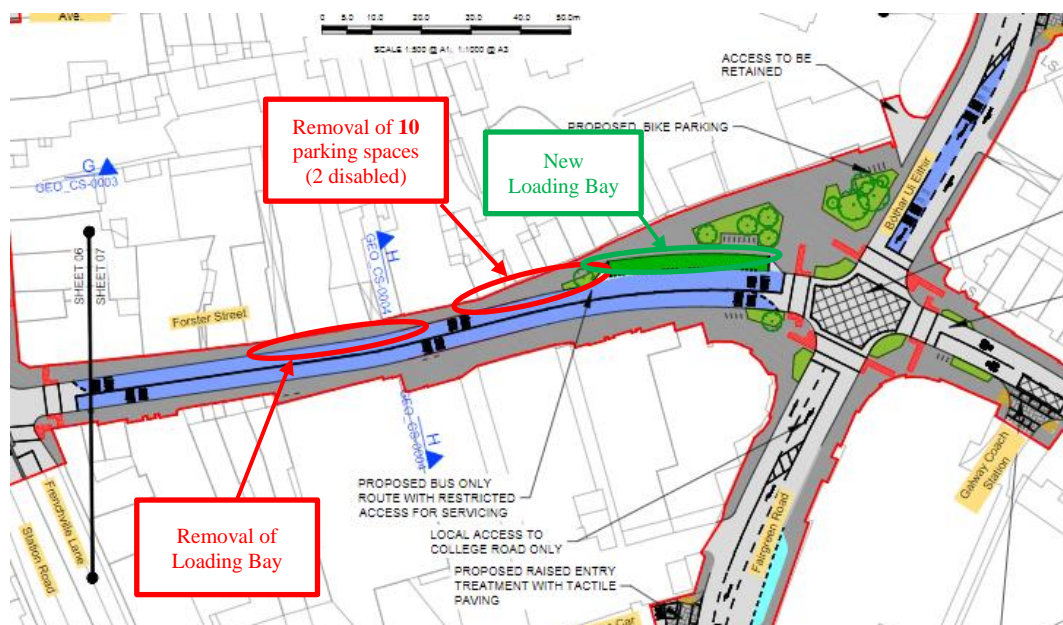


Figure 6: Proposed scheme design on Forster Street

4.3 Overall Parking Impact

A summary of the parking impact with respect to the change in overall parking supply on the Proposed Scheme corridor from the Salmon Weir Bridge to Forster Street is shown in **Table 6**, which includes consideration of spaces on adjacent streets within an approximate 200m distance.

Table 6: Impact of Parking Changes for Salmon Weir Bridge to Forster Street

Location	Type of Parking		No. of Spaces		
			Baseline	Scheme	Change
Eglinton Street (between St. Francis Street and Williamsgate Street)	Loading / Clearway	Commercial	6	4	-2
Eglinton Street (between St. Francis Street and Williamsgate Street)	Informal Parking	Commercial	9	0	-9
Williamsgate Street (between Eglinton Street and Eyre Square North)	Loading / Clearway	Commercial	3	3	0
Eyre Square east (between Eyre Square north and Forster Street)	Loading / Taxi Rank	Commercial	6	12	+6
Eyre Square east (between Eyre Square north and Forster Street)	Taxi Rank	Commercial	8	0	-8
Eyre Square east (between Eyre Square north and Forster Street)	Bus Set Down	Commercial	5	5	0
Forster Street (Between Eyre Square and College Road)	Designated Paid	Commercial	8	0	-8
Forster Street (Between Eyre Square and College Road)	Designated Disabled	Commercial	2	0	-2
Forster Street (Between Eyre Square and College Road)	Loading Bay	Commercial	6	6	0
Approx. adjacent parking of type within 200m			1298	1298	0
Total			1351	1328	-23

5 Parking Impact on College Road and Dublin Road

5.1 Baseline Parking and Loading Analysis

5.1.1 Corridor On-Street Parking Bays and Regulation

This section travels east on College Road from the junction with Forster Street to the junction with Lough Atalia Road then continues east to the junction with Dublin Road and southbound along Dublin Road.

This section of the route contains 64 designated paid parking spaces at the following locations:

- Approximately 22 pay and display spaces scattered throughout the northern side of the road with a restriction of up to 2 hours. These parking spaces are available from 08:30 to 18:30 from Monday to Saturday, and 13:00 to 18:00 on Sundays; and
- Approximately 43 pay and display spaces on the southern side of the road with a restriction of up to 2 hours. These parking spaces are available from 08:30 to 18:30 from Monday to Saturday, and 13:00 to 18:00 on Sundays.

The designated Pay & Display parking spaces above have a tariff of €2.00 per hour with a restriction of up to two hours, and a minimum charge of 50c.

There is a set down only area outside Yeats College to the west of College Road on the northern aspect with space available for 2 vehicles.

There is a loading bay on the southern aspect of the route at the College Road Florist on the eastern end of College Road with space available for 2 vehicles. This loading bay has a max stay duration of 30 minutes and is in operation from 08:30 to 18:30 Monday to Saturday.

There are 3 designated disabled parking spaces on the southern aspect of College Road, two of which are located opposite Aaron House B&B, and the third located further east opposite Connacht Rugby sports grounds.

In addition to the public on street parking, there is also privately owned parking which will be impacted by the proposed scheme. All of these are located along College Road, between the Lough Atalia Road junction and the Moneenageisha Junction:

- Approximately 58 parking spaces designated for residents and visitors to the Gleann Noinin residential development;
- Approximately 11 parking spaces designated for customers to the Circle K Petrol Filling Station development;
- Approximately 24 parking spaces designated for residents and visitors to the Moneenageisha Court residential development;

- Approximately 12 parking spaces designated for residents and visitors to the Bayview B&B development;

There is currently no existing on-street parking or loading along Dublin Road between the junction with College Road and the end of the proposed scheme.

A summary of the existing parking supply from College Road to Dublin Road is presented in **Table 7**.

Table 7: Existing On-Street Parking and Loading Spaces on College Road to Dublin Road

Sub-section	Existing Parking Facilities	Number of Spaces
College Road (Forster Street to Lough Atalia Road)	Designated Paid Parking	64 spaces
	Designated Disabled Parking	3 spaces
	Loading Bay / Set Down	2 bays (4 spaces)
College Road (Lough Atalia Road to Dublin Road)	Gleann Noinin	58 spaces
	Circle K	11 spaces
	Moneenageisha Court	24 spaces
	Bayview B&B	12 spaces
Dublin Road (College Road to end of scheme)	Designated Paid Parking	0
	Loading Bay	0

5.1.2 Loading Bays

There is one loading bay, offering space for 2 vehicles, available on College Road. It is located on the southern aspect of the road in the vicinity of College Road Florists. It is designated as a loading bay from 08:30 to 18:00 from Monday to Saturday with a maximum stay of 30 minutes. This would primarily provide loading activities for the College Road Florist shop with frontage College Road.

There is also a set down only area of 2 spaces on the northern aspect of College Road, at Yeats College. This bay operates as a set down only area for Yeats College and appears to operate for 24 hours a day Monday to Sunday.

As loading activities occur 24hrs throughout the day, loading bays should be available for loading most of the time.

5.1.3 On-Street Parking Bays and Regulation on Local Side Streets

There are several side streets which are able to be used by local residents and visitors/businesses. These spaces are most likely to be utilised by residents and residential visitors rather than visitors to premises along the route as an alternative to parking directly on the corridor. These side streets are all residential cul-de-sacs and parking is therefore largely informal and unregulated. These residential cul-de-sacs are within 100m from the corridor and in the vicinity of the on-street parking directly on the corridor, such as:

- The Elms (residential);
- Glenmore (residential);
- The Green (residential); and
- Loyola Park (residential);

The availability of parking spaces on all the streets listed above is restricted, as all have signs and notices in place stating parking is for residents only and that fines/clamping is in place for non-residents.

5.1.4 Land Use and Parking Demand

The route from College Road to Dublin Road contains a large range of land uses illustrated in Appendix B. There are a number of sites which have surface level off street parking on their premises such as Galway City Council, Yeats College, Connacht Rugby Sports Grounds, the Huntsman Inn, the G Hotel & Spa, Wellpark Retail and various B&B's and Hostels throughout the route. Therefore, it can be assumed that parking activities are within their premises and would not require on-street parking along the corridor.

The route from College Road to Dublin Road runs through large trip attractors in Galway City, which include the following:

- Galway City Council;
- Galway Greyhound Stadium;
- Connacht Rugby Sports Ground;
- The G Hotel and Spa; and
- Wellpark Retail Centre.

Generally, there are a range of B&B's, shops, restaurants/takeaways, pubs/bars located along the route from College Road to Dublin Road.

5.2 Cross City Link Parking Proposals

5.2.1 Proposed On-Street Parking and Loading Bay Supply

With BusConnects Cross City Link infrastructure in place, there is an associated need to remove some parking spaces to provide improved facilities for pedestrians, cyclists, and buses. The planned changes in on-street parking along the route from College Road to Dublin are illustrated in **Table 8**.

Table 8: Existing and Proposed Parking Supply Summary (College Road to Dublin Road)

Sub-section	Parking / Loading Facilities	Existing	Proposed	Loss of Parking / Loading
College Road (Forster Street to Lough Atalia Road)	Designated Paid Parking	64 spaces	46 spaces	-18 spaces
	Designated Disabled Parking	3 spaces	4 spaces	0
	Loading / Set Down	2 bays (4 spaces)	2 Bays (4 spaces)	0
College Road (Lough Atalia Road to Dublin Road)	Gleann Noinin	58 spaces	52 spaces	-6 spaces
	Circle K	11 spaces	7 spaces	-4 spaces
	Moneenageisha Court	24 spaces	24 spaces	0
	Bayview B&B	12 spaces	7 spaces	-5 spaces
Dublin Road (College Road to end of scheme)	Designated Paid Parking	0	0	0
	Loading Bay	0	0	0

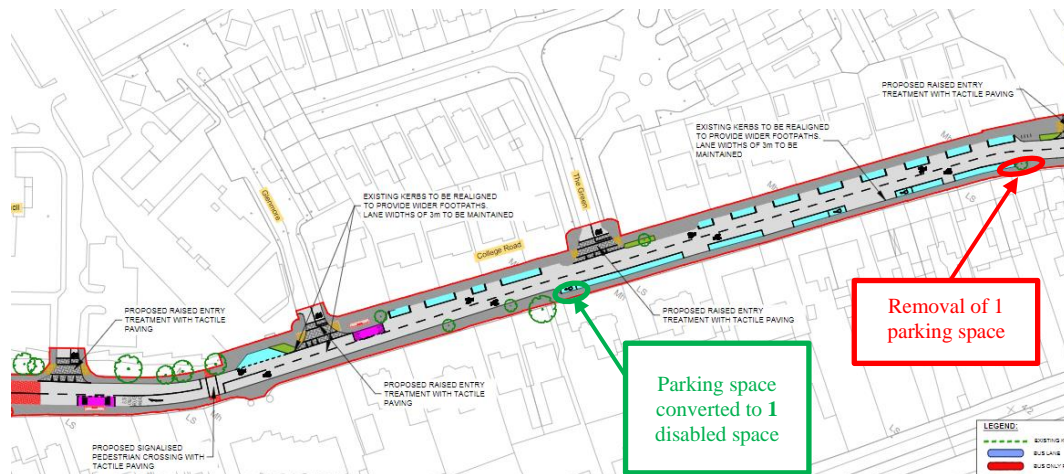


Figure 7: Proposed scheme design on College Road

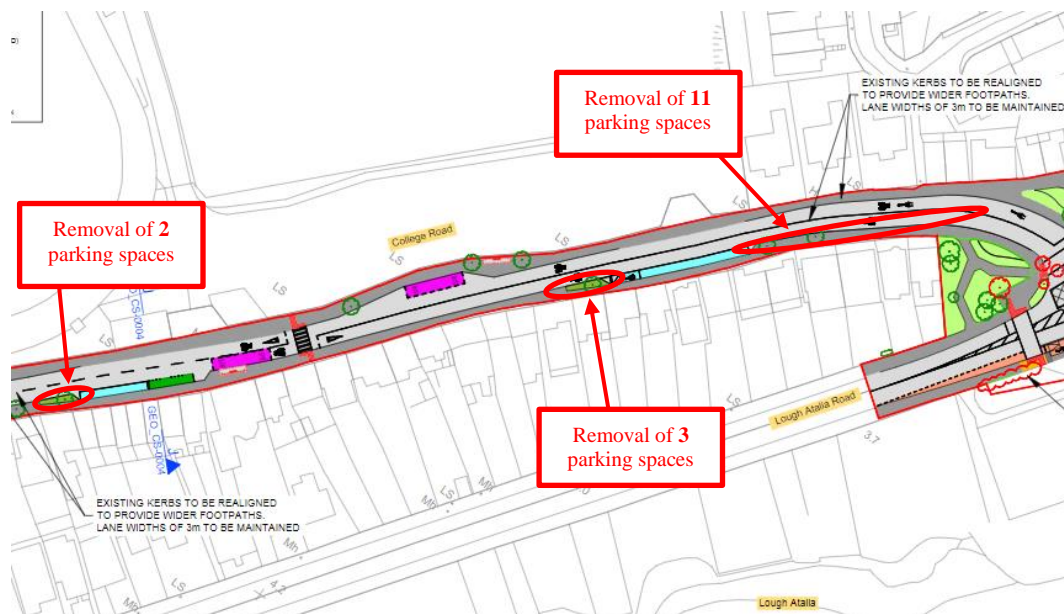


Figure 8: Proposed scheme design on College Road

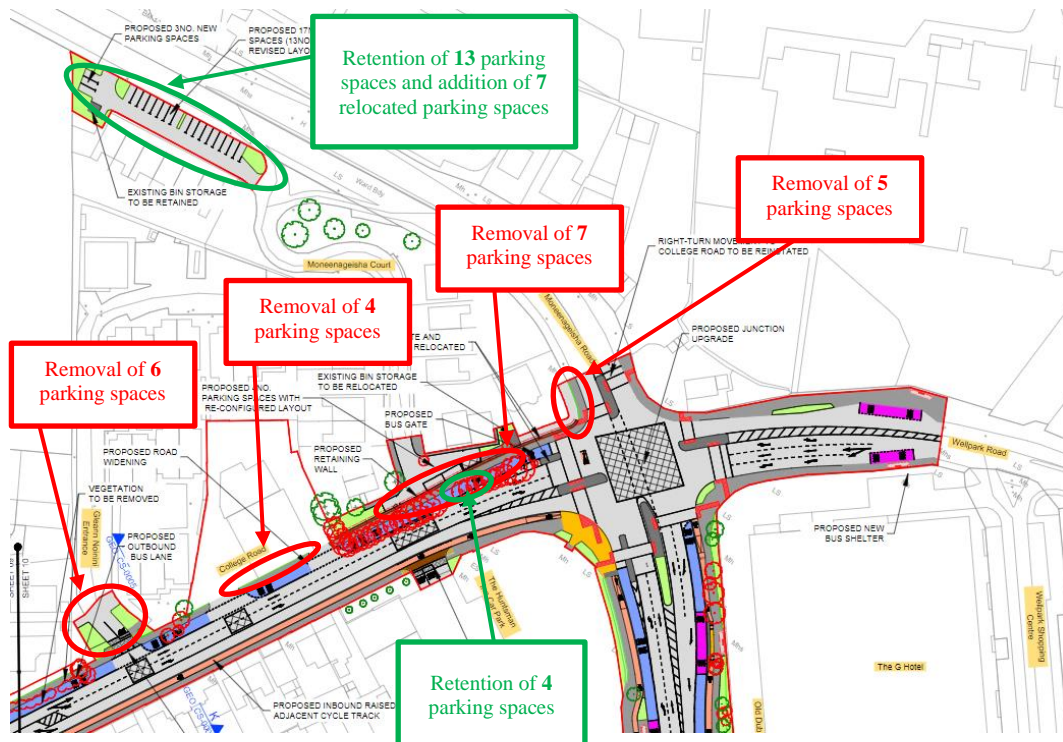


Figure 9: Proposed scheme design on College Road

5.3 Overall Parking Impact

A summary of the parking impact with respect to the change in overall parking supply on the Proposed Scheme corridor in section is shown in **Table 9**, which includes consideration of spaces on adjacent streets within an approximate 100m distance, all of which are in the public carpark on College Road adjacent to the Sportsground.

Table 9: Impact of Parking and Loading Changes from College Road to Dublin Road

Location	Type of Parking		No. of Spaces		
			Baseline	Scheme	Change
College Road (from Forster Street to Lough Atalia Road)	Designated Paid	Residential	64	46	-18
College Road (from Forster Street to Lough Atalia Road)	Designated Disabled	Commercial	3	4	+1
College Road (from Forster Street to Lough Atalia Road)	Loading / Set Down	Commercial	2 bays (4 spaces)	2 bays (4 spaces)	0
College Road (Lough Atalia Road to Dublin Road)	Private (Gleann Noinin)	Residential	58	52	-6

Location	Type of Parking		No. of Spaces		
			Baseline	Scheme	Change
College Road (Lough Atalia Road to Dublin Road)	Private (Circle K)	Commercial	11	7	-4
College Road (Lough Atalia Road to Dublin Road)	Private (Moneenageisha Court)	Residential	24	24	0
College Road (Lough Atalia Road to Dublin Road)	Private (Bayview B&B)	Commercial	12	7	-5
Dublin Road (College Road to end of scheme)	Designated Paid	Residential	0	0	0
Approx. adjacent parking of type within 200m			90	90	0
Total			266	234	-32

6 Parking Impact on Lough Atalia Road to Headford Road / Dyke Road

6.1 Baseline Parking and Loading Analysis

6.1.1 Corridor On-Street Parking Bays and Regulation

This section travels south west on the Headford Road and Dyke Road, along St Brendan's Avenue and Bóthar Na mBan, north east along Prospect Hill to Bóthar Bhreandáin Ui Eithir and south along Fairgreen Road to Lough Atalia Road.

Headford Road (from St Bridget's Place to St Brendan's Avenue) has an unregulated / informal bay at Richard Walsh Cycles, where free parking / loading is available for 2 vehicles.

The Dyke Road car-park is a large public surface car-park containing 510 parking spaces. This operates on a pay & display arrangement with a fixed fee of €5 08:30 – 18:30 Mon – Sat and 13:00 – 18:00 Sunday.

St Brendan's Avenue and Bóthar Na mBan (from Headford Road to Prospect Hill) has no designated on-street parking. There is a bus set down and pick up only bay on the northern aspect of the road at Galway County Council with space for 2 buses, and a loading bay with approximately 3 spaces on the southern aspect of the road in the same location.

There is currently no existing on-street parking along Prospect Hill between Bóthar Na mBan and Bóthar Bhreandáin Ui Eithir.

Bóthar Bhreandáin Ui Eithir (from Prospect Hill to Fairgreen Road) has a bus lane in the southbound direction which operates for 24 hours a day from Monday to Sunday. There are no dedicated on-street parking spaces on this section of the route.

Fairgreen Road (from Bóthar Bhreandáin Ui Eithir to Lough Atalia Road) there are two drop off areas on the eastern aspect of the route opposite the Park House Hotel, at the Galway Coach Station. Each area has space for 3 vehicles, with a max stay of 5 minutes. There is also a restriction sign stating no taxis. It should be noted that the desktop analysis showed taxis utilising this drop off area. There is also a designated taxi rank on the southern aspect of the route, in the vicinity of the Revenue Regional Office, with space for 10 vehicles. As well as a 24 hour Loading Bay / Clearway of 5 spaces. It should be noted that the desktop analysis showed an area of informal parking which occurred on a section of footpath between the taxi rank and the roadway, of 7 vehicles.

A summary of the existing parking supply from Lough Atalia Road to Headford Road and Dyke Road is presented in **Table 10**.

Table 10: Existing On-Street Parking and Loading Spaces on Lough Atalia Road to Headford Road

Sub-section	Existing Parking Facilities	Number of Spaces
Headford Road (from St Bridget's Place to St Brendan's Avenue)	Informal Free Parking	2 spaces
Dyke Road Car Park	Pay & Display	510 spaces
St. Brendan's Avenue	Designated Paid Parking	48 spaces
Bóthar Na mBan (from Headford Road to Prospect Hill)	Bus Set down	1 Bay (2 spaces)
	Loading Bay	1 Bay (3 spaces)
Fairgreen Road (from Bóthar Bhreandáin Ui Eithir to Lough Atalia Road)	Set Down Area	1 Bay (3 spaces)
	Set Down Area	1 Bay (3 spaces)
	Taxi Rank	1 Bay (10 spaces)
	Loading Bay / Clearway	1 Bay (5 spaces)

6.1.2 Loading Bays

There is one loading bay, offering space for 3 car parking spaces, available on Bóthar Na mBan. It is located on the southern aspect of the road in the vicinity of Galway County Council. It is designated as a loading bay for 24hrs of the day from Monday to Saturday with a maximum stay of 30 minutes. This would primarily provide loading activities for the shops with frontage to Bóthar Na mBan such as TK Maxx.

There is also a loading bay / clearway of 5 spaces on the southern aspect of Fairgreen Road, opposite the Revenue Regional Office. While the road markings suggest that this is a loading bay, the signage suggests that this is clearway for 24 hours a day Monday to Sunday.

6.1.3 On-Street Parking Bays and Regulation on Local Side Streets

There are several side streets which are able to be used by local residents and visitors/businesses. These spaces are likely to be utilised by visitors to premises along the route as an alternative to parking directly on the corridor.

There are designated Pay & Display and Permit Parking with almost 106 spaces (3 of which are designated disabled) on the local side streets within 200m from the corridor and in the vicinity of the on-street parking directly on the corridor, such as:

- St Brendan's Avenue;
- Bóthar Irwin;
- Bohermore;
- St. Bridget's Place;
- St. Bridget's Terrace and
- Forster Street.

The availability of parking spaces on all the streets listed above, except for, have time plates of 08:30 to 18:30 Monday to Saturday and 13:00 to 18:00 Sunday. The designated Pay & Display parking spaces above have a tariff of €2.00 per hour with a restriction of up to two hours, and a minimum charge of 50c.

6.1.4 Land Use and Parking Demand

The route from Lough Atalia Road to Headford Road contains a large range of land uses illustrated in Appendix B. There are a number of sites which have surface level off street parking on their premises such as Galway County Council, to the rear of On Yer Bike Cycles, and the residencies behind Sherry FitzGerald. Therefore, it can be assumed that parking activities are within their premises and would not require on-street parking along the corridor.

There are also a number of multistorey car parks along the route such as:

- Corrib Shopping Centre Car Park, which operates 24 hours a day Monday to Sunday with 576 spaces. The car park operates at a cost of €2.40 per hour up to 5 hours, €15.00 for 10 hours and €20.00 for 24 hours.
- Park House Hotel car park for guests, with costs included in room rates and the City Centre Car Park at Fairgreen House.
- City Park at Fairgreen Road, with 410 spaces, which operates 24 hours a day Monday to Sunday at a cost of €2.70 an hour and €20.00 for 24 hours. The carpark also offers 20 day, quarterly and yearly passes.
- Galway Coach Station, with 168 spaces, which operates 24 hours a day Monday to Sunday at a cost of €2.70 an hour and €20.00 for 24 hours.
- The Galmont Hotel & Spa, with 240 spaces, which operates from Monday to Sunday 08:00 to 19:00 at a rate of €2.50 per hour and €20.00 for 24 hours, and 17:00 to 11:00 at a flat rate of €15.00. as well as a rate of €9.00 for 24 hours offered to customers.

The route from Lough Atalia Road to Headford Road runs through large trip attractors in Galway City, which include the following:

- The Galmont Hotel & Spa;

- Revenue Regional Office;
- The Western Hotel;
- Galway County Council;
- TK Maxx;
- Car Wash Galway (previously Great Gas Filling Station)

Generally, there are a range of shops, restaurants/takeaways, pubs/bars located along the route from Lough Atalia Road to Headford Road.

6.2 Cross City Link Parking Proposals

6.2.1 Proposed On-Street Parking and Loading Bay Supply

With BusConnects Cross City Link infrastructure in place, there is an associated need to remove some parking spaces to provide improved facilities for pedestrians, cyclists, and buses. The planned changes in on-street parking along the route from Lough Atalia Road to Headford Road are illustrated in **Figure 9** and summarised in **Table 11**.

Table 11: Existing and Proposed Parking Supply Summary (Lough Atalia Road to Headford Road)

Sub-section	Parking / Loading Facilities	Existing	Proposed	Loss of Parking / Loading
Headford Road (from St Bridget's Place to St Brendan's Avenue)	Informal Free Parking	2 spaces	0	-2 spaces
Dyke Road Car Park	Designated Paid Parking	510 spaces	500 spaces	-10 spaces
St. Brendan's Avenue	Designated Paid Parking	48 spaces	46 spaces	-2 spaces
Bóthar Na mBan (from Headford Road to Prospect Hill)	Bus Set Down	1 Bay (2 spaces)	1 Bay (2 spaces)	0
	Loading Bay	1 Bay (3 spaces)	1 Bay (3 spaces)	0

Sub-section	Parking / Loading Facilities	Existing	Proposed	Loss of Parking / Loading
Fairgreen Road (from Bóthar Bhreandáin Uí Eithir to Lough Atalia Road)	Set Down Area	1 Bay (3 spaces)	1 Bay (3 spaces)	0
	Set Down Area	1 Bay (3 spaces)	1 Bay (3 spaces)	0
	Taxi Rank	1 Bay (10 spaces)	1 Bay (10 spaces)	0
	Loading Bay / Clearway	1 Bay (5 spaces)	1 Bay (5 spaces)	0
	Informal / Unregulated Parking	7 spaces	0	-7 spaces

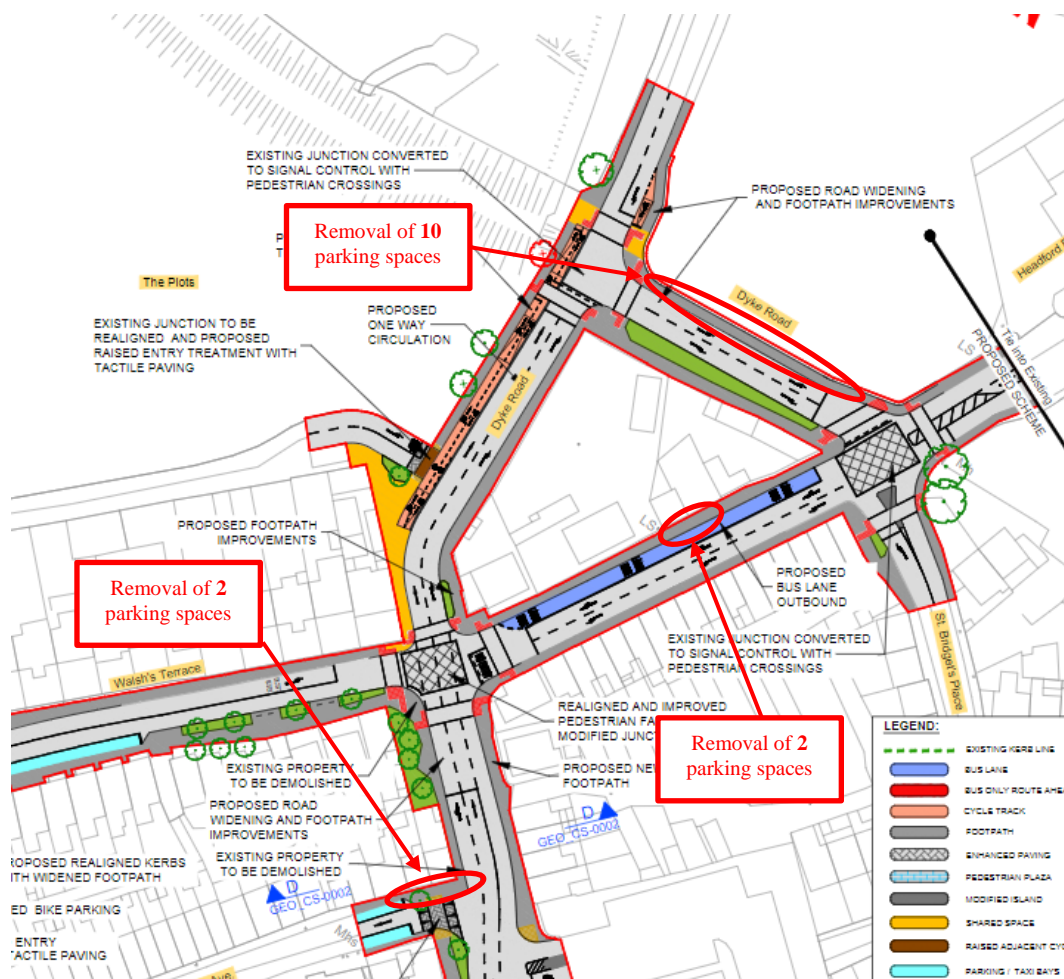


Figure 9: Proposed scheme design on Dyke Road and Headford Road

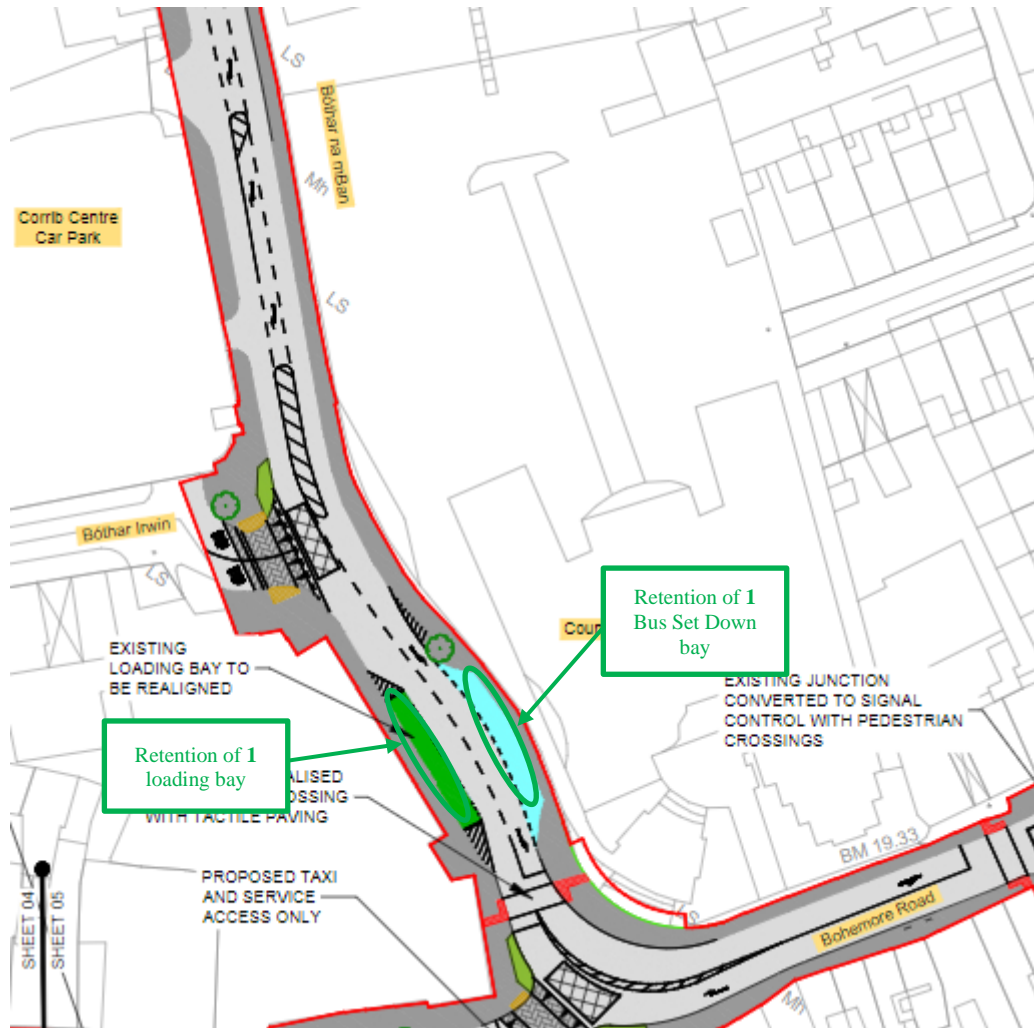


Figure 10: Proposed scheme design on Bóthar Na mBan

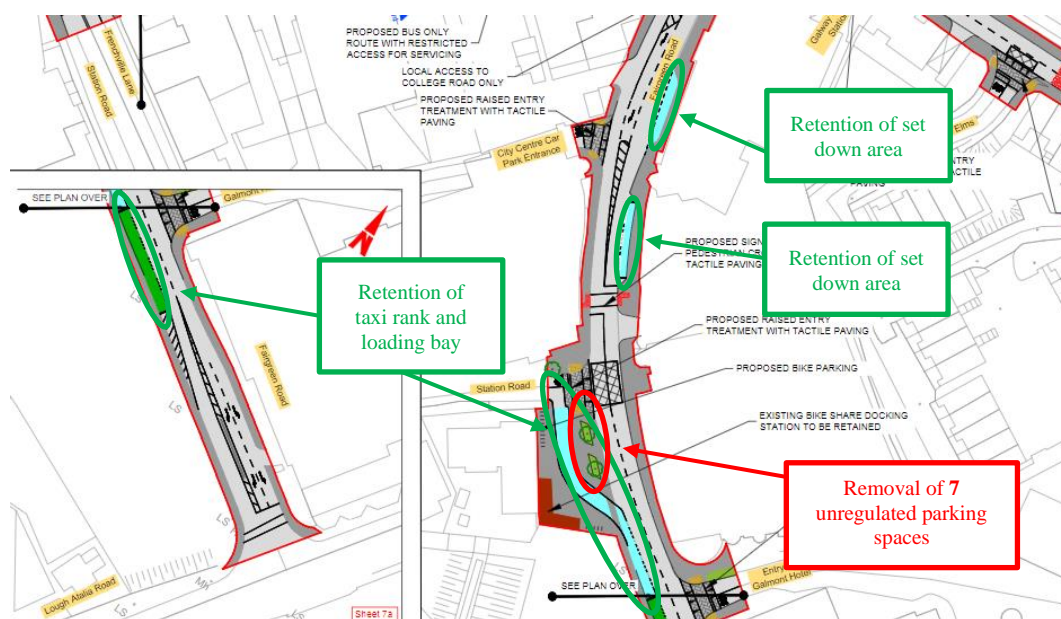


Figure 11: Proposed scheme design on Fairgreen Road

6.3 Overall Parking Impact

A summary of the parking impact with respect to the change in overall parking supply on the Proposed Scheme corridor in section is shown in **Table 12**, which includes consideration of spaces on adjacent streets within an approximate 200m distance.

Table 12: Impact of Parking and Loading Changes from Lough Atalia Road to Headford Road

Location	Type of Parking		No. of Spaces		
			Baseline	Scheme	Change
Headford Road (from St Bridget's Place to St Brendan's Avenue)	Informal / Unregulated Parking	Commercial	2	0	-2
Dyke Road Car-Park	Designated Paid Parking	Commercial	510	500	-10
St Brendan's Avenue	Designated Paid Parking	Residential	48	46	-2
Bóthar Na mBan (from Headford Road to Prospect Hill)	Bus Set Down	Commercial	2	2	0
Bóthar Na mBan (from Headford Road to Prospect Hill)	Loading Bay	Commercial	3	3	0
Fairgreen Road (from Bóthar Bhreandáin Uí Eithir to Lough Atalia Road)	Set Down Area	Commercial	3	3	0
Fairgreen Road (from Bóthar Bhreandáin Uí Eithir to Lough Atalia Road)	Set Down Area	Commercial	3	3	0
Fairgreen Road (from Bóthar Bhreandáin Uí Eithir to Lough Atalia Road)	Taxi Rank	Commercial	10	10	0
Fairgreen Road (from Bóthar Bhreandáin Uí Eithir to Lough Atalia Road)	Loading Bay	Commercial	5	5	0
Fairgreen Road (from Bóthar Bhreandáin Uí Eithir to Lough Atalia Road)	Informal / Unregulated Parking	Commercial	7	0	-7
Approx. adjacent parking of type within 200m			106	106	0
Total			699	678	-21

7 Parking Impact at Galway Cathedral

7.1 Baseline Parking and Loading Analysis

7.1.1 Corridor On-Street Parking Bays and Regulation

This section runs along Gaol Road from the junction with University Road to the Salmon Weir Bridge.

At the end of this section, towards the Salmon Weir Bridge, the proposed design includes the removal of a section of Gaol Road to be replaced by a pedestrian plaza, including amendments to an existing coach parking area.

There are two surface carparks in the vicinity of Galway Cathedral, these are the Parish of the Cathedral Carpark, and Cathedral Square Carpark. The Cathedral Square Carpark contains 152 spaces (5 designated disabled) and operates a flat rate of €5.00 for 2 hours from 08:30 to 18:30 Monday to Saturday and from 13:00 to 18:00 on Sundays. There is no cost to parking outside of operation hours in either carpark.

Gaol Road (from University Road to Nun's Island) currently has 2 designated disabled parking spaces at the entrance to Island House. It should be noted that the desktop analysis showed that informal parking occurs along the western aspect of Gaol Road in the vicinity of Island House. This section can potentially fit up to 10 spaces, where parking activities may occur in an informal and unregulated nature.

Gaol Road (from Nun's Island to the Salmon Weir Bridge) currently has no designated on street parking spaces. There is however 2 designated bus set-down only bays along the eastern aspect of the route with space for approximately 9 buses. Both bays operate from 08:00 to 18:00 seven days a week, with a maximum stay of 30 minutes.

A summary of existing parking and loading supply on Gaol Road from the junction with University Road to the Salmon Weir Bridge is presented in **Table 13**.

Table 13: Existing Parking and Loading Spaces in the vicinity of Galway Cathedral

Sub-section	Existing Parking Facilities	Number of Spaces
Gaol Road (from University Road to Nun's Island)	Tour Bus Stop	4 spaces
	Designated Disabled Parking	2 spaces
	Informal Parking	10 spaces
Gaol Road (from Nun's Island to the Salmon Weir Bridge)	Bus set-down only	2 Bays (9 spaces)
Galway Cathedral Parking	Bus Parking	0
	Designated Paid Parking	158 spaces
	Disabled Paid Parking	5 spaces

7.1.2 Loading Bays

As shown in **Table 13**, there are no loading bays along this section of the Proposed Scheme, there are however 2 bus set down only bays which can accommodate up to 9 busses. All set down bays are designated as such from 08:00 to 18:00 seven days a week, with a maximum stay of 30 minutes.

7.1.3 On-Street Parking Bays and Regulation on Local Side Streets

There is a single side street, Nun's Island, which is able to be used for parking by local residents and visitors/businesses. These spaces are likely to be utilised by residents and visitors to premises along the street itself. There are designated Pay & Display and Permit Parking with approximately 25 spaces on the local side street, within 200m from the corridor and in the vicinity of the on-street parking directly on the corridor.

The availability of parking spaces along Nuns Island are designated as Pay and Display Parking from 08:30 to 18:30 from Monday to Saturday and 13:00 to 18:00 on Sunday with a 2 hour stay duration.

7.1.4 Land Use and Parking Demand

This section of the Proposed is predominantly a single use area. Which is illustrated in **Appendix B**.

There is one site which has surface level off street parking on their premises, this is the Parish of the Cathedral carpark.

The Parish of the Cathedral Carpark contains 150 spaces and operates 24 hours a day at a rate of €1.50 and hour or €8.00 for 24 hours, Monday to Saturday, with no cost on Sundays. There is no cost to parking outside of operation hours in either carpark.

There are three key trip attractors along Gaol Road from the junction with University Road to the Salmon Weir Bridge. These are:

- Galway Cathedral;
- NUIG Buildings; and
- Island House.

7.2 Cross City Link Parking Proposals

7.2.1 Proposed On-Street Parking and Loading Bay Supply

With BusConnects Cross City Link infrastructure in place, there is an associated need to remove some parking spaces to provide improved facilities for pedestrians, cyclists, and buses. The planned changes in the vicinity of Galway Cathedral are illustrated in **Figure 12** and is summarized in **Table 14**.

Table 14: Existing and Proposed Parking and Loading Supply (Galway Cathedral)

Sub-section	Parking / Loading Facilities	Existing Spaces	Proposed	Loss of Parking / Loading
Gaol Road (from University Road to Nun's Island)	Tour Bus Stop	4 spaces	0	-4 spaces
	Designated Disabled Parking	2 spaces	2 spaces	0
	Informal Parking	10 spaces	0	-10 spaces
Gaol Road (from Nun's Island to the Salmon Weir Bridge)	Bus Set Down	2 Bays (9 spaces)	4 spaces	-5 spaces
Galway Cathedral Parking	Bus Parking	0	10 spaces	+10 spaces
	Designated Disabled Parking	5 spaces	5 spaces	0
	Designated Paid Parking	158 spaces	42 spaces	-116 spaces

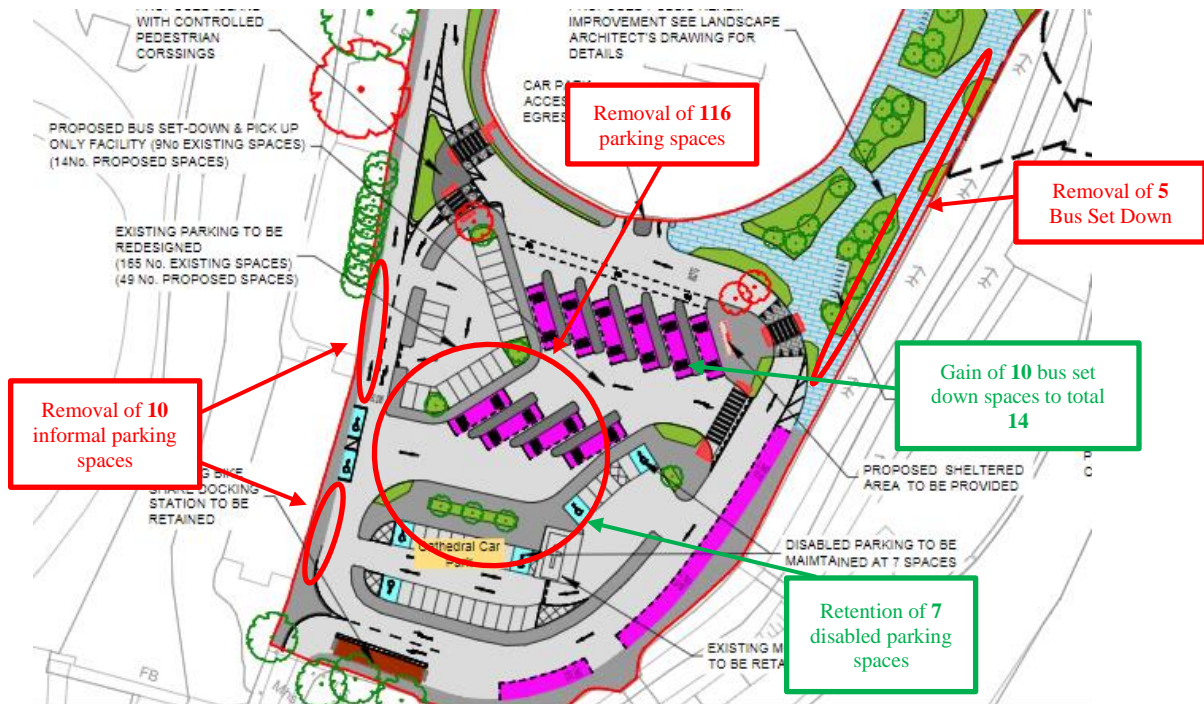


Figure 12: Proposed scheme design on Gaol Road and Galway Cathedral Carpark

7.3 Overall Parking Impact

A summary of the parking impact with respect to the change in overall parking supply on the Proposed Scheme corridor on this section of the Proposed Scheme is shown in **Table 15**, which includes consideration of spaces on adjacent streets within an approximate 200m distance.

Table 15: Impact of Parking and Loading Changes for Galway Cathedral

Location	Type of Parking		No. Spaces		
			Baseline	Scheme	Change
Gaol Road (from University Road to Nun's Island)	Tour Bus Stop	Commercial	4	0	-4
Gaol Road (from University Road to Nun's Island)	Designated Disabled Parking	Commercial	2	2	0
Gaol Road (from University Road to Nun's Island)	Informal Parking	Commercial	10	0	-10
Gaol Road (from Nun's Island to the Salmon Weir Bridge)	Bus Set Down	Commercial	9	4	-5
Galway Cathedral Parking	Bus Parking	Commercial	0	10	+10
Galway Cathedral Parking	Designated Disabled Parking	Commercial	5	5	0
Galway Cathedral Parking	Designated Paid	Commercial	158	42	-116
Approx. adjacent parking of type within 200m			175	175	0
Total			363	238	-125

8 Parking Impact on Woodquay and Newtownsmith

8.1 Baseline Parking and Loading Analysis

8.1.1 Corridor On-Street Parking Bays and Regulation

Woodquay (from Headford Road to Eglinton Street) has designated on-street Pay & Display spaces throughout located on both the eastern and western aspects of the route as well as centrally between the northbound and southbound lanes. It has a total of approximately 66 parking spaces (including 2 disabled spaces) which are in operation from 08:30 to 18:30 from Monday to Saturday and 13:00 to 18:00 on Sunday with a duration of 2 hours. The designated Pay & Display parking spaces above have a tariff of €2.00 per hour with a restriction of up to two hours, and a minimum charge of 50c.

There is also a loading bay / taxi bay and a taxi bay on the western side of the route in the vicinity of Barr An Chaladh, with a total of four spaces, 2 of which operate as pay and display parking spaces between the 08:30 to 18:30 from Monday to Saturday and 13:00 to 18:00 on Sunday.

Newtownsmith (from the Salmon Weir Bridge to Mary Street) has designated on-street Pay & Display spaces throughout located on the eastern aspect of the route. It has a total of approximately 10 parking spaces which are in operation from 08:30 to 18:30 from Monday to Saturday and 13:00 to 18:00 on Sunday with a duration of 2 hours. There is also a loading bay in the vicinity of Our Lady's College Galway, which has space for 3 vehicles and operates 24hrs a day.

The existing parking supply on Woodquay and Newtownsmith is summarised in **Table 16**.

Table 16: Existing Parking and Loading Spaces on Woodquay Street and Newtownsmith

Sub-section	Existing Parking Facilities	Number of Spaces
Woodquay Street (from Headford Road to Eglinton Street)	Designated Paid Parking	64 spaces
	Disabled Paid Parking	2 spaces
	Loading Bay / Taxi Rank	1 bay (2 spaces)
	Taxi Rank / Paid Parking	1 bay (2 spaces)
Walsh's Terrace	Designated Paid Parking	5 spaces
	Designated Paid Parking	10 spaces

Sub-section	Existing Parking Facilities	Number of Spaces
Newtownsmith (from the Salmon Weir Bridge to Bowling Green)	Designated Paid Parking	10 spaces
	Loading Bay	1 bay (3 spaces)

8.1.2 Loading Bays

There is one loading bay of 2 spaces on Woodquay Street outside Barr An Chaladh which is designated as a loading bay between 05:30 and 18:30 and as a taxi bay between 18:30 and 05:30 Monday to Sunday. This loading bay is likely to be used by the number of bars, restaurants and other retail units located within close vicinity.

There is also a loading bay of 3 spaces located outside Our Lady's College Galway, which has space for 3 vehicles and operates 24hrs a day. This loading bay is likely to be used by the large clothing shop Born.

8.1.3 On-Street Parking Bays and Regulation on Local Side Streets

There are a number of side streets which are able to be used by local residents and visitors / businesses. These spaces are likely to be utilised by some residents and visitors to premises on Woodquay Street and on Newtownsmith as an alternative to parking directly on the corridor.

There are Pay & Display and Permit Parking areas for approximately 120 spaces (5 designated disabled parking, 2 designated EV parking) within 200m from the corridor and in the vicinity of the on-street parking directly on the corridor, at the following locations:

- Eyre Street;
- Riverside;
- Corrib Terrace;
- Waterside;
- Court Avenue;
- Bowling Green; and
- Market Street.

The parking spaces on the streets listed above have varying time plates, including 08:30 to 18:30 from Monday to Saturday at Waterside, and 08:30 to 18:30 from Monday to Saturday and 13:00 to 18:00 on Sunday on all other streets. The designated Pay & Display parking spaces above have a tariff of €2.00 per hour with a restriction of up to two hours, and a minimum charge of 50c.

8.1.4 Land Use and Parking Demand

Woodquay Street and Newtownsmith both consist of different land uses throughout, as shown in **Appendix B**.

Woodquay Street has no sites along its route with private off street parking. The route runs through large trip attractors in Galway City, which include numerous bar, restaurants and retail premises.

There are two sites along Newtownsmith which have non-residential on-site parking such as:

- Newtownsmith Carpark at the south west of the road, which is a Pay and Display Carpark which operates from 08:30 to 18:30 Monday to Saturday and 13:00 to 18:00 on Sundays. The site consists of 40 spaces (one of which is designated disabled parking; and
- Our Lady's College Galway, which is permit parking only during school hours but operates as a Pay and Display parking outside of school hours, from 18:00 to 21:00 Monday to Friday and 08:00 to 21:00 Saturday to Sunday (during academic term) and from 08:00 to 21:00 Monday to Sunday (outside of academic term). The site consists of 50 spaces (one of which is designated disabled).

The key trip attractors that have access to Newtownsmith include Our Lady's College Galway and Born Clothing Store. While Our Lady's College Galway has parking within their premises, Born Clothing Store does not. Therefore, parking overspill may occur and visitors may use on-street parking within the surrounding areas.

8.2 Cross City Link Parking Proposals

8.2.1 Proposed On-Street Parking and Loading Bay Supply

With BusConnects Cross City Link infrastructure in place, there is an associated need to remove some parking space to provide improved facilities for pedestrians, cyclists, and buses. The planned changes in on-street parking on Woodquay and Newtownsmith are summarised in **Figure 13** to **Figure 15** and illustrated in **Table 17**.

Table 17: Existing and Proposed Parking and Loading Spaces (Woodquay and Newtownsmith)

Sub-section	Parking / Loading Facilities	Existing	Proposed	Loss of Parking / Loading
Woodquay Street (from Headford Road to Eglinton Street)	Designated Paid Parking	64 spaces	22 spaces	-42 spaces
	Disabled Paid Parking	2 spaces	0	-2 spaces

Sub-section	Parking / Loading Facilities	Existing	Proposed	Loss of Parking / Loading
	Loading Bay / Taxi Rank	1 bay (2 spaces)	1 bay (5 spaces)	+3 spaces
	Taxi Rank / Paid Parking	1 bay (2 spaces)	0	-2 spaces
Walsh's Terrace	Designated Paid Parking	5 spaces	10 spaces	+5 spaces
Newtownsmith (from the Salmon Weir Bridge to Bowling Green)	Designated Paid Parking	10 spaces	6 spaces	-4 spaces
	Loading Bay	1 bay (3 spaces)	1 bay (3 spaces)	0

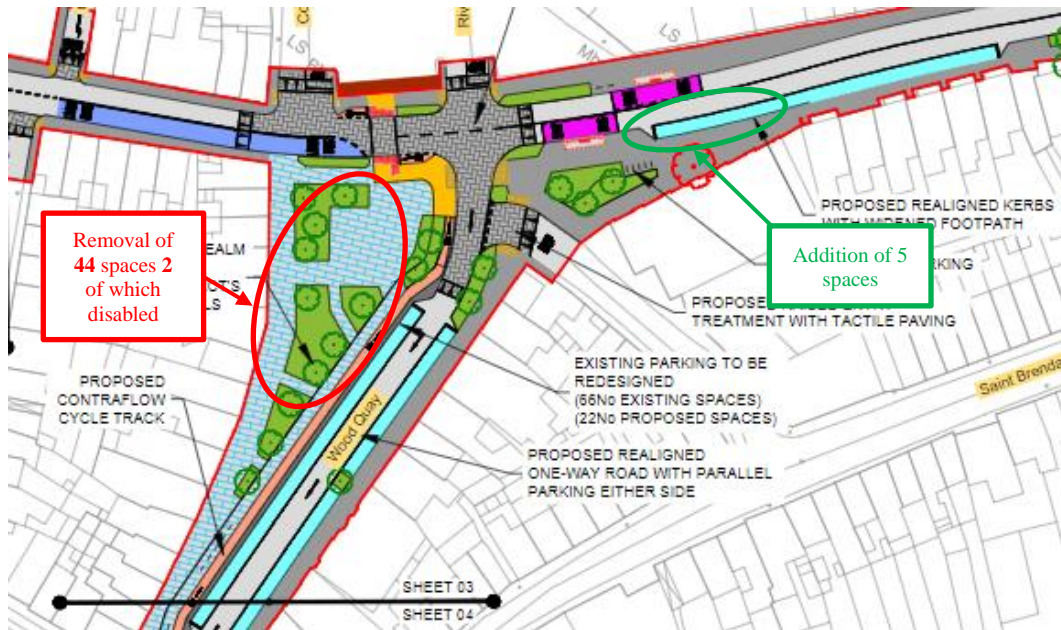


Figure 13: Proposed scheme design on Wood Quay

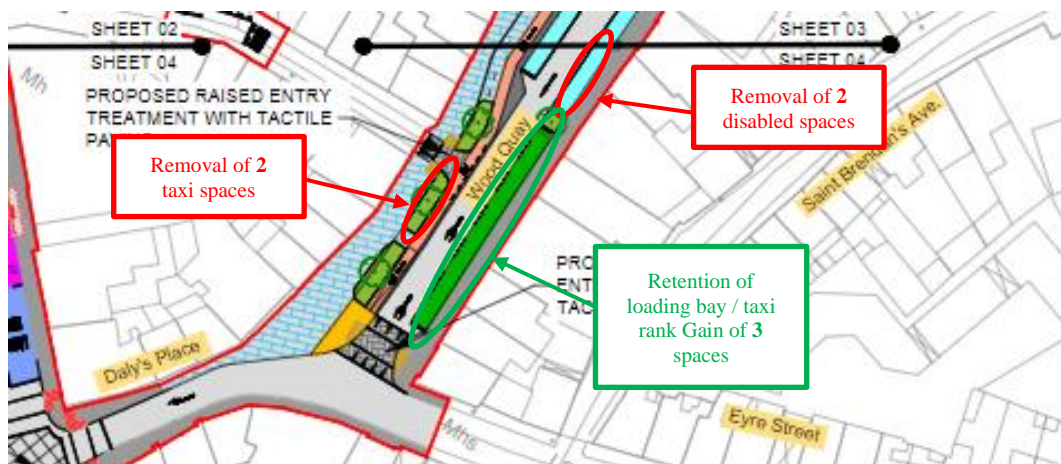


Figure 14: Proposed scheme design on Wood Quay

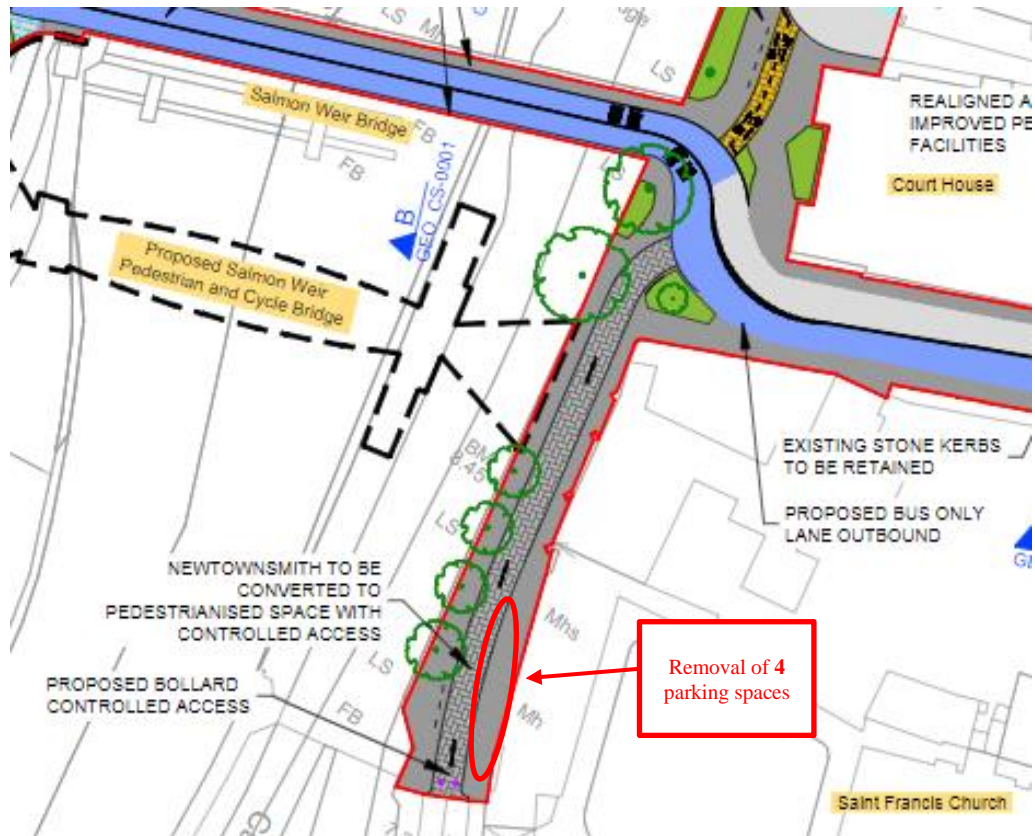


Figure 15: Proposed scheme design on Newtownsmith

8.3 Overall Parking Impact

A summary of the parking impact with respect to the change in overall parking supply on the Proposed Scheme corridor on Woodquay Street and Newtownsmith is shown in **Table 18**, which includes consideration of spaces on adjacent streets within an approximate 200m distance.

Table 18: Impact of Parking and Loading Changes for Woodquay and Newtownsmith

Location	Type of Parking		No. of Spaces		
			Baseline	Scheme	Change
Woodquay Street (from Headford Road to Eglinton Street)	Designated Paid	Commercial	64	22	-42
Woodquay Street (from Headford Road to Eglinton Street)	Disabled Designated Paid Parking	Commercial	2	0	-2
Woodquay Street (from Headford Road to Eglinton Street)	Loading Bay / Taxi Rank	Commercial	2	5	+3
Woodquay Street (from Headford Road to Eglinton Street)	Taxi Rank / Paid Parking	Commercial	2	0	-2
Walsh's Terrace (Bóthar na mBan to Woodquay)	Designated Paid	Commercial	5	10	+5
Newtownsmith (from the Salmon Weir Bridge to Bowling Green)	Designated Paid Parking	Commercial	10	6	-4
Newtownsmith (from the Salmon Weir Bridge to Bowling Green)	Loading Bay	Commercial	3	3	0
Approx. adjacent parking of type within 200m			120	120	0
Total			208	166	-42

9 Parking Impact on Eyre Square North and Prospect Hill

9.1 Baseline Parking and Loading Analysis

9.1.1 Corridor On-Street Parking Bays and Regulation

Eyre Square North has no designated paid on street parking. The street has a bus set down bay (5 spaces) along the northern aspect of the route throughout operating 24hrs a day Monday to Sunday. To the north of this set down area, behind a pedestrian island with bus shelters, is another lane which consists of a large taxi rank bay on the southern aspect, as well as a loading bay, a hackney carriage set down bay, a bus set down bay and 2 designated disabled permit parking spaces, all on the northern aspect of the route.

While the taxi and loading bays appear to operate 24hrs a day, the bus set down bay is time plated. The bus set down bay has space for 1 large bus.

Prospect Hill has two taxi rank bays on the north western aspect of the road with space for 10 vehicles which operates 24hrs, as well as 2 designated disabled parking spaces. A loading bay with 3 spaces is located adjacent to these two disabled parking spaces. There are 2 designated disabled permit parking spaces located outside Paddy's Bar & Lounge on the south eastern aspect of the road. There is also a loading bay with approximately 5 spaces operating from 06:00 to 18:00 Monday to Friday.

It should be noted that the desktop analysis showed that informal parking occurs along a time-plated clearway with space for 1 vehicle on Prospect Hill, despite the clearway being of 24hrs designation. The clearway is located between the loading bay and a bike share stand in the vicinity of Mapfre Assistance.

A summary of the existing parking supply on Eyre Square North and Prospect Hill is provided in **Table 19**.

Table 19: Existing On-Street Parking and Loading Spaces on Eyre Square North and Prospect Hill

Sub-section	Existing Parking Facilities	Number of Spaces
Eyre Square North	Bus Set Down	2 Bays (6 spaces)
	Loading Bay	1 Bay (2 spaces)
	Taxi Rank	1 Bay (14 spaces)
	Designated Disabled Parking	2 spaces
	Hackney Carriage set-down	1 bay (1 space)
Prospect Hill	Designated Disabled permit Parking	4 spaces
	Loading Bay	2 bays (8 spaces)
	Taxi Rank	2 Bay (11 spaces)
Bóthar Irwin	Designated Paid Parking	3 spaces
	Designated Disabled Parking	1 space

9.1.2 Loading Bays

As shown in **Table 19**, there is a total of 3 loading bays with space for a total of 10 cars or small vans in this section of the corridor, located on the Eyre Square North and Prospect Hill. Both loading bays on Eyre Square North appear to be in operation 24hrs a day Monday to Sunday, whereas the loading bay at Prospect Hill is designated as a loading bay from 06:00 to 18:00 from Monday to Friday.

9.1.3 On-Street Parking Bays and Regulation on Local Side Streets

There are several side streets which are able to be used by local residents and visitors/businesses. These spaces are likely to be utilised by visitors to premises in the vicinity of Eyre Square, as an alternative to the lack of parking on the corridor itself. There are designated Pay & Display parking spaces with approximately 30 spaces on the local side streets, 3 of which are designated disabled parking, within 200m from the corridor and in the vicinity of the on-street parking directly on the corridor, which are located on Eyre Street and Bóthar Irwin.

The designated Pay & Display parking spaces above are available from 08:30 to 18:30 from Monday to Saturday and 13:00 to 18:00 Sundays with a maximum stay duration of 2 hours.

9.1.4 Land Use and Parking Demand

Eyre Square North and Prospect Hill is a corridor that has a range of land uses illustrated in **Appendix B**. There are multiple sites where there is surface level off street parking is available such as Galway County Council and to the rear of On Yer Bike Cycles. Therefore, it can be assumed that parking activities are within their premises and would not require on-street parking along the corridor. The route is also in close proximity to the Corrib Centre Car park, which has up to 576 spaces which are free for the first 10 minutes and €2.40 per hour thereafter up to 5 hours, with a 10 hour stay of €15.00 and a 24 hour stay of €20.00.

Eyre Square North and Prospect Hill also run through a number of large trip attractors in Galway City, which include the following:

- Ulster Bank Eyre Square;
- Dunnes Stores;
- Bank of Ireland Eyre Square;
- The Quincentennial Fountain;
- TK Maxx;
- Galway County Council; and
- The Western Hotel.

Generally, the route contains a range of shops, restaurants/takeaways, pubs/bars located along Eyre Square North and Prospect Hill.

An illustration of land use on Eyre Square North and Prospect Hill can be found in Appendix B

9.2 Cross City Link Parking Proposals

9.2.1 Proposed On-Street Parking and Loading Bay Supply

With BusConnects Cross City Link infrastructure in place, there is an associated need to remove some parking space to provide improved facilities for pedestrians, cyclists, and buses. The planned changes in on-street parking on Eyre Square North and Prospect Hill are illustrated in **Figure 16** and **Figure 17** and summarised in **Table 20**.

Table 20: Existing and Proposed Parking and Loading Spaces (Eyre Square North and Prospect Hill)

Sub-section	Parking / Loading Facilities	Existing	Proposed	Loss of Parking / Loading
Eyre Square North	Bus Set Down	2 bays (6 spaces)	1 bay (4 spaces)	-2 spaces
	Loading Bay	1 bays (2 spaces)	1 bay (4 space)	+2 spaces
	Taxi Rank	1 bay (14 spaces)	0	-14 spaces
	Designated Disabled Parking	2 spaces	0	-2 spaces
	Hackney Carriage set-down	1 bay (1 space)	0	-1 spaces
Prospect Hill	Designated Disabled Permit Parking	4 spaces	4 spaces	0
	Loading Bay	2 bays (8 spaces)	2 bay (9 spaces)	+1 space
	Taxi Rank	2 bays (11 spaces)	2 bays (7 spaces)	-4 spaces
Bóthar Irwin	Designated Paid Parking	3 spaces	0	-3 spaces
	Designated Disabled Parking	1 space	3 spaces	+2 spaces

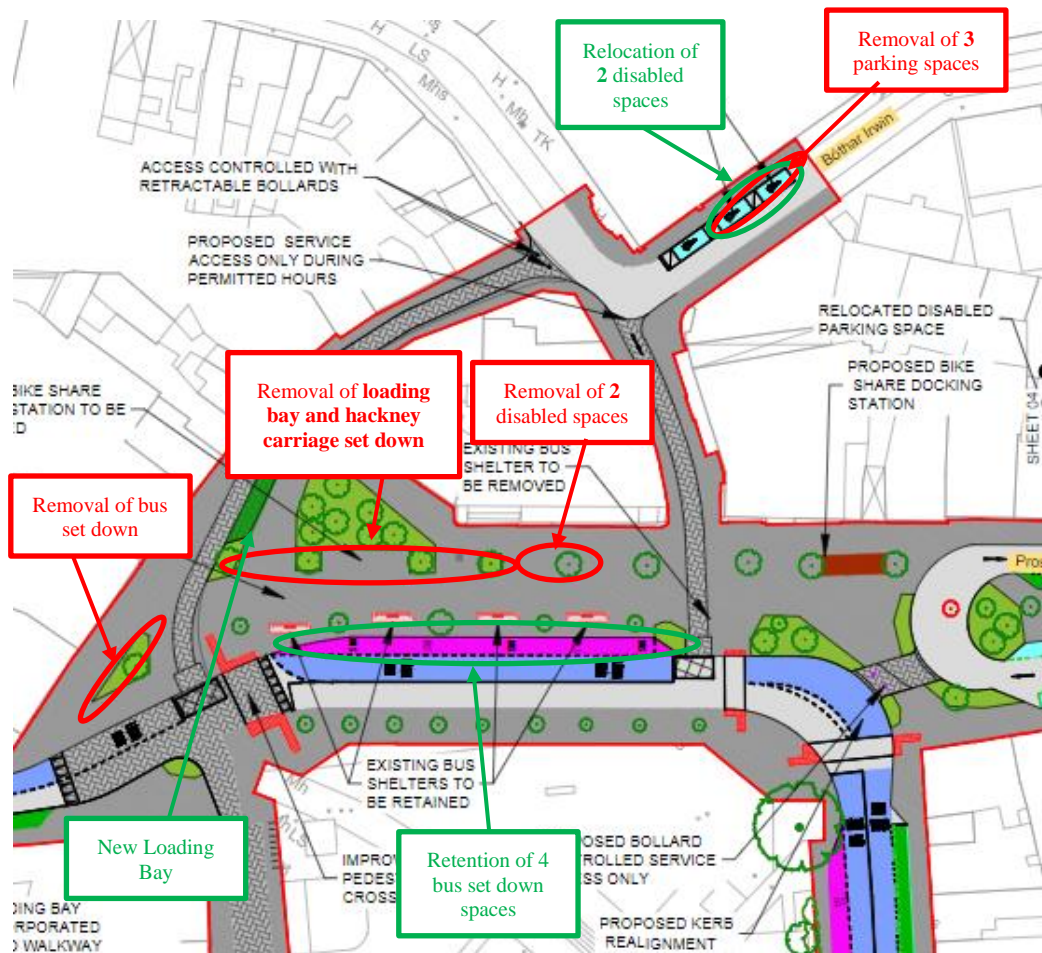


Figure 16: Proposed scheme design on Eyre Square North

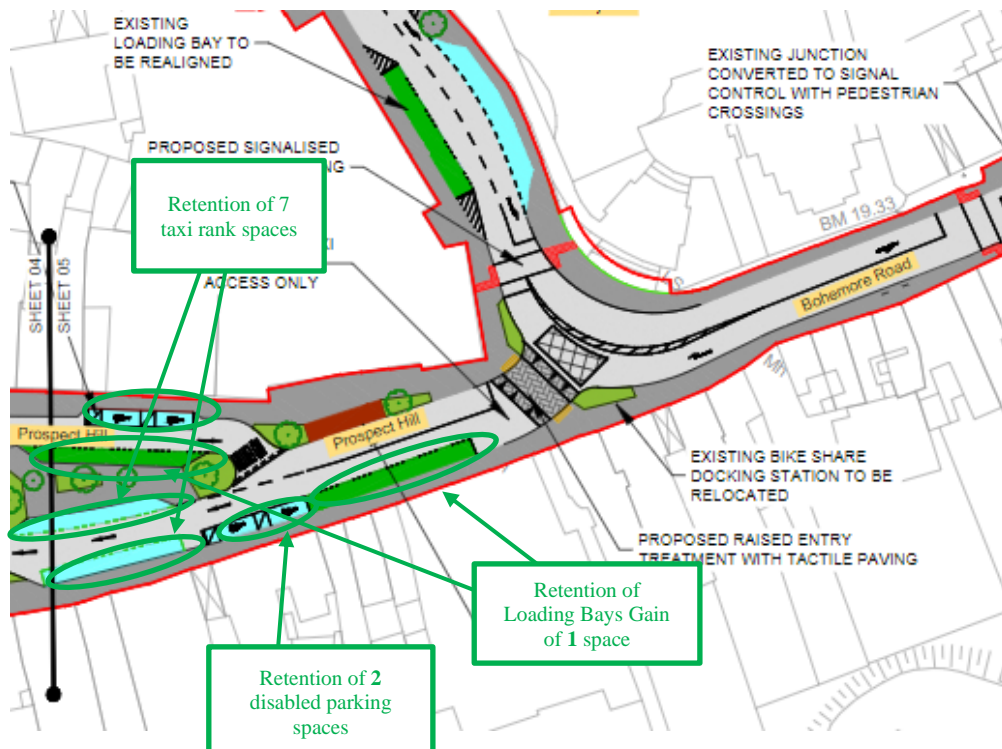


Figure 17: Proposed scheme design on Prospect Hill

9.3 Overall Parking Impact

A summary of the parking impact with respect to the change in overall parking supply on the Proposed Scheme corridor on Eyre Square North and Prospect Hill is shown in **Table 21**, which includes consideration of spaces on adjacent streets within an approximate 200m distance.

Table 21: Impact of Parking and Loading Changes for Eyre Square North and Prospect Hill

Location	Type of Parking		No. of Spaces		
			Baseline	Scheme	Change
Eyre Square North	Bus Set Down	Commercial	6	4	-2
Eyre Square North	Loading Bay	Commercial	2	4	+2
Eyre Square North	Taxi Rank	Commercial	14	0	-14
Eyre Square North	Disabled Designated Parking	Commercial	2	0	-2
Eyre Square North	Hackney carriage Set-down	Commercial	1	0	-1
Prospect Hill	Designated Disabled Parking	Commercial	4	4	0
Prospect Hill	Loading Bay	Commercial	8	9	+1
Prospect Hill	Taxi Rank	Commercial	11	7	-4
Bóthar Irwin	Designated Paid Parking	Commercial	3	0	-3
Bóthar Irwin	Designated Disabled Parking	Commercial	1	3	+2
Approx. adjacent parking of type within 200m			606	606	0
Total			658	637	-21

10 Parking Impact on Merchants Road to Dock Road

10.1 Baseline Parking and Loading Analysis

10.1.1 Corridor On-Street Parking Bays and Regulation

Merchants Road currently has a tour bus set down bay, with 2 spaces, on the western aspect of the route, which is also signed as a 24hr clearway. There is a city bus stop adjacent to the tour bus set down. Two taxi bays to the eastern aspect of the route which operate as Pay and Display parking from the hours of 08:30 to 18:30 Monday to Saturday and 13:00 to 18:00 on Sundays, and as a taxi bay from 18:30 to 05:30 Monday to Sunday. The two bays combined can accommodate 6 vehicles. There are also 2 designated disabled permit parking spaces on the eastern aspect of the route towards the junction with Forthill Street.

Forthill Street (From Merchants Road to Dock Road) currently has 17 designated Pay and Display parking spaces, along its southern aspect, which operate from 08:30 to 18:30 Monday to Saturday and 13:00 to 18:00 on Sundays. There are a further 2 designated Pay and Display parking spaces, with the same operation as above, on the opposite side of the route, it should be noted that the desktop analysis has identified that these spaces are being used to display used cars for sale from VP Motors. There is also a bus set down bay on the northern aspect of the route sufficient to accommodate 1 bus.

A summary of the existing parking supply from Merchants Road to Dock Road is in **Table 22**.

Table 22: Existing On-Street Parking and Loading Spaces Merchants Road to Dock Road

Sub-section	Existing Parking Facilities	Number of Spaces
Merchants Road	Designated Disabled Parking	2 spaces
	Tour Bus set down	1 bay (2 space)
	Designated Paid Parking / Taxi Rank	2 bays (6 spaces)
Forthill Street (From Merchants Road to Dock Road)	Designated Paid Parking	19 spaces
	Bus Set Down	1 bay (1 space)

10.1.2 Loading Bays

There are no loading bays on this section of the route between Merchants Road and Dock Road. Therefore, it is assumed that loading activities occur within the premises of businesses, or during early morning and evening periods.

10.1.3 On-Street Parking Bays and Regulation on Local Side Streets

There are several side streets which are able to be used by local residents and visitors/businesses. These spaces are likely to be utilised by visitors to premises along the route from Merchants Road and Dock Road as an alternative to parking directly on the corridor. There are designated Pay & Display and Permit Parking with approximately 62 spaces (4 of which are designated disabled permit parking) on the local side streets, within 200m from the corridor and in the vicinity of the on-street parking directly on the corridor, such as:

- Merchants Road; 08:30 to 18:30 Monday to Saturday, 13:00 to 18:00 Sunday
- St. Nicholas Street; 08:30 to 18:30 Monday to Saturday, 13:00 to 18:00 Sunday
- Dock Road; 22 (4 disabled) 24 hour Monday to Sunday

10.1.4 Land Use and Parking Demand

The route from Merchants Road and Dock Road contains a range of land uses illustrated in Appendix B. There is one site along the route which has private parking on its premises. This parking is located to the rear of Ross House Office Centre with spaces for approximately 10 vehicles.

There is also a large Q Park car park with 444 spaces located on the north western aspect of Merchants Road at the Eyre Square Shopping Centre. The car park operates Monday to Sunday 24hrs a day at a cost of €2.70 an hour, or €22.00 for 24 hours. The carpark also offers monthly, quarterly and yearly pricing offers.

There is a multistorey carpark with 480 spaces to the south of Dock Road at Hynes Yard. The carpark operates from 05:30 to 00:00 Monday to Sunday at a rate of €2.70 per hour, or €20.00 for 24 hours. The carpark also offers a customer rate of €9.00 for 24 hours.

The route runs through a number of trip attractors in Galway City, which include the following:

- Eyre Square Shopping Centre;
- Kinlay Hostel Galway; and
- Ross House.

Generally, Merchants Road and Dock Road has a range of shops, restaurants, residential apartments, and office spaces located along the route.

An illustration of land use on from Merchants Road and Dock Road can be found in Appendix B.

10.2 Cross City Link Parking Proposals

10.2.1 Proposed On-Street Parking and Loading Bay Supply

With BusConnects Cross City Link infrastructure in place, there is an associated need to remove some parking spaces to provide improved facilities for pedestrians, cyclists, and buses. The planned changes in on-street parking along the route from Merchants Road to Dock Road are illustrated in **Figure 18** and summarised in **Table 23**.

Table 23: Existing and Proposed Parking and Loading Spaces (Merchants Road to Dock Road)

Sub-section	Parking / Loading Facilities	Existing	Proposed	Loss of Parking / Loading
Merchants Road	Designated Disabled Parking	2 spaces	2 spaces	0
	Bus Set Down	1 bay (2 spaces)	2 bays (3 spaces)	+1 space
	Designated Paid Parking / Taxi Rank	2 bays (6 spaces)	2 bays (5 spaces)	-1 space
Forthill Street (From Merchants Road to Dock Road)	Designated Paid Parking	19 spaces	6 spaces	-13 spaces
	Bus Set Down	1 bay (1 space)	1 space	0

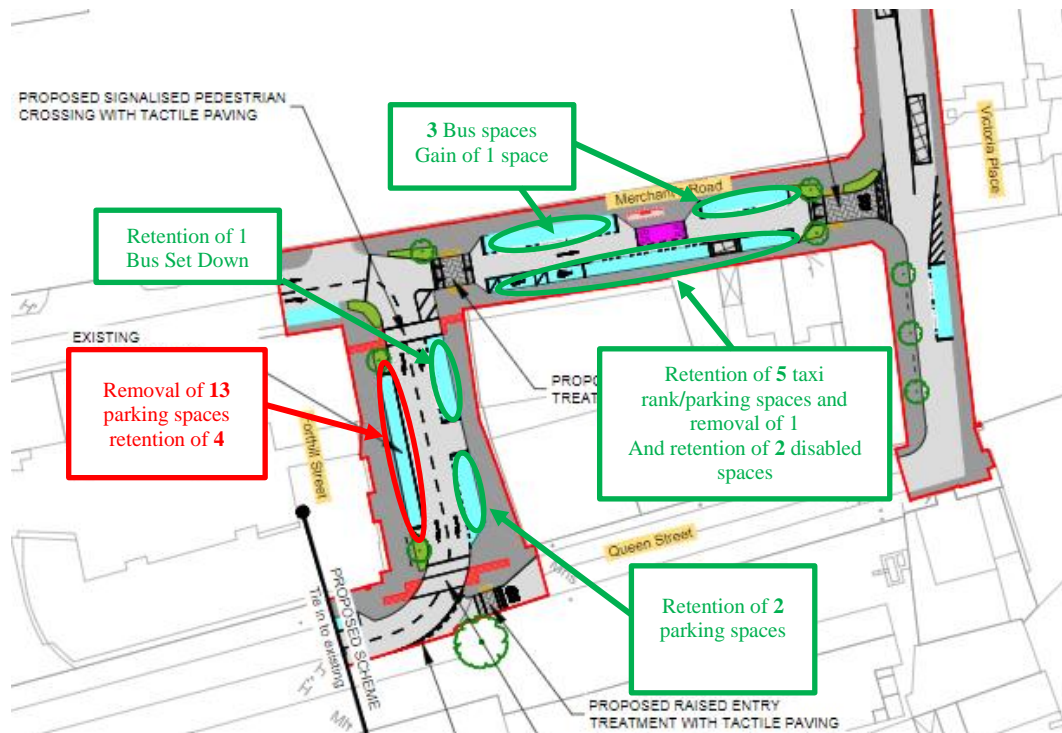


Figure 18: Proposed scheme design on Merchants Road, Forthill Street and Dock Road

10.3 Overall Parking Impact

A summary of the parking impact with respect to the change in overall parking supply on the Proposed Scheme corridor in section is shown in **Table 24**, which includes consideration of spaces on adjacent streets within an approximate 200m distance.

Table 24: Impact of Parking and Loading Changes (Merchants Road to Dock Road)

Location	Type of Parking		No. of Spaces		
			Baseline	Scheme	Change
Merchants Road	Designated Disabled Parking	Commercial	2	2	0
Merchants Road	Bus Set Down	Commercial	2	3	+1
Merchants Road	Designated Paid Parking / Taxi Rank	Commercial	6	5	-1
Forthill Street (From Merchants Road to Dock Road)	Designated Paid Parking	Commercial	19	6	-13
Forthill Street (From Merchants Road to Dock Road)	Bus Set Down	Commercial	1	1	0
Approx. adjacent parking of type within 200m			986	986	0
Total			1016	1003	-13

11 Summary and Conclusions

11.1 Summary of Parking Changes

With the proposed scheme in place, there is an associated need to remove some parking space to provide improved facilities for pedestrians, cyclists, and buses – which inevitably requires some reallocation of parking road space. Where there is an area acting as both a loading bay and taxi rank, it will be counted as a loading bay in Table 26. The proposed changes in parking and loading provision along the Cross City Link are summarised in **Table 25** and **Table 26** below:

Table 25: Summary of Parking Changes

	No. of Spaces				
Location	Baseline		Proposed		Change
	Corridor	Adjacent	Corridor	Adjacent	
University Road (Newcastle Road to Salmon Weir Bridge)	17	211	13	211	-4
Salmon Weir Bridge to Forster Street	32	1298	5	1298	-27
College Road and Dublin Road	172	90	139	90	-33
Lough Atalia Road to Headford Road	585	106	564	106	-21
Galway Cathedral	188	175	63	175	-125
Woodquay and Newtownsmith	83	120	38	120	-45
Eyre Square and Prospect Hill	42	606	18	606	-24
Merchants Road / Dock Road	30	986	17	986	-13

Table 26: Summary of Loading Changes

Location	No. of Spaces		
	Loading Bays		Change
	Baseline Spaces	Proposed Spaces	
University Road (Newcastle Road to Salmon Weir Bridge)	3	3	0
Salmon Weir Bridge to Forster Street	21	25	+4
College Road and Dublin Road	4	4	0
Lough Atalia Road to Headford Road	8	8	0
Galway Cathedral	0	0	0
Woodquay and Newtownsmith	5	8	+3
Eyre Square and Prospect Hill	10	13	+3
Merchants Road / Dock Road	0	0	0

11.2 Summary of Parking Impact and Mitigation

With BusConnects infrastructure in place, the impacts of the change in on-street parking have been considered and are itemised below (in summary); the associated mitigation effects of the BusConnects plan and other measures are also summarised:

- The Cross City Link Scheme will have a moderate impact to parking on the road network along and within the vicinity of the scheme with an expected reduction in approximately 220 of parking space provision. This equates to approximately 5% of the surrounding available parking provision available for public use.
- Aspects of the Cross City Link scheme and network proposals are expected to mitigate the reduction in parking by reducing reliance on private cars due to availability of an improved bus network with journey reliability, by availability of improved cycling infrastructure, and by continued and managed use of private off-street parking.
- The overall provision of loading spaces within the scheme will be increased by 10 no. spaces.
- Improved compliance with parking and loading bay regulations, and management of loading activities will also assist in offsetting the reduction in on-street parking spaces. It is concluded that the overall impact of loss of parking space on these streets is limited and will be largely offset by the cumulative effect of mitigations.

Other issues and design considerations will also have an impact on parking availability and usage:

- Commercial premises will need to consider adapting their loading arrangements – for example by loading at night-time or hours outside of operation of the Cross-City Link.
- Cycle parking is to be incorporated in the Cross City Link scheme – which will enhance the ability of residents to cycle instead of driving and parking a car to use local services

Appendix A

Scheme Section Map

Appendix B

Existing Land Use