

# Straitéis Iompair na Gaillimhe Galway Transport Strategy

An Integrated Transport Management Programme for Galway City and environs



## Technical Report September 2016



Galway City Council  
**Galway Transport Strategy**  
Galway Transport Strategy -  
Technical Report

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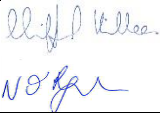


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# 1 Introduction and Purpose

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## 1.1 Introduction

Galway City Council and Galway County Council, in partnership with the National Transport Authority, have reviewed and consolidated transport proposals to form a coherent and integrated transport strategy for Galway City and its environs. This encompasses all modes of transport, and includes an implementation strategy over the short, medium and long term. It is intended that it will be used to direct funding to deliver transport projects in a phased manner based on priority needs.

A Galway Transport Strategy (GTS) has been prepared and is presented in summary form in a separate report. This report presents detail of supporting technical material, including transport modelling and transport networks appraisal, which has informed the preparation of the GTS. Generally, material contained within the GTS is extracted and summarised from this report.

The format of this GTS Technical Report follows that of the summary GTS Report and is further accompanied by a number of referenced technical appendices.

The complete suite of GTS documents prepared to date comprise the following:

- GTS Strategy Summary Report;
- GTS Strategy Technical Report (this document);
- GTS Appendix A – Transport Demand Report;
- GTS Appendix B – Appraisal and Modelling Report;
- GTS Appendix C – Public Transport Network Development Report;
- GTS Appendix D – Public Transport Infrastructure Development Report;
- GTS Appendix E – Park & Ride Location Analysis Report;
- GTS Appendix F – Cycle Network and Infrastructure Development Report;
- GTS Appendix G – Public Realm Proposals;
- GTS Appendix H – Smarter Mobility Scoping Report;
- GTS Appendix I – Strategic Environmental Assessment: SEA Statement and SEA Environmental Report;
- GTS Appendix J – Natura Impact Statement; and
- GTS Appendix K – Strategic Flood Risk Assessment;

The GTS sets out a series of proposed actions and measures for implementation, covering infrastructural, operational and transport policy requirements. The strategic measures outlined included in GTS will be advanced and implemented as outlined in Figures 10.2 and 10.3 of Chapter 10 of this report. The GTS aims to make best use of existing infrastructure, to ensure the most efficient and sustainable use of the limited road space, and to provide new infrastructure in the most appropriate locations and for the most suitable modes.

The GTS will be a key part of facilitating Galway's growth as a city both physically and economically, whilst creating the potential for improvements of the urban environment.

Based on the appraisal undertaken, walking, cycling, bus, rail, road and traffic management measures are included in the GTS, as well as mobility management proposals to reduce reliance on private motorised transport and hence increase the use of sustainable travel modes.

The GTS therefore formulates the overall future transport programme for Galway City and the surrounding areas. It is expected that the proposals and objectives set out in the GTS will be considered for incorporation into the new Galway City Development Plan (2017-2023) and the Galway County Development Plan (2015-2021). Individual transport schemes identified within the Strategy will themselves proceed through the normal planning processes prior to being implemented.

## 1.2 Current Issues Affecting the Transport Network

A number of specific characteristics of Galway City and environs result in significant problems and inefficiencies with respect to the movement of people and goods, including:

- An over-reliance on private cars;
- Peak hour congestion and journey time unreliability for all motorised transport;
- Safety concerns as a result of traffic congestion;
- Many key junctions within the city operating at or over capacity;
- Connectivity issues on the National and Regional road network resulting in significant volumes of cross-county and strategic travel demand between east and west Galway being concentrated and funnelled through the city area in order to cross the River Corrib;
- The pattern of residential development in the area, along with the location of employment destinations, generating a large amount of cross-city as well as city-bound travel demand;
- Large amounts of residential development located proximate to major employment and educational destinations city-wide, but not readily accessible by walking, cycling or public transport, thereby encouraging travel by private car;
- The short distance between Lough Corrib and Galway Bay, two significant natural physical constraints impacting upon the city;
- A natural barrier to cross-city and cross-county travel formed by Lough Corrib, the River Corrib and Galway Bay, with the three principal river crossings experiencing heavy traffic flows, leading to congestion and delay;
- The position of Galway City as a major regional centre for employment and education for a large geographical area, leading to large numbers of long-distance commuters for whom public transport is not currently a viable option, which leads to greater numbers of cars entering the city;
- The impact of traffic congestion on the City's reputation, particularly with regard to inward development;

- The suburban nature of much of the residential areas, and the wide distribution of jobs across a number of central and non-central locations, which lead to a situation where travel by public transport is not a viable option for many journeys;
- Long journey times and delays on the current bus network, due in part to the limited available road space in the city centre for introducing bus priority which both reduces its attractiveness to passengers and increases costs of operating; and
- Limited road space on most of the principal roads, which reduces opportunities for safe and comfortable cycling.

### 1.3 Vision and Principles

The GTS will facilitate Galway with an opportunity to grow both physically and economically, offering better transport choices, and creating a public realm to be enjoyed by residents and visitors alike. This in turn will underpin the objectives of the current and future City and County Development Plans.

The overall vision is:

***“to create a connected city region driven by smarter mobility.”***

To address the current and future transport needs of the city, a fundamental shift is needed 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.

In order to achieve this vision the guiding principles underpinning the preparation of the Transport Strategy are as follows:

1. To promote and encourage sustainable transport, and in particular to make it convenient and attractive to walk, cycle or use public transport;
2. To improve accessibility and permeability to and within the city centre for pedestrians, cyclists and public transport users, while also maintaining an appropriate level of access for vehicular traffic for commercial and retail purposes;
3. To maximise the safety and security of pedestrians, cyclists and other transport users, particularly within the core city centre;
4. To manage and increase transport capacity, where necessary, for the efficient movement of people and goods into and within the city;
5. To provide opportunities to enhance the city centre public realm through traffic management and transport interventions;
6. To maintain and develop transport infrastructure and services to a high degree of quality and resilience; and
7. To adopt a ‘smarter technology’ approach to all transport interventions, whereby transport infrastructure and services are future-proofed.

## 1.4 Planning Framework

It is intended that the proposals and objectives set out in the Galway Transport Strategy will be considered for incorporation into the new Galway City Development Plan (2017-2023), and the Galway County Development Plan (2015-2021).

As set out earlier, the strategy will expand beyond the timescale of both the current and new City Development Plans and the County Development Plan and will take a longer term view in terms of what needs to be delivered over a 20-year period.

## 1.5 Strategic Environmental Assessment, Appropriate Assessment and Strategic Flood Risk Assessment

The preparation of the Galway Transport Strategy was subject to Strategic Environmental Assessment (SEA). Article 1 of SEA Directive (2001/42/EC) states that the ‘objective of this Directive is to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development, by ensuring that, in accordance with this Directive, an environmental assessment is carried out of certain plans and programmes which are likely to have significant effects on the environment.’

The Galway Transport Strategy was subject to the formal, systematic environmental assessment of the likely significant effects of implementing the strategy to ensure that environmental implications have been taken into account in decision-making prior to the finalisation of the GTS (included in Appendix I). Therefore, the provisions of the strategy have been assessed for potential environmental effects and measures arising from the SEA have been integrated into the final GTS.

An Appropriate Assessment (AA) of the strategy has also been undertaken as part of the preparation of the GTS. The purpose of the AA is to provide a focused and detailed impact assessment of the implications of the strategy, alone and in combination with other strategic actions and projects, on the integrity of Natura 2000 sites in view of their conservation objectives.

A Natura Impact Statement (NIS) accompanies this report (included in Appendix J) and presents an assessment of whether the GTS could affect the integrity of the European Sites within its Zone of Influence. The assessment process has informed the preparation of the GTS and includes a mitigation strategy (which has also been incorporated into the GTS) to ensure the adverse effects on the integrity of any European Sites will not occur as a result of implementing the GTS.

The GTS has also been subjected to a Strategic Flood Risk Assessment (SFRA), which addresses the issues of assessment and management of flood risk in plans and land use plans. This is included in Appendix K. The findings of the NIS and

the SFRA have informed the SEA process and any necessary measures arising from the recommendations of the NIS and SFRA have been incorporated into the strategy in order to ensure that potential adverse effects are mitigated.

The AA Process will be completed by the relevant Competent Authority.

## 1.6 Consultation

An initial public information event was held in May 2015, at which feedback from the public on the key transport issues was received. A second consultation process was also undertaken on the Draft GTS and its sub-components in June 2016. The consultation material was made available online and at City Hall, and further responses were received from the public and statutory consultees during the periods of open consultation which followed. The main themes and issues arising from the submissions were:

- Public transport in the city needs improvement generally;
- Cycle lanes should be improved generally;
- A light rail or improved heavy rail system should be considered;
- The bus lane network should be extended;
- A bypass of Galway City is not necessary;
- Public transport needs to incorporate school transport;
- Park & Ride sites should be introduced;
- Private car dependency should be reduced;
- Pedestrian/mobility impaired facilities should be improved;
- The use of Quincentenary Bridge for bus services should be considered;
- A new road traffic bridge should be provided adjacent to Salmon Weir Bridge (which should be pedestrianised);
- The city UTM system should be expanded to improve traffic flow around city; and
- The environmental impacts of the GTS should be considered.

This feedback has been considered by Galway City Council and Galway County Council and has informed the preparation of this Galway Transport Strategy.

## 2 Policy and Transport Context

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### 2.1 Study Area & Existing Land Use Context

The study area for the GTS comprises the Galway City Council administrative area, and the surrounding hinterland within the Galway County Council administrative area, with the settlements of Bearna, Oranmore, Maigh Cuilinn, and Baile Chláir. The city municipal area is illustrated in Figure 2.1.

Within the study area, the city centre has been defined for the purposes of this strategy. This is made up of the area bounded by the city's canal network to the west, and the Fairgreen/Bóthar Bhreandáin Uí hEithir/Bóthar na mBan road cordon to the east. This area is also highlighted in



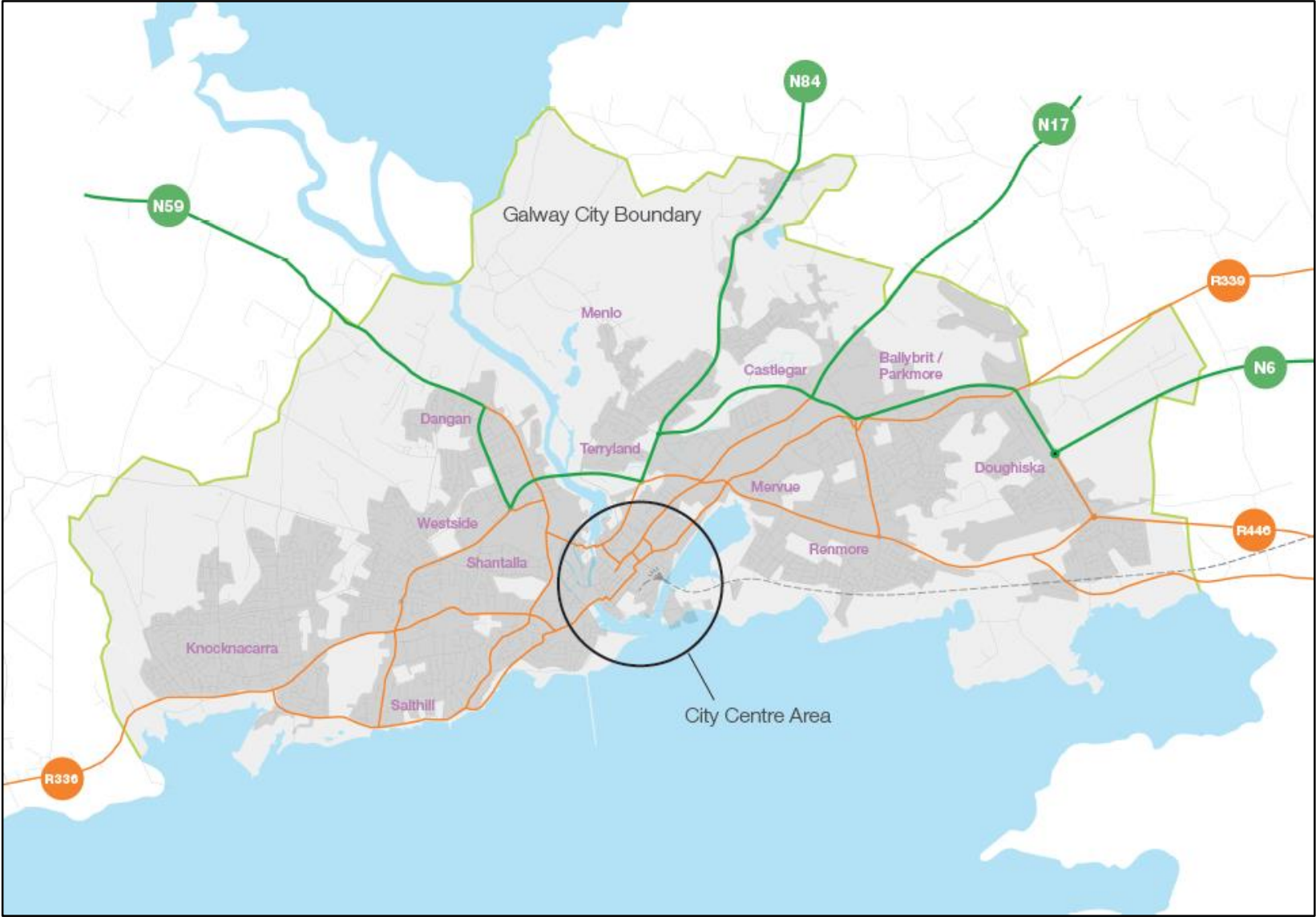


Figure 2.1: Study Area



## 2.2 Land Use Context and Future Growth

In the preparation of this strategy, an appraisal of the existing land use and planned growth areas for the study area outlined above was undertaken in order to inform the development and design of transport proposals, as well as an examination of the function of the city centre in itself and for the wider area.

The existing land use profile of the study area is characterised by significant residential development in the west and east of the city, and in other locations close to major employment and retail areas which are concentrated within the city centre area and in the east of the city. To the north of the city there are several small towns and villages on either side of Lough Corrib, with dispersed residential development throughout the rural areas.

In addition, some large residential developments in close proximity to major employment and educational facilities are not easily accessible by walking, cycling or public transport. These settlement patterns have given rise to an increased travel demand, both to the city centre and across the city centre, from the suburban areas and from the wider region.

Based on current zoning and objectives in the Development Plans, it is anticipated that the existing land uses and major origins and destinations of travel demand across the study area will remain largely unchanged over the time period of this strategy. It is necessary however to consider the location and impact of new development both within the city centre and within the wider suburban areas as set out in City and County Development Plans and Local Area Plans, to ensure that these areas are considered in the development of the transport proposals.

A number of brownfield areas are identified as key development opportunities within the city centre, including Ceannt Station and Galway Harbour. The development and expansion of Galway Port is also expected to occur in the coming years. To the north, the Headford Road area is also a key location for redevelopment and modernisation of existing retail complexes to mixed-use developments.

To the east of the city, significant residential development is envisaged at Ardaun, as well as complementary local employment and services. It is also important to note that opportunities for redevelopment of Galway Airport, purchased in 2014 by Galway City and Galway County Council, remain possible over the lifetime of this strategy.

Other existing suburban areas, including Knocknacarra, Castlegar and Doughiska, are envisaged to grow, albeit at a more constrained rate. District centres and lower-order neighbourhood centres are identified by the Draft City Development Plan 2017-2023 for these suburban areas, and in other locations including Westside, Salthill, Ballinfoyle, Renmore and Ballyburke, which will see the levels of employment rise in these areas.

Census 2011 records the population of Galway City at 75,529 persons. The population target for Galway City as set out in the Regional Planning Guidelines for the Western Region is set at 98,700 by the year 2022.

This target was set in 2000, and notwithstanding the slower growth than expected in the intervening years, it remains the current official growth target for the City due to built-up demand for housing as well as population growth targets. In recognition of this target, the Draft CDP adopts a growth estimate of approximately 8,500 households above levels recorded in Census 2011, which equates to an increase of 23,171 persons achieved by 2022, a target population increase of approximately 31%.

The Census 2011 Report 'Profile 10 – Door to Door' indicated that approximately 50% of the daytime working population in Galway commute into the city from the county and beyond – predominantly from County Galway, but also from areas in Mayo and Clare. Oranmore, Athenry, Bearna and Maigh Cuilinn are the main feeder towns for Galway City's daytime working population, and they, along with Baile Chláir and the rural hinterland, contribute large numbers of commuters travelling to and from the city daily. Figure 2.2 illustrates the dispersed character of the commuting traffic entering Galway City and suburbs daily.

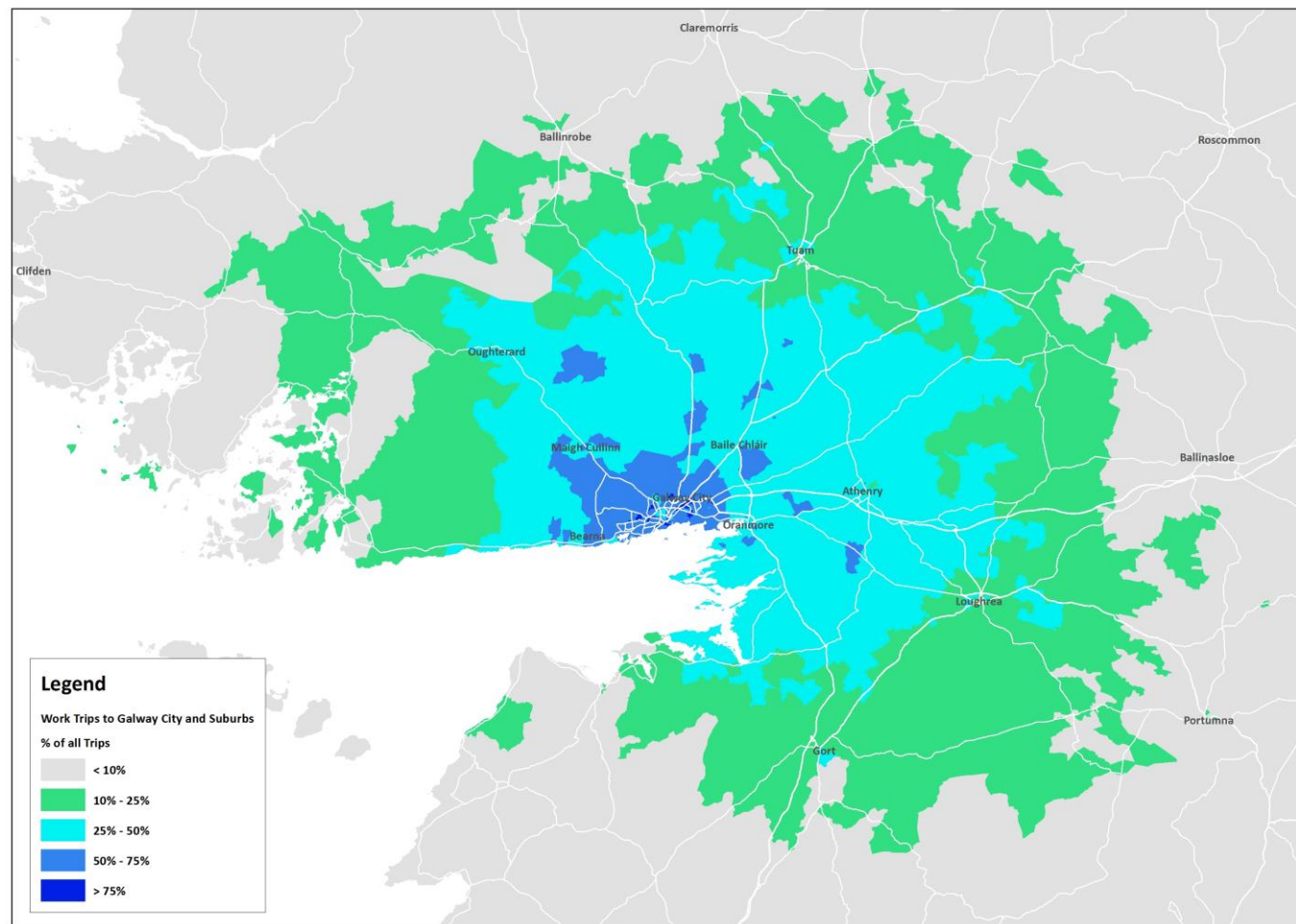


Figure 2.2: Percentage of Commuters in small areas working in Galway City and suburbs

## 2.3 Current Transport Supply

### 2.3.1 Pedestrian Network

The majority of the study area is provided with pedestrian facilities of varying quality.

Within the city centre, there are pedestrian-only streets which are a key asset to the local economy, in particular the tourism/shopping thoroughfare of William Street, Shop Street and Quay Street. Other pedestrian facilities of note include the city canal network and the promenade at Salthill.

There have also been major junction improvement schemes in recent years which have considerably improved pedestrian facilities across the city and suburbs.

However, numerous locations remain throughout the study area where the quality of the pedestrian facilities is poor. At certain locations in the city centre, private and public vehicular traffic impacts on the safety and comfort of pedestrians. There are streets throughout the city with substandard or missing footpaths, limited or no crossing facilities, and permeability issues resulting from the manner in which residential areas have been developed. Some suburban residential areas are accessible by direct routes, but these are substandard and not suitable for use by mobility impaired pedestrians, while others have no footpaths provided for pedestrian access to main thoroughfares. The absence of permeability within housing areas often leads to excessively circuitous trips for pedestrians to walk relatively short distances. All of these factors discourage walking as a mode for short trips.

### 2.3.2 Cycle Network

Although the city's generally flat topography is conducive to cycling, the current mode share of 5% is relatively low. Similar to the bus network, the existing network of cycle infrastructure is limited and discontinuous. Figure 2.3 below shows the extent of the current cycle network.

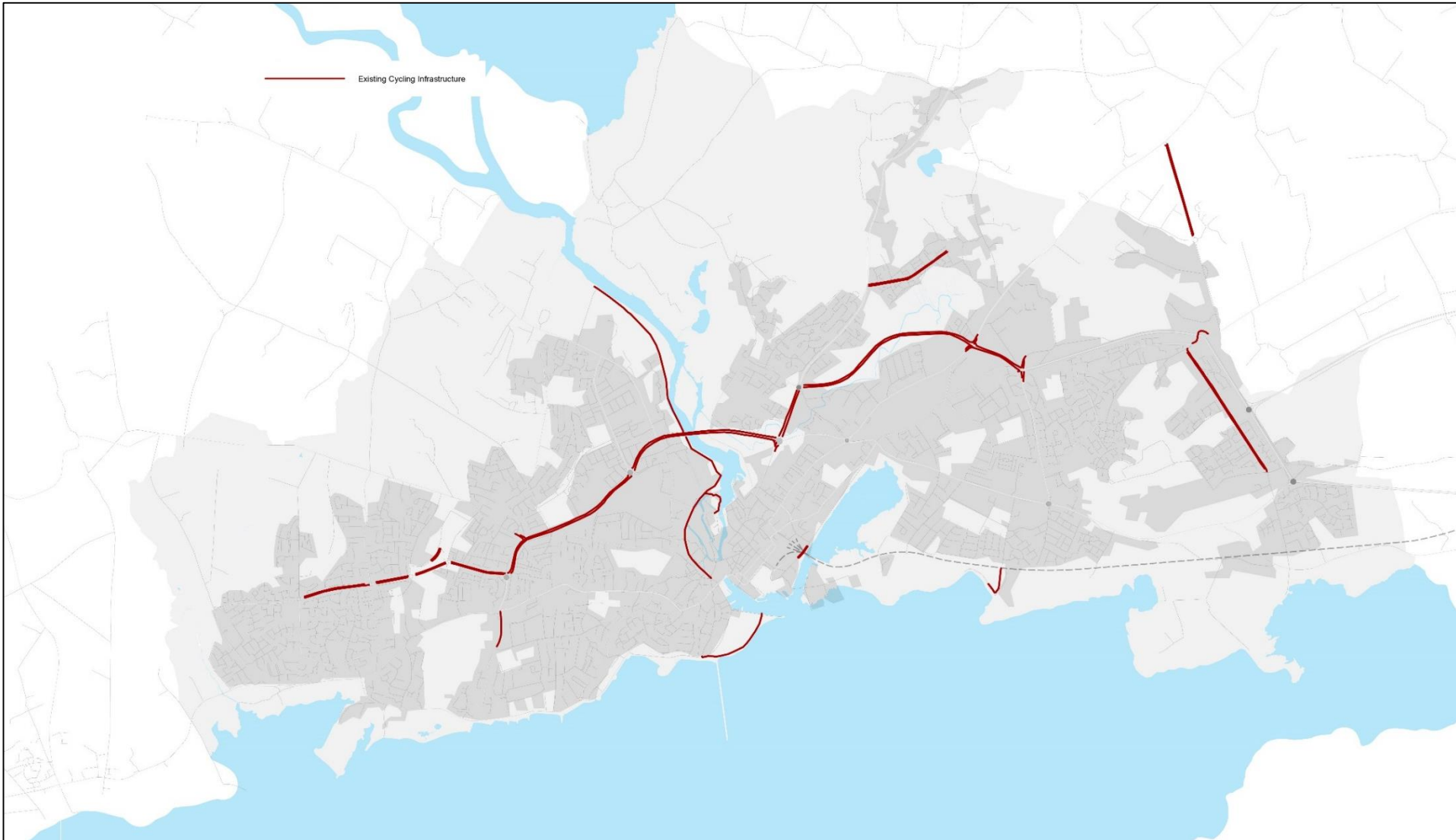


Figure 2.3: Extent of Existing Cycle Network Infrastructure

The volume of vehicular traffic on the narrow city centre streets also contributes to an environment that is neither appealing nor perceived as safe for cycling. While there have been numerous cycle network improvements in recent years, not least the roll-out of the Bike Share Scheme, and several schemes in development aimed at enhancing the network, the cycling environment remains limited. This is particularly true in areas outside the city, despite the fact that many towns and villages are within cycling distance of the city and each other, such as Bearna, Oranmore, Maigh Cuilinn and Baile Chláir.

### **2.3.3 Local and Regional Bus Networks**

The central part of the study area is served by the existing city bus service, including a limited range of bus priority infrastructural elements of varying extent and quality. The city bus infrastructure is very much discontinuous, with priority measures only provided along sections of key corridors and not continuous over any significant portion of the network.

As such the city bus network is subject to delay, impacting the attractiveness of the bus as a mode of choice. Figure 2.4 below illustrates the extent of existing bus priority measures within the study area.



Figure 2.4: Extent of Existing Bus Priority Infrastructure



The 2011 Census recorded a mode share of 8% for travel within the city area to work or education, which is a relatively low bus mode share for urban areas. Of the current city bus services, only one (the 409 Parkmore service) has a current target frequency of one bus in each direction every 12 minutes at peak times. This is an improvement on the service prior to April 2016, which had one bus in each direction every 15 minutes, but all other services are operating on frequencies ranging from one bus in each direction every 20 minutes up to over an hour on some routes.

However, improvements to the city bus service in recent years, including the development and implementation of a number of significant bus priority schemes, simplification of routes and schedules, newer fleet and the roll-out of the Leap card have collectively seen an increase in patronage of over 30% from 2012-2015, albeit from a previously low base. This indicates a strong foundation from which the early momentum behind an increase in bus patronage can be driven further.

In addition to the city bus network, a number of regional bus service providers operate to and from the city. Regional, intercity and private tourist coach services are subject to delays due to infrastructural deficiencies approaching and within the city centre, where the principal destinations are located at Ceannt Station, Fairgreen Coach Station, Eyre Square/Merchants Road and Galway Cathedral. These delays, along with multiple centralised destinations in the city centre and a lack of integration with the city bus routes and ticketing systems, discourage use of regional bus services for commuters from surrounding towns and villages which are served directly by regional buses.

National coach services benefit from high-quality road connectivity from the east and south, increasingly of motorway standard with the relatively recent construction of the M6 and the current development of the M17/M18, which will also improve connectivity to the north-east. Similar to the regional services, there are numerous operators providing intercity services to and from the city, with a resultant high number of arrivals and departures daily from Ceannt Station and Fairgreen Station.

These services are also subject to delays due to infrastructural deficiencies approaching and within the city centre, which discourages use of public transport between cities, and may impact on tourism in Galway City if accessibility of the city is not improved.

## 2.3.4 Rail Network

The study area is served by the existing single-track heavy commuter rail line from the east, terminating in the city centre at Ceannt Station. The rail line connects to Oranmore/Garraun and Athenry to the east. From Athenry there is a connection to the Western Rail Corridor service from Limerick and Ennis, and the main line continues east to Dublin.

There are 10 daily services scheduled from Ceannt Station to Heuston, and 9 scheduled return services from Heuston to Ceannt, with journey time being as short as 130 minutes.

There are 8 scheduled daily services between Ceannt Station and Colbert Station in Limerick, and 8 scheduled return services, with journey time being as short as 90 minutes.

### 2.3.5 Road Network

The geography of Galway City is physically constrained; it is divided by the River Corrib and to a lesser degree Lough Atalia, and it is bounded to the south by Galway Bay and to the north by Lough Corrib, all of which present natural barriers to free movement and development and constraints to the road network. There are currently four bridges crossing the river, of which three are in very close proximity to the city centre, thus drawing traffic into the city for the sole purpose of crossing the river. As discussed in Section 2.2, the land use characteristics of the city give rise to significant cross-city and city-bound travel demand, particularly during peak hours, and large portions of this need to use these river crossings, regardless of mode.

Vehicular traffic crossing the city however is heavily constrained by the limited number of road crossings of the River Corrib, some of which are currently operating over capacity at peak hours. At present, Quincentenary Bridge is the sole option for traffic wishing to avoid the city centre area. Heavy congestion and delay on the approaches to Quincentenary Bridge often leads to traffic re-routing towards Salmon Weir Bridge, O'Brien's Bridge and Wolfe Tone Bridge, which in turn creates congestion across the city.

Galway County and the Connemara region, as far west as Clifden and on to Letterfrack, are equally dependent on this narrow funnel for access as this area is restricted by the extents of Lough Corrib heading north, the Twelve Bens mountains, the Maamturk mountains and many smaller lakes. Access to this area is via the bridges across the River Corrib in Galway City due to the physical natural constraints. Therefore, cross-county traffic and more strategic traffic to and from the west of the country is channelled towards Galway City in order to cross the River Corrib, further exacerbating traffic congestion and delay.

The M6/N6 is a highly important national road, and is identified as part of the TEN-T Comprehensive Network. The M6/N6 is also identified as a Strategic Radial Corridor in the National Spatial Strategy (NSS) and is an important inter-urban transport corridor linking the Gateway City of Galway with the Greater Dublin Area via the Midlands Linked Gateway.

It therefore provides access to regional and international markets through strategic airport and port locations, as well as linking with other strategic national roads. This road corridor has benefitted in recent years from major improvement schemes including the N6 Bóthar na dTreabh upgrade scheme, the upgrade of the former Lynch, Morris, and Font roundabouts to signalised junctions, and the completion of the M6 motorway.

In addition, the N17, a NSS Strategic Linking Corridor and national primary road, and the N59 and N84 national secondary roads are important regional links to and from the city. In the wider area the M17/M18 scheme, currently under construction, will significantly improve connectivity to the south of the region.

While a key challenge of this strategy is to provide sustainable and reliable alternatives to travel by private car, the management of the road network will remain critical for the functioning of the city and suburban areas. Across the wider regional area, the dispersed nature of origins and destinations means that it will not be possible to provide public transport alternatives at sufficient levels of service to address all future transport demand. In these locations, the private car is likely to remain the dominant mode of travel for at least part of the journey.

## 2.4 Movement Context

This section outlines a summary of the existing level of travel demand in Galway City and its surrounding areas. Further details on the existing movement context in the study area is contained in ‘**Appendix A – GTS Transport Demand**’.

Drawing on available data sources including Census and POWSCAR as outlined in this section, travel patterns across all modes were evaluated for a base year of 2012, with a particular emphasis on travel to work and education, which constitutes approximately 70% of all trips within the study area during the peak periods. Future demand was then calculated from this base year, using a forecast year of 2034, and accounting for population and land use forecasts over this time period.

Data from the National Household Travel Survey covers the Galway City and County areas, whereas data gleaned from Census 2011 results can be tailored to the city and suburban area for examining mode share in the more urbanised sections of the study area.

According to the National Household Travel Survey (2012), the highest concentration of all trips in Galway occurs between 8am and 9am. ‘Home-to-work’ trips comprise the largest concentration of trips during this peak hour, making up 40% of the total trips. ‘Home to education’ trip numbers are similarly high at 35%. Other trip purposes account for the remaining 25%.

Travel volumes reduce considerably by mid-morning, with hourly trip volumes between 11:00 and 14:00 being approximately half of the peak hour demand. The number of trips between 14:00 and 16:00 is 69% of the peak hour and correlates to the end of the school day. Whilst traffic congestion in Galway in the PM peak is perceived to be comparable to the AM peak, total trip demand between 17:00 and 18:00 is 75% of the AM peak hour volume. In this regard, it is worth noting that levels of congestion are not only related to trip volumes, but are also related to trip length distribution and mode.

### 2.4.1 Data Sources

A number of different data sources are available, and have been utilised extensively in the development of each element of the Strategy. Key data sources include:

**Census 2011 Place of Work, School or College – Census of Anonymised Records (POWSCAR)** provides extensive information on travel patterns to work and education for the entire population. Information was extracted from the

POWSCAR dataset for Galway City and County covering the following elements of travel demand:

- Volume of work and education trips;
- Origin and destination patterns;
- Mode of travel; and
- Time of departure.

**The National Household Travel Survey (2012)**, which was undertaken between April and November 2012. The survey data provides information on day-to-day travel behaviour for the participant households. Figure 2.5 outlines the trip volumes for each hour for ‘home to work’, ‘home to education’, ‘work to home’, ‘education to home’, other trip purposes and all trip purposes combined.

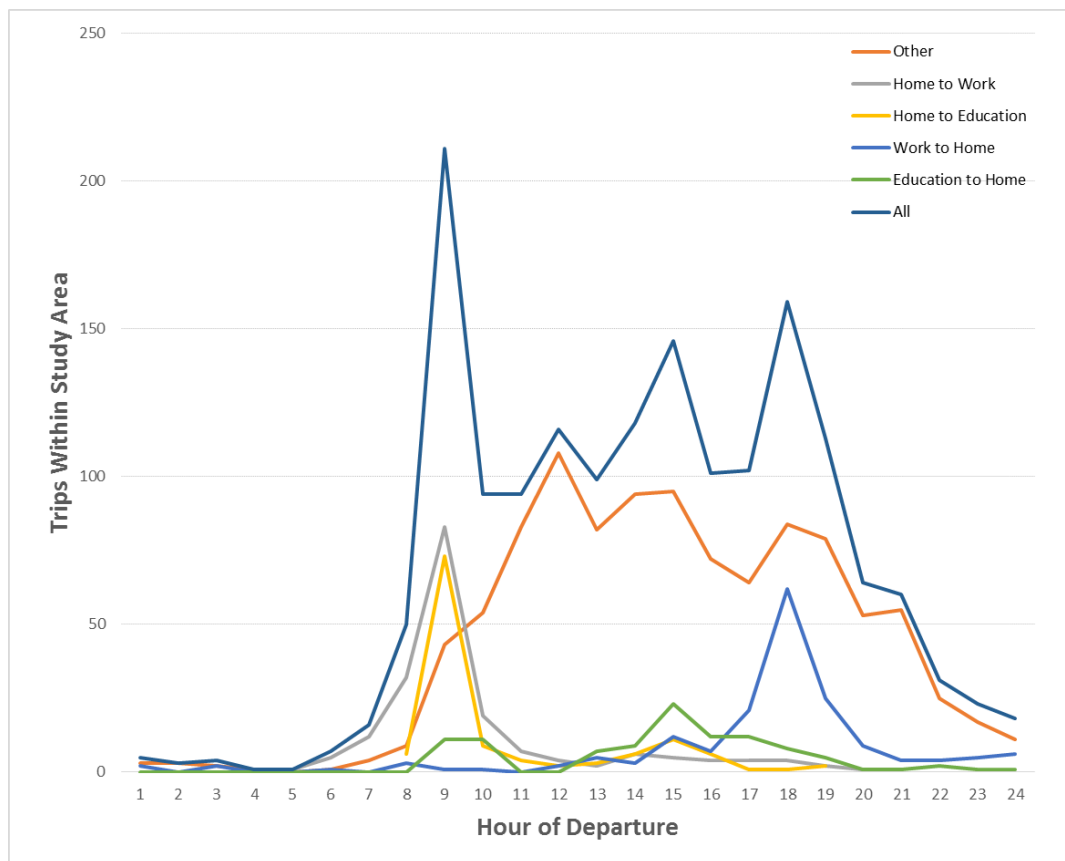


Figure 2.5: Profile of Weekday Trip Demand – Galway City & County (National Household Travel Survey 2012)

Journey time data was obtained from the TomTom Satellite Navigation database on an area-wide basis within an area covering Galway City, which provides journey time information on a link-by-link basis for every link in the network.

For the purposes of this study, and in order to maximise the sample size of journey times, data for the period from September 2012 to May 2013 was extracted and average values were used to validate the model and take into account different travel patterns for times such as weekends, bank holidays and school holidays.

The above data was subsequently calibrated against traffic counts recorded during 2012 to provide reliable base year demand figures.

## 2.4.2 Methodology

Demand analysis was conducted using the National Household Travel Survey and POWSCAR in conjunction with existing travel demand models for the Galway area, to ascertain an understanding of current travel characteristics within Galway City and County. The National Household Survey is conducted by the CSO and represents travel patterns throughout the day whereas POWSCAR and the Interim Model look at peak movements. The movements are broken down by mode used and trip purpose.

## 2.4.3 Major Trip Origins and Destinations

The National Transport Authority (NTA) divided the Study Area into 31 zones using the CSO Small Area structure. POWSCAR data was extracted and processed in accordance with the 31-zone structure, as illustrated in Figure 2.6 below. The resulting origin – destination matrix for the 31 zones is included in ‘**Appendix A – GTS Travel Demand**’.

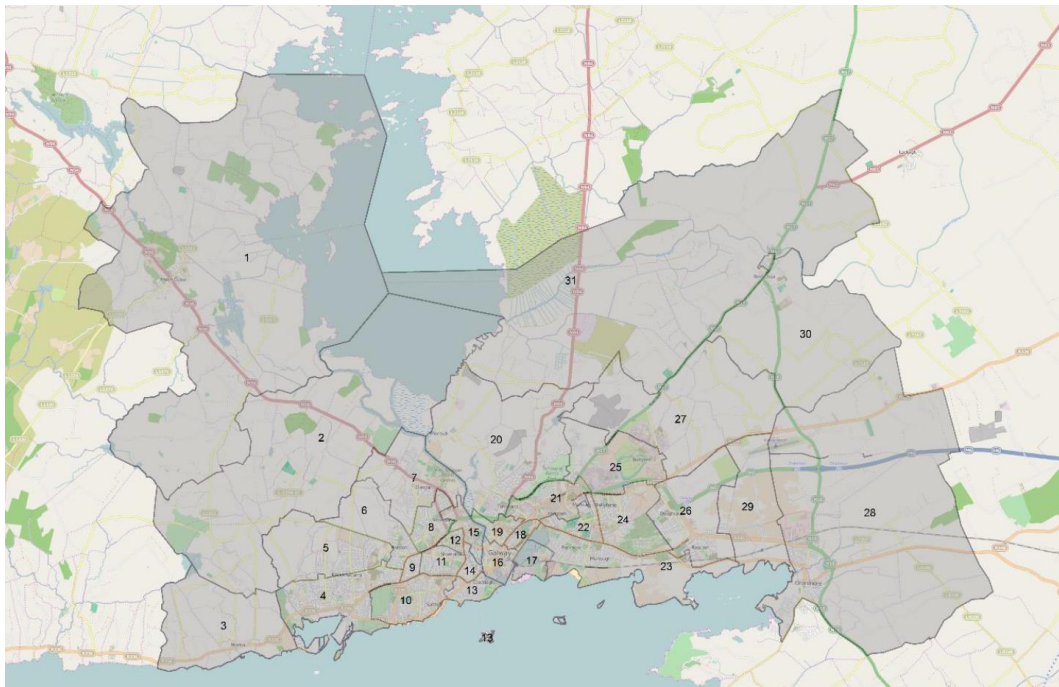


Figure 2.6: POWSCAR Zoning Structure

### POWSCAR Zoning Structure

Just over 45,000 trips were recorded within POWSCAR for the 31 zones. More than one in eight (13%) of these trips is internal, with the origin and destination in the same zone.

The destinations with the highest originating trips and highest arriving trips are shown in Table 2.1 and illustrated in Figure 2.7 below.

Origin	Zone	Trips	Destination	Zone	Trips
Knocknacarra South	4	4,800	NUIG	15	6,500
Tirellan	20	3,550	City Centre	16	5,600
Doughiska	26	3,500	Ballybrit	25	4,000
Knocknacarra North	5	3,000	Salthill	10	3,400
Merlin Park Hospital	24	2,800	Mervue Ind. Estate	21	3,375
Oranmore	28	2,600	GMIT	22	2,600

Table 2.1: Main Attractor/Generator Zones (Source - POWSCAR)





Figure 2.7: Principal Trip Attractors/Generators



## 2.4.4 Current Mode Split

The mode share by trip purpose, obtained from the National Household Travel Survey 2012, is shown in Table 2.2. Note that the mode share data presented below covers both Galway City and County.

Car is the dominant mode, accounting for three quarters of all trips. Walking provides for a high proportion of trips, amounting to nearly 18% overall mode share. It is noteworthy that the proportion of ‘other’ trips facilitated by walking is relatively high (19%).

The bus caters for nearly 10% of home to education trips within Galway City and County in the dataset and probably reflects the role of school bus services, particularly in rural areas.

Mode	All trip Purposes	Home to Education	Home to Work	Other
Car	74.3%	71.4%	78.2%	74.0%
Walk	17.8%	16.7%	10.7%	19.0%
Bus	3.4%	9.9%	2.5%	2.9%
Train	0.1%	0.0%	0.3%	0.0%
Cycle	1.1%	0.5%	2.5%	0.9%
Taxi	0.5%	0.0%	0.0%	0.6%
Motorbike	0.2%	0.0%	0.9%	0.1%
Truck or Van	2.6%	1.6%	4.7%	2.3%

Table 2.2: Mode Share by Trip Type – Galway City & County (source – National Household Travel Survey, 2012)

## 2.5 Planning and Policy

Figure 2.8 illustrates where the GTS sits in terms of policy and planning. As a strategy document, positioned at a local level, it is informed by local, regional and national policy.



Figure 2.8: GTS Planning Policy Context

## 2.5.1 National Policy & Guidelines

### 2.5.1.1 National Spatial Strategy (2002-2020)

The National Spatial Strategy identified a number of Gateway Cities that are to be the focus of population and economic growth in their region as well as ‘engines of regional and national growth’ in a wider context. Galway is one of these Gateway Cities along with Cork, Limerick and Waterford, and has a very important role to play as the only major urban centre in the west of Ireland.

The National Spatial Strategy (NSS) is defined as:

*“... a twenty year planning framework designed to achieve a better balance of social, economic, physical development and population growth between regions. Its focus is on people, on places and on building communities.”*

The current policy of Galway City Council clearly conforms to these ideals by focusing on the provision of public transport and walking and cycling projects, thereby focusing on increasing the provision and quality of more ‘sociable’ modes of transport and hence creating the sense of place and community identified in the NSS.

Currently, the National Spatial Strategy has been withdrawn for review and preparation of a new similar strategy is expected to occur in 2016.

### 2.5.1.2 Smarter Travel – A Sustainable Transport Future (2009-2020)

Smarter Travel – A Sustainable Transport Future (2009-2020) is a government policy document which was launched in 2009. The policy document was prepared in the context of unsustainable transport and travel trends in Ireland.

Notwithstanding the economic conditions of recent years, Ireland will still see significant car ownership levels, higher car usage levels, lower speeds and longer commute times, increased health issues, pollution and congestion, and an overall decline in quality of life in the coming years if intervention measures are not implemented.

The overall vision set out in this policy document is to achieve a sustainable transport system in Ireland by 2020. The challenge therefore is to act, putting strategies in place to incrementally change the travel and transport system in Ireland to a more sustainable format.

The Government sets out five key goals within Smarter Travel, which are:

- To improve quality of life and accessibility to transport for all, and in particular, for those with reduced mobility and those who may experience isolation due to lack of transport;
- To improve economic competitiveness through maximising the efficiency of the transport system and alleviating congestion and infrastructural bottlenecks;

- To minimise the negative impacts of transport on the local and global environment through reducing localised air pollutants and greenhouse gas emissions;
- To reduce overall travel demand and commuting distances travelled by the private car; and
- To improve security of energy supply by reducing dependency on imported fossil fuels.

Aligned with these goals, the key targets are:

- To support sustainable travel, future population and employment growth will take place in sustainable compact urban areas or rural areas, which discourages dispersed development and long commuting;
- Work-related commuting by car will be reduced from a current modal share of 65% to 45%, resulting in an additional 500,000 people using alternative, sustainable means of transport;
- Car commuters to work will be accommodated via other modes such as walking, cycling, public transport and car sharing, to the extent that commuting by these modes will rise to 55% by 2020;
- The total kilometres travelled by the car fleet in 2020 will not increase significantly from current total car kilometres;
- The road freight sector will become more energy efficient, with a subsequent reduction in emissions; and
- A reduction will be achieved on the 2005 figure for greenhouse gas emissions from the transport sector.

The policy document contains 49 actions, which are grouped into four main themes:

- Actions to reduce distance travelled by private car and encourage smarter travel, including focusing population and employment growth predominantly in larger urban areas, and the use of pricing mechanisms or fiscal measures to encourage behavioural change;
- Actions aimed at ensuring that alternatives to the car are more widely available, mainly through a radically improved public transport service and through investment in cycling and walking;
- Actions aimed at improving the fuel efficiency of motorised transport through improved fleet structure, energy efficient driving, and alternative technologies; and
- Actions aimed at strengthening institutional arrangements to deliver the targets.

### 2.5.1.3 National Cycle Policy Framework 2009-2020

The National Cycle Policy Framework (NCPF) was developed as part of a suggested action contained in Smarter Travel, and as such the two are aligned. The plan notes a decline in cycle commuting from 1986 to 2006, but in the context of increasing congestion, journey times and emissions on roads, a return to cycle usage becomes more viable.

The plan therefore sets out a substantial suite of interventions to improve the ease and safety of cycling, in order to achieve greater mode share going forward; again, as with Smarter Travel, these interventions include both ‘hard’ and ‘soft’ measures.

The ‘mission’ is to create a strong cycling culture in Ireland. From the very highest level, the plan states that all planning should consider the needs of cyclists, and that this should dissipate downward into National, Regional, Local and sub-local plans. Transport infrastructural designs need to be cycling-friendly. The framework states that the focus needs to be on:

- Reducing volumes of through-traffic, especially HGVs, in city and town centres and especially in the vicinity of schools and colleges;
- Calming traffic/enforcing low traffic speeds in urban areas;
- Making junctions safe for cyclists and removing cyclist-unfriendly multi-lane one-way street systems; and
- Paying special attention to integrating cycling and public transport.

Other interventions include the following:

- Schools will be a strong focus of the NCPF;
- Supporting the provision of dedicated signed rural cycle networks for Cycling Tourism;
- Ensuring surfaces used by cyclists are maintained to a high standard and are well lit;
- Ensuring that all cycling networks are sign-posted to a high standard;
- Supporting the provision of secure cycle parking at all destinations of importance;
- Integrating cycling and Public Transport, including cycle parking at stations, and the capability to carry bikes on PT services; and
- Creation of municipal bike systems to complement an improved PT system.

The NCPF states that making provision for cyclists in the urban environment does not merely consist of providing dedicated cycling facilities, but also involves wider traffic interventions that benefit all vulnerable road users. It also acknowledges that investment in a cycling network has an impact on an entire geographical area, not just a linear corridor where a cycle facility is installed. It has an impact on road safety within that area as well as a positive impact on the health of the population using the whole network, which amounts to a societal effect.

The vision for 2020 is that all cities, towns and villages will be bicycle friendly, and the bicycle will be the mode of choice for all ages. By 2020, 10% of all trips will be made by bicycle. There are a total of 19 objectives set out in the NCPF, across 5 broad themes covering Infrastructure, Communication/Education, Financial Resources, Legislation, Human Resources and Co-ordination, and Evaluation/Effects. These 19 objectives are wide-ranging and comprehensive, encompassing both physical infrastructural works, and planning, educational and legislative measures.

### 2.5.1.4 Department of Transport Design Manual for Urban Roads and Streets (2012)

As one of the key recommendations of the Smarter Travel document, the Design Manual for Urban Roads and Streets (DMURS) was developed and launched in 2012.

DMURS sets out guidance on how to approach the design of urban streets in a more balanced way. As a result of the development and publication of DMURS, the traditional Design Manual for Roads and Bridges (DMRB) focussed approach to road and street design no longer applies to urban roads and streets (save in exceptional circumstances). DMURS sets out a series of principles, approaches and standards that are necessary to achieve balanced, best-practice design outcomes with regard to street networks and individual streets. The aim is to address street design within urban areas, setting out an integrated design approach. Well-designed streets will be at the heart of sustainable communities, and will create connected physical, social and transport networks that promote real alternatives to car journeys. DMURS advocates a holistic, design-led approach to street design.

Crucially, the manual recognises the importance of assigning higher priority to pedestrians and cyclists, without unduly compromising vehicle movement, in order to create secure, connected places that work for all. From a policy context, DMURS notes the importance of ‘the alignment of spatial planning and transport policy to contain suburban sprawl, linking employment to transport and encouraging modal shift to more sustainable modes of transport’.

To support this, DMURS states that ‘street layouts in cities, towns and villages will be interconnected to encourage walking and cycling and offer easy access to public transport. Compact, denser, more interconnected layouts, particularly where served by good quality bus or rail services, will help to consolidate cities, towns and villages, making them viable for reliable public transport’.

The traditional approach to street design has placed emphasis on the importance of traffic flow in Ireland. As a result, this has led to the proliferation of street networks where the car and the pedestrian are segregated. These, however, have in turn led to an increase in car dependency and a reduction in pedestrian activity. Street design has created severance, with distributor roads bisecting communities, cul-de-sac streets leading to significantly increased walking distances, lengthy crossing lengths and wait times, marginalisation of pedestrians and cyclists, minimal route choice for walking and cycling and an overall lack of connectivity for non-motorised modes of transport.

DMURS recognises that segregation of vehicles and pedestrians in urban areas is not possible, and the interaction of these modes must inform the design process. Instead of free-flowing road layouts which encourage higher vehicular speeds and reduce safety, integrated, shared spaces which encourage a change in behaviour and a greater balance of priority will help to reorganise the hierarchy of users in a manner which prioritises and supports sustainable modes of transport.

Integrated design approaches result in simpler street networks with higher connectivity, attractive routes and environments for pedestrians and cyclists,

promotion of more sustainable modes of transport, more compact (therefore less expensive) streets and junctions and self-regulating, safer streets.

DMURS proposes a new mode user hierarchy which leads with pedestrians and cyclists followed by public transport, placing the car at the foot of this hierarchy. In this regard, DMURS advocates that cars should no longer take priority over the needs of the other users.

Designers must have regard to four core principles, these are as follows:

- The creation of integrated street networks which promote higher levels of permeability and legibility for all users, and in particular more sustainable forms of transport;
- The promotion of multi-functional, place-based streets that balance the needs of all users within a self-regulating environment;
- The quality of the street is measured by the quality of the pedestrian environment; and
- Greater communication and co-operation between design professionals through the promotion of a plan-led, multi-disciplinary approach to design.

DMURS sets out clear and comprehensive approaches to all elements of urban street design, including guidance for junction design, parking provision, pedestrian crossings, network connectivity, cycle provisions, etc. The implementation of the principles, approaches and standards contained in DMURS will be dependent on the adoption of the document across spatial planning. To this end, it is mandatory for DMURS to be incorporated into Development Plans, Local Area Plans, Masterplans, etc. DMURS also sets out a series of development rationale to be applied across all proposed developments, regardless of scale, in order to demonstrate how a proposed development conforms to DMURS.

### **2.5.1.5 NTA Permeability Best Practice Guide (2015)**

The NTA published the 'Permeability Best Practice Guide' in 2015, a policy document on how best to facilitate demand for walking and cycling in existing built-up areas.

People need to access shops, schools, local services, places of work, and public transport stops and stations on a daily basis from their homes. This best practice guide seeks to provide a choice of mode for these journeys in existing built-up areas by promoting permeability for pedestrians and cyclists, thereby addressing the legacy of severance built in to recent expansions of Irish towns and cities, of which Galway is not an exception.

This guidance note provides a methodology for the retention and creation of linkages within the urban environment for people to make journeys by active modes, i.e. walking and cycling.

In addition, by providing connections to public transport services, access to these services will be improved and increased levels of use may be expected, which reduces reliance on the private car.



Permeability in this context describes the extent to which an urban area permits the movement of people by walking or cycling. It does not relate to the movement of motorised vehicles and is therefore concerned with providing a competitive advantage to walking and cycling over other modes. This is known as ‘filtered permeability’. Barriers to filtered permeability can include:

- Boundary walls around estates and within residential areas that prevent movement along natural desire lines, being usually the shortest and most direct route connecting two points;
- Cul-de-sacs which prohibit through movement;
- Poorly designed linkages that are difficult or unattractive to use; and
- Connections which require much longer travel distances than direct linkages.

A permeable or connected district can contribute to a range of planning objectives related to design, social integration and transport. Permeability can enhance the attractiveness of a neighbourhood through the provision of additional useable open space; can increase social interactions by facilitating more activity in the public realm, and can maximise the potential for walking and cycling to a range of services.

Benefits of increasing permeability in an area include:

- Improved local economic wellbeing by facilitating short trips to local shops on foot or by bicycle, rather than encouraging longer trips to out-of-town centres by car;
- Public transport becoming more accessible due to shortened journeys to stops, encouraging use of public transport and leading to time and cost savings for the user and reduced reliance on the private car generally;
- Health benefits due to use of active modes, instilling healthy travel patterns and building activity into people’s daily lives. This is particularly applicable in the case of school travel, improving children’s health and fitness and building a habit of using active modes from an early age; and
- Community development due to connected neighbourhoods, which lead to increased social interactions, the presence of more people on the street, a consequent perception of a neighbourhood as safer due to this passive surveillance, and hence an overall sense of community.

In developing or retroactively improving permeability in an area, the needs of pedestrians and cyclists must be considered. These can be categorised under five headings which combine to provide a particular quality of service, as follows:

- Safety – is it safe to walk or cycle from someone’s house to their destination and back?
- Coherence – is it obvious to the cyclist or pedestrian where to go? Is the route legible and straightforward?
- Directness – is the route direct?
- Attractiveness – does the cycle or walking route attract or deter users by virtue of the impression it gives to passers-by and is it well-maintained?
- Comfort – is the route comfortable to walk and cycle on? Is the surface even and consistent?

In order to implement filtered permeability, i.e. enabling the most direct routes for trips in a built-up environment to be possible by walking and cycling, but not necessarily by car, and with the above categories in mind, the Permeability Best Practice Guide has set out four key principles governing the creation and maintenance of connections in urban and suburban areas:

- Origins and destinations, such as schools and shops, should be linked in the most direct manner possible for pedestrians and cyclists;
- Greater priority should be given to pedestrians and cyclists;
- The physical design of links should be fit for purpose in terms of capacity and security; and
- Junctions in urban and suburban areas should cater for pedestrians and cyclists safely and conveniently.

The document also sets out a step-by-step guide for the implementation of permeability schemes to meet these principles, which advises the following steps:

- **Scheme Identification:** A set of potential permeability schemes initially needs to be identified. This can be undertaken through analysis of mapping, discussion with local elected representatives and residents and by using local knowledge;
- **Appraisal:** Appraisal is undertaken to assess the potential positive and negative impacts of each scheme. This is undertaken before implementation to establish the viability and benefits of each scheme;
- **Prioritisation:** Outputs from the scheme appraisal are used to establish a prioritised list of permeability schemes;
- **Consultation:** Various types of consultation with key stakeholders and residents are recommended. The key stage of consultation comes after schemes have been appraised and prioritised and is used to inform final designs;
- **Design:** This is the stage at which the schemes from the prioritised programme are designed in detail, taking on board feedback from consultation and ensuring designs follow best practice and are consistent with guidance and manuals; and
- **Evaluation:** Once schemes have been implemented it is important that an evaluation is undertaken to establish whether the scheme is delivering on its intended benefits. Findings from the evaluation can also be used to inform future schemes.

## 2.5.2 Regional Policy

### 2.5.2.1 Regional Planning Guidelines for the West Region (2010-2022)

The Regional Planning Guidelines (RPG's) for the West Region apply to the Galway, Mayo and Roscommon area and take the NSS guidelines to a more regional and focused level. Within this region Galway City is the only Gateway City as identified in the NSS and is the economic capital of the region. Specific reference is made to the implementation of the proposals contained in 'Smarter Travel – A New Transport Policy for Ireland 2009 – 2020' within the region.

SG2 of the guidelines aims to “put in place an integrated sustainable transport and access infrastructure that:

- Facilitates access by all at a reasonable cost and with reasonable travel times to educational, work, leisure, health and other services;
- Promotes appropriate public transport services – rail or bus transport and other sustainable modes of travel such as walking and cycling;
- Provides a high level of service on major roads that minimises travel times and maximises safety and facilitates public transport by upgrading the network of national roads in the region in line with Transport 21 and NDP objectives;
- Facilitates the movement of goods in and out of the region in a way that promotes competitiveness; and
- Minimises the need for car-based travel where practical and viable.

The need for sufficiently robust, comprehensive and high quality public transport, walking and cycling infrastructure is acknowledged in the RPG's with the following explicit policy objectives:

- IO9: Support the sustainable development of an integrated transportation system for Galway City and County areas; and
- IP 10: To investigate the potential for development of integrated transportation hubs in the Gateway (Galway), Hub, Linked Hub and other appropriate urban locations;
- IP13: Promote on-going Traffic Management policies and plans in the Gateway [City of Galway...] with particular emphasis on measures to facilitate public transport, walking and cycling;
- IP21: Promote a better environment for pedestrians, cyclists and persons with disabilities in the city, towns, villages and rural areas so as to facilitate increased mobility and access for citizens;
- IO32: Promote the development of safe and convenient pedestrian and cycling facilities in Galway City, towns and villages of the Region to minimise the dependence on private motor vehicles and to encourage an active and healthy lifestyle; and
- IO33: Support the provision of designated rural cycle networks especially for visitors and recreational cycling and develop a network of walkway/cycleway through the region which includes green routes.

- This must take account of potential impacts on the environment and be guided by Habitats Directive Assessment, where appropriate.

In addition, objective C010 of the guidelines specifies that it is intended to:

- Support the upgrading of junctions on relief roads subject to not compromising the operational efficiency, capacity or safety of roads and respecting the NRA policy Statement on Development Management and Access to National Roads (May 2006) where relevant.

### 2.5.3 Local Policy

#### 2.5.3.1 Galway City Development Plan (2011-2017)

The Galway City Development Plan 2011 – 2017 sets out a principal transportation objective as follows:

*“To integrate sustainable land use with an integrated transportation system that is based on smarter travel principles. To ensure the most efficient and sustainable use of land and a transportation system that eases movement to and within the city which facilitates access to a range of transport modes and accessible to all sections of the community.”*

Because of its location as the only major urban centre in the west, which is one of the more underdeveloped parts of the country, Galway City’s employment catchment area is second only to Dublin in terms of area as commuters travel from as far away as Mayo and Roscommon to the city. The predominant mode of travel amongst these commuters is the car. This in turn has resulted in traffic congestion on the main transport network and a negative impact on the functionality of the network itself. Employment opportunities increased dramatically between 1995 and 2007, until the economic downturn of 2008. Car usage and traffic congestion has increased alongside this improved economic profile. Even under the current economic climate, the private car is still the principal mode of transport. The transportation objective quoted above clearly conveys a desire to develop a transport network within the city based predominantly on Smarter Travel principles.

Within the plan, the integration of land use and transportation is recognised as a key factor in achieving Smarter Travel objectives. It also acknowledges that the promotion of Smarter Travel ideals are essential if the general public are to participate in it, support it and ultimately see the long term benefits of the programme.

Transportation strategies in the development plan include:

- To support and facilitate the improvement and further development of a public transportation system and encourage the use of other sustainable modes of transport in accordance with national policy as set out in the smarter travel policy and the National Cycle Framework Plan;

- To co-ordinate an integrated sustainable transportation system for the city and environs in conjunction with service providers, Galway County Council and other relevant agencies;
- To support and facilitate the development of integrated land use and transportation proposals based on delivery of a high quality integrated sustainable transportation system in order to facilitate the overall economic well-being and competitiveness of the city and to ensure the movement of people and goods in a manner that improves ease of access for all, enhances quality of life and enhances the environment;
- To support the aims and objectives of the GTU and implementation of recommended actions; and
- To support and facilitate, in conjunction with other agencies, a modal change from the private car to more sustainable modes of transport, namely public transport, walking and cycling.

### 2.5.3.2 Galway County Development Plan (2015-2021)

The current Galway County Development Plan contains a number of strategic transport aims, including:

- Providing a safe and efficient network of transport to serve the needs of the people and the movement of goods and services to, from and within Galway County;
- Providing access for all in an integrated manner with an enhanced choice of transport options including the Rural Transport Programme;
- Promoting and encouraging the use of alternative sustainable modes of transport and to promote the use of transport energy from renewable resources;
- Promoting development on serviced lands in towns and villages, particularly those located along public transport corridors in accordance with the Sustainable Residential Development in Urban Areas Guidelines (2009), having regard to existing settlement patterns;
- Safeguarding the strategic transport function and carrying capacity of the motorway and national road network and associated junctions in order to provide for the safe and efficient movement of inter-urban and inter-regional traffic; and
- Supporting the opening of the Western Rail Corridor route from Athenry, Tuam Hub Town, Claremorris to Collooney (4 Sections) as an option for passenger and cargo transportation.

### 2.5.3.3 Draft Galway City Local Economic and Community Plan (2015-2021)

As part of new leadership roles assigned to local authorities under the Local Government Reform Act 2014, Galway City Council now has the primary responsibility for leading economic, social and community development in the city.

The Galway City Local Economic & Community Plan (LECP) is for a six-year period and sets out objectives and actions to promote and support economic development and to promote and support local and community development in Galway City.

The guiding principles of the LECP are:

- The promotion and main-streaming of equality;
- Sustainability;
- Maximising returns by co-operation, collaboration and avoiding duplication;
- Participative Planning;
- Community consultation and engagement;
- Community development principles; and
- Accessibility and ownership.

The vision for Galway City set out in the LECP is as follows:

*“That Galway will be a successful City Region with a creative, inclusive and innovative ecosystem in place to ensure its sustainable development into the future.”*

The LECP is based on five high-level goals that were identified during the plan preparation process:

1. A world-class, creative city region;
2. An innovative city;
3. An equal and inclusive city;
4. A sustainable, resilient urban environment that is the regional capital of the West; and
5. A city that promotes the health and well-being of all its people.

Key actions and initiatives were agreed for each of the above high-level goals. Achievement of these will necessitate inter-agency collaboration in order to meet the challenges of improving the well-being of the people and economy of Galway City. Action plans are proposed to be developed for each year of the lifetime of the LECP, with clear and measurable actions for implementation.

### 2.5.3.4 Draft Galway City Development Plan (2017-2023)

The Draft Galway City Development Plan (2017-2023) will continue to promote the achievement of a sustainable integrated transportation system, and will aim to facilitate increased modal shift away from the private car and to promote measures to reduce traffic congestion in the city.

The principal transportation aim set out in the Draft City Development Plan is:

*“To integrate sustainable land use and transportation, facilitating access to a range of transport modes, accessible to all sections of the community that ensures safety and ease of movement to and within the city and onward connectivity to the wider area of County Galway and the West Region.”*

The approach to the transportation strategy set out in the Draft City Development Plan comprises four main elements, as follows:

- Support and facilitate the integration of land use and transportation in order to facilitate the overall economic well-being of the city and to ensure the movement of people and goods in a manner that is safe and provides ease of access for all, enhances quality of life and minimises environmental impact;
- Support the Galway Transport Strategy (GTS) and the associated implementation programme which will deliver a high quality public transport network, provide and encourage the use of other sustainable modes of transport, and facilitate the efficient movement of private vehicles and freight;
- Support the N6 GCRR project in conjunction with Galway County Council and Transport Infrastructure Ireland in order to develop a transportation solution to address the existing congestion on the road network and reduce the negative impact of vehicular traffic on the functioning and experience of the city centre and to facilitate city bound, cross –city, cross- county and strategic east – west movements; and
- Support the reduction of greenhouse gas emissions through promotion of sustainable land use and transportation.

## 2.5.4 Local Studies

### 2.5.4.1 Galway Transportation and Planning Study (1999 & 2002)

The 1999 Galway Transportation and Planning Study sought to embrace the concept of the integration of land use and transport in the city and county, highlighting a need for a more sustainable approach to development in Galway, with an emphasis on public transport, and an increasing dependency on the private car.

The study aimed to consolidate development in Galway in two main areas, as follows:

- Focus on Galway City – consolidate development within the Ardaun Corridor – this was based on a high-quality living and working environment, with bus-



based links to and within Galway City, using appropriate prioritisation measures and investment in vehicles, information, park and ride, stops and termini; and

- Focus on main County Towns – encouraging the development of the main towns within Galway’s catchment including Tuam, Oranmore, Athenry, Loughrea and Gort, as well as satellite towns of Oughterard, Headford, Baile Chláir, Moycullen, Bearna and Spiddal, and linking these to Galway City via a county based fixed route radial network serving the main towns and villages and a ‘Dial-a-bus’ facility to serve the rural areas outside the fixed routes.

The 1999 GTPS also identified strategic road priorities to remove through traffic within the City, improve road access from outside the GTPS area and open up development opportunities in the Ardaun Corridor.

The original GTPS was reviewed and updated in 2002. The update confirmed the appropriateness of many of the strategic policies in the 1999 GTPS, reaffirmed the Ardaun Corridor importance as a sustainable solution to City and County growth, and supported the need for growth within the main centres outside of Galway City. The update also took account of new national and local policy, and sought to maximise the opportunities presented by the National Development Plan and the (then) emerging National Spatial Strategy.

However, the update also extended the 1999 GTPS with a number of new recommendations:

- Recognising and harnessing the complementary strengths of the City and County;
- Planning for higher than anticipated growth; and
- Enhanced Public Transportation opportunities.

The GTPS identified the development of a much-improved public transport system as a key element. The updated study took the original 1999 proposals and extended them, as follows:

#### **1999 GTPS:**

- Bus-based internal PT loops in Galway City;
- Major bus priority initiative to accelerate bus timings, offer an attractive alternative to the car and capitalise upon recent Bus Éireann investment in the fleet; and
- Development of P+R facilities at a number of locations.

#### **Updated GTPS:**

- Enhanced inter-city rail linkages;
- Potential to offer commuter linkages between the sub-regional centres from proposals that may emerge in the context of the NSS and the National Strategic Rail Study;
- Focusing development within strategic towns and villages in the county area to support the critical mass of development necessary for enhanced use of existing rail infrastructure and services and bus-based transport links to Galway City and other urban centres;

- Building on the capacity of the existing rail infrastructure and services, with particular emphasis on strengthening Galway's links with other major cities and the promotion of balanced regional development;
- Promoting cycling through settlement structure, by making roads safer and utilising the opportunities for improving cycling conditions using bus priority measures; and
- Pedestrian/Cycling networks utilising on and off-street carriageway options.

Within Galway City, the transportation recommendations related to providing an effective public transport system within the City to reduce the severe levels of congestion being experienced. This would be based around continued development of the bus network, bus priority and other measures.

Assuming the adoption of appropriate traffic management policies and demand restraint measures, the following recommendations were made:

- Achieving a 10-minute frequency along routes within the City;
- Design of routes and layout of residential and other developments which accommodate efficient provision of bus services and which discourage car commuting;
- Early consideration of the GCC/Bus Éireann Study for bus priority measures within the city;
- Further development and implementation of City Centre parking controls to operate alongside effective use of P+R facilities;
- Extension of the urban bus network to include Ardaun;
- Continued improvements to the mainline services between Dublin and Galway City;
- Investigate the potential for the development of a Western Rail Corridor;
- Improvements to Galway Rail station; and
- Improved bus interchange facilities as part of the Eyre Square Enhancement Scheme.

#### **2.5.4.2 Galway City and Environs Strategic Bus Route and Bus Transportation Study (2006)**

The Galway City and Environs Strategic Bus Route and Bus Transportation Study was commissioned by Galway City Council to look at the issue of inadequate public transport and car dependency in the city. At the time of the study only 4% travelled to work by public transport.

The study therefore looked at identifying a framework for development of a bus network which:

- Was comprehensive enough to address all the ways in which the bus system could be improved to make it more attractive;
- looked forward to consider the future needs of a rapidly growing city, as well as future opportunities and constraints; and
- Provide a clear plan which would promote multi-annual investment in priority measures, supporting infrastructure and bus services.

The approach taken was to examine every aspect of the bus journey, from the customer's perspective, right from the beginning of the process when one seeks information about using the bus system to the final stage, when one alights from the bus and walks to their destination. The results of this approach were then validated through stakeholder consultation.

The study proposed a five-pronged approach:

- **Quality Bus Corridors** – Quality bus corridors were to be introduced on the existing routes on the Dublin Road, Monivea Road, City Centre, Clybaun/Rahoon, Taylor's Hill, Salthill, Tuam Road, Headford Road and Newcastle Road. Two new corridors were also to be developed: an Orbital Corridor and an Ardaun Corridor;
- **Park & Ride** – Park & Ride sites were to be developed on the major access routes;
- **Improved Traffic Management & Increased Car Restraint** – The measures to be introduced here included parking/loading restrictions, enforcement, signal/junction improvements, greater control of parking availability & price, UTMC and on-going car restraint;
- **Marketing** – On-going marketing of bus systems, promotion of bus priority initiatives, provision across many channels, innovative fares & ticketing and customer focussed route development; and
- **Planning Policy & Practice** – Measures to promote and facilitate the development of the bus system, bus orientated development/re-development of key sites, the gradual introduction of car restraint and the establishment of a transport team to prioritise the implementation of policy.

The analysis carried out in the study indicated that the introduction of the above would double the number of trips taken on public transport, increase reliability & service frequency, decrease walking times to access the services and decrease journey times.

### 2.5.4.3 Galway Metropolitan Area Smarter Travel Plan (2009)

The Metropolitan Area Smarter Travel Bid of 2009 was jointly developed by Galway City Council and Galway County Council. The bid was produced as part of a national competition whereby winning bids would be allocated to local authorities for funding towards implementation of their proposals. The proposal was developed with a view to improving the overall transport network, but with a focus on sustainable travel modes.

The Metropolitan Area Smarter Travel Bid envisaged a number of major public transportation schemes, including:

- Delivery of the Oranmore transportation hub at Garraun;
- Delivering improvements to the bus network;
- Facilitating the development of Park and Ride facilities on arterial routes into Galway; and
- Improving service provision, marketing and awareness of services.

It also envisaged five specific actions to increase mode share for cycling and walking, as follows:

- Develop an integrated network of walking and cycling routes;
- Increase priority for pedestrians and cyclists in the city and town centres of Bearna, Oranmore and Baile Chláir;
- Improve permeability of residential areas for pedestrians and cyclists;
- Increase the availability of bike parking; and
- Introduce cycle training facilities in the city and in Oranmore.

Actions included soft measures such as marketing and promotion, education and travel planning as well as infrastructure projects to fill a clear gap in amenities for pedestrians and cyclists. The reduction and calming of traffic volumes was a top priority in improving safety and the perception of safety for pedestrians and cyclists, and the introduction of 30kph zones was proposed as part of the plan.

#### **2.5.4.4 Galway Public Transport Feasibility Study (2010)**

The objective of the Galway Public Transportation Feasibility Study was to provide a more detailed examination of all public transport options identified in previous studies, including Bus Rapid Transit, Light Rail & Associated Park & Ride Facilities.

To achieve this objective, a delivery plan for improved public transport was developed using in-depth analysis and forecasting of the (then) current and future public transport needs of the city. The study built upon the principles set out in previous local and national studies, together with a consideration of local planning issues and problems. In the preceding years, Galway City had continued to benefit from economic growth, which in turn increased the problems for the City's transport systems.

A multi-modal transport model of the city was developed to assess the comparative transport impact of potential public transport options. The model was also used as a basis for appraising the wider economic and environmental benefits of the preferred strategy.

The study identified five objectives for a Transport System:

- Trips would be predictable;
- Increased capacity;
- Allowance for future economic growth;
- Increased ambience of the city centre; and
- System would be accessible and inclusive.

Each transport option was to be considered under the following broad headings:

- Enhancing Public Transport – This had the aim of improving the public transport offer, providing more capacity and making the option the mode of choice; and
- Managing Travel Demand – This aimed to make more intelligent use of the prevailing network, to reduce the use of cars, to reduce the need to travel, to revise car parking standards and to develop mobility management plans.

The potential transportation options that were then further examined were;

- High Density/Low Capacity Vehicle Bus Network;
- Enhanced Conventional Bus Network;
- BRT with Enhanced Conventional Bus to infill the network; and
- Light Rail with bus feeders & complementary services.

The appraisal of proposed public transport options also concluded that public transport improvements would not be sufficient on their own to curb the dominance of the car and its associated traffic impacts in Galway City. Traffic related congestion and other delays heavily impact on public transport provision in terms of efficiency, reliability, timetabling and future viability. The GTPS stated that an improved public transport service can only be delivered with a reallocation of road space to support public transport and cycling, and also if walking in both the City centre and suburbs is attractive and safe. Providing better permeability for walking and cycling, with more appropriate and safe shortcuts for walking and cycling, serves to extend the public transport catchment area.

The study recommended that along with appropriate demand management interventions, priority should be given to improving the permeability for walking and cycling within and around the city together with the implementation of improved public transport provision to yield significant benefit to Galway city.

#### **2.5.4.5 Galway City and Environs Walking and Cycling Strategy (2010-2017)**

Galway City and County Councils jointly commissioned a Walking and Cycling Strategy for the city and environs, which was to provide a clear plan for the future development of cycling and pedestrian networks including safe, attractive infrastructure to encourage greater use of sustainable travel modes. The aim was to increase uptake of Smarter Travel modes, leading to a change in the overall transport network, resulting in reduced car dependency, improved air quality, safer roads, increased public transport use and a boost to the local economy.

This strategy clearly defined the needs of different categories of pedestrians and cyclists as users of the same networks with different purposes and requirements for their journey types. It included an analysis of travel patterns and extensive community and stakeholder consultation, identified issues and challenges on the existing network, and defined an approach to responding to these problems. The strategy set out objectives, policies and actions under four themes as follows:

- Infrastructure and Amenity Improvements;
- Traffic and Parking Management/Smarter Streetscapes;
- Integrated Transport and Land Use Policy; and
- Travel Planning, Marketing and Education.

The strategy mentions particular concerns regarding the limited cycle lane network, and the lack of facilities and safety risk for cyclists and pedestrians at busy junctions, some of which have since been converted to signalised junctions

with crossing facilities. It also cites pedestrian connectivity and lack of crossings at desire lines as an issue, particularly in the Headford Road and Docklands areas, at the junction of Eglinton Street and Williamsgate Street, and at the junction of Eyre Square and Victoria Place. Some of these areas have since been improved but others remain substandard.

Overall issues and opportunities identified are summarised in the following points:

- Safety of pedestrians and cyclists at junctions, safety of cyclists on road, traffic volumes and speed, perception of safety on poorly lit city centre streets;
- Connectivity of footpaths and cycle lanes, permeability of residential estates, connectivity to public transport;
- Maintenance of walkways and cycle lanes including drainage, lighting and general cleanliness;
- Availability of secure and sheltered bike parking;
- Enforcement of parking restrictions;
- Need for increased education and promotion of walking and cycling; and
- Need for improved signage and wayfinding, particularly on bike lanes and existing shared paths.

Its vision was “to create a culture of active, sustainable travel in Galway City and its Environs by encouraging and providing for walking and cycling as safe, accessible and attractive modes of transport for all, and by ensuring that walking and cycling become the first choice for trips in the area.”

Nine objectives were established to support this vision and address the issues listed above. These were each categorised under one of the four strategy themes.

### **Infrastructure and Amenity:**

*Objective 1:* Develop a high amenity network of walking and cycling routes linking key destinations to encourage more active travel;

*Objective 2:* Improve integration of pedestrian and cycling infrastructure with public transport nodes and corridors;

*Objective 3:* Improve the maintenance of pedestrian and cycling infrastructure;

*Objective 4:* Increase bike parking provision throughout Galway City and its Environs;

### **Smarter Streetscapes:**

*Objective 5:* Adopt the concept of Smarter Streetscapes in Galway City Centre, Town Centres, neighbourhoods and school zones;

*Objective 6:* Ensure traffic management and parking policies support Smarter Travel Modes and Smarter Streetscapes;

### **Integrated Transport and Land Use Policy:**

*Objective 7:* Ensure future development recognises the needs of pedestrians and cyclists.

## Travel Planning, Marketing and Education:

*Objective 8:* Undertake a programme of travel planning at workplaces, educational institutions and residential areas;

*Objective 9:* Introduce a marketing and education campaign to raise awareness of walking and cycling as safe and enjoyable modes of travel for commuting and leisure.

The strategy set various quantified targets for each mode type, including but not limited to mode split targets. Proposals to achieve these targets included:

- Establish an Urban Cycle Network, Interurban Cycle Network and Greenway Network;
- Signalise of major roundabout junctions;
- Introduce of an Urban Traffic Control Strategy;
- Review signal phasing to provide a better pedestrian service where possible;
- Improve crossing facilities at roundabouts;
- Create speed tables at canal walk junctions with streets and new pedestrian crossings at multiple locations;
- Upgrade shared surface facilities and provide new on-road cycle lanes;
- Investigate potential for new bridges, particularly across the River Corrib;
- Improve signage for pedestrians and cyclists;
- Introduce a Bike Share Scheme;
- Implement the recommendations of the Galway Bus Strategy and the Public Transport Feasibility Study;
- Negotiate with public transport operators regarding the possibility of transporting bicycles on public transport;
- Raise awareness of the shared use of bus lanes with all users;
- Establish a maintenance hotline for pedestrian and cyclist routes;
- Implement of a programme of lighting improvements;
- Introduce of a programme of ongoing drainage maintenance;
- Improve surface quality on pedestrian and cycle paths;
- Provide sheltered and secured bicycle parking in a city centre car park;
- Review and monitor bicycle parking standards;
- Provide mobile bicycle parking for special events;
- Work with An Garda Síochána and other stakeholders to develop a strategy against bike theft;
- Introduce Smarter Streetscapes in Galway city centre, Baile Chláir, Oranmore, Bearna, Maigh Cuilinn, neighbourhood areas in the city suburbs, and in the vicinity of schools and educational institutions;
- Review parking policy in the city centre and in Oranmore;
- Improve traffic and parking enforcement;
- Introduce a 30kph zone in Galway City, Bearna and Oranmore;
- Examine potential strategic road closures to motorised traffic;
- Undertake accessibility audits for all new development;
- Introduce workplace travel plans at all workplaces with more than 100 employees;



- Continue to deliver recommendations from the An Taisce Green Travel Theme;
- Implement pilot Personalised Travel Plans in Renmore and Oranmore;
- Increase Smarter Travel communications and public relations;
- Increase Travel Education for all road users; and
- Increase advertising and promotional activities for walking and cycling.

The strategy set out a timeline for these measures to be implemented, and an overall indicative cost and appraisal. Some of the measures have been implemented either wholly or partly, and the remainder have been examined and included in the Galway Transport Strategy where appropriate.

#### **2.5.4.6 Galway Metropolitan Area Bus & Cycle Network Plan (2014)**

The Galway Metropolitan Area Bus & Cycle Network Plan was commissioned by Galway City Council to develop a five-year investment plan for the bus and cycle network.

The overall goal was an integrated plan, which would reflect existing and future travel demand and would achieve a quality of service across the transport network.

The plan comprised an initial review of the quality of the prevailing bus and cycle networks, stakeholder engagement, analysis of travel demand, development of transport networks and necessary infrastructure, and finally an implementation plan.

The proposed bus network plan was based on achieving the highest level of service possible where demand is highest. The network was classified into primary and secondary routes. Primary routes are those which act as the main distributor routes into and around the city, and carry the most patronage. Secondary routes are those which connect to more local areas or those where bus priority cannot be achieved.

The proposed primary routes included:

- Old Dublin Road/Coast Road;
- College Road;
- Merlin Park Corridor;
- Tuam Road;
- Newcastle Road/University Road; and
- Seamus Quirke/Bishop O'Donnell Road.

The secondary routes included:

- Doughiska Road;
- Monivea Road (east);
- Ballybane Road;
- Tuam Road (north of Ballybane Road Junction);
- City Centre routes;

- Newcastle Road/Moycullen Road;
- Western Distributor Road; and
- Kingston Road/Bearna Road.

In addition to the proposed bus network, the study also proposed to utilise ITS developments and opportunities in order to further augment and maximise the efficiency of the network, including the use of Advanced Vehicle Location (AVL) capabilities within Bus Éireann and to use the UTC system developed by Galway City Council to greater effect. Other ancillary proposals included the improvement of bus stops throughout the Metropolitan Area.

The proposed cycle network plan focused on encouraging mode shift to cycling by achieving the highest level of service possible where demand is highest.

The urban cycle network was classified into primary, secondary and feeder routes by quality of service. The primary network was to comprise a limited number of high quality arterial facilities crossing the urban area which permit “2+1” cycling as per the National Cycle Manual. The secondary network was to connect the primary network to key trip generators and residential areas.

The feeder network was to supplement these networks by providing advisory routes of improved environment for cyclists by means of traffic management measures, without direct provision of cycle facilities. In addition to these, the plan proposed an Interurban Cycle Network with links across the metropolitan area to connect to surrounding urban centres, and a Green Network to cater mainly for recreational cyclists.

The proposed urban network primary routes included:

- Oranmore to City Centre Greenway
- City Centre to Bearna Greenway
- Ballybrit Connector
- Dangan Greenway
- Western Distributor Road
- Seamus Quirke Road
- N6 Quincentenary Bridge
- N6 Bóthar na dTreabh
- Doughiska Road

The interurban cycle network included the above Oranmore to Bearna Greenway via the City Centre, a connection to Moycullen via the Dangan Greenway, and a link to Baile Chláir via a secondary route along the N17.

The plan also recommends junction upgrades to improve safety and connectivity for cyclists, particularly at roundabout junctions.

## 2.6 Key Challenges to be addressed in this Transport Strategy

It is clear that the existing transport network and its component parts, as set out above, are experiencing difficulties meeting the current transport demands, with delays and congestion, particularly for vehicular traffic and public transport, becoming increasingly prevalent. As the economy continues to grow, and the role of Galway City as a regional gateway develops, it is critical that the transport network can evolve to meet future travel demand. In this regard, a number of key challenges must be addressed by the Galway Transport Strategy. These include:

- The need to transform Galway City Centre from a location typically characterised by heavy congestion and significant traffic volumes to a destination of choice for residents, workers and visitors alike;
- The need to reduce the reliance on travel by private car;
- The need to deliver a public transport network that can offer journey time reliability and frequencies sufficient to maximise the attractiveness of the service and to meet demand;
- The need to supplement the public transport network with complementary facilities such as Park and Ride for the benefit of people accessing the city from the surrounding rural areas;
- The need to facilitate city-bound, cross-city, cross-county and strategic east-west travel on the National and Regional road network without impacting on the functionality of the city;
- The need to improve accessibility to and through residential areas for sustainable travel modes in order to improve the appeal of alternatives to the private car;
- The need to maximise connectivity by walking, cycling and public transport to major employment and education facilities;
- The need to minimise non-essential traffic flow through the city centre;
- The need to minimise the impact of traffic congestion on Galway City Centre, in order to allow the city to grow in a sustainable manner; and
- The need to achieve efficiency and resilience on Galway's transport network, across all modes.

## 3 Strategy Development

### 3.1 Approach and Methodology

The approach adopted for formulation and testing of the GTS and its constituent measures was:

- To initially **establish overall strategic objectives**;
- To **develop and test strategy options and alternatives** in line with these objectives, and;
- To then **develop specific proposals** to enable the preferred options to function and deliver maximum performance when brought together under the overall strategy.

A flow-chart illustrating the process of developing the strategy is set out in Figure 3.1.

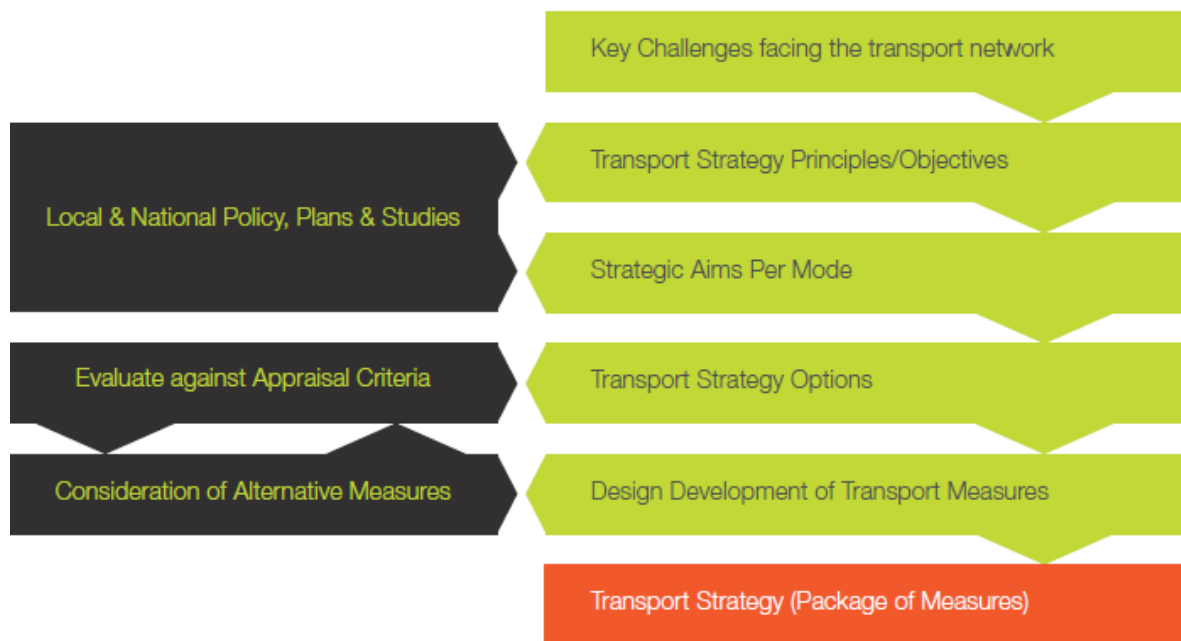


Figure 3.1: Strategy Development Process

### 3.2 Strategic Objectives

Strategic objectives developed for the Galway Transport Strategy must be in accordance with and support the broader national economic, social and environmental objectives as set out in the Department of Transport ‘Guidelines on a Common Appraisal Framework (CAF) for Transport Projects and Programmes’. The strategic objectives have been formulated based on an analysis of the key objectives from the City Development Plan, the County Development Plan and

previous transport studies outlined in Chapter 2. They provide a basis for developing aims and proposals for mode-specific solutions.

The CAF appraisal categories and the associated objectives of the GTS are as follows:

- **Economic** – to give value for money, and support Galway’s function as a regional centre;
- **Safety** – to achieve a safer environment for all transport modes, and facilitate a healthier lifestyle;
- **Environment** – to encourage better integration between transport and urban form, thereby minimising harmful transport emissions;
- **Integration** – to provide for integration of transport modes and land use planning and policies; and
- **Accessibility and Social Inclusion** – to improve multi-modal accessibility, and provide for a socially-inclusive transport network.

The transport network options have been evaluated in line with these categories / objectives, and an emerging strategy identified for each mode – which in turn has provided guided development of specific proposals for each component of the overall Transport Strategy (walking, cycling, public transport, traffic networks and complementary measures)

### 3.3 Examining Journey Types

In order to achieve a connected city and environs, this transport strategy seeks to deliver an integrated network of ‘links’ (routes) and ‘nodes’ (stops and interchange locations) along which people can travel seamlessly, changing corridors and modes as necessary to make their journey. The most suitable travel modes to address the travel demand for different types of journey have therefore been examined.

It is important that the strategy recognises the range of desire lines for travel in the city, such that the measures developed are targeted at particular movements (rather than adopting a universal mode-share target for all journeys in and through Galway). The shape and operational characteristic of the network for each mode is fundamental in achieving an appropriate usage of that mode. This means that unless the network links match the journeys people want to make then usage of the network will be limited, regardless of the quality of the service in question.

Each network has been subject to investigation taking into account a co-ordinated approach to achieving an overall integrated network, such that travellers can switch between modes and networks during their journey. The extent and coverage of each network is constrained by the physical form of the city, which includes the natural environmental constraints as well as the built environment and land ownership, as well as the cost implications and deliverability.

It is relevant to note that the strategic movement of goods (for example to Galway Port) will continue to be predominantly road based – and cannot be facilitated by walking, cycling or public transport, and that the fixed location of the Port itself also represents a physical constraint in terms of the need to facilitate these

strategic traffic movements. Also, long distance traffic with origins and destinations outside of the city (for example from Dublin to Connemara), generally has no option but to travel through the city.

This bypassing traffic is currently added to local traffic which increases congestion and decreases the accessibility of the western region.

Figure 3.2 presents the range of journeys undertaken in Galway together with the most appropriate modes of travel for each type of journey. For example, radial journeys into the centre are most suitable for bus travel, whereas journeys from rural areas into non-central areas of Galway may often be most suitable for car travel or combined with Park & Ride. This indicates that there are some modes which will be quite compatible with certain trip types, and others which will not be a viable option for the same trip type.



Figure 3.2: Trips to, within and across Galway

The wide variety of trips can be classified in the following broad categories:

- A-A – within the City Centre** – for example, Eyre Square to Dominick Street  
 These type of journeys should generally be made on foot or by bicycle. Journeys across the centre by car should be discouraged and drivers should be encouraged to either use public transport or park their car before travelling across the central area.
- B-B – Outer City <<>> City Centre** – for example, Knocknacarra to Eyre Square

Journeys on radial corridors should be possible by bus (or other forms of public transport) - provided that the service is of a high frequency. Safe bicycle lanes are also essential to encourage cyclists.

- **C-C – Outer City << >> External Areas** (not crossing River Corrib) – for example, Ballybrit to Tuam

These journeys are difficult to cater for by public transport, and are often not practical on foot or by bicycle. Use of Park & Ride bus services could however be attractive if the service is of a high quality and frequency.

- **D-D – City Centre << >> External Areas** – for example, Eyre Square – Loughrea

These journeys are difficult to attract in large numbers to public transport, as travellers have a wide range of origins outside the city which cannot all be served by frequent public transport. Provision of Park & Ride bus services could however be attractive if the service is of a high quality and frequency.

- **E-E – Outer City << >> Outer City** (crossing River Corrib and via the City Centre) – for example, Salthill to GMIT

At present, these journeys are generally made by car. However, safe and direct dedicated cycle routes would encourage cycling for this type and length of journey, and if a reliable public transport service was provided operated via the city centre some drivers would consider these options to be a reasonable alternative. Frequent and reliable bus services on a few radial corridors would allow passengers to transfer between services with a short wait.

- **F-F – External << >> Outer City** (crossing River Corrib, but not via City Centre) – for example, Maigh Cuilinn to Parkmore

These journeys are difficult to attract to public transport, as travellers have a wide range of origins outside the city which cannot all be served by frequent public transport. An alternative to travel by car could be Park & Ride bus services if the service is of a high quality and frequency.

- **G-G – Outer City << >> Outer City** (crossing River Corrib but not via City Centre) – for example, Westside to Mervue

Journeys between peripheral areas can be difficult to serve by public transport, as orbital public transport is generally not financially viable, and public transport via the centre can often be much slower than travel by car if not on connecting public transport routes. Some travellers will however use public transport via the centre if it is of sufficient frequency and reliability. In addition, the provision of safe dedicated cycle routes could facilitate cycling for this type of journey.

- **H-H – External Area << >> External Area** (crossing River Corrib, but not via City Centre) – for example, An Spidéal to Headford

These journeys are the most difficult to attract to public transport, as travellers have a wide range of origins and destinations outside the city which cannot all



be served by frequent public transport. Travel by car is often the only practical mode.

- **I-I – Short travel in Outer City Areas** – for example, Renmore to Merlin Park

These type of journeys can often be made on foot or by bicycle, and are generally difficult to make by public transport unless the journey is on a main radial bus corridor.

### 3.4 Transport Strategy by Travel Mode

The range of different journey types in Galway requires bespoke solutions for each travel mode in order to develop an integrated package of measures such that the ‘sum of the parts’ improves transport conditions and journey choices for all in Galway.

The principles outlined in Section 1, together with the categories of objectives defined according to Department of Transport Guidelines (and set out in Section 3.2 above) form the basis for development of strategic aims for each transport mode or system. The strategy elements to address the current and future transport needs are summarised below for each mode/network:

#### 3.4.1 Transport Strategy - Traffic Networks

##### 3.4.1.1 Traffic Management

Traffic within the city’s central area needs to be managed to make it a more comfortable environment for pedestrians and cyclists, and to ensure that public transport travelling through the city is reliable at all times of day. This is essential to achieve a travel mode shift in favour of public transport. Key aims are therefore to reduce vehicular movement through the city centre, to reduce vehicle speeds in the core city centre area, and to prioritise active modes (walking and cycling) and public transport in the city centre. The strategy therefore includes for routing of traffic which currently passes through the centre (to reach edge-of-centre locations) to more suitable orbital routes around the core city centre area.

##### 3.4.1.2 Road and Street Network

It is recognised that some journeys across the city are not always convenient by non-car modes such as cycling or public transport (for example, most ‘through’ journeys on National or Regional roads across the city, journeys with an origin or destination outside the city in rural areas, journeys late at night etc.). Hence it is considered necessary to provide a resilient/reliable cross-city route for travel by road.

An orbital route (identified as part of the N6 Galway City Ring Road project), is considered to be an important element of providing this resilience. Providing additional orbital traffic capacity will increase the opportunities for re-allocation

of existing road space for use by pedestrians, buses and cyclists, identified as a key traffic management objective of this strategy.

### **3.4.1.3 Parking**

As part of a strategy to manage traffic in the central area, it is envisaged that the availability of on-street parking will be reduced, and access routes to off street parking facilities will be rationalised and managed to minimise car circulation within the city centre. Within this area, there will be greater emphasis on the management of, and accessibility to, off-street parking locations (including wayfinding and parking guidance). Parking measures will also aim to reduce and manage on-street parking on public transport routes outside the core city centre area.

There will also be a need to adopt a parking pricing structure which seeks to set the cost of city centre parking at a level that does not undermine travel by public transport as a realistic alternative to car travel from a financial standpoint.

### **3.4.1.4 HGV Management**

The central area of Galway is unsuitable for heavy goods traffic, and should be restricted to only those vehicles of a suitable size with destinations (or origins) in the city centre. In combination with this, there is a need to manage the arrangements for routing and timing of deliveries to the core city centre area. Articulated vehicles will be restricted to accessing and egressing Galway Port via Lough Atalia Road.

While a planned redevelopment of Galway Port is currently in the planning process, it is not a project that forms part of the GTS. Although if implemented it may influence local freight movements, the GTS approach to HGV management will remain the same irrespective.

## **3.4.2 Transport Strategy – Local Public Transport**

### **3.4.2.1 City Public Transport**

For Galway to flourish as an attractive city in which to live and work, a modern high-quality public transport system is needed, which allows people to conveniently reach key destinations within a reasonable time. This will, over time, create opportunities for lifestyle choices with less reliance on private car use.

Maximising the attractiveness of public transport can best be achieved by focusing on provision of a network of high-frequency cross-city services, with guaranteed and reliable journey times. This will require public transport priority measures to be implemented. In addition, there may also be a requirement to provide additional local bus services which access neighbourhoods directly, and serve more local travel requirements.

It is important that the proposed bus network facilitates a high level of public transport accessibility across Galway City, is supported by strong potential for

interchange between services, will provide linkages from most parts of the city, and will connect with transport services from suburban towns.

### **3.4.2.2 Public Transport Interchange and Transfer**

The usage of public transport systems is maximised by ‘building in’ convenient interchange between public transport services.

Simple end-to-end services will not attract passengers in sufficiently large numbers. Although the proposed public transport network will aim to directly link as many people as possible to their primary work/education location, the next generation of public transport in Galway will need to recognise the principle of ‘transfer’ in the way people use services, as ultimately this will provide a much larger range of destinations accessible for the travelling public.

### **3.4.2.3 Taxis**

Taxis provide an essential service for people for whom other forms of public transport are not always convenient, and for ‘last mile’ services, for example at the start or end of a long train or coach journey. It is important that waiting areas are safe and attractive, and are conveniently located, but without detrimental impact on the local environment. Where appropriate, taxis will be able to use bus priority infrastructure.

## **3.4.3 Transport Strategy – Regional Public Transport**

### **3.4.3.1 Regional/Inter-city/Commuter Bus & Coach Network**

For regional and longer-distance bus and coach services, journey speed and reliability are crucial (compared to frequency). It is therefore important that coaches are able to access bus priority routes, and are provided with sufficient access to and from bus/coach termini in the city centre.

The attractiveness of these services can also be enhanced by providing interchange between regional and local public transport – at key locations on radial routes outside as well as within the city centre.

### **3.4.3.2 Rail**

Rail provides regional and national connectivity, complementing the bus system. The improvement of this mode will involve more frequent services.

Locally it is desirable to maximise opportunities for transfer between rail and local public transport at Ceannt Station, Oranmore/Garraun and Athenry. The strategy therefore includes for an improved transport hub at Ceannt Station/Fairgreen Coach Station in the heart of the city centre, providing enhanced interchange between rail and local and regional bus services.

### 3.4.3.3 Park & Ride

Galway has a high proportion of travel with one end of the journey outside the city. Many of these journeys have destinations throughout the city and hence it is particularly challenging to attract such journeys onto a Park & Ride system. A traditional bespoke Park & Ride bus service into the city centre would not provide accessibility to a sufficient range of destinations to make it attractive.

It is therefore preferable to base Park & Ride provision on the proposed city-wide core public transport network – such that a range of destinations can be reached.

This approach is also more financially sustainable and the service provision to users would be integrated within the public transport fare structure. In parallel with providing Park & Ride services, it will be important to manage the availability and price of parking in the city centre such that Park & Ride will clearly offer a cost saving to commuters.

### 3.4.3.4 Tourist Coach Management

Tourist/visitor coaches will need to be provided with suitable drop-off/pick-up locations in the city centre, with layover spaces provided in a limited number of managed locations outside the core city centre area. Routing for coaches can also be planned such that use is made of proposed priority bus lanes where appropriate.

## 3.4.4 Transport Strategy -Active Modes

### 3.4.4.1 Walking

Within the city centre, there needs to be an emphasis on improving and prioritising the pedestrian network and environment, encouraging and accommodating movement between places and to cater for mobility impaired persons.

This will include reducing traffic in the core city centre area. Outside of the core city centre area, emphasis will be placed on increasing permeability within suburban residential and employment areas, improving the pedestrian network where necessary, increasing pedestrian safety and maximising pedestrian accessibility to the public transport network.

### 3.4.4.2 Cycling

For cycling to provide a means of ‘mass’ movement in the city, it will be necessary to provide a ‘core’ network combining good segregation from traffic where practical, and traffic management elsewhere. Feeder networks will also need to be defined to fill the gaps between core corridors.

Convenient cycle parking at major destinations across the city is also essential. To establish a ‘cycling city’, the further roll-out of the city Bike Share Scheme is desirable – as this assists in normalising cycle travel in the central areas in particular.

### 3.4.4.3 Public Realm

The pedestrian environment serves all users, including residents, commuters, tourists and shoppers.

The reallocation of road space to public transport in the city centre will be accompanied by an associated improvement in the public realm – in other words, an essential aspect of attracting passengers onto public transport is improve the quality of the receiving environment for passengers' onward journeys on foot. Improvement of the quality of the public space on transport corridors is therefore a key element of this strategy.

## 3.4.5 Transport Strategy – Complementary Measures

### 3.4.5.1 Smarter Mobility

Intelligent Transport Systems (ITS) and technologies allow transport modes to communicate with each other and the wider environment, providing integrated transport solutions and enhanced experiences for transport customers. Smarter Mobility and ITS will be incorporated into Transport Strategy measures to support infrastructure proposals and to further improve the transport network by maximising efficiency and capacity. Expansion of the existing City Urban Traffic Control (UTC) network is critical, as well as using ITS to manage parking efficiently, improve wayfinding around the city, upgrade street lighting, improve and upgrade junctions and to allow the city to leverage future developments in Smarter Mobility.

### 3.4.5.2 Travel to Places of Education

It is important to develop a public transport, cycling and walking network that is conducive to facilitating access to school and University campuses. It is also important to promote behavioural change in tandem with any infrastructure improvements to encourage students to use sustainable modes. Promotion of school travel plans across the city will continue, while infrastructure and permeability improvements will improve access to education by sustainable modes. Galway City Council will liaise with the Department of Education regarding the implications of school admission policies on the travel patterns of students.

Furthermore, increased use of the Leap card by school students will offer increased flexibility for public transport services.

### 3.4.5.3 Land Use Integration

Integrating land use with transport demand is a fundamental requirement for creating a sustainable city. It is vital to align settlements and major developments with transport interventions and services to reduce travel demand by the private car and to foster and promote sustainable transport modes. Major developments will need to be focussed on core corridors where they can be well served by public transport and cycling and subject to design principles which promote walking. A

co-ordinated approach to mobility management and improvements to permeability will also increase the appeal of sustainable modes.

#### **3.4.5.4 Behavioural Change**

Promotion of alternatives to the private car, for the workforce and for students alike is intended to raise awareness of the travel choices available and to underpin a shift to sustainable modes of transport. It is intended to continue the development of mobility management plans at major employment and educational institutions and to continue the rollout of the Green Schools Travel Programme across Galway.

#### **3.4.5.5 Demand Management**

In order to shift the focus within the city centre to walking, cycling and public transport, demand management measures are needed to enhance the function of the city for these users. This may include measures such as managing and controlling the availability and cost of parking, restricting traffic flow from certain streets, reducing speed limits, providing additional pedestrian crossings at key locations and a reduced emphasis on facilitating through-traffic.

### **3.5 Strategy Appraisal**

#### **3.5.1 Transport Model**

The GTS, including consideration of alternatives, has been tested using the Western Regional Model (WRM). The WRM is one of five models that comprise the National Transport Authority's (NTA) Regional Modelling System. The models are strategic multi-modal, network based transport models and are centred on the five main cities of Dublin, Cork, Galway, Limerick, and Waterford. The models were developed in 2016 to help the Authority support its national transport planning remit and deliver on its planning and appraisal needs.

The WRM can be described as three core modelling components which receive inputs from the National Demand Forecasting Model, a separate modelling system that estimates the total quantity of daily travel demand generated by and attracted to every Census Small Area. These three components are the Demand Model, Road Assignment Model and the Public Transport Assignment Model. All demand and Public Transport model components of the WRM are implemented in Cube Voyager software with SATURN modelling software used for the Road Model Assignment.

The WRM covers the five counties of Connacht and County Donegal, with a focus on Galway City. These areas are represented by 693 detailed internal zones with 56 external zones presenting travel between the modelled area and the rest of Ireland. The zoning system for the model was based on Census Small Area (CSA) boundaries and Electoral Districts (EDs). The demographic and the work/school travel characteristics of the population of each CSA or ED is available through the

census data which informed both the estimation of demand and formation of zone boundaries.

The base year of the model is 2012 and it represents an average weekday with five separate peak periods modelled:

- AM Peak (07:00-10:00);
- Morning Inter Peak (10:00-13:00);
- Afternoon Inter Peak (13:00-16:00);
- PM Peak (16:00-19:00); and
- Off Peak (19:00-07:00).

The model covers all surface access modes for personal travel and goods vehicles including 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).

The travel demand is segmented according to trip purpose, car availability, employment type and educational level in order to group people with similar travel behaviours (for example, 'blue collar' commuters who own a car). This allows groups to be treated differently according to their behaviour. In total the demand has been segmented into 33 distinct classifications. Both the assignment and demand elements of the WRM have been calibrated and validated against observed data.

### 3.5.2 Appraisal Methodology

The strategy components set out in this chapter have been subject to an appraisal of how they address the objectives of the Transport Strategy against key performance indicators as set out in Section 3.2.

Transport networks options have been modelled using the WRM to ascertain the impacts on travel conditions, mode share and delay. Modelling has been undertaken for options with different combinations of measures (e.g. with and without major road interventions, with demand management, etc.) and the results quantified to provide guidance in identifying the preferred strategy. The key outcomes of the appraisal of strategy options are set out in Sections 3.7 and 3.8. Table 3.1 shows the appraisal criteria adopted for the evaluation of proposals.

Category	Assessment Criteria	Key Performance Indicators
<b>Economic</b>	Ensure value for money in the implementation of proposals	Utilisation of existing infrastructure and extent of new infrastructure requirements
	Support Galway City's function as a regional centre for employment, education, retail, leisure and tourism by providing access for all through an efficient and reliable transport network	Peak hour journey times by mode Capacity versus demand Congestion
<b>Safety</b>	Develop a safer city centre for all transport modes and users	Consider safety implication of all interventions



Category	Assessment Criteria	Key Performance Indicators
		Traffic management measures
	Exploit transport's role in facilitating a healthier lifestyle	Measures which support walking and cycling
<b>Environment</b>	Provide opportunities for better integration between transport and urban form	Reduce traffic volumes in sensitive areas
	Reduction and minimisation of transport-related emissions (including CO <sub>2</sub> )	Reduced transport emissions
<b>Integration</b>	Support integration between sustainable transport and land use planning and policies	Compatibility of transport measures with local, regional and national spatial planning and transport policy
	Provide for better transport integration	Park & Ride facilities Public transport interchange opportunities
<b>Accessibility and Social Inclusion</b>	Improve multi-modal accessibility within residential, employment and retail centres	Accessibility by walking and cycling, public transport, car and HGV
	Provide a socially-inclusive transport network	Coverage and quality of service of public transport network

Table 3.1: Appraisal Criteria

## 3.6 Appraisal Outcomes

### 3.6.1 Scenarios developed for testing

A hierarchical approach was adopted for the assessment of combined strategies that sets out the order of interventions required to support sustainable travel choices. These start with interventions for walking and cycling, followed by the need for additional public transport infrastructure, supported by demand management measures aimed at encouraging a switch to sustainable modes. Finally, options for new strategic road infrastructure were examined. Further information regarding the methodology for appraising the combined strategies is contained in **'Appendix B – GTS Appraisal and Modelling'**. The methodology for formulating and testing the numerous proposals was as follows:

1. A number of scenarios were developed with a view to meeting the strategy objectives for Galway, but without requiring substantial investment in additional road infrastructure (Scenarios 1-4). These scenarios represent a gradual incremental increase (from Scenario 1 to Scenario 4) in the level of investment and the overall changes made to the existing transport network.
2. Scenarios 1-4 were assessed using the Western Region Model, and a preferred Scenario was identified, and carried forward for further testing.
3. A number of scenarios were developed to account for major road infrastructure, namely the implementation of the N6 Galway City Ring Road scheme (GCRR). These three scenarios represented the

implementation of approximately one-third of the GCRR, approximately two-thirds, and full implementation of the GCRR project.

4. The preferred Scenario from Scenarios 1-4 was tested with the combinations of the N6 GCRR scheme as Scenarios 5-7.

### 3.6.2 Assessment Results – Scenarios 1-4

Scenarios 1-4 are detailed as follows:

- **Scenario 1** includes for improvements to walking and cycling facilities along the existing transport network, as well as the delivery of an enhance network;
- **Scenario 2** includes the same improvements to walking, cycling and bus as contained in Scenario 1, but also seeks to improve permeability and journey time reliability through the provision of additional walking/cycling links, as well as increased priority for buses in the city centre;
- **Scenario 3** is the same as scenario 2, but allows for the assessment of orbital and cross city bus services; and
- **Scenario 4** includes for all of the measures contained in scenario 2, but with the inclusion of a high frequency LRT route running through the City Centre.

Using the assessment criteria outlined in Table 3.1, Scenario 1 overall performed comparatively poorly against the other scenarios largely due to the lack of public transport priority measures within the city centre. Scenario 3 also performed less well due to the increased congestion caused by the reallocation of road space along the N6 to public transport.

Scenario 4 (which includes for a high frequency cross city bus and light rail service and prioritisation measures) performed better overall when compared to Scenarios 1, 2 & 3 in providing a safer city centre for all transport modes, improving the urban realm and integrating between sustainable transport and land use. However it performed significantly poorly compared to Scenario 2 in terms of efficiency of the public transport network and cost. Scenario 2 performed consistently well across all of the objectives particularly in terms of multi-modal accessibility, transport network reliability and efficiency and cost. It was therefore considered on balance this was the preferred scenario.

Therefore, based on an overall assessment under the combined criteria of Economy, Safety & Physical Activity, Environment, Integration and Accessibility and Social Inclusion, Scenario 2 was considered to be the preferred Active Mode & Public Transport scenario to be brought forward for testing with additional road infrastructure.

### 3.6.3 Assessment Results – Scenarios 5-7

Scenarios 5-7 are detailed as follows:

- **Scenario 5** – Scenario 2 plus the proposed N6 link up to the N84 (approximately one-third of the GCRR scheme);
- **Scenario 6** – Scenario 2 plus the proposed N6 link up to the N59 (approximately two-thirds of the GCRR scheme); and

- **Scenario 7** – Scenario 2 plus the proposed N6 link up to the to R336 Bearna Road (the full GCRR scheme).

Scenario 2 has been included in the additional assessment to establish whether any additional road infrastructure is required with public transport and active mode measures in place.

The findings of the assessment showed that overall Scenario 2 performed comparatively poorly in terms of safety in the city centre, accessibility and social inclusion, efficiency of the transport network and improvements to the urban realm. Scenario 5 also performed less well against these same objectives.

Scenario 7 (Scenario 2 plus the full N6 GCRR scheme) performed better overall when compared to Scenarios 2, 5 & 6 in providing a safer city centre and a more socially inclusive transport network and improving accessibility. Scenario 6 also performed reasonably well and similarly to Scenario 7 against most of the objectives and performed marginally better than Scenario 7 in terms of transport emissions. However on balance it was considered that Scenario 7 ensured better value for money and it was therefore considered the preferable scenario.

### 3.6.4 Assessment Conclusion

The findings of the assessment indicate that Scenario 7 best meets the objectives of the GTS. Scenario 7 comprises the following measures:

- An upgraded & integrated public transport network;
- City centre public transport prioritisation;
- Improvements to walking and cycling infrastructure and priority;
- Integrated Park & Ride facilities;
- Demand management measures; and
- Full orbital bypass of Galway from the N6 to the R336 Bearna Road linking the N6, N17, N84 & N59 national roads.

Full details of the Appraisal process and the outcomes summarised above are available in **‘Appendix B – GTS Appraisal and Modelling’**.

## 3.7 Public Transport Choices

### 3.7.1 What Public Transport Network and Mode Best Suits Galway?

It is important to note that the choice of mode for public transport (e.g. bus, light rail, demand responsive) is to a large extent secondary to the development of a network with appropriate coverage and frequency. This aspect is well described in a good practice guide<sup>1</sup> as follows:

*“Getting the network right is usually more important than the often debated and studied choice between bus and rail systems. Mode selection for new parts of the*

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<sup>1</sup> Network Design for Public Transport Success – Theory and Examples, Institute Of Transport Economic / Civitas

*network should normally come after an overall network strategy has been created. Then the roles of different bus and rail systems can be conceived as specialised tasks within the network, and the different advantages of the various public transport modes and types of lines may be more easily exploited.”*

The proposed public transport network layout (as detailed in Section 5 of this report) has been developed as a function of catchment areas based on residential and commercial land use, in order to maximise the potential number of passengers and journeys. The evolution of the final network and the development process are described in detail in ‘**Appendix C - Public Transport Network Development**’.

The most appropriate mode for public transport in Galway has been assessed using the WRM to test the potential passenger use of high frequency public

transport services. This looked at bus-based or light rail-based options on the busiest corridors in Galway, with additional buses on other corridors. The results provide a basis for identifying the public transport system best suited to Galway.

Modelling of future conditions indicates that with high-frequency services in place, the maximum single directional passenger demand is approximately 1,100 over a 1-hour period (in the AM Peak).

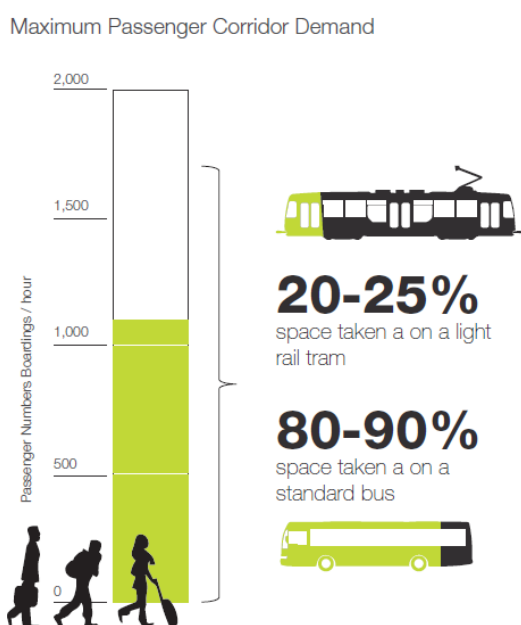


Figure 3.3: Estimated Maximum Occupancy of Public Transport System Options

As illustrated in Figure 3.3, this broadly equates to 80-90% of the passenger capacity of a frequent bus service, and less than 25% of the capacity of a frequent light rail service.

In addition, the typical carrying capacity of a range of public transport systems, from the standard single-decker bus to a heavy rail system, is shown in Table 3.2. It can be seen that frequency is the key factor in maximising the carrying capacity of any public transport system. For example, the table below shows that a double decker bus operating at a 10-minute frequency can carry up to 450 passengers an hour, which is close to the carrying capacity of a light rail system operating once every 30 minutes (518 passengers).

	<b>Standard Single Decker Bus</b>	<b>Standard Double Decker Bus</b>	<b>Articulated Bus/Tri- Axle Double Decker Bus</b>	<b>Light Rail</b>	<b>Heavy Commuter Rail Service</b>
<b>Design Capacity (Persons)</b>	<b>30 People</b>	<b>75 People</b>	<b>102 People</b>	<b>259 People</b>	<b>409 People</b>
<b>Frequency (minutes)</b>					
30	60	150	204	518	818
20	90	225	306	777	1227
15	120	300	408	1036	1636
10	180	450	612	1554	2454
6	300	750	1020	2590	4090
5	360	900	1224	3108	4908
4	450	1125	1530	3885	6135
3	600	1500	2040	5180	8180
2	900	2250	3060	7770	12270

Table 3.2: Typical Carrying Capacities of Public Transport Systems

The figures set out in Table 3.2 indicate that a light rail service would provide capacity far in excess of what is practically required in Galway. Hence, when considering the greater cost of building and operating light rail services at the same frequency as bus services, it is clear that bus-based public transport represents the most appropriate system for Galway over the period considered in this Transport Strategy.

The public transport network and type of system (or mode) is also dependent on a number of further considerations as follows:

### Street Network:

Galway is an historic city and its layout and road network reflect a city that has developed over many years with some roads and streets, especially in the city centre, being very narrow, resulting in difficult turning movements for some modern public transport vehicles. As is often the case, the limited available road space must provide for many competing demands such as pedestrian and cyclist movements, vehicular access and parking, loading and deliveries as well as public transport. An adaptable bus-based public transport mode, which can integrate with other modes when needed, is therefore considered to best suit the city.

## Network vs. Corridor:

The most successful public transport networks and services are generally those that offer a consistently high frequency throughout the day on a network of services, and hence can attract a broad variety of trip purposes such as commuter trips, trips to education and trips for retail and leisure activities. In addition, land use in Galway is spread throughout a number of corridors, with a wide distribution of origins and destinations. Consequently, trips do not all converge to create high demand corridors, and as such, an integrated network of bus services is considered more appropriate for maximising mode share and revenue (to pay for services) than linear corridor ‘mass transit’ services. The network efficiently provides greater direct catchment within less dense demand areas such as Galway’s suburban areas and the extensive hinterland. This also results in well used services throughout the day and the opportunity to efficiently maintain public transport services with regular frequency patterns that provide flexibility for the passenger to travel when they would like.

## Best Practice Guidance on Mode versus Demand:

Guidance in respect of the types of public transport systems most suitable relative to the levels of passenger demand (per direction per hour) is shown in Figure 3.4 (greater capacities can be reached through larger vehicles and/or additional lanes/tracks).

In terms of operating urban public transport systems, high-capacity rail-based systems are generally employed where the ‘demand’ (i.e. flows past a point) is over 3,000 per hour per direction. Modelling of future conditions indicate that, with a high-frequency service in place, the maximum single directional passenger demand on radial corridors in Galway is only 1,100 in the peak hour, and hence it would be necessary to reduce the frequency of a light rail service to match this lower demand.

This in turn would be less attractive to passengers than a higher frequency bus-based service. Hence, when considering the typical capacity of public transport systems, it is clear that a bus-based system is the appropriate solution in Galway.

It is therefore concluded that a high-quality bus-based public transport service will cater for the forecasted passenger demand and will provide significant flexibility in terms of network options and the ability to integrate with other modes. In particular, a bus-based public transport network can cater for high volumes of demand along combined corridor sections (for example through the city centre) whilst diverging out to efficiently provide greater direct catchment within less-dense suburban areas of Galway.

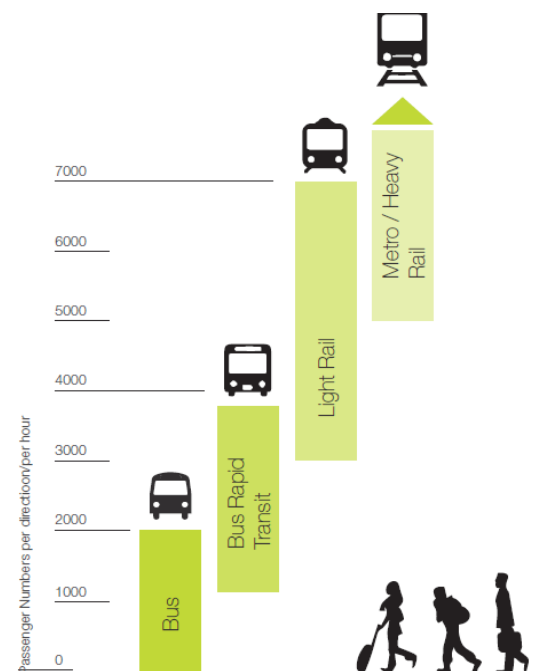


Figure 3.4: Public Transport Mode Capacities (source: UITP Paper ‘Public Transport: making the right mobility choices (Vienna 2009))



### 3.7.2 Orbital services versus radial services (with interchange) through the city centre

Surveys of existing transport and the Transport Model have confirmed that strong demand will remain for radial movements into the city centre and also east-west movements across the city. Providing for this cross-city movement by dedicated orbital services is not considered to be the best option as there is insufficient variety in trip purposes to support high-frequency services throughout the day. A less-frequent service with limited hours of operation and/or lower frequencies would not provide for good flexibility from the passenger's perspective, and would have an insignificant impact on overall modal splits in terms of transfer from private car usage to public transport.

However, in order to quantify the potential impact of orbital bus services (via Quincentenary Bridge), the model has been utilised to test cross-city bus services travelling via the city centre against an orbital service.

The results are summarised in Figure 3.5, which shows that hourly boardings for an orbital service are approximately 50% of the boardings for an equivalent service routed via the city centre, with 700 passengers boarding an orbital service as opposed to 1500 passengers boarding a cross-city service. This outcome clearly indicates that cross-city bus services via the city centre will be both more attractive to passengers and more financially viable than orbital services.

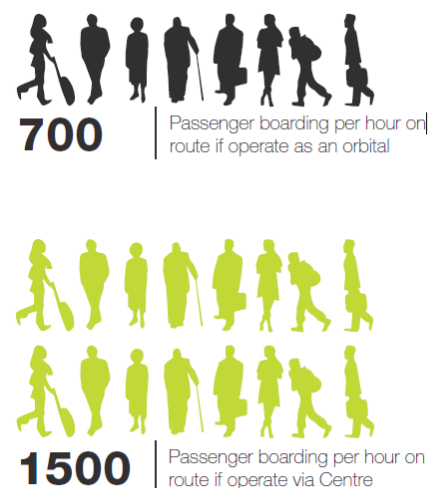


Figure 3.5: Modelled Boardings Comparison for Radial and Orbital cross-city services (AM Peak Boardings in both directions)

Further key benefits of routing services through the city centre are:

- Service frequencies are maximised along the central portion of radial corridors, which will be likely to attract high passenger use due to low waiting times; and
- Co-routing of cross-city services along the same corridor through the city centre will, importantly, provide passengers with opportunities to transfer between services to reach a much wider range of destinations. An orbital bus service would tend to carry only those passengers with final destinations close to the route, with a more tidal movement, i.e. buses will tend to be empty on the return journey, whereas a cross-city route serves multiple origins and destinations along its full length. In addition, an orbital service provides little opportunity for passengers to take advantage of interchange to other services, further reducing the catchment areas served.

Both options would require significant bus priority measures to ensure reliable journey times and deliver a successful high quality service, and providing road space for buses simultaneously on city centre corridors and on the Quincentenary



Bridge corridor is unlikely to be practical in respect of managing traffic capacity. Only one cross-city bus corridor is therefore proposed, with bus priority measures through the city centre where most services are routed. This is considered to be much more beneficial than provision of bus priority just on Quincentenary Bridge and its approaches, which forms part of the N6 National Primary route.

## 3.8 Road Network Choices

### 3.8.1 Which Road Network Configuration Best Suits Galway?

The major traffic routes through Galway City are over capacity and congested at peak times, resulting in unreliable journey times for both general traffic and the existing bus network, particularly for cross-city journeys. Traffic delays have a negative impact on nearly all the strategic objectives identified for the Transport Strategy including:

- **Economy:** journey time costs for access to work and education. Delays in the network have cost implications for the movement of freight and goods;
- **Safety:** traffic congestion has a range of direct and indirect impacts including impacts on active lifestyles, quality of life, stress and safety of all road users, as well as impacts on adjacent residents and occupiers of road frontage properties;
- **Environment:** the rate of fuel consumption and the resulting traffic emissions increase significantly at lower speeds; and
- **Accessibility and Social Inclusion:** traffic congestion increases the time taken to travel and therefore reduces the accessibility of areas affected. In a mixed road user environment, as is largely the case in Galway, traffic congestion creates barriers for pedestrians, cyclists and public transport movements.

A key aspect of addressing current traffic issues is to support and facilitate a shift to more sustainable transport modes where practical to do so. Increasing the rates of travel by sustainable modes in Galway City will require a significant improvement in the quality of the public transport, pedestrian and cycling networks.

This will benefit from the targeted reallocation of road space from general traffic to sustainable modes.

For example, to deliver cross-city journeys by public transport, major priority measures such as bus lanes and traffic restrictions are required through the city centre. Whilst this will support travel mode shift, it will also reduce the capacity of the overall transport network. Therefore without accompanying road network and traffic management interventions, traffic congestion issues will continue to be a problem over time.

Therefore, whilst a range of public transport, walking and cycling measures are proposed to bring about a shift away from car travel, a significant level of traffic congestion will remain in the city. It is relevant that the provision of a high frequency bus network in Galway (with improved priority through the city centre) in the future would result in both increased public transport usage in the city, but

also increased congestion on the major river crossings and nearby junctions due to trip displacement.

The diagram in Figure 3.6 illustrates the modelled comparison of overall travel times (for all modes) for the present day network, and for two scenarios with improved public transport and walking and cycling improvements; that is, with and without a new orbital traffic route. The comparison shows that reducing travel congestion across the network as a whole requires both improvement to public transport, walking and cycling networks *and* ultimately the provision of a new orbital route.

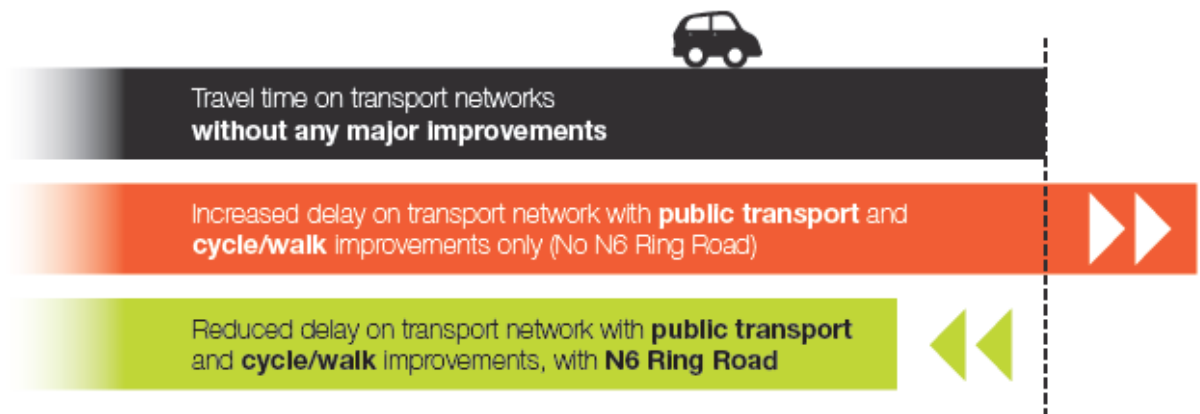


Figure 3.6: Travel time comparison with and without N6 Galway City Ring Road

Given the strong negative impact of congestion on achieving the objectives of this strategy, unless additional capacity is provided for traffic, the overall objectives for the Transport Strategy will not be met. Furthermore, this additional road capacity should not be in conflict with the enhanced sustainable transport network, rather it should focus on supporting trips that cannot be facilitated by the proposed measures (i.e. outer-city movements and external-to-external trips). A new road link to the north of the city is therefore proposed as part of this Transport Strategy to deliver the necessary capacity and support the delivery of sustainable transport measures, particularly within the city centre.

### 3.8.2 Traffic Flows on Galway's Bridges

Various options for the extent of the additional road capacity and connectivity have been tested together with the sustainable transport network measures. The results of the assessment shows that the inclusion of a new road link to the north of the city, in tandem with the active travel and public transport measures, results in a reduction in traffic volumes on Quincentenary Bridge and Wolfe Tone Bridge of approximately 20% in both cases.

This in turn improves journey time reliability within the city centre for all transport modes. In particular, public transport journey times will reduce and become much more reliable through the city centre with the inclusion of the new road link.

Figure 3.7 illustrates the change in traffic flows on the four River Corrib crossings as a result of providing public transport, walking and cycling improvements only, and with the N6 Galway City Ring Road project in place.

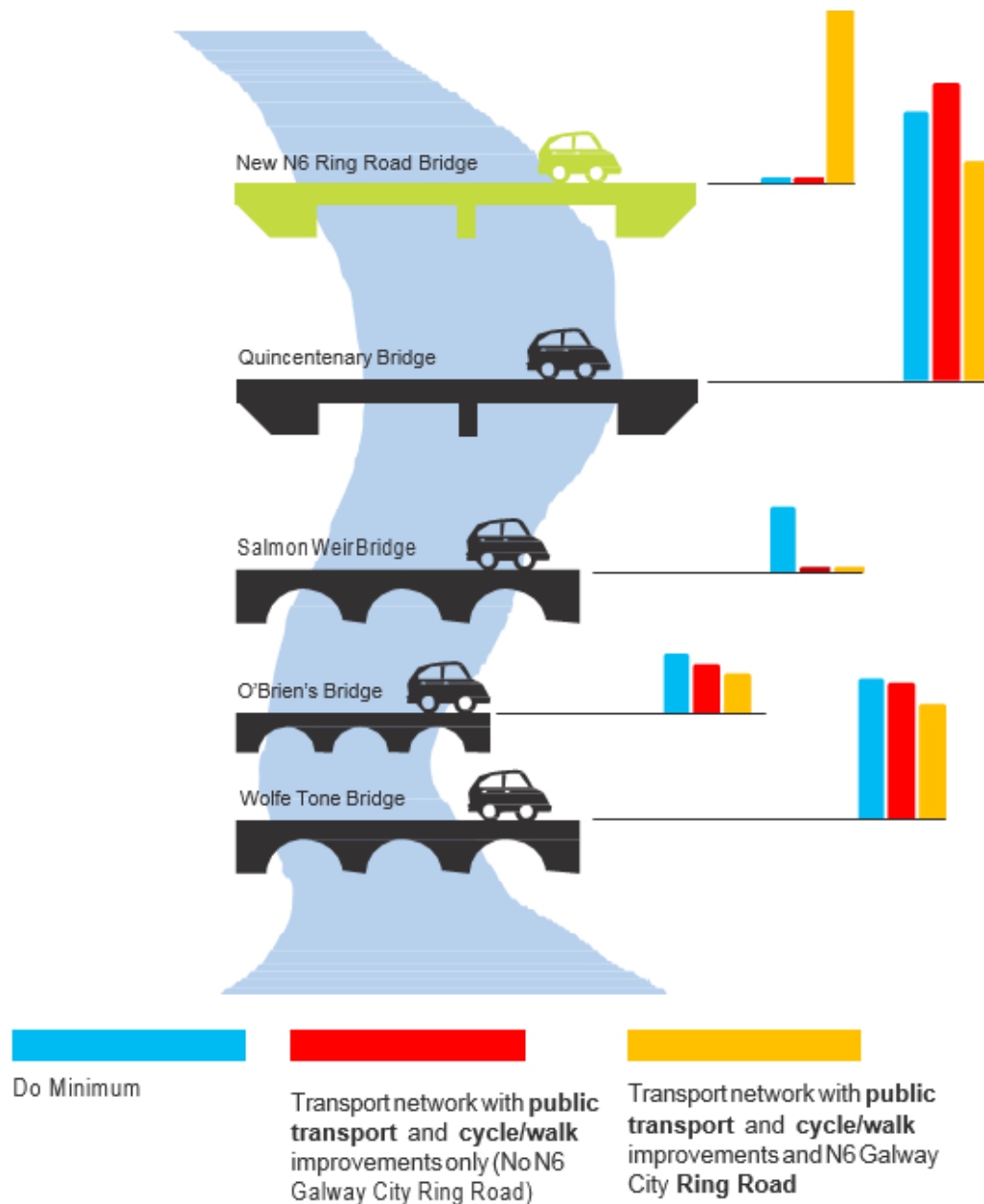


Figure 3.7: Peak Hour Vehicle Flows across Corrib Bridges

At Salmon Weir Bridge it is proposed to remove all through-traffic such that the bridge is used exclusively by buses, taxis and cyclists (with a new pedestrian bridge alongside).

Modelling forecasts of journeys over the bridge indicate that the introduction of bus priority represents a change to the mode of travel rather than a change in the number of trips, so approximately the same number of people will cross the bridge in the peak hours, but they will do so by active modes or using public transport rather than in private cars, as the majority do currently.

In addition, this change would significantly enhance the adjacent public realm and local environment, as well as considerably improving safety for pedestrians and cyclists along this important thoroughfare for tourists and students.

Figure 3.8 below illustrates that passenger trips crossing Salmon Weir Bridge in the peak periods with the bridge designated as a public transport-only river crossing remain almost unchanged compared to the numbers crossing the bridge when open to all traffic.

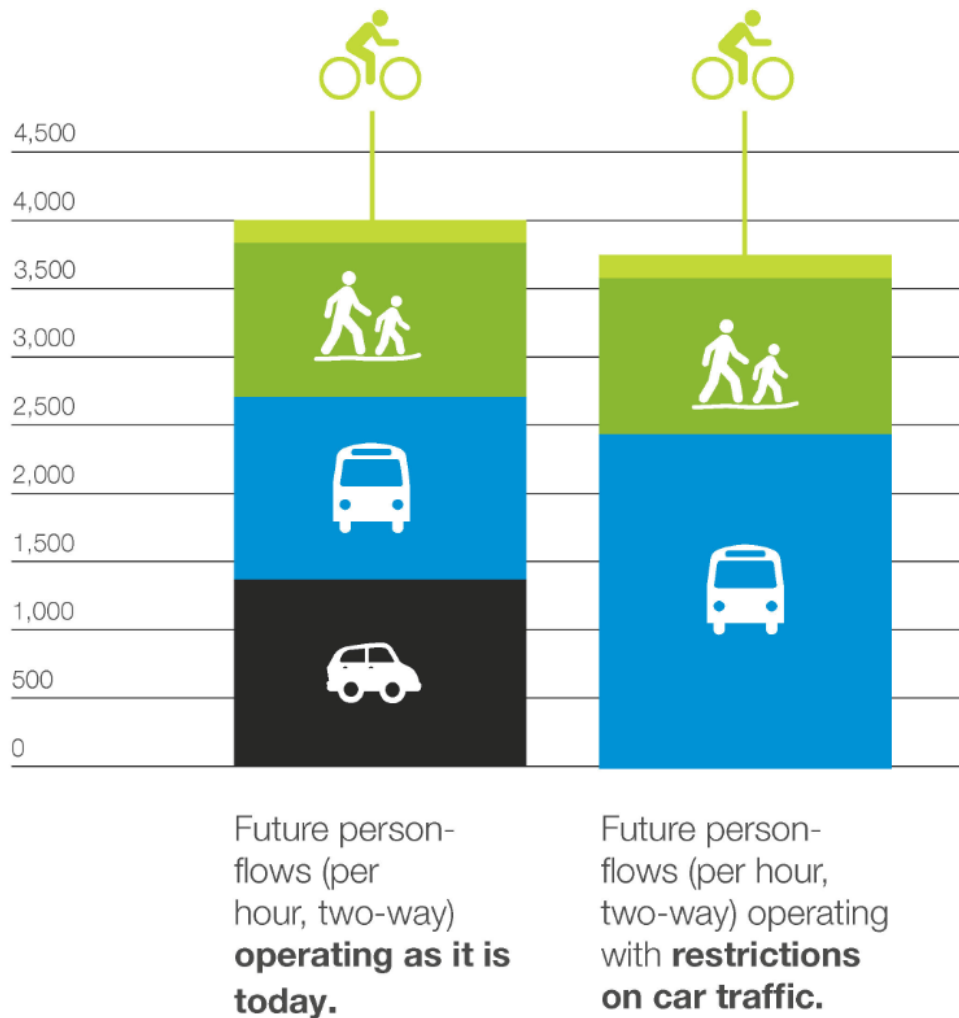


Figure 3.8: Peak Hour Person Flows across Salmon Weir Bridge – existing vs proposed

## 4 Traffic Network

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### 4.1 Introduction

As discussed in Section 1, the road network in Galway carries different users (cars, lorries, cyclists, buses, coaches, taxis, school transport, emergency services) as well as catering for varied journeys within the city, such as into the centre, across the city, short local trips, trips, which start or end outside the city, through-trips etc. This road network varies from narrow city streets approximately 3m wide, some of which are pedestrianised for most of the day, to dual carriageways over 15m in width. Most roads and streets within the city boundary and further afield in the study area fall somewhere between these two categories, generally having one lane in each direction, varying between 4m and 10m wide, with footpaths on both sides. As this road network accommodates all of the above journey types, congestion is currently an issue throughout the city and beyond.

Recent major improvement works carried out on the city road network include the Bóthar na dTreabh upgrade scheme, the conversion of a number of large roundabouts to signalised junctions, and the deployment and subsequent expansion of the UTC system operated by the Galway Transportation Unit (GTU).

Traffic navigating the city centre area in particular comes into direct conflict with pedestrians, cyclists and public transport users, in an area that is not capable of balancing the needs of these users. This leads to chronic congestion, associated queuing and delay across the city road network, and frustration for travellers across all modes. If no intervention is put in place, these issues will continue to worsen over time as the city grows. It is therefore essential that the resilience of the road-based transport network is improved to support Galway's development and allows the city centre to perform its economic role as a Gateway City, but with a focus on doing so in a sustainable manner.

This strategy sets out a range of measures to address current and future congestion, and includes traffic management (especially in the city centre to prioritise walking, cycling and bus movement), new and improved road and highway links, management of parking activity and controlling and managing heavy goods vehicle movement and associated deliveries. The routes through and around the city have been classified on different levels in order to separate journeys by type and assign the most suitable journey types to each road network or alternative mode. These projects will be advanced and implemented as set out in Figures 10.2 and 10.3 in Chapter 10 of this report.

Heavy traffic flows that do not have a destination within the city centre will be encouraged to undertake their journeys via alternative routes, and through-traffic is to be removed from Galway City Centre as much as is feasible. In doing so, and by adopting policies intended to change the hierarchy of transport users in the city at present, capacity can be released and safeguarded in the core city centre area, and subsequently this capacity can be used to prioritise sustainable transport modes.

## 4.2 City Centre Traffic Management

The key challenge from the point of view of the road and street network is to maximise its efficiency in carrying the most appropriate types of traffic flow on the correct 'level' of the network hierarchy to match the journey types as set out in Section 3.3.

Notwithstanding the need to reduce the mode share for travel by private car, the existing road network remains heavily congested, and will likely continue to do so. While improvements to the walking, cycling and public transport networks will likely see these modes increase their overall share of daily trips, the dispersed nature of travel to and from Galway City will still necessitate sufficient capacity to accommodate trips by private car.

Nevertheless, this strategy aims to remove non-essential motorised traffic from the core city centre area (i.e. traffic travelling through the city centre whose origin and destination lie outside the city centre). This will be achieved using a combination of routes around the city centre (termed the 'City Centre Access Network'), and will prioritise other modes within the core city centre area via the 'Cross-City Link', a proposed corridor (discussed later in Section 4.4) through the core city centre area with higher levels of priority allocated to walking, cycling and public transport over private car traffic. The proposed city centre traffic management measures are summarised in Table 4.1.

Strategic Aims	Proposed Measures	Design Development and Consideration of Alternatives
Reduce through-car movement and speeds in the city centre.	<p>It is proposed to organise the city centre road network such that there is a 'city centre access network' (made up of sections of road circumventing the core city centre area of Galway, rather than a continuous road) along sections of the following roads:</p> <ul style="list-style-type: none"> <li>• Lough Atalia Road;</li> <li>• Dock Road/Merchants Road;</li> <li>• Wolfe Tone Bridge;</li> <li>• Father Griffin Road;</li> <li>• The Crescent;</li> <li>• St. Mary's Road;</li> <li>• Lower Newcastle Road;</li> <li>• Quincentenary Bridge;</li> <li>• Sean Mulvoy Road; and</li> <li>• Moneenageisha Road.</li> </ul> <p>The city centre access network will provide access to the city centre and a through route for local journeys. A secondary network of road access routes will also provide access to car parks, including Fairgreen Road, Bóthar Na mBan and Headford Road.</p>	<p>Lough Atalia Road is designated as part of the orbital in preference to College Road (which is more suitable as a bus route), as it provides a route to car parks on the south side of the city centre (and to the docks area) and it also forms a direct connection to Dock Road, Wolfe Tone Bridge and to Galway Port.</p> <p>The city centre access network has two river crossings, at Wolfe Tone Bridge and Quincentenary Bridge, with the latter also serving as a key route for intra-city through traffic.</p>

Strategic Aims	Proposed Measures	Design Development and Consideration of Alternatives
Prioritise Public Transport movements in the city centre.	<p>A public transport route, the 'Cross-City Link', is to be implemented through the core city centre area (with restrictions on other motorised traffic).</p> <p>The Cross-City Link is routed along University Road, across the Salmon Weir Bridge, along Eglinton Street, around Eyre Square and along Forster Street and College Road.</p>	<p>Salmon Weir Bridge was identified as the preferred bus-only route on the west side of the city centre. Alternatives were also considered at:</p> <ul style="list-style-type: none"> <li>• Wolfe Tone Bridge, which has a poor connection with the bus lane corridor on Seamus Quirke Road, and at</li> <li>• Quincentenary Bridge, which was found not to align well with passenger desire lines (particularly into the city centre).</li> </ul> <p>On the east side of the city centre, establishing a 'bus priority' route along College Road was identified as the most appropriate and feasible means of ensuring that buses and coaches could travel directly to from both the Old Dublin Road and Wellpark Road.</p>

Table 4.1: City Centre Traffic Management – Strategic Aims and Proposed Measures

### 4.3 City Centre Access Network

It is clear that the future increase in travel demand cannot be catered for by private vehicle trips alone. In order to ensure that the overall transport system can facilitate this demand, some road space will need to be dedicated to active modes and public transport. However, given the catchment of Galway City, some journeys by private car will still be necessary, and HGVs will continue to need access to the city and the port. A clearly defined 'city centre access network' is proposed to enable traffic to access and move around the core city centre area.

This will facilitate access to car parks, permit traffic to access the city centre at the most appropriate entry points for its ultimate destination and allow for reduced cross-city traffic along specified corridors.

The city centre access network shown in Figure 4.1 illustrates the optimum routes to key destinations in central Galway.



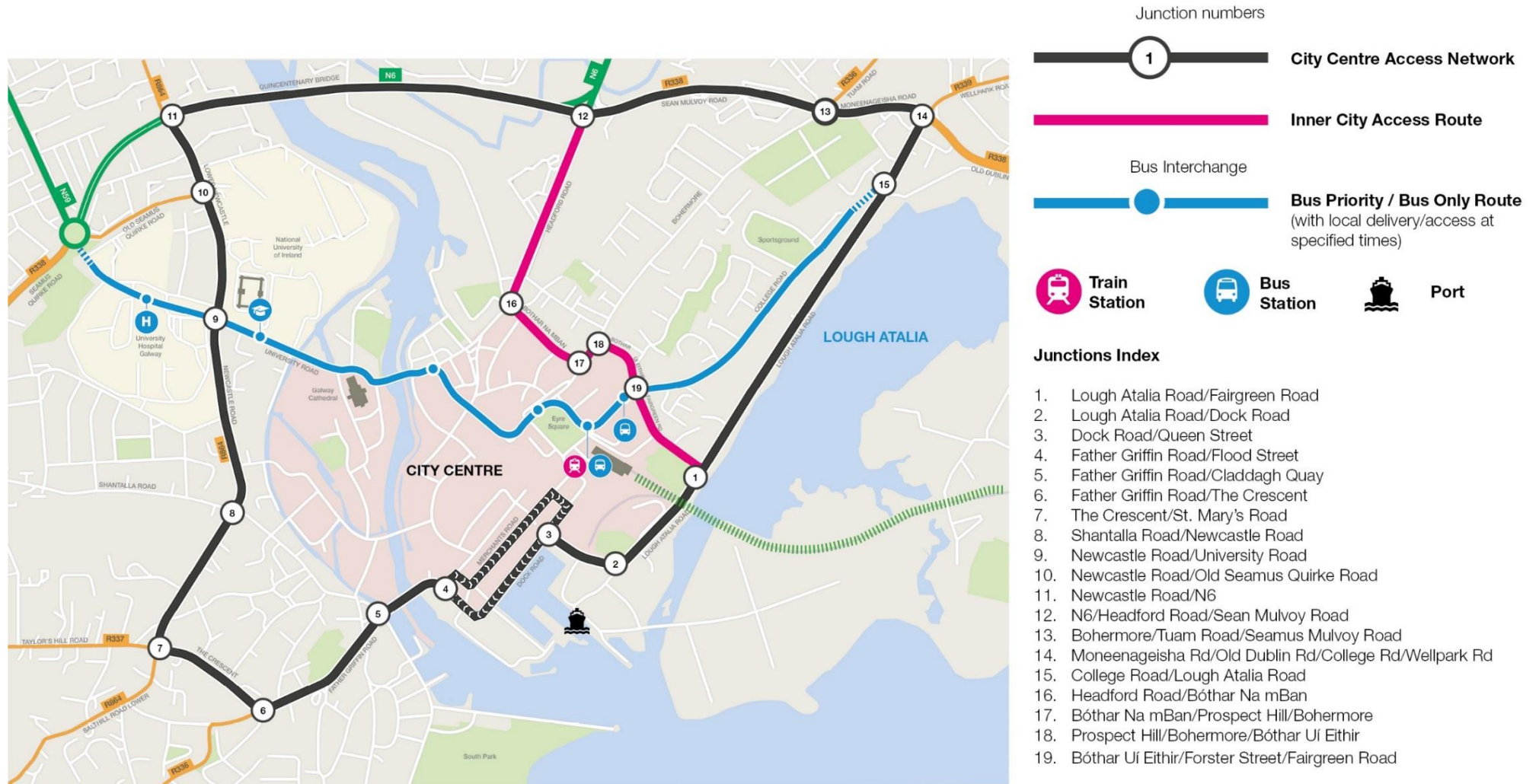


Figure 4.1: City Centre Access Network

Vehicular traffic will travel in both directions along Lough Atalia Road, will use the current one-way system around Dock Road and Merchants Road, and will travel in both directions across Wolfe Tone Bridge, continuing west towards Salthill Promenade along Whitestrand Road (R336). Furthermore, the use of Lough Atalia Road as a part of the City Centre Access Network maintains access and egress from Galway Port as per the existing arrangement (with or without expansion).

It will be possible to access the Lower Salthill and Taylor's Hill areas by continuing on Father Griffin Road, but traffic access in this area will be subject to junction revisions that will enable continuous bus priority from Salthill Road Lower (Devon Park junction) to St. Mary's Road and Newcastle Road. Access to Shantalla will be possible from the Salthill and Fr. Griffin Road areas, but traffic management measures will make it more favourable to access Shantalla from the R338 Seamus Quirke Road-Bishop O'Donnell Road corridor.

Access to Salthill, Ragoon, Westside, Newcastle, University Hospital Galway, and NUIG will generally be provided from that corridor.

The city centre access network will have its primary junctions at the Bodkin junction (for access to Headford Road shopping area and Wood Quay), Sean Mulvoy Road for access to Bohermore, and Moneenageisha Road in order to connect with Lough Atalia Road.

In conjunction with these revisions, a two-way inner city access route comprising Bóthar na mBan, Bóthar Bhreandáin Uí hÉithir and Fairgreen Road will provide an additional inner link from the Headford Road to Lough Atalia Road. In effect, private motorised traffic will be able to access the city centre from all directions, and to exit on the same side. In order to circulate within the city however, cars will have to use the orbital River Corrib crossings on the city centre access network.

### **Key Changes:**

Under these proposals, Bóthar Bhreandáin Uí hÉithir and a section of Fairgreen Road will experience some change in movements, becoming a two-way route for traffic.

## **4.4 The Cross-City Link**

The Cross-City Link, as illustrated schematically in Figure 4.2, consists of a central corridor traversing the core city centre area, which will be restricted to use by public transport vehicles, pedestrians, cyclists and local access only. It will enable efficient and reliable public transport to and through the city centre from University Road, across Salmon Weir Bridge, along Eglinton Street, around Eyre Square and along Forster Street and College Road.

This forms a central route for public transport, cyclists and pedestrians accessing key areas such as University Hospital Galway, NUIG, the retail and recreational centre of the city and public transport hubs at the train and bus stations. Public realm improvements are proposed along the Cross-City Link to provide an enhanced environment for cycling and walking, and overall this will create more

pleasant surroundings for journeys to and through the city centre. Further details of these proposals are presented in Section 7.

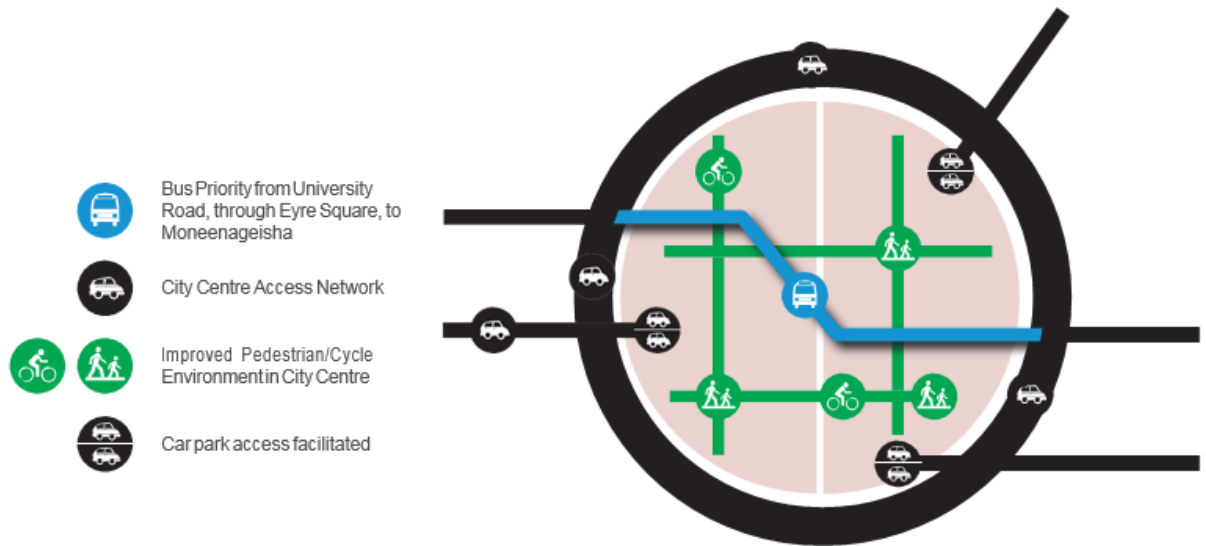


Figure 4.2: The Cross-City Link Concept

The Cross-City Link concept is based on the following key components:

- Creating a new link from Browne Roundabout through the University Hospital Grounds and on to University Road for public transport and cyclists;
- Removing non-essential traffic from University Road (from the junction with Newcastle Road);
- Restricting use of Salmon Weir Bridge to public transport (including taxis) and cyclists only;
- Providing a new, parallel bridge structure at the Salmon Weir Bridge for pedestrian use;
- Removing non-essential traffic from St. Francis Street, Eglinton Street and Williamsgate Street;
- Removing non-essential traffic from Eyre Square North (including Prospect Hill) Eyre Square South and Eyre Square East, Victoria Place and Queen Street;
- Removing non-essential traffic from College Road and Forster Street;
- Creating a bus gate on College Road to remove through traffic;
- Reverting Bóthar Uí Eithir to two-way traffic flow;
- Creating a clockwise one-way loop around Woodquay, Mary Street, Newtownsmith and St. Vincent's Avenue;
- Improvements at the junction of Bóthar na mBan and the Headford Road;
- Facilitating access to the city centre car parks;
- Creating a high-quality urban realm from University Road through to Fairgreen;
- Fostering a 'shared space' style environment within the Cross-City Link area;
- Implementing a reduced speed limit within the Cross-City Link area; and
- Facilitating two-way traffic flow from Lough Atalia Road to the Headford Road via Fairgreen, Bóthar Uí Eithir and Bóthar na mBan.

The Cross-City Link forms a central route for public transport, cyclists and pedestrians accessing key areas such as University Hospital Galway, NUIG, the retail and recreational centre of the city and public transport hubs at the rail and bus stations. Public realm improvements are proposed along the Cross-City Link corridor to provide an enhanced environment for cycling and walking, and overall this will create more pleasant surroundings for journeys to and through the city centre.

## 4.5 Core City Centre Access

The core city centre area inside of the city centre access network, will see road space reallocated to prioritise public transport and active modes. This will in turn facilitate public realm improvements along the Cross-City Link corridor, but requires changes in movements for private cars within the city centre to facilitate this. The proposed movement strategy can be seen in Figure 4.3. Access to off-street car parking is maintained via these movements. The city centre remains accessible, but priority is no longer given to the private car in this area.



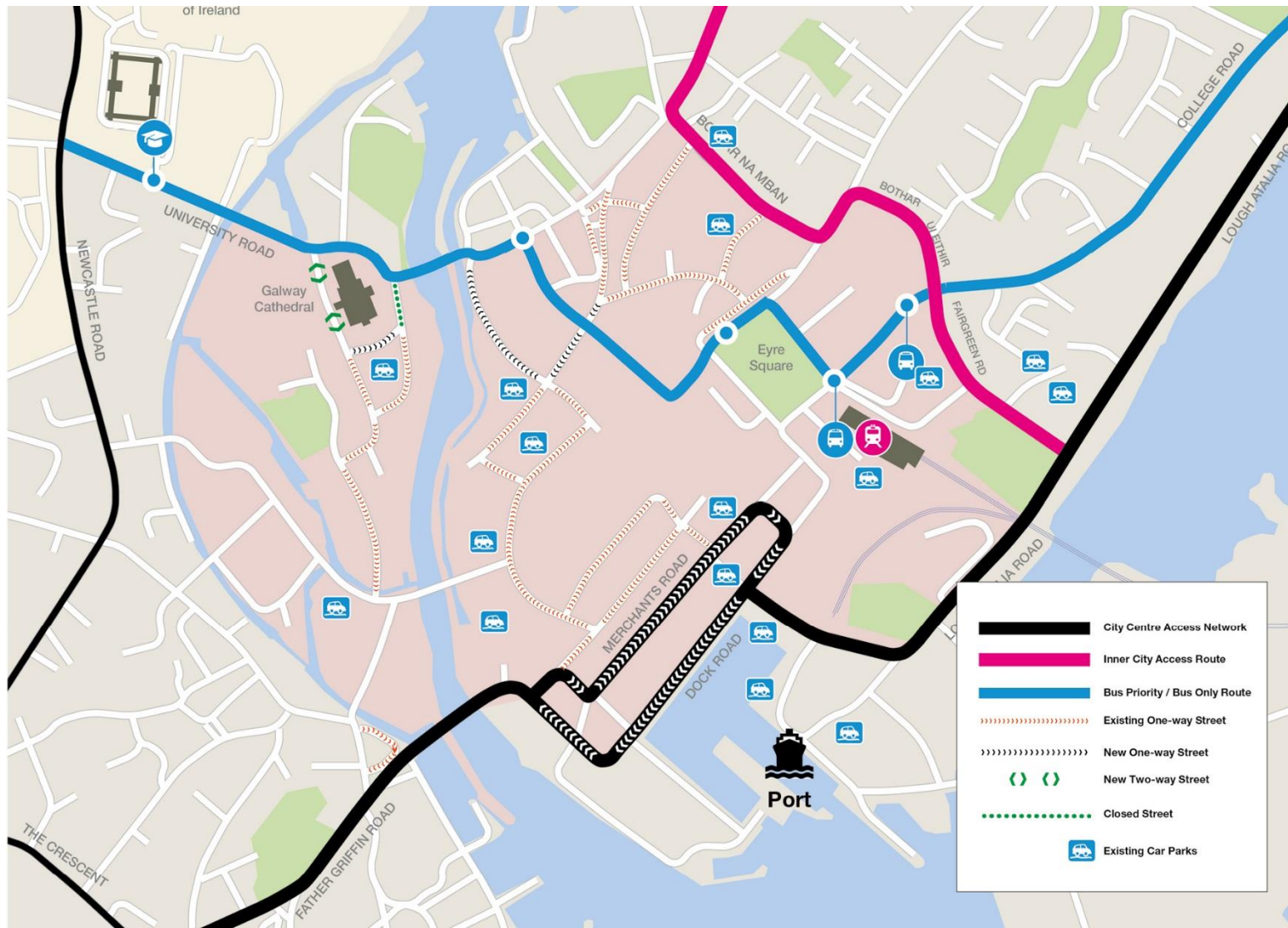


Figure 4.3: Core City Centre Area

### Key Changes:

The core city centre area will experience the following changes in movements:

- University Road, Salmon Weir Bridge, Eyre Square, Victoria Place, Forster Street and College Road will become public transport and local access only;
- St Mary Street will become one-way west-bound;
- Newtownsmith will become one-way north-bound; and
- Access to the Cathedral and car park by car will be from the western side only. This access will become two-way.

## 4.6 Road and Street Network

The existing wider road network is crucial to the operation of the city and surrounding region. Due to the rural nature of the immediate surroundings of the city, and given the wide distribution of destinations and trips to, within and across the study area, it will not be possible to provide sufficient public transport alternatives to fully address the transport demand. Even with the anticipated increased uptake in walking, cycling and public transport use, the regional and national road network is likely to suffer an increasing degree of congestion. In the peripheral urban and rural areas travel by private car will therefore remain a key part of the transport system as a whole.

Upgrades to junctions along the N6 have and will continue to improve the performance of this road, but scope for additional capacity is limited by the number and nature of the river crossings. In order to enhance Galway's function as a regional city and to permit continued growth, an additional river crossing is required. The N6 Galway City Ring Road project has identified the most suitable corridor for an orbital road scheme for Galway. The route for this road scheme is presented in Figure 4.4.

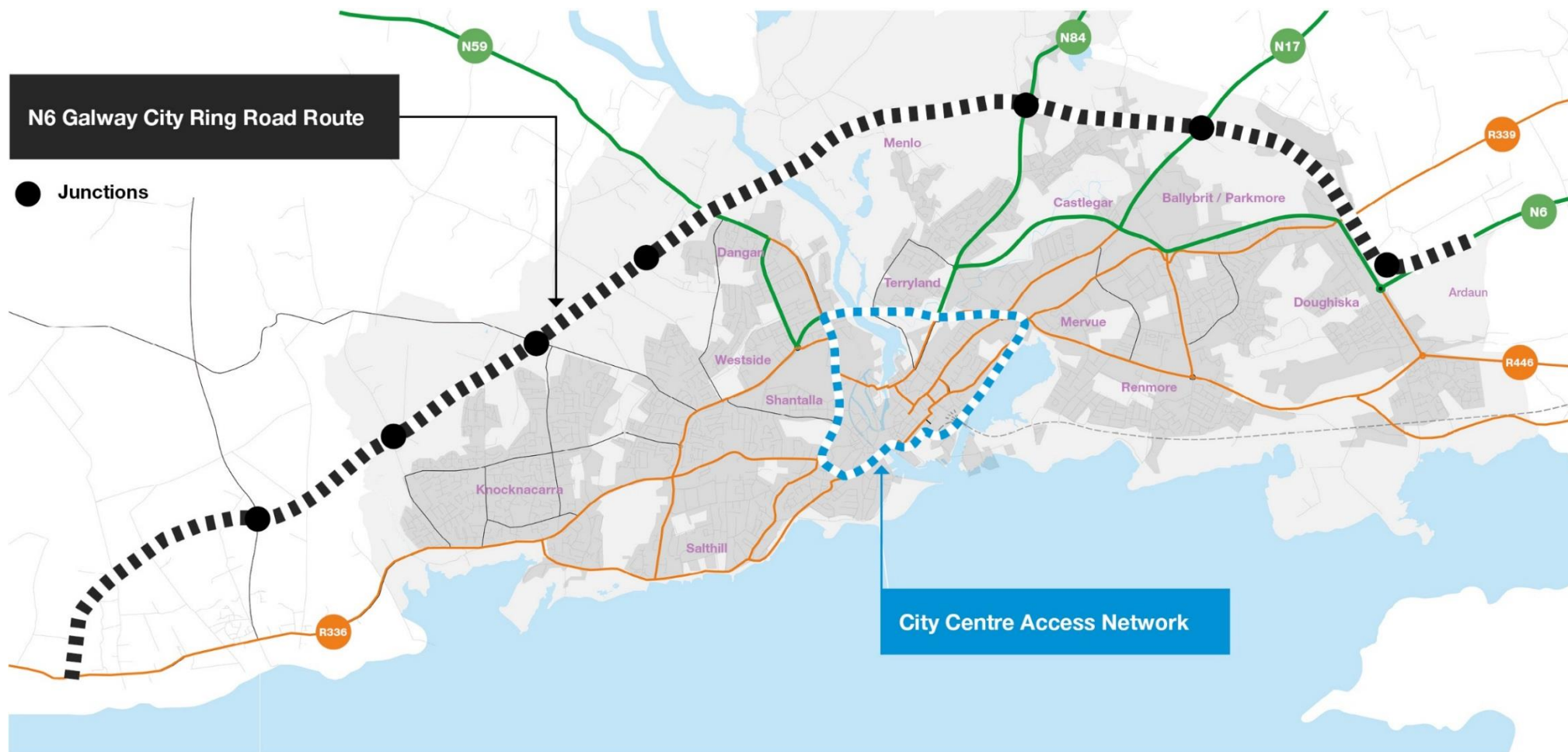


Figure 4.4: N6 Galway City Ring Road Proposed Route Corridor



The importance and benefits of the proposed orbital route to the delivery of an overall integrated Transport Strategy for Galway have been established as part of the strategy development process, as set out earlier in Chapter 3. Table 4.2 summarises the aims, proposals and alternatives considered for the road and street network measures.

Strategic Aims	Proposed Measures	Design Development and Consideration of Alternatives
Provide resilience of operation of the road network such that all travellers have a reliable (not necessarily fast) journey time	An outer orbital route is recommended in order to enhance resilience of the Galway Transport Strategy, by reducing congestion on other principal roads, and providing opportunity for re-allocation of road space within the city for bus priority and cycle lanes.  In addition to the outer orbital route, a number of ancillary, localised road links are proposed to improve connectivity at a local level for motorised traffic, pedestrians, cyclists and buses.	Upgrades of junctions along the N6 have and will continue to improve the performance of this road, but this is limited by the number and nature of the river crossings. A new orbital road link is required to enhance the resilience of the network, and cater for growth of the city. The N6 Galway City Ring Road project has investigated options – and a feasible corridor has been identified for an orbital road – with associated road links.  Numerous public transport scenarios were modelled in order to assess non-road-based solutions – but provision of a new orbital road was found to provide the best overall benefit (in tandem with multi-modal improvements elsewhere).
Provide road network improvements to cater for those journeys which are not able to be made (in a viable manner) by public transport, by cycle, or on foot.	An outer orbital route will provide a convenient route for some car-based journeys which are not able to be made easily by other modes – such as through-journeys.	The extent of proposals contained in this strategy is non-exhaustive, and further road upgrades or new road links may be necessary for redevelopment of existing sites, or for new developments such as the planned Ardaun corridor, for example.

Table 4.2: Road and Street Network – Strategic Aims and Proposed Measures

Although the orbital route of the N6 Galway City Ring Road represents the most significant road infrastructure proposed, and provides the greatest resilience to the network by means of an additional bridge across the River Corrib, additional road links are recommended by this strategy for local relief to congestion. Some of these roads are intended for public transport use only and are therefore also listed in Section 5 of this report, and others are for use by general traffic, private and public. Proposed junction upgrades and proposed road links, including the GCRR, are presented in Figure 4.5 and listed in Table 4.3. This is not considered to be an exhaustive extent of works, and will continue to be assessed against needs by the Local Authorities and the NTA as part of the GTS review and implementation planning process.



Figure 4.5: Road Infrastructure Proposals

Location	Infrastructure
North of Galway City and Bearna	N6 Galway City Ring Road, including associated link roads to the N59 and Knocknacarra.
Shantalla	New road link from Newcastle Road to Bóthar Einde for bus and cyclist use only.
Terryland	New link from Gort na Coiribe to Castlawn Heights for bus, cyclist and pedestrian use only.
Tirellan-Liosbán Link Road	New road link between the Headford Road and the Tuam Road via Liosbán Industrial Estate, including an at-grade signalised junction with the N6 Bóthar na dTreabh.
Parkmore Link Road	New road link between Ballybrit Business Park and Parkmore Business Park.
Parkmore-N17 Link Road	New road link between Parkmore Link Road and the N17.
Merlin Park Hospital / Galway Crystal Junction	New entrance to hospital from the Old Dublin Road at the Galway Crystal junction, forming a signalised crossroads junction.
Merlin Park Hospital	Access to Doughiska Road to be provided for bus, ambulance, cyclist and pedestrian use.
Doughiska Road/Bóthar na dTreabh	Overbridge on Bóthar na dTreabh to connect Old Doughiska Road for bus, cyclist and pedestrian use.
Blake Roundabout (Ballymoneen Road)	Conversion of roundabout to signalised junction and provision of pedestrian crossing facilities.
Athy Roundabout (Clybaun Road)	Conversion of roundabout to signalised junction and provision of pedestrian crossing facilities.
Bóthar Stiofáin Roundabout	Conversion of roundabout to signalised junction and provision of pedestrian crossing facilities.
Gort na Bró Roundabout	Conversion of roundabout to signalised junction with realignment of one arm, and provision of pedestrian crossing facilities.
Deane Roundabout	Conversion of roundabout to signalised junction with realignment of at least one arm, and provision of pedestrian crossing facilities.
Threadneedle Road Roundabout	Conversion of roundabout to signalised junction and provision of pedestrian crossing facilities.
D'Arcy Roundabout (Salhills)	Conversion of roundabout to signalised junction and provision of pedestrian crossing facilities.
Devon Court / Lower Salhills Junction	Signalisation of junction and provision of pedestrian crossing facilities.
Browne Roundabout (UHG)	Conversion of roundabout to signalised junction with realignment of one arm, and provision of pedestrian crossing facilities.
Newcastle Road / N6 Junction	Reconfiguration of signals linked to Browne Roundabout upgrade.
Kirwan Roundabout (Menlo Park)	Conversion of roundabout to signalised junction with realignment of one arm, and provision of pedestrian crossing facilities.

Location	Infrastructure
Joyce Roundabout (Cemetery Cross)	Conversion of roundabout to signalised junction with realignment of at least one arm, and provision of pedestrian crossing facilities.
Headford Road / Bóthar na mBan Junction	Junction movements altered as part of the Inner City Access Route.
Bóthar na mBan / Prospect Hill / Bóthar Bhreandáin Uí hEithir	Junction movements altered as part of the Inner City Access Route.
Forster Street / Fairgreen Road Junction	Junction movements altered as part of the Inner City Access Route and the Cross-City Link.
Lough Atalia Road / College Road Junction	Junction movements altered as part of the City Centre Access Network.
Skerritt Roundabout	Signalisation of junction and provision of pedestrian crossing facilities.

Table 4.3: Proposed Road Infrastructure Measures

There are also some additional junctions not listed which require infrastructural changes to provide bus priority or to improve the safety of the junction without changing the layout.

## 4.7 Parking

As with all urban centres, the supply and management of parking is fundamentally linked to the management of travel demand. While the supply of parking is not mutually exclusive of public transport, there is a need to strike a balance between the two. Within city centre, there are over 4,000 off-street parking spaces, and a further 700- 800 on-street spaces. A number of these car parks are primarily structured around long-stay parking, which is available for as little as €4 per day.

Within the city centre and environs, there are locations which provide on-street parking, off-street public car parking and privately owned car parks. Pay and Display is the main type of parking available in Galway City.

The typical conditions for the pay and display system are as follows:

- 08:30-18:30 – Monday to Saturday;
- Sundays/Public Holidays are free of charge;
- 2-hour maximum stay;
- 50 cent for 15 minutes;
- €2 for an hour; and
- €4 for two hours.

The public car parks operate on a long-term or short-term stay basis. Long-term stay car parks charge a fee of €4 per day, and are located at the Greyhound Track on College Road, on Dyke Road and at Galway Cathedral Short-term car parks

are subject to an hourly rate of €2, of a daily rate of €4. These are located at Mill Street, and at Newtownsmith.

There are also free surface car parks in Salthill on the main promenade, and at Toft Car Park beside the Atlantaquaria. There are also a number of private car parks in the city centre.

The total parking provision in the city centre is therefore as set out in Table 4.4. This includes the public car parks outlined above and privately-owned car parks.

Name	Operator	Location	Number of Spaces
Jury's Hotel	ETI Security	Quay Street	348
Harbour Hotel	Harbour Company	New Dock Road	114
Eyre Square Shopping Centre	QPark	Eyre Square (access on Merchants Road)	452
Radisson Hotel	QPark	Lough Atalia Road	260
Fairgreen Car Park	QPark	Fairgreen Road	400
Corrib Shopping Centre	Corrib Shopping Centre	Eyre Square	580
Hynes Yard	Park Rite	Merchants Road	480
Forster Street	Euro Car Parks	Fairgreen	450
Docks Car Park	Harbour Company	Dock Road	89
Market Street Car Park	APCOA	Market Street	88
Greyhound Track	Galway City Council	College Road	112
Dyke Road	Galway City Council	Dyke Road	510
Galway Cathedral	Galway City Council	Gaol Road	161
Mill Street	Galway City Council	Mill Street	82
Bowling Green Car Park	Galway City Council	Newtownsmith	50
TOTAL			4,176

Table 4.4: Private Car Parking in Galway City

As part of this strategy, it is proposed to reduce the dominance of car parking within the city, and particularly to shift the emphasis from on-street to managed off-street parking provision. This requires high-quality alternatives to car-based commuting, namely the walking, cycling and public transport proposals outlined in the Transport Strategy. A number of the existing car park sites within the city represent development opportunity sites, and over time the development of these sites may see a natural reduction in parking stock.

In order to discourage commuter car parking and encourage the transfer to public transport, the Council will restrict car parking within the city centre area. In addition, a strong focus on encouraging major employers to develop robust mobility management proposals will form part of the longer-term strategy for addressing the existing demand for car parking within the city centre.

It may also be necessary to consider adopting reduced parking standards for developments that are located proximate to public transport corridors, in particular those located on the Core City Bus network proposed in Chapter 6.

Parking provision and enforcement are a key concern on particular streets, for example Fairgreen Road, Forster Street, in Salthill, within the vicinity of UHG and NUIG and along the Promenade. The measures in relation to parking are set out in Table 4.5.

Strategic Aims	Proposed Measures	Design Development and Consideration of Alternatives
To provide efficient access arrangements for city centre car parks	It is proposed to rationalise the city centre street hierarchy such that well-signed routes to car parks are available via the city centre access network and local access routes.  Variable Message Signage is also proposed on approaches to the city as well as an associated Parking Guidance System.	Parking is a key element of choice of travel mode, and also can be a physical detriment to city-centre streets. Management of access routes, on-street parking, and pricing are considered as supporting an overall strategy to improve transport conditions in the city centre.  In order to discourage commuter car parking and encourage transfer to public transport, it is proposed to restrict car parking within the city centre area. In addition, a strong focus on encouraging major employers to develop robust mobility management proposals will form part of the longer-term strategy for addressing the existing demand for car parking within the city centre.
To ensure that parking is not significantly cheaper than public transport.	To adopt a philosophy that parking fees are similar or more than typical bus fares. E-parking (parking by phone or text) fees may assist in equalising parking and bus prices.	The adoption of reduced parking standards for developments that are located in proximity to core (high-frequency) public transport is also proposed.
To reduce the impact of parking on footpath environment and movement of buses and cycles	It is proposed to remove most of the on-street parking in the city centre to provide more road-space for pedestrians and public transport, while retaining disabled driver parking. Improved enforcement is also proposed. Some rationalisation of on-street parking on radial access routes will also assist bus movement.	

Table 4.5: Parking – Strategic Aims and Proposed Measures

## 4.8 HGV Management

Efficient freight transport and delivery systems are essential for the economic activity of the city and surrounding areas. Galway Port and industrial areas need to retain reliable transport connections for the movement of goods, while commercial outlets and shops need dependable distribution systems to manage stock levels and provide customer deliveries. The use of Lough Atalia Road as a part of the City Centre Access Network maintains access and egress from Galway Port as per the existing arrangement (with or without expansion).

Given the dispersed rural nature of the region and limited national rail network, movement by road is, and will continue to be, the dominant mode of freight transfer in the region.

Consequently, development and management of the road network must take the movement of goods vehicles into account, whether to or from the port, the industrial areas of the city, the commercial and retail premises in the city centre, or further afield in the county, region and country. The measures in relation to HGV movement are summarised in Table 4.6.

Strategic Aims	Proposed Measures	Design Development and Consideration of Alternatives
Restrict HGV access to the city centre to only those vehicles with destinations (or origins) in the city centre	Enable movement around the city via the Inner City Access Route, including access to the city centre and the port.	An orbital road corridor around the city centre will provide a key element of managing access to the central area – such that extraneous traffic is removed. SMART methods will need to be studied to identify route management and low impact delivery schemes (with use of smaller, quieter and lower emissions vehicles).
Manage the routing and timing of deliveries to the central area.	Develop a loading and delivery strategy for the city centre core targeting off-peak hours, similar to the current arrangements on Shop Street and Quay Street.	

Table 4.6: HGV Management – Strategic Aims and Proposed Measures

## 4.9 Environmental Assessment

The proposed traffic network elements of the GTS have the potential to positively and negatively affect a range of environmental factors. In order to avoid and mitigate potential adverse impact, the detailed development and consenting of various measures must have regard to the protective environmental policies and objectives of the statutory development plans for Galway City and for Galway County (refer to SEA Environmental Report – Appendix I), which will ensure that potential adverse impacts are avoided or are appropriately mitigated.

The detailed development and consenting of particular measures will also be subject to further detailed and specific environmental assessment – most notably in the form of Environmental Impact Assessment (EIA) for measures such as the proposed N6 Galway City Ring Road.

Potential for impact on European Sites is considered in detail in the following.

The proposed traffic network elements of the GTS have the potential to adversely affect the integrity of European Sites. Section 4.9.1 below outlines the assessment of the potential impacts, the identified potential impact pathways to those European Sites potentially affected and references the corresponding mitigation measures (as detailed in Chapter 9). The full assessment is provided in the NIS in Appendix J.

### 4.9.1 N6 Galway City Ring Road (N6 GCRR)

The potential impact pathways associated with the proposed N6 GCRR and the European Site(s) which are potentially at risk of adverse effects on Site integrity are summarised below:



#### 4.9.1.1 Habitat Loss

The N6 GCRR will likely result in the direct loss of habitat (terrestrial and/or freshwater) in Lough Corrib SAC; habitat fragmentation is directly associated with this impact pathway. None of the habitats within both the SAC boundary and the current road corridor that will be lost are qualifying interest (QI) habitats of Lough Corrib SAC, nor are they supporting habitats to any QI habitat or to species such that their loss would affect the species' conservation objectives. However, as the final landtake associated with the proposed N6 GCRR has not yet been determined, there remains a risk that some level of habitat loss may occur outside of the current corridor for the proposed N6 GCRR and could therefore result in additional habitat loss/fragmentation within Lough Corrib SAC.

Mitigation measures: refer to Box 1c in Chapter 9 below

#### 4.9.1.2 Habitat degradation – hydrogeology

Tunnelling and/or deep excavations likely to be associated with the N6 GCRR may affect the existing hydrogeological regime which in turn may affect groundwater dependant habitats (and in some cases supported species) within the following European Sites: Lough Corrib SAC, Lough Corrib SPA, Inner Galway Bay SPA, Cregganna Marsh SPA, Rahasane Turlough SAC, Rahasane Turlough SPA, Castletaylor Complex SAC, Kiltiernan Turlough SAC and/or Lough Fingall Complex SAC.

Mitigation measures: refer to Box 2b in Chapter 9 below

#### 4.9.1.3 Habitat degradation – tunnelling/excavation

Tunnelling and/or deep excavations at Lackagh Quarry has the potential to affect the integrity of surface level habitats in Lough Corrib SAC.

Mitigation measures: refer to Box 3 in Chapter 9 below

#### 4.9.1.4 Habitat degradation – water quality impacts during construction and/or operation

As the N6 GCRR will cross the River Corrib and numerous watercourses which drain to Galway Bay, construction works, and operation of the proposed road development, has the potential to affect surface, ground and/or coastal water quality and as a consequence affect wetland/coastal/estuarine habitats in Lough Corrib SAC, Galway Bay Complex SAC and/or Inner Galway Bay SPA.

Mitigation measures: refer to Box 4 and Box 5b in Chapter 9 below

#### 4.9.1.5 Habitat degradation – shading

The proposed River Corrib Bridge will have shading effects (i.e. reduced sunlight and levels of direct precipitation) on habitats beneath the structure within Lough Corrib SAC.

Mitigation measures: refer to Box 6 in Chapter 9 below

#### **4.9.1.6 Habitat degradation – air quality**

Introducing a new road has the potential to cause a reduction in air quality, potentially affecting fauna species and/or habitats<sup>2</sup>.

Mitigation measures: refer to Box 7 in Chapter 9 below

#### **4.9.1.7 Habitat degradation – non-native invasive species**

Introducing or spreading non-native invasive species during construction and/or operation (e.g. maintenance works) of the proposed road development has the potential to affect habitats, and may as a consequence affect supported species, in Lough Corrib SAC, Galway Bay Complex SAC, Lough Corrib SPA and/or Inner Galway Bay SPA.

Mitigation measures: refer to Box 8 in Chapter 9 below

#### **4.9.1.8 Disturbance/displacement**

Construction works and/or operation associated with the proposed road development has the potential to result in levels of disturbance that could potentially displace QI/SCI species from important habitat areas (e.g. breeding/resting places or foraging areas) within Lough Corrib SAC (e.g. along the River Corrib), Galway Bay Complex SAC (e.g. in the vicinity of Bearna Woods), and Lough Corrib SPA or Inner Galway Bay SPA (in the case of SPAs, important ex-situ habitat areas remote from the designated site but important in supporting SCI populations).

Mitigation measures: refer to Box 9 in Chapter 9 below

#### **4.9.1.9 Barrier effect**

Construction works associated with the proposed road development along the River Corrib have the potential to create a barrier to fauna species movement (e.g. within foraging areas or along commuting routes) in Lough Corrib SAC.

Mitigation measures: refer to Box 10 in Chapter 9 below

#### **4.9.1.10 Mortality risk**

The N6 GCRR will include for the construction of a new bridge structure across the River Corrib, a new road in the vicinity of the Coolagh lakes, and a new bridge over the Bearna Stream. All of these areas are used by Otter (a QI species of Lough Corrib SAC and Galway Bay Complex SAC) and there is a permanent risk of mortality/road traffic collision impacts if Otter gain access to the road

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<sup>2</sup> As one of the key principles of the GTS is to “To promote and encourage sustainable transport, and in particular to make it convenient and attractive to walk, cycle or use public transport”, there may be an overall positive impact compared with the “Do-nothing” scenario in urban and suburban areas of Galway City and the associated European Sites (Lough Corrib SAC, Galway Bay Complex SAC and Inner Galway Bay SPA)

carriageway. Constructing a new bridge over the River Corrib poses a (temporary) risk of construction materials/debris falling into the river and injuring/killing QI aquatic. A new bridge across the River Corrib poses a permanent collision risk with the bridge structure to SCI bird species of Lough Corrib SPA and/or Inner Galway Bay SPA commuting along the river corridor.

Mitigation measures: refer to Box 11 in Chapter 9 below

## 5 Local Public Transport

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### 5.1 Background

Good practice guidance<sup>3</sup> indicates that the following principles apply when planning public transport:

- **Organisation and transport policy:** Well-used and high-quality networks require attention to the organisation of planning duties and powers, appropriate forms of incentives, and good control of the infrastructure where services operate to minimise disruption;
- **Long-term stability:** Long-term stability of a high service quality is required for the public transport system to influence urban development and create more sustainable transport patterns – and to gain the trust and long-term use by passengers;
- **A robust and simple structure for major market segments:** Robustness is most easily achieved when the public transport system is built up as a simple network of as few, clearly defined lines as possible. A ‘simple’ network will provide a public transport service that is easier to perceive and remember for the users, easier to market, brand and sell, and simpler to plan and operate; and
- **Serving all citizens:** Much of the resources of the public transport system must be directed towards the main transport corridors to achieve high usage. However this concentration of resources in a corridor should be balanced with the need to provide a minimum transport service to the general population irrespective of car availability – and hence some other transport solutions (e.g. low-frequency or demand-responsive services) will need to be employed to give access to the stops and hubs on the main transport network.

It is further identified in good practice guidance for urban public transport networks that high passenger use is dependent on high operational frequency, in a ‘virtuous circle’ as follows:

- High-frequency services are essential to attract casual passengers and to offer a reasonable alternative to the private car in terms of availability. A minimum ‘turn-up-and-go’ level of service is generally considered to be at least 5 services per hour (i.e. every 12 minutes); and
- High-frequency services are necessary to provide the necessary capacity for passengers to be accommodated comfortably, e.g. 500 passengers per hour point demand would require around 10 buses per hour – or 5 articulated buses, or 2 trams per hour (for a 300-person capacity tram as per LUAS).

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<sup>3</sup> HiTrans Best practice guide no. 2. Public transport – Planning the networks. Stavanger (NO), HiTrans (European Commission’s Interreg IIIB North Sea Programme).

## 5.2 Developing a Public Transport Network for Galway City

As set out in Section 3, and detailed in ‘**Appendix C – GTS Public Transport Network Development**’, the most appropriate form of public transport for Galway City is a high-frequency, cross-city bus-based network.

Public transport in Galway is currently a peripheral mode with usage well below 10% of motorised travel. A step-change in provision and usage of public transport is needed to meet the above objectives, and hence an essential component of this transport strategy is to provide an efficient, reliable and attractive bus system for Galway, such that a high proportion of trips within the city and environs are able to be made by bus. This requires the achievement of both journey-time reliability and journey speeds sufficient to make the service competitive against private car usage.

The methodology undertaken to develop the proposed Galway City Bus Network was as follows:

1. Develop the most appropriate bus network for the study area, based on origin-destination patterns, and maximising network coverage and services to the principal trip attractors and generators;
2. Classify the proposed network into services which will be of higher frequency and services of lower frequencies; and
3. Development of infrastructural priority proposals for the network, based on on-site investigations to determine engineering constraints.

As stated above, further details on the development of the proposed bus network development are contained in ‘**Appendix C – GTS Public Transport Network Development**’, while further details on the development of infrastructure proposals are contained in ‘**Appendix D – GTS Public Transport Infrastructure Development**’.

In order to provide a framework for developing measures, a series of aims for local public transport have been set out – allowing for network proposals to be developed. The proposals are set out in Table 5.1.

Aims	Proposed Measures	Design Development and Consideration of Alternatives
Maximise patronage attraction by providing a high frequency public transport network	<p>The existing main bus corridors are proposed to be upgraded to ‘high frequency’ public transport routes which will form a ‘fixed’ spine of future public transport in Galway.</p> <p>These routes are proposed as follows:</p> <p>West:</p> <ul style="list-style-type: none"> <li>• Western Distributor Road – Seamus Quirke Road – University</li> </ul>	<p>Design development has considered various alternative public transport route corridors on the basis of:</p> <ul style="list-style-type: none"> <li>• Matching the core network with the existing bus lanes; and</li> <li>• Evaluation of the physical road space and land use within which bus priority infrastructure can realistically be delivered within the constraints of the</li> </ul>

Aims	Proposed Measures	Design Development and Consideration of Alternatives
	<p>Hospital Galway – University Road, and on to Eyre Square</p> <ul style="list-style-type: none"> <li>• Knocknacarra - R336 Coast Road – Salthill – Newcastle Road – University</li> </ul> <p>Hospital Galway – University Road, and on to Eyre Square</p> <p>East:</p> <ul style="list-style-type: none"> <li>• Parkmore – Ballybrit – Monivea Road – Wellpark Road – College Road – Eyre Square</li> <li>• Parkmore – Doughiska – Old Dublin Road – College Road – Eyre Square</li> </ul> <p>City Centre:</p> <ul style="list-style-type: none"> <li>• University Road - Salmon Weir Bridge - Eglinton Street - Eyre Square – Forster Street – College Road</li> </ul>	<p>existing land use. The impacts of altering land use was also considered.</p> <p>To the west, the Seamus Quirke Road – Western Distributor Road corridor has existing bus priority measures in place and, crucially, there is space available for future provision of bus lanes (along Western Distributor Road) – and hence this represents the most suitable corridor – although other corridors west of the city may carry localised bus services.</p> <p>To the east, Old Dublin Road is an established bus corridor with substantial bus priority measures already in place.</p> <p>On the west side of the city centre core area, a ‘bus-only’ route via Salmon Weir Bridge was identified as the most appropriate and feasible means of delivering the essential combination of short and reliable journey times through the city centre. Alternatives were also considered as follows:</p>
Provide city-wide network coverage / connectivity to all parts of the city	<p>Local buses may also be required to maximise the coverage of the overall bus network and to provide bus connectivity to areas that lie outside of the principal bus network. Local buses will also provide connection and transfer to and from the city bus network.</p> <p>This ancillary local network will necessarily evolve over time (e.g. as developments proceed), and hence does not represent a fixed network. As patronage increases over time, these routes may be upgraded to higher frequency services, where practical to do so.</p>	<ul style="list-style-type: none"> <li>• Via Wolfe Tone Bridge - there is very poor connection with the bus lane corridor on Seamus Quirke Road; and</li> <li>• Use of Quincentenary Bridge as a major bus corridor for radial and cross-city routes</li> </ul> <p>was not considered to be the most appropriate as the majority of passengers throughout the day are destined for key attractors south of the bridge, and in the city centre, as well as to the east. In the case of cross-city journeys, it is</p>
Provide reliable journey times	<p>Bus Lanes and Bus Priority measures have been designed at a conceptual level along the principal network corridors as follows:</p> <ul style="list-style-type: none"> <li>• Western Distributor Road – Seamus Quirke Road Corridor;</li> <li>• Salthill Road / St Mary’s Road / Newcastle Road Corridor;</li> <li>• Old Dublin Road Corridor;</li> <li>• Wellpark Road / Monivea Road Corridor; and</li> <li>• City Centre Corridor (University Road - Salmon Weir Bridge -</li> </ul>	<p>considered essential that buses operate through the central area for interchange with other services at Eyre Square and at Ceannt and Fairgreen Stations (but with bus priority to maintain speed and reliability).</p> <p>On the east side of the city centre, establishing a bus priority route along College Road was identified via travel demand as the most appropriate and feasible means of ensuring that buses and coaches could travel directly to from both the Old Dublin Road and Wellpark Road.</p>

Aims	Proposed Measures	Design Development and Consideration of Alternatives
	Eglinton Street – Eyre Square – Forster Street – College Road).	<p>Alternatives were also considered as follows:</p> <ul style="list-style-type: none"> <li>• Bohermore – does not provide direct connection with Old Dublin Road/Wellpark Road, and hence there is a high degree of risk of congestion at Moneenageisha, causing journey time delay; and</li> <li>• Lough Atalia road – considered to be more suitable as a city centre distributor road, as it provides a route to car parks on the south side of the city centre (and to the docks area).</li> </ul>

Table 5.1: Local Public Transport – Strategic Aims and Proposed Measures

### 5.3 Existing Bus Network

The existing bus network is shown in Figure 5.1.

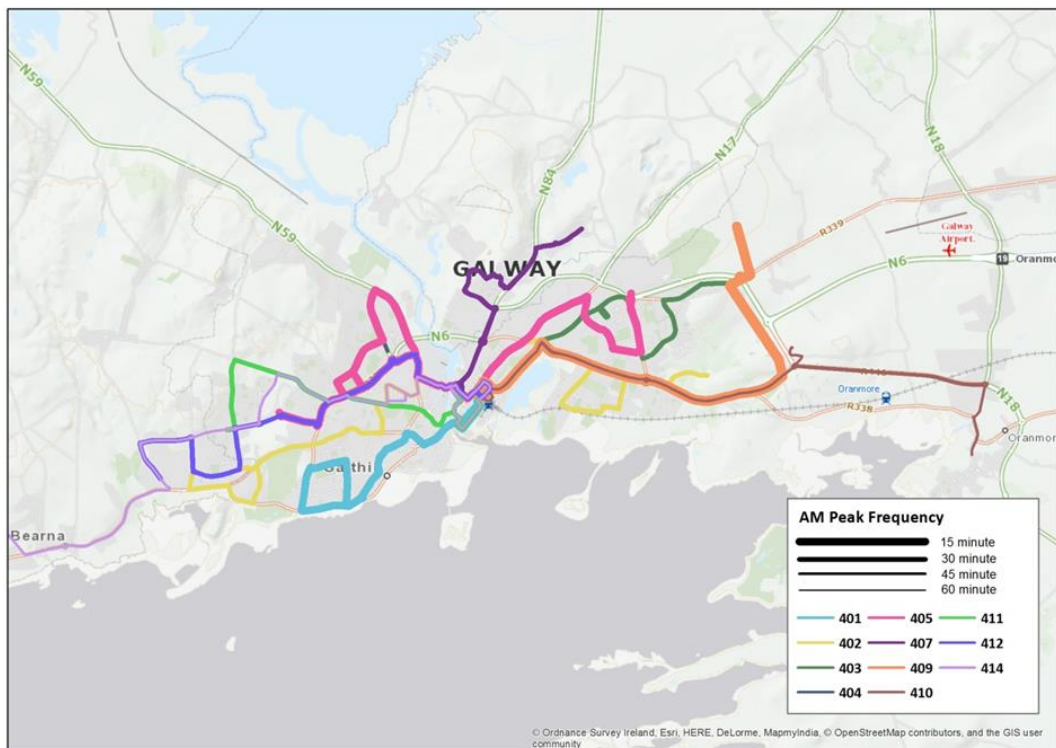


Figure 5.1: Existing Bus Network (source – NTA)

The existing extent of bus priority, and the corresponding existing bus network within the city and suburbs are shown in Figure 5.2 below. It can be clearly seen that Eyre Square is the focal point for the city bus network and for interchange between routes.





Figure 5.2: Existing Bus Priority Infrastructure

As shown in Figure 5.2, there are sections of the network where comprehensive bus priority is provided via on-road bus lanes, however it can also be seen that extensive portions of the existing bus network are not provided with dedicated priority, particularly in the city centre. Table 5.2 below classifies the extent of the existing bus network, detail the location and the type of priority.

Link	Description	Hours of Operation	Length (approximate)
Seamus Quirke Road	Bus Lanes on both sides	24H	1.6km (both)
Bóthar Uí Eithir	Southbound Bus Lane	24H	170m
Forster Street	Inbound Bus Lane	16:00-19:00 Daily	170m
Old Dublin Road	Inbound Bus Lane	24H	3km
Old Dublin Road	Outbound Bus Lane	24H	650m
Tuam Road (approaching Baile Chláir)	Inbound Bus Lane	24H	1.3km
Tuam Road (approaching Baile Chláir)	Outbound Bus Lane	24H	1.5km
Rahoon Road	Inbound Bus Lane	24H	300m
Headford Road (at Terryland)	Inbound Bus Lane	24H	100m

Table 5.2: Extent of Existing Bus Priority

As can be seen in Table 5.2, the extent of bus priority within the city is limited, with a total of approximately 10.4km of dedicated bus lanes provided (of which, almost 30% are outside the city, near Baile Chláir).

As part of the Galway Metropolitan Area Bus & Cycle Network Plan (2014), a Quality of Service (QoS) Audit was undertaken on the existing bus network.

Table 5.3 shows the result of the QoS audit.

Location (direction)	Type of Facility	QoS Rating
Seamus Quirke Road (inbound)	Bus/Cycle Lane	B
Seamus Quirke Road (outbound)	Bus/Cycle Lane	B
Rahoon Road (inbound)	Bus/Cycle Lane	C
Bóthar Uí Eithir	Bus/Cycle Lane	C
Forster Street	Bus/Cycle Lane	D
Old Dublin Road (inbound)	Bus/Cycle Lane	B
Old Dublin Road (outbound)	Bus/Cycle Lane	B

Table 5.3: Quality of Service on existing bus network (Galway Metropolitan Area Bus & Cycle Network Plan, 2014)

In addition to the bus routes, an audit was also undertaken on the stops and shelters within the Metropolitan Area. This audit found a wide disparity in the type and quality of stop facilities provided across the network.

The current bus service offering comprises a number of routes of varying frequency, from 12 minutes to 60 minutes. The principal route is the 409 Eyre Square – Parkmore service, which is also the sole city bus service with a 12-minute frequency at present.

The principal constraint affecting the existing bus network is the absence of dedicated priority. As outlined above, there are under 10km of dedicated bus lanes provided (with 30% of these provided near Baile Chláir). Sections of the existing network where there is no designated priority are therefore completely dependent on prevailing traffic congestion.

The absence of dedicated priority in the form of bus lanes compromises the reliability of the offering, and therefore reduces the appeal of the bus service. In addition, congestion and delay on the road network quickly propagates and impacts on the bus service where there is no priority and the bus must merge with general traffic, undermining the service further.

In addition, despite the recent works carried out at a number of existing major junctions in the city to convert them from roundabouts to signalised junctions, there are a number of remaining major junctions where similar works are required to allow for bus priority measures to be implemented, including Browne Roundabout and Kirwan Roundabout to the west, and Skeritt Roundabout to the west, for example.

The Galway Metropolitan Area Bus & Cycle Network Plan (2014) identified the following main issues impacting on the bus network:

- Congestion
- Lack of priority
- Poor Traffic Management, and
- Under-performing ITS equipment

Notwithstanding the above issues identified across the bus network, it is also noteworthy that in the years since 2012, reviews, amendments and improvements to the city bus service and fleet has seen a significant increase in bus patronage – an overall growth of 29% in passenger numbers was recorded on the Bus Éireann and City Direct services from 2012-2015. This growth is attributed to the completion of a number of major infrastructural projects to provide dedicated bus priority, revisions to the network and improved connectivity between key residential areas, the city centre and major employment areas.

Other improvements to the service include revised, simpler timetables, the introduction of the Leap card and the roll-out of Real-Time Passenger Information (RTPI). This clearly indicates a desire to avail of the city bus services if they are comfortable, reliable and efficient, and this encouraging trend must be used as a foundation for development of the bus network.

## 5.4 Developing the Galway City Bus Network

Using the existing bus route alignments as a starting point, a cross-city network proposal was developed. This proposal was based on linking the residential origins to the key destination locations.

The routing of buses was modified in some cases to better reflect the current origin-destination combinations extracted from the 2011 POWSCAR data, and all routes were designed to allow for cross-city interchange at key locations – most noticeably at stops within the core city centre area.

By pairing cross-city routes, it was possible to reduce the number of services to 5, making the network more legible for residents and visitors alike.

Further details on the development of the Galway City Bus Network are contained in ‘Appendix C – GTS Public Transport Network Development’.

The proposed routes are:

### **Green Route:**

Knocknacarra – City Centre – Parkmore Industrial Estate (via Seamus Quirke Road and Dublin Road);

### **Red Route:**

Knocknacarra – City Centre – Parkmore Industrial Estate (via Salthill and Ballybrit Industrial Estate);

### **Blue Route:**

Clybaun Road – City Centre – Castlegar (via Dr Mannix Road and Tirellan);

### **Yellow Route:**

Dangan – City Centre – Parkmore Industrial Estate (via Westside Shopping Centre and Castlepark); and

### **Brown Route:**

Bearna – City Centre – Oranmore (via Seamus Quirke Road and Deerpark Industrial Estate)

These routes are illustrated in Figure 5.3, which also illustrates potential interchange points between the proposed services and potential Park & Ride site locations.

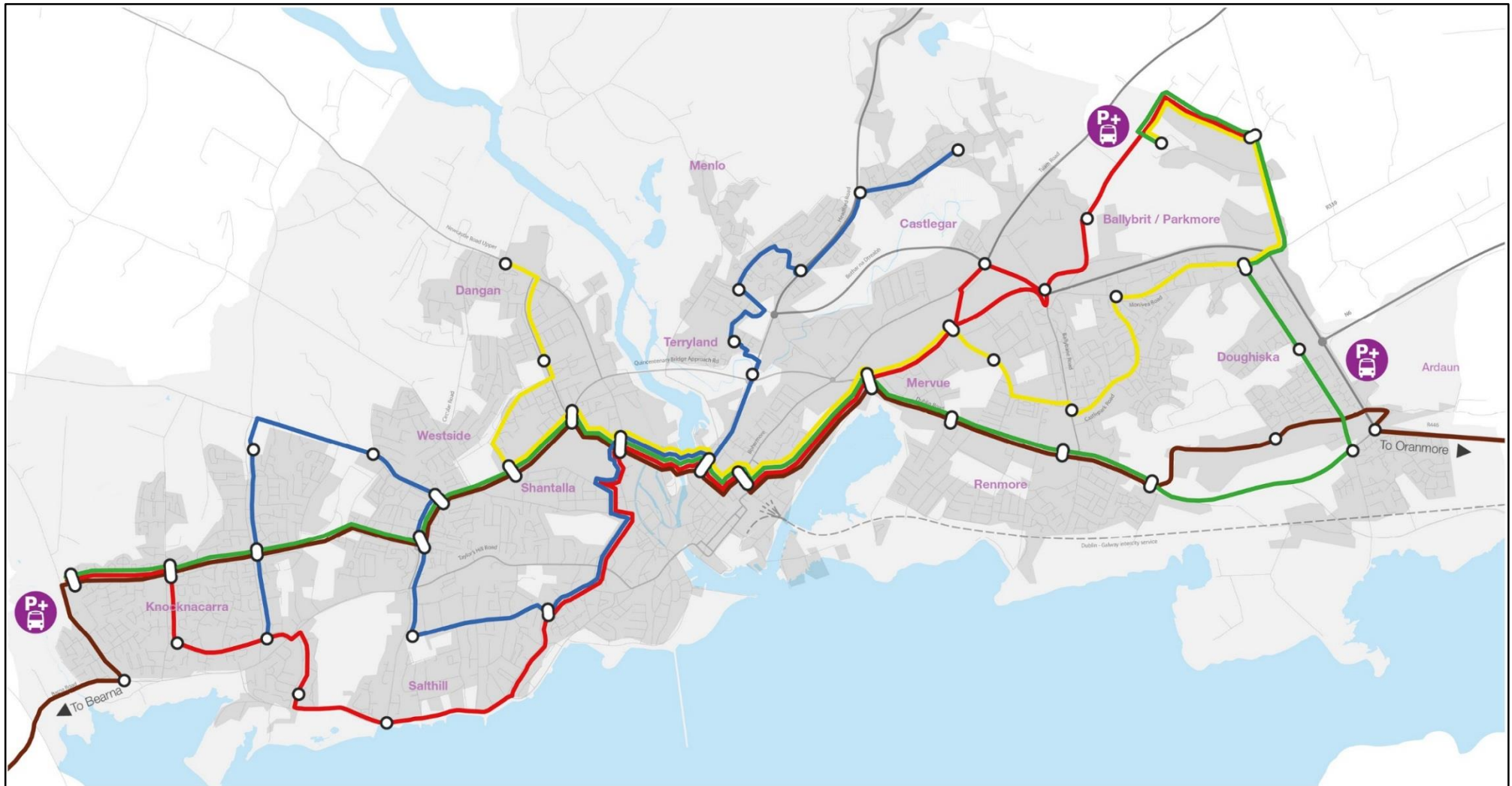


Figure 5.3: Galway City Proposed yBus Network Routes

All routes will serve the major trip attractors of the City Centre, Galway University Hospital and University College Galway, as well as linking all major destinations across the city into the public transport network.

### 5.4.1 Service Frequency

It is critical that the new network is serviced by frequent and reliable bus services. One of the problems with the current bus provision in Galway is the relatively poor frequency of services across the network, with only one route (of the 11 currently serving Galway City) operating more than 4 buses per hour per direction in the peak hour.

To ensure that the bus is a convenient and fast transport option in Galway, as well as to ensure that interchange is considered as an integral element of the bus network, it is essential that the frequency and reliability of bus services is maintained across the bus network, and throughout the day. It is an aspiration of this strategy that all 5 routes will operate at a 15-minute frequency (or better) during the peak period, with the red and green routes likely to operate at a 10-minute frequency or better initially based on existing demand. It is also an objective of this strategy to ensure that a high bus frequency is maintained across the whole day to ensure that the bus network is a viable alternative to other trip purposes, as well as peak hour commuting.

A number of the 5 routes proposed above lie on existing principal public transport corridors, and are already served by some of the existing city bus services. These sections of the proposed network, which will route in a direct manner on key travel corridors will be the primary focus for implementation of significant infrastructural priority measures (through provision of bus lanes, removal of pinch points and delays, and maximising the efficiency and reliability of services on the proposed bus network to make the bus service more attractive than the private car). Other sections of the proposed bus network are more heavily constrained in terms of engineering design due to their less-direct routing and due to the route characteristics – these sections of the proposed bus network will be provided with priority infrastructure where feasible.

Once established, it is intended that the level of travel demand on the proposed bus network will be regularly monitored, with some routes potentially being upgraded to Bus Rapid Transit (BRT) services in the future by increasing the level of frequency and service provision accordingly, if development along the routes intensifies and patronage increases sufficiently.

On approaches to, and through the city centre, it is essential that public transport travels relatively unhindered by road congestion (to achieve high patronage and to ensure that services are financially viable). This will require implementation of traffic management measures and the removal of through-traffic from the city centre, as set out in Section 4, in order to prioritise bus services.

The number of buses operating in Galway City will have to be expanded to meet this increase in service provision, however it is anticipated that improvements in journey times owing to the increased bus priority across the network, as well as the simplification of the network will result in a more efficient utilisation of the



bus fleet. This improved operational efficiency will benefit both passengers and bus operators.

### 5.4.2 Network Catchment

An analysis of the population and employment catchment of the proposed bus network was undertaken. This assessment quantifies the number of residential and commercial properties within a 10-minute walking catchment of the proposed bus network. This analysis considers the existing road network, and does not take into account any proposed improvements in pedestrian accessibility to the bus routes, however it does provide a good indication of how well the new bus network will serve Galway City. The spatial catchment of the Cross City Bus Network is set out in Figure 5.4.

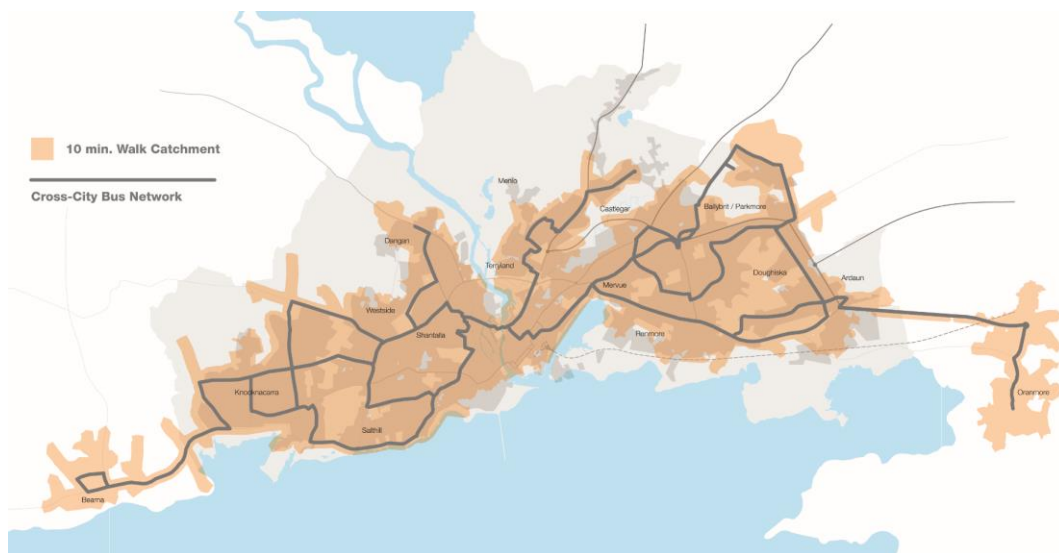


Figure 5.4: Cross-City Bus Network Catchment

The spatial coverage of the proposed bus network was also assessed against the existing coverage of bus services in Galway. To facilitate a direct comparison, the existing bus services were amalgamated to establish the road routes which are currently served by buses passing at a frequency of more than 4 per hour. Within the study area there are circa 35,000 properties, 90% of which are residential. It is the intention to ensure that as many of these properties as possible are within 10 minutes walking distance of a bus service.

Figure 5.5 shows the percentages of properties which are within a 10-minute walking catchment of the existing and proposed bus network. It is clear that the proposed cross-city network will provide a much higher level of accessibility to a high frequency bus service, with over 70% coverage of both residential and commercial properties. 77% of Primary schools and 93% of secondary schools within the study area will also lie within a 10-minute walk of the proposed bus network.

This compares well to the existing bus provision, which offers a high frequency service to only 43% of residential properties, 54% of commercial premises, 43% of primary schools and 57% of secondary schools.



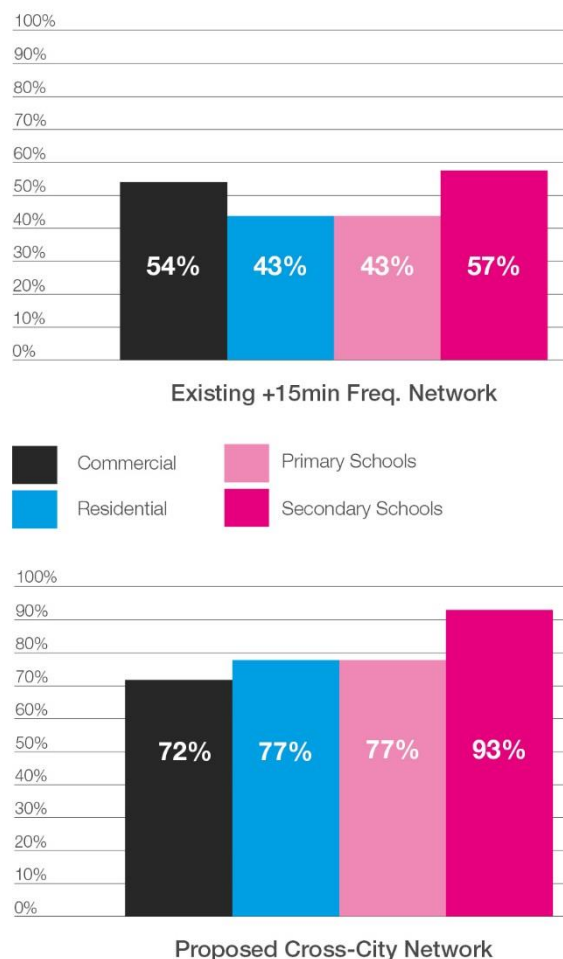


Figure 5.5: 10-minute Walking Catchment to existing and proposed networks (with frequencies of 15 minutes or less per hour)

Further details on the development of the proposed bus network for Galway City is contained in ‘**Appendix C – GTS Public Transport Network Development**’.

## 5.5 Proposed Infrastructural Measures

In order to ensure that the core bus network identified can be delivered in practice and meet the level of service objectives identified, each of the route corridors has been appraised with regard to physical constraints, with initial high level concept designs prepared at pinch-point/junction locations. These design interventions are presented in Figure 5.6 and listed in Table 5.4 and will be advanced and implemented in accordance with Figures 10.2 and 10.3 in Chapter 10 of this report.



Figure 5.6: Bus Priority Infrastructure

Location	Infrastructure
University Road	Limited access for private motorised vehicles.
Salmon Weir Bridge	Public transport and cyclists only.
St Francis Street	Public transport and cyclists only.
Eglinton Street	Public transport and cyclists only.
Williamsgate Street	Public transport and cyclists only.
Eyre Square	Public transport and cyclists only.
Forster Street	Public transport and cyclists only.
College Road	Limited access for private motorised vehicles.
UHG	Bus priority route through UHG connecting back entrance at Browne Roundabout, main entrance at University Road and southern entrance on Costello Road.
Shantalla	Bus-only road link from Newcastle Road to Bóthar Eide.
Western Distributor Road	Bus lanes on both sides from Cappagh Road to Deane Roundabout.
Bishop O'Donnell Road	Bus lanes on both sides from Deane Roundabout to Ragoon Road (existing).
Ragoon Road	Bus lane inbound on approach to Seamus Quirke Road (existing).
Seamus Quirke Road	Bus lanes on both sides from Ragoon Road to Browne Roundabout (existing).
R336 Coast Road	Bus lanes on both approaches to junction with Threadneedle Road at Blackrock.
R336 Coast Road	Bus lanes on east-bound and south-bound approaches to junction of Upper Salthill and Seapoint Promenade.
Devon Court	Bus priority at junction of Devon Court and Upper Salthill Road.
Headford Road	Extension of existing bus lane inbound on section of Headford Road to the south of Bodkin Junction as far as St Bridget's Place.
N84 Headford Road	Bus lane southbound from Baile an Chóiste to Kirwan Roundabout.
Terryland	New link from Gort na Coiribe to Castlawn Heights for bus, cyclist and pedestrian use only.
R338 Old Dublin Road	Bus lane inbound on approach to Moneenageisha Cross.
R338 Old Dublin Road	Extension of existing bus lane outbound as far as Skerritt Roundabout.
Doughiska Road	Bus lanes on both sides of southern extremity of Doughiska Road, providing priority through the junction with the Old Dublin Road.
Merlin Park Hospital	Bus priority at new entrance to hospital from the Old Dublin Road.
Merlin Park Hospital	Access to Doughiska Road to be provided for bus and ambulance use only.
Doughiska Road/Bóthar na dTreabh	Overbridge on Bóthar na dTreabh to connect Old Doughiska Road for bus, cyclist and pedestrian use only.
Briarhill	Bus-only link from northern end of Doughiska Road to Briarhill Junction.
Ballybrit Crescent	Bus lane southbound from Ballybrit Crescent houses to junction with R339 Monivea Road.
Wellpark Road	Bus lane southbound from GMIT Cluain Mhuire Campus to Moneenageisha Cross.

Location	Infrastructure
Wellpark Road	Bus lane northbound from GMT Cluain Mhuire Campus to Joyce Road/Monivea Road/Connolly Avenue junction.
Joyce Road	Bus lane outbound from Wellpark Road to Tuam Road, with bus priority at the Tuam Road junction.
Tuam Road	Bus lane outbound from Joyce Road to junction with Bóthar na dTreabh.
N17 Tuam Road	Bus lane inbound from Parkmore Road to Bóthar na dTreabh.
N17 Tuam Road	Bus lane outbound from Parkmore Road to connect to existing bus lane on approach to Baile Chláir.

Table 5.4: Bus Priority Infrastructure Measures

It is intended that dedicated bus infrastructure will be developed to the greatest extent possible along the core routes in order to deliver continuous bus priority on the approaches to the city and through the core city centre area. This involves a combination of providing bus lanes and reconfiguring junction layouts and signal timings to ensure bus priority and consequent reliability of service.

On some approaches, and certainly through the city centre, it is not practical to achieve this within the constraints of the current road layout and allocation of space, and hence there will be an increasing emphasis on overall traffic management and the removal of through-traffic on the Cross-City Link, as set out in Section 4.3. A consequence of this alteration of traffic networks and bus routes is that the current bus lane on Bóthar Bhreandáin Uí hEithir and Forster Street is removed. The Forster Street section will be restricted to use by public transport and for local access only, and the Bóthar Bhreandáin Uí hEithir section will be converted for use by general traffic as part of the city centre access network.

It should be noted that concept design interventions developed at this stage are for high level appraisal purposes only in order to give confidence that the proposed network can be delivered. Further detailed investigations will be undertaken as these proposals progress through design and the statutory planning processes.

## 5.6 City Centre Public Transport Interchange

It is recognised that usage of public transport can be made significantly more attractive and convenient (as an alternative to the car) by providing opportunities for transfer between services, which can significantly increase the journey options for travellers. The number of destinations served on a single end-to-end service can be increased significantly by providing easy transfer to other services.

The opportunities for public transport interchange in the city centre under the Transport Strategy are illustrated in Figure 5.7, with aims and measures proposed summarised in Table 5.5. These measures will be advanced and implemented in accordance with Figure 10.2 and 10.3 in Chapter 10 of this report.

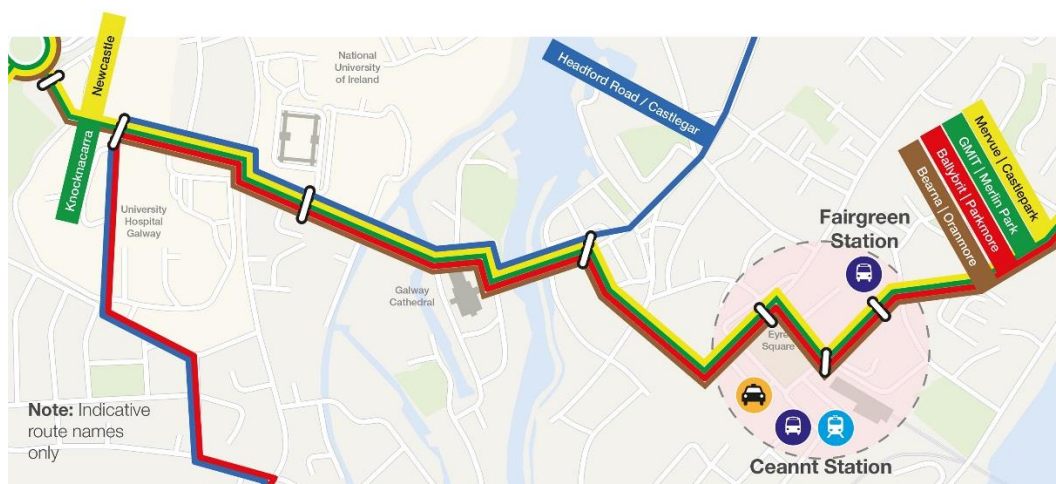


Figure 5.7: City Centre Public Transport Interchange

Aims	Proposed Measures	Design Development and Consideration of Alternatives
Maximise range of destinations by providing convenient interchange between public transport services	Eyre Square has been identified as the main hub for Bus/Bus transfer – as well as Bus/Train and Bus/Coach at Ceannt Station/Fairgreen Station. Other key bus transfer hubs will be located at: <ul style="list-style-type: none"> <li>• University Hospital; and</li> <li>• University Road/Cathedral.</li> </ul>	The location of interchange points is a function of the public transport routes. Design development has focused on Eyre Square as the primary location for interchange – due to its inherent advantages over other locations, as follows: <ul style="list-style-type: none"> <li>• It is located on all of the core bus routes;</li> <li>• It is proximate to Ceannt Station (bus and rail) and Fairgreen Station (bus);</li> <li>• It is already accommodating key bus stops;</li> <li>• It is a busy area and hence provides bus passengers with a secure waiting environment; and</li> <li>• It has retail and café/snack premises close by, which enhance the interchange experience.</li> </ul>
Implement multi-mode ticketing which allows transfer between modes	It is proposed that all services will allow for cross-ticketing such that passengers can transfer between routes without extra charges.	

Table 5.5: City Centre Public Transport Interchange – Strategic Aims and Proposed Measures

## 5.7 Supporting Measures for Local Public Transport

### 5.7.1 Traffic Restrictions in the City Centre

It is essential to the operation of a successful public transport system that bus priority is provided within the city centre area. Traffic management proposals to achieve this include:

- Restrictions to general traffic flow on University Road, College Road, Forster Street, Eglinton Street, Williamsgate Street, Prospect Hill, Victoria Place and around Eyre Square;
- Segregation of pedestrians from buses at Salmon Weir Bridge through provision of a new, parallel pedestrian bridge adjacent to the existing structure; and
- Designation of Salmon Weir Bridge as a public transport-only bridge crossing

### 5.7.2 Bus Fleet and Stops

As part of the public transport quality of service provision under this strategy, it is proposed to:

- Upgrade the existing city bus fleet for comfort (seating arrangements, Wi-Fi enabled vehicles, etc.);
- Provide vehicles suitable for access by mobility impaired persons, including wheelchair accessibility and space provision;
- Provide high-quality bus shelter facilities including seating, information panels, real-time information displays, with a standardised bus stop pole style and secure cycle parking where appropriate;
- Review and rationalise the spacing of stops across the network; and
- Integrate the bus fleet Automatic Vehicle Location (AVL) system and the Galway City Council Urban Traffic Control (UTC) system in order to allow the adaptive UTC system to enable and improve bus priority at signalised junctions.

### 5.7.3 Ticketing and Payment

It is proposed to:

- Introduce a simplified payment structure, comprising alternative fares for radial journeys to the city centre only and for cross-city journeys;
- Introduce the phased implementation of an easy-to-use cashless payment system by means of the Leap card and off-board ticketing;
- Investigate other forms of contactless payment in the coming years;
- Explore potential future integration with Demand-Responsive Transport systems, including Mobility as a Service (MaaS) – which essentially means that travel can be made across different modes but using a single mobile device application for journey information and payment.

### 5.7.4 Marketing and Branding

It is intended that a single ‘brand’ is applied to all local public transport in Galway (across all transport organisations); this will take the form of logos, maps, ticketing, timetables and signs. Branding will also be included in Mobility Management initiatives at major employment/educational facilities and School Transport Plans.

### 5.7.5 Access on Foot to Public Transport Stops

It is essential that passengers can walk directly to stops on the public transport network, and measures are proposed as follows:

- Around the city, it is proposed to carry out a continuous programme of improvements to address permeability and severance issues prevalent, with a view to maximising the walking catchment to stops on the bus network; and
- Other improvements along links and at junctions will seek to improve facilities for pedestrians, in particular those with mobility impairments.

### 5.7.6 Taxi and Demand Responsive Services

Eyre Square will remain the main central taxi rank. Locations for taxi ranks on the east and west of the city centre will also be identified such that taxis can travel directly to/from outer areas of the city without a need to travel through the centre, although they will be permitted to use the Cross-City Link.

It is recognised that taxi services will over time migrate to SMART-orientated, demand-responsive transport with information and payment via SMART device technology.

## 5.8 Environmental Assessment

The proposed public transport measures of the GTS have potential for appreciable positive impacts – particularly on human beings and transport-related factors. The measures also have some potential to negatively affect a range of other environmental factors, e.g. biodiversity, cultural heritage, *etc.* In order to avoid and mitigate potential adverse impact, the detailed development and consenting of various measures must have regard to the protective environmental policies and objectives of the statutory development plans for Galway City and for Galway County (refer to SEA Environmental Report – Appendix I), which will ensure that potential adverse impacts are avoided or are appropriately mitigated.

Potential for impact on European Sites is considered in detail in the following.

The proposed public transport elements of the GTS have the potential to adversely affect the integrity of European Sites. Section 5.8.1 below outlines the assessment of the potential impacts, the identified potential impact pathways to those European Sites potentially affected and references the corresponding mitigation measures (as detailed in Chapter 9). The full assessment is provided in the NIS in Appendix J.



### 5.8.1 Public Transport Network

The potential impact pathways associated with the proposed Public Transport Network and the European Site(s) which are potentially at risk of adverse effects on Site integrity are summarised below:

#### 5.8.1.1 Habitat Loss

Due to their locations within, or in close proximity to, European Sites some of the public transport infrastructure elements have the potential to result in direct loss of habitat in Galway Bay Complex SAC, Inner Galway Bay SPA or Lough Corrib SAC; habitat fragmentation is directly associated with this impact pathway. Loss of habitat from these European Sites, and indeed in any potential ex-situ sites supporting SCI bird species of the SPA (e.g. roost sites or feeding sites), has the potential to affect the conservation objectives supporting the Site's QI/SCI species.

These public transport elements are as follows (numerical references when given are as per Appendix D of the GTS):

- Park & Ride Facilities – the indicative location of the Western Distributor Road/R336 Bearna Road could affect habitats within Galway Bay Complex SAC, Inner Galway Bay or ex-situ sites linked with the latter and Lough Corrib SPA
- Rail – additional transport infrastructure at Ceannt Station and surrounding lands lie within or adjacent to Galway Bay Complex SAC and Inner Galway Bay SPA
- Providing additional coach parking at Ceannt Station/Galway Harbour may include lands within or adjacent to Galway bay Complex SAC and/or Inner Galway Bay SPA
- Salmon Weir Bridge (and associated with this measure is the provision of a new pedestrian bridge to the south of the Salmon Weir Bridge which must cross Lough Corrib SAC)
- D2.1.3 UHG Grounds/University Road – terminates at the Salmon Weir Bridge which is within Lough Corrib SAC
- D2.1.7 Coast Road – the existing road and associated hard standing lies within, or is adjacent to, Galway bay Complex SAC and lies adjacent to Inner Galway Bay SPA
- D2.1.8 Salthill Road Upper – the southern end of this corridor lies within Galway Bay Complex SAC and adjacent to Inner Galway Bay SPA
- D2.2.1 St. Vincent's Avenue/St. Francis Street/Eglinton Street – this corridor includes the Salmon Weir Bridge which is within Lough Corrib SAC
- D2.2.3 Forster Street/College Road – the northern end of this corridor lies in close proximity to Galway Bay Complex SAC and Inner Galway Bay SPA
- D2.2.4 Old Dublin Road – the western end of this corridor lies within and in close proximity to Galway Bay Complex SAC and adjacent to Inner Galway Bay SPA

Mitigation measures: refer to Box 1b in Chapter 9 below

### 5.8.1.2 Habitat degradation – hydrogeology

Although unlikely, there is the possibility that excavations associated with the installation of the public transport network may affect the existing hydrogeological regime which in turn may affect groundwater dependant habitats (and in some cases supported species) within European Sites. Given the likely nature of works associated with the infrastructure described in Appendix D of the GTS - which would be minimally invasive in terms of excavation requirements and with any such works being undertaken in the urban environment, poses little risk of interacting with groundwater – only elements adjacent to Lough Corrib SAC, Galway Bay Complex SAC or Inner Galway Bay SPA are likely to be at any risk of effects. However, even in those locations the risk is minimal.

Mitigation measures: refer to Box 2a in Section 3.2 below

### 5.8.1.3 Habitat degradation – water quality impacts during construction/operation

All of the public transport elements will be connected to the existing drainage network which ultimately discharges to Galway Bay via the River Corrib or other watercourses within the city and environs. Construction works therefore, have the potential to affect surface and/or groundwater quality which in turn could affect aquatic/wetland habitats, and potentially QI/SCI species, in Lough Corrib SAC, Galway Bay Complex SAC, Inner Galway Bay SPA and/or ex-situ sites which may support SCI species of Inner Galway Bay SPA or Lough Corrib SPA. Some elements are (or could potentially be) located within or in close proximity to European Sites and therefore may pose a greater risk in this regard (numerical references when given are as per Appendix D of the GTS):

- Park & Ride Facilities – the indicative locations given in Appendix E of the GTS are potentially hydrologically linked to Lough Corrib SAC, Galway Bay Complex SAC, Inner Galway Bay or ex-situ sites linked with Inner Galway Bay SPA or Lough Corrib SPA
- Additional transport infrastructure (rail or coach parking) at Ceannt Station/Galway Harbour or Galway Cathedral lies within or adjacent to Lough Corrib SAC, Galway Bay Complex SAC and Inner Galway Bay SPA
- D2.1.3 UHG Grounds/University Road – terminates at the Salmon Weir Bridge which is within Lough Corrib SAC
- D2.1.7 Coast Road – the existing road and associated hard standing lies within, or is adjacent to, Galway bay Complex SAC and lies adjacent to Inner Galway Bay SPA
- D2.1.8 Salthill Road Upper – the southern end of this corridor lies within Galway Bay Complex SAC and adjacent to Inner Galway Bay SPA
- D2.2.1 St. Vincent's Avenue/St. Francis Street/Eglington Street – this corridor includes the Salmon Weir Bridge which is within Lough Corrib SAC
- D2.2.3 Forster Street/College Road – the northern end of this corridor lies in close proximity to Galway Bay Complex SAC and Inner Galway Bay SPA
- D2.2.4 Old Dublin Road – the western end of this corridor lies within and in close proximity to Galway Bay Complex SAC and adjacent to Inner Galway Bay SPA

- D2.2.7 Headford Road/Dun na Coiribe/Castlelawn Heights/Tirellan Heights – crosses the Terryland River which drains to the River Corrib

Many of the GTS road infrastructure proposals will involve upgrades to the existing road network, in addition to new road infrastructure. Facilitating increased use of transport modes such as bus, bicycle and walking over individual car use in Galway City and its environs would be expected to reduce traffic levels and have a positive impact on water quality discharges from the city drainage network.

The GTS includes a number of new road infrastructure developments in Galway City, aside from the N6 GCRR: new road links from Newcastle Road to Bóthar Einde, from Dun na Coiribe to Castlelawn Heights, between Bóthar na dTreabh and the Tuam Road via Liosbán Industrial Estate, between Ballybrit Business Park and Parkmore Business Park, between Parkmore Link Road and the N17 and two links at Merlin Park (one from the Dublin Road and over the R446 at Doughiska). Road drainage, in the absence of any treatment measures, could contain pollutants such as hydrocarbons and heavy metals, which could impact on water quality in receiving watercourses and in Galway Bay. A reduction in water quality in receiving watercourses/waterbodies could affect sensitive QI habitats and QI/SCI species of European Sites downstream – Lough Corrib SAC, Galway Bay Complex SAC, Inner Galway Bay SPA and/or ex-situ sites which may support SCI species of Inner Galway Bay SPA or Lough Corrib SPA.

Mitigation measures: refer to Box 4, Box 5a and Box 5b in Chapter 9 below

#### **5.8.1.4 Habitat degradation – shading**

Upgrading the public transport network will/may require the provision of (or may be dependent on the delivery of) additional transport infrastructure in areas within or adjacent to European Sites which have the potential to affect habitat areas within Lough Corrib SAC as a result of direct shading:

- Salmon Weir Bridge (and associated with this measure is the provision of a new pedestrian bridge to the south of the Salmon Weir Bridge which must cross Lough Corrib SAC).

New bridge structures have the potential to result in shading effects (i.e. reduced sunlight and levels of direct precipitation) on habitats beneath the structure. Such impacts could potentially affect QI habitats and/or habitats which may support QI/SCI species of Lough Corrib SAC.

Mitigation measures: refer to Box 6 in Chapter 9 below

#### **5.8.1.5 Habitat degradation – non-native invasive species**

Introducing or spreading non-native invasive species during construction and/or operation (e.g. maintenance works) of any public transport network elements has the potential to affect habitats, and may as a consequence affect supported species, in Lough Corrib SAC, Lough Corrib SPA, Galway Bay Complex SAC, Inner

Galway Bay SPA and/or ex-situ sites which may support SCI species of Inner Galway Bay SPA or Lough Corrib SPA.

Mitigation measures: refer to Box 8 in Chapter 9 below

#### 5.8.1.6 Disturbance/displacement

Construction works and/or operation associated with elements of the public transport network has the potential to result in levels of disturbance that could potentially displace QI/SCI species from important habitat areas (e.g. breeding/resting places, such as roost sites for wintering birds, or foraging areas) within Lough Corrib SAC, Lough Corrib SPA, Galway Bay Complex SAC, Inner Galway Bay SPA and/or ex-situ sites which may support SCI species of Inner Galway Bay SPA or Lough Corrib SPA. Those in closest proximity to European Sites, and posing the greatest risk of effects, are:

- Park & Ride Facilities – the indicative locations given in Appendix E of the GTS are potentially located within or in close proximity to Lough Corrib SAC, Galway Bay Complex SAC, Inner Galway Bay or ex-situ sites linked with Inner Galway Bay SPA or Lough Corrib SPA
- Additional transport infrastructure (rail or coach parking) at Ceannt Station/Galway Harbour or Galway Cathedral lies within or adjacent to Lough Corrib SAC, Galway Bay Complex SAC and Inner Galway Bay SPA
- D2.1.3 UHG Grounds/University Road – terminates at the Salmon Weir Bridge which is within Lough Corrib SAC
- D2.1.7 Coast Road – the existing road and associated hard standing lies within, or is adjacent to, Galway Bay Complex SAC and lies adjacent to Inner Galway Bay SPA
- D2.1.8 Salthill Road Upper – the southern end of this corridor lies within Galway Bay Complex SAC and adjacent to Inner Galway Bay SPA
- D2.2.1 St. Vincent's Avenue/St. Francis Street/Eglinton Street – this corridor includes the Salmon Weir Bridge which is within Lough Corrib SAC
- D2.2.3 Forster Street/College Road – the northern end of this corridor lies in close proximity to Galway Bay Complex SAC and Inner Galway Bay SPA
- D2.2.4 Old Dublin Road – the western end of this corridor lies within and in close proximity to Galway Bay Complex SAC and adjacent to Inner Galway Bay SPA
- D2.2.7 Headford Road/Dun na Coiribe/Castlelawn Heights/Tirellan Heights – crosses the Terryland River which drains to the River Corrib

Mitigation measures: refer to Box 9 in Chapter 9 below

#### 5.8.1.7 Barrier effect

The Cross-City Link is an integral part of the Public Transport Network and includes for a new pedestrian bridge across Lough Corrib SAC, south of the Salmon Weir Bridge. Construction works and/or the new structure has the potential to create a barrier to fauna species movement (e.g. within foraging areas or along commuting routes).

Mitigation measures: refer to Box 10 in Chapter 9 below.

#### **5.8.1.8 Mortality Risk**

The Cross-City Link is an integral part of the Public Transport Network and includes for a new pedestrian bridge across Lough Corrib SAC, south of the Salmon Weir Bridge. Construction works have the potential to result in the mortality of QI/SCI species as a result of construction debris/materials accidentally falling onto aquatic/estuarine habitats.

Mitigation measures: refer to Box 11 in Chapter 9 below

## 6 Regional Public Transport

### 6.1 Regional/Inter-city/Commuter Bus & Coach Network

The principal destinations within the City for regional and national bus services will be Eyre Square, at Ceannt Station and at Fairgreen Coach Station. There are coach parking facilities on Merchants Road and at Galway Cathedral, which cater for tour buses and private coaches. Table 6.1 lists the strategic aims for regional public transport.

Aims	Proposed Measures	Design Development and Consideration of Alternatives
Coaches and buses should have reliable journey times in the city	Bus lanes proposed for city bus services are in general also suitable for buses and coaches which have origins and/or destinations outside the city.	Design development has focused on city centre traffic management and local bus priority measures – especially in the city centre. These measures are considered to match the aims for reliable coach services as the city network is a bigger cause of delay than more rural road links.
Good access in and out of bus/coach termini in the city centre	The proposed city centre traffic management, with reduced through-traffic and local distributor routes will ensure that coaches are able to access termini with minimal congestion.	
Interchange between regional and local public transport	A high-quality city bus network will provide interchange opportunities for regional bus travellers – such that passengers can switch modes at a rationalised number of hubs outside the city centre.	

Table 6.1: Regional/Inter-city/Commuter Bus & Coach Network - Strategic Aims and Proposed Measures

Regional services travelling to and from Galway City will for the most part avail of the infrastructure proposals within the city area, in addition to other proposals which extend to outside the city boundary, including the Tuam Road bus corridor scheme currently under development.

As part of the Cross-City Link proposal, the proposed traffic restrictions on College Road will significantly benefit services from the south, east and north-east; it is envisaged that College Road will become the primary route to and from the city for these services. College Road provides direct access to Fairgreen Coach Station and to Ceannt Station via Forster Street. For services approaching from the west and north-west, the proposed infrastructure measures on the western side of the city and the proposed restrictions on University Road and at the Salmon Weir Bridge contained in the Cross-City Link will provide high quality connectivity to and from the city centre.

The above mentioned measures will be advanced and implemented in accordance with Figures 10.2 and 10.3 in Chapter 10 of this report.

## 6.2 Rail

The sole rail connection to Galway is from the east, via a single-track line connecting to Athenry where interchange is possible with Limerick services, while the main line then continues onwards to the east towards Dublin. The single-track connection to Athenry limits the capacity of the existing service to and from Galway.

Ceannt Station will remain the terminus for rail services to Galway City, being ideally located for interchange with the proposed city bus network. The station will be the subject of redevelopment works in the coming years, and further redevelopment works in the area around Ceannt Quarter, and improvements at Eyre Square and Fairgreen as part of the Cross-City Link proposals will enhance the passenger experience for rail travel. Garraun will continue to act as a rail connection point for Oranmore. Table 6.2 indicates the strategic aims for rail.

Aims	Proposed Measures	Design Development and Consideration of Alternatives
Increase frequency of rail services	Rail services will continue to be reviewed to ensure passenger demand is met.	Ceannt Station redevelopment will provide an opportunity in the future to enhance interchange between rail and other modes, particularly local public transport.
Interchange between regional and local public transport	Ceannt Station will remain the terminus for rail services to Galway City and, pending major upgrades at the station, will significantly improve the offering for passengers. In addition, future redevelopment works in the vicinity of Ceannt Quarter will re-energise this part of the city centre, and this will complement Eyre Square and Fairgreen as a collective hub for interchange between services within Galway City Centre.	

Table 6.2: Rail Network - Strategic Aims and Proposed Measures

## 6.3 Park & Ride

Galway has a high proportion of travel with one end of the journey outside the city (at around 30% of motorised journeys). The provision of Park & Ride sites on approaches to the city will be important. Serving these with ‘normal’ scheduled bus services will maximise their financial viability and will also offer a wider range of destinations with the ability of passengers to interchange between routes on the core bus network.

This will provide alternatives to the private car for those accessing the city from the county and wider region, and thereby reduce traffic flows to and from the city.

A number of potentially suitable corridors for Park & Ride have been identified as part of the core bus network development. Further details on the identification of suitable Park & Ride sites are contained in **‘Appendix E – GTS Park & Ride Location Analysis’**. The selection of suitable indicative locations includes



examination of strategic radial corridors of travel to Galway, integration with the proposed city bus network and examining feasible corridors for suitability.

Park & Ride facilities will be developed within the existing road corridor and boundary where possible, or on existing brownfield sites in the first instance. Where this is not possible, greenfield sites will be explored. Any site investigation will require consideration of potential environmental impacts. The implementation of Park & Ride facilities will be as outlined in Figures 10.2 and 10.3 in Chapter 10 of this report.

It is intended that the capacity of these Park & Ride locations will grow organically over time as demand increases, but will initially be small-scale facilities.

Park & Ride aims and proposed measures as part of this strategy are summarised in Table 6.3.

Selection criteria for P&R sites.

Aims	Proposed Measures	Design Development and Consideration of Alternatives
Maximise destinations reachable by Park & Ride services	It is proposed to base Park & Ride on the city-wide core high-frequency public transport network such that a range of destinations can be reached.	Potential Park & Ride sites are proposed on the M6, the N17, the N59 and west of the city. Locations will need to be investigated in detail.
Ensure that Park & Ride is financially sustainable	Basing Park & Ride on the city-wide public transport network will maximise the financial viability of Park & Ride services. It is intended that the cost of Park & Ride will be integrated with the overall public transport journey fare for passengers.	

Table 6.3: Park & Ride - Strategic Aims

## 6.4 Tourist Coach Parking Management

Tourist and visitor coaches will require the provision of suitable drop-off/pick-up locations in the city centre, with layover spaces provided in locations outside the core city centre area. Routing for coaches should be planned such that use is made of priority bus lanes where appropriate. Strategic aims for the management of tourist coaches are indicated in Table 6.4.

Aims	Proposed Measures	Design Development and Consideration of Alternatives
Controlled coach drop-off/pick-up in the core city centre area	Possible sites identified to eliminate layover in the city centre are: <ul style="list-style-type: none"> <li>Galway Cathedral;</li> </ul>	Potential drop-off/pick-up locations will be investigated in detail in addition to setting out associated access routes in the city

Aims	Proposed Measures	Design Development and Consideration of Alternatives
Provision of managed layover coach parking areas outside the core city centre area	<ul style="list-style-type: none"> <li>Galway Harbour; and</li> <li>Merchants Road.</li> </ul>	centre (e.g. using the Cross-City City Link bus priority corridor).

Table 6.4: Tourist Coach Parking Management – Strategic Aims

The Galway City Coach Parking Study (2013) outlined the varying user groups of the existing city coach services; namely students, commuters and tourists.

In addition to the need to consider the requirement for coach parking to meet these needs, there is also an additional need to consider the specific parking requirements of European-style coaches, where passengers alight on the same side as the driver (unlike Irish coaches). There are therefore different parking requirements in order to address safety concerns.

At present there are three main locations in the city for coach parking purposes, and a number of ancillary, smaller individual areas. The principal location for coach parking in the city at present is at Galway Cathedral, serving a commuter and student function due to its proximity to the city centre and NUIG, and a tourist function due to its proximity to Galway Cathedral itself.

In summer months (tourism-related) and typically on Fridays (student-related) there is evidence of a lack of capacity at this location. The site at Galway Cathedral also contains approximately 170 parking spaces, which are available for a daily rate of €4 and are generally heavily occupied.

The second major parking site is at Eyre Square itself on the eastern and northern sides, where the city bus services also stop for interchange purposes. Layover for buses at this site can be up to 5 minutes due to timetabling, resulting in significant numbers of buses competing for a limited amount of available road space.

The third major coach parking site is along Merchants Road/Victoria Place/Forthill Street, where there is on-street parking for coach set-down use. These locations are proximate to a number of the major city centre hotels and are therefore popular for tourist coaches. These spaces are often used in the morning for delivery/loading purposes.

There are other, smaller facilities on Bóthar na mBan (adjacent to County Hall), Spanish Arch (at Jury's Inn), Forster Street (at Galway Coach Station) and in Salthill (at Seapoint Leisure Centre).

The Coach Parking Study outlined a number of core recommendations intended to improve capacity and safety, as follows:

- Re-locating parking provision at Galway Cathedral by removing approximately 40 existing parking spaces and providing 11 dedicated coach parking spaces in a dedicated coach parking area within the existing surface car park;

- Providing a 1.5m hatched buffer around the existing coach parking at the Cathedral, thereby increasing safety, but not increasing the number of coach parking spaces;
- Removal of on-street parking on Merchants Road – note that this proposal entails the removal of parking on both sides of the street in order to cater for European coach parking requirements. General parking would be displaced into the adjacent multi-storey car park on Merchants Road;
- Development of an 11-space coach parking facility at the rear of Ceannt Station, with access and egress via Lough Atalia Road;
- Re-development of a derelict site at the Docklands (the site of the disused silo tank storage) to provide 18 coach parking spaces;
- Development of a 9-space coach parking facility in Salthill (off-road).

Other recommendations included softer proposals, such as increased signage and the development and roll-out of a mobile application or a mobile-optimised website, possibly complementary to the NTA's 'Real-Time Ireland' app.

## 6.5 Environmental Assessment

The proposed regional public transport measures of the GTS have the potential for positive impacts – particularly on human beings and transport-related factors. The measures also have some limited potential to negatively affect a range of other environmental factors, *e.g.* relating to new infrastructure, park & ride facilities, *etc.* In order to avoid and mitigate potential adverse impact, the detailed development and consenting of various measures must have regard to the protective environmental policies and objectives of the statutory development plans for Galway City and for Galway County (refer to SEA Environmental Report – Appendix I), which will ensure that potential adverse impacts are avoided or are appropriately mitigated.

The proposed regional public transport elements of the GTS have the potential to adversely affect the integrity of European Sites. Section 5.8.1 above outlines the assessment of the potential impacts, the identified potential impact pathways to those European Sites potentially affected and references the corresponding mitigation measures (as detailed in Chapter 9). The full assessment is provided in the NIS in Appendix J.

## 7 Cycling, Walking & Public Realm

### 7.1 Cycling

#### 7.1.1 Existing Cycle Network

The existing cycle network in Galway remains limited, despite significant improvement works in recent years. The extent of dedicated cycle facilities in the city is low, and there are numerous gaps across the current network between facilities.

The main facilities are as follows:

- Raised adjacent cycle lanes on Seamus Quirke Road/Bishop O'Donnell Road, transitioning to on-road at junctions, from Deane Roundabout to Browne Roundabout. Additional short sections of on-road cycle lanes on the approach to Seamus Quirke Road on Ragoon Road and Letteragh Road;
- Raised adjacent cycle paths on the N6 Bóthar na dTreabh from the junction with Ballybane Road to the Kirwan Roundabout, transitioning to on-road at junctions. Additional short sections of on-road cycle lanes on the approach roads to the junctions, including the Ballybane Road, Ballybrit Business Park, the Tuam Road and the N17;
- Raised adjacent cycle paths on the Headford Road between the Bodkin Junction and Kirwan Roundabout, with short sections of on-road cycle lane to the south of Bodkin Junction;
- Raised adjacent cycle paths between Browne Roundabout and Bodkin Junction, including across the Quincentenary Bridge;
- On-road cycle paths on the Western Distributor Road between Blake Roundabout and Deane Roundabout;
- On-road cycle path northbound only on Threadneedle Road;
- Raised adjacent cycle paths through part of the Gateway Retail Park;
- Raised adjacent cycle paths along Bóthar an Chóiste between housing estates;
- On-road cycle paths on Parkmore Road;
- Underpass on the N6 at Briarhill providing a crossing facility;
- Raised adjacent cycle paths on Doughiska Road;
- Off-road segregated cycle path beside Ballyloughaun Road from the railway bridge to the beach;
- The Eglinton Canal paths and the Dangan Greenway, linking the NUIG sports grounds to the Quincentenary Bridge, University Road, and through the city canal network to Wolfe Tone Bridge;
- Off-road cycle path around South Park from Nimmo's Pier to Grattan Road;
- Shared footpath along Salthill Promenade from Grattan Road to Blackrock;
- Short section of on-road cycle paths on Lough Atalia Road, installed as part of the bridge lowering works in 2015; and
- Sections of the existing bus lanes are available for cyclist use, including on the Old Dublin Road, Ragoon Road, Bóthar Uí Eithir and part of Forster Street.

In addition to the existing cycle network, in early 2015 the Public Bike Share scheme was launched in Galway. This comprises a total of 195 bicycles at 15 docking stations in the city centre area. Expansion work is planned for 2016/2017 which will lead to additional docking stations if demand dictates need.

As part of the Galway Metropolitan Area Bus & Cycle Network Plan (2014), a Quality of Service (QoS) assessment was carried out on the existing cycle network, in accordance with the guidelines set out by the National Transport Authority. Full details of the QoS audit are provided in ‘**Appendix F – GTS Cycle Network & Infrastructure Development**’. The results of the QoS audit are shown below in Table 7.1.

Location	Type of Facility	Length of Facility	Quality of Service
Western Distributor Road	C3 – Cycle Lane	2 km	C
Seamus Quirke Road / Bishop O'Donnell Road	C2 – Cycle Track Immediately Adjacent	1.6 km	B
N6 Quincentenary Bridge (Browne Roundabout – Sean Mulvoy Junction)	C2 – Cycle Track Immediately Adjacent	1.6 km	B
Headford Road (Sean Mulvoy Junction – Kirwan Roundabout)	C2 – Cycle Track Immediately Adjacent	0.5 km	C
Bóthar na dTreabh ( Kirwan Roundabout – Lynch Roundabout)	C2 – Cycle Track Immediately Adjacent	2.4 km	B
Doughiska Road	C2 – Cycle Track Immediately Adjacent	1.4 km	D
Castlegar	C1 – Cycle Track Separated from Road	0.95 km	C
Rahoon Road (Outbound)	C3 – Cycle Lane	0.25 km	B
Rahoon Road (Inbound)	B1 – Bus Lane	0.4 km	C
Nimmo's Pier – Grattan Road	S2 – Shared Space	0.8 km	A
NUIG Campus - Quincentenary Bridge	G1 – Cycle Trail or Greenway / S2 – Shared Space	1.8 km	A
Quincentenary Bridge - NUIG Sports Grounds	G1 – Cycle Trail or Greenway / S2 – Shared Space	2.25 km	A
Galway Retail Park	C1 – Cycle Track Separated from Road	0.05 km	B
Dublin Road Outbound (French Junction – Renmore Park)	B1 – Bus Lane	0.7 km	C
Dublin Road Inbound (Doughiska Road – Renmore Park)	B1 – Bus Lane	3.3 km	C
Bóthar Uí Eithir	B1 – Bus Lane	0.18 km	C
Forster Street	B1 – Bus Lane	0.16 km	C

Table 7.1: Quality of Service Audit of Existing Cycle Network (GMA Bus & Cycle Network Plan 2014)

### 7.1.2 Development of Cycling Network

In order to meet strategic objectives, the overall aspiration of the proposed cycle network is to provide a safe and comfortable environment for cyclists in the city and surrounding areas, and in turn to support an increase in the number of cyclists and encourage a greater modal shift from the private car to cycling.

As an area with relatively flat topography and a compact city centre, Galway is ideally suited to cycling as a means of transport. However, the existing cycling facilities in the city and surrounding areas are limited and discontinuous. The cycle network proposed in this strategy is intended to maximise the provision of high quality dedicated cycling facilities and to improve measures giving priority to cyclists, encouraging uptake in cycling both for commuting and as a leisure activity in the city and surrounding areas.

The methodology adopted for the development of the cycle network is as follows:

1. Determination of appropriate cycle linkage requirements;
2. Identification of engineering constraints on potential cycle corridors; and
3. Development of preliminary cycle network proposals and identification of alternatives/mitigation measures where appropriate.

Further details on the development of the proposed cycle network and the associated infrastructure proposals are set out in ‘**Appendix F – GTS Cycle Network & Infrastructure Development**’.

The overall cycle network has been developed on the basis of three networks which support each other and reinforce connections across the urban area. These networks are classified as ‘primary’, ‘secondary’ and ‘feeder’ routes, indicating the desired function and character of the cycle route.

The proposed cycle network hierarchy is illustrated in Figure 7.1, while Table 7.2 details how the proposed measures meet the strategic aims for this mode. The proposed measures will be advanced and implemented as outlined in Figures 10.2 and 10.3 in Chapter 10 of this report.

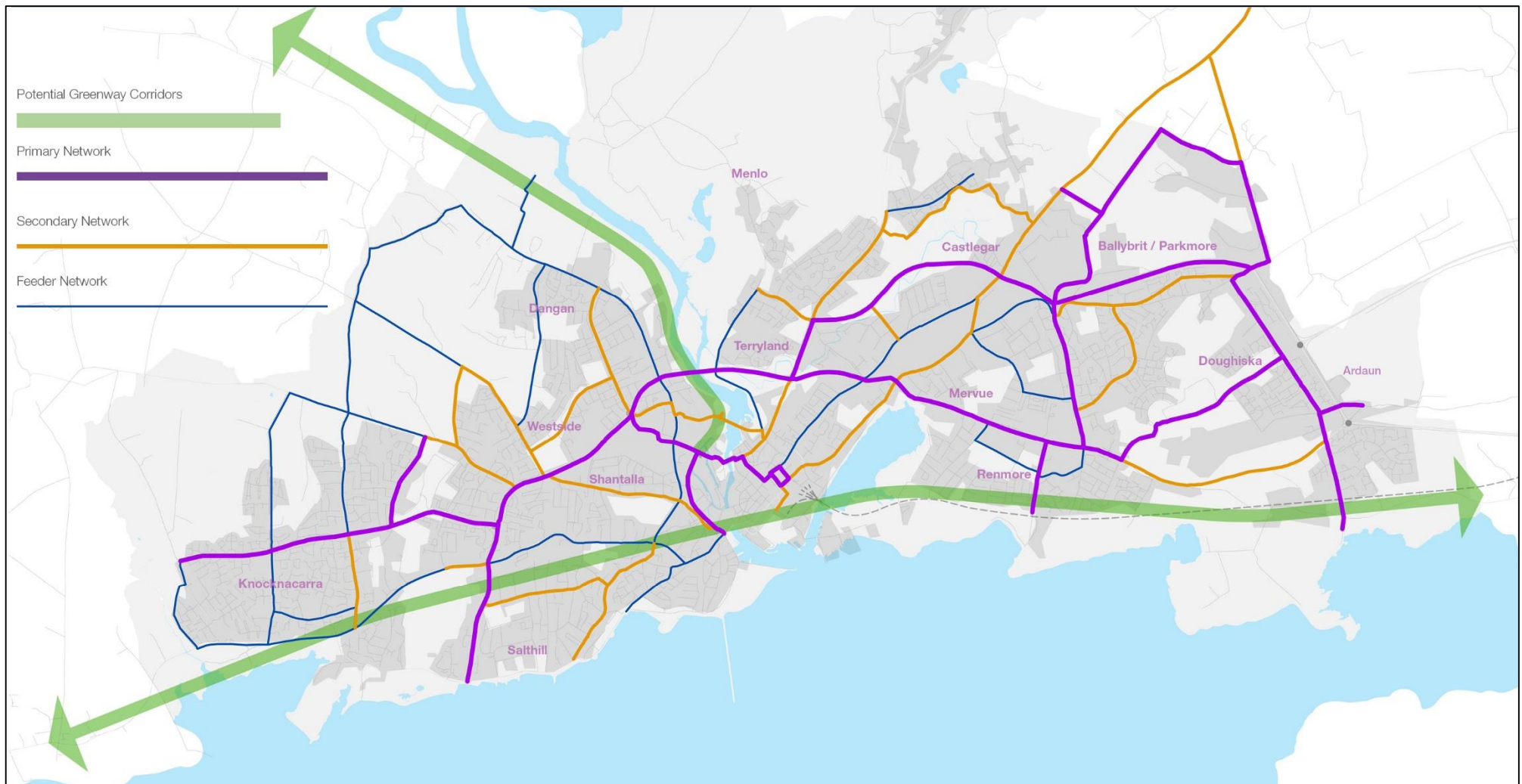


Figure 7.1: Proposed Cycle Network



Aims	Proposed Measures	Design Development and Consideration of Alternatives
To provide a primary ‘trunk’ cycle network which will provide a convenient and safe route for medium-distance radial commuter/leisure journeys	<p>The primary network includes two Greenways providing connectivity for cyclists from nearby towns and villages; one along the western bank of the River Corrib from Galway City to Oughterard, via Maigh Cuilinn; and one along the coast from An Spidéal to Oranmore, passing through Galway City. Furthermore, the latter will continue east, connecting to the Dublin-Galway Cycleway.</p> <p>As part of the Greenway network, it is proposed to carry out investigations to determine the feasibility of connecting from Eyre Square to Renmore via the existing rail crossing over Lough Atalia or via existing land links at Galway Port, as an alternative to a route to the north of Lough Atalia.</p> <p>Additional primary routes include a cross-city route to the north of the city, building on existing facilities, and a route through the city centre, along with some key north-south links. In general, primary routes are either segregated, off-road cycle only paths, or dedicated cycle lanes along new or existing roads. Wherever possible, these routes are separated from traffic by kerbs or edge markings.</p>	<p>Design development has considered various alternative cycle route corridors on the basis of:</p> <ul style="list-style-type: none"> <li>- Matching the primary network with the existing Greenway proposals and areas of high demand; and</li> <li>- Evaluation of the physical road space within which cycle infrastructure can realistically be delivered within the constraints of the existing land use.</li> </ul> <p>Conceptual designs have been prepared along sample links and at junctions and pinch points to verify that the proposed networks can be realised.</p> <p>The cycle network design has also included identifying junction upgrades (at a conceptual level) at numerous locations around the city, notably the signalisation of several large roundabout junctions. This will improve the safety of cyclists at these junctions, providing signalised crossing facilities and simplified junctions for cyclists to navigate.</p>
To provide a secondary cycle network which will provide a recognisable grid network for local journeys, and will be connected to the primary network for longer journeys.	<p>The secondary network provides connections from residential areas and areas of employment to the primary network and key destinations. Secondary links are a combination of off-road cycle paths, cycle lanes along existing roads, shared bus and cycle lanes, and traffic-calmed roads. They often run parallel to primary routes, providing an alternative link.</p> <p>In addition to this network, feeder links have been identified on streets and roads which are highly constrained or more suited to other modes, but need to cater for cyclists also. These are generally cycle-friendly advisory routes where traffic calming and management measures allow cyclists and motorists to mix safely.</p>	
To increase options for cycling in and across the city centre.	Through-traffic will be removed from the core city centre area. This will reduce the amount of motorised traffic on these roads, creating a shared environment where cyclists can safely use the street network. Cyclists will be permitted to use Salmon Weir Bridge, which is to be designated as public transport only as part of the Cross-City Link.	

Table 7.2: Cycle Network – Strategic Aims and Proposed Measures

### 7.1.3 Cycling Infrastructure Measures

Proposals for dedicated cycling infrastructure have been based on investigations made in previous studies as outlined in Section 2 which have been subject to detailed appraisal, as well as site visits to evaluate gaps in the network, physical

constraints, and changes to the network since the publication of previous studies and policies.

In order to develop a continuous, safe cycle network, the proposed routes are fully segregated to the greatest extent possible, with cyclists physically separated from motorised traffic. The proposed Greenways will form a central spine for this system, with off-road links extending east, west and north from the city centre. In the other networks, raised adjacent cycle lanes are provided along some routes, with a kerb providing segregation. In other cases, the network includes on-road cycle lanes and/or makes use of wide bus lanes to cater for both buses and cyclists along the same route.

In addition to this, proposed traffic management measures play a part in providing an environment that welcomes cyclists. The Cross-City Link is an important element in this, by limiting access to parts of the city for private motorised vehicles, and thereby providing priority for cyclists, pedestrians and public transport vehicles. On other routes, traffic management, traffic calming and signage is proposed to alert motorists to the presence of other road users and alter driver behaviour accordingly.

These measures are presented in Figure 7.2 below, while a list of the proposed interventions is provided in Table 7.3.

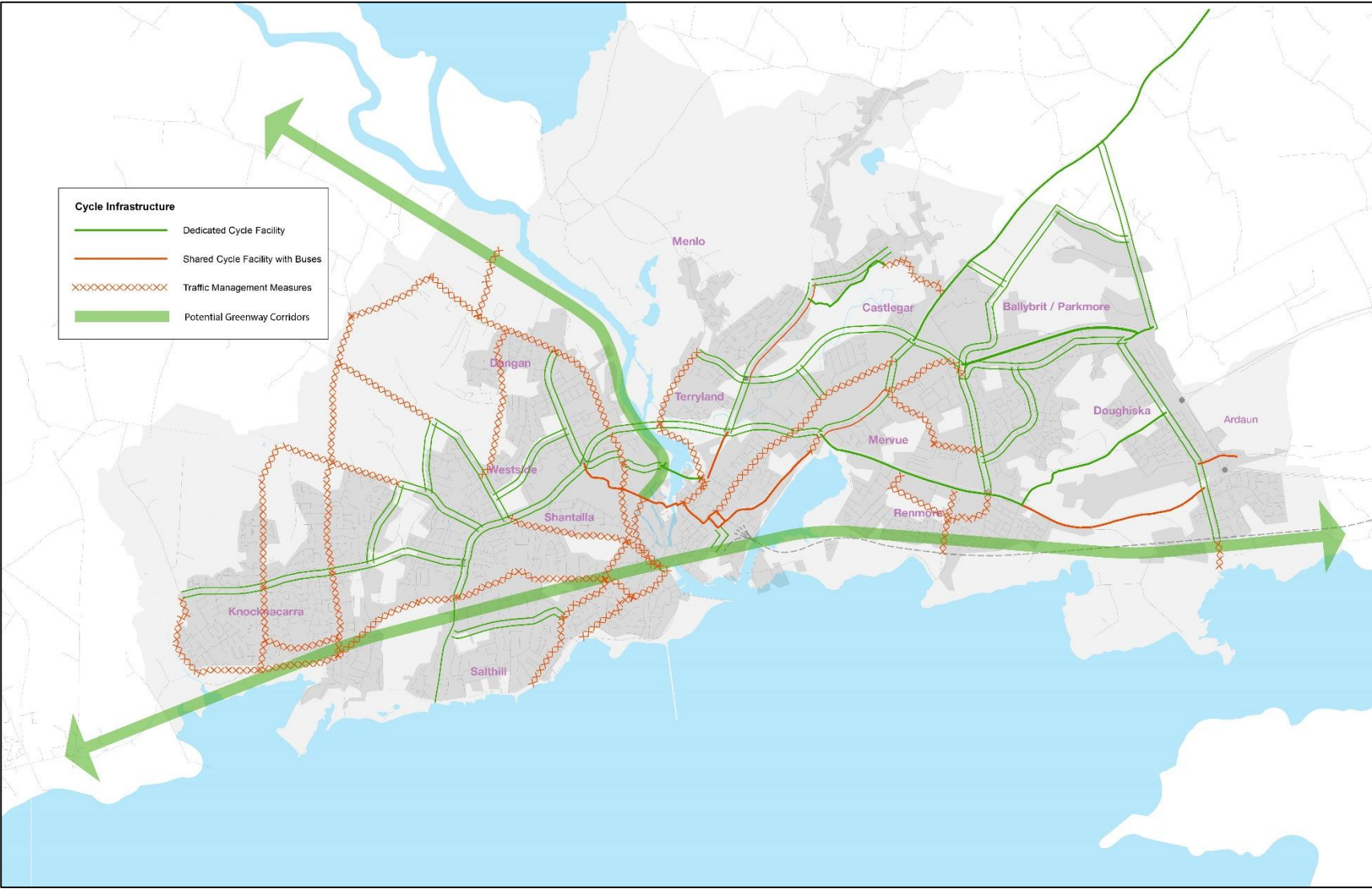


Figure 7.2: Proposed Cycling Infrastructure

Location	Infrastructure
University Road	Limited access for private motorised vehicles provides priority for cyclists, pedestrians and public transport.
Salmon Weir Bridge	Cyclists and public transport only.
St Francis Street	Cyclists and public transport only.
Eglinton Street	Cyclists and public transport only.
Williamsgate Street	Cyclists and public transport only.
Eyre Square	Cyclists and public transport only.
Forster Street	Cyclists and public transport only.
College Road	Limited access for private motorised vehicles provides priority for cyclists, pedestrians and public transport.
Lough Atalia Road	Greenway – two way segregated cycleway from the city to Renmore, potentially crossing Lough Atalia in the vicinity of the existing railway bridge, or circumnavigating the inlet to the north near Moneenageisha junction.
Renmore/Roscam	Greenway – two way segregated cycleway to the south of the Old Dublin Road to connect Galway City with Oranmore. This may re-use the existing section of segregated cycleway next to Ballyloughaun Road, and will form part of the Dublin-Galway Greenway.
Old Dublin Road	Two way segregated cycleway on the southern side of the road in the vicinity of Moneenageisha, crossing the Old Dublin Road and continuing along the northern side of the road as far as the current entrance to Merlin Park Hospital.
Old Dublin Road	Shared facility inbound with bus lane between the current entrance to Merlin Park Hospital and Doughiska Road.
Renmore Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Renmore Avenue	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Murrough Avenue	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Ballyloughaun Road	Traffic management and signage between the Old Dublin Road and the railway crossing. Existing two-way segregated cycle path south of the railway crossing to be maintained, and may form part of the Greenway.
Doughiska Road	On-road cycle lanes between the Old Dublin Road and the railway crossing. Traffic management and signage between the railway crossing and coast. These facilities are likely to link to the Greenway at some point, depending on its detailed design.
Doughiska Road	Existing cycle lanes to be upgraded along the Doughiska Road to give priority to cyclists and junctions and entrances, and extended to the south as far as the Old Dublin Road.
Merlin Woods	Two way off-road cycle path, with conversion of the current entrance to Merlin Park Hospital for use by cyclists and pedestrians only, and creation of a dedicated path through Merlin Woods and connecting to the Doughiska Road in the vicinity of Túr Uisce.
Ballybane Road	Raised adjacent cycle path on both sides.

Location	Infrastructure
Castlepark Road	On-road cycle lane on both sides of Castlepark Road between Ballybane Road and Monivea Road.
Monivea Road	Raised adjacent cycle path on both sides of the Monivea Road between Ballybane Road and Castlepark Road, transitioning to on-road cycle lanes on both sides from Castlepark Road to Briarhill Junction.
Briarhill	Cyclist priority crossing facilities to be retained or replaced on this junction. Current underpass may require reconfiguration for bus priority or road realignment. Segregation recommended if possible for ease of cyclist movement across this junction.
Ballybrit Crescent	On-road cycle lanes from Parkmore Roundabout to the R339 Monivea Road.
Parkmore Road	Retention of on-road cycle lanes from Parkmore Roundabout to the N17, with resurfacing and signage included to improve condition and encourage use.
Ballybrit Business Park	Extension of on-road cycle lanes at the entrance to Ballybrit Business Park and Ballybane Industrial Estate to the northern end of the business parks.
Parkmore West Business Park	On-road cycle lanes on both sides of the central road through Parkmore West Business Park, from Parkmore Roundabout to the western extremity of the business park.
Parkmore Link Road	New road link between Ballybrit Business Park and Parkmore Business Park to include on-road cycle lanes on both sides.
Parkmore-N17 Link Road	New road link between Parkmore Link Road and the N17 to include on-road cycle lanes on both sides.
Wellpark Road	On-road cycle lane opposite shared use bus lanes, i.e. inbound shared bus and cycle lane and outbound on-road cycle lane only between Moneenageisha Cross and GMIT Cluain Mhuire Campus, and inbound on-road cycle lane and outbound shared bus and cycle lane between Cluain Mhuire and Joyce Road.
Connolly Avenue	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
St. James' Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Monivea Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists between Wellpark Road and Ballybane Road.
Joyce Road	On-road cycle lanes on both sides.
Tuam Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists between Cemetery Cross/Joyce Roundabout and the junction with Joyce Road. On-road cycle lanes on both sides of the Tuam Road between Joyce Road and the N6 Bóthar na dTreabh.
N6 Bóthar na dTreabh	Retention of raised adjacent cycle lanes on both sides of the N6 from the junction with Ballybane Road to Kirwan Roundabout.
Bohermore	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Sean Mulvoy Road	Raised adjacent or off-road cycle path where possible. Additional proposal for traffic calming measures and signage to reduce vehicle speeds and advertise the presence of cyclists, particularly in the vicinity of Joyce Roundabout.

Location	Infrastructure
Moneenageisha Road	Raised adjacent or off-road cycle path where possible. Additional proposal for traffic calming measures and signage to reduce vehicle speeds and advertise the presence of cyclists in the vicinity of Joyce Roundabout and Moneenageisha Cross.
Headford Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists from the Town Hall to St. Bridget's Place. Proposed shared bus and cycle lane inbound between Bodkin Junction and St. Bridget's Place.
N6 Headford Road	Retention of raised adjacent cycle lanes on both sides of the N6 between Kirwan Roundabout and Bodkin Junction.
N84 Headford Road	Inbound shared bus and cycle lane and outbound on-road cycle lane only between Kirwan Roundabout and Baile an Chóiste.
N6-Liosbán Link Road	New road link between the N6 Bóthar na dTreabh and the Tuam Road via Liosbán Industrial Estate to include raised adjacent cycle lanes on both sides.
Baile an Chóiste	Retention of raised adjacent cycle lanes through Baile an Chóiste.
Ballinfoyle	Two way off-road cycle path from the Headford Road through Ballinfoyle, connecting to the Baile an Chóiste facility near Maigh Riocaird and leading on to Castlegar Village.
Castlegar	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists between the connection point of the Ballinfoyle cycleway and the N17.
N17 Tuam Road	Two way off-road cycleway along the eastern side of the N17 between the N6 Bóthar na dTreabh and Parkmore Road, switching to along the western side of the N17 between Parkmore Road and Baile Chláir.
Menlo Park	Raised adjacent cycle lanes on both sides.
Dyke Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists between Menlo Park Road and Waterside.
N6 Quincentenary Bridge	Retention of raised adjacent cycle lanes on both sides of the N6 between Browne Roundabout and Bodkin Junction.
Waterside	Two way off-road cycleway between the NUIG campus and Dyke Road, incorporating a cyclist and pedestrian bridge across the Corrib on the existing piers which previously formed part of the Clifden Railway Bridge.
NUIG	Retention and upgrade of the Dangan Greenway – a cycleway and footpath along the western bank of the River Corrib between the NUIG sports fields and University Road.
N59/Upper Newcastle	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists along the N59 between the Ballagh Road and the junction with the N6 Bóthar na dTreabh.
Lower Newcastle	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists along Lower Newcastle between the N6 Bóthar na dTreabh junction and University Road.
Canal Paths	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists on the cul-de-sacs and on the roads which cross the canals and canal paths. Retention of the canal paths as cyclist and pedestrian only routes.

Location	Infrastructure
UHG	Shared use for cyclists of the bus priority route through UHG connecting back entrance at Browne Roundabout, main entrance at University Road and southern entrance on Costello Road.
Old Seamus Quirke Road	On-road cycle lanes on both sides.
N59 Thomas Hynes Road	On-road cycle lanes on both sides.
Chestnut Lane	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Seamus Quirke Road / Bishop O'Donnell Road	Retention of raised adjacent cycle lanes on both sides between Browne Roundabout and Deane Roundabout
Bishop O'Donnell Road	Raised adjacent cycle lanes on both sides between Deane Roundabout and Threadneedle Cross.
Siobhán McKenna Road	On-road cycle lanes on both sides.
Circular Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Letteragh Road	On-road cycle lanes on both sides from Seamus Quirke Road to the edge of currently developed lands at Sliabh Ríoga, with a possibility of extending this with any future development. Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists from this point to the junction with the Gortaclea Road.
Ballagh Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Gortaclea Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Rahoon-Letteragh Link Road	New link connecting Rahoon and Letteragh Roads, with raised adjacent cycle lanes on both sides. This facility could alternatively be provided via internal roads through residential estates.
Rahoon Road	On-road cycle lanes on both sides from Seamus Quirke Road as far as Bóthar Stiofáin, with a possibility of extending this alongside future development. Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists beyond this point to the junction with the Clybaun Road.
Western Distributor Road	Upgrade of existing cycle lanes from Blake Roundabout to Deane Roundabout to raised adjacent cycle lanes, and extension of these as far west as Cappagh Road.
Bóthar Stiofáin	On-road cycle lanes on both sides.
Clybaun Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Ballymoneen Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Shantalla Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
St. Helen's Street	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Victoria Place	On-road cycle lanes on both sides.



Location	Infrastructure
Queen Street	On-road cycle lanes on both sides.
Dock Road	Greenway – two way segregated cycleway between Lough Atalia and the River Corrib. The exact route of this is yet to be determined pending detailed design.
Fr. Griffin Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Claddagh Quay/Spanish Arch	Proposal to investigate the feasibility of a new cyclist and pedestrian bridge across the Corrib as part of the Greenway development, to the south of the existing Wolfe Tone Bridge.
South Park	Retention of existing cycle and pedestrian path around South Park and Nimmo's Pier, which may form part of the Greenway.
Salthill/Bearna	Greenway – two way segregated cycleway to connect Galway City with Bearna, and beyond to Spiddal.
The Crescent	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Taylor's Hill	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Whitestrans Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Salthill Road Lower	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Salthill Road Upper	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Dr Mannix Road	On-road cycle lanes on both sides.
Threadneedle Road	On-road cycle lane northbound to be retained and extended to include the section from the Coast Road to Dr Mannix Road northbound only.
Kingston Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.
Shangort Road	Traffic management and signage to reduce vehicle speeds and advertise the presence of cyclists.

Table 7.3: Cycling Infrastructure Measures

The designs outlined in Table 7.3 were subject to design considerations relating to physical constraints such as the existing built environment and topography, the nature of an area, e.g. residential, commercial, and the journey types likely along each corridor and section of the network.

It should be noted that concept design interventions developed at this stage are for high level appraisal purposes only in order to give confidence that the proposed network can be delivered.

## **7.1.4 Supporting Measures for Cycling**

### **7.1.4.1 Bike Share Scheme**

The Coca-Cola Zero Bike Share Scheme was launched in Galway in November 2014. In Galway City, there are currently 15 hire stations. Further stations are planned, with future expansion possible depending on uptake. It is anticipated that the development of cycle facilities as outlined above will encourage higher numbers of cyclists, both on private and shared bikes.

### **7.1.4.2 Bicycle Parking**

Bicycle parking will be provided and/or upgraded near bus stops and key destinations such as the city centre, the rail and bus stations, schools and colleges, the hospitals, shopping areas and other large workplaces, and in the regional towns.

### **7.1.4.3 Permeability and Wayfinding**

Permeability is a key constraint for cyclists and pedestrians in Galway. Links between residential areas and/or workplaces will be improved for use by active modes, providing more direct routes. In addition, a cycle route signage programme is proposed in parallel to the development of the cycle network.

## **7.2 Walking**

### **7.2.1 Development of Pedestrian Network**

Galway has significant potential to build on the existing pedestrian environment for the city's residential and commercial community, shoppers and the significant number of tourists who visit the city all year round.

As a city of learning with a compact, walkable city centre, Galway City and its suburbs enjoys a high walking mode share of approximately 23% (source – Census 2011, Galway City & Suburbs), providing a strong foundation from which a prominent and sustainable walking culture can be fostered.

The benefits of pedestrian priority within the city centre are long-recognised, with the pedestrianised area from William Street through Shop Street, High Street and Quay Street representing a major asset to the local economy. Further afield, the canal walkways and the promenade at Salthill are other flagship pedestrian features, as well as amenity routes along the natural assets of Lough Atalia and the River Corrib. Furthermore, recent improvement works on major routes and at key junctions has included significant enhancement of the pedestrian facilities available, particularly at junctions where upgrading to signalisation has allowed for pedestrian priority.

The pedestrian network comprises every public footpath, walkway, open space and path within the study area. While the vast majority of the pedestrian network in the city and suburbs is of reasonably good quality, there are locations where the

pedestrian offering is limited, with sub-standard footpaths, lack of crossing facilities and low priority in the hierarchy of road users being common issues. The large roundabout junctions at Browne, Kirwan and Skerritt Roundabouts are illustrative of this issue, with any existing crossing facilities located a distance from the junctions themselves, and high pedestrian demand across these major junctions.

A major factor impacting the viability and the suitability of the existing pedestrian network within the city area is the mixture of strategic and cross-city traffic and pedestrian flows on links and junctions that cannot accommodate both modes suitably and safely. The routing of major traffic flows, often cross-city, through the city core area significantly impacts upon the existing pedestrian, cycling and public transport networks. Nowhere is this more evident than within the city centre core itself, around Eyre Square, and on the Salmon Weir and Wolfe Tone Bridges.

The Western Distributor Road also serves as an example of a route with numerous roundabout junctions that place an emphasis on facilitating vehicle flow, to the detriment of safe pedestrian movements. Cemetery Cross/Joyce Roundabout is a further example of a compact urban roundabout junction, carrying significant, often aggressive traffic flows and with a noticeable lack of pedestrian priority.

Other locations where there are noticeable deficiencies in the pedestrian network include along the Headford Road, specifically at the junction with Bóthar na mBan, on sections of Newcastle Road, Taylor's Hill Road, and further from the city centre in Castlegar and on Cappagh Road, among others. These represent areas where there are substandard footpath widths, lack of crossing facilities, and in some instances missing footpath links entirely.

Research carried out in recent years has indicated that the proportion of walking trips decreases considerably with increasing distance from the city centre.

The limited number of crossings of the River Corrib within the city centre also hinders walking, in particular due to poor quality pedestrian facilities and heavy traffic flow on the bridges.

Within the core city centre area, there will be a continued focus on improving and prioritising the pedestrian network to encourage and accommodate movement between places and to cater for mobility impaired persons.

The adoption of an integrated strategy, which removes significant volumes of motorised transport from the city centre will create the space to achieve this, thereby reinforcing the concept of Galway as a 'walking city'.

The Cross-City Link initiative outlined in Section 4.3 of this report will seek to reinforce the pedestrian at the top of the hierarchy of modes and underpin the planned transformation of the city centre. In particular, the inclusion of a new pedestrian-only bridge to the south of Salmon Weir Bridge provides a dedicated pedestrian link to facilitate and encourage further journeys on foot in the city centre.

The development of a new pedestrian and cyclist bridge to the south of the Wolfe Tone Bridge is also proposed as part of the potential Greenway route between

Bearna and Oranmore via Galway City. This will provide a safer crossing of the river for pedestrians than the footpath on the southern side of the Wolfe Tone Bridge, which currently experiences high levels of demand, and the informal crossing points at either end of the bridge as it cannot be crossed along its span due to the segregated footpath to the north. The Wolfe Tone Bridge will remain open to pedestrians, but the second bridge is expected to alleviate some of the pressure on it as a pedestrian crossing of the river, as well as providing a cyclist facility.

Outside of the city centre, emphasis will be given to increasing permeability within suburban residential areas, improving and updating the pedestrian network, increasing pedestrian safety and maximising pedestrian accessibility to the public transport network. Specific emphasis is also placed on improving connectivity and permeability in the industrial sites to the east of the city, including to, from and between Ballybrit and Parkmore industrial parks.

In order to provide a framework for developing measures, a series of aims for walking has been set out which provide a basis for developing specific plans for infrastructure proposals, as indicated in Table 7.4.

Aims	Proposed Measures	Design Development and Consideration of Alternatives
To provide improvements for pedestrians along city centre public transport corridors.	Provide a new pedestrian river crossing at Galway Cathedral, adjacent to Salmon Weir Bridge; and  Establish and implement a city centre public realm improvement programme (signage, surface materials and lighting), including pedestrianisation schemes, to create a comfortable, well connected walking environment.	Design development has considered: Priority movements for pedestrians and areas of key desire lines; Conflict points between modes and selecting the appropriate corridor to cater for each mode (i.e. prioritising footpaths, cycle lanes and/or bus lanes in particular locations); Gap analysis in the existing pedestrian network;
To increase priority given to pedestrians over road traffic.	Transform the character of the core city centre area with a clear emphasis on pedestrians through extended pedestrianised areas, traffic management, reducing pedestrian wait times at crossings, removal of through-traffic, reducing on-street parking availability and revised road and junction layouts; and  Enhance the pedestrian offering through upgrade of major roundabout junctions to include signalisation, and provide dedicated pedestrian facilities and priority.	Identification of areas of concern with regards to pedestrian safety; Junction upgrade proposals, incorporating pedestrian crossing facilities; and Permeability and pedestrian access to residential and employment areas.
To increase legibility and wayfinding.	Define a safe, legible city centre pedestrian network, providing for ease of movement for all users, including persons with mobility, visual and hearing impairments, and for those using buggies and prams; and  Implement a Smart Information and Integrated Wayfinding strategy for the city centre for all modes, including pedestrians. This will include wayfinding signage across the city and provision of information on walking, cycling	Conceptual designs have been prepared along sample road sections and at key junctions to illustrate potential layouts and the feasibility of proposed junction upgrades or other works.

Aims	Proposed Measures	Design Development and Consideration of Alternatives
	and public transport networks, to benefit the community and visitors alike.	
To increase the quality, comfort and safety of the pedestrian facilities.	A structured, prioritised programme of improvements will be undertaken across the pedestrian network, including providing new footpath facilities, widening existing facilities, providing new and improved crossing facilities, removal of street clutter, adapting junction layouts in order to minimise crossing distances and reduce vehicle speeds, and a program of improvements of pedestrian permeability through residential areas in order to create safe, secure environments that encourage and foster a strong walking culture.	

Table 7.4: Walking Network Design Measures

## 7.2.2 Supporting Measures for Walking

The transport strategy will ensure that the needs of pedestrians, including the mobility impaired and disabled, are fully considered in the design of all new facilities and upgrades of existing facilities. This will include:

- Revision of road junction layouts, where appropriate, to provide dedicated pedestrian crossings, reduce pedestrian crossing distances, provide more direct pedestrian routes and reduce the speed of turning traffic;
- Creation of permeable pedestrian environments in residential areas, amenable to walking, and maximising accessibility to the proposed bus network;
- In conjunction with An Garda Síochána, evaluate, and where appropriate seek the introduction of, lower speed limits in the core city centre area and on residential streets;
- Cooperation with other agencies in the enforcement of laws in relation to parking on footpaths;
- Removal of unnecessary street clutter to facilitate ease of movement along streets and through ‘places’; and
- Leisure Walking: advance the roll-out of the Greenway network, including the Oranmore-City Centre-Bearna Greenway, part of which links into the Dublin-Galway Cycleway, and the extension of the Dangan Greenway to Moycullen and beyond.

Any proposed measures will be advanced and implemented in accordance with Figures 10.2 and 10.3 in Chapter 10 of this report.

Permeability is a key constraint for cyclists and pedestrians in Galway. Links between residential areas and workplaces alike will be continuously improved as part of a structured, prioritised implementation programme based upon the principles above.

## 7.3 Public Realm

Galway City Council has committed to delivering a Public Realm Strategy in 2016.

The quality of the pedestrian environment is an important characteristic which influences residents, commuters, tourists and shoppers in their choice of destination and main mode of travel. The reallocation of road space to public transport in the city centre must therefore be accompanied by an associated improvement of the public realm – i.e. the receiving environment for passengers' onward journeys on foot.

This section outlines a number of specific measures to be implemented supporting Galway as a 'walking city' and enhancing city centre public realm, in turn strengthening Galway City ahead of becoming European Capital of Culture for 2020.

### 7.3.1 The Cross-City Link

The Cross-City Link concept aims to reinvent the current traffic and bus routes through the city centre as a multi-modal corridor within a high quality environment, with general traffic largely excluded. The Cross-City Link proposal includes the following elements, which are contributory factors to the enabling of public realm enhancements:

**Bus Priority:** The route will be subject to traffic restrictions such that road sections become essentially bus-only, with a commensurate reduction in traffic flows – but with local access and deliveries allowed on a permitted basis.

**General Traffic:** General traffic will be excluded from the corridor from Salmon Weir Bridge to the north-eastern end of Forster Street. A further bus only section is proposed for College Road to prevent general traffic from entering and leaving the city centre via College Road, with Lough Atalia Road designated as the main access route for general traffic and remaining a two-way road.

**Deliveries and Local Access:** Certain permitted vehicles will be allowed to travel on the Cross-City Link route for delivery and business purposes. A management system will be implemented in respect of permits, delivery times and locations of access, etc. Local businesses and residents will continue to be able to access their property.

**Legibility and Linkage:** The Cross-City Link will define a clear, legible corridor, linking places which currently have high pedestrian footfall and movement within the city centre. It will encompass the NUIG Campus and University Hospital Galway, continue past the Cathedral and Courthouse, through Eyre Square and on towards the Sportsgrounds. It creates a space within the city and immediate environs that considers pedestrians, cyclists and public transport above the private car, and will greatly strengthen these modes as viable choices for commuters and visitors alike.

**Key Locations:** Key locations along the route will be upgraded in respect of the urban landscape to create comfortable spaces for pedestrians:

- **University Road** – the gateway to the city from the west, accessing the canal network, NUIG and Nun’s Island (from the junction with Newcastle Road to Salmon Weir Bridge);
- **Cathedral Quarter** – comprising the front entrance to Galway Cathedral and surrounding street space;
- **A New Pedestrian Bridge** adjacent to Salmon Weir Bridge, providing an alternative to the sub-standard pedestrian facilities on Salmon Weir Bridge;
- **Courthouse (Waterside)** – a key riverfront area adjacent to the Cathedral Quarter;
- **St. Francis Street/Eglinton Street** – providing connectivity to the existing pedestrianised commercial areas on William Street, Shop Street and environs;
- **Eyre Square** – the principal destination within the city centre for shopping and recreation;
- **Ceannt Quarter** – incorporating Ceannt Station and rail/bus interchange; and
- **College Road** – the gateway to the city from the east.

The Cross-City Link is illustrated in Figure 7.3. Note that the following illustration is conceptual only and will be the subject of a separate design process. Further illustrative examples of the proposed public realm works, and a number of proposed photomontage views along the route are shown in ‘**Appendix G – GTS Public Realm Proposals**’.

### 7.3.2 Universal Design

The GTS will adopt an approach to design that is inclusive of all persons, in particular those who face specific challenges on a day-to-day basis when utilising the various modes of transport to travel around the city.

Many people are faced with a wide range of difficulties for end-to-end travel. In particular, people with disabilities, elderly people and parents with younger children are often presented with numerous obstacles to comfortable travel. While portions of their journey may indeed be of a high standard, and both accessible and comfortable, end-to-end travel, including interchange between modes can introduce numerous barriers, many of which are significant. Physical access to transport services can be hindered by poor quality footpaths, poor station or stop quality, barriers to movement (for example due to sub-standard crossing facilities) and by the behaviour of others (including illegal parking of vehicles on footways).

Access to information to allow users to suitably plan their journey represents a further constraint, with websites and mobile device applications not being designed to be universally accessible. Universal Design represents the adoption of an approach to designing services or their environment in a manner that can be accessed, understood and used by all persons, regardless of age, size, or ability.

It is an objective of the GTS therefore to foster and sustain an inclusive approach to the operation of the transport network, and all of its constituent travel modes. Network proposals, including both new proposals and the improvement of existing facilities, will be undertaken in a manner that fully considers the accessibility requirements of all prospective users. To this end, many of the proposals contained in the GTS are intended to achieve this objective.



Permeability improvements are intended to maximise accessibility to the various elements of the transport network, while improvements to the walking network will include upgrading existing sub-standard facilities in addition to implementing modern and comfortable facilities.

At the operational and management level, enforcement of restrictions on indiscriminate parking is recommended to ensure that ease of movement is not hindered. A number of major junctions are to be upgraded from large roundabout junctions to provide enhanced priority for vulnerable road users. The proposed public transport network developed for Galway City significantly increases the catchment of residential, commercial and educational facilities that will be within a 10 minute walk of a high frequency service, while land use recommendations contained in the GTS include an emphasis on focusing intensive development on corridors served by high quality public transport services.

Significantly, the 'Cross-City Link' proposal creates an opportunity to extend the provision of quality urban space for non-vehicular road users within the city centre.



Figure 7.3: The Cross-City Link – Public Realm Proposals

## 7.4 Environmental Assessment

The proposed cycling, walking and public realm measures of the GTS have the potential for significant positive impacts – particularly in relation to human beings. The measures also have the potential for some negative impacts – particularly in relation to biodiversity and this is also discussed in more detail under potential impact on European Sites below.

In order to avoid and mitigate potential adverse impact, the detailed development and consenting of various measures must have regard to the protective environmental policies and objectives of the statutory development plans for Galway City and for Galway County (refer to SEA Environmental Report – Appendix I), which will ensure that potential adverse impacts are avoided or are appropriately mitigated.

The detailed development and consenting of some measures – *e.g.* greenways may also be subject to further screening for requirement for Environmental Impact Assessment (EIA) or for assessment of potential impact for specific environmental factors, *e.g.* biodiversity, cultural heritage etc.

The proposed cycling and pedestrian elements of the GTS have the potential to adversely affect the integrity of European Sites. Sections 7.4.1 to 7.4.5 below outline the assessment of the potential impacts, the identified potential impact pathways to those European Sites potentially affected and references the corresponding mitigation measures (as detailed in Chapter 9). The full assessment is provided in the NIS in Appendix J.

### 7.4.1 Bearna Greenway

The potential impact pathways associated with the proposed Bearna Greenway and the European Site(s) which are potentially at risk of adverse effects on Site integrity are summarised below:

#### 7.4.1.1 Habitat Loss

As a route has not yet been selected for the Bearna Greenway, applying the precautionary principle, it has the potential to result in the direct loss of habitat (terrestrial and/or estuarine/marine) in Galway Bay Complex SAC and Inner Galway Bay SPA as the Greenway may follow the coastline between the city and Bearna Village; habitat fragmentation is directly associated with this impact pathway. Loss of habitat from these European Sites, and indeed in any potential ex-situ sites supporting SCI bird species of the SPA (*e.g.* high-tide roost sites or terrestrial feeding sites), has the potential to affect the conservation objectives supporting the Site's QI/SCI species.

Mitigation measures: refer to Box 1a in Chapter 9 below

#### **7.4.1.2 Habitat degradation – hydrogeology**

Although unlikely, there is the possibility that excavations associated with the Bearna Greenway may affect the existing hydrogeological regime which in turn may affect groundwater dependant habitats (and in some cases supported species) within European Sites. Given the likely nature of works associated with building a cycleway (which would be minimally invasive in terms of excavation requirements and therefore pose little risk of interacting with groundwater), and the underlying geology in this area (poorly productive granite bedrock), the Zone of Influence (ZoI) of any groundwater interaction would not be expected to extend beyond Galway Bay Complex SAC, Inner Galway Bay SPA, and wetland sites locally which may support SCI species of both Inner Galway Bay SPA and/or Lough Corrib SPA.

Mitigation measures: refer to Box 2a in Chapter 9 below

#### **7.4.1.3 Habitat degradation – water quality impacts during construction**

As the Bearna Greenway may be located adjacent to the coastline and/or must cross watercourses which drain to Galway Bay, construction works have the potential to affect surface, ground and/or coastal water quality. As a consequence, the Bearna Greenway could affect wetland/coastal/estuarine habitats, and potentially QI/SCI species, in Lough Corrib SAC, Galway Bay Complex SAC and/or coastal ex-situ sites which may support SCI species of Lough Corrib SPA.

Mitigation measures: refer to Box 4 in Chapter 9 below

#### **7.4.1.4 Habitat degradation – shading**

Any new bridge structures installed as part of the Bearna Greenway that are located within Galway Bay Complex SAC and/or Inner Galway Bay SPA, have the potential to result in shading effects (i.e. reduced sunlight and levels of direct precipitation) on habitats beneath the structure. Such impacts could potentially affect QI habitats and/or habitats which may support QI/SCI species of these European Sites.

Mitigation measures: refer to Box 6 in Chapter 9 below

#### **7.4.1.5 Habitat degradation – non-native invasive species**

Introducing or spreading non-native invasive species during construction and/or operation (e.g. maintenance works) of the Bearna Greenway has the potential to affect habitats, and may as a consequence affect supported species, in Lough Corrib SAC, Galway Bay Complex SAC and/or coastal ex-situ sites which may support SCI species of Lough Corrib SPA.

Mitigation measures: refer to Box 8 in Chapter 9 below

#### **7.4.1.6 Disturbance/displacement**

Construction works and/or operation associated with the Bearna Greenway has the potential to result in levels of disturbance that could potentially displace QI/SCI species from important habitat areas (e.g. breeding/resting places, such as high tide roosts for wintering birds, or foraging areas) within Galway Bay Complex, Inner Galway Bay SPA and potentially Lough Corrib SPA (coastal ex-situ sites which may support SCI species of this SPA).

Mitigation measures: refer to Box 9 in Chapter 9 below

#### **7.4.1.7 Barrier effect**

As the Bearna Greenway must cross the Bearna Stream (part of Galway Bay Complex SAC) and may affect other habitat areas within Galway Bay Complex SAC, construction works and/or any proposed new structures have the potential to create a barrier to fauna species movement (e.g. within foraging areas or along commuting routes).

Mitigation measures: refer to Box 10 in Chapter 9 below

### **7.4.2 Galway to Dublin Cycleway (Galway City to Oranmore)**

The potential impact pathways associated with the proposed Galway City to Oranmore section of the Galway to Dublin Cycleway and the European Site(s) which are potentially at risk of adverse effects on Site integrity are summarised below:

#### **7.4.2.1 Habitat Loss**

As a route has not yet been selected for this section of the Galway to Dublin Cycleway, applying the precautionary principle, it has the potential to result in the direct loss of habitat (terrestrial and/or estuarine/marine) in Galway Bay Complex SAC and Inner Galway Bay SPA as it may follow the coastline between the city and Oranmore Village; habitat fragmentation is directly associated with this impact pathway. Loss of habitat from these European Sites, and indeed in any potential ex-situ sites supporting SCI bird species of the SPA (e.g. high-tide roost sites or terrestrial feeding sites), has the potential to affect the conservation objectives supporting the Site's QI/SCI species.

Mitigation measures: refer to Box 1a in Chapter 9 below

#### **7.4.2.2 Habitat degradation – hydrogeology**

Although unlikely, there is the possibility that excavations associated with this section of the Galway to Dublin Cycleway may affect the existing hydrogeological regime which in turn may affect groundwater dependant habitats (and in some cases supported species) within European Sites. Given the likely nature of works associated with building a cycleway (which would be minimally invasive in terms of excavation requirements and therefore pose little risk of interacting with groundwater), the ZoI of any groundwater interaction would not

be expected to extend beyond Galway Bay Complex SAC or Inner Galway Bay SPA, and wetland sites locally which may support SCI species of both Inner Galway Bay SPA and/or Lough Corrib SPA. However, given the underlying karst geology, hydrogeological impacts affecting a wider area to include Cregganna Marsh SPA, Rahasane Turlough SAC, Rahasane Turlough SPA, Castletaylor Complex SAC, Kiltiernan Turlough SAC or Lough Fingall Complex SAC cannot be ruled out.

Mitigation measures: refer to Box 2a in Chapter 9 below

#### **7.4.2.3 Habitat degradation – water quality impacts during construction**

As this section of the Galway to Dublin Cycleway may be located adjacent to the coastline and/or must cross watercourses which drain to Galway Bay, construction works have the potential to affect surface, ground and/or coastal water quality. As a consequence, this section of the Galway to Dublin Cycleway could affect wetland/coastal/estuarine habitats, and potentially QI/SCI species, in Lough Corrib SAC, Galway Bay Complex SAC and/or coastal ex-situ sites which may support SCI species of Lough Corrib SPA.

Mitigation measures: refer to Box 4 in Chapter 9 below

#### **7.4.2.4 Habitat degradation – shading**

Any new bridge structures installed as part of this section of the Galway to Dublin Cycleway that are located within Galway Bay Complex SAC and/or Inner Galway Bay SPA, have the potential to result in shading effects (i.e. reduced sunlight and levels of direct precipitation) on habitats beneath the structure. Such impacts could potentially affect QI habitats and/or habitats which may support QI/SCI species of these European Sites.

Mitigation measures: refer to Box 6 in Chapter 9 below

#### **7.4.2.5 Habitat degradation – non-native invasive species**

Introducing or spreading non-native invasive species during construction and/or operation (e.g. maintenance works) of this section of the Galway to Dublin Cycleway has the potential to affect habitats, and may as a consequence affect supported species, in Lough Corrib SAC, Galway Bay Complex SAC and/or coastal ex-situ sites which may support SCI species of Lough Corrib SPA.

Mitigation measures: refer to Box 8 in Chapter 9 below

#### **7.4.2.6 Disturbance/displacement**

Construction works and/or operation associated with this section of the Galway to Dublin Cycleway has the potential to result in levels of disturbance that could potentially displace QI/SCI species from important habitat areas (e.g. breeding/resting places, such as high tide roosts for wintering birds, or foraging areas) within Galway Bay Complex, Inner Galway Bay SPA and potentially



Lough Corrib SPA (coastal ex-situ sites which may support SCI species of this SPA).

Mitigation measures: refer to Box 9 in Chapter 9 below

#### **7.4.2.7 Barrier effect**

As this section of the Galway to Dublin Cycleway may cross streams or coastal habitats within Galway Bay Complex SAC, construction works and/or any proposed new structures have the potential to create a barrier to fauna species movement (e.g. within foraging areas or along commuting routes).

Mitigation measures: refer to Box 10 in Chapter 9 below

### **7.4.3 Galway to Oughterard Greenway**

The potential impact pathways associated with the proposed Galway to Oughterard Greenway and the European Site(s) which are potentially at risk of adverse effects on Site integrity are summarised below:

#### **7.4.3.1 Habitat Loss**

As a route has not yet been selected for the Galway to Oughterard Greenway, applying the precautionary principle, it has the potential to result in the direct loss of habitat (terrestrial and/or aquatic) in Lough Corrib SAC and Lough Corrib SPA and Ross Lake and Woods; habitat fragmentation is directly associated with this impact pathway. Loss of habitat from these European Sites, and indeed in any potential ex-situ sites supporting SCI bird species of the SPA (e.g. roost sites or feeding sites), has the potential to affect the conservation objectives supporting the Site's QI/SCI species.

Mitigation measures: refer to Box 1a in Chapter 9 below

#### **7.4.3.2 Habitat degradation – hydrogeology**

Although unlikely, there is the possibility that excavations associated with the Galway to Oughterard Greenway may affect the existing hydrogeological regime which in turn may affect groundwater dependant habitats (and in some cases supported species) within European Sites. Given the likely nature of works associated with building a cycleway (which would be minimally invasive in terms of excavation requirements and therefore pose little risk of interacting with groundwater), and the locations of groundwater bodies in that area, the ZoI of any groundwater interaction would not extend beyond Lough Corrib SAC, Lough Corrib SPA or Ross Lake and Woods SAC, and/or wetland sites locally which may support SCI species of Lough Corrib SPA.

Mitigation measures: refer to Box 2a in Chapter 9 below



#### **7.4.3.3 Habitat degradation – water quality impacts during construction**

As the Galway to Oughterard Greenway may be located within or adjacent to Lough Corrib SAC, Lough Corrib SPA and/or Ross Lake and Woods SAC and/or must cross watercourses which drain to these European Sites and to Galway Bay, construction works have the potential to affect surface and/or groundwater quality. As a consequence, the Galway to Oughterard Greenway could affect wetland habitats, and potentially QI/SCI species, in Lough Corrib SAC, Lough Corrib SPA, Ross Lake and Woods SAC, Galway Bay Complex SAC, and/or ex-situ sites which may support SCI species of Lough Corrib SPA.

Mitigation measures: refer to Box 4 in Chapter 9 below

#### **7.4.3.4 Habitat degradation – shading**

Any new bridge structures installed as part of the Galway to Oughterard Greenway that are located within Lough Corrib SAC, Lough Corrib SPA and/or Ross Lake and Woods SAC, have the potential to result in shading effects (i.e. reduced sunlight and levels of direct precipitation) on habitats beneath the structure. Such impacts could potentially affect QI habitats and/or habitats which may support QI/SCI species of these European Sites.

Mitigation measures: refer to Box 6 in Chapter 9 below

#### **7.4.3.5 Habitat degradation – non-native invasive species**

Introducing or spreading non-native invasive species during construction and/or operation (e.g. maintenance works) of the Galway to Oughterard Greenway has the potential to affect habitats, and may as a consequence affect supported species, in Lough Corrib SAC, Lough Corrib SPA, Ross Lake and Woods SAC, Galway Bay Complex downstream, and/or ex-situ sites which may support SCI species of Lough Corrib SPA.

Mitigation measures: refer to Box 8 in Chapter 9 below

#### **7.4.3.6 Disturbance/displacement**

Construction works and/or operation associated with the Galway to Oughterard Greenway has the potential to result in levels of disturbance that could potentially displace QI/SCI species from important habitat areas (e.g. breeding/resting places, such as roost sites for wintering birds, or foraging areas) within Lough Corrib SAC, Lough Corrib SPA, Ross Lake and Woods SAC and/or ex-situ sites which may support SCI species of Lough Corrib SPA.

Mitigation measures: refer to Box 9 in Chapter 9 below

#### **7.4.3.7 Barrier effect**

As this section of the Galway to Oughterard Greenway may cross streams or linear habitats within Lough Corrib SAC and/or Ross Lake and Woods SAC,

construction works and/or any proposed new structures have the potential to create a barrier to fauna species movement (e.g. within foraging areas or along commuting routes).

Mitigation measures: refer to Box 10 in Chapter 9 below

#### 7.4.4 Cycle Network (Non-Greenway Elements)

The potential impact pathways associated with the proposed Non-Greenway elements of the Cycle Network and the European Site(s) which are potentially at risk of adverse effects on Site integrity are summarised below:

##### 7.4.4.1 Habitat Loss

Due to their locations within, or in close proximity to, European Sites some of the non-greenway cycle network infrastructure elements have the potential to result in direct loss of habitat in Lough Corrib SAC, Galway Bay Complex SAC or Inner Galway Bay SPA; habitat fragmentation is directly associated with this impact pathway. Loss of habitat from these European Sites, and indeed in any potential ex-situ sites supporting SCI bird species of the SPA (e.g. roost sites or feeding sites), has the potential to affect the conservation objectives supporting the Site's QI/SCI species.

These non-greenway cycle network elements are as follows (numerical references when given are as per Appendix F of the GTS):

- F4.1 Knocknacarra South – includes a feeder cycle corridor along the coast road/R336 which lies within, or is adjacent to, Galway Bay Complex SAC and lies adjacent to Inner Galway Bay SPA (the Bearna Greenway also forms part of the proposals in this area and is described separately under that heading)
- F4.2 Salthill – includes Threadneedle Road, Salthill Road Upper and Whitestrand Road, sections of which either lie within or adjacent to Galway Bay Complex SAC and Inner Galway Bay SPA
- F4.6 Newcastle & Dangan – includes the N6/Quincentenary Bridge, NUIG and Chestnut Lane sections of which lie either within or adjacent to Lough Corrib SAC (the Galway to Oughterard Greenway also forms part of the proposals in this area and is described separately under that heading)
- F4.7 City Centre – includes new bridges over the River Corrib at the site of the Old Clifden Railway Bridge, the Salmon Weir Bridge and Wolfe Tone Bridge, and proposed works along College Road. The first two locations cross Lough Corrib SAC, the area south of Wolfe Tone Bridge crosses Galway Bay Complex SAC, and the proposed works along College Road lies in close proximity to Galway Bay Complex SAC and Inner Galway Bay SPA
- F4.8 Terryland and Ballinfoyle – includes the N6/Quincentenary Bridge, which crosses Lough Corrib SAC, and Dyke Road, sections of which lie adjacent to Lough Corrib SAC
- F4.10 Renmore & Dublin Road – includes College Road, the Dublin Road and Doughiska Road. The northern end of College Road lies in close proximity to Galway Bay Complex SAC and Inner Galway Bay SPA, the western end of the Dublin Road lies within and in close proximity to Galway Bay Complex

SAC and adjacent to Inner Galway Bay SPA, and the southern end of Doughiska Road lies adjacent to Galway Bay Complex SAC and Inner Galway Bay SPA (the proposed Galway City to Oranmore section of the Galway to Dublin Cycleway also forms part of the proposals in this area and is described separately under that heading)

- Supporting measures to expand the bike share scheme, provide for and upgrade bicycle parking facilities, and improve cycling permeability across the city are not location specific and could potentially affect European Sites within Galway City – Lough Corrib SAC, Galway Bay Complex SAC and Inner Galway Bay SPA
- A greenway connecting Eyre Square and Renmore (in the vicinity of Galway Port or the existing rail crossing over Lough Atalia) would cross Galway Bay Complex SAC and Inner Galway Bay SPA

Mitigation measures: refer to Box 1b in Chapter 9 below

#### **7.4.4.2 Habitat degradation – hydrogeology**

Although unlikely, there is the possibility that excavations associated with the installation of non-greenway cycle network elements may affect the existing hydrogeological regime which in turn may affect groundwater dependant habitats (and in some cases supported species) within European Sites. The likely nature of works associated with the majority of infrastructure described in Appendix F of the GTS and would be minimally invasive in terms of excavation requirements and with any such works being undertaken in the urban environment, poses little risk of interacting with groundwater – only elements adjacent to Lough Corrib SAC, Galway Bay Complex SAC or Inner Galway Bay SPA are likely to be at any real risk of effects (see list above under habitat loss). Installation of new bridge structures may be more likely to interact with groundwater. However, as these bridges are all associated with a modified urban landscape in the city centre, the risk is likely to remain low.

Mitigation measures: refer to Box 2a in Chapter 9 below

#### **7.4.4.3 Habitat degradation – water quality impacts during construction**

Many of the non-greenway cycle network elements may be connected to the existing drainage network which ultimately discharges to Galway Bay via the River Corrib or other watercourses within the city and environs. Construction works therefore, have the potential to affect surface and/or groundwater quality which in turn could affect aquatic/wetland habitats, and potentially QI/SCI species, in Lough Corrib SAC, Galway Bay Complex SAC, Inner Galway Bay SPA and/or ex-situ sites which may support SCI species of Inner Galway Bay SPA or Lough Corrib SPA. Some elements are (or could potentially be) located within or in close proximity to European Sites and therefore may pose a greater risk in this regard (numerical references when given are as per Appendix F of the GTS):

- F4.1 Knocknacarra South – includes a feeder cycle corridor along the coast road/R336 which lies within, or is adjacent to, Galway Bay Complex SAC and lies adjacent to Inner Galway Bay SPA (the Bearna Greenway also forms part of the proposals in this area and is described separately under that heading)
- F4.2 Salthill – includes Threadneedle Road, Salthill Road Upper and Whitestrand Road, sections of which either lie within or adjacent to Galway Bay Complex SAC and Inner Galway Bay SPA
- F4.3 Shantalla – includes facilities along the canals which are hydrologically linked to Lough Corrib SAC, Galway Bay Complex SAC and Inner Galway Bay SPA via the River Corrib
- F4.6 Newcastle & Dangan – includes the N6/Quincentenary Bridge, NUIG and Chestnut Lane sections of which lie either within or adjacent to Lough Corrib SAC (the Galway to Oughterard Greenway also forms part of the proposals in this area and is described separately under that heading)
- F4.7 City Centre – includes new bridges over the River Corrib at the site of the Old Clifden Railway Bridge, the Salmon Weir Bridge and Wolfe Tone Bridge, and proposed works along College Road. The first two locations cross Lough Corrib SAC, the area south of Wolfe Tone Bridge crosses Galway Bay Complex SAC, and the proposed works along College Road lies in close proximity to Galway Bay Complex SAC and Inner Galway Bay SPA
- F4.8 Terryland and Ballinfoyle – includes the N6/Quincentenary Bridge, which crosses Lough Corrib SAC, and Dyke Road, sections of which lie adjacent to the River Corrib (Lough Corrib SAC)
- F4.10 Renmore & Dublin Road – includes College Road, the Dublin Road and Doughiska Road. The northern end of College Road lies in close proximity to Galway Bay Complex SAC and Inner Galway Bay SPA at Lough Atalia, the western end of the Dublin Road lies within and in close proximity to Galway Bay Complex SAC and adjacent to Inner Galway Bay SPA at Lough Atalia, and the southern end of Doughiska Road lies adjacent to Galway Bay Complex SAC and Inner Galway Bay SPA at Oranmore Bay (the proposed Galway City to Oranmore section of the Galway to Dublin Cycleway also forms part of the proposals in this area and is described separately under that heading)
- Supporting measures to expand the bike share scheme, provide for and upgrade bicycle parking facilities, and improve cycling permeability across the city are not location specific and could potentially affect European Sites within Galway City – Lough Corrib SAC, Galway Bay Complex SAC and Inner Galway Bay SPA
- A greenway connecting Eyre Square and Renmore (in the vicinity of Galway Port or the existing rail crossing over Lough Atalia) would cross Galway Bay Complex SAC and Inner Galway Bay SPA at Lough Atalia

Many of the non-greenway cycle elements are likely to be dependent on either upgrades to the existing road infrastructure, or proposed new road infrastructure – this is assessed above under *Habitat degradation – water quality impacts during construction/operation* in the Public Transport Network section.

Mitigation measures: refer to Box 4 in Chapter 9 below

#### 7.4.4.4 Habitat degradation – shading

Upgrading the non-greenway cycle network will/may require the provision of (or may be dependent on the delivery of) additional transport infrastructure in areas within or adjacent to European Sites which have the potential to affect habitat areas within those Sites as a result of direct shading:

- The secondary cycle network includes for a proposed new bridge over the River Corrib along the line of the Old Clifden Railway at NUI Galway/Waterside which crosses Lough Corrib SAC
- Facilitating city cycling relies upon the Cross-City Link which includes for a new pedestrian bridge across Lough Corrib SAC, south of the Salmon Weir Bridge
- Connecting a greenway between Eyre Square and Renmore may impact on Galway Bay Complex SAC and Inner Galway Bay SPA at Lough Atalia
- A proposed new cycle/pedestrian bridge over the River Corrib, to the south of Wolfe Tone Bridge, must cross Galway Bay Complex SAC

New bridge structures have the potential to result in shading effects (i.e. reduced sunlight and levels of direct precipitation) on habitats beneath the structure. Such impacts could potentially affect QI habitats and/or habitats which may support QI/SCI species of Lough Corrib SAC, Galway Bay Complex SAC or Inner Galway Bay SPA.

Mitigation measures: refer to Box 6 in Chapter 9 below

#### 7.4.4.5 Habitat degradation – non-native invasive species

Introducing or spreading non-native invasive species during construction and/or operation (e.g. maintenance works) of any non-greenway cycle network elements has the potential to affect habitats, and may as a consequence affect supported species, in Lough Corrib SAC, Lough Corrib SPA, Galway Bay Complex SAC, Inner Galway Bay SPA and/or ex-situ sites which may support SCI species of Inner Galway Bay SPA or Lough Corrib SPA.

Mitigation measures: refer to Box 8 in Chapter 9 below

#### 7.4.4.6 Disturbance/displacement

Construction works and/or operation associated with elements of the non-greenway cycle network has the potential to result in levels of disturbance that could potentially displace QI/SCI species from important habitat areas (e.g. breeding/resting places, such as roost sites for wintering birds, or foraging areas) within Lough Corrib SAC, Lough Corrib SPA, Galway Bay Complex SAC, Inner Galway Bay SPA and/or ex-situ sites which may support SCI species of Inner Galway Bay SPA or Lough Corrib SPA. Those in closest proximity to European Sites, and posing the greatest risk of effects, are:

- F4.1 Knocknacarra South – includes a feeder cycle corridor along the coast road/R336 which lies within, or is adjacent to, Galway Bay Complex SAC and

lies adjacent to Inner Galway Bay SPA (the Bearna Greenway also forms part of the proposals in this area and is described separately under that heading)

- F4.2 Salthill – includes Threadneedle Road, Salthill Road Upper and Whitestrand Road, sections of which either lie within or adjacent to Galway Bay Complex SAC and Inner Galway Bay SPA
- F4.6 Newcastle & Dangan – includes the N6/Quincentenary Bridge, NUIG and Chestnut Lane sections of which lie either within or adjacent to Lough Corrib SAC (the Galway to Oughterard Greenway also forms part of the proposals in this area and is described separately under that heading)
- F4.7 City Centre – includes new bridges over the River Corrib at the site of the Old Clifden Railway Bridge, the Salmon Weir Bridge and Wolfe Tone Bridge, and proposed works along College Road. The first two locations cross Lough Corrib SAC, the area south of Wolfe Tone Bridge crosses Galway Bay Complex SAC, and the proposed works along College Road lies in close proximity to Galway Bay Complex SAC and Inner Galway Bay SPA
- F4.8 Terryland and Ballinfoyle – includes the N6/Quincentenary Bridge, which crosses Lough Corrib SAC, and Dyke Road, sections of which lie adjacent to Lough Corrib SAC
- F4.10 Renmore & Dublin Road – includes College Road, the Dublin Road and Doughiska Road. The northern end of College Road lies in close proximity to Galway Bay Complex SAC and Inner Galway Bay SPA, the western end of the Dublin Road lies within and in close proximity to Galway Bay Complex SAC and adjacent to Inner Galway Bay SPA, and the southern end of Doughiska Road lies adjacent to Galway Bay Complex SAC and Inner Galway Bay SPA (the proposed Galway City to Oranmore section of the Galway to Dublin Cycleway also forms part of the proposals in this area and is described separately under that heading)
- Supporting measures to expand the bike share scheme, provide for and upgrade bicycle parking facilities, and improve cycling permeability across the city are not location specific and could potentially affect European Sites within Galway City – Lough Corrib SAC, Galway Bay Complex SAC and Inner Galway Bay SPA
- A greenway connecting Eyre Square and Renmore (in the vicinity of Galway Port or the existing rail crossing over Lough Atalia) would cross Galway Bay Complex SAC and Inner Galway Bay SPA

Mitigation measures: refer to Box 9 in Chapter 9 below

#### 7.4.4.7 Barrier effect

Construction works associated with the new structures, or the structures themselves, have the potential to create a barrier to fauna species movement (e.g. within foraging areas or along commuting routes):

- The secondary cycle network includes for a proposed new bridge over the River Corrib along the line of the Old Clifden Railway at NUI Galway/Waterside which crosses Lough Corrib SAC



- Facilitating city cycling relies upon the Cross-City Link which includes for a new pedestrian bridge across Lough Corrib SAC, south of the Salmon Weir Bridge
- Connecting a greenway between Eyre Square and Renmore may impact on Galway Bay Complex SAC at Lough Atalia
- A proposed new cycle/pedestrian bridge over the River Corrib, to the south of Wolfe Tone Bridge, must cross Galway Bay Complex SAC

Mitigation measures: refer to Box 10 in Chapter 9 below

#### 7.4.4.8 Mortality Risk

Construction works associated with the new structures have the potential to result in the mortality of QI/SCI species as a result of construction debris/materials accidentally falling onto aquatic/estuarine habitats:

- The secondary cycle network includes for a proposed new bridge over the River Corrib along the line of the Old Clifden Railway at NUI Galway/Waterside which crosses Lough Corrib SAC.
- Facilitating city cycling relies upon the Cross-City Link which includes for a new pedestrian bridge across Lough Corrib SAC, south of the Salmon Weir Bridge.
- Connecting a greenway between Eyre Square and Renmore may impact on Galway Bay Complex SAC and Inner Galway Bay SPA at Lough Atalia.
- A proposed new cycle/pedestrian bridge over the River Corrib, to the south of Wolfe Tone Bridge, must cross Galway Bay Complex SAC

Mitigation measures: refer to Box 11 in Chapter 9 below

#### 7.4.5 Pedestrian Network

The potential impact pathways associated with the proposed Pedestrian Network and the European Site(s) which are potentially at risk of adverse effects on Site integrity are summarised below:

##### 7.4.5.1 Habitat Loss

Aside from the three principle greenway projects (which are discussed separately), the provision of infrastructure associated with the pedestrian network in areas within or adjacent to European Sites has the potential to result in the permanent loss of habitat in Lough Corrib SAC, Galway Bay Complex SAC or Inner Galway Bay SPA; habitat fragmentation is directly associated with this impact pathway. Loss of habitat from these European Sites, and indeed in any potential ex-situ sites supporting SCI bird species of the SPA (e.g. roost sites or feeding sites), has the potential to affect the conservation objectives supporting the Site's QI/SCI species:

- The Cross-City Link includes for a new pedestrian bridge across Lough Corrib SAC, south of the Salmon Weir Bridge



- Connecting a greenway between Eyre Square and Renmore (in the vicinity of Galway Port or the existing rail crossing over Lough Atalia) may impact on Galway Bay Complex SAC and Inner Galway Bay SPA
- The proposed new bridge over the River Corrib along the line of the Old Clifden Railway at NUI Galway/Waterside which crosses Lough Corrib SAC
- A proposed new cycle/pedestrian bridge to the south of Wolfe Tone Bridge must cross Galway Bay Complex SAC

Mitigation measures: refer to Box 1b in Chapter 9 below

#### **7.4.5.2 Habitat degradation – hydrogeology**

Although unlikely, there is the possibility that excavations associated with the installation of pedestrian network elements may affect the existing hydrogeological regime which in turn may affect groundwater dependant habitats (and in some cases supported species) within European Sites. Given the likely nature of works associated with the majority of the pedestrian network described in the GTS they would be minimally invasive in terms of excavation requirements and, with any such works being undertaken in the urban environment, pose little risk of interacting with groundwater – only elements adjacent to Lough Corrib SAC, Galway Bay Complex SAC or Inner Galway Bay SPA are likely to be at any real risk of effects (see list above under habitat loss). Installation of new bridge structures may be more likely to interact with groundwater. However, as these bridges are all associated with a modified urban landscape in the city centre, the risk is likely to remain low.

Mitigation measures: refer to Box 2a in Chapter 9 below

#### **7.4.5.3 Habitat degradation – water quality impacts during construction**

Many of the pedestrian network elements may be connected to the existing drainage network which ultimately discharges to Galway Bay via the River Corrib or other watercourses within the city and environs. Construction works therefore, have the potential to affect surface and/or groundwater quality which in turn could affect aquatic/wetland habitats, and potentially QI/SCI species, in Lough Corrib SAC, Galway Bay Complex SAC, Inner Galway Bay SPA and/or ex-situ sites which may support SCI species of Inner Galway Bay SPA or Lough Corrib SPA. Some elements are (or could potentially be) located within or in close proximity to European Sites and therefore may pose a greater risk in this regard:

- The Cross-City Link includes for a new pedestrian bridge across Lough Corrib SAC, south of the Salmon Weir Bridge
- Connecting a greenway between Eyre Square and Renmore (in the vicinity of Galway Port or the existing rail crossing over Lough Atalia) may impact on Galway Bay Complex SAC and Inner Galway Bay SPA
- The proposed new bridge over the River Corrib along the line of the Old Clifden Railway at NUI Galway/Waterside which crosses Lough Corrib SAC
- A proposed new cycle/pedestrian bridge to the south of Wolfe Tone Bridge must cross Galway Bay Complex SAC

Mitigation measures: refer to Box 4 in Chapter 9 below

#### 7.4.5.4 Habitat degradation – shading

Upgrading the pedestrian network will/may require the provision of (or may be dependent on the delivery of) additional transport infrastructure in areas within or adjacent to European Sites which have the potential to affect habitat areas within those Sites as a result of direct shading:

- A proposed new bridge over the River Corrib along the line of the Old Clifden Railway at NUI Galway/Waterside which crosses Lough Corrib SAC
- A proposed new pedestrian bridge across Lough Corrib SAC, south of the Salmon Weir Bridge
- Connecting a greenway between Eyre Square and Renmore may impact on Galway Bay Complex SAC and Inner Galway Bay SPA at Lough Atalia
- A proposed new cycle/pedestrian bridge over the River Corrib, to the south of Wolfe Tone Bridge, must cross Galway Bay Complex SAC

New bridge structures have the potential to result in shading effects (i.e. reduced sunlight and levels of direct precipitation) on habitats beneath the structure. Such impacts could potentially affect QI habitats and/or habitats which may support QI/SCI species of Lough Corrib SAC, Galway Bay Complex SAC or Inner Galway Bay SPA.

Mitigation measures: refer to Box 6 in Chapter 9 below

#### 7.4.5.5 Habitat degradation – non-native invasive species

Introducing or spreading non-native invasive species during construction and/or operation (e.g. maintenance works) of any pedestrian network elements has the potential to affect habitats, and may as a consequence affect supported species, in Lough Corrib SAC, Lough Corrib SPA, Galway Bay Complex SAC, Inner Galway Bay SPA and/or ex-situ sites which may support SCI species of Inner Galway Bay SPA or Lough Corrib SPA.

Mitigation measures: refer to Box 8 in Chapter 9 below

#### 7.4.5.6 Disturbance/displacement

Construction works and/or operation associated with elements of the pedestrian network has the potential to result in levels of disturbance that could potentially displace QI/SCI species from important habitat areas (e.g. breeding/resting places, such as roost sites for wintering birds, or foraging areas) within Lough Corrib SAC, Lough Corrib SPA, Galway Bay Complex SAC, Inner Galway Bay SPA and/or ex-situ sites which may support SCI species of Inner Galway Bay SPA or Lough Corrib SPA. Those in closest proximity to European Sites, and posing the greatest risk of effects, are:

- The proposed new pedestrian bridge across Lough Corrib SAC, south of the Salmon Weir Bridge

- Connecting a greenway between Eyre Square and Renmore (in the vicinity of Galway Port or the existing rail crossing over Lough Atalia) may impact on Galway Bay Complex SAC and Inner Galway Bay SPA
- The proposed new bridge over the River Corrib along the line of the Old Clifden Railway at NUI Galway/Waterside which crosses Lough Corrib SAC
- A proposed new cycle/pedestrian bridge to the south of Wolfe Tone Bridge must cross Galway Bay Complex SAC

Mitigation measures: refer to Box 9 in Chapter 9 below

#### 7.4.5.7 Barrier effect

Construction works associated with the new structures, or the structures themselves, have the potential to create a barrier to fauna species movement (e.g. within foraging areas or along commuting routes):

- A proposed new bridge over the River Corrib along the line of the Old Clifden Railway at NUI Galway/Waterside which crosses Lough Corrib SAC
- A proposed new pedestrian bridge across Lough Corrib SAC, south of the Salmon Weir Bridge
- Connecting a greenway between Eyre Square and Renmore may impact on Galway Bay Complex SAC at Lough Atalia
- A proposed new cycle/pedestrian bridge over the River Corrib, to the south of Wolfe Tone Bridge, must cross Galway Bay Complex SAC

Mitigation measures: refer to Box 10 in Chapter 9 below

#### 7.4.5.8 Mortality Risk

Construction works associated with the new bridge structures, or the structures themselves, have the potential to result in the mortality of QI/SCI species as a result of construction debris/materials accidentally falling onto aquatic/estuarine habitats:

- The proposed new bridge over the River Corrib along the line of the Old Clifden Railway at NUI Galway/Waterside which crosses Lough Corrib SAC
- A proposed new pedestrian bridge across Lough Corrib SAC, south of the Salmon Weir Bridge
- Connecting a greenway between Eyre Square and Renmore may impact on Galway Bay Complex SAC and Inner Galway Bay SPA at Lough Atalia
- A proposed new cycle/pedestrian bridge over the River Corrib, to the south of Wolfe Tone Bridge, must cross Galway Bay Complex SAC

Mitigation measures: refer to Box 11 in Chapter 9 below

## 8 Complementary Measures

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### 8.1 Smarter Mobility

Smarter Mobility can be described as the way intelligent transport services are changing the way cities function. Intelligent Transport Solutions (ITS) use technology to increase efficiency, safety and co-ordination across transport networks.

The Local Authorities, supported by the National Transport Authority, will continue to adopt of Smarter Mobility and ITS as a means of improving the overall transport experience in Galway, building on existing initiatives such as the City Urban Transport Management Centre (UTMC). The UTMC forms the hub for urban traffic control in the city together with the recently-introduced Parking Guidance System (PGS), Variable Message Signs (VMS), CCTV and fault monitoring system.

Other improvements progressed by the NTA in recent years include the introduction of integrated ticketing through the introduction of the Leap card, the provision of Real-Time Passenger Information at bus stops, and the roll out of the city Bike Share Scheme.

Smarter Mobility policies and ITS will be used to support and ‘future-proof’ proposed infrastructure, implement changes and add value to the operation of the transport network by maximising efficiency and ensuring the optimum performance of the entire network.

Smarter Mobility and ITS proposals have been developed based on a number of overarching principles aimed at encouraging sustainable transport use, improving accessibility and permeability to and within the city, maximising safety, managing transport capacity and developing supporting infrastructure to a high standard and resilience. Further detail on Smarter Mobility systems, analysis and opportunities for Galway are available in ‘**Appendix H – GTS Smarter Mobility**’.

Smarter mobility projects can be broadly categorised into three groups:

- Projects which provide additional capacity to the transportation network;
- Projects which incorporate demand management; and
- Projects which utilise intelligent systems to deliver overall efficiency and cost savings.

Projects can fall under more than one category and deliver multiple benefits.

**Additional capacity** can be gained through the efficient use of the network by being more resilient to change and giving greater ease of movement to the most appropriate mode at different locations.

**Demand management** describes projects which in some form limit movement for particular modes and encourage the use of the most appropriate mode for the purpose of the trip. Demand management measures will be developed over time and will potentially include bus and pedestrian priority at traffic signals, managing parking fee structures to reduce the attractiveness of car travel to and from the city

centre, and traffic management to reinforce the hierarchy of need within the core city centre area from the private car to other modes.

Potential measures will originate at a 'policy' level so that measures can be developed and be classified as meeting policy aims. Projects which include enforcement of similar policies would also be considered as demand management measures.

**Intelligent systems** include those which utilise current and future technologies in order to deliver services in a more efficient manner. Over their lifetime these systems will deliver the intended service at a lower cost and a higher level of service. Cost savings can be earned through streamlining of delivery, reductions in power consumption and encouraging modal shift.

Proposed Smarter Mobility and ITS projects for Galway include:

- Removing non-essential private cars from an area within the core city centre;
- Maintaining, expanding and integrating Galway City Council's Urban Traffic Management Centre (GCC UTMC);
- Providing an integrated ticketing system or universal method of payment across all modes;
- Creating and operating a smart parking system for Galway City;
- Creating a smart street lighting system for Galway;
- Providing an integrated way-finding system for all modes;
- Auditing all traffic signal junctions to ensure correct layout, configuration and operation is in place;
- Creating smart priority routes for pedestrians and cyclists;
- Providing smart parking facilities for cyclists;
- Providing a "last mile" taxi service for bus users;
- Providing a zone-based, variable pricing structure for public transport;
- Examining demand-based variable pricing for parking;
- Encouraging and providing for electric vehicle usage over time;
- Enforcement of red light running and parking restrictions; and
- Ensuring all proposals are future-proofed for Co-operative ITS (or C-ITS, which entails vehicles and devices and the built environment being capable of communicating).

## 8.2 Travel to Places of Education

School travel is a critical factor affecting transport in Galway, particularly in the morning peak period. School trips by car are a substantial contributor to local congestion and have a significant impact on travel times by all modes. In many instances, a trip to a school to drop off children forms part of a different trip, usually a journey to work, and as a result it is challenging to develop overarching solutions to school travel applicable to the entire study area.

Bespoke solutions are often required for individual school sites. Galway City Council will liaise with the Department of Education regarding the impact of school admission policies on school travel demand.

However, across the study area, improvements to school transport arrangements combine the following:

- Behavioural change programmes which encourage students and schoolchildren to travel to school by modes other than the private car;
- General strategic improvements of bus, cycle and walking networks will provide safe opportunities for students to use non-car modes – especially when bus and cycle networks are planned to serve educational centres;
- Permeability improvements targeted at walking and cycling modes, improving accessibility to the bus network, and also minimising excessive routing for those who wish to walk or cycle to school;
- Promotion of school travel plans, and participation in the Green Schools Travel initiative; and
- At second and third levels, implementing mobility management planning for student travel, combined with targeted promotion of alternatives to the private car to better inform students of their travel options.

Figure 8.1 illustrates the locations of educational facilities within Galway City in the context of the proposed transport strategy bus and cycle networks.

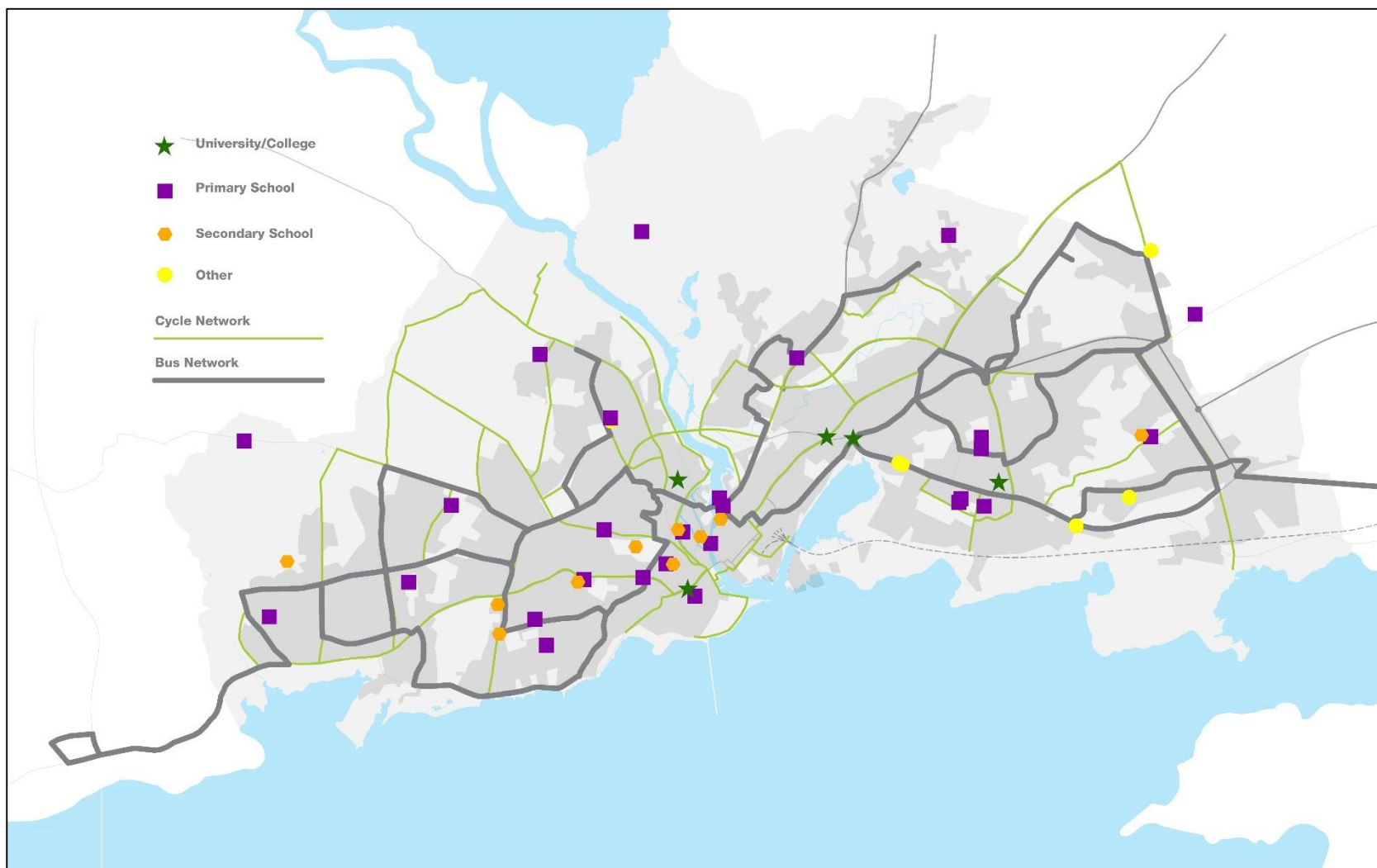


Figure 8.1: Proposed Bus and Cycle Networks and locations of educational facilities



### 8.3 Land Use Integration

The integration of land use and transportation is essential in creating sustainable city living. The alignment of settlement and land use patterns to an integrated transportation strategy can provide opportunities to reduce car dependency and allow for greater investment in alternative means of travel including public transport, walking and cycling. It also delivers considerable benefits in terms of reduced congestion, reduced greenhouse gas emissions, enhanced health and wellbeing and has benefits for the public realm.

The consolidation of settlements into areas that are close to employment centres, shops, community and educational facilities is a strategic policy of Galway City Council, which is reflected in policies and objectives relating to land use in the Draft City Development Plan (2017-2023). The strategy for the city promotes the sustainable development of key brownfield sites such as Ceannt Station, the Inner Harbour and the Headford Road area, consolidation of existing residential areas, and significant new development at Ardaun on the eastern edge of the city. The Ardaun development area is envisaged to be of mixed-use (thereby conforming to the principles of integrated land use and transportation) in addition to providing a counterpoint to the existing large residential developments to the west of the city centre.

This is further supported in the Draft City Development Plan (2017-2023) through the development of sustainable residential neighbourhoods, where the reliance on private transport is reduced and where services are provided locally, allowing access by walking and cycling. The consolidation and concentration of development reduces travel demand, allows for the effective provision of services including public transport, and enables more sustainable patterns of travel.

At a local level, the preparation of Local Area Plans and masterplans provides a framework for mixed-use development in conjunction with this strategy and the application of sustainable densities at locations adjacent to public transport routes. Collectively, these plans will ensure that sustainable patterns of travel can be achieved.

The primary goals of land use and transport integration in responding to the need to travel may be summarised as follows:

- Reducing the need to travel;
  - Reducing the distance travelled;
  - Reducing the time taken to travel;
  - Promoting walking and cycling; and
  - Promoting public transport use.
- Figure 8.2 illustrates existing land use patterns relative to the core public transport corridors set out in this strategy.

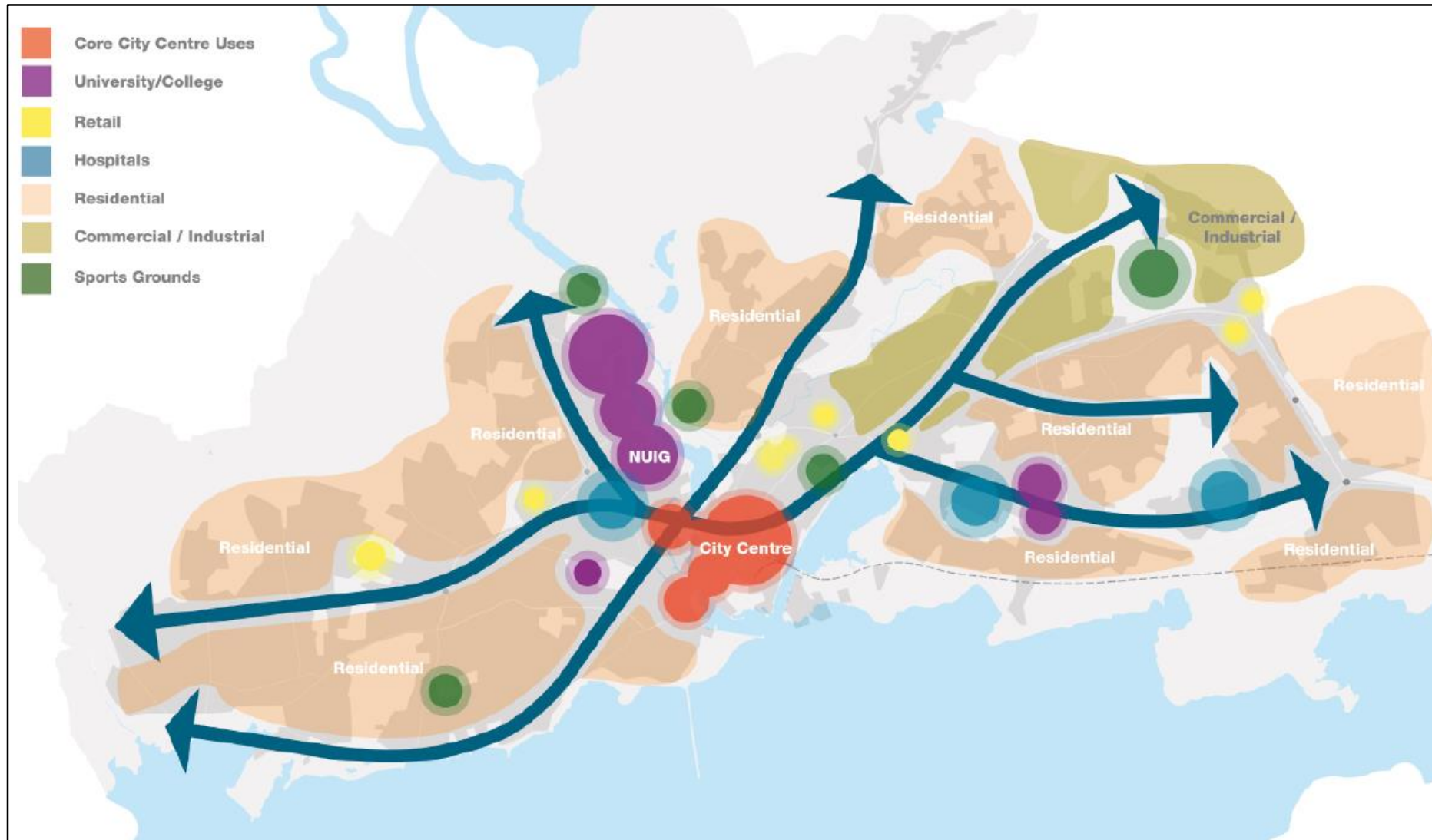


Figure 8.2: Land use integration with proposed public transport corridors

### 8.3.1 Land Use Principles

The following land use principles should therefore guide development in Galway:

- High-volume, trip-intensive developments, such as offices and retail, should primarily be focused into the city centre, or in areas well served by public transport;
- Residential development located proximate to high-capacity public transport should be prioritised over development in less accessible locations;
- All non-residential development proposals should be subject to maximum parking standards – these standards should vary with location with regard to the centrality of the proposal within the city and the level of public transport provision. Area-based parking standards could be considered;
- For all major employment developments and all new and extended schools, travel plans/mobility management initiatives should be conditioned as part of planning permissions and be carried out in a manner consistent with existing NTA guidance;
- To the extent practicable, residential development should be carried out sequentially, whereby lands which are, or will be most accessible by walking, cycling and public transport – including infill and brownfield sites – are prioritised;
- Planning at the local level should promote walking, cycling and public transport by maximising the number of people living within walking and cycling distance of their neighbourhood or district centres, public transport services, and other services at the local level such as schools;
- New development areas should be fully permeable for walking and cycling and the retrofit of walking and cycling facilities should be undertaken where practicable in existing neighbourhoods, in order to give a competitive advantage to these modes;
- Where possible, developments should provide for filtered permeability. This would provide for walking, cycling, public transport and private vehicle access but at the same time would restrict or discourage through trips by private car;
- To the extent practicable, proposals for right-of-way extinguishments should only be considered where these do not result in more circuitous walking and cycling trips for local residents accessing public transport or local destinations; and
- In urban areas, including the numerous towns, villages and settlements, the Design Manual for Urban Roads and Streets (DMURS) will guide localised proposals with a view to reaffirming walking, cycling and public transport modes over the private car.

## 8.4 Behavioural Change

Behavioural change, as it applies to transport, is about making people aware of the range of travel choices available for the variety of trips which they make on a daily basis and encouraging the use of more sustainable travel choices where feasible.

Measures to encourage this involve the targeted promotion of public transport, walking, cycling and car sharing as alternatives to single-occupancy private car use. They comprise a highly personalised approach aimed at engaging a group of people, making them think about their travel choices, providing them with full information, and encouraging and incentivising the use of alternative travel modes.

In recent years, fostered by the Government's Smarter Travel policy document and supporting initiatives and work undertaken by a number of agencies, there has been increased awareness of the benefits that such programmes can deliver. The NTA is responsible for the management of the Smarter Travel Workplaces and Campuses Programme and administers the Green Schools Travel Module on behalf of the Department of Transport, Tourism and Sport. In addition to these two core programmes, the NTA funds behavioural change initiatives via the Regional Cities Sustainable Transport Grants Programme for Galway City. These programmes have been highly successful in reducing car use in many locations across the country and, if maintained and expanded, can be predicted to have a regional-level impact on travel behaviour in the Galway Metropolitan Area.

As an example, the recent national rise in cycling to primary school between 2006 and 2011 – the first such rise in a generation – occurred at the same time as Green Schools Travel began to roll out on a significant scale.

Furthermore, the Galway University Hospitals group were named 'Smarter Travel Workplace of the Year' in 2015 following their efforts in working towards a reduction in single occupancy car trips to and from the Hospital.

The above programmes form a core element of this strategy and it therefore commits to the continued implementation and support for Smarter Travel Workplaces and Campuses and a School Travel programme over its lifetime. Behavioural change initiatives will continue to be promoted in Galway to travellers within, to and from the city in order to encourage the use of sustainable travel modes, chiefly public transport, walking, cycling and car-sharing as alternatives to single-occupancy private car use. Initiatives will be developed and targeted at various locations and at varying scales, for example at workplaces, schools and neighbourhoods.

## 8.5 Environmental Assessment

The proposed complementary measures of the GTS have limited potential for adverse impacts, nevertheless measures associated with land use integration must also regard to the protective environmental policies and objectives of the statutory development plans for Galway City and for Galway County (refer to SEA Environmental Report – Appendix I), which will ensure that potential adverse impacts are avoided or are appropriately mitigated.

## 9 Environmental Assessment

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### 9.1 Introduction

This chapter outlines the process for the Strategic Environment Assessment (SEA), Appropriate Assessment (AA) and Strategic Flood Risk Assessment (SFRA) of the GTS and the mitigation measures proposed by these assessments. The Environmental Report for the SEA is included in Appendix I of this report, the Natura Impact Statement for the AA in Appendix J and the SFRA report is included in Appendix K.

### 9.2 Strategic Environmental Assessment (SEA)

The European Directive (2001/42/EC) on the assessment of the effects of certain plans and programmes on the environment (also known as the ‘SEA Directive’) as transposed into national legislation requires that certain plans and programmes are subject to Strategic Environmental Assessment (SEA).

SEA is a process for evaluating, at the earliest appropriate stage, the environmental quality and consequences of Plans / Programmes (PP). The purpose is to ensure that the environmental consequences of Plans / Programmes are assessed during their preparation and prior to their completion and the effect of the implementation of Plans / Programmes may also be subject to monitoring. The SEA process also gives interested parties an opportunity to comment on the environmental impacts of the proposed Plan / Programme and to be kept informed during the decision-making process.

The Galway Transport Strategy (GTS) is subject to Strategic Environmental Assessment as described in the following sections.

#### 9.2.1 Strategic Environmental Assessment Process

Strategic Environmental Assessment is a sequential process that follows a number of key stages as follows:

- **Screening:** Preparation of a SEA Screening Report with Screening Determination as to whether the Plan / Programme should be subject to SEA.
- **Scoping:** Preparation of a Scoping Report highlighting the environmental issues to be considered in the making of the Plan / Programme and assessed in the SEA Environmental Report. Scoping allows for consultation with SEA Statutory Consultees and facilitates incorporation of their views into the SEA Environmental Report.
- **Environmental Assessment:** Preparation of a systematic identification and evaluation of alternatives and of the likely significant environmental effects of implementing a Plan / Programme. The findings of the assessment, which is carried out at various stages in the plan or programme-making (*e.g.* Draft, Final *etc.*), are set out in the SEA Environmental Report.
- **Consultation:** Formal gathering of the views of Statutory Consultees and Members of the Public on the Draft Plan / Programme and SEA



Environmental Report (and Appropriate Assessment, if required). This involves a period of public display of the Draft Plan or Programme, as well as the SEA Environmental Report (and Appropriate Assessment, if required).

- **Completion:** Completion / Issue of Final Plan / Programme taking account of likely significant environmental effects and inputs received during the consultation process and integrating mitigation into the Plan / Programme. The Environmental Report is concluded and the reasons for decisions are summarised in the SEA Statement.
- **Monitoring:** Monitoring of the significant environmental effects which may arise from implementing the Plan / Programme.

## 9.2.2 SEA and Appropriate Assessment

Appropriate Assessment (AA) is an assessment of the likely impact, if any, of a Plan / Programme on the integrity of a Natura 2000 site (also known as European Site) or on the Natura 2000 network. (See Section 9.3 Appropriate Assessment of this Chapter for more detail).

There is an important relationship between SEA and AA in that Circular Letter ‘SEA 1/08 & NPWS 1/08 Appropriate Assessment of Land Use Plans’<sup>4</sup> issued by the Department of Environment, Heritage and Local Government in 2008, clarified that *in any case where, following screening, it is found that the draft plan or amendment may have an impact on the conservation objectives of a Natura 2000 site or that such an impact cannot be ruled out, adopting a precautionary approach-*

- *an appropriate assessment of the plan must be carried out and*
- *in any case where a strategic environmental assessment (SEA) would not otherwise be required, it must also be carried out.*

The findings of the AA for the Galway Transport Strategy, which also informed the SEA Environmental Report, are presented in a separate Natura Impact Statement (NIS) included in Appendix J of this report. The NIS, the SEA Environmental Report and the SEA Statement accompanies the completed Galway Transport Strategy.

## 9.2.3 SEA Screening

As the proposed Galway Transport Strategy is not subject to mandatory Strategic Environmental Assessment, the Draft GTS was screened for likely significant environment impacts. The screening had regard to the relevant criteria as set out in Schedule 1 of S.I. No. 435/2004 - Planning and Development (SEA) Regulations, as amended. The conclusion of the screening assessment was that the proposed Galway Transport Strategy should be subject to full Strategic Environmental Assessment because of:

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<sup>4</sup> 2008: Department of Environment, Heritage and Local Government; Circular Letter SEA 1/08 & NPWS 1/08 Appropriate Assessment of Land Use Plans

- The scale and scope of the proposed Galway Transport Strategy, including its role as a future implementation framework with actions and measures for infrastructural, operational and policy elements over 20 years.
- The nature and sensitivity of the receiving environment and the potential for significant impacts (either positive or negative) on biodiversity; population; human health; fauna; flora; soil; water; air; climatic factors; material assets; cultural heritage; landscape and the interrelationship between these factors.
- The assessment for Screening for Appropriate Assessment, which found that the proposed Galway Transport Strategy could not be screened out for no potential for likely significant impact on a Natura 2000 site.

### 9.2.4 SEA Scoping

A SEA Scoping Report was prepared for the Draft Galway Transport Strategy (Draft GTS) and issued to the statutory consultees in April 2016. This Scoping Report allowed for determination of the range of key issues to be addressed in the SEA Environmental Report. The report provides for the spatial scope (area), temporal scope (timeframe) and technical scope (environmental issues) of the Draft GTS to be considered in the environmental assessment.

The Scoping Report also drafted the strategic environmental objectives (SEOs) against which the Draft GTS was assessed for likely environmental impacts. The SEOs covered a range of environmental factors from Biodiversity, Human Beings, Soils & Geology, Water, Air & Climate, Material Assets, Cultural Heritage, and Landscape, to interaction of same.

The Scoping Report was issued to the following:

- Environmental Protection Agency
- Minister of the Environment, Community and Local Government
- Minister of Communications, Energy and Natural Resources
- Minister of Agriculture, Food and the Marine
- Minister of Arts, Heritage and the Gaeltacht
- Surrounding planning authorities

Responses to the Scoping Report were received from the EPA and the Department of Arts, Heritage and Gaeltacht. The EPA welcomed the intention of the Draft GTS in promoting the increased use of public transport, cycling and walking and brought attention to some additional plans/programmes, guidance, and SEA WebGIS resources of relevance to the SEA for the GTS. The EPA response included specific recommendations for consideration of:

- management of transport related emissions in supporting achievement of a low carbon economy
- development of traffic management measures to reduce the potential for traffic congestion and associated vehicular emissions – including short, medium and long-term traffic requirements over the lifetime of the GTS
- the assessment and management of noise from the main infrastructural transport sources – including taking account of available noise action plans
- where relevant, designated quiet areas in open country



- the need to protect and improve (as appropriate) air quality within the GTS area

The Department of Arts, Heritage and Gaeltacht set out considerations in relation to potential adverse effects on European sites; provided an overview of key ecological / natural heritage features in Galway City and its surrounds; and provided information on available data / information sources. The submission also highlighted reference to the EPA's *Integrated Biodiversity Impact Assessment* best practice guidance; noted areas of biodiversity that should be included within the scope of the SEA, and stated that the Environmental Report is required to contain environmental protection objectives for biodiversity, flora and fauna and that these should integrate with the objectives and obligations of other directives, acts and plans, including the city's own Heritage Plan and Biodiversity Plan.

These aspects were considered, as appropriate, in the SEA Environmental Report.

### 9.2.5 SEA Environmental Report and Elements of GTS with Potential for Adverse Environmental Effects

The SEA Environmental Report included an assessment of various alternative approaches for the GTS, comprising:

- Do-minimum approach
- Prioritisation of a road transport based approach
- Prioritisation of a public transport based approach
- An integrated transport based approach

The assessment of alternatives approaches found that the integrated transport based approach as detailed in the Galway Transport Strategy has the preferred outcome in terms of effectiveness and overall environmental benefit.

The SEA Environmental Report, included in Appendix I of this report, includes a full assessment of the likely environmental impacts of the various measures outlined in the GTS. It is noted that particular measures within the GTS do have potential for adverse environmental impacts and are listed below in Table 9.1.

Principle Elements / Measures of the GTS with Potential for Likely Significant Adverse Impacts	Likely Significant Adverse Impacts
<b>Traffic Network</b> – Cross City Link	New bridge over River Corrib with potential for likely significant impacts within limited river edge and riverine areas on Biodiversity, Water, Material Assets, Cultural Heritage, Landscape and Interaction between these factors.
<b>Traffic Network</b> – N6 Galway City Ring Road	Significant new ring road infrastructure with potential for likely significant impacts on a full range of environmental factors, including Biodiversity, Human Beings, Soils & Geology, Water, Air & Climate, Material Assets, Cultural Heritage, Landscape and Interaction between these factors.
<b>Regional Public Transport</b> – Park & Ride	New parking areas to be provided on main approaches to Galway City with potential for likely significant

Principle Elements / Measures of the GTS with Potential for Likely Significant Adverse Impacts	Likely Significant Adverse Impacts
	impacts, within limited areas, on Biodiversity, Soils & Geology, Water, Material Assets, Landscape and Interaction between these factors.
<b>Cycling, Walking and Public Realm</b> - Bearn Greenway, Galway to Oranmore Cycleway, Galway to Moycullen Greenway	New cycling, walking greenways and cycleways with potential for likely significant impacts along limited corridors on Biodiversity, Soils & Geology, Water, Material Assets, Cultural Heritage, Landscape and Interaction between these factors.
<b>Cycling, Walking and Public Realm</b> - Public Realm	Interventions and improvements to the Public Realm, including new pedestrian and cycling bridges over the River Corrib with potential for likely significant impacts, within limited areas, on Biodiversity, Soils & Geology, Water and Interaction between these factors.
<b>Complementary Measures – Land use Integration</b>	Integration of proposed transport measures with land use planning policies and objectives with potential for likely significant impacts on Soils & Geology, Water, Material Assets, Cultural Heritage, Landscape and Interaction between these factors.

Table 9.1 GTS measures with the potential for adverse environmental impacts

Following a period of public display, submissions on the SEA Environmental Report for the Draft Galway Transport Strategy were received from the EPA and from Department of Arts, Heritage and Gaeltacht (NPWS).

The EPA suggested under Monitoring, that the Environmental Report should identify environmental parameters to be monitored and frequency of monitoring. NPWS suggested that protection of nature conservation sites should be included within the strategic environmental objectives (SEOs), and that NHAs, pNHAs, and other local biodiversity sites should be mapped and impacts of the GTS on same should be considered in the Environmental Report. NPWS also queried aspects of the assessment of interrelationship of potential impacts and the assessment of uncertain impacts on biodiversity under alternative scenarios.

All of these considerations and suggestions have been addressed in the final Environmental Report.

## 9.2.6 SEA Mitigation Measures

Where likely significant impacts were identified in the assessment, these were reviewed in detail to determine if sufficient appropriate protective policies and objectives / mitigation measures exist to address potential adverse effects and to propose further mitigation where sufficient protection or mitigation does not exist. The mitigation measures have been identified with reference to environmental protection provided for under planning and development, to measures set out in the NIS (Appendix J) and with reference to protective policies and objectives as set out in:

- Galway City Development Plan 2011-2017 (policies and objectives highlighted in **Blue Text**), and

- Galway County Development Plan 2015-2021 (policies and objectives highlighted in **Red Text**)

Consideration has also been given to policies and objectives within the Galway City Draft Development Plan 2017-2023.

As identified in the Natura Impact Statement (NIS) (See Section 9.3 of this chapter and Appendix J), particular aspects of the Strategy could potentially affect the integrity of European Site(s), primarily through direct and/or indirect impacts on habitats and fauna species. These impacts include habitat loss or degradation; impacts on soils, water, air quality, shading; the introduction of non-native invasive species; disturbance/displacement of fauna; creation of barriers to fauna movement; or by increased risk of mortality for fauna species.

Assessment of likely impact and detailing of mitigation measures, where required, for European Site(s) is set out in detail under Sub-section 9.2 of this Chapter. These measures have also been considered in detail in the preparation of the SEA Environmental Report.

#### 9.2.6.1 Specific Mitigation Measures

- Particular significant infrastructural measures, including the proposed N6 Galway City Ring Road, the Bearna Greenway, Galway to Dublin Cycleway (Galway City to Oranmore)<sup>5</sup>, and the Galway to Oughterard Greenway<sup>6</sup>, will be subject to the provisions of the Environmental Impact Assessment (EIA) Directive (Council Directive 85/337/EEC as amended by Directive 97/11/EC and 2003/35/EC on the assessment of the effects of certain public and private projects on the environment). As such, these elements of the GTS will be subject to separate and further detailed assessment of likely significant impacts on the environment, and to the preparation of an Environmental Impact Statement (EIS), which shall further detail appropriate mitigation measures to avoid, reduce and/or remediate adverse impacts.
- Securing consent for specific measures set out in the Galway Transport Strategy will be subject to the requirements of sustainable planning and development as implemented through national planning and development legislation and as provided for under **Strategic Policies 1.2, 1.5, 1.6 & 1.7** of the Galway City Development Plan 2011-2017 and **Strategic Objectives DS 1, DS 2 & DS 3** of the Galway County Development Plan 2015-2021. The strategic policies outlined in the current city plan (above) are also reflected in the Strategic Goals (Nos. 1 to 7) as set out in the **Galway City Draft Development Plan 2017-2023**.

In securing consent and during construction, all aspects of the Galway Transport Strategy will be subject to the provisions of Appropriate Assessment as required under the Habitats Directive (92/43/EEC). The specific scope and detail of mitigation measures required to address potential for effects on European Sites is set out in more detail in Section 9.3 of this Chapter and Appendix J. Provision is also made for protection of the Natura 2000 network (European Sites) under **Natural Heritage, Recreation and**

<sup>5</sup> The GTS includes that portion of the Galway to Dublin Cycleway between Galway City and Oranmore.

<sup>6</sup> The GTS includes that portion of the Galway to Oughterard Greenway between Galway City and Moycullen.

**Amenity Policies 4.2, 4.3, 4.4 & 4.5 and associated Specific Objectives (Section 4.19)** of the Galway City Development Plan 2011-2017 and **Strategic Objectives DS 6, DS 9, & DS 10, and Natural Heritage and Biodiversity Policies NHB 1, NHB 7 & NHB 8 and Natural Heritage and Biodiversity Objectives NHB 1, NHB 2, NHB 5 and NHB 13** of the Galway County Development Plan 2015-2021. These measures will ensure that there is no likely significant direct or indirect adverse impacts on the integrity of the European Site(s). The protective nature of the policies and objectives as set out in relation to the Natura 2000 Network (European Sites) in the current city plan (above) are also reflected in the **Galway City Draft Development Plan 2017-2023**.

- Specific mitigation for potential impacts on Biodiversity, including Flora and Fauna is provided for under **Natural Heritage, Recreation and Amenity Policies 4.2 to 4.6 and under associated Specific Objectives (Section 4.19)** of the Galway City Development Plan 2011-2017 and **General Heritage Policies GH 1 to GH 3 and Natural Heritage and Biodiversity Policies NHB 1 to NHB 8 and Natural Heritage and Biodiversity Objectives NHB 1 to NHB 13** of the Galway County Development Plan 2015-2021. The protective nature of the Natural Heritage, Recreation and Amenity policies and objectives outlined in the current city plan (above) are also reflected in the Natural Heritage, Recreation and Amenity policies as set out in Chapter 4 of the **Galway City Draft Development Plan 2017-2023**.
- Mitigation for potential impacts on Human Beings, including Population and Human Health, is provided for under mitigation for particular environmental factors, *e.g.* water, air quality, noise, landscape *etc.* In addition a specific mitigation is provided for under **Policies 1.3, 1.4, 4.2, 5.2, 6.3, 8.6 and Specific Objectives 4.10** of the Galway City Development Plan 2011-2017 and **Policy CC 5 and Objectives DS 5, CS 2, CS 6, SS 6, EDT 1, EDT 13, WW 2, WS 14, CF 8, SI 8** of the Galway County Development Plan 2015-2021. The protective nature of the policies and objectives outlined in the current city plan (above) are also reflected in the **Galway City Draft Development Plan 2017-2023**, including under Health and Wellbeing in the Strategic aims of the Cultural Strategy for the City.
- Specific mitigation for potential impacts on Soils and Geology is provided for under **Objective DS 8** of the Galway City Development Plan 2011-2017 and **Objectives EQ 2, NHB 4 & NHB 12** of the Galway County Development Plan 2015-2021. The protective nature of the objective outlined in the current city plan (above) is also reflected in the **Galway City Draft Development Plan 2017-2023**.
- Specific mitigation for potential impacts on Water, including Drainage, Flood Risk and Groundwater is provided for under **Policies 4.3, 4.5, 4.9, 8.5, 8.10, 8.11, 8.12, & 9.4 and Specific Objective 8.15** of the Galway City Development Plan 2011-2017 and **Policies FL 1, FL 2, FL 3, FL 4, FL 5, TI 2, WS 1, WS 2, WS 3 & WS 4 and Objectives DS 7, DS 8, DS 9, DS 10, CS 4, EDT 5, EDT 14, TI 2, WS1 to WS 16, EQ 1, FL 1, FL 2, FL 3, FL 4, FL 5 & FL 6** of the Galway County Development Plan 2015-2021. The protective nature of the policies and objectives outlined in relation to water in the current city plan (above) are also reflected in the **Galway City Draft Development Plan 2017-2023**.

- Specific mitigation for potential impacts on Air & Climate, including Air Quality, Noise and Climate Change is provided for under **Policies 1.7, 8.3 & 8.7** of the **Galway City Development Plan 2011-2017** and **Policies CC 1 to CC 7 and Objectives DS 8, ER 3, CC 6, TI 12 & FL 5** of the Galway County Development Plan 2015-2021. The protective nature of the policies outlined in relation to air & climate in the current city plan (above) are also reflected in the **Galway City Draft Development Plan 2017-2023**.
- Specific mitigation for potential impacts on Material Assets, including land use, tourism, transport, services & utilities, waste management and wastewater, are provided for under **Policies 1.2, 1.4, 1.5, 2.3, 2.9, 3.2 to 3.5, 4.2, 5.2, 6.2 to 6.5, 8.7, 8.9, 8.10, 8.12, 10.5 and Specific Objectives 3.6, 6.10, 8.7, 8.15**, of the Galway City Development Plan 2011-2017 and **Policies DS 9, CS 4, EDT 5, EDT 6, TI 1 to TI 7, WW 1, WM 1, WM 2, EQ 2, CC 4, CC 6, AFF 4 & AFF 6 and Objectives DS 1, DS 2, DS 3, DS 5, DS 8, DS 11, CS 3, CS 5, UHO 1, EQ 1, EDT 5, EDT 11, EDT 14, TI 1 to TI 18, WW 1 to WW 8, WM 1 to WM 6, FL 1, NHB 13, SI 1, SI 4, SI 6 & AFF 2** of the Galway County Development Plan 2015-2021. The protective nature of the policies and objectives outlined in relation to material assets in the current city plan (above) are also reflected in the **Galway City Draft Development Plan 2017-2023**.
- Specific mitigation for potential impacts on Cultural Heritage, including archaeology and architectural heritage, are provided for under **Policies 4.2, 6.8, 6.9, 7.2, 7.3 & 7.4** of the Galway City Development Plan 2011-2017 and **Policies EDT 1, ICT 2, GH 1, GH 2, GH 3, AH 1, AH 2, ARC 1 to ARC 5 & CF 6 and Objectives DS 1, DS 5, UHO 7, EQ 1, AH 1 to AH 11, ICT 2, ARC 1 to ARC 7 & CF 6**, of the Galway County Development Plan 2015-2021. The protective nature of the policies and objectives outlined in relation to cultural heritage in the current city plan (above) are also reflected in the **Galway City Draft Development Plan 2017-2023**.
- Specific mitigation for potential impacts on Landscape are provided for under **Policies 4.3, 4.6, 4.8, 5.2, 8.5, 8.7, 8.8 and Specific Objectives 3.6, 4.10**, of the Galway City Development Plan 2011-2017 and **Policies ICT 2, GH 1, NHB 2, NHB 3, LCM 1 and Objectives DS 5, UHO 7, UHO 8, EDT 1, EDT 8, TI 13, EQ 2, CC 7, AH 6, AH 9, AH 10, ARC 1, ARC 7, NHB 2, NHB 7, NHB 10, NHB 11, LCM 1 to LCM 3, FPV 1**, of the Galway County Development Plan 2015-2021. The protective nature of the policies and objectives outlined in relation to landscape in the current city plan (above) are also reflected in the **Galway City Draft Development Plan 2017-2023**.

## 9.2.7 SEA Monitoring

In accordance with Article 10 of the SEA Directive, the Environmental Report details a series of actions to monitor any significant effects on the environment of the implementation of measures set out in the Galway Transport Strategy. This will allow for identification at an early stage of any unforeseen adverse effects, and to be able to undertake appropriate remedial action.



## 9.3 Appropriate Assessment

### 9.3.1 Requirement for Appropriate Assessment

It is necessary that the process by which Galway City Council and Galway County Council prepare and integrate the GTS as a key element of supporting land use plans is carried out in accordance with the requirements of Article 6 of the Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) (hereafter referred to as the Habitats Directive). The Habitats Directive is primarily transposed into Irish Law by S.I. No. 477 of 2011, European Communities (Birds and Natural Habitats) Regulations 2011 (hereafter referred to as the Birds and Habitats Regulations) and by the Planning and Development (Amendment) Act 2010, as amended (hereafter referred to as the Planning Acts).

In meeting the requirements of Article 6(3) of the Habitats Directive, the first step of the process is for the competent authority (in this instance Galway City Council) to carry out Screening for Appropriate Assessment. If likely significant effects cannot be ruled out at that stage of the process, the competent authority then carries out Appropriate Assessment (AA). These assessments and how they relate to the GTS are discussed in more detail in the NIS included in Appendix J of this report.

A Natura Impact Statement (NIS), which contains necessary information to inform Galway City Council to undertake an AA, has been prepared by Scott Cawley Ltd. on behalf of Galway City Council. It provides information on, and assesses the potential for, the GTS to impact on Natura 2000 sites (hereafter referred to as European Sites)<sup>7</sup> and furthermore assess whether the GTS would impact on the integrity of any European Site.

It is only in the case where AA cannot rule out that any Plan/Strategy will result in adverse effects on the integrity of European Site(s) by the assessment carried out under Article 6(3), that the provisions of Article 6(4) of the Habitats Directive are considered, as outlined in Figures 10.2 and 10.3. The information provided in the NIS indicates that this scenario does not apply in the case of the GTS.

### 9.3.2 Screening for Appropriate Assessment

Screening for Appropriate Assessment considers (in the absence of mitigation measures) whether the proposed GTS, either individually or in-combination with other plans and/or projects, is likely to have a significant effect on any European Site(s) in view of its/their conservation objectives – i.e. is there a source-pathway-receptor relationship by which the GTS could potentially result in a significant effect on a European Site(s).

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<sup>7</sup> Natura 2000 sites are defined under the Habitats Directive (Article 3) as a European ecological network of special areas of conservation composed of sites which host the natural habitat types listed in Annex I and habitats of the protected species listed in Annex II. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats. In Ireland these sites are designated as European Sites – defined under the Planning Acts and/or Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)

Screening for Appropriate Assessment was carried out by Galway City Council, informed by an Appropriate Assessment Screening Report prepared by RPS - *Galway Transport Strategy Screening for Appropriate Assessment* (RPS, 2016).

The Screening for Appropriate Assessment determination was that the GTS had the potential to impact upon the following European Sites and therefore, Appropriate Assessment was required: Lough Corrib SAC, Lough Corrib SPA, Galway Bay Complex SAC, Inner Galway Bay SPA, Rahasane Turlough SAC, Rahasane Turlough SPA, Castletaylor Complex SAC, Kiltiernan Turlough SAC, Lough Fingall Complex SAC, and Cregganna Marsh SPA.

### 9.3.3 Appropriate Assessment

Having ascertained during the screening test that the GTS is either likely to have a significant effect on a European Site(s), or that any such likelihood is uncertain or cannot be ruled out, Appropriate Assessment (AA) considers whether or not that significant effect would adversely affect the integrity of any European Site(s), after consideration of mitigation measures. – *i.e.* where a source-pathway-receptor relationship exists, would it, despite the implementation of mitigation measures, affect the conservation objectives supporting the conservation condition of the Qualifying Interests/Special Conservation Interest species of the European Sites?

Many of the guiding principles, strategic objectives, strategic aims and project elements presented in the GTS were assessed as having the potential to adversely affect the integrity of a number of European Sites, including in-combination with other plans and projects, via the identified impact pathways (See Appendix J – Natura Impact Statement).

A suite of mitigation measures have been included to address the potential for impacts to affect European Sites via the identified impact pathways to ensure that the GTS poses no risk of adversely affecting any European Sites and are included below in Section 9.3.5.

### 9.3.4 Elements of the GTS with the Potential for Adverse Effects on Site Integrity

The GTS consists of a number of project elements, generated by a series of guiding principles, strategic objectives and strategic aims under an overall vision “to create a connected city region driven by smarter mobility”. The various projects that are proposed to be implemented through the GTS can be grouped under the following general headings: the N6 Galway City Ring Road (GCRR), the Bearna Greenway, the Galway to Dublin Cycleway (Galway City to Oranmore)<sup>8</sup>, the Galway to Oughterard Greenway<sup>9</sup>, the public transport network, the non-greenway elements of the cycle network, and the pedestrian network.

Each of these project elements are associated with strategic aims which were all analysed to identify impact pathways (and their Zone of Influence (ZoI)) by which the GTS could potentially impact on European Sites, considering the Site’s

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<sup>8</sup> The GTS includes that portion of the Galway to Dublin Cycleway between Galway City and Oranmore.

<sup>9</sup> The GTS includes that portion of the Galway to Oughterard Greenway between Galway City and Moycullen.



Qualifying Interests (QIs)/Special Conservation Interests (SCIs) and the conservation objectives supporting their conservation condition. A summary of this assessment, as it relates to each of the GTS project elements is included in Chapters 4 - 8. Full details of this assessment is included in Appendix J – Natura Impact Statement.

### 9.3.5 Mitigation Measures

This section details the mitigation measures required to ensure that the GTS elements do not affect the conservation objectives of the QIs/SCIs of any European Sites, and therefore will not result in adverse effects on Site integrity as a result of the potential impacts referenced above in Section 9.3.4 and described in Sections 4.9, 5.8, 6.5 and 7.4. This includes not inhibiting any future efforts to repair or remediate any legacy impacts to European Sites that have occurred since their designation in cases where the conservation objectives are to restore favourable conservation condition rather to maintain it. The references to the mitigation measures in that section correspond with the relevant text boxes below.

In the hierarchy of land use plans, the Galway County Development Plan 2015-2021, Galway City Development Plan 2011-2017 and the Galway City Draft Development Plan 2017-2023 and subsequent development plans have an overarching role in ensuring the protection of European Sites whilst guiding the future development of Galway City. This includes implementing the measures set out in the GTS over the next 20 years.

The relevant land use Plans include a range of environmental protection policies, to which all projects proposed under the GTS will be subject. These environmental protection policies will serve, in many cases, to safeguard against the GTS resulting in adverse effects on the integrity of any European Sites. These environmental protection policies are extracted from the relevant Plans and included in Appendix J – Natura Impact Statement.

Many of the GTS elements are described at a level of geographic specificity where more project-specific mitigation measures are required to adequately address the various potential impact pathways at the project-level to be able to demonstrate that the GTS will not adversely affect the integrity of any European Sites. These project-level mitigation measures are presented below, under the heading of each of the identified impact pathways.

### 9.3.5.1 Habitat Loss

Mitigation measures to ensure that any habitat loss associated with the Cycle Network Greenways do not pose a risk of adversely affecting the integrity of any European Sites are included below in Box 1a. Those relating to the Public Transport Network, Non-greenway Cycle Network, and the Pedestrian Network are included in Box 1b, and those relating to the N6 GCRR in Box 1c.

Box 1a: Mitigation measures in relation to habitat loss affecting European Sites – Cycle Network Greenways

#### GTS – Habitat Loss: Cycle Network Greenways

If the alignment of the Bearna Greenway, the Galway to Dublin Cycleway (Galway City to Oranmore), or the Galway to Oughterard Greenway will result in habitat loss within a European Site:

- a habitat survey of the affected area will be carried out to identify and classify the habitat types present (in accordance with the most recently published Annex I habitat classification guidance documents) to determine whether impacted habitat areas correspond with any of the QI Annex I habitats for which Lough Corrib SAC, Galway Bay Complex SAC or Ross Lake and Woods SAC are selected. A loss of any area of QI habitat, or any area of supporting habitat that in turn affects the QI habitat, would affect the conservation objectives supporting the habitat's conservation condition, resulting in an adverse effect on Site integrity;
- if habitats in Lough Corrib SAC are likely to be affected and are assessed as being suitable to support the Sites' QI plant species (Slender green feather-moss - *Drepanocladus (Hamatocaulis) vernicosus* and Slender Naiad - *Najas flexilis*) an appropriate level of survey will be carried out to definitively support an assessment and conclusion of whether the proposed project will affect the conservation objectives supporting the species' favourable conservation status, and thus adversely affect the integrity of the SAC;
- if aquatic habitats in Lough Corrib SAC are likely to be affected and are assessed as being suitable to support the Sites' aquatic QI species (Otter, Atlantic salmon, Sea lamprey, Brook lamprey, White-clawed crayfish or Freshwater pearl mussel) an appropriate level of survey will be carried out to definitively support an assessment and conclusion as to whether the proposed project will affect the conservation objectives supporting the species' favourable conservation status, and thus adversely affect the integrity of the SAC;
- if aquatic and/or coastal habitats in Galway Bay Complex SAC are likely to be affected and are assessed as being suitable to support the Sites' aquatic/marine QI species (Otter and Harbour seal) an appropriate level of survey will be carried out to definitively support an assessment and conclusion as to whether the proposed project will affect the conservation objectives supporting the species' favourable conservation status, and thus adversely affect the integrity of the SAC;
- an assessment will be made, based on an appropriate level of survey work to definitively support its conclusion, as to whether any habitat loss associated with the Galway to Oughterard Greenway will affect the conservation objectives supporting the favourable conservation status of the Lesser horseshoe bat roost for which the Ross Lake and Woods SAC is designated, and thus adversely affect the integrity of the SAC<sup>10</sup>; and

<sup>10</sup> Although the Lesser horseshoe bat is known to be present within the Galway City and environs ((N6 Galway City Transport Project Route Selection Report (Arup, 2015))), the roost that forms the QI population for this European Site (Eborhall House) is 11km away from the nearest GTS project (the Galway to Oughterard Greenway), on the northern shore of Lough Corrib. This distance would be regarded to be beyond the normal core foraging range of the Eborhall House population and beyond

- if the greenways will result in habitat loss within Lough Corrib SPA/Inner Galway Bay SPA, an assessment will be made, based on an appropriate level of survey work to definitively support its conclusion, as to whether the habitat loss will affect the conservation objectives supporting the species' favourable conservation status, and thus adversely affect the integrity of the SPA. This assessment will also consider the effects of habitat loss in areas outside of the SPA in the context of whether these areas are important in supporting the SCI populations (i.e. constitute ex-situ sites as defined in the conservation objectives).

Any sections of the proposed greenways which will adversely affect the integrity of any European Site as a result of habitat loss or fragmentation, either alone or in-combination with any other plans or projects, or where such effects cannot be definitively ruled out, will not be progressed and an alternative will be implemented which avoids this impact.

**Box 1b: Mitigation measures in relation to habitat loss affecting European Sites - Public Transport Network, Non-greenway Cycle Network and Pedestrian Network (proposed bridge structures)**

#### **GTS – Habitat Loss: Public Transport Network and Non-greenway Cycle Network, and Pedestrian Network**

Generally, the Public Transport Network, Non-greenway Cycle Network, and Pedestrian Network project elements are currently described at a strategic level in terms of their location and function/role within the GTS. However, some, such as the proposed pedestrian bridge near the Salmon Weir Bridge or providing public transport infrastructure along the R336 in Salthill, have a more definite location described. The required ecological information and assessment required, as documented below, will be required to inform the development of the detailed design at the project stage.

Survey and assessment requirements to inform the detailed design of Public Transport Network, Non-Greenway Cycle Network, and Pedestrian Network project elements are listed below.

If elements of the Public Transport Network, the Non-Greenway Cycle Network or the Pedestrian Network will result in habitat loss within a European Site:

- a habitat survey of the affected area will be carried out to identify and classify the habitat types present (in accordance with the most recently published Annex I habitat classification guidance documents) to determine whether impacted habitat areas correspond with any of the QI Annex I habitats for which Lough Corrib SAC or Galway Bay Complex SAC are selected. A loss of any area of QI habitat, or any area of supporting habitat that in turn affects the QI habitat, would affect the conservation objectives supporting the habitat's conservation condition, resulting in an adverse effect on Site integrity;
- if aquatic habitats in Lough Corrib SAC are likely to be affected and are assessed as being suitable to support the Sites' aquatic QI species (Otter, Atlantic salmon, Sea lamprey, Brook lamprey, White-clawed crayfish or the Freshwater pearl mussel) an appropriate level of survey will be carried out to definitively support an assessment and conclusion as to whether the proposed project will affect the conservation objectives supporting the species' favourable conservation status, and thus adversely affect the integrity of the SAC;
- if aquatic and/or coastal habitats in Galway Bay Complex SAC are likely to be affected and are assessed as being suitable to support the Sites' aquatic/marine QI species (Otter and Harbour seal) an appropriate level of survey will be carried out to definitively support an assessment and conclusion as to whether the proposed project will affect the conservation

the normal commuting range of this species except on exceptional occasions or over long periods of time – for example, bats dispersing and moving between areas in the wider landscape over a period of many years/generations.

objectives supporting the species' favourable conservation status, and thus adversely affect the integrity of the SAC; and

- if habitat areas within Inner Galway Bay SPA will be lost as a result of implementing any of these elements, an assessment will be made, based on an appropriate level of survey work to definitively support its conclusion, as to whether the habitat loss will affect the conservation objectives supporting the species' favourable conservation status, and thus adversely affect the integrity of the SPA. This assessment will also consider the effects of habitat loss in areas outside of the SPA in the context of whether these areas are important in supporting the SCI populations (i.e. constitute ex-situ sites as defined in the conservation objectives)

All of the assessments must also consider whether there is any potential for adverse effects on European Site integrity in-combination with other plans and/or projects.

Considering the general locations provided, the type of infrastructure development envisaged for each of these project elements, and the ecological information and assessment required to be carried out to inform their design, it is reasonable to assume that at the detailed design stage any potential for a project element to impact on the European Site as a result of habitat loss could, and will, be resolved through the exploration of alternative locations or designs whilst still fulfilling their function/role in supporting the overarching vision, guiding principles and strategic objectives/aims of the GTS.

Any proposed projects which will adversely affect the integrity of any European Site as a result of habitat loss or fragmentation, either alone or in-combination with any other plans or projects, or where such effects cannot be definitively ruled out, will not be progressed and an alternative will be implemented which avoids this potential impact.

#### Box 1c: Mitigation measures in relation to habitat loss affecting European Sites – N6 GCRR

##### **GTS – Habitat Loss: N6 GCRR**

Where the N6 GCRR landtake, to include lands for the site compounds and drainage design (or any other landtake requirements not specified at this stage in the project design), falls outside of the current corridor for the proposed road development, they will not be located in areas where they would adversely affect the integrity of Lough Corrib SAC, either alone or in-combination with any other plans or projects, as a result of habitat loss or fragmentation.

### 9.3.5.2 Habitat Degradation – Hydrogeology

Mitigation measures to ensure that all GTS elements, aside from the N6 GCRR, do not pose a risk of adversely affecting the integrity of any European Sites are included below in Box 2a. Specific mitigation measures to address the potential hydrogeological impacts associated with the N6 GCRR are included below in Box 2b.

Box 2a: General mitigation measures (excluding the N6 GCRR) relating to potential hydrogeological impacts affecting European Sites

#### **GTS – Hydrogeology General**

As part of the design phase, all GTS projects will establish at the earliest possible stage of the feasibility/design process whether their construction or operation will interact with or affect groundwater. If groundwater impacts are likely, an assessment of the zone of influence of any such interaction will be carried out with respect to identifying if there is any risk of groundwater impacts affecting the hydrogeological regime supporting QI habitats/species in any European Sites.

Where any such impacts are identified, appropriate mitigation measures will be designed and implemented to ensure that the GTS project element will not adversely affect the integrity of any European Sites, either alone or in-combination with any other plans or projects, by impacting on the existing hydrogeological regime.

Box 2b: Specific mitigation measures relating to the proposed N6 GCRR and potential hydrogeological impacts affecting European Sites

#### **GTS – Hydrogeology N6 GCRR**

During construction/operation of the proposed tunnel at Lackagh Quarry there is a risk of groundwater impacts which could affect habitats within Lough Corrib SAC. The following mitigation measures are proposed to ensure that the proposed tunnel, and construction of western and eastern approaches to same, will not adversely affect the integrity of Lough Corrib SAC. These mitigation measures are based upon the results of a study carried out to qualify and quantify the potential impacts that may be associated with a tunnel at Lackagh Quarry. If additional mitigation measures are required at the detailed design stage of the N6 GCRR, these will be designed and implemented to ensure that any tunnel or excavations in this area will not adversely affect the integrity of any European Sites, either alone or in-combination with any other plans or projects, by impacting on the existing hydrogeological regime.

#### Works in the quarry outside and east of the SAC (Section 1)

A composite support system of rock bolts, steel mesh and sprayed concrete will be used to stabilise the quarry face. In the event that sprayed concrete is used, groundwater seepage from the quarry face will be facilitated by installing weep holes. The frequency of weep holes will be based on the expected groundwater seepage from the quarry face to reduce any water build-up behind the shotcrete layer.

The drainage network for the proposed road within Lackagh Quarry will collect all surface water from both carriageways on the eastern approach to the tunnel. The road drainage will be sealed and directed to a hydrocarbon interceptor and then to a containment pond. Following containment all water will enter an infiltration pond with a 1m constructed subsoil bed that will allow the treated water to recharge to ground. The pond is designed to accommodate a 100-year storm event, with 50% of volume to infiltrate to ground within 24 hours.

The proposed finished level of the proposed road will lie above the groundwater table, however, the embankment starter layer would in part be submerged during the winter groundwater high. In this regard the starter layer will be constructed so as not to dam groundwater in parts of the quarry floor. Similarly, the drainage network will not be installed during the seasonal groundwater high so as to avoid the need for dewatering and groundwater lowering.

#### Construction of the tunnel section beneath the SAC (Section 2)

No groundwater dewatering of the bedrock aquifer will be permitted during construction works. No construction works will be permitted during periods of high groundwater periods where groundwater dewatering would be required to facilitate works. When the groundwater rise occurs all construction activities within the zone below the high winter groundwater level for the tunnel will cease and the operation made safe until groundwater levels drop, which may include the installation of berms to prevent groundwater entering or exiting the tunnel from the tunnel portal.

The hydrogeological study of Lackagh Quarry has identified a potential perched water table and flow path along a clay wayboard in the limestone sequence. The clay wayboard will be intersected by the tunnel and there may be inflows along it. These inflows will be managed during construction and allowed to infiltrate to ground along the tunnel section. On sealing of the tunnel these inflows will be transferred laterally around the outside of the tunnel box section and to the groundwater table below.

To facilitate groundwater flow around the completed tunnel a drainage blanket up to the winter groundwater level (16.7m OD) will be incorporated during construction. It is envisaged that this will take the form of a drainage layer, drainage pipes or similar placed outside the permanent cast in-situ reinforced concrete tunnel lining and waterproof membrane.

#### Construction of western approach to the tunnel outside the SAC (Section 3)

No dewatering of the bedrock aquifer will be permitted due to the sensitive nature at the groundwater dependant habitat at nearby Coolagh Lakes.

Where excavation into subsoils below the winter groundwater level is required, an additional geotechnical investigation to establish the overburden permeability will be required to determine if inflows to the excavation will occur from the bedrock aquifer. In the case that inflow is likely below the winter groundwater level then construction below the winter groundwater level will not be permitted. The additional geotechnical investigation will calculate groundwater seepage based on an assessment of permeability, thickness of overburden between the excavation and the bedrock aquifer and geotechnical stability.

A watertight seal will be installed on the underside of the road base and the cutting sides to protect against groundwater inflow. This area will be sealed during construction (and permanently) to 17.7mOD; which is derived from the groundwater high (15.7m OD) plus 2m free board. Slope or retaining structures will be utilised from +17.7mOD to existing ground level where required.

Runoff will be collected by a sealed drainage system and discharged to ground by infiltration ponds to the west.

#### Operation of the tunnel

All wash water entering the tunnel on vehicles will be collected in a sealed drainage system and pumped to foul sewer for treatment at a municipal facility.

### 9.3.5.3 Habitat degradation – tunnelling/excavation

Mitigation measures relating to the risk of tunnelling or excavations, associated with the proposed N6 GCRR, in the vicinity of Lackagh Quarry are included in Box 3.

Box 3: Mitigation measures relating to habitat degradation from construction of the tunnel at Lackagh Quarry affecting European Sites

#### **GTS – Habitat degradation – tunnelling/excavation (N6 GCRR)**

During construction of the proposed tunnel at Lackagh Quarry there is a risk of impacts to habitats above in Lough Corrib SAC or to adjacent habitats in the SAC along the alignment of the western approach to the tunnel. The following mitigation measures are proposed to ensure that the proposed Lackagh Tunnel, and construction of the western and eastern approaches to same, will not adversely affect the integrity of Lough Corrib SAC via this impact pathway. These mitigation measures are based upon the results of a study carried out to qualify and quantify the potential impacts that may be associated with a tunnel/excavations at Lackagh Quarry. If additional mitigation measures are required at the detailed design stage of the N6 GCRR, these will be designed and implemented to ensure that any tunnel or excavations in this area will not adversely affect the integrity of any European Sites, either alone or in-combination with any other plans or projects, via this impact pathway.

#### Works to the quarry face (Section 1)

A composite support system of rock bolts, steel mesh and sprayed concrete will be used to stabilise the quarry face. The proposed works will be completed prior to the tunnel excavation and be limited to the quarry face. These rockface protective measures will limit movement within the rockmass resulting in no adverse impact to the Limestone pavement.

During the construction of the tunnel the Lackagh Quarry stabilised face will be monitored for movement and cracks to ensure no impact to the Limestone pavement. In the unforeseen event that movement is observed additional support systems will be installed.

During operational phase of the tunnel continued monitoring will take place to ensure that further stabilisation measures are implemented to protect against any further movement or instability within the rockmass surrounding the tunnel portal. During the operational stage of the tunnel there will be no adverse impact on the Limestone pavement.

#### Construction of the tunnel (Section 2)

- Each individual tunnel will maintain at least 8m of clear rock above the tunnel crown to the ground level of Lough Corrib SAC. This eight meters allows a sufficiently stable rock arch to develop around the tunnel which will ensure the stability of the tunnel in the temporary case;
- The minimum clear distance of seven meters will be maintained between the twin mined tunnel based on the strength of the rock and expected size of the tunnels;
- Pre-support measures will be installed at the quarry face around the proposed tunnel portal to prevent collapse into the quarry;
- The blasting charge weights used for excavation will be limited to cater for the proximity of sensitive receivers. Following a preliminary assessment, vibrations of 25mm/sec will not adversely impact the Limestone pavement environment. During the blasting period the Limestone pavement will be monitored to establish if vibration in excess of 25mm/sec are feasible whilst not affecting the Limestone pavement;



- Pre-support measures when required in the form of sub-horizontal spiles will be implemented which provide a stiffer support in addition to the rock bolts and sprayed concrete. These additional measures provide an extra level of safety to the temporary works ensuring there is no impact; and
- Temporary works in the tunnel in the form of steel arch supports, rock bolts and sprayed concrete will be installed to form a reinforced rock arch support allowing the tunnel to be excavated without causing risk of collapse.

#### Construction of western approach to the tunnel (Section 3)

Retaining system will be installed to retain the Annex I habitat where required, this is generally where there is insufficient area (footprint) for self-supporting earthworks slopes between the existing ground level and to 17.7mOD as outlined in Box 2b. These locations are known as 'pinch points'.

Retaining systems are dependent on the ground conditions in the pinch point locations. The proposed retaining systems that will be used to control these impacts include:

1. Rock bolts, rock dowels, steel mesh, sprayed concrete in areas of rock only; and
2. Piled retaining walls, supported with ground anchors in areas of overburden only and in areas with a combination of overburden and rock

The exposed rockface surrounding the western tunnel portal will be continuously assessed during excavation. Where required stability control measures will be implemented in the form of rock bolts, steel mesh and sprayed concrete.

### 9.3.5.4 Habitat degradation – water quality (construction)

Mitigation measures relating to the risk to water quality posed by construction works associated with all GTS elements are included in Box 4.

Box 4: Mitigation measures relating to habitat degradation, through construction-related water quality impacts, affecting European Sites

#### **GTS – Habitat degradation – water quality (construction)**

As part of the design phase, all GTS projects will assess the risk of construction works affecting water quality. This will consider factors such as: the nature and scale of the works proposed; materials to be used (e.g. hazardous chemicals/substances such as hydrocarbons and cement based products); and the presence of, or proximity of the construction site to, potential pollution pathways via surface water or drainage features.

Best practice construction methodologies will be followed in relation to the protection of watercourses in accordance with the following guidance, where applicable:

- Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016);
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (National Roads Authority, 2008);
- CIRIA C648: *Control of water pollution from linear construction projects: Technical Guidance*; and
- CIRIA C649: *Control of water pollution from linear construction projects: Site guide*.

Where risks are identified, a pollution control plan will be prepared. The pollution control plan will include sufficient pollution control measures to ensure that silt, runoff, water pumped from excavations, cement based compounds, hydrocarbons, or any other hazardous chemicals would not significantly affect water quality in any receiving drainage features, watercourses, or waterbodies. Sufficient detail will be included in the pollution control plan to demonstrate that all measures included therein, will adequately address all the identified impact pathways and associated risks and will not affect water quality in receiving watercourses to a degree, either alone or in-combination with any other plans or projects, that would adversely affect the integrity of any European Sites.

### 9.3.5.5 Habitat degradation – water quality (operation)

Mitigation measures relating to the implementation of the Park & Ride facilities are included in Box 5a; those relating to the operational risk to water quality posed by new road infrastructure are included in Box 5b.

Box 5a: Mitigation measures relating to habitat degradation as a result of water quality impacts during operation affecting European Sites – Park & Ride Facilities

#### **GTS – Habitat degradation – water quality (operation) – Park & Ride Facilities**

The design of Park & Ride facilities will include sufficient pollution control measures to ensure that run-off or drainage discharges do not impact upon water quality in receiving watercourses resulting in adverse effects on the integrity of any European Sites, either alone or in-combination with any other plans or projects.

The type, design and scale of all pollution control measures will be appropriate to the scale and capacity of each Park & Ride site.

Pollution control measures will be monitored and maintained to ensure their effectiveness.

If required, at such time that future expansion or increases in capacity at the Park & Ride sites are required, pollution control measures will be upgraded to maintain the levels of pollution control required to protect water quality in receiving European Sites.

Box 5b: Mitigation measures relating to habitat degradation as a result of water quality impacts during operation affecting European Sites – New Road Developments

#### **GTS – Habitat degradation – water quality (operation) – New Road Developments**

The design of new road developments will include sufficient pollution control measures to ensure that run-off or drainage discharges do not impact upon water quality in receiving watercourses resulting in adverse effects on the integrity of any European Sites, either alone or in-combination with any other plans or projects.

The type, design and scale of all pollution control measures will be appropriate to the scale and capacity of the proposed road development. These may include grassed channels, swales, filter drains, wetlands, attenuation/detention/infiltration ponds, or other Sustainable Urban Drainage System (SUDS) measures.

Pollution control measures will be monitored and maintained to ensure their effectiveness.

### 9.3.5.6 Habitat degradation – shading

Mitigation measures relating to habitat degradation as a result of shading impacts are included in Box 6.

Box 6: Mitigation measures relating to habitat degradation through shading impacts affecting European Sites

#### **GTS – Habitat degradation – shading**

To inform the bridge designs, a habitat survey of all areas potentially at risk of shading impacts from a bridge structure will be carried out. The survey will identify and classify the habitat types present (in accordance with the most recently published Annex I habitat classification guidance documents) to determine whether affected habitat areas correspond with any of the QI Annex I habitats for which Lough Corrib SAC or Galway Bay Complex SAC are selected, and are at risk of shading related impacts. Effects on any area of QI habitat could affect the conservation objectives supporting the habitat's conservation condition, resulting in an adverse effect on Site integrity.

Where any such impacts are identified, alternative locations and/or designs will be developed to ensure that the bridge structures will not adversely affect the integrity of any European Sites, either alone or in-combination with any other plans or projects, as a result of shading impacts.

Considering the general locations provided for these bridge structures, and the ecological information and assessment required to be carried out to inform their design, it is reasonable to assume that at the detailed design stage any potential for a project element to impact on the European Site as a result of shading impacts could, and will, be resolved through the exploration of alternative locations or designs whilst still fulfilling their function/role in supporting the overarching vision, guiding principles and strategic objectives/aims of the GTS.

### 9.3.5.7 Habitat Degradation – Air Quality

Mitigation measures to protect European Sites from potential air quality impacts are included in Box 7.

Box 7: Mitigation measures relating to European Sites from air quality impacts associated with the GTS

#### **GTS - Habitat Degradation – Air Quality**

As part of the N6 GCRR design phase, an air quality assessment will be carried out to determine the air quality baseline and model/predict the air quality ZoI and increases in contaminants associated with the proposed road development (e.g. nitrogen oxides, particulate matter and heavy metals).

All habitats within European Sites, and within the air quality ZoI, will be surveyed to identify and classify the habitat types present (in accordance with the most recently published Annex I habitat classification guidance documents) to determine whether impacted habitat areas correspond with any of the QI Annex I habitats for which Lough Corrib SAC is selected and are at risk of air quality impacts, or any area of supporting habitat that in turn affects the QI habitat. These habitats will also be assessed in the context of whether they support any QI species of the SAC.

Where it is determined that there are habitats at risk from air quality related impacts, appropriate mitigation measures will be designed and implemented to ensure that the N6 GCRR will not adversely affect the integrity of Lough Corrib SAC, either alone or in-combination with any other plans or projects.

Best practice construction methods will be applied in relation to all construction work associated with GTS projects to minimise dust emissions during construction. Mitigation measures to prevent wind-blown dust affecting sensitive habitats will be implemented to prevent any long-term effects on QI habitats or adverse effects on the integrity of any European Sites. Such mitigation measures may include watering of the construction site/access roads, road cleaning, vehicle speed restrictions, and temporary physical barriers to prevent wind-blown dust.

### 9.3.5.8 Habitat Degradation – Non-native Invasive Species

Mitigation measures to protect European Sites from impacts associated with non-native invasive species are included in Box 8.

Box 8: Mitigation measures relating to habitat degradation from non-native invasive species affecting European Sites

#### **GTS - Habitat Degradation – Non-native Invasive Species**

All elements of the GTS will establish, through an appropriate level of survey, whether non-native species (listed on Schedule 3 of the European Communities (Birds and Natural Habitats) Regulations, 2011) are present in any areas affected by the proposed construction works or operational maintenance works.

If present, the species will be identified, locations mapped and an invasive species management plan prepared detailing the handling and control measures that will be implemented to ensure that the species concerned, or contaminated vector material, will be eradicated from the construction site and will not be allowed to spread or be introduced to other areas.

The invasive species management plan will also include management and control measures to prevent maintenance regimes during operation from spreading non-native invasive species where there is a risk of the project site becoming recolonised from any other infested areas.

### 9.3.5.9 Disturbance/Displacement

Mitigation measures to protect European Sites from potential impacts associated with disturbance or displacement effects are included in Box 9.

Box 9: Mitigation measures relating to disturbance or displacement effects affecting European Sites

#### **GTS – Disturbance/Displacement**

##### **Otter, Atlantic salmon, Sea lamprey, Brook lamprey (Lough Corrib SAC)**

##### **Otter, Harbour seal (Galway Bay Complex SAC)**

An appropriate level of survey will be required to identify if, and how, QI species utilise habitat areas potentially affected by disturbance/displacement effects associated with any elements in the GTS. The results of these surveys and any assessment defining the disturbance/displacement ZoI, will be sufficient to adequately inform an assessment (and definitively support its conclusions) as to whether the predicted disturbance/displacement effects would affect the conservation objectives supporting the species' favourable conservation status, and thus adversely affect the integrity of the SPA.

Where disturbance or displacement effects are predicted, appropriate mitigation measures will be designed and implemented to ensure that GTS elements will not adversely affect the integrity of the SPA, either alone or in-combination with any other plans or projects, via this impact pathway.

If, despite the implementation of mitigation measures, there remains a risk that disturbance or displacement will adversely affected the integrity of any European Site(s), the project will not be progressed unless an alternative solution can be implemented which avoids/reduces the impact to a level that the integrity of the European Site(s) is(are) unaffected.

##### **Lesser horseshoe bat (Ross Lake and Woods SAC)**

An assessment will be made, based on an appropriate level of survey work to definitively support its conclusion, as to whether any disturbance or displacement effects associated with the Galway to Oughterard Greenway will affect the conservation objectives supporting the favourable conservation status of the Lesser horseshoe bat roost for which the Ross Lake and Woods SAC is designated, and thus adversely affect the integrity of the SAC; and

Where disturbance or displacement effects are predicted, appropriate mitigation measures will be designed and implemented to ensure that the greenway will not adversely affect the integrity of the SAC, either alone or in-combination with any other plans or projects, via this impact pathway.

If, despite the implementation of mitigation measures, there remains a risk that disturbance or displacement will adversely affected the integrity of Ross Lake and Woods SAC, the portion of the greenway concerned will not be progressed unless an alternative can be implemented which avoids/reduces the impact to a level that the integrity of the European Site(s) is(are) unaffected..

##### **Wintering and Breeding Birds (Lough Corrib SPA, Inner Galway Bay SPA)**

An appropriate level of survey will be required to identify if, and how, SCI bird species utilise habitat areas potentially affected by disturbance/displacement effects associated with any elements in the GTS. This includes habitat areas within the SPA boundaries and important ex-

situ habitat areas remote from the SPA. The results of these surveys and any assessment defining the disturbance/displacement ZoI, will be sufficient to adequately inform an assessment (and definitively support its conclusions) as to whether the predicted disturbance/displacement effects would affect the conservation objectives supporting the species' favourable conservation status, and thus adversely affect the integrity of the SPA.

Where disturbance or displacement effects are predicted, appropriate mitigation measures will be designed and implemented to ensure that GTS elements will not adversely affect the integrity of the SPA, either alone or in-combination with any other plans or projects, via this impact pathway.

If, despite the implementation of mitigation measures, there remains a risk that disturbance or displacement will adversely affected the integrity of any European Site(s), the project will not be progressed unless an alternative solution can be implemented which avoids/reduces the impact to a level that the integrity of the European Site(s) is(are) unaffected.

### 9.3.5.10 Barrier Effect

Mitigation measures to protect European Sites from impacts associated with barrier effect are included in Box 10.

Box 10: Mitigation measures relating to barrier effects affecting European Sites

#### **GTS – Barrier Effect**

##### **Otter, Atlantic salmon, Sea lamprey, Brook lamprey (Lough Corrib SAC)**

##### **Otter, Harbour seal (Galway Bay Complex SAC)**

Best practice will be followed in relation to bridge/culvert construction and design (including installing dedicated mammal passage facilities) to prevent barrier effects occurring on affected watercourses, in accordance with the following guidance, where applicable:

- Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016)
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (National Roads Authority, 2008)

A construction methodology and construction management plan will be prepared in relation to all bridge structures; both permanent structures and those installed temporarily to facilitate construction works. This will contain sufficient detail regarding the construction methodology and control measures in order to demonstrate that the construction works will not pose a barrier to aquatic species and will not adversely affect the integrity of any European Sites, either alone or in-combination with any other plans or projects, via this impact pathway.

If, despite the implementation of mitigation measures, there remains a risk that the project will adversely affected the integrity of any European Site(s) via this impact pathway, the project will not be progressed unless an alternative solution can be implemented which avoids/reduces the impact to a level that the integrity of the European Site(s) is(are) unaffected.

##### **Lesser horseshoe bat (Ross Lake and Woods SAC)**

If the Galway to Oughterard Greenway will be located within 2.5km of the Lesser horseshoe bat roost for which the Ross Lake and Woods SAC is designated an assessment will be made, based

on an appropriate level of survey work to definitively support its conclusion, as to whether any predicted barrier effect will affect the conservation objectives supporting the species' favourable conservation status, and thus adversely affect the integrity of the SAC.

Where a barrier effect is predicted, appropriate mitigation measures will be designed and implemented to ensure that the greenway will not adversely affect the integrity of the SAC, either alone or in-combination with any other plans or projects, via this impact pathway.

If, despite the implementation of mitigation measures, there remains a risk that the barrier effect will adversely affected the integrity of Ross lake and Woods SAC, the portion of the greenway concerned will not be progressed unless an alternative can be implemented which avoids/reduces the impact to a level that the integrity of the European Site(s) is(are) unaffected.

### 9.3.5.11 Mortality Risk

Mitigation measures to protect European Sites from mortality risk impacts are included in Box 11.

Box 11: Mitigation measures relating to mortality risk affecting European Sites

#### **GTS – Mortality Risk**

##### **Otter (N6 GCRR operation) – [Lough Corrib SAC, Galway Bay Complex SAC]**

Mammal resistant fencing will be required to prevent Otter gaining access to the proposed road carriageway. The fencing will be constructed as per the specification described in the *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (National Roads Authority, 2008). The precise location and extent of mammal resistant fencing in association with providing access under the proposed road will be finalised as part of the design process and will be based upon an appropriate level of survey to ensure that the proposed road development poses no mortality risk to the Otter population of Lough Corrib SAC, either alone or in-combination with any other plans or projects. The effectiveness of the mammal-resistant fencing will be monitored and maintained post-construction.

##### **Otter, Atlantic salmon, Sea lamprey, Brook lamprey, Harbour seal (construction works over water)**

Best practice construction methodologies will be followed in relation to the protection of watercourses in accordance with the following guidance, where applicable:

- Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016)
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (National Roads Authority, 2008)

A construction methodology and construction management plan will be prepared in relation to each of the proposed bridge structures. This will contain sufficient detail regarding the construction methodology and control measures in order to demonstrate that the construction works pose no mortality risk to aquatic species beneath the construction zone and will not adversely affect the integrity of any European Sites, either alone or in-combination with any other plans or projects, via this impact pathway.



**Wintering and Breeding Birds - bridge collision risk [Lough Corrib SPA, Inner Galway Bay SPA]**

An appropriate level of survey will be required to identify if, and how, SCI bird species utilise habitat areas where new bridge structures are proposed. This will form the basis of an assessment as to what potential collision risk a bridge structure would pose to the bird species concerned, based on the location of the bridge structure and the design being considered. As part of an iterative process, the results of this assessment will also inform the bridge design. The design process will have regard to those design elements that contribute to the overall level of potential collision risk posed by bridge structures, with a view to minimising any such risk. Such design elements include deck profile and depth, height above the ground/river, and the design of the supporting structures (e.g. extent, height and density of supporting cables or piers). If an unacceptable level of risk remains, additional mitigation strategies will be explored to support a conclusion that any residual risk would not affect the conservation objectives supporting the favourable conservation condition of the SPAs SCI bird species, either alone or in-combination with any other plans or projects.

If, despite the implementation of mitigation measures, there remains a risk that the project will adversely affected the integrity of any European Site(s) via this impact pathway, the project will not be progressed unless an alternative solution can be implemented which avoids/reduces the impact to a level that the integrity of the European Site(s) is(are) unaffected.

### 9.3.6 Conclusion of the NIS

As documented in the NIS it has been concluded, following an examination, analysis and evaluation of the GTS, in light of best scientific knowledge, including in particular the nature of the predicted impacts from the GTS elements and with the implementation of the mitigation measures proposed, that the GTS does not pose a risk of adversely affecting the integrity of any European Sites, either alone or in-combination with other plans or projects.

## 9.4 Strategic Flood Risk Assessment

Galway City Council undertook a screening of the GTS for Strategic Flood Risk Assessment (SFRA) and determined that a SFRA is required in order to assess and manage flood risk in accordance with the Office of Public Works (OPW) Flood Risk Management Planning Guidelines (FRMPG).

Stages 1 and 2 of the SFRA have been undertaken and full details of this assessment are included in Appendix K of this report.

The SFRA reviewed the potential for flood risk from fluvial coastal, pluvial and groundwater flooding as a result of the GTS and involved consulting:

- the OPW National Preliminary Flood Risk Assessment (pFRA) Mapping
- the OPW CFRAM (Catchment Flood Risk Assessment and Management) mapping for the Areas for Further Assessment (AFA) of Galway City and Oughterard Village and associated hydrological reports
- the Irish Coastal Protection Strategic Study - Western Coast and other relevant mapping including historical OSI mapping

- the OPW River Corrib Benefiting Lands mapping (developed as part of the River Corrib-Clare Arterial Drainage Scheme)
- known historical flooding areas and extents

The study area is located principally within Hydrometric Area 30 (River Corrib System) but also to the west within Hydrometric Area 31 and to the southeast in Hydrometric Area 29.

The pFRA mapping was used in combination with other information as a coarse screening tool for identifying potential flood hazard and then a more detailed assessment was undertaken with the use of the CFRAM mapping.

Appendix K of this report documents this SFRA.

## 10 Implementation and Outcomes

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### 10.1 Implementation

The Galway Transport Strategy is intended to frame the long-term build-out of transport in Galway City and environs for the next 20 years. The delivery of the proposals set out in this strategy will be subject to a number of influencing factors. The primary factor will be the availability of funding to construct the various infrastructural elements (both major and minor), and the availability of funding to implement the various supporting measures. Other influencing factors include aligning the provision of new infrastructure and services in line with the emergence of a transport need (for example, the development of lands at Ardaun), the need to have certain proposals implemented as a precursor for others, and the need to progress individual schemes through the statutory planning processes.

The implementation of the strategy, and delivery of the specific proposals, will therefore be through a series of multi-annual 'Implementation Plans' which will be agreed between the Councils and funding agencies, in particular the NTA.

The implementation plans will set out short term delivery programmes for the proposals of the Galway Transport Strategy, and will be fully cognisant of funding availability, as well as requirements and timelines of statutory planning processes.

Ultimately, this will ensure that the Strategy can be delivered in a timely and efficient manner, and ensure that the transport benefits for Galway are maximised.

It is anticipated that the annual service plans of the City and County Councils will also reflect the contents of the Implementation Plans.

Provision will be made for the periodic review of the Strategy to take account of emerging trends, and any emergence of new development opportunities, or to reflect the changing requirements of the evolving Galway transport network.

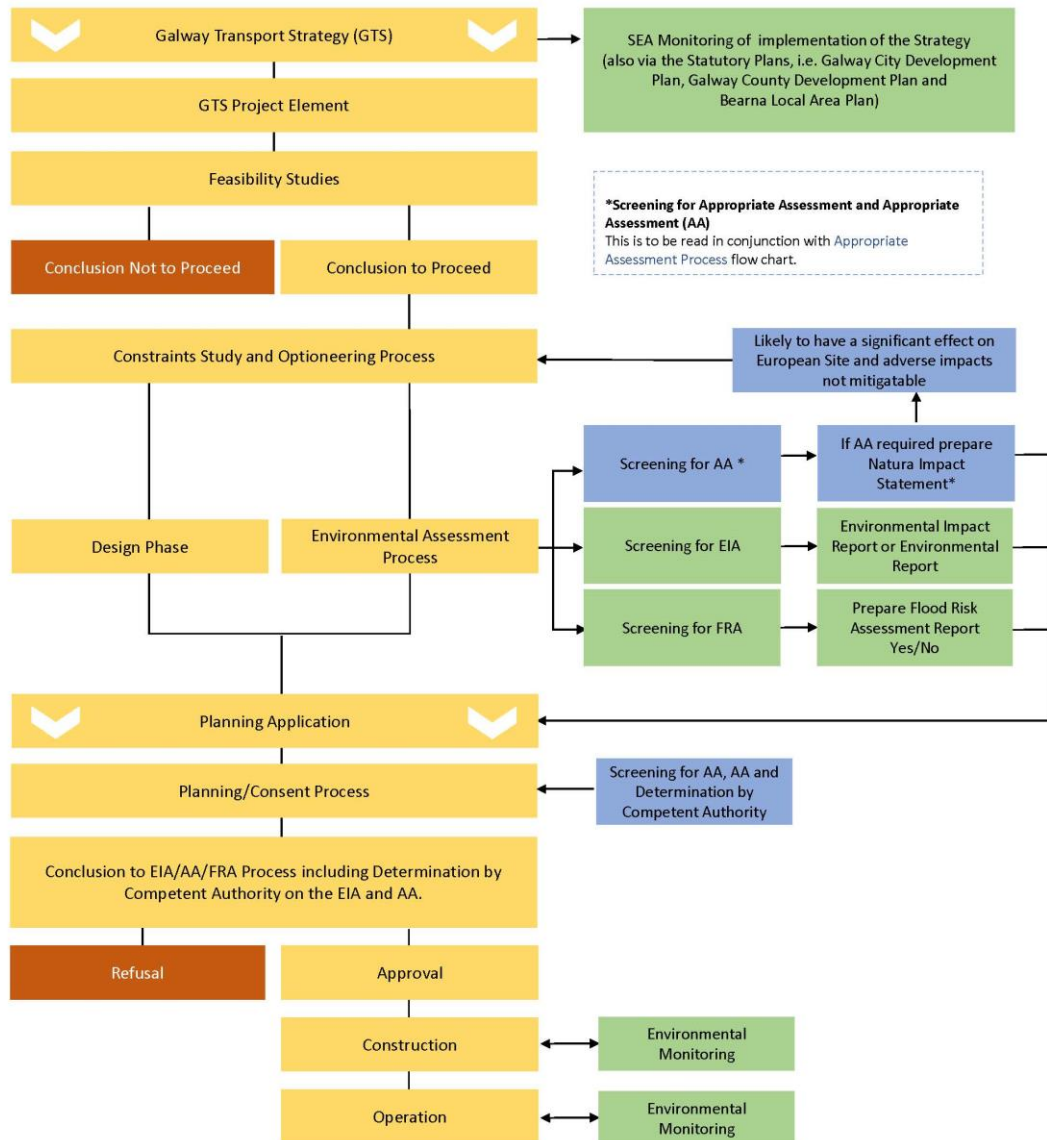
From a strategic planning perspective, it is anticipated that the implementation of the Galway Transport Strategy will be phased over three broad time bands (Short Term, Medium Term and Long Term). This timeframe for delivery is set out in Figure 10.1, with Short Term indicating within the next five years approximately, Medium Term within the next ten years approximately, and long term being beyond this timeframe.



Figure 10.1: Indicative Phasing of Implementation of the GTS

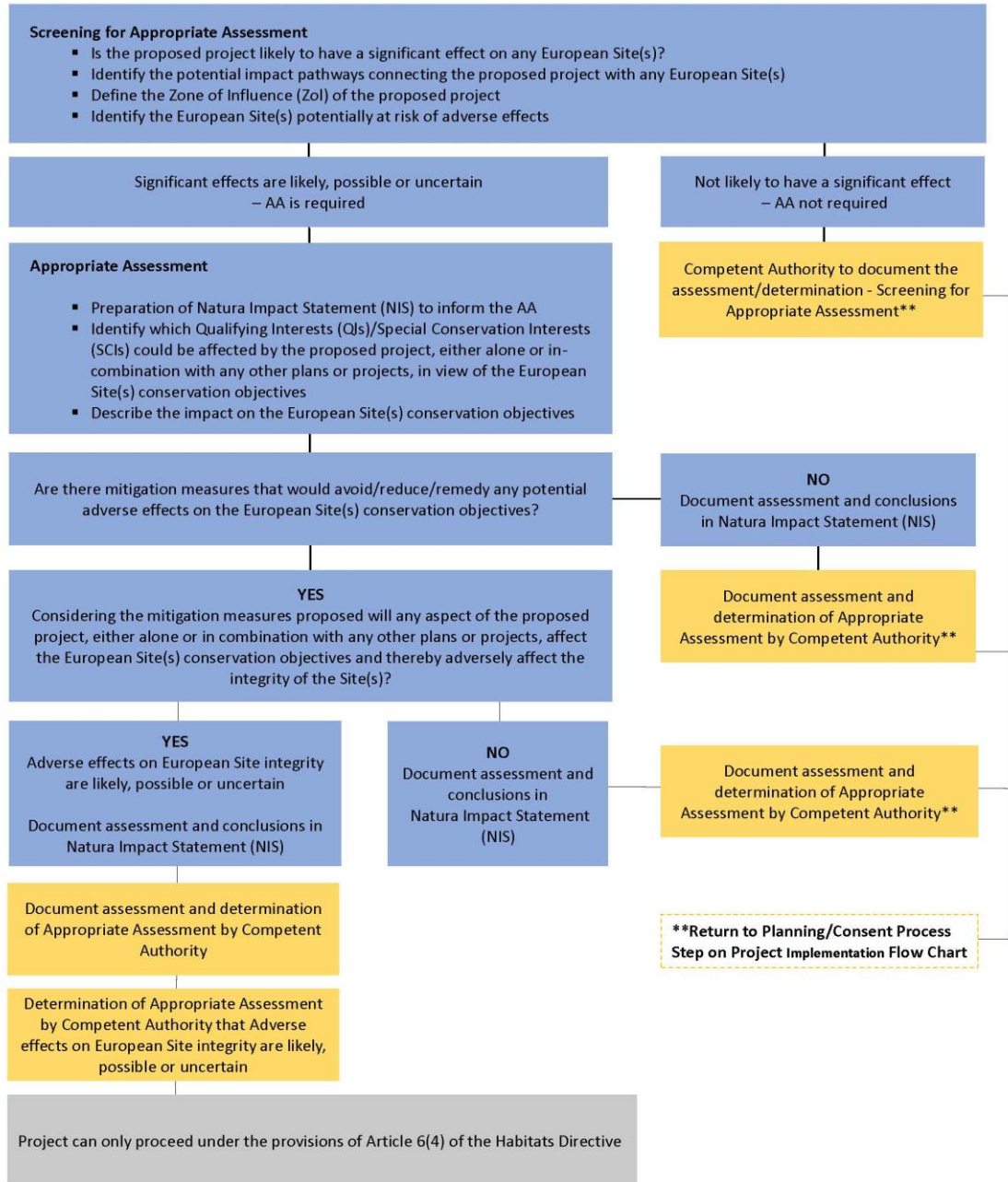
The strategic measures outlined within the GTS will be advanced and implemented as set out in Figures 10.2 and 10.3 below.

## Galway Transport Strategy (GTS) Implementation Flow Chart



ARUP

Figure 10.2 Project Implementation Flow Chart

**Galway Transport Strategy (GTS)****Appropriate Assessment Process Flow chart | Sheet 1 of 2**

See Appropriate Assessment Process Flow chart 2 of 2

**ARUP**

Figure 10.3 Appropriate Assessment Flow chart sheet 1 of 2



**Galway Transport Strategy (GTS)****Appropriate Assessment Process Flow chart | Sheet 2 of 2**

See Appropriate Assessment Process Flow chart 1 of 2

**ARUP**

Figure 10.4 Appropriate Assessment Flow chart sheet 2 of 2



## 10.2 Outcomes

The implementation of the proposals set out in this strategy will result in positive outcomes for Galway, providing long-term transport, tourism, commercial/ retail and public realm benefits for the city and its environs. These benefits are listed below:

**Future-Proofing the City** – to ensure Galway can continue to grow as an economic and cultural centre in the West of Ireland, the Strategy frames the future transport needs of the city and its environs, in terms of Public Transport, Walking, Cycling and Strategic Road provision.

### **Facilitating New Transport Infrastructure**

- **Public Transport:** Ensuring that ‘Cross-City Link’ is introduced to increase the amount of people able to access the heart of the city by public transport;
- **Walking and Cycling:** Ensuring that a network of cycle and walking routes are developed across the city and environs to provide safe, convenient and comfortable links to key destinations from residential areas; and
- **Road Network:** Providing improved access and movement across, and within Galway City and environs, and facilitating the development of a strategic relief road which will meet the long term road capacity requirements of the city, as well as offering vastly improved accessibility to the west of County Galway.

**Improved Efficiency** of overall transport network, by optimising the use of limited city centre road space, facilitating a greater degree of access to the city.

**Improved Environment, Urban Realm and Ambience** – enhancing the streetscape of the city centre, reducing noise and air pollution (including CO<sub>2</sub> transport emissions), and freeing up more space where people can walk, shop, socialise and enjoy the city.

**Tourism, Commercial and Retail Benefits** – improving the overall commercial/retail and tourist environment of Galway, with additional transport capacity for shoppers and visitors accessing the city centre, and tourist locations such as Salthill Promenade and Galway Racecourse.