ARUP

Galway County Council

N6 Galway City Ring Road

Obligations under Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended) and submissions in relation to the Climate Action Plan 2024

Reference: GCRR-4.03-30.12_001

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Part IV of 2025 RFI Response

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1. Introduction

An Bord Pleanála (ABP) issued a Request for Further Information (RFI) to Galway County Council on 6 December 2023 (Ref: ABP-318220-23), in relation to the N6 Galway City Ring Road (N6 GCRR) which requested the submission of information in relation to, *inter alia*, the most recent Climate Action Plan.

As requested by ABP, this report addresses the most recent approved Climate Action Plan, the Climate Action Plan 2024 (CAP24). It considers how the proposed N6 GCRR aligns with CAP24 and also with the other plans, strategies and objectives specified in section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended) (the "Climate Act").

This report provides the information necessary for ABP to be satisfied that, by approving the proposed N6 GCRR, it would be discharging its obligations under section 15 of the Climate Act and performing its functions in a manner consistent with CAP24, the most recent approved long term climate strategy and the other plans and objectives specified in section 15.

This report should also be read in conjunction with the updated EIAR submitted with the Response to ABP's RFI, and in particular Chapter 17 of the updated EIAR in relation to Climate, which assesses the climate effects of the proposed N6 GCRR in accordance with the EIA Directive. The climate assessment for EIA purposes is a different test to this consideration of ABP's obligations under Section 15 of the Climate Act contained in this report. The updated EIAR presents the assessment of effects on climate during the construction and operation phase of the Project by comparing the emissions in a scenario with the proposed Project to a scenario without the proposed Project. As the EIA assessment only considers the effects of the Project, it cannot account for emission reductions associated with additional commitments which will arise from the delivery of the Galway Transport Strategy (GTS) or the most recent approved climate action plan, CAP24. The reductions in carbon emissions likely to arise from the GTS and CAP24 in conjunction with the Project are presented in this report. The conclusion of the EIA assessment, i.e. with and without the proposed Project only, is that the proposed Project when considered in isolation is expected to have a permanent moderate adverse residual effect on climate during over its lifecycle following the implementation of construction phase mitigation.

2. Executive Summary

The key targets for the transport sector from an operational perspective in the CAP24 are as follows:

- 20% reduction in total vehicle kilometres travelled relative to 2030 Business as Usual (BAU)
- 50% reduction in carbon emissions compared to 2018 levels
- Significant increases to sustainable transport trips and modal share

A modelling exercise has been undertaken to look at the Galway Transport Strategy (GTS) afresh in the context of the transport problems facing Galway today, to consider whether the proposed N6 GCRR is still required as part of the GTS, and to consider whether the proposed N6 GCRR is consistent with CAP24.

As is clear from the detailed updated traffic modelling and assessment set out in Chapter 6 of the updated EIAR and discussed further below, the existing transport issues which triggered the need for the GTS (including the proposed N6 GCRR) in 2016 still exist today and are impacting on all modes of transport in the city.

That updated traffic modelling and assessment shows that the proposed N6 GCRR remains an integral part of the GTS and is key to the delivery of the objectives of the GTS, enabling the following outcomes aligned with CAP24:

- A 16% reduction in total vehicle kilometres travelled in 2030, when compared to the BAU[1] scenario.
- A 43% reduction in carbon emissions from transport within the area of influence of the proposed N6 GCRR in 2030, when compared to 2018 levels. This substantial reduction in vehicle emissions, is achieved against a backdrop of a forecast 30% increase in population in the Greater Metropolitan Area (GMA) between 2016 and 2030.

Based on that analysis and updated traffic modelling, as set out in this report, it is clear that the delivery of the proposed N6 GCRR is still required today as an integral part of the GTS, and its delivery as part of the GTS and alongside the measures which informed the targets for transport set out in CAP23 and CAP24 (the transport targets have not changed between CAP23 and CAP24) results in a 43% carbon emissions reduction from transport by 2030 within the area of influence of the proposed N6 GCRR when compared back to 2018 levels.

In addition to these significant contributions to the specific national targets set out in CAP24, the proposed N6 GCRR has been developed in line with and is consistent with the modal hierarchy and intervention hierarchy set out in the National Investment Framework for Transport in Ireland (NIFTI) and will also facilitate significant increases in sustainable transport trips and modal share.

When delivered alongside demand management measures to achieve CAP24 targets, the proposed N6 GCRR will:

- Enable demand management measures within the city like car free areas and congestion charges, which would restrict general traffic from using three out of the existing four bridge crossings, and help to reduce city centre traffic, supporting potential road space reallocation for sustainable modes and public realm improvements
- Facilitate demand management measures to help achieve CAP24 targets whilst ensuring a level of mobility for residents on both sides of the city
- Enable a better performing network for all modes by reducing delays across the network by 50% compared with 2023 levels, whilst not increasing the level of car trips within the metropolitan area
- Reduce the need for HGVs to travel within the city: 25% reduction in the level of HGV kilometres within the N6/R338 cordon of the city which accounts for approx. 60% of the city's current population; benefitting pedestrians, cyclists and public transport users with a consequential improvement in air quality in line with CAP24 and supporting a safer environment for active travel trips
- Facilitate the BusConnects programme for the city, by providing another river crossing to offset restrictions on Salmon Weir Bridge and enable potential restrictions on other city centre bridges via car free urban areas and congestion charges
- Accommodate the significant planned growth within city and environs in line with National Planning Framework (NPF) targets (50% increase in population by 2040, compared to 2016 levels)

Therefore, not only will the proposed N6 GCRR be consistent with CAP24 during its operational phase, as an integral part of GTS and enabler of demand management measures set out in CAP24, the proposed N6 GCRR is essential to the optimal achievement of GTS combined with the forecast population growth and the CAP24 targets.

The reduction in total vehicle kilometres and carbon emissions that will be achieved through the implementation of the GTS (including the proposed N6 GCRR) and CAP24 and the significant increases to sustainable transport trips and modal share that will be facilitated during the operational phase are

[1] This scenario is used as the benchmark against which the vehicle kilometre reduction target is calculated.

transformational in terms of the future compact growth of Galway City by 50% in line with national policy to reduce and minimise demand for transport in the first case.

However, there are associated, but necessary negative effects of embedded carbon and carbon emissions during the construction process from embodied carbon associated with the materials and transport of construction materials to site.

The analysis in this report demonstrates that, by granting the approvals sought for the proposed N6 GCRR, ABP would be performing its functions in a manner consistent with CAP24, the most recent approved long term climate strategy and the other plans and objectives specified in section 15 of the Climate Act.

3. Section 15 of the Climate Act Climate Action Plan

As ABP will be aware, section 15(1) of the Climate Action and Low Carbon Development Act 2015 (as amended) (the **"Climate Act"**) provides that:-

"15. (1) A relevant body shall, in so far as practicable, perform its functions in a manner consistent with—

(a) the most recent approved climate action plan,

(b) the most recent approved national long term climate action strategy,

(c) the most recent approved national adaptation framework and approved sectoral adaptation plans,

(d) the furtherance of the national climate objective, and

(e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State."

ABP is a relevant body and, therefore, in considering whether to grant approval of the proposed N6 GCRR, ABP must ensure that it performs its functions in a manner consistent with CAP24, as the most recently approved CAP, and also with the long term climate action strategy and the other plans and objectives specified in Section 15.

4. Climate Action Plan

4.1 Introduction

The purpose of the Climate Action Plan is to lay out a roadmap of actions which will ultimately lead us to meeting our national climate objective of pursuing and achieving, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy. It aligns with the legally binding economy-wide carbon budgets and sectoral emissions ceilings that were agreed by Government in July 2022.

4.2 Most Recent Approved Climate Action Plan

Section 15 refers to the most recent approved action plan. The draft Climate Action Plan 2024 (CAP24) was agreed by Government on 20 December 2023 and, following the completion of Strategic Environmental Assessment, Appropriate Assessment, and a six-week public consultation, the finalised version of CAP24 was approved by Government on 21 May 2024. Therefore, CAP24 is the most recent approved Climate Action Plan for the purposes of section 15 of the Climate Act. Should CAP25 be approved before consent for the Project is granted, then that will be the most recent approved CAP for the purposes of Section 15.

4.3 Transport Targets in CAP24

The key transport targets in CAP24 are as follows:

- 20% reduction in total vehicle kilometres travelled relative to 2030 business-as-usual (BAU)
- 50% reduction in fuel usage
- significant increases to sustainable transport trips and modal share

The CAP24 target is to achieve a 20% reduction in vehicle kilometres travelled, at a national level, when compared against the 2030 BAU scenario. The comparison relative to the 2030 BAU scenario was confirmed as the correct assessment procedure to Galway County Council/Arup/Systra by the Department of Transport and is expressly and unambiguously set out in CAP24, which expressly refers on page 283 to a *"20% reduction in total vehicle kms. relative to 2030 BAU scenario"*.

This 2030 BAU Scenario includes the implementation of a number of projects including very importantly the proposed N6 GCRR, and takes account of future growth projections in line with the National Planning Framework, etc. Also, very importantly, the target of a 20% reduction in vehicle kilometres travelled when compared against the 2030 BAU Scenario does not mean that the number of vehicle kilometres travelled in 2030 should be lower than the present day, or lower than it was in prior years, or that any individual project must result in a reduction in vehicle km travelled. Instead, the target is that the overall number of vehicle km travelled in 2030 at a national level (not solely in Galway) should be 20% less than it would have been, had the various measures in CAP not been introduced, i.e., in a 2030 "business as usual" scenario.

As part of the modelling exercise done by the NTA and SYSTRA, to inform the Climate Action Plan 2023 (CAP23), which in turn informed CAP24, it was shown that the 20% vehicle reduction target compared to the 2030 BAU, and the targeted 50% reduction in carbon emissions from transport compared to 2018 levels, could be achieved at a national level.

It is notable that the BAU scenario which was modelled as part of that exercise includes several major infrastructure projects, including the proposed N6 GCRR. Therefore, the exercise showed that the targets (emission reduction and vehicle kilometre reduction) set out in CAP23 and CAP24 (transport sector targets have not changed in both versions) at a national level could be achieved with the inclusion of the proposed N6 GCRR. Therefore, the delivery of the proposed N6 GCRR as part of an overall transport solution for Galway, is consistent with CAP and with the achievement of the targets set out in CAP24 at a national level.

CAP24 also highlights the indirect effects of measures to reduce transport emissions, and it states: "*Action to reduce transport emissions in particular reduces exposure to pollutants and associated mortality risks and will help Ireland achieve its ambition to move towards the World Health Organisation Air Quality guidelines, as outlined in the Clean Air Strategy*". Therefore, air quality improvements are indirect effects arising from measures to reduce transport emissions, and so the contribution of the proposed N6 GCRR to improving air quality in Galway has also been considered and assessed in the context of CAP24.

CAP24 is accompanied by an Annex of Actions including Action No. TR/24/9(TF) to carry out an on-going programme of review, update, appraisal and planning of services in accordance with a Metropolitan Area Transport Strategy (MATS) for each city. The GTS remains as the adopted current transport policy for Galway City and environs as set out in the current development plans.

Section 5 outlines the modelling undertaken to consider and assess the proposed N6 GCRR as an integral part of the GTS against the targets and measures set out in CAP24, and presents the results which show full alignment and consistency of the proposed N6 GCRR with CAP24.

4.4 Future Growth under NPF as envisaged in CAP24

Ireland 2040 aspires for Galway to be a larger, more compact city which will contribute to more balanced regional growth together with a more sustainable future. As recognised in the National Planning Framework (NPF) *"Galway has been Ireland's most rapidly developing urban area for half a century and is a key driver for the west of Ireland"*. Galway has been growing economically and is the economic engine at the heart of the Western region. Significant new employment opportunities and associated education opportunities have

been created in line with national policy, such that Galway is a dynamic vibrant city which also serves a large hinterland.

Under the NPF, the population of Galway City is planned to increase by 50% by 2040. Within the metropolitan area, the population is expected to grow to approximately 150,000 people by 2040 from the 2016 level of approximately 95,000. The planned increase in population and employment within the metropolitan area will increase the demand for travel across all modes (including freight) by over 20%, thereby exacerbating the transport capacity issues experienced today. This has to be considered in the context of the transport problems facing Galway, and the measures set out in the Climate Action Plan.

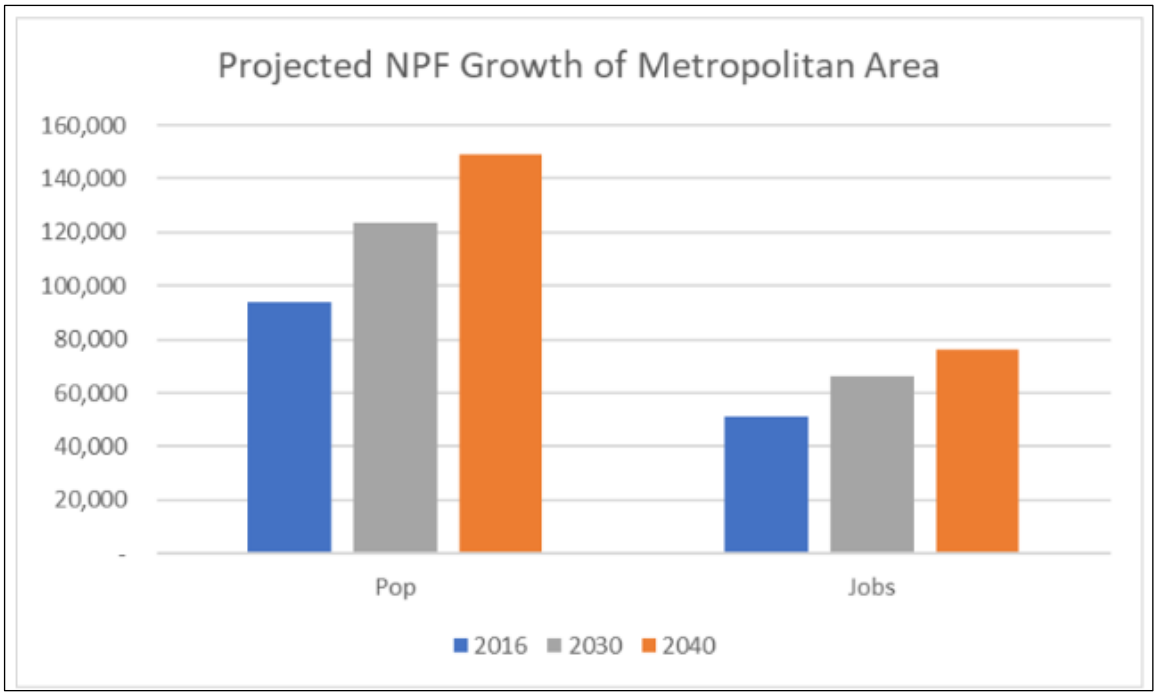

Plate 4.1 Projected NPF Growth of Metropolitan Area

The population increase of 50% and associated growth in employment will increase the demand for travel across all modes (including freight) increases. This is part of national planned policy and requires a transport strategy to successfully deliver such growth. The forecast demand for travel envisaged under the NPF growth scenarios will exacerbate the operational issues on the network, with further delays and journey time reliability issues experienced across all modes as shown in Plate 4.2 and Plate 4.3 below.

The Western Regional Model was utilised to provide data to illustrate these issues listed above with the data provided below. The figures below compare various model statistics for 2018 and 2030. These years were chosen as they are the years in CAP24 against which the emission reduction target is measured.

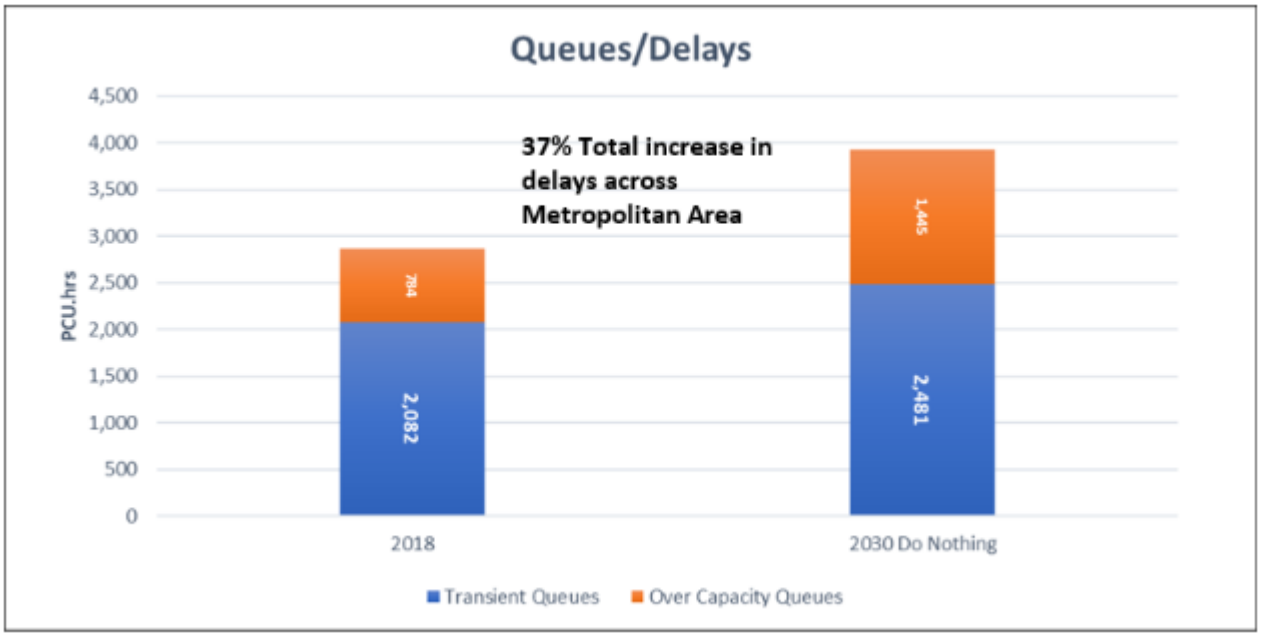

Plate 4.2 Delay Time 2018 versus 2030 Do-Nothing

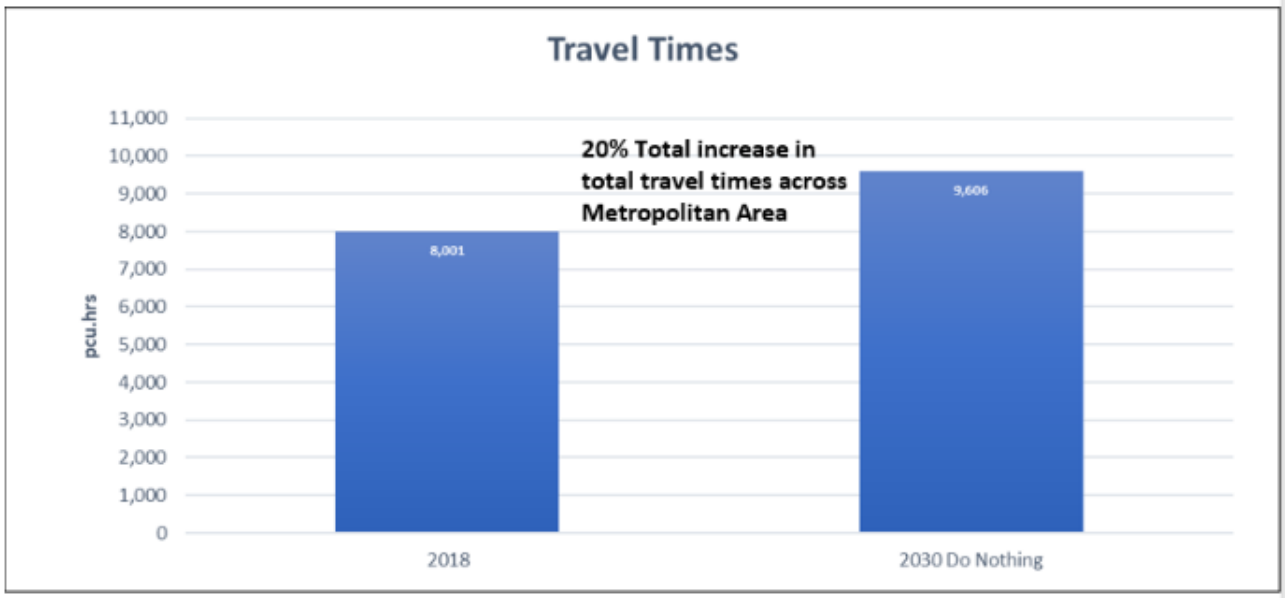

Plate 4.3 Travel Time 2018 versus 2030 Do-Nothing

It can be seen above that queuing and journey times associated with the existing congestion across the wider city network will continue to increase in the period from 2018 to 2030 in the absence of the intervention measures that have been identified within the GTS as necessary to support the growth of the city in a sustainable manner in accordance with CAP24, including the implementation of the proposed N6 GCRR. The objective of compact growth and the attainment of the CAP24 targets is only possible if active travel is facilitated and public transport systems operate free of congestion. To achieve this, a sustainable transport network must be the best option. Reallocating space for walking, cycling and public transport will make the sustainable transport network safe and efficient and will reduce reliance on cars, thus helping to achieve the carbon emission reduction targets in CAP24.

5. N6 GCRR is consistent with CAP24

5.1 Operational Phase

The objectives of the GTS are to achieve a fundamental shift towards sustainable travel, reducing the dependency on the private car and taking action to make Galway more accessible and connected, enhancing quality of life within the city for all. Updated traffic modelling and assessment discussed below demonstrates that the proposed N6 GCRR is still required as an integral part of the GTS to address the transport problems facing Galway today. The GTS and proposed N6 GCRR must also be considered in the context of CAP24 and the CAP24 targets for the decarbonisation of the transport sector, to ensure that the transport needs of the growing population of Galway City up to 2040 and beyond will be predominantly serviced by sustainable modes.

5.1.1 Modelling Tools

In order to forecast the level of emissions produced by each modelled scenario, a series of tools were developed and utilised to inform the emissions modelling as part of the preparation of CAP23, which in turn informed the preparation of CAP24. These are as follows:

- Irish Car Fleet Model
- Carbon Footprinting Tool (CFT)
- NTA's Regional Modelling System (RMS) – Specifically the NTA's Western Regional Model (WRM)

The Irish Car Fleet Model provides the majority of assumptions relating to fleet improvements, while the cumulative effect of measures on carbon emissions is assessed in the CFT. Results from the WRM also feed into the CFT to generate assumptions on behavioural change and vehicle kilometre responses to various measures.

The CFT and the Irish Car Fleet Model were developed by the NTA and SYSTRA, as part of the modelling work done to inform the CAP23, which in turn informed CAP24, and they have been used as part of this assessment, to estimate the emissions resulting from the proposed N6 GCRR.

5.1.2 Irish Car Fleet Model

An Irish Car Fleet Model was used to assess the impact of new vehicle technologies on carbon emissions. The model is based on the 2019 Irish car fleet inventory and predicts how the proportion of fuel types (petrol, diesel, battery electric, plug-in hybrid electric, or other) within the fleet will change over time. Its forecasts are based on observed Irish scrappage rates by age and fuel type, combined with predictions for new registrations and second-hand imports (primarily from the UK). Fleet forecasts, and the associated carbon emissions, also include assumptions on the ongoing replacement of older Internal Combustion Engine (ICE) vehicles with new EURO 6 models.

5.1.3 Carbon Footprinting Tool (CFT)

The CFT forecasts the percentage reduction in carbon emissions from various transport related measures. The outputs from the CFT can be compared to the 2018 baseline level (2018 is the baseline level in which the emission reduction targets are measured against in CAP24) to determine their impact. A graphical summary of the CFT process is presented in Plate 5.1 below:

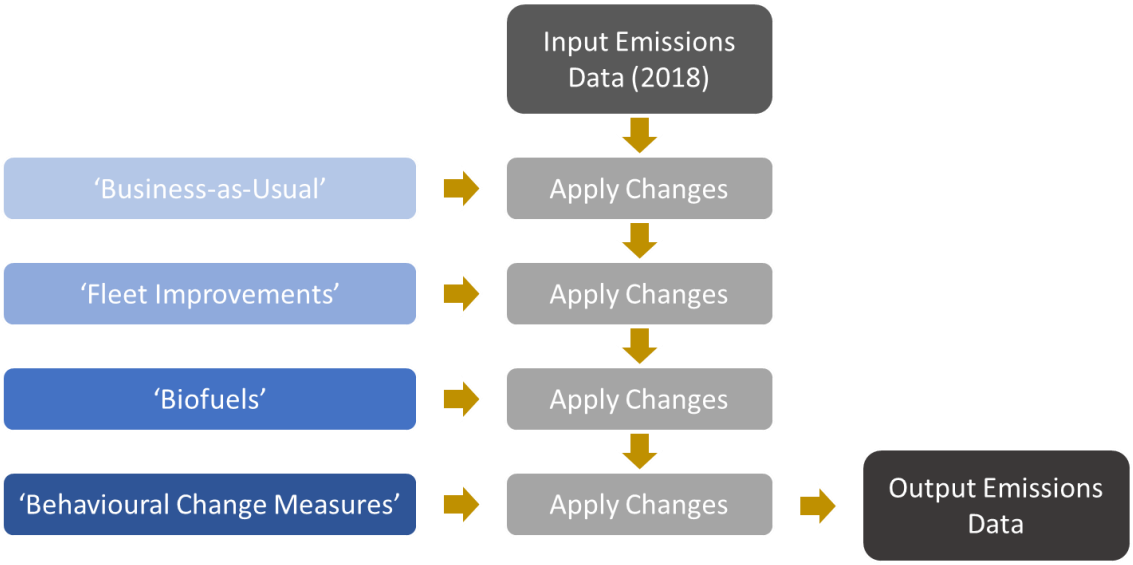

Plate 5.1 Overview CFT Process

As mentioned in the previous section, the 'Business-as-Usual' term in the graph above, refers to a scenario that captures the continuation of past trends in transport network development and is used as the starting point in the CFT process. The next step, 'Fleet Improvements' refers to the impact that the increased uptake of electric vehicles or EVs will have on emissions. The next step, 'Biofuels', refers to the impact that biofuels will have on petrol and diesel emission reduction based on the remaining internal combustion engine fleet, following the 'Fleet Improvements' step. The final step, 'Behavioural Change Measures', refers to the impact that various demand management measures will have on travel behaviours, and, in turn, vehicle kilometres travelled and carbon emissions.

5.1.4 NTA's Regional Model System

The NTA's Regional Model System (RMS) includes five Regional Models cover the entirety of Ireland and are a set of multi-model demand models, which are focussed on the following areas:

- Dublin, represented by the East Regional Model (ERM)
- Cork, represented by the South-West Regional Model (SWRM)
- Limerick, represented by the Mid-West Regional Model (MWRM)
- Galway, represented by the West Regional Model (WRM)
- Waterford, represented by the South-East Regional Model (SERM)

As the WRM focuses on Galway, it was used for this assessment.

The WRM was used as the primary tool to assess demand management measures such as parking constraint, congestion charging and car-free urban centres etc.

The RMS also includes a National Demand Forecasting model (NDFM). The NDFM forecasts overall travel demand over a 24-hour period which is then used as an input by the WRM.

The purpose of the WRM is to forecast changes in transport demand and travel choices, as well as to provide estimates of vehicle and person volumes on road and public transport networks. The Regional Models also produce several other useful indicators such as total vehicle kilometres travelled and associated tailpipe emissions.

5.1.5 CAP Modelling Assumptions

As outlined in Section 5.1.1, a number of modelling tools were developed and used to inform the targets contained in CAP23 and CAP24 (as noted above, the transport targets are the same in CAP23 and CAP24). The same tools have also been used as part of this assessment to estimate the level of vehicle emissions arising from proposed N6 GCRR related scenarios.

The modelling exercise which informed CAP23 and, in turn, CAP24, assumed a level of transport infrastructure and demand management measures, when modelling a 2030 BAU and CAP Do-Something (DS) scenario. The next section details the assumptions which were used for the CAP modelling, and which have also been used in the assessment of the proposed N6 GCRR outlined in this report.

5.1.5.1 Modelling Scenarios

The following is a list of scenarios which were modelled as part of the modelling exercise which informed CAP23 and in turn CAP24, to allow the CAP24 key performance indicators (KPIs) to be assessed:

- **2018 scenario** – This scenario is used as the baseline with which to compare 2030 emissions.
- **2030 BAU scenario** – This scenario is used as a benchmark against which the vehicle kilometre reduction target is calculated. The BAU scenario contains transport infrastructure in line with the NDP and, as part of the modelling done to inform the Climate Action Plan, the proposed N6 GCRR was included in the BAU scenario which was developed by the NTA and Department of Transport. It was also included in the BAU scenario used in this assessment.
- **2030 Climate Action Plan Do-Something (CAP DS) scenario** – This scenario builds upon the BAU scenario in that it assumes the same level of infrastructure as the BAU, including the proposed N6 GCRR, but also includes a level of demand management measures, which would help change behaviours or travel mode choices and help achieve the CAP KPIs.

These scenarios have also been modelled as part of the updated traffic modelling undertaken for the purposes of this report, to allow the proposed N6 GCRR, as an integral part of the GTS, to be considered and assessed against the CAP24 KPIs.

5.1.5.2 BAU and CAP DS Transport Schemes

The following are the key transport schemes which were assumed to be in place by 2030, in the Galway County area and which are included in both the BAU and CAP DS scenarios, both in the modelling work undertaken to inform CAP23 and CAP24, and in the modelling undertaken for the purposes of this report:

- N6 Galway City Ring Road (the subject of this assessment)
- N59 Moycullen Bypass (complete and open to traffic)
- N59 Dangan Junction Upgrade
- 30km/hr speed limit zones in the city centre (already in place)
- Galway BusConnects – New Bus network and Cross City Link Scheme (which was granted approval by An Bord Pleanála on 27 September 2024 currently subject to judicial review) and Dublin Road scheme which was submitted to An Bord Pleanála on 14 February 2025
- Park and Ride locations (Phase 1) from the GTS
- Train service between Galway City and Athenry every half hour
- Cycling network outlined in the GTS

5.1.5.3 CAP Do Something Demand Management Measures

Set out below are a list of the demand management measures which were included in the CAP scenario developed by the NTA during the modelling exercise to inform the transport targets set out in CAP23. The measures are outlined in the 'Modelling Executive Summary' technical document[2] in section 4.5.1 of the report published by the NTA. A similar modelling exercise was not undertaken as part of CAP24 but the targets for transport remain the same in both CAP23 and CAP24. The demand management measures identified were as follows:

- Trip rates in line with post pandemic behaviours (i.e. a reduction in white collar commuting to reflect increased home working)
- Reduced car ownership levels in Galway City – 10% reduction compared to 2016 levels
- Car Free Urban Centre (Plate 5.2 below shows the city centre area used for the CAP23 modelling exercise and was also adopted as part of this modelling assessment noting that there is no change to the targets from CAP23 to CAP24)
- Congestion Charge Area (Plate 5.3 below shows the city centre area used for the CAP23 modelling exercise and was also adapted as part of this modelling assessment)
- Fuel cost increases
- Removal of free workplace car parking
- Increase in parking charges
- Parking charge applied to urban areas (€5 per hour)
- 50% reduction in public transport fares

The car free urban centre and congestion charge areas were selected as they form the core city centre area which includes Eyre Square. Access to the central part of this area, including Shop Street, is already restricted, and the BusConnects project proposes another expansion of this area along Eglington Street to Eyre Square.

The further expansion of this area is deliverable whilst maintaining access around it via the City Centre Access Network and the Inner-City Access Route as set out in the GTS. This is the same car free urban centre as modelled for the CAP23 modelling exercise.

The same demand management measures are also included in the CAP DS scenario modelled for the purposes of this report. While these measures are not committed as yet, they were included in the modelling exercise which informed CAP23 and in turn CAP24 and their targets for the transport sector.

The CAP23 and CAP24 modelling work also assumed there would be no sale of combustion engines from the end of 2029, and so that assumption has also been used in the modelling undertaken for the purposes of this report. This is as per the 2030 KPI, set out in CAP23 and CAP24, which targets all new car registrations to be electric vehicles[3].

[2] https://www.nationaltransport.ie/wp-content/uploads/2023/01/Climate-Action-Plan-Phase-3-Modelling-Exec-Summary-v5.6.pdf

[3] https://www.gov.ie/pdf/?file=https://assets.gov.ie/296414/7a06bae1-4c1c-4cdc-ac36-978e3119362e.pdf#page=null (CAP24 document. Table 15.5, page 263)

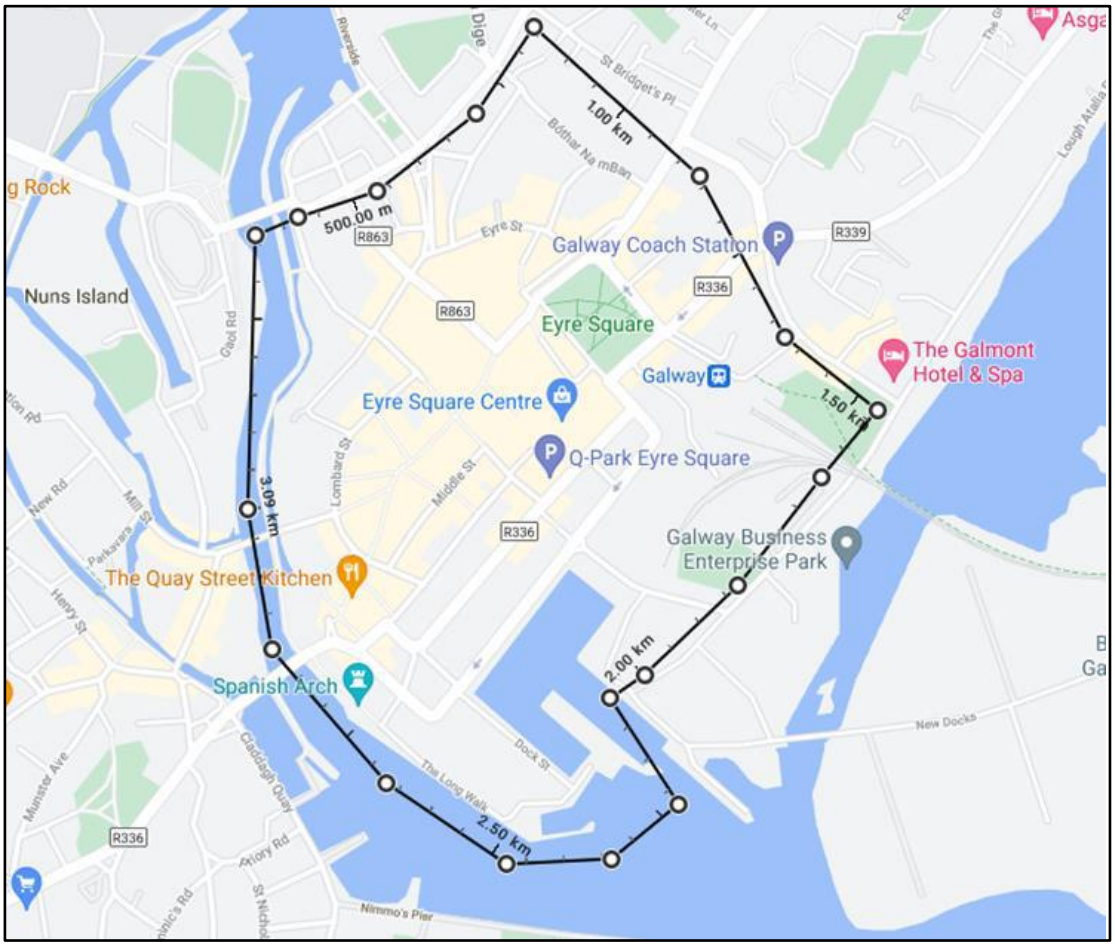

Plate 5.2 Car Free Urban Area

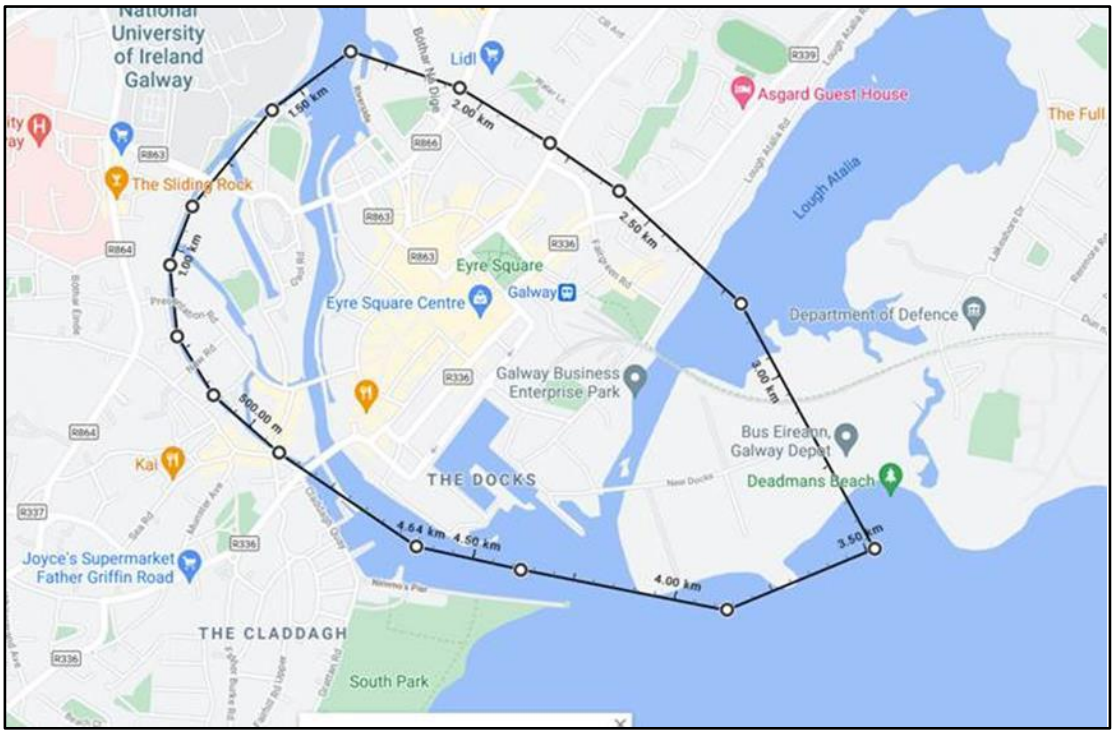

Plate 5.3 Congestion Charge Area

5.2 CAP Assessment Results – Operational Phase

Updated transport modelling, based on the same transport modelling approach and assumptions as those used in the modelling undertaken to inform CAP23 and CAP24, was undertaken to assess the overall benefits of delivering the proposed N6 GCRR, as an integral part of the GTS, against the KPIs set out in CAP24 and to consider whether the delivery of the proposed N6 GCRR would be consistent with CAP24. A summary of the results of the modelling assessment is presented in this section. The following transport KPIs have been assessed in line with CAP24 targets:

- % reduction in transport-related emissions by 2030 compared to 2018 levels
- % reduction in total vehicle kilometres compared to a 2030 BAU scenario

Further outputs from the modelling are presented to demonstrate how the delivery of the proposed N6 GCRR as an integral part of the overall GTS and alongside the demand management measures envisioned under CAP24, will help achieve the national CAP24 targets. These KPIs include:

- Mode Share comparisons within the Galway Metropolitan Area
- Demand for the proposed N6 GCRR in conjunction with CAP Demand Management measures
- Network Performance with CAP Demand Management measures, both with and without proposed N6 GCRR
- % reduction in HGV traffic across the city

5.2.1 Emissions Reduction

The transport related emissions reduction KPI is measured by comparing the emission levels between the 2030 CAP DS scenario and the 2018 scenario. While the 50% emissions reduction targeted in CAP24 is a reduction at a national level, the geographical area used for the purposes of this comparison was taken as the Area of Influence[4] of the proposed N6 GCRR. This area is shown in Plate 5.4 below.

[4] The area over which the N6 GCRR results in changes in traffic flows

Plate 5.4 N6 GCRR Area of Influence – used for Emissions Reduction

When examining the area of influence of the proposed N6 GCRR, set out in Plate 5.4 above, the delivery of the 2030 CAP Scenario (which includes the delivery of the proposed N6 GCRR as an integral part of the GTS) results in a 43% reduction in carbon emissions from transport when compared to 2018 levels. As noted above, this is the area over which changes to traffic flows and hence carbon emissions are likely to be affected by the introduction of the proposed N6 GCRR. Therefore, this reduction can be considered as a contribution to the national level reduction in transport emissions overall. The results of the assessment indicate that the delivery of the proposed N6 GCRR as an integral part of the GTS, as well as other national level measures as set out in CAP24, contributes significantly to the achievement of this national level target, whilst also catering for an approx. 30% increase in the population level across the metropolitan area by 2030, versus 2016 levels.

5.2.2 Vehicle Kilometre Reduction

The vehicle kilometre reduction KPI is measured by comparing the kilometres travelled in the 2030 CAP DS scenario against the 2030 BAU scenario. As previously mentioned, the BAU scenario also includes the proposed N6 GCRR. The same geographical area as per Plate 5.4 above, was used in line with the emission reduction KPI. Table 5.1 below shows the comparison of kilometres travelled by vehicle type.

Table 5.1 Vehicle Kilometre Comparison

Vehicle Type	BAU (veh km)	CAP DS (veh km)	Difference (%)
Cars	5,804,590	4,770,659	-18%
LGVs	432,041	427,581	-1%
HGVs	456,865	453,370	-1%
Total	6,693,494	5,651,608	-16%

When examining the area of influence of the proposed N6 GCRR, the table above shows that the delivery of the 2030 CAP Scenario results in an overall reduction of 16% in vehicle kilometres travelled when compared to the 2030 BAU scenario whilst also catering for an approx. 30% increase in the population level across the metropolitan area by 2030, versus 2016 levels.

A further examination of these results indicated that, within the area of influence of the proposed N6 GCRR, travel by car reduces by 18% when comparing the 2030 CAP Scenario to the 2030 BAU scenario, whilst Goods Vehicles (LGVs and HGVs) only reduce by 1%, illustrating the continued need for freight/goods movements on the network to support the population increase even with the implementation of CAP interventions (but see also the analysis at Section 5.2.6 below which demonstrates the significant reduction in HGV traffic achieved within the N6/R338 cordon of the city centre, which illustrates the impact of the proposed N6 GCRR). The results of the assessment indicate that the delivery of the CAP DS Scenario, which includes the proposed N6 GCRR as an integral part of the GTS, as well as other national level measures, contributes significantly towards the achievement of this national level target.

The above results indicate that the proposed N6 GCRR, as a critical component of the GTS, and in tandem with demand management measures as identified within CAP24, will contribute significantly towards the achievement of the vehicle km reduction targets set out in CAP24 and is therefore considered to be consistent with CAP24.

5.2.3 Improved Mode Share

Mode share results for the metropolitan area have also been extracted from the model to provide a more detailed understanding of the impact of the delivery of the proposed N6 GCRR in the context of CAP24. These are presented below in Plate 5.5. The results have been presented for both the BAU scenario and CAP DS scenario, both with and without the proposed N6 GCRR in place.

In the BAU scenario (without the implementation of CAP measures) (first two bars in the graph), the car mode share (blue bars) within the metropolitan area in the without proposed N6 GCRR scenario is 52.6% and with the inclusion of the proposed N6 GCRR is 54.6%.

Following the inclusion of the CAP24 measures, however, the car mode share reduces by approximately 25% to only 29.6% in the CAP DS without proposed N6 GCRR scenario (third bar in the graph). The inclusion of the proposed N6 GCRR in this scenario, with the CAP24 measures (fourth bar in graph), effectively results in no change in this car mode share (29.7%), thus giving an equivalent significant reduction in the car mode share. The fact that the introduction of the proposed N6 GCRR in the CAP DS Scenario does not lead to an increase in car mode share demonstrates that, under the CAP DS scenario and as part of an overall transport strategy, the proposed N6 GCRR is not inducing additional traffic, and therefore the additional capacity in the network created by the introduction of the proposed N6 GCRR is being used for strategic traffic movements and traffic movements that are not conducive to walking, cycling or public transport as a mode choice, thereby freeing up road space elsewhere for public transport to operate optimally and active modes to travel safely.

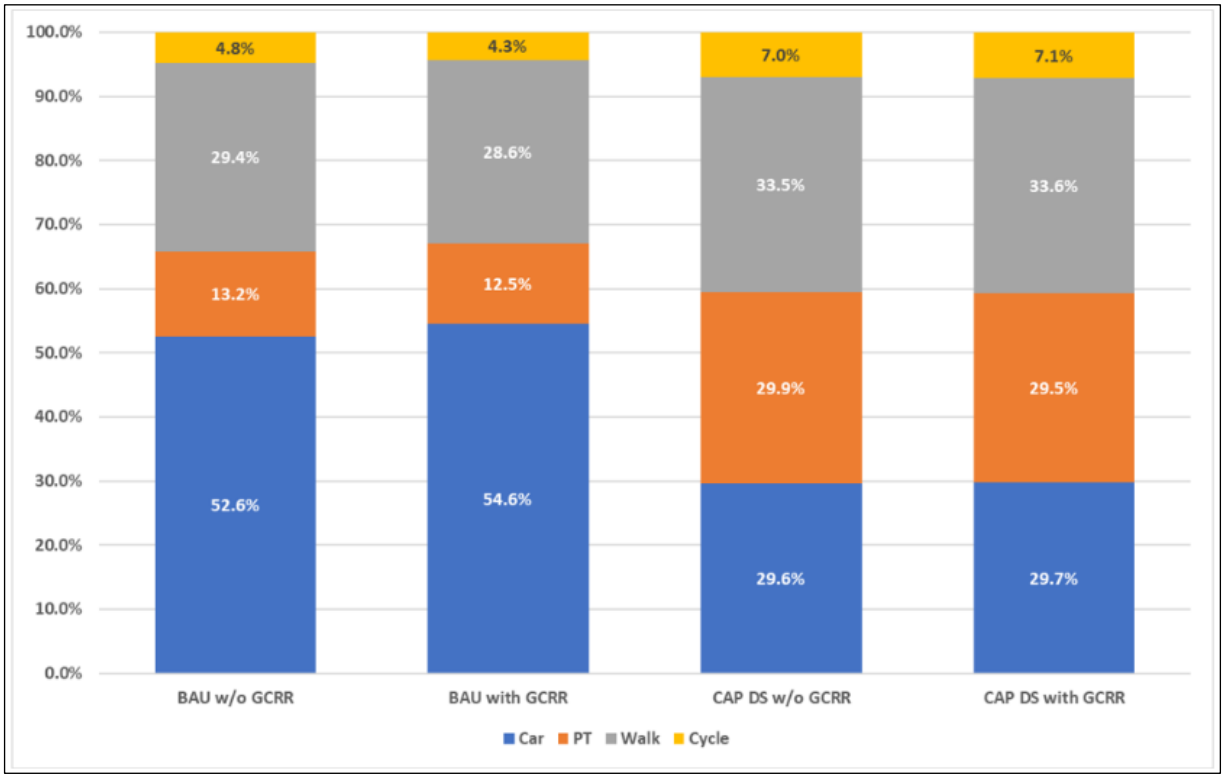

Plate 5.5 Mode Share Results, BAU vs CAP (with and without N6 GCRR)

5.2.4 Demand for GCRR with Demand Management Measures

The River Corrib traverses Galway City in a north-south axis, with all movements across the city accommodated by four bridges. On an average workday, the combined Annual Average Daily Traffic (AADT) on the four bridges is approx. 80,000. The limited capacity across the bridges currently results in congestion and delays throughout the day. As part of the NTA's BusConnects Cross-City Link project, it is proposed to convert the Salmon Weir Bridge to a sustainable transport corridor, limiting movements to buses, pedestrians and cyclists between the hours of 7 a.m. and 7 p.m. During these hours, approx. 20% of the total volume, crossing the River Corrib, currently uses the Salmon Weir Bridge.

An assessment of AADT for the river crossings in the city in 2030 has been examined for the BAU and CAP DS scenarios (both contain the proposed N6 GCRR). In both of these scenarios, the Cross-City Link scheme is assumed to be in place and thus the Salmon Weir Bridge is closed to vehicular traffic. Table 5.2 shows the results for this assessment.

Table 5.2 Annual Average Daily Traffic (AADT) crossing the River Corrib

Location	BAU (includes N6 GCRR)	CAP DS (includes N6 GCRR)	% Difference
Quincentenary Bridge	36,557	30,640	-16%
N6 GCRR over River Corrib	43,224	37,367	-14%
Wolfe Tone Bridge	15,057	7,065	-53%
O'Brien's Bridge	7,967	3,403	-57%
Total Crossing River Corrib	**102,805**	**78,474**	**-24%**

The results above show that, even with the demand management measures proposed under CAP24, there is still a strong demand for the proposed N6 GCRR. AADTs on the Quincentenary bridge and the proposed N6 GCRR, do reduce by approx. 15%, following the introduction of the CAP24 measures, but still exceed 30,000 and 37,000 respectively.

The Wolfe Tone and O'Brien bridges both see higher reductions (> 50%) in car traffic due to the demand management measures targeted for the city centre area, which includes a car free urban area, although the bridges still provide for deliveries and facilitate a level of local access.

In total, the demand management measures proposed under CAP24 reduce traffic travelling over the River Corrib by 24%, from approx. 103,000 to 78,000 in 2030 when compared to the BAU scenario. This is 2,000 vehicles less than the present-day scenario, whilst also catering for an approx. 30% increase in the population level across the metropolitan area by 2030.

The above results demonstrate that the proposed N6 GCRR forms an integral component of the GTS and is consistent with achieving the objectives of CAP24, accommodating the necessary movement of strategic traffic across the Galway Metropolitan area, while helping to substantially reduce car traffic across Wolfe Tone and O'Brien bridges, thereby creating a safer and more attractive urban centre.

5.2.5 Improved Network Performance

An additional KPI was extracted, specifically looking at the performance of the road network in the morning peak hour. Plate 5.6 below illustrates the results by comparing the level of delay in 2023 with the level of delay in 2030, for the CAP DS scenario, both with and without the proposed N6 GCRR. The CAP DS scenario, without the proposed N6 GCRR, sees an approx. 20% reduction in the level of delay experienced compared with the 2023 level. This illustrates that the demand management measures outlined above lead to an improvement in the level of delay experienced with a significant further improvement to approx. 50% reduction in delay compared to 2023 levels when the demand management measures are combined with the proposed N6 GCRR. This demonstrates the impact that the proposed N6 GCRR can have on the performance of the road network, when implemented alongside demand management measures to achieve CAP24 targets. This reduction will not only help general traffic but also help bus users travel through the city quicker and enable more reliable journey times. This will be particularly important on sections of the bus network which do not have any current or planned bus priority infrastructure, as part of the GTS and, thus, have to travel alongside general traffic.

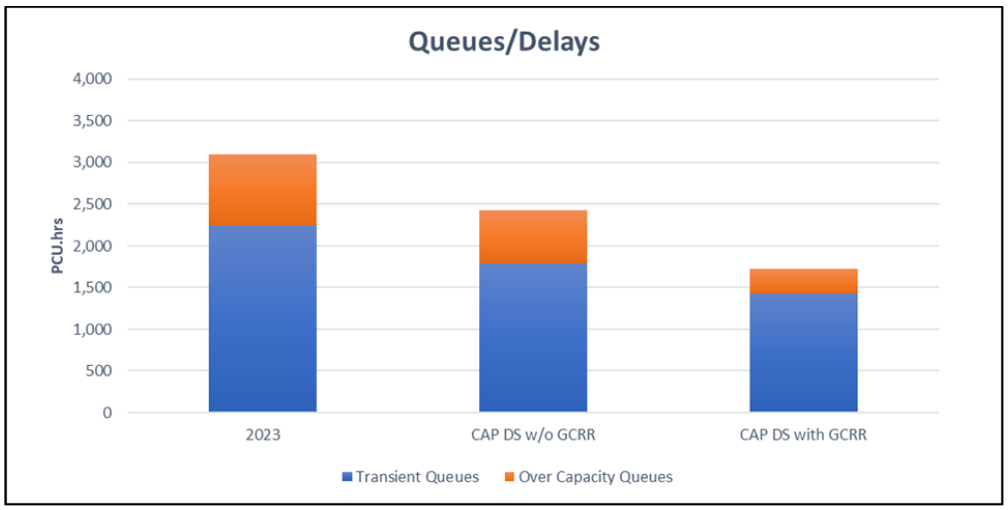

Plate 5.6 Delay Comparison (2023 vs 2030 CAP DS, with and without N6 GCRR)

Importantly, under the CAP scenario, the reduction in delays and improvement in journey time experienced with the delivery of the proposed N6 GCRR, can be achieved whilst maintaining the same car mode share.

As mentioned above, the fact that the introduction of the proposed N6 GCRR in the 2030 CAP Scenario does not lead to an increase in car mode share demonstrates that, even where there are reduced delays and journey times with the proposed N6 GCRR in place, under the envisaged 2030 CAP scenario and as part of an

overall transport strategy, the proposed N6 GCRR is not inducing additional traffic, and therefore the additional capacity in the network created by the introduction of the proposed N6 GCRR is being used for strategic traffic movements and traffic movements that are not conducive to walking, cycling or public transport as a mode choice, thereby freeing up road space elsewhere for public transport and active modes.

5.2.6 % reduction in HGVs within the city

The WRM was used to forecast the increase in HGVs by 2030, aligned with NPF growth, within the metropolitan area. The number of HGVs is expected to increase by approximately 10% in the morning peak hour by 2030, compared with current levels. As illustrated by Table 5.1 above, while the demand management measures which have been modelled have an impact on car vehicle kilometres, they effectively have no impact on goods vehicle kilometres. This is due to a lack of an alternative for goods vehicle movements, unlike car trips, which could switch modes to public transport, walking or cycling.

Therefore, in order to ascertain the impact of the proposed N6 GCRR on the movement of goods vehicles, the reduction in HGV flows at various junctions across the city have been examined. Table 5.3 below shows the difference at each junction outlined, for the morning peak hour, with the proposed N6 GCRR in place.

Table 5.3 Morning Peak Hour HGV Reductions at Various Junctions across City

Junction	CAP DS (No N6 GCRR)	CAP DS (With N6 GCRR)	Difference	Difference (%)
N6/Briarhill	379	249	-130	-34%
N6/Ballybrit	288	165	-123	-43%
N6/N83 Tuam Road	282	206	-76	-27%
N6/N84 Headford Road	233	216	-17	-7%
N6 Quincentenary Bridge (Eastern Side)/Headford Road	219	167	-52	-24%
N6 Quincentenary Bridge (Western Side)/Upper Newcastle Road	225	160	-65	-29%
College Road/Dublin Road	287	196	-90	-31%
Skerrit Roundabout Junction	158	131	-27	-17%
Joyce Roundabout	171	116	-55	-32%
Browne Roundabout	170	129	-42	-24%
Deane Roundabout	46	9	-37	-81%
D'Arcy Roundabout (Salthill)	35	22	-13	-37%
Barna Road/Upper Salthill Road	38	26	-12	-32%

The results show that the proposed N6 GCRR has a positive impact when it comes to removing HGVs throughout the city area. The majority of junctions above show between 25% - 30% less HGVs passing through them. Furthermore, while Table 5.1 above shows that the demand management measures modelled effectively have no impact on goods vehicle kilometres across the entire study area used for the kilometre reduction assessment, when the proposed N6 GCRR is added alongside these demand management measures, there is an approx. 25% reduction in HGV kilometres within the N6/R338 cordon of the city.

This cordon currently accounts for approx. 60% of the city's current population. By removing this HGV traffic from this heavily populated residential area, air quality will be improved, and cyclists will benefit from a safer network, particularly where there is no existing or planned cycle infrastructure. Again, this aligns with Section 5.7 of CAP24 which outlines the co-benefits of climate action which includes improved

air quality, and which enables active travel and physical activity which in turn have positive physical and mental health benefits.

5.2.7 Public Transport Journey Time Comparison

An examination was carried out on the routes which will form part of the new public transport network serving the city & suburbs, as developed within the BusConnects Galway: Network Redesign project (finalised in December 2023) and illustrated below for reference https://busconnects.ie/cities/galway/galway-bus-network-redesign/.

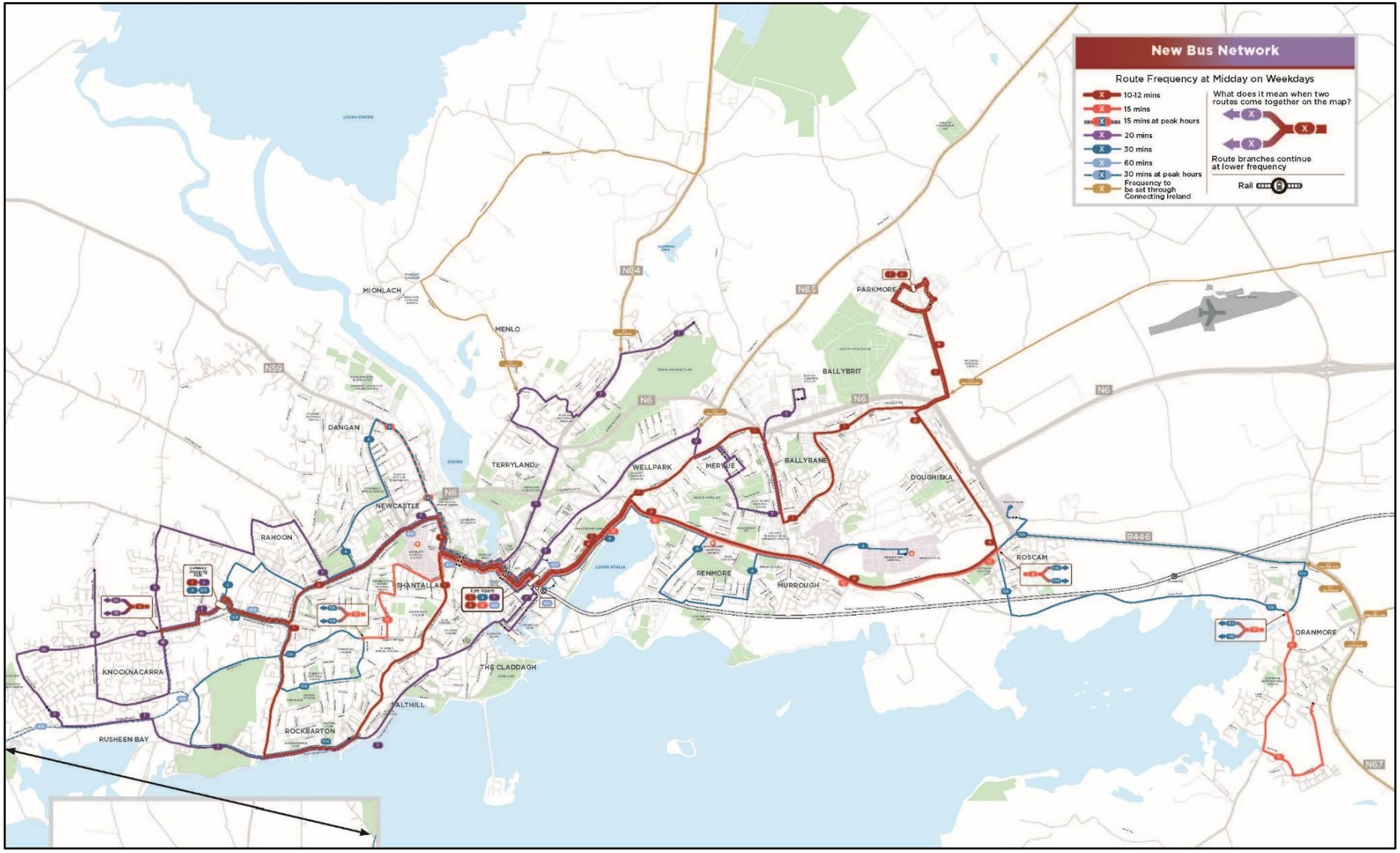

Plate 5.7 BusConnects Bus Network in Galway City

The TomTom data demonstrates that journey times increase along various routes compared to the Interpeak i.e. indication of reliability of the new network in the peak periods (note: data shown is from November 2024). All routes below form part of the proposed Bus Network for the city and the table below also shows the services which would be using each route, along with the proposed frequency of the service.

Table 5.4 2024 Bus Network Journey Time Reliability

Journey Time Comparison to Interpeak Period (2024)			
Route Description	**Services & (Frequency)**	**AM**	**PM**
Ballybane Road Northbound	#1 (15 min.) and #3 (20 min.)	18%	35%
Ballybane Road Southbound	#1 (15 min.) and #3 (20 min.)	34%	132%
Wellpark Road Outbound	#1 (15 min.)	-4%	54%
Wellpark Road Inbound	#1 (15 min.)	45%	98%
Doctor Mannix Road Outbound	#10B (30 min.)	9%	7%
Doctor Mannix Road Inbound	#10B (30 min.)	56%	13%
Connolly Avenue Northbound	#1 (20 min.)	53%	18%
Connolly Avenue Southbound	#1 (20 min.)	10%	22%
Thomas Hynes Road Northbound	#4 (30 min.)	5%	27%
Thomas Hynes Road Southbound	#4 (30 min.)	58%	5%
Upper Newcastle Road Southbound	#4 (30 min.)	30%	71%
Upper Newcastle Road Northbound	#4 (30 min.)	1%	19%
Lower Newcastle Road Southbound	#4 (30 min.), #9 (10 min.) and #3 (20 min.)	-2%	124%
Lower Newcastle Road Northbound	#4 (30 min.), #9 (10 min.) and #3 (20 min.)	-4%	104%
Taylors Hill Westbound	#10A (30 min.)	22%	75%
Taylors Hill Eastbound	#10A (30 min.)	62%	23%
Western Distributor Road Westbound	#9 (10 min.) and #3 (20 min.)	17%	14%
Western Distributor Road Eastbound	#9 (10 min.) and #3 (20 min.)	91%	6%
Salthill Road Lower Southbound	#1 (20 min.)	12%	8%
Salthill Road Lower Northbound	#1 (20 min.)	10%	21%

The data in Table 5.4 has been derived from journey time data from the network (from November 2024) and illustrates the substantial variability in journey times across the city in the morning and evening peak periods, when compared to the interpeak period. The routes above do not have any current or planned bus priority infrastructure as part of the GTS and, therefore, buses along these routes would have to travel alongside general traffic and are prone to unreliable journey times, particularly during peak hour congestion. The data shows that these new bus services will experience significantly increased journey times during the peak periods due to the widespread, network-wide traffic congestion. All of this undermines the reliability of passenger travel by bus during these peak periods and will likely continue to increase further as the city continues to grow.

The next section examines the impact of the proposed N6 GCRR when it comes to reducing future traffic volumes along proposed BusConnects routes which do not have current or planned bus priority infrastructure as part of the GTS.

It should also be noted that the BusConnects Galway Cross City Link scheme, which has been granted approval by An Bord Pleanála, would restrict access to general traffic on the Salmon Weir Bridge between the hours of 7 a.m. to 7 p.m. This restriction would create a sustainable transport corridor in the Eyre Square area and help facilitate the large increase in cross city bus services planned as part of the NTA's BusConnects Programme for the city (50% increase in services).

Currently during the hours of 7 a.m. to 7 p.m. on an average weekday, the Salmon Weir Bridge has traffic volumes of approx. 12,000, which accounts for approx. 20% of the traffic volumes across all four bridges during those hours. A significant portion of these 12,000 vehicles would, in the future, be likely to use the Quincentenary Bridge instead to cross the city, even though the Quincentenary Bridge currently suffers from severe congestion issues, especially during the peak hours.

This underlines the importance of the proposed N6 GCRR as a critical and complementary component of the GTS. The proposed N6 GCRR remains critical to the optimal implementation of all elements of the GTS by providing another river crossing and helping to offset the restriction on the Salmon Weir Bridge. It will facilitate the BusConnects programme in the city and help the city grow its current population by 50% up to 2040 aligned with NPF targets, and CAP24.

5.3 EIAR Modelling – Operational Phase

The future year traffic networks modelled as part of Chapter 6 (Traffic) of the updated EIAR were based upon known planned infrastructure and measures which are proposed to be implemented by the opening and design year of the proposed N6 GCRR (2031 and 2046 respectively). These future year traffic models assessed in Chapter 6 of the updated EIAR include the infrastructure and measures set out in the Galway Transport Strategy (GTS). Full details of what was included in the future year traffic networks, is detailed in Section 6.4.5.1 of the updated EIAR.

The results contained within this section, are taken from the updated EIAR and show the benefits of delivering the proposed N6 GCRR as part of an overall transport solution for Galway City, alongside the other infrastructure/measures which are set out in the GTS. A further traffic modelling scenario called the "Climate Action Plan scenario" was also developed, which includes the measures set out in CAP24, to demonstrate how the delivery of the proposed N6 GCRR as integral to the optimal implementation of the GTS and consistent with CAP24. The results of that separate modelling exercise are detailed below.

Table 5.5 shows AADT reductions along routes in the city which will host BusConnects services and which do not have existing or planned bus priority infrastructure, based on the updated traffic modelling undertaken for the purposes of the updated Chapter 6 of the updated EIAR. These services which are outlined below, would have to travel alongside general traffic. By implementing the proposed N6 GCRR as part of a full suite of measures set out in the GTS, these routes would benefit from quicker and more reliable journey times for bus users across both sides of the city. The locations of the streets referenced in the table are shown on Plate 5.8.

Table 5.5 Design Year AADT Reductions along BusConnects Routes without existing or planned bus priority infrastructure (Table 6.18 from Updated EIAR)

AADT Locations	Road	Bus Connects Routes & Midday Frequencies	AADT Reduction
13	Kingston Road	10A (30 min.)	45%
15	Barna Road	424 (60 min.)	53%
28	Tuam Road (Mervue)	3 (20 min.)	26%
8	N6 Terryland	7 (20 min.)	15%
21	Upper Newcastle Road	4 (15 min. at peak hours)	26%
29	Wolfe Tone Bridge	7 (20 min.)	27%
14	R336 Upper Salthill Road	7 (20 min.) & 10A (30 min)	14%
65	Seapoint Promenade	7 (20 min.)	29%
72	Taylor's Hill Road (Taylor's Hill Primary School)	10 (15 min.)	36%

AADT Locations	Road	Bus Connects Routes & Midday Frequencies	AADT Reduction
64	Upper Salthill Road (Salthill Promenade)	1 (10 – 12 min.), 7 (20 min.) & 10A (30 min)	20%
60	Monivea Road (Crown Square development)	1 (10 – 12 min.)	16%
58	Coast Road (Oranmore Train Station)	10B (30 min.)	10%
75	Newcastle Road (Scoil Chroi Iosa)	1 (10 – 12 min.)	18%
70	Shangort Road (McGrath's Field Park)	9B (20 min.)	29%
71	Ballymoneen Road	9B (20 min.)	36%

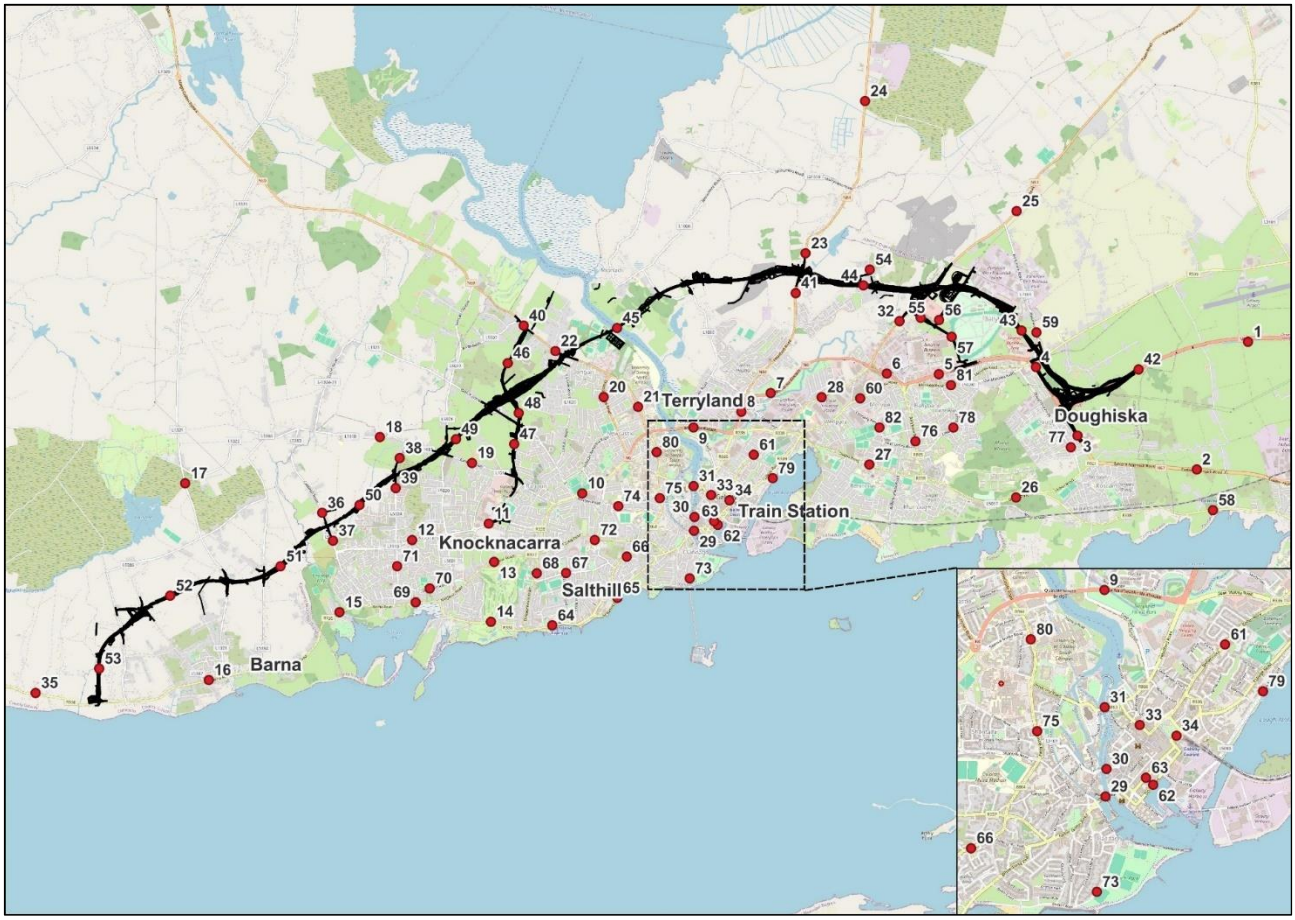

Plate 5.8 AADT Locations for updated EIAR

Table 6.17 of the updated EIAR, also highlights that, as evidenced by the updated traffic modelling, the proposed N6 GCRR would reduce traffic on the Quincentenary bridge by 33%, by providing another crossing over the River Corrib. This reduction enables the BusConnects Cross City Link to implement a sustainable transport corridor through the city centre and restrict general traffic from using the Salmon Weir bridge.

Also illustrated in Section 6.9.4.3 of the updated Chapter 6 of the updated EIAR is the impact that the proposed N6 GCRR will have on reducing the level of HGV kilometres within the city, again based on updated traffic modelling. The proposed N6 GCRR will result in a 25% reduction in the level of HGV

kilometres within the N6/R338 cordon of the city, which accounts for approx. 60% of the city's current population.

Also illustrated in Section 6.9.3.1 of the updated Chapter 6 of the updated EIAR, is the reduction in the level of traffic near schools/universities in the city based on the updated traffic modelling. The below bullet points show an extract from that section which highlight the reductions, which would make these areas safer and improve air quality outside of schools.

- School Road (Castlegar National School) – 66% reduction
- Dr Mannix Road (St. Enda's National School) – 29% reduction
- Threadneedle Road (St. Enda's Secondary School) – 9% reduction
- Taylor's Hill Road (Taylor's Hill Primary School) – 36% reduction
- Shantalla Road (Scoil Bhride) – 11% reduction
- Newcastle Road (Scoil Chroi Iosa) – 18% reduction
- Lower Newcastle Road (adjacent to UoG campus) – 13% reduction
- O'Briens bridge (St. Patricks Primary School) – 26%

Section 5.7 of CAP24 outlines the co-benefits of climate action which includes improved air quality and states that *"embracing active travel (walking and cycling) can have improved physical and mental health benefits which, considered in economic terms, are even greater than the positive environmental impact, while the shift to renewable fuel sources improves air quality. Additionally, climate action can help improve air quality, which was highlighted as a priority in the EPA's 2022 Air Quality in Ireland report*[5]*. Action to reduce transport emissions in particular reduces exposure to pollutants and associated mortality risks and will help Ireland achieve its ambition to move towards the World Health Organisation Air Quality guidelines, as outlined in the Clean Air Strategy."*

The percentage reductions in AADT due to the proposed N6 GCRR would lead to improved air quality and also make walking and cycling more attractive across the city due to the diversion of traffic including HGVs. Table 5.6 reproduces Table 16.33 of Chapter 16 of the updated EIAR. This shows locations where air quality is predicted to improve as a result of decreases in AADT, with the largest AADT decreases shown in the darkest shades of green and the lesser AADT decreases shown in lighter shades of green. Light green areas represent scenarios where AADT flow values will decrease by less than 20%, the darkest green represents a greater than 80% decrease. The reduction in traffic will result in a localised improvement of air quality in these regions, which will be particularly evident where sensitive receptors are adjacent to roadways and traffic reductions are substantial. As can be seen in the table below, many of these locations correspond to the population centres in the urban area.

Table 5.6 Locations of reduced AADT flows

Link Number	Link Location	2031	2046
		DS - DM	DS - DM
4	N6 South of Briarhill	41%	42%
5	N6 Near Ballybrit Business Park	24%	20%
6	N6 Between N17 and R865	29%	26%
7	N6 Between N84 and N17	29%	27%
8	N6 East of Quincentenary Bridge	20%	15%
9	N6 - On Quincentenary Bridge	32%	33%
10	R338 at Westside Playing fields	31%	30%

[5] EPA (2023), Air Quality in Ireland Report 2022

Link Number	Link Location	2031	2046
		DS - DM	DS - DM
11	Western Distributor Road between Clybaun Road and R338	43%	43%
13	R337 Kingston Road. Kingston	42%	45%
15	R336. Barna Road. Barna Woods	54%	53%
16	R336. Barna Road. Barna. Creagan Bus Stop	51%	51%
28	R338. Dublin Road. Between Renmore Road and Michael Collins Road	15%	17%
29	R336. Tuam Road. Mervue Business Park	25%	26%
30	Wolfe Tone Bridge	26%	27%
44	Letteragh Road North of GCRR Link Road	93%	82%
94	N6 North of Briarhill	31%	30%
95	R339 East of Briarhill	27%	25%
98	Ballybrit Crescent North of R339	38%	36%
99	Ballybrit Crescent North of Briarhill Business Park	40%	37%
119	Western Distributor Road - East of Gort na Bro	30%	36%

The current congestion and high traffic flows in highly populated areas in Galway City potentially causes air quality issues for those residents. The benefits of removing traffic from these densely populated areas to less populated areas are considered and assessed in Chapter 16, Air Quality of the updated EIAR. Therefore, the proposed N6 GCRR is also consistent with CAP on the basis that it is as a critical part of an overall transport solution required to achieve the necessary mode shift in Galway with resultant positive indirect effects of emissions reductions as highlighted in CAP.

5.4 Construction Phase

An assessment of carbon emissions was carried out to determine the likely GHG emissions (CO_{2eq}) predicted due to the construction phases of the Project and is set out in Chapter 17 of the updated EIAR. The assessment includes the pre-construction (site clearance) stage, the assessment of the embodied carbon associated with all materials used in the construction phase, the emissions during the construction phase associated with transport of materials to and from site, and additionally emissions related to waste generated during the construction phase. Each of these emission generators is targeted to minimise as much as possible for emission reduction in line with CAP24.

5.4.1 Green procurement

CAP24 sets out certain requirements in relation to public sector procurement practices as set out in Chapter 10 (Public Sector Leading by Example) of CAP24. These practices require public sector bodies, including Galway County Council and Transport Infrastructure Ireland, to implement Green Public Procurement and specify low carbon construction methods and low carbon cement material as far as practicable in projects. The implementation of these procurement practices by public sector bodies such as Galway County Council and Transport Infrastructure Ireland contributes to achieving Ireland's overall targets in relation to reducing the embodied carbon in construction materials as set out in Chapter 13 (Industry) of CAP24.

As set out in detail in Chapter 7 (Construction Activities) and Chapter 17 (Climate) of the updated EIAR submitted with the response to ABP's RFI, the proposed N6 GCRR has been designed in such a way as to minimise as far as practicable the embodied carbon associated with the Project and to provide for the use of low carbon construction methods and low carbon cement material. Furthermore, if ABP grants the approvals sought, when progressing the proposed N6 GCRR, Galway County Council and Transport Infrastructure Ireland will ensure that they comply with the provisions of Chapter 10 (Public Sector Leading by Example) of CAP24 including in particular in relation to Green Public Procurement.

Therefore, the construction and maintenance of the proposed N6 GCRR would also be consistent with these aspects of CAP24.

5.4.2 Material use and reuse

A key target of CAP24 is to decrease embodied carbon in construction materials. By 2025, it is proposed to decrease by 10% embodied carbon for materials produced and used in Ireland. This target is increased to 30% by 2030.

Design of all elements of the proposed N6 GCRR, including site clearance areas, excavation quantities (along with the type and volume of waste generated, coupled with the nature of the waste treatment, e.g., reuse, recycling, recovery or disposal), and construction material quantities (e.g. tonnage of materials) focussed from the outset on minimising generation of greenhouse gas emissions during construction arising from the construction activity itself or the materials used in construction.

The substitution of concrete containing Portland cement with concrete containing ground granulated blast furnace slag (GGBS) has led to an estimated saving of c.1,034 tonnes of CO_{2eq} in the current design (50% of cement as GGBS). A commitment to the use of steel which comprises a minimum of 70% recycled steel is also included in the proposed N6 GCRR.

The proposed N6 GCRR will minimise wastage of materials due to poor timing or over ordering on site, thus, helping to minimise its embodied carbon footprint. Where practicable, opportunities for materials reuse will be incorporated within the ambit of the project including the use of reclaimed asphalt and recycled aggregate and where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport. This will result in a zero nett export of materials from the site except for unacceptable material.

Therefore, the progression of the N6 Galway City Ring Road would also be consistent with these aspects of CAP24.

5.4.3 Material transportation

As set out in Chapter 7 (Construction Activities), all suitable material excavated will be utilised in the construction of the proposed N6 GCRR with a zero nett export of materials from the site except for unacceptable material. Internal haul routes along the construction corridor will minimise the movement of material as much as possible by providing the shortest distance between source and destination.

Site compounds are provided at key central locations to minimise the daily site travel along the construction project. Additional specific site compounds are located at key structures to enable delivery of materials directly to the structure location and avoid double handling with associated additional transportation requirements.

5.5 Summary Benefits of delivering N6 GCRR as an integral component of GTS

In summary, the results of the modelling analysis indicate that the delivery of the proposed N6 GCRR, as an integral part of the GTS and a key part of achieving the objectives of CAP24, will:

- Enable potential demand management measures within the city like car free areas and congestion charges, which as illustrated in Section 5.1.5.3 would restrict general traffic from using three out of the existing four bridge crossings, and help to reduce city centre traffic and associated congestion and carbon emissions in line with CAP24, supporting potential road space reallocation for sustainable modes and encourage a shift from private car trips in line with CAP24 and public realm improvements.
- Facilitate demand management measures to help achieve CAP24 targets whilst ensuring a level of mobility for residents on both sides of the city.
- Enable a better performing network for all modes by reducing delays across the network by 50% compared with 2023 levels, whilst not increasing the level of car trips within the metropolitan area.
- Facilitate the BusConnects programme for the city, by providing another river crossing to offset restrictions on Salmon Weir bridge and enable potential restrictions on other city centre bridges via car free urban areas and congestion charges which encourages the shift from private car trips to public transport in line with CAP24.

- Accommodate the significant planned growth within city and environs in line with NPF targets (50% increase in population by 2040, compared to 2016 levels).
- Reduce the need for HGVs to travel within the city, achieving a 25% reduction in the level of HGV kilometres within the N6/R338 cordon of the city which accounts for approx. 60% of the city's current population. This will benefit pedestrians, cyclists and public transport users and will result in improved air quality and supporting a safer environment for active travel trips.

Moreover, the construction and maintenance of the proposed N6 GCRR have been designed in accordance with CAP24 with clear commitments to green procurement for all services associated with it, maximising the reuse of materials and minimising the transportation of materials and personnel on site.

The reduction in total vehicle kilometres and carbon emissions that will be achieved and the significant increases to sustainable transport trips and modal share that will be facilitated during the operational phase are such that the benefits from the proposed N6 GCRR combined with the measures included in the GTS and CAP24 in climate terms significantly outweigh the negative effects of embedded carbon and carbon emissions during the construction process.

5.6 Assessment relative to the plans, strategies and objectives specified in Section 15 of Climate Action and Low Carbon Development Act 2015 (as amended)

5.6.1 Introduction

Section 15 of the Climate Act stipulates that a relevant body (An Bord Pleanala in this case) must, "*in so far as practicable, perform its functions in a manner consistent with:*

(a) the most recent approved climate action plan,

(b) the most recent approved national long term climate action strategy,

(c) the most recent approved national adaptation framework and approved sectoral adaptation plans,

(d) the furtherance of the national climate objective, and

(e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State."

An assessment of the proposed N6 GCRR, the GTS and CAP24 relative to each matter specified in section 15 is provided below.

5.6.2 The most recent approved climate action plan

Consistency with the most recent approved climate action plan, CAP24, has been demonstrated above.

5.6.3 The most recent approved national long term climate action strategy

Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction 2024 is the most recent approved national long term climate action strategy. It sets out indicative pathways, beyond 2030, towards achieving carbon neutrality for Ireland by 2050. The Strategy provides a pathway to a whole-of-society transformation and links shorter-term Climate Action Plans and Carbon Budgets, and the longer-term objective of the European Climate Law and Ireland's National Climate Objective. The Strategy reiterates the need to substantially accelerate the implementation of the Climate Action Plan measures to limit and counteract emissions growth associated with increased social and economic activity from future population growth.

When the proposed N6 GCRR is delivered as an integral part of the GTS and alongside a series of demand management measures identified in CAP24, there will be a 43% reduction in carbon emissions from transport by 2030 within the area of influence of the proposed N6 GCRR when compared to 2018 levels. This aligns with the Strategy through limiting emissions despite population growth.

The Strategy states that achieving a fully decarbonised industry sector will require *'driving material efficiency in construction to reduce embodied anergy in materials'*. Measures are proposed to minimise, as far as practicable, the embodied carbon associated with the proposed N6 GCRR and to provide for the use of low carbon construction methods and low carbon cement material. The proposed N6 GCRR will also comply with the requirements of Government procurement guidance which sets out to promote the reduction of embodied carbon in publicly supported construction projects, and in particular the procurement of cement and concrete.

5.6.4 The most recent approved national adaptation framework and approved sectoral adaptation plans

Ireland's second statutory National Adaptation Framework (NAF) was published on 5 June 2024. This latest NAF replaces the first iteration of the framework published in 2018, which was reviewed in 2022 in line with the five-year requirement of the Climate Act and is the most recent approved National Adaptation Framework for the purposes of the Climate Act.

The NAF sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. Building on the progress made under first NAF, the new NAF outlines a whole of government and society approach to climate adaptation in Ireland. It takes account of developments since 2018 in areas of climate policy, research, sectoral and local adaptation planning, as well as on the recommendations made following the statutory 2022 NAF review.

An assessment of the climate change vulnerability of the proposed N6 GCRR is included in Section 17.5.2.2.2 of Chapter 17 of the updated EIAR. A risk assessment was conducted for potentially significant impacts on the proposed N6 GCRR associated with climate change. The risk assessment considered the likelihood and consequence of potential impacts occurring and then provided an evaluation of the significance of the impact. Flood risk, windspeed, extreme rainfall and heat were all assessed, and the conclusion is that no significant adverse effects will arise in this regard. Therefore, it can be concluded that the Project is consistent with the most recent approved national adaptation framework and approved sectoral adaptation plans in that it ensures that the proposed infrastructure is safeguarded from the impacts of climate change.

The Transport Climate Change Sectoral Adaptation Plan was published in 2019. The Plan describes the main features of the Irish transport sector. The Plan identifies the key vulnerabilities in the transport network and looks to promote greater resilience to safeguard its continued operation. It can be concluded that the Project is consistent with the most recent approved sectoral adaptation Plan in that it ensures that the proposed infrastructure is safeguarded from the impacts of climate change.

5.6.5 The furtherance of the national climate objective

The National Climate Objective, as set out in section 3(1) of the Climate Act, is that: "*The State shall, so as to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy...*"

When the proposed N6 GCRR is delivered as part of the GTS and alongside a series of demand management measures identified in CAP24, there will be a 43% reduction in carbon emissions from transport by 2030 within the area of influence of the proposed N6 GCRR when compared to 2018 levels. This aligns with the furtherance of the national climate objective by transitioning to a climate neutral economy.

The updated EIAR provides an assessment of the Project from an environmental sustainability aspect. Chapter 17 of the updated EIAR contains an assessment of climate effects, and Chapter 8 of the updated EIAR contain an assessment of biodiversity effects.

5.6.6 The objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State

The impact that the inclusion of the proposed N6 GCRR will have on the performance of the road network, when implemented alongside demand management measures to achieve CAP24 targets is set out in the assessment results in Section 0 above.

As outlined therein, there will be a 43% reduction in carbon emissions from transport by 2030 within the area of influence of the proposed N6 GCRR when compared to 2018 levels and an overall reduction of 16% in vehicle kilometres travelled when compared to the 2030 BAU scenario whilst also catering for an approx. 30% increase in the population level across the metropolitan area by 2030 versus 2016 levels. This improvement will not only help general traffic but will also help bus users travel through the city quicker and enable more reliable journey times. This will assist in indirectly mitigating emissions by encouraging modal shift to more sustainable modes. It is noted that the design speed for the proposed N6 GCRR at 100km/hr is less than the 120km/hr that usually applies to motorway schemes, further mitigating emissions.

A number of construction measures are described in Section 5.4 which will also have the effect of mitigating greenhouse gas emissions.

As noted above, the assessment of the climate change vulnerability of the Project concluded that no significant adverse effects are due to arise in this regard, so that it can be concluded that the Project is consistent with adapting to the effects of climate change.

5.6.7 Summary of consistency with the plans, strategies and objectives specified in Section 15

The assessment of the proposed N6 GCRR when combined with the Galway Transport Strategy and CAP24 demonstrates consistency with each matter specified in Section 15 of the Climate Act during the operational phase of the project due to the reduction in carbon emission and vehicle kilometres travelled whilst catering for a significant population increase across the metropolitan area.

Mitigation measures are proposed during the construction phase to mitigate greenhouse gas emissions in accordance with the matters specified in Section 15, these include the use of low carbon cement and recycled steel.

The Project is consistent with adapting to the effects of climate change which is consistent with the matters specified in Section 15.

6. Conclusion

To summarise, Galway City and its environs have critical transport issues, as identified above, that require urgent resolution and the updated transport modelling and assessment undertaken for the purposes of this report and for Chapter 6 of the updated EIAR demonstrates that those transport problems are the same today as they were at the time of the preparation of the GTS in 2015. There are however significant constraints for developing new transport infrastructure for Galway given (i) the physical form of the city, (ii) the limited space available, (iii) the built environment and residential areas on both sides of the River Corrib, and (iv) the presence of designated ecological sites. The capacity of the existing road network is wholly inadequate as all traffic mixes and requires the interaction of vehicular traffic with pedestrians, cyclists and vulnerable road users. The overall transport solution should determine the varying types of travel demand and direct them to the most appropriate route or alternative mode.

The development of the proposed N6 GCRR aligns with the principles of sustainable road development with the analysis demonstrating that the tests for the provision of additional new road infrastructure have been met. Furthermore, the proposed N6 GCRR supports the reallocation of existing road infrastructure for active travel modes and public transport routes, all of which aligns with NIFTI and CAP24.

The updated transport modelling undertaken for the purposes of this report and for Chapter 6 of the updated EIAR has shown that the proposed N6 GCRR is still required as an integral part of the GTS, and that when the proposed N6 GCRR is delivered alongside a series of demand management measures identified in CAP24, there will be a 43% reduction in carbon emissions from transport by 2030 within the area of influence of the proposed N6 GCRR when compared to 2018 levels.

Further, the delivery of the proposed N6 GCRR alongside the measures identified in CAP24 results in a 16% reduction in vehicle kilometres travelled when compared to the 2030 BAU scenario within the area of influence of the proposed N6 GCRR, which is another key target of CAP24. The results of these assessments indicate that the delivery of the proposed N6 GCRR alongside the measures set out in CAP24 and other national level measures, contributes significantly towards the achievement of these national level targets. Therefore, the proposed N6 GCRR as an integral part of the GTS is consistent with the CAP24.

Having regard to the analysis set out in this report, ABP can be satisfied that, in granting the approvals sought for the proposed N6 GCRR, it will be performing its functions in a manner consistent with the most recent approved climate action plan, CAP24, as well as the climate action strategy and the other plans and objectives specified in Section 15 of the Climate Act.