Contents

18 Human Beings, Population and Human Health

18.1 Introduction

This chapter of the EIAR consists of an impact appraisal of the proposed N6 Galway City Ring Road, hereafter referred to as the proposed road development, under the heading of Human Beings, Population and Human Health. This is a broad ranging topic which *"covers the existence, activities and health of people, usually considering people as groups or 'populations'"* (EPA 2015)[1].

Aspects examined in this chapter primarily relate to impacts from the proposed road development on socio-economic activities and on local community health.

Aspects related to socio-economic activities include journey patterns, amenity and community severance, business, tourism and employment, and use of the Irish language. The Irish language is addressed separately in various sections of this chapter. Other aspects relevant to human beings such as natural amenity, built and natural heritage, ecosystem services, material assets and nuisance are dealt with in the following chapters:

- Chapter 7, Construction Activities
- Chapter 8, Biodiversity
- Chapter 9, Soils and Geology
- Chapter 10, Hydrogeology
- Chapter 11, Hydrology
- Chapter 12, Landscape and Visual
- Chapter 13, Archaeological, Architectural and Cultural Heritage
- Chapter 14, Material Assets Agriculture
- Chapter 15, Material Assets Non-Agriculture
- Chapter 16, Air Quality and Climate
- Chapter 17, Noise and Vibration

Human health impacts are primarily considered through an assessment of the environmental pathways by which health can be affected such as air, noise, water or soil. Therefore, the health assessment relies on the assessments in the following chapters and draws on the findings as necessary to examine whether the effects arising from any identified impacts may have a health impact and to ensure that the effects which may have a health impact are fully considered:

[1] Extracted from the Advice Notes for Preparing Environmental Impact Statements (EPA draft September 2015) which have not been updated since

- **Chapter 9, Soils and Geology** to identify if there are any areas of contaminated soils
- **Chapter 10, Hydrogeology** to identify areas with any potential impacts on groundwater
- **Chapter 11, Hydrology** and **Appendix A.11.1** to identify areas with any potential impacts on surface water and areas of flood risk
- **Chapter 16, Air Quality and Climate** to identify the predicted air quality values adjacent to the proposed road development
- **Chapter 17, Noise and Vibration** to identify the predicted noise levels at properties adjacent to the proposed road development

The health assessment also considers psychological effects, health improvement and improvement to services. Other aspects, such as changes in traffic flows which are dealt with in **Chapter 6, Traffic Assessment and Route Cross-Section**, have also been considered in this chapter in relation to the assessment of Socio-economic and Health impacts to ensure that the effects of these issues on human beings, population and human health have been addressed.

This chapter initially sets out the methodology (**Section 18.2**), describes the receiving environment (**Section 18.3**) and summarises the main characteristics of the proposed road development which are of relevance for human beings, population and human health (**Section 18.4**). The evaluation of impacts of the proposed road development on human beings, population and human health are described (**Section 18.5**). Measures are proposed to mitigate these impacts (**Section 18.6**) and residual impacts are described (**Section 18.7**). The chapter concludes with a summary (**Section 18.8**) and reference section (**Section 18.9**).

To inform the human beings, population and human health impact appraisal, this chapter has utilised the information gathered during the constraints and route selection studies for the proposed road development. Submissions received as part of the extensive public consultation carried out in respect of the project were assessed and design changes made to minimise the potential impacts on human beings and properties as part of the design phase. These submissions also informed the assessment undertaken for this chapter. **Sections 4.17, 6.5.11** and **7.6.11** of the **Route Selection Report** considered the human beings and population constraints within the scheme study area and compared the potential impacts on human beings and population of the proposed route options. These sections of the Route Selection Report contributed to the design of the proposed road development.

This chapter should be read in conjunction with **Figures 18.1.001**, **18.1.002** and **18.1.101** to **18.1.114** which illustrate the location of community facilities such as schools, hospitals, hotels relative to the proposed road development.

18.2 Methodology

18.2.1 Introduction

This assessment has been prepared in accordance with the relevant guidelines listed in **Section 18.2.2.1** below. Data has been collected primarily through a review of relevant documents listed in **Section 18.2.2.1** below and information gathered through the extensive public consultation detailed in **Chapter 1, Introduction** and mapping provided by the design team. This data was supported by site visits and local discussions with residents, businesses, schools and representatives of other community facilities. Furthermore, a Language Impact Assessment (LIA) for the proposed road development has been undertaken, the results of which are included in **Section 18.5.6**. A literature review on the potential impacts of roads on human health has also been carried out and is detailed in **Section 18.2.5.7** of this EIAR.

Aspects examined in this chapter primarily relate to impacts from the proposed road development on socio-economic activities and on local community health. These two themes are discussed together in some sections of this chapter but separately in other sections where appropriate.

18.2.2 Relevant Guidelines, Data Sources and Consultations

18.2.2.1 Relevant Guidelines

This assessment has been prepared having regard to the following guidelines:

- Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2002)
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA 2003)
- Advice Notes for Preparing Environmental Impact Statements (EPA draft September 2015)
- Revised Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, draft September 2015)
- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, draft August 2017)
- Guidelines for treatment of tourism in an Environmental Impact Statement (Fáilte Ireland, 2011)
- European Commission Guidance (2003) Implementation of Directive 2001/42 on the assessment of the effects of certain plans and programmes on the environment
- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017)
- The World Health Organisation (WHO) Night time Noise Guidelines for Europe

- Health Impact Assessment Resource and Tool Compilation (US EPA 2016)
- World Health Organisation Guidelines for Community Noise (1999)
- Health in Environmental Impact Assessment - A Primer for a Proportionate Approach (IEMA 2017)
- Health Impact Assessment (Institute of Public Health Ireland 2009)

18.2.2.2 Data Sources and Consultations

An assessment of the potential impacts on human beings, population and human health requires an understanding of the community which is built up through background research, site visits, and discussions with members of the local community and the findings of the assessment of the environmental factors (pathways) through which health could be affected such as air, noise, water, soils, property acquisition or demolition and traffic volumes. The potential impacts of the proposed road development on human beings, population and human health is then assessed against this background data.

Background data has been collected for the proposed road development by means of:

- Primary data sources (e.g. demographic data from Census 2016, Census 2011 and Census 2006 as produced by the Central Statistics Office)
- Maps of the surrounding area, including Ordnance Survey 1:50,000 maps and aerial mapping
- A review of the design of the proposed road development and its potential impacts on material assets non-agriculture
- A review of secondary sources including the Galway County Development Plan 2015-2021 as varied and the proposed Variation No. 2 to the Galway County Development Plan, the Galway City Development Plan 2017-2023 as varied, the Bearna Local Area Plan as amended, the Gaeltacht Local Area Plan 2008-2014 as extended, the Ardaun Local Area Plan 2018-2024 and reports Galway City Council or Galway County Council such as the Socio Economic Statement of County Galway (2015), the Galway City Local Economic and Community Plan 2015-2021, and the various websites relating to economic developments, tourism, amenity and recreation e.g. www.galwaychamber.com and www.galwaytourism.ie
- Observation of local settlement and travel patterns and identification of community facilities
- Public consultation process which included discussions with local organisations and residents and with relevant statutory bodies. Over 950 individual property owner meetings, including many home visits, took place between the design team and property owners and the concerns expressed during these meetings were taken on board and fully informed the human beings, population and health assessment. The full details of this public consultation process are set out in **Chapter 1, Introduction**

- A literature review on the potential impacts of roads on human health. This review has focused on reviewing scientific evidence of the potential impacts of roads on human health and is detailed in the relevant sections below
- Collating the results of the assessment of the environmental factors (pathways) through which health could be affected such as air, noise, water, soils and traffic volumes, which are based upon reference to accepted standards/guidelines/limits for the protection of human health
- In this chapter, an assessment is performed by considering health in its broader aspects. As well as considering the protection of health, this chapter also considers opportunities for health improvements and access to services. The data used to assess opportunities for health improvements and access to services included information gathering during the extensive public consultations including a meeting with University Hospital Galway and data extracted from the traffic model to identify accessibility to services
- The traffic model was also used to quantify the health impacts in terms of difference in people walking or cycling and the level of accessibility and social inclusion with the proposed road development and the full set of measures identified by the GTS complete
- For the Irish Language assessment, consultation with Údarás na Gaeltachta and feedback from the public consultation was utilised
- A 'human beings, population and health' workshop also took place on the 8 June 2017 with the design team, noise, air, socio-economic, landscape and visual and health experts in attendance. The purpose of this workshop was to discuss any significant effects of the construction and operation of the proposed road development on human beings, population and health and the findings of this workshop informed this chapter

18.2.2.3 Study Area

The study area for the socio-economic appraisal covers the lands within and adjacent to the proposed development boundary in addition to areas where changes in traffic volumes are predicted. The study area extends from Na Foraí Maola, west of Bearna Village to the existing N6 to the east at Coolagh and includes a rural/semi suburban landscape populated with individual dwelling and community facilities.

The study area for the Irish language appraisal covers the lands within and adjacent to the proposed development boundary as for the socio-economic appraisal but also includes the Galway Gaeltacht.

The study area in relation to the protection of human health appraisal varies depending on the emission type and its extent, for example, impacts arising from noise, air, water and soil vary with the precise distance depending on the particular emission, its concentration and other dispersion factors. Refer to the **Chapter 9, Soils and Geology**, **Chapter 10, Hydrogeology**, **Chapter 11, Hydrology**, **Chapter 16, Air Quality and Climate** and **Chapter 17, Noise and Vibration** for details of the study areas of the particular emission types (soil, water, air and noise).

18.2.3 Impact Assessment Methodology - Socio-Economics

This section presents the methodology and criteria used in the socio-economic assessment of impacts on human beings and population, and is followed by the impact assessment methodology used in the Irish language assessment in **Section 18.2.4** and health assessment in **Section 18.2.5**.

The purpose of the socio-economic appraisal is to identify the potential significant impacts as they can affect local people and users of the proposed road development during both the construction and operational phases, along with the likely economic impacts at both local and regional level. Socio-economic impacts on human being's due to a development of this type fall into four key categories, namely:

1. Journey characteristics: accessibility and connectivity, including potential impacts on journey time, journey time reliability and travel patterns
2. Amenity:
    a. Journey amenity: Impacts on journey amenity arising from pedestrian/cyclist proximity to traffic, volume of traffic, frequency of congestion, pedestrian and cycle facilities, noise, air quality and changes in the visual environment (as discussed in respective chapters of this EIAR) as they relate to the pleasantness of the environment for walking, cycling or driving
    b. General amenity: Impacts due to any effect that the proposed road development may have on residential quality of life, amenity or recreation facilities due to the same factors together with changes in environmental quality or facilities for amenity
3. Community severance: with regard to the use of community facilities, particularly those used by older people, children or other vulnerable groups
4. Economic: an evaluation of the proposed road development in the context of economic development, tourism and employment

In addition, relative to many other road developments, the proposed road development will involve a high number of residential, and some commercial, demolitions and acquisitions, due to the dispersed pattern of development within the study area. These potential impacts are addressed specifically under the category of general amenity.

Impacts are compared between the Do-Nothing and the Do-Something scenarios and arise from direct, indirect, secondary and cumulative effects on environmental conditions. Impacts can be positive, neutral or negative. The significance of an impact/effect is described as *Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant* or *Profound*. It usually follows that the significance of an impact depends, among other considerations, on:

- The location and character of the local environment
- The sensitivity of the local population and its capacity to absorb change
- The nature of the environmental effect
- The timing and duration of an effect

- The scale or extent of the effect in terms of area or population affected
- The magnitude (duration and frequency) of an effect
- The probability of an effect's occurrence

The impacts may be short term, medium term or long term. Construction impacts relevant to the socio-economic assessment are, by their nature, temporary in nature, although the impact of demolitions can have a prolonged effect on communities that remain.

In line with best practice the socio-economic assessment generally addresses effects at a community level rather than for individuals or identifiable properties, although impacts for small communities are assessed where these may consist of a handful of houses or families, impacts on individual businesses are discussed where these are especially significant. The rationale for applying a particular level of significance to an impact as it would affect the worst hit subset of the population is summarised in **Tables 18.13** and **18.14**. The tables include:

1. The nature of an effect
2. Location and the population subgroup affected
3. The current situation
4. The potential impact due to the proposed road development
5. Impact significance
6. Impact duration (i.e. temporary, short, medium or long term)
7. Receptor extent
8. Proposed mitigation
9. The residual impact

Receptor extent qualifies the preceding assessment of significance by identifying the number of receptor types, i.e. people or businesses, likely to be affected as an approximate proportion of the local population or the total number of businesses. Receptor extent is assessed qualitatively as: few; medium; many; or very many. For instance, an impact may be significant for a particular population subset, but the number of people impacted could be few in number. The table also describes the mitigation proposed and the residual significance of the impact.

18.2.3.1 Journey Characteristics

The assessment of journey times and patterns is inevitably dependent on precisely where an individual journey originates and ends, when it is undertaken (e.g. within or outside peak hours) and by whom it is undertaken, i.e. by drivers, cyclists, users of public transport or pedestrians, including individuals whose transport options may be restricted. The impact varies for each journey, but typical journeys to popular destinations can often be identified. Potential impacts have been assessed in accordance with the significance criteria outlined in **Table 18.1** with positive impacts resulting from a decrease in journey length or time and negative impacts resulting from an increase in journey length or time.

Table 18.1: Criteria used in the assessment of changes in Journey Length or Duration

Impact level	Significance criteria
Imperceptible	No noticeable change to present journeys length or duration
Not significant	An effect which can cause noticeable change, but without significantly extending (or shortening) journey length or duration, or changing journey habits
Slight	Slight improvement to journeys length or duration where impact is positive. Some inconvenience where impact is negative. Some likelihood of changes in journey habits
Moderate	Moderate reduction in journey length or durations where impact is positive, moderate increase where impact is negative. Greater likelihood of changes in journey habits
Significant	Much shorter journey length or duration where impact is positive, much longer increase where impact is negative. High likelihood of changes in journey habits
Very significant	Considerably shorter journey length or duration where impact is positive, considerably longer increase where impact is negative. High likelihood of changes in journey habits
Profound	An approximate doubling (or halving) in typical journey length or duration sufficient to cause marked change in behaviour of a sizeable proportion of population

Journey length refers to the distance associated with a particular journey, whilst duration is the time taken to make the journey. The average walking speed for pedestrians is taken to be 5km/hr (3km/hr for vulnerable groups). International studies suggest that the average urban cycle speed is between 12-20km/hr. Impacts on journey amenity and community severance are addressed separately in the sections below, although there are obvious interactions between each of these categories and with economic impacts. In addition, new transport facilities can improve accessibility of places which were formerly awkward to reach or improve connectivity between home and workplaces, community facilities and between parts of a city or region. Improved connectivity can have implications for choice of transport mode, for land use and economic development.

18.2.3.2 Amenity

Journey amenity

The assessment of journey amenity uses the same significance categories as before and is supported by cross-reference where necessary with chapters on traffic, noise or visual impacts. The level of traffic on a road, the proximity and separation of footpaths and cycle-paths, the nature of any crossings/junctions to be negotiated, the legibility of a journey (including signage), visual intrusions (including sightlines) and perceived and actual safety, are amongst the factors relevant to the assessment of journey amenity, as are the number and types of people affected. The principal concern is with pedestrians or cyclists, but journey amenity impacts also apply to drivers, for example due to safety anxiety associated with the crossings of major roads. Such journeys could involve sensitive population subgroups such as

older drivers or school children as passengers. There are interactions too with the assessment of journey characteristics and community severance.

General amenity

The key criterion in relation to general amenity is community wellbeing, including social sustainability. Direct effects on communities due, for example, to loss of community facilities such as amenity space, natural areas or opportunities to interact with others, can impact on community wellbeing or community interaction. Indirect effects may result from changes in environmental quality, for instance, from noise or visual intrusion and are cross-referenced where applicable with relevant chapters of the EIAR. Impact levels are defined in **Table 18.2** below.

Table 18.2: Criteria used in the assessment of amenity impacts

Impact Level	Significance Criteria
Imperceptible	No noticeable change in the character of the environment
Not significant	An effect which can cause noticeable changes in the character of the environment, but without significant consequences for the community's well-being, amenity or health
Slight	A small impact on community wellbeing can be attributed to the proposed road development
Moderate	A moderate impact on the community wellbeing can be attributed to the proposed road development
Significant	An effect which has the potential to impact on community wellbeing such as to affect people's behaviour and quality of life
Very significant	An effect which has the potential to substantially impact on community wellbeing such as to affect most people's behaviour and quality of life
Profound	Effects of a scale to significantly impact on community wellbeing to an extent that people's behaviour or quality of life is substantially changed, for example where significant health issues arise or where people may wish to relocate

Demolitions and acquisitions

Demolitions or acquisitions of residential properties are subject to financial compensation, but can have a significant impact on the householders involved. In addition, there can be significant impacts on communities or neighbours left behind, especially where the number of demolitions or acquisitions represents a high proportion of the total number of households. The impact definitions applied to the category of general amenity have been applied to the subject of demolitions and acquisitions in this chapter. The potential health impacts as a result of demolitions or acquisitions is assessed in **Section 18.5.5**.

18.2.3.3 Community Severance

Severance is a typical impact of a road. Its effect is to discourage community interaction and occurs where access to community facilities or between neighbourhoods is impeded by a lengthening of journey time or by the physical barrier of a road (for example, high traffic volumes or perimeter fencing). Social

severance can occur due to restrictions on people's accessibility, but also where communities become identified by their containment within road boundaries. This can include the psychological effect of traffic or safety concerns as barriers to social interaction. Social severance can also occur for busy roads such as motorways even where access is available. On the other hand, relief from existing severance may be provided by a new road where traffic volumes or speed are moderated, by the inclusion of crossing facilities in the design, or through the presence of overbridges or underpasses.

The definition of severance is not precise. It depends on the location of community facilities, the level of use of facilities, the time of day or duration when traffic conditions are experienced, the sensitivity of the population affected and the geographical spread of the community. Children, the elderly, the mobility impaired and people without access to a private car would be amongst those most affected by community severance and any corresponding loss of neighbourhood interaction.

Sensitive receptors are identified specifically where they comprise a high proportion of pedestrian journeys or where specific amenities are associated with these groups. Sensitive groups can include young and older population cohorts, the mobility impaired and people at risk of social isolation. Relevant community facilities include schools, surgeries, hospitals, churches, post offices, shops, sports facilities and centres of social activity.

New Severance

New severance is a negative impact generated and occurs whenever a barrier is created between people and community facilities. The barrier could take the form of a new road, fencing, additional traffic or the need to detour from a current traveling route. **Table 18.3** below provides examples of how new severance can be defined. The criteria are specific to pedestrians, although severance will apply also to cyclists and potentially to local vehicle journeys too, particularly for some sensitive population sub-groups. Quantitative criteria have not been included in the table as impact definitions may vary depending on the nature of road trips and crossings (i.e. by car or pedestrian). Similarly, the introduction of crossing facilities could reduce severance even where traffic levels are increased.

Table 18.3: Criteria used in the assessment of New/Increased Severance

Impact level	Significance criteria
Imperceptible	Journey patterns maintained
Not significant	Noticeable effects on connectivity, but without significant consequences for journey patterns
Slight	Present journey patterns likely to be maintained, albeit with some hindrance to movement
Moderate	Some residents, including children and elderly people, are likely to encounter severance. For others, journeys will be longer or less attractive
Significant	Many residents, including children and elderly people, are likely to encounter significant severance which could discourage them from making particular journeys

Impact level	Significance criteria
Very significant	Most residents, including children and elderly people, are likely to encounter significant severance which will be sufficient to induce a reorganisation of their activities or cause them to make less frequent trips to nearby neighbourhoods or to make less use of particular community facilities
Profound	People are likely to be deterred from making trips to an extent that includes permanent loss of access or a change in the location of centres of activity

Relief from Severance

Relief from severance is a positive impact which is defined in relation to existing severance. Relief from severance could follow from a transference of traffic from an existing road, including heavy goods vehicles (HGVs), from improvements in road design or sightlines, or from the introduction of crossing facilities. The Annual Average Daily Traffic (AADT) data was taken from the traffic model for the proposed road development. However, the degree of relief from severance depends on the context in which this change occurs including the existing absolute volume of road traffic, but also the speed of traffic and number of crossings by pedestrians, cyclists or others. **Table 18.4** provides a guide to criteria used in the assessment of relief from severance. It should be noted that a relief from severance is a positive impact and therefore the table reflects the positive impact levels, increasing from imperceptible to profoundly positive. Where the assessment varies from these definitions due to the context in which the relief occurs, the reasons for the variance are discussed. There is also the potential for interactions with Journey Amenity, in that there are implications for real and perceived safety.

Table 18.4: Criteria used in the assessment of Relief from Severance

Impact level	Significance criteria
Imperceptible	No noticeable consequences for journey patterns
Not significant	Noticeable effects on connectivity, i.e. <10% reduction in daily traffic levels (AADT), but without significant consequences for journey patterns
Slight	10-30% reduction in traffic levels (AADT) or some reduction in severance
Moderate	31-50% reduction in traffic levels (AADT) or a reduction in severance sufficient to encourage some new journeys by foot or bicycle
Significant	51-70% reduction in traffic levels (AADT) or a reduction in severance sufficient to allow residents to make more frequent journeys to community facilities by foot or bicycle
Very significant	71-90% reduction in traffic levels (AADT) or a very significant reduction in severance sufficient to allow most residents to make more frequent journeys to particular community facilities by foot or bicycle
Profound	More than 90% reduction in traffic levels (AADT) or reductions in severance such as to provide new access to community facilities or to cause a very significant increase in pedestrian or cycle journeys

18.2.3.4 Economic

General

Economic and employment impacts occur at both the local and regional scale and can be either positive or negative. A development can have positive effects for ancillary businesses or for employment or, alternatively, have negative effects for other businesses. Changes in access or connectivity, as discussed under the category of journey characteristics, can have significant effects on business or investment. Impacts include changes in turnover or in access to business opportunities. Effects could impact on individual companies or the wider community, for example where a number of businesses are affected or where the retail or business environment of a town is impacted. Impact levels are defined in **Table 18.5** below.

Tourism

Tourism makes a significant contribution to the Irish economy, to local economies and to regional development. It provides opportunities for business development, growth and innovation with Small and Medium Sized Enterprises (SMEs) being well-represented in the sector. Consequently, it is also important for employment and is relatively labour intensive compared with other industrial sectors. Interactions between journey characteristics, journey amenity or the nature of destinations used for amenity, can have an impact on tourism and businesses and employment in this sector. Tourist numbers can be affected by either a lengthening or shortening of journeys and reduced or improved connectivity with tourism destinations. Changes in both journey characteristics and amenity can impact on the decision to stop or overnight at particular locations. Changes to sites of cultural or natural heritage value can either discourage or encourage tourists to stop or to continue with their journey or, in extreme cases, to travel at all. Tourists include international visitors as well as visitors from other regions of Ireland.

Table 18.5: Criteria used in the assessment of Economic Impacts

Impact level	Significance criteria
Imperceptible	No noticeable economic impacts
Not significant	An effect which causes noticeable changes in the character of the environment, but without noticeable consequences for the local economy, businesses or employment
Slight	A small effect (positive or negative) on the business environment can be attributed to the proposed road development
Moderate	A moderate effect (positive of negative) on the business environment can be identified
Significant	An effect (positive or negative) that has the potential to impact on business performance or to influence the location decisions of new business
Very significant	An effect (positive or negative) that has the potential to substantially impact on business performance or to influence the location decisions of new business
Profound	Effects of a scale to significantly impact (positively or negatively) on the performance of a major business or several businesses. Where these businesses are important local employers there is the possibility of major impacts for the general prosperity of the local area or region

18.2.4 Impact Assessment Methodology – Irish Language

The purpose of the Irish Language appraisal is to identify the potential significant impacts, if any, of the proposed road development during both the construction and operational phases on the Irish Language.

The Irish Language appraisal is based on:

- inspection of the associated environmental studies and project documentation
- consideration of national legislation and policy documents and the Galway County and City Gaeltacht Development Plans and local area plans (LAPs) including the Gaeltacht LAP as extended and Bearna LAP as amended
- review of relevant submissions made during the public consultations and consultation with Údarás na Gaeltachta
- consideration of previous case work experience

This assessment has been prepared with due regard to the guidelines on the preparation of environmental impact assessment report published by the EPA in 2017 and the preparation of environmental impact statements published by the EPA in 2002, 2003 and 2015.

18.2.5 Impact Assessment Methodology – Human Health

This section sets out the methodology that was used in order to assess the impact of the proposed road development on health.

18.2.5.1 Guidance on the methodology for assessing human health in EIA

The recitals to the 1985 and 2011 EIA Directives refer to "human health" and include "Human Beings" as the corresponding environmental factor. The 2014 EIA Directive (2014/52/EU) changes this factor to "Population and Human Health". However, no specific guidance on the meaning of the term Human Health has been issued in the context of Directive 2014/52/EU. In addition, no specific guidance on the assessment of human health in the context of EIA has been issued to date.

The 2017 draft EPA guidelines on the information to be contained in Environmental Impact Assessment Reports note that "*while no specific guidance on the meaning of the term Human Health has been issued in the context of Directive 2014/52/EU, the same term was used in the SEA Directive (2001/42/EC)*". The Commission's SEA Implementation Guidance (section 5.26) states "*The notion of human health should be considered in the context of the other issues mentioned in paragraph (f) and thus environmentally related health issues such as exposure to traffic noise or air pollutants are obvious aspects to study*". (Paragraph (f) (of Annex I of the SEA Directive) lists the environmental factors including soils, water, landscape, air etc.).

The 2017 draft EPA guidelines note that the above health assessment approach is consistent with the approach set out in the 2002 EPA Guidelines where health was considered through assessment of the environmental pathways through which it could be affected, such as air, water or soil:

"*The evaluation of effects on these pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure or risk. These standards are in turn based upon medical and scientific investigation of the direct effects on health of the individual substance, effect or risk. This practice of reliance upon limits, doses and thresholds for environmental pathways, such as air, water or soil, provides robust and reliable health protectors [protection criteria] for analysis relating to the environment*".

The 2017 draft EPA guidelines also note that in an EIAR, "*the assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc. and that "assessment of other health & safety issues are carried out under other EU Directives, as relevant. These may include reports prepared under the Integrated Pollution Prevention and Control, Industrial Emissions, Waste Framework, Landfill, Strategic Environmental Assessment, Seveso III, Floods or Nuclear Safety Directives. In keeping with the requirement of the amended Directive, an EIAR should take account of the results of such assessments without duplicating them*".

The Institute for Environmental Management and Assessment (IEMA) in the UK issued a discussion document in 2017 *Health in Environmental Impact Assessment*

- *A Primer for a Proportionate Approach*, which it describes as a primer for discussion on what a proportionate assessment of the impacts on health should be in EIA and is a useful document when considering what can and should be assessed in the context of EIA. Regard has been had to the general approach advocated in this document when compiling this chapter.

One of the messages in the IEMA document in terms of assessing health in EIA, is that there should be a greater emphasis on health outcomes, (that is the potential effects on human health), rather than simply the health determinants, (that is the agents or emissions which could have the potential to have health effects). The IEMA document noted that in EIA, there has previously been a strong focus on just the agents or emission levels (e.g. dust) rather than focussing on the effects of these agents/emission levels on human health. This change in emphasis does not mean a complete change in practice. For example, measurement and modelling of dust levels continues to be an essential part of the health assessment.

The IEMA document notes that "*public health is defined as the science and art of promoting and protecting health and well-being, preventing ill-health and prolonging life through the organised efforts of society and has three domains of practice: health protection, health improvement and improving services*". The IEMA document suggests that these three domains should be considered in the assessment of health in EIA. Examples of health protection issues to be considered could include issues such as chemicals, radiation, health hazards, emergency response and infectious diseases whilst health improvement issues could include lifestyles, inequalities, housing, community and employment. Examples of improving services issues could include service planning, equity and efficiencies.

The World Health Organization (WHO) defined health in its broader sense in its 1948 constitution as "*a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity"*. Therefore, whilst the EPA guidance is useful in terms of health protection, for a more holistic assessment as per the IEMA document, it is also worthwhile to look at broader health effects in terms of opportunities for improvement of health and for improvement of access to services. While it is important to do this, it is also important not to attribute every conceivable event as being a health effect. To further rely on the WHO definition, a health effect would be something that would have a material impact on somebody's physical mental and social well-being be that positive or negative.

Health Impact Assessment versus Environmental Impact Assessment

The IEMA document notes that Health Impact Assessment (HIA) and EIA are separate processes and that whilst a HIA can inform EIA practice in relation to human health, a HIA alone will not necessarily meet the EIA human health requirement. HIA is not routinely carried out for major infrastructure schemes in Ireland.

Guidance for performing Health Impact Assessment (HIA)'s was issued by the Institute of Public Health in Ireland in 2009. There are however considerable difficulties in performing a HIA as outlined by the Institute of Public Health for a project such as a road development. Not least of these is the difficulty of getting baseline health data. It is quite difficult due to patient confidentiality and other reasons to accurately determine levels of even relatively common medical

conditions in a relatively defined population that might be affected by a road project. Qualitative and quantitative baseline health data is a vitally important part of the appraisal section of the HIA. In the absence of an accurate baseline it is very difficult to assess qualitative and quantitative changes that might occur. One could use more generalised data that might exist for larger areas such as a city or county but these would be at most an estimate of the local baseline and not accurate enough to allow for meaningful interpretation. Therefore, a standalone HIA is not considered the most appropriate for this assessment.

The IEMA document notes that the WHO provides an overview of health in different types of impact assessment[2] and presents the WHO perspective on the relationship of HIA to other types of impact assessment as follows:

"The health sector, by crafting and promoting HIA, can be regarded as contributing to fragmentation among impact assessments. Given the value of impact assessments from a societal perspective, this is a risk not to be taken lightly ... The need … and justification for separate HIA cannot automatically be derived from the universally accepted significance of health; rather, it should be demonstrated whether and how HIA offers a comparative advantage in terms of societal benefits …

Health issues can, and need to, be included [in impact assessment] irrespective of levels of integration. At the same time, from a civic society perspective, it would be unacceptable for HIA to weaken other impact assessments. A prudent attitude suggests optimizing the coverage of health along all three avenues:

- *better consideration of health in existing impact assessments other than HIA;*
- *dedicated HIA; and*
- *integrated forms of impact assessment*

It is clear therefore that even the WHO does not support a stand-alone HIA unless it could be demonstrated to be of advantage over the EIAR. It is for these reasons that this health assessment is part of the EIAR and there is no stand-alone HIA.

It is therefore important to note that this assessment on human health is part of an overall EIAR rather than a stand-alone HIA. The HIA is defined as a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, programme or project on both the health of a population and the distribution of those effects within the population, whilst the health assessment in the context of EIA focuses the attention of the assessment on likely significant effects, i.e. on effects that are deemed likely to occur and, if they were to occur, would be expected to be significant (as per the requirements of the EIA Directive). Conducting an HIA will not necessarily meet the EIA population and human health requirement.

Therefore, *health protection, health improvement and improving services* are all considered in this chapter of the EIAR. The methodology for assessing health

2 World Health Organization Regional Office for Europe. Health in impact assessments: opportunities not to be missed. 2014

protection, health improvement and improving access to services is considered further in **Sections 18.2.5.3**, **18.2.5.4** and **18.2.5.5** respectively of this EIAR.

18.2.5.2 Literature Review

A literature review on the potential impacts of roads on human health has been carried out. This section presents the results of that literature review which informed the methodology used for human health assessment.

One of the first areas in the literature review to consider is the health determinants relevant to the proposed road development – that is the agents or emissions which could have the potential to have health effects. Health outcomes – that is the potential effects on human health arising from those health determinants are then considered.

The environmental factors (pathways) through which health could be affected by a road development both during construction and operational phases include:

- Noise and Vibration – for example potential exposure of people to noise emissions from vehicles and construction activities
- Air - for example potential exposure of people to dust and air emissions from vehicles and construction activities
- Water – for example potential exposure of people to changes in water quality (surface and ground water) or changes in water flows – flood risk
- Soils – for example potential exposure of people to contaminated land

The health outcomes arising from such emissions are discussed further below.

In addition, the impacts of the proposed road development on psychological health and also health improvements and improvements to services have been included in the literature review below. These topics also fall under the area of "Wellness".

The last fifteen years in Ireland has seen the development of the modern motorway network between the major urban centres as well as relief roads in urban areas. The literature review included a review of any published data of reported health effects from either the construction or operation of these roads. Using a "PubMed[3]" search, key words such as "Health Effects Roads Ireland" found that there were no published studies in peer reviewed literature. There was however a significant tranche of literature from outside Ireland and in particular in relation to emissions to air and noise. The vast majority of the studies deal with potential emissions from operational roads with a particular emphasis on Noise, Particulate Matter (including PM_{10} and $PM_{2.5}$) as well as other air pollutants such as NO_2 and SO_2 amongst others. The literature is clear that these are the major hazards with the potential for human health effects. The literature is also strongly consistent with a Dose response effect as presented in **Table 18.6** below with regard to noise and air emissions - the lower the dose the lower the effect. Health based standards[4] such as WHO and EU

[3] PubMed is a search engine accessing primarily the MEDLINE database of references and abstracts on life sciences and biomedical topics.
[4] The term standards in this instance covers guidelines for example noise guidelines as such standard are not currently available.

standards incorporate literature evidence in the setting of these standards. In essence there is little evidence of significant health effects from air and noise emissions when these standards are not exceeded. It is important to note that these standards are set to protect vulnerable subsections of the population including its most vulnerable members which include children and persons with disabilities and, accordingly, will necessarily protect the more robust subsections. Other emissions such as water and soil can be an issue if there is potential contamination to water or soil or an enhanced flood risk. Again, there is little evidence of significant health effects from water and soil emissions when these standards are not exceeded.

The health assessment in this EIAR considers the results of technical assessments for environmental factors listed above which are detailed in **Chapter 9, Soils and Geology**, **Chapter 10, Hydrogeology**, **Chapter 11, Hydrology**, **Chapter 16, Air Quality and Climate** and **Chapter 17, Noise and Vibration** and their proposed mitigation measures to establish any potential health hazard directly attributed to what is proposed.

These assessments use standards (such as air quality standards) in order to identify whether significant impacts will arise or not. Again, as noted above, the health standards such as those set by the WHO are primarily intended to protect the vulnerable subsections of the population and, accordingly, will necessarily protect the more robust subsections. The standards are set at levels for which there will be no significant health effects, but do not exclude each and every effect, i.e. slight or moderate health effects are possible even below the levels at which health based standards would apply.

These health based standards are discussed further below in relation to the various environmental pathways but it is also appropriate to understand the principle behind the setting of such standards.

Noise

Noise is measured using the standard decibel scale (dBA). The "A" represents a weighting that mimics human hearing. It is important to note that because the decibel is a logarithmic scale i.e. a non-linear scale, the figure can be somewhat confusing. Essentially, an increase by 3dB means a doubling of the sound intensity in energy terms.

The human ear however does not perceive this degree of increase in volume. Normally a 10dB increase in noise level equates to a subjective doubling in audible sound. Very few noise sources are constant. A series of noise events can be averaged over any given period of time using the equivalent continuous sound level (Leq). Leq is the method of averaging recommended in industry and environmental assessments and in guidelines issued by, for example, the World Health Organization.

It is normally assumed that noise inside a building with the windows open, will be at least an estimated 15dB less than that outside. With windows closed, noise levels are reduced further inside, up to in excess of 35dB, depending on the building fabric. The actual attenuation varies depending on the type of building, size of the windows and other factors.

It should be noted that the assessment for this EIA Report relates to environmental exposure to noise. Undoubtedly those with the highest noise exposure will be those working on the construction of the proposed road development. Legislation is in place for control of work place noise and is policed by the Health and Safety Authority.

A Europe-wide study by Fritschi, 2011[5]) and another paper by Hellmuth, 2012[6], published by WHO demonstrate a significant burden of adverse health impacts associated with environmental noise exposure, drawing from earlier WHO publications summarising health evidence and recommending guidelines for community noise exposure. A review of noise exposure across Europe in 2014 by the European Environment Agency (EEA) likewise recommends and applies metrics for various health outcomes. In general terms, increasing noise in communities is associated with adverse health outcomes and vice versa. The nature and the severity of these outcomes is further discussed below.

The potential health impacts due to noise include:

- Noise-Induced Hearing Impairment
- Interference with Speech Communication
- Disturbance at schools
- Sleep Disturbance
- Hypertension and Cardiovascular Disease

Noise-Induced Hearing Impairment

Hearing impairment is typically defined as an increase in the threshold of hearing. It is assessed by threshold audiometry. It only occurs however above a certain noise level. Data from the International Standards Organisation (ISO) and WHO states that Noise Induced Hearing Loss will not occur at noise levels below 70dB no matter how long the exposure continues.

Interference with Speech Communication

Noise interference can interfere with speech comprehension. These may include problems with concentration, fatigue, uncertainty and lack of self-confidence, irritation, misunderstandings, decreased working capacity, problems in human relations, and a number of stress reactions.

Particularly vulnerable to these types of effects are the hearing impaired, the elderly, children in the process of learning, and individuals who are not familiar with the spoken language. Sensitive communication takes place indoors for the majority of the time and as noted above, the average noise attenuation of being inside a building with the windows open is conservatively estimated to be 15dB.

[5] Fritschi, L. et al., 2011. Burden of disease from environmental noise, Copenhagen: WHO Regional Office for Europe

6 Hellmuth, T., Classen, T., Kim, R. & Kephalopolous, S., 2012. Methodological guidance for estimating the burden of disease from environmental noise, Copenhagen: WHO Regional Office for Europe

Disturbance at schools

There are several studies on the effect of environmental noise on education. However most of these relate to airport noise and to a lesser extent traffic noise. From the literature review undertaken, school learning may be the factor most affected by environmental noise.

The RANCH study was one of the largest studies performed on this matter in Europe and was published in the Lancet in 2005. While showing little new data, it suggests a small effect on reading comprehension in 9 to 10 year old primary school children. It also stated "Neither aircraft noise nor traffic noise affected sustained attention, self-reported health, or overall mental health." It was surprising that the study suggested significantly improved memory function in children exposed to high levels of traffic noise. This appears intuitively difficult to understand, but certainly does not suggest that there is the opposite effect. Based on this literature review, disturbance at schools will not be a significant issue.

Sleep Disturbance

Sleep disturbance is considered to be a major environmental noise effect on human health. It is however estimated that 80-90% of the reported cases of sleep disturbance in noisy environments are for reasons other than noise originating outdoors. Understanding of the impact of noise exposure on sleep stems mainly from experimental research in controlled environments.

Field studies conducted with people in their normal living situations are scarce. However most of the more recent field research on sleep disturbance has been conducted for aircraft noise.

Sensitive groups include the elderly, shift workers, persons especially vulnerable to physical or mental disorders and other individuals with sleeping difficulties.

There is evidence that habituation to night-time noise events occurs, and that noise-induced awakening decreases with increasing number of sound exposures per night. Studies have also shown that the frequency of noise-induced awakenings decreases for at least the first eight consecutive nights with people becoming accustomed to the noise thereafter (Journal Behavioural Sleep Medicine, 2007). In summary people get used to the noise and the potential for interference with sleep diminishes.

As stated above most of the published research is related to aircraft noise but in a published study (Babish, 2006) which studied some 23,000 people, the authors concluded that at the same average night time noise-exposure level, aircraft noise is associated with more self-reported sleep disturbance than road traffic, and road traffic noise is associated with more sleep disturbance than railways.

People also sleep during the daytime, for example shift workers, and instances where ambient noise levels are much greater during the day it is therefore less likely that an additional noise source will have a significant effect to those who try to sleep during day time.

Hypertension and Cardiovascular Disease

A number of studies have postulated a link between environmental noise and hypertension and also cardiovascular disease. There is somewhat more evidence in relation to airport noise rather than noise due to road traffic. Some of the studies, particularly in relation to noise due to road traffic, have problems due to potential confounders[7]. One of the issues was trying to differentiate whether effects may be due to air pollution rather than noise. Some more recent studies have suggested that noise may have an independent effect. The extent of the effect is difficult to determine but it is clear that it is only at higher levels of environmental noise that any measurable effect is likely to occur.

Regarding road noise specifically, several meta-analyses of cardiovascular disease have been published by W. Babisch. These date from 2006 to 2014 and show evidence to provide a risk ratio for all ischaemic heart disease (IHD), also known as coronary heart disease (CHD) risk. A meta-analysis published by Vienneau in 2015, used many of the same studies to establish an IHD risk ratio that was used in the 2014 European Environment Agency quantification of noise health impacts across Europe. A limited number of studies of stroke risk associated with environmental noise exposure have also been published by Houthuijis.

These postulated links have been considered by expert bodies such as the WHO when they set their noise guidelines and in particular the night time noise guidelines.

In 2009 the WHO issued Night Noise Guidelines for Europe which explore the effects of night time noise. It stated that in the two European countries studied (Switzerland and The Netherlands) that almost 50% of the population are exposed to night time noise in excess of 45dB L_{night}.

These guidelines quote some health effects at quite low night time levels and proposed an ideal noise level of 40dB L_{night} as measured outside residences. They do however accept that this is essentially unachievable in the foreseeable future and therefore proposes an interim value of 55dB L_{night} outside instead.

It should also be stated that the effects detected at lower night time levels (below 55dB L_{night}) are relatively benign in terms of health effects such as increased mobility (tossing and turning) while asleep. More significant health effects are only linked to much higher noise levels, usually in excess of 70dB L_{night}.

The WHO night noise guidelines refer to L_{night} parameter which relates specifically to noise levels over the night-time period. The NRA Guidelines on the Treatment of Noise and Vibration and quoted in **Chapter 17, Noise and Vibration** sets a design goal in terms of a composite 24 hour parameter, the L_{den}. Whilst the L_{den} includes for night-time noise, direct comparison of the two parameters is not possible as they relate to different averaging time periods. The results of the noise assessment were discussed by the author of this chapter and an understanding of the difference in units and its implications for the results was obtained.

[7] In statistics, a confounder (also confounding variable or confounding factor) is a variable that influences both the dependent variable and independent variable causing a spurious association.

In most urban environs one would expect many areas to have noise levels at or above 55dB L_{night} and Galway is no different. In this context any assessment of potential impacts must take into account the baseline or existing noise levels.

It is important to note that whilst the WHO Guidelines are used in assessing potential health impacts, they can at times be misinterpreted. They are not, and were never intended to be, considered as a threshold. For example, the difference between a property experiencing a night time noise level of 54dB and another property experiencing a night time noise level of 55.1dB would be imperceptible for individuals living there and differences in health status would also be imperceptible.

The WHO Guidelines are guidelines for protection of health in communities. In terms of potential impacts on health, night time noise is far less important and does not merit being considered in the same way as other factors such as diet, exercise, cigarette smoking and genetics. The slight increase or decrease in night-time noise that might occur on individual residences would be so small as to be unmeasurable in terms of health effects. Therefore, in assessing night time noise in the context of the WHO Guidelines, it should only be in the context of overall noise levels in the community rather than the increase or decrease at an individual residence or clusters of residences. Whilst noise levels are often quoted with respect to potential effects on health and they are used in the significance assessment, it should be noted that the differences in significance between the different levels are relative rather than absolute.

Summary Noise

In terms of the health effects of environmental noise there is some limited evidence of effects on blood pressure, cardiovascular risk, school performance and in relation to sleep disturbance. Any effects demonstrated are more likely at higher noise levels. Many effects are only demonstrated with ambient noise in excess of 70dB.

Vibration

Vibration has the potential to have health effects when perceptible. These could include for example sleep disturbance. Another issue which is sometimes described is infrasound. The latter is sound but at a frequency so low that it is not audible to the human ear. If at high levels it may be perceived as vibration. These effects, in relation to vibration and infrasound, however only occur when the levels are high and perceptible to human beings for example an underground train.

Air Quality

Vehicles with internal combustion engines emit air pollutions, including particular matter, carbon monoxide, nitrogen oxides and a variety of hydrocarbons. Previously, lead compounds were added to petrol and lead emissions were a major issue but the sale of leaded petrol has been banned for many years. In the last few years in Ireland, partly because of tax driven reasons, there has been a switch in the type of internal combustion engines in cars from primarily petrol to primarily diesel cars in newer vehicles. Emissions would be broadly similar. However, there are some differences and in particular there is a higher level of particulate emissions from diesel cars. Nitrogen oxides and hydrocarbons can oxidise oxygen in the air

to ozone if exposed to high levels of sunlight. While this is problematic in some countries, it is less likely to be an issue in the Galway area for reasons outlined further below.

The following components of air emissions of motor vehicles were considered for the health assessment:

- carbon monoxide
- other products of combustion
- fine particulates

Carbon Monoxide

Carbon monoxide is formed by incomplete combustion of fuels such as petrol and diesel. It can be absorbed into the blood stream and reduce the oxygen carrying capacity of blood. It is present in all forms of combustion. High levels of carbon monoxide exposure are associated with increased hospital admissions, cardiovascular disease and mortality.

Products of combustion

Nitrogen dioxide, and oxides of Nitrogen in general, directly affects the lungs. It is also gas produced during fuel combustion and impairs the lungs immune defence mechanism. When contacted with water which would line the lungs, it forms an acid to essentially burn the airways. There can be an increased severity of asthmatic attacks, etc. due to high levels of exposure to nitrogen dioxide.

Fine particles

Fine particles include PM_{10}, i.e. particulate matter less than 10 micrograms in diameter but also in more recent time, more emphasis has been made on smaller particles, again including $PM_{2.5}$, i.e. less than 2.5 microns, PM_1 and even nanoparticles which are smaller particles again. These have been known to exacerbate respiratory conditions such as bronchitis and pneumonia and there is increased mortality with higher levels.

Particulate emissions have received attention in recent years given increasing evidence of their health effects. Indeed, there have been calls to ban diesel vehicles in larger cities because of potential adverse effects. However, when assessing the human health impacts of the proposed road development, one must consider the Do-Nothing scenario would lead to those vehicles continuing to go through congested city centre routes with slow average speeds giving the potential for greater emissions. Overall therefore the proposed road development may have potential benefits regarding particles compared to the Do-Nothing scenario. This is discussed further in **Section 18.6** of this EIA Report.

Appropriate Standards

The starting point in selecting the appropriate standard to apply is EU directives which had been set down. In Ireland, these are monitored by the EPA. The current applicable directive is the Clean Air for Europe (CAFÉ) Directive.

The following table shows the limit or target values specified by the directive that set down limits for specific air pollutants. The directive covers:

- Sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (PM_{10} and $PM_{2.5}$) and lead
- Carbon monoxide and benzene
- Ozone
- Arsenic, Cadmium, Nickel and Benzo(a)pyrene

Table 18.6: Limit values of CAFE Directive 2008/50/EC

Pollutant	Limit Value Objective	Averaging Period	Limit Value ug/m3	Limit Value ppb	Basis of Application of the Limit Value	Limit Value Attainment Date
SO_2	Protection of human health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year	1 Jan 2005
SO_2	Protection of human health	24 hours	125	47	Not to be exceeded more than 3 times in a calendar year	1 Jan 2005
NO_2	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year	1 Jan 2010
NO_2	Protection of human health	calendar year	40	21	Annual mean	1 Jan 2010
PM_{10}	Protection of human health	24 hours	50		Not to be exceeded more than 35 times in a calendar year	1 Jan 2005
PM_{10}	Protection of human health	calendar year	40		Annual mean	1 Jan 2005
$PM_{2.5}$ - Stage 1	Protection of human health	calendar year	25		Annual mean	1 Jan 2015
$PM_{2.5}$ - Stage 2	Protection of human health	calendar year	20		Annual mean	1 Jan 2020
Lead	Protection of human health	calendar year	0.5		Annual mean	1 Jan 2005

Pollutant	Limit Value Objective	Averaging Period	Limit Value ug/m3	Limit Value ppb	Basis of Application of the Limit Value	Limit Value Attainment Date
Carbon Monoxide	Protection of human health	8 hours	10,000	8620	Not to be exceeded	1 Jan 2005
Benzene	Protection of human health	calendar year	5	1.5	Annual mean	1 Jan 2010

As discussed previously, air quality standards are set to protect the vulnerable such as those with respiratory illnesses, the old and infirm. Slightly higher levels of oxides of nitrogen above the standards may have no effect on the vast majority of the population but may be significant for the vulnerable. Hence the human health impact assessment has relied on compliance with the Air Quality Standards to determine whether significant impacts will arise on human health or not. The standards used in **Chapter 16, Air Quality and Climate** include the *Air Quality Standards Regulations 2011,* which incorporate *European Commission Directive 2008/50/EC* which has set limit values for the pollutants SO_2, NO_2, PM_{10}, benzene and CO. The C*ouncil Directive 2008/50/EC* combines the previous *Air Quality Framework Directive (96/62/EC)* and its subsequent daughter directives (including *1999/30/EC* and *2000/69/EC*). Provisions were also made for the inclusion of new ambient limit values relating to $PM_{2.5}$. These are clearly appropriate and robust standards. The table above shows that the levels are set primarily for the protection of human health. Therefore, provided these levels are not exceeded one can be confident that there will be no adverse effect on human health due to air emissions.

Potential Health Impacts from Air

In 2010, the Health Effect Institute (HEI) Panel in the US, in a study partially funded by the US EPA on the Effects of Traffic-Related Air Pollution, concluded that exposure to air pollutants specifically from roads is likely to be associated with all-cause mortality[8], cardiovascular disease incidence and mortality, and reduced lung function, albeit with weaker evidence (due to fewer and smaller studies) than the wider air pollution health evidence base.

The WHO published a review in 2005 of the health effects of transport-related air pollution which concluded that health effects include increased cardiopulmonary mortality risk and respiratory morbidity risk.

Since 2013, the International Agency for Research on Cancer (IARC) defines diesel engine exhaust as carcinogenic to humans. Petrol engine exhaust is classified by IARC as possibly carcinogenic, as there is inadequate evidence to form a firmer conclusion.

A relatively recent article by Chen et Al published in the Lancet in early 2017 showed a small (7%) increase in the incidence of dementia in those living less than 50 meters from major roads but no increase in the incidence of Multiple Sclerosis or Parkinsons disease. The authors postulated that increased levels of $PM_{2.5}$ and

[8] This is mortality from all causes e.g. cancer, heart, lung etc.

NO_2 may be associated factors. However, there were important limitations on the study as the study was based in Ontaria, Canada where major roads would include very busy highways and trunk roads. Perhaps the most significant criticism of the study was that the authors could not account for socio-economic effects. Socio-economic effects are related to the incidence of dementia. Therefore, if the individuals living within 50 metres of major roads in Ontario were of lower socio-economic status than those living further away this might explain the relatively small increase in the occurrence of dementia in this study. Overall while further studies are recommended one can draw relatively little from this one study.

While there are some difficulties making comparisons between the impact of road building in say China, far more relevant information can be gleaned with similar projects within Ireland while being conscious of international published data. This is due to the fact that the baseline environment in densely populated counties such as China, which currently includes polluted air quality in its baseline, is not comparable to that of Ireland and in particular Galway.

The 2014 publication from the OECD The Cost of Air Pollution, The Health Impacts of Road Transports points out that while the health impacts of air pollution in western countries is decreasing, that it is increasing in countries like China and India. It is more important for us in Ireland to consider the data from this country and similar countries.

While it is now 13 years old, an important document in Ireland was the Health Impacts of Transport, a Review published in March 2005 by the Institute of Public Health in Ireland. This remains the most recent publication from this body on this subject.

The document reviews the elements of health impacts of transport. It originated as part of the transport HIA in Ballyfermot organised by the Eastern Regional Health Authority and proceeds from the Institute's strategic objective to strengthen the capacity of those working for public health.

In the Executive Summary they stated:

"the effect of air quality on human health has been extensively researched and expert opinion is available in this area. Currently, evidence is strongest for air pollution as a cause for short-term health problems in certain groups such as the elderly and those with underlying health problems such as heart or lung disease. Longer term health impacts are suspected to result from certain components of air pollution. However, it has been difficult to ascribe a cause and effect with certainty. Traffic is a leading source of air pollution and any issues which would reduce traffic volume can have potential benefits to health by improving air quality. Vehicle speeds is also a factor warranting consideration. Low average speeds such as those on congested routes are less efficient in the use of fuel and result in greater pollution emissions."

It can be concluded that the principal of moving traffic to a road with higher average speeds has actually a potential benefit on health.

It is important in these areas to consider the baseline environment. The EPA Air Quality Index shows that the air quality in both Galway City and County is very

good. There are multiple reasons for this. One is Galway's geographical location on the edge of the Atlantic Ocean exposed to prevailing winds which predominantly blow air pollutions away from the centres population. There have also been very good controls with regard to potential sources of pollution in the Galway area. This was further supported by the site specific air quality monitoring undertaken for the proposed road development. Refer to **Chapter 16, Air Quality and Climate**.

There is no history of heavy industry emitting high levels of pollutions for example. The major sources of industry currently operating in Galway include medical device companies with very low emissions. It is against this background air quality that any emission would occur. These are detailed further in **Chapter 16, Air Quality and Climate**.

Water

Accessibility to high quality clean water is obviously very important contributor to human health. In Ireland these are regulated by the European Union (drinking water) Regulations 2014. These regulations impose duties on Irish Water and local authorities in relation to the sampling and recording of water quality. There are strict standards in relation to the quality of water in relation to its chemical content as well as microbiological aspects. Provided the standards are observed one can be confident that there will be no adverse effect on human health due to effects on water quality.

Flooding also has potential for human health effects. Apart from the economic impacts of flooding, particularly of repeated flooding in certain areas, individuals who have their homes and residences flooded can be subject to very significant psychological impacts. Financial loss can occur particularly in areas which previously experienced flooding and were no longer insured. This loss can relate to the actual damage to the properties caused by the flooding but also the potential loss in value of the property. These can be associated with increased levels of anxiety and even depression. Flooding can also be a potential source for the spread of disease. This made the spread by vermin or alternatively flooding the sewers and septic tanks. When considering the potential health effects of the proposed road development in relation to flooding, it is important to consider if the risk of flooding is increased or decreased or indeed unaffected by the proposed road development.

Soils

<u>Contamination of Land</u>

If a project has the capacity to contaminate land this also has the potential for human health effects. This contamination could for example arise if previously buried contaminated material is unearthed during the construction process. Examples of this might include an unidentified landfill, previous industrial contamination or indeed naturally occurring sources of contamination. Contaminated land could in turn affect health either by direct contact, either people living and working on the land itself or for example children playing on the land. Some contaminants may be concentrated in food grown in the land and this is another manner in which contaminated land could have a health effect.

Radon

Radon is a naturally occurring radioactive gas that originates from the decay of uranium in rocks and soils. It is colourless, odourless and tasteless and can only be measured using special equipment. When radon surfaces in the open air, it is quickly diluted to harmless concentrations, but when it enters an enclosed space, such as a house or other building, it can sometimes accumulate to unacceptably high concentrations. Radon decays to form tiny radioactive particles, some of which remain suspended in the air. When inhaled into the lungs these particles give a radiation dose that may damage cells in the lung and eventually lead to lung cancer.

It is only when radon has potential to build up in buildings that are inhabited by human beings that the health risk occurs. Indeed, these buildings due to heating or otherwise can in certain areas draw in radon from the ground as warm air rises within the buildings. If radon is found at high levels in buildings one of the most effective remedies is to create a sump which creates its own negative pressure and draws the radon away from entering the building. More information on this can be found on the EPA website[9].

Psychological

In the planning process, potential adverse effects on psychological health are often mentioned, for example, anxiety and stress experienced by those whose homes are to be unfortunately compulsory acquired or those whom will experience a change in the environment in which they live.

The community will also experience annoyance from the temporary impacts of traffic management and other effects during the construction phase. As against this there is the potential reduction in annoyance amongst road users in the operational phase where there are reduced journey times. Annoyance however, is not in itself a health effect.

For virtually every proposal for any road development there are concerns about potential adverse effects on a person's overall psychological well-being. This is somewhat a more difficult matter to assess as there are no direct measurements one can use. While one can give great detail in predicting for example noise emissions one cannot use the same scientific certainty in predicting psychological impacts. It is not possible to use a standards-based approach for example.

There are various degrees of psychological impact and these can be both positive and negative. There can be a positive impact, whereby people may look forward to better transport. There can also be adverse effects of varying degrees. At the lower end of this impact might be annoyance where somebody is annoyed by for example, outside noise, dust depositing or temporary traffic delays associated with construction of the roads. This is not a medical impact as such. If someone develops a psychological illness such as anxiety or depression this would be a medical impact.

Construction by its very nature is transient but it is expected that construction activities will cause some annoyance such as from road diversions and temporary

[9] http://www.epa.ie/radon/getinformed/

road closures. The potential effects are minimised by use of appropriate traffic management and avoidance of extended night time closures. There has been a considerable amount of road construction in Ireland over the last few decades. However, there is no documented evidence from these projects to link adverse outcomes with psychological health in Ireland.

Health Improvements

The proposed road development has the potential to provide opportunities for health improvements.

Employment and income are among the most significant determinants of long-term health, influencing a range of factors including the quality of housing, education, diet, lifestyle, coping skills, access to services and social networks. Many epidemiological studies consistently show better health outcomes are associated with higher socio-economic status.

Consequently, poor economic circumstances can influence health throughout life, where communities subject to socio-economic deprivation are more likely to suffer from morbidity, injury, mental anxiety, depression and tend to suffer from higher rates of premature death than those less deprived. One of the most reliable methods to improve health within a community is to raise it socio-economic status.

Projects that have the potential to support regeneration, reduce unemployment and improve socio-economic circumstance, could contribute to improving the health and wellbeing of socio-economically deprived communities.

In social health terms, economic development also brings the opportunity for reducing inequities in society. Long-term unemployment for example is detrimental to the individual, family and society. It has potential to transfer across generations so that families where the head of household is long term unemployed are themselves far more likely to become or stay unemployed. This has potential to create and sustain social inequities. The economic development opportunities provided by the proposed road development have the potential to create more employment and reduce the risk of long-term unemployment. This in turn can lead to greater opportunities for equity in society.

Improvement of Access to Services

Studies show that recreational activities can have a positive impact on a person's wellbeing and their health.

A study by Lyon et Al[10] from 2004 showed a much improved survival rate from out-of-hospital cardiac arrests was strongly influenced by reduced response times for emergency services. The ability for emergency services such as ambulances to rapidly access emergency situations therefore has the ability to save lives.

Improving access to cinemas, parks, retail and other recreational activities will therefore make it easier for people to undertake recreational activities. Improved

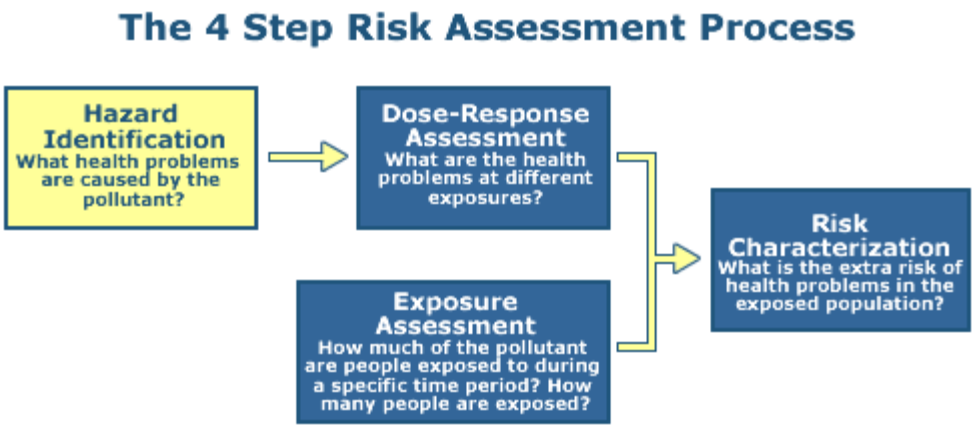
[10] Emerg Med J. 2004 Sep;21(5):619-24| Lyon RM1, Cobbe SM, Bradley JM, Grubb NR.

access to medical services will also have added benefits to a person's health as will access to education facilities as outlined above in the Health Improvement section.

18.2.5.3 Health Protection

The assessment of human health for the proposed road development, in terms of health protection, follows the approach set out in the EPA guidelines and in the European Commission's SEA Implementation Guidance. It is also similar in nature to the US EPA guidance. Human Health protection is considered through the assessment of the environmental factors (pathways) through which health could be affected such as air, noise, water and soils. The US EPA guidance includes a four step approach which is represented graphically in **Plate 18.1** below.

Plate 18.1: Human Risk Assessment



The potential noise, air, soils and water impacts which could affect human health were identified (Hazard Identification), the scale of these potential impacts (Dose-Response Assessment) and their duration (Exposure Assessment) were assessed and the significance of the potential impact on human health determined (Risk Characterisation).

When using a recognised Health Based Standard, the dose-response assessment is actually included in the standard. In other words, the authorities or expert committees which recommended the level of the standard will have taken into account the health problems at the different exposure levels and set the level within the standard to prevent these problems from occurring.

18.2.5.4 Health Improvement

Projects that have the potential to support regeneration, reduce unemployment and improve socio-economic circumstance, could contribute to improving the health and wellbeing of socio-economically deprived communities.

The assessment of human health for the proposed road development, in terms of health improvement, includes an assessment on how the proposed road development would impact on the socio-economics of the community.

18.2.5.5 Improvement of access to services

Improving access to services such as hospitals or recreational facilities will have an impact on the health of a community. Therefore, the assessment of human health for the proposed road development includes an assessment on whether or not the proposed road development will improve accesses to these services.

18.2.5.6 Significance of Health Impacts

There is a difficulty in assigning levels of significance to human health impacts. In medicine, as in all science, the concept of statistical significance is used. This involves attaching a value to significance, often expressed as a percentage level of confidence in the data. Confidence measures of 95% or even 99% are often used to measure levels of certainty or changes that are not due to chance alone.

This is a valid approach for the study of the impacts on a *population*, but does not absolutely exclude a response on an *individual*. However, it is difficult to assign levels of significance to individual human health impacts without detailed information about that individual. Thus, the significance of health effects are assessed on a group or community basis rather than on an individual basis. There is such a variability in human response that one could never identify all possible individual effects and so, in accordance with the guidance referred to above, it is considered to be more appropriate to assess the significance of health effects at a population level. The significance criteria for the assessment of the health of communities are therefore as outlined in **Table 18.7** below.

Table 18.7: Criteria Used in the Assessment of Community Health Protection Impacts

Impact Level	Significance Criteria
Imperceptible	No significant human health impacts are apparent
Slight	A small impact on reported symptoms but no change in health status can be attributed to the proposed road development
Moderate	A moderate impact on health status but no change in morbidity or mortality can be attributed to the proposed road development
Significant	The proposed road development has the potential to impact on health status with an associated change in morbidity
Very Significant	The proposed road development has the potential to impact on the health status of groups of people
Profound	The proposed road development has the potential to impact on the health status of communities

Asthma can be used as an example when using these criteria:

- An Imperceptible impact would be one with no measurable effect on asthma
- A Slight impact might be a temporary increase in symptoms but no change in the severity of the underlying condition or treatment required

- A Moderate impact might be an increasing use of inhalers attributable to the proposed road development but no change in underlying condition and no effect on the vast majority of asthmatics
- A Significant effect might be an individual becoming asthmatic or an individual's asthma becoming measurably more severe as a result of the proposed road development
- A Very significant effect might be a group of individuals becoming asthmatic or their asthma becoming measurably more severe as a result of the proposed road development
- A Profound effect might be a measurable increase in the incidence or severity of asthma in a community as a result of the proposed road development

18.3 Receiving Environment

18.3.1 Context

Galway City and its environs sits within the 4.5km[11] distance between the Lough Corrib and Galway Bay and is divided by the River Corrib with the built and natural environment and residential areas located on both sides of the river. The proposed road development skirts the city and majority of lands zoned for development. The baseline environment is represented by the semi-rural/urban fringe of Galway City and for the most part the landscape is dominated by low intensity grazing and uncultivated, undulating lands and bog and areas zoned for and built residential, commercial, and industrial and amenity development. However, given the built environmental, the linear development of the city with housing along every road radiating out of the city and the unavoidable proximity to residential areas, the proposed road development will unfortunately and unavoidably result in a number of property demolitions and community impacts.

Preliminary demographic data is available from Census 2016 (July 2016) on the population of Galway City and its environs. The Galway City Development Plan 2017-2023 draws on the population projections prepared for the Regional Planning Guidelines 2010-2022. In line with the National Spatial Strategy 2002-2020, it aims to concentrate population in the city with sufficient zoned land capacity to meet the needs of a population of 98,700 (36,286 households) by 2022. As of 2016, the Central Statistics Office (CSO) Census recorded a population of 78,668 for Galway City, an increase of 4.2% on the preceding figure for 2011 and 8.6% on 2006. The number of households also grew by around 4.1%. The figures demonstrate that the population has increased significantly in recent years despite the effect of the economic recession of 2008-2011. The population is, however, unlikely to grow at a rapid enough rate to meet the original projections of the Regional Planning Guidelines. Similarly, population projections in the Galway County Development Plan 2015-2021 also rely on the existing Regional Planning Guidelines. The County Development Plan proposes concentrating development in the hub town of Tuam, the Galway Gateway and the Strategic Economic Corridor to the east of Galway City between Oranmore and Attymon. Population growth will involve demand for

[11] Distance measured from south shore of Lough Corrib to Spanish Arch at Galway Docks

residential development and an increased pressure on the existing transport infrastructure.

Residential development has tended to occur on a largely west-east spine. Both the Galway City Development Plan and the Galway County Development Plan envisage an eastward extension of the city towards the area covered by the Ardaun LAP 2018-2024 to the east of Doughiska between the R339 Monivea Road and the R446 Doughiska Road. The development plans acknowledge the potential pressure that this new growth will place on existing transport infrastructure into the city and the need to integrate land use and transportation. A need for consolidation or regeneration within selected neighbourhoods is identified in the plans.

Residential development is more scattered within the urban fringe, often along minor roads and especially north of Bearna. There are distinct and established communities in addition to those listed in the data from the CSO below. Amongst others, these include Bearna, Na Foraí Maola, Troscaigh, An Chloch Scoilte, Cappagh, Ballymoneen, Keeraun, Mincloon, Dangan, Menlough, Ballindooley, Ballinfoyle, Castlegar, Parkmore, Doughiska and Coolagh.

Table 18.8: Population Galway City and County

	2016	**2011**	**2006**	**2002**
Galway City	78,668	75,529	72,414	65,832
Rest of County Galway	179,390	175124	159,256	143,245
Total County Galway	258,058	250,653	231,670	209,077

Table 18.9 indicates the population of each Electoral Division (ED) in the wider Galway area as recorded at the time of the 2016 Census. The table reveals modest percentage increases in population with some of the larger increases having been experienced in the suburban area of Ballybaan and the village of Bearna. Some more established areas such as Dangan have experienced an increase in population as compared to a reduction in the last Census period.

The extents of the Galway Gaeltacht area can be seen in **Figures 18.1.01** and **18.1.02**. Population figures for the Galway Gaeltacht to the west and north of the city are included in **Table 18.9** as these areas will be better connected by the proposed road development. Relative to several of the suburban and urban/rural fringe EDs, these figures reveal rather small population increases for the areas west of the city along the R336 as far as Rossaveel (Ros an Mhil) with the exception of Na Forbacha closer to the city where the population grew by 7.9%. The Gaeltacht is an area that is currently rather difficult to access from the east side of Galway City and the rest of the country, although growth potential here is somewhat restricted by the confinement to a narrow strip between the sea and blanket bog to the immediate north. The population growth has been greater in the Gaeltacht area along the N59 Moycullen Road between the city and Oughterard.

Table 18.9: Population Electoral Divisions

Electoral Division	Population 2016	Population 2011	Percent change	Population Density (persons per km^2)
Galway Gaeltacht				
27054 Cil Chuimin (Kilcummin)	1314	1315	-0.1%	23.9
27061 Saileama	1453	1448	0.3%	21.2
27055 Cill Aithnin	1044	1000	4.4%	14.3
27063 An Spidéal	1443	1450	-0.5%	40.9
27051 Na Forbacha	1415	1312	7.9%	47.5
27159 Oughterard	2636	2604	1.2%	21.8
27162 Wormhole	2376	2315	2.6%	38.2
27062 Sliabh an Aonaigh	763	763	0%	13.2
27065 Tulaigh Mhic Aodhain	2075	1985	4.5%	68.4
27059 Maigh Cuillinn	2142	2008	6.7%	74.0
Galway Urban Rural fringe				
27044 Bearna (Barna Rural)	3727	3630	2.7%	156.4
27052 Galway Rural (part)[12]	149	126	18.3%	63.5
Galway suburbs				
26003 Bearna (Barna)	15185	14384	5.6%	2131.0
26015 Rahoon	3076	3009	2.2%	615.3
26006 Dangan	4132	3608	14.5%	2193
26013 Newcastle	1900	1820	4.4%	2500
26010 Menlough (Mionlach)	5118	4990	2.6%	610.8
26004 Castlegar (An Caisleán Gearr)	4053	4135	-2.0%	1079.6
26002 Ballybrit (Baile an Bhriotaigh)	949	898	5.7%	366.5
26001 Ballybaan	13019	12298	6.9%	1710.4
26011 Mervue	1831	1796	1.9%	1510

Based on the more detailed results from the 2016 Census, **Table 18.10** illustrates the expansion in the number of households in Galway over time in the study area and in the suburbs despite the current high levels of traffic on the existing N6. The table reveals how population trends over time have been reflected in the number of

[12] Galway Rural (part) is a small ED (#27052) on the south-west shore of Lough Corrib

private households. The table shows that expansion into the rural areas of Bearna (Rural) has been well-established and continuous over the years, albeit from a small base. By comparison, expansion into the main village of Bearna and the townlands of Rahoon and Castlegar has been more recent, mainly from the 1990s. Established suburbs such as Dangan and Newcastle had experienced much of their growth prior to the 1990s, although the most recent Census results show that this could be changing.

Table 18.10: Houses by year built (2016)

	Pre 1971	1971 – 1980	1981 - 1990	1991 - 2000	2001 - 2010	2011: -	Unknown year	Total
Bearna (Barna Rural)	12.3%	11.2%	9.5%	19.8%	41.7%	2.4%	3.1%	1188
Bearna (Barna)	2.1%	4.4%	16.9%	34.5%	32.9%	1.8%	7.4%	5516
Galway Rural (part)	7.2%	9.1%	4.5%	5.5%	4.5%	2.7%	0	110
Rahoon	6.5%	9.8%	15.7%	27.1%	32.7%	1.5%	6.7%	1110
Dangan	9.6%	25.1%	30.3%	18.4%	5.2%	0.8%	10.7%	1512
Newcastle	25.4%	47.0%	12.1%	3.2%	2.5%	0.4%	9.4%	713
Menlough	6.1%	22.2%	25.3%	14.6%	17.9%	1.5%	12.4%	1823
Castlegar	5.2%	14.7%	9.8%	15.5%	40.2%	0.6%	13.9%	1566
Ballybrit	8.4%	7.2%	18.1%	32.4%	21.2%	0.3%	12.5%	321
Ballybaan	2.7%	6.6%	6.8%	13.3%	57.4%	16.%	11.6%	4554
Mervue	55.9%	16.8%	7.5%	1.9%	0.3%	0.3%	17.4%	755

Table 18.11 presents the figures for mode of journey to work, college or school and reveals high proportions of journeys by foot in the central or established neighbourhoods such as Dangan, Newcastle, Murrough and in Menlough. Levels of cycling are also in excess of 6% in these EDs. Journeys by foot also exceed 10% in Castlegar, Ballybrit and Ballybaan, but are understandably low in the urban/rural fringe area where vehicle use accounts for more than 50% of journeys. In Bearna, around 80% of people make their journey by car with the consequence that pressure is inevitably placed on the local road infrastructure, the environment and community wellbeing. Around one quarter of people in these EDs travel as a passenger or by bus, including a high proportion of students and school children.

Table 18.11: Journey mode to work, college and school (2016)

	On foot	Bicycle	Public transport	Car / van driver / motorcycle	Car passenger	Other / at home	Not stated
Bearna (Rural)	5.2%	2.0%	3.1%	51.0%	32.0%	4.0%	2.4%
Bearna (Barna)	6.9%	4.1%	11.1%	47.6%	25.6%	2.3%	3.4%

	On foot	Bicycle	Public transport	Car / van driver / motorcycle	Car passenger	Other / at home	Not stated
Galway Rural (pt)	0.1%	0.1%	0%	61.4%	29.5%	0%	3.4%
Rahoon	10.7%	5.7%	4.9%	36.0%	17.7%	1.6%	2.3%
Dangan	43.4%	8.0%	4.1%	26.8%	12.9%	1.3%	3.6%
Newcastle	49.6%	8.5%	4.8%	21.0%	11.5%	0.8%	3.8%
Menlough	34.0%	6.4%	5.8%	35.2%	13.0%	1.5%	4.0%
Castlegar	16.6%	6.3%	12.4%	42.3%	15.3%	1.5%	5.6%
Ballybrit	11.7%	3.2%	16.1%	47.0%	16.3%	1.7%	4.0%
Ballybaan	12.9%	2.9%	13.5%	42.33%	19.2%	1.2%	7.8%
Mervue	19.3%	4.2%	11.6%	37.4%	10.6%	1.4%	15.6%

Table 18.12 shows journey times to work, college or school. These conform to expectations in that journey times are less in the established neighbourhoods of Newcastle and Dangan and are extended in the urban/rural fringe. Most journeys are completed in less than 30 minutes in most EDs, but a further 20% of journeys take between approximately 30 minutes and three-quarters of an hour in the urban/rural fringe. Only 3.5% of journeys exceed three-quarters of an hour. However, given that some urban roads are near to capacity, and that most people travel to work or college by car, journey time is vulnerable to increases in traffic volumes and to incidents giving rise to congestion.

Table 18.12: Journey time to work, college and school (2016)

	< 15 mins	1/4 - 1/2 hour	1/2 - 3/4 hour	3/4 hour - 1 hour	1 hour - 1 ½ hours	> 1 ½ hours	Not stated
Bearna Rural	24.6%	38.8%	23.7%	3.8%	3.5%	1.3%	4.4%
Bearna	22.2%	42.4%	21.0%	3.8%	2.8%	1.5%	6.2%
Rahoon	25.2	33.1%	13.4%	2.1%	1.7%	0.7%	4.8%
Dangan	41.3%	39.5%	8.5%	2.3%	1.3%	0.7%	6.4%
Newcastle	52.6%	32.2%	5.6%	1.3%	1.4%	0.5%	6.5%
Menlough	31.8%	44.4%	12.0%	1.5%	2.0%	1.3%	6.9%
Castlegar	29.0%	38.8%	17.5%	2.8%	2.4%	0.9%	8.5%
Ballybrit	32.3%	39.5%	14.7%	4.1%	2.3%	1.1%	6.0%
Ballybaan	30.2%	36.0%	17.1%	3.0%	2.3%	0.7%	10.8%
Mervue	35.4%	31.6%	9.6%	1.8%	1.2%	0.5%	19.8%

In addition to residential development, areas have been zoned for major retail and light industrial development in Rahoon, along Seamus Quirke Road and east of the River Corrib in the vicinity of the Bodkin and Kirwan Junctions. The National University of Ireland Galway (NUIG) occupies a corridor of land beside the western bank of the River Corrib with teaching and research facilities located north and

south of the Quincentenary Bridge, as well as extensive recreation facilities comprising the NUIG Sporting Campus to the north in Dangan.

Large light industrial and commercial estates are found to the east of the N83, particularly in the suburbs of Ballybrit, Parkmore and Briarhill and include the Ballybrit Industrial Park, the City East Business Park, Oldenway Business Park, Briarhill Business Park, the Galway Technology Park and the Parkmore Business Park. Commercial business parks are fewer in number, to the west of the River Corrib, the Galway West Business Park and the Gateway Retail Park are located in the vicinity of Rahoon and Clybaun. A large area is zoned for enterprise and commercial activity between Bóthar Stiofán in Knocknacarra/Clybaun across to the Western Distributor Road. One business park, Galway Business Park, is situated off the N59 Moycullen Road and benefit from proximity to the NUIG Campus.

18.3.2 Character

The study area commences in the rural area to the west and north of Bearna Village. Although the landscape retains elements of a wild and rocky vista there has also been a significant amount of new linear residential development in recent years. This development is adjacent to the few minor roads traversing the study area between which land use is largely low intensity agricultural. The proposed road development follows a corridor just outside of the built up residential areas of Clybaun and Letteragh on the edge of Galway City, but does cross the Dangan townland of established residential development and areas of amenity use to the east.

The same pattern applies east of the River Corrib where the corridor for the proposed road development traverses parts of Ballindooley and Castlegar. Further to the east, the area around Ballybrit includes extensive areas of commercial development and also the Galway Racecourse.

From a Human Health perspective, the health of the population in Galway is broadly similar to other areas within Ireland. In its most recent publication on Health Status and Health Service Utilisation 2010, the CSO provides information of a number of health statuses. The statistics are reflective of the region, in this case, the West of Ireland. It shows, for example, in terms of self-perception of Health Status, 85% of adults perceive their health as being either Very Good or Good. This compares to 89%in Dublin, 87% in the South West and 84% in the Midlands. There are also statistics on doctor diagnosed medical conditions including for example, asthma, chronic bronchitis, diabetes and mental health problems, as well as others. In all cases, prevalence of these conditions is similar to other areas of the country. In general, therefore, the statistics suggest a health status broadly consistent with the Irish population as a whole.

18.3.3 Significance

The proposed road development is intended to provide improved connectivity to the national road network for communities on the western side of the River Corrib which is only possible at present by using one of the four city centre bridge crossings. It will attract traffic from the city centre and suburbs, leading to improved

journey time reliability and potentially facilitating the reallocation of the road space to public transport. It will also provide for an improved city centre environment for all due to reduced congestion and improved journey amenity, allowing walking and cycling to become safer, more practical transport modes. At present, bus patronage is less than 10%. Current journey times for both private vehicles and public transport are extended significantly by regular congestion particularly in the vicinity of the Bodkin Junction and Kirwan Roundabout, but also at the Browne Roundabout and along Seamus Quirke Road. Significant community severance is currently experienced along Seamus Quirke Road, the Western Distributor Road and along every section of the existing N6, including areas with important community and retail facilities. Although there are signalised crossings, wait times can be lengthy due to the volume of traffic. In the eastern half of the city at Briarhill, there is a pedestrian underpass, but crossings of any sort are necessarily prevented along much of the existing N6 in Ballybrit by a central barrier. While there are few community facilities in this area, the commercial and industrial estates to the north are important places of employment to which most access occurs by private vehicle.

The economy of Galway City has a strong representation of software, pharmaceuticals, medical devices and engineering businesses. Tourism is also an important economic sector and the city is the gateway to Connemara and the Aran Islands. As well as the economic benefit of the tourism sector, the city's historic heritage, cultural and arts scene attract large numbers of visitors and provide city residents with a vibrant environment. Galway City itself has various well-known sites and holds numerous event and festivals throughout the year including the Galway Arts Festival, the Galway Food Festival, the Cúirt International Festival of Literature, the Oyster Festival and the Galway Races. In addition, the NUIG Sporting Campus, the River Corrib, Lough Corrib and Galway Bay are also used for walking, fishing, and a variety of water-based activities throughout the year.

High quality transportation access in and out of the city is essential to the sustainability of the city's growth, the capacity of the tourism sector to drive regional development and to the city's ability to stimulate economic development across the county, including more economically peripheral areas to the west of the city. To date, most industrial development has occurred in the east of the city where the best connections are to be found via roads to Dublin, Limerick, Cork and the east of the country. However, there are several large industrial or commercial estates which currently have very restricted access, in some cases only to the existing N6. The increasing volume of traffic in these areas impacts significantly on average journey times, especially at peak hours, and presents a threat to continued economic investment.

The route of the proposed road development generally avoids nucleated settlements with the exception of areas such as Dangan, Ballindooley/Ballinfoyle and Castlegar. There are areas of concentrated or linear residential development and also scattered development. Identities have emerged, often associated with historical townlands, local crossroads, schools or sports clubs. These sports facilities, together with the NUIG Sporting Campus, are well used by people living outside of the study area. There are also small family business premises and some equine activity.

18.3.4 Sensitivity

In the current baseline environment, there are limited opportunities for pedestrian crossings along the existing N6 away from dedicated crossing facilities. Combined with long wait times where these facilities are present, this imposes a particularly significant impact on sensitive or vulnerable population subsets such as young people, the elderly and people with disabilities. The CSO data records, rather high levels of disability (all types) in Rahoon (11.1%), Dangan (12.2%) and Newcastle (19.7%) relative to an average of 9.7% for the other EDs in the study area. These are neighbourhoods with a relatively high representation of older people and pockets of social disadvantage as indicated by the Pobal HP Deprivation Index (see also **Section 18.3.5**). Heavy traffic volumes, together with severance, noise and air quality impacts, reduce local quality of life, have potential implications for health and inhibit the ease of movement of people to schools, shops, medical centres and other community facilities. Road crossings can be awkward for those whose mobility is impaired and, away from crossing facilities, can entail an accident risk for all pedestrians. It can also be difficult for drivers to gain safe access to and from busy roundabout junctions. In addition, whilst there are some cycle lanes along the existing N6, these sometimes terminate at junctions without onward facilities, including for crossings. While the level of cycling in Galway City is comparable to other regional cities, the figures are low by an international comparison. Inadequate cycling facilities, poor journey amenity and safety hazards, greatly discourage cycle journeys from the suburbs into the city.

Galway City is an important national tourist destination. The attractiveness of the city to visitors partly depends on city centre traffic volumes remaining manageable and on vehicle access to the centre and the west not being subject to poor journey amenity, delay or congestion. Such factors impact negatively on the visitors' experience and their willingness to recommend Galway as a destination to others.

The proposed road development will also pass through the Galway Gaeltacht as shown in **Figure 18.1.001** and **18.1.002**. The Galway Gaeltacht is an area of cultural distinctiveness that is an important part of the county's identity and an attraction to visitors. This identity could be strengthened by the economic stimulus of the improved accessibility provided by the proposed road development.

In addition, some of the landscape in the west and central parts of the study area is of amenity interest or value. The corridor of the River Corrib is a sensitive landscape feature which is used for walking, rowing and angling and which links the city to its wider hinterland. Much of this corridor is occupied by lands managed by NUIG. These lands are accessible to the general public and are used by both university and non-university sports clubs and as an amenity. The university highlighted the role of these lands in providing for a unified campus and their importance in terms of providing sports and amenity facilities for attracting students and high-calibre staff. The concept of a unified campus has already been impacted by the partial physical severance incurred due to the Quincentenary Bridge on existing N6. Similarly, there are quiet roads and boithríns in the study area which are used for walking locally, including a historic mass paths. In particular, minor roads in the west of the study area are much used for walking, jogging and cycling. The study area is largely free of built development north of the existing N6, although there is much scattered residential development.

Residents consulted in the local community in the study area during the course of the assessment have often acknowledged the potential positive impacts of the proposed road development, noting in particular the potential for shorter travel times due to reduced urban congestion. People have also referred to the prospect for improved connectivity between parts of the city and the benefit this will have both socially and for employment. Concerns were simultaneously expressed regarding perceived environmental and community impacts, many of which mirror those received during the earlier public consultation. Such anxieties can sometimes impact on individuals' health and well-being prior to the commencement of works. Where possible, these concerns have been addressed during the design process or by the proposed mitigation with the net impact discussed in the relevant section of this and other chapters.

18.3.4.1 Identification of vulnerable groups

While every human being should be considered a sensitive receptor, the vulnerable are the most sensitive. These vulnerable groups may be more susceptible to impacts associated with the proposed road development.

Children and adolescents constitute a vulnerable group partly due to their need to be able to move around freely to and from school and recreational activities. They lack the experience and judgement displayed by adults when moving around traffic in public spaces. Studies[13] show that they may also be more sensitive than adults to air pollution and other environmental factors.

Elderly people constitute a very variable group when it comes to their need and scope for moving around the community. Generally speaking, the elderly people are slower in their movements and more health conditions may occur. Elderly people in general have greater sensitivity to air pollution and potential effects on the respiratory system and cardiovascular system and more likely to express anxieties in relation to potential air quality or noise impacts due to the proposed road development. There are many reasons for this sensitivity, including the possible presence of other medical condition such as respiratory or cardiovascular disease. Subtle changes in the environment have the potential to have an adverse effect that would not be experienced by younger more resilient persons. There are other vulnerable groups also, for example, persons with disabilities or persons with mental illness. It is important to note that, in this assessment, it is assumed that all areas contain highly vulnerable individuals including the old, the very young, disabled and persons with disabilities, as well as people who are sick today or who may be sick at the time the proposed road development is being constructed or operational. However, as noted above, there are some particular areas with higher levels of sensitive population subsets than others.

Vulnerable groups of people occur throughout the receiving environment for the proposed road development and include among others, a crèche, schools, nursing home and areas with a higher number of older family groups.

[13] http://www.who.int/ceh/risks/en/

18.3.5 Community Profile

Evidence shows that different communities have varying susceptibilities to health impacts both positive and negative as a result of social and demographic structure, behaviour and relative economic circumstance.

Whilst specific health data for individuals in the vicinity of the proposed road development is confidential and difficult to establish, a community profile has been used to establish the baseline and identify unequal distributions in existing factors such as deprivation or burden of poor health, in order that changes in community exposure to certain health pathways and their degree of impact on the population or community can be assessed.

A group made up of the Health Services Executive, Lenus and the Irish Health Repository have published health profiles for all the Local Authorities areas in Ireland and a health profile is available for both Galway City and County. The most recent profiles published relate to 2015 and have been used to establish a community health profile for the proposed road development.

The Health Profile identified that Galway City:

- "*has the lowest dependency ratio* in Ireland *of 34.9% (i.e. the number of those aged between 0-14 and 65 and over, as a percentage of the number of persons aged between 15 and 64). The national rate is 49.3%*
- *has the second most ethnically diverse population with 23.8% being non-white Irish. It also has the highest proportion of Travellers nationally of 2.3% (national 0.7%)*
- *is the third most affluent local authority area*
- *has the second highest education attainment levels of 45.0% (national rate 30.6%). The proportion of those with primary education only is 9.3% (national rate 15.2%)*
- *has the highest incidence of male malignant melanoma, and slightly above average for male prostate and colorectal cancers (Galway City and County data)*
- *is average or below average for the four main causes of mortality, all cause mortality and suicides (Galway City and County data)*
- in terms of the age breakdown of the population it shows that Galway City, has a relatively higher percentage of the population in the young adult ages from 20-35 and a relatively smaller percentage in the very young and older age groups than the national population. However, this demographic is not unusual for an urban setting in Ireland

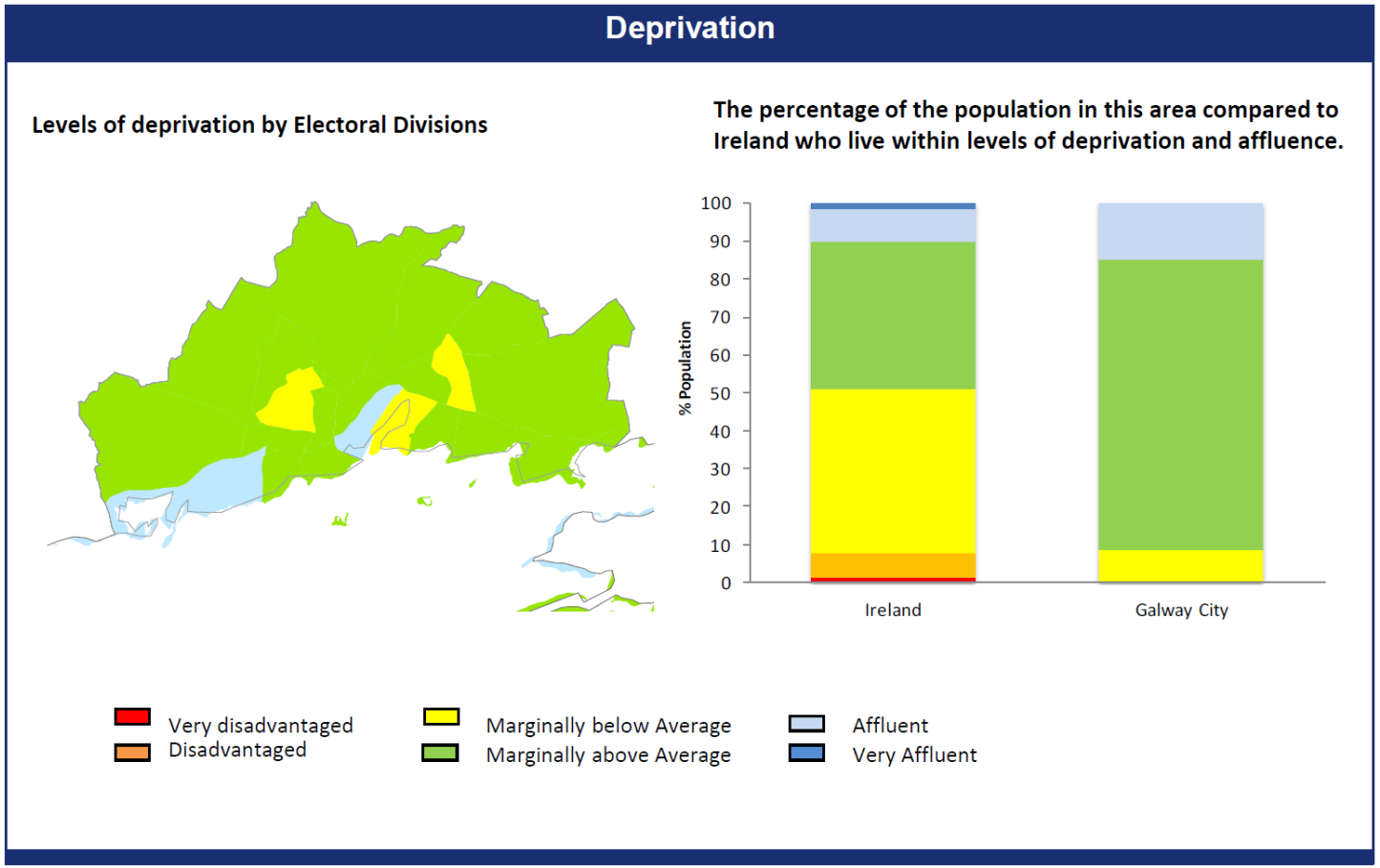
The Health Profile identified that Galway County:

- *Is the tenth most affluent local authority area nationally*
- *The Traveller population of 1.4% is above the national rate of 0.7%*
- *Has a low lone parent rate of 9.3% (national 10.9%)*

- *Has a low birth rate for mothers under 20 years of age at 7.0% (national 12.3%)*
- *Has the highest incidence rate of male malignant melanoma nationally, but is below average for female malignant melanoma, breast cancer, female colorectal cancer and male and female lung cancer (City and County data)*
- *Has average or below average mortality for the four main causes of mortality and for all mortalities (City and County data)*
- *Is below average for male and female deliberate self harm*

In terms of deprivation, the health profile report includes a map which shows deprivation levels as a percentage of population compared to national levels, see **Plate 18.2** for a copy of this map. It should be noted that the data shown on the map are averages and the scale of the map covers a relatively large area and does not give a true reflection of what is happening on a smaller more local scale. Areas which are categorised as affluent will contain small areas which are disadvantaged and similarly areas shown as disadvantaged will contain individuals or groups of considerable advantage. This shows geographically Galway City has relatively large areas which are marginally above average in terms of affluence or defined as affluent. However, there are parts of Galway City which score relatively highly on the Pobal Deprivation Index including the ED which contains the neighbourhood of Newcastle and areas close to the city centre.

Plate 18.2: Deprivation Map for Galway City (*Extract from Health Profile 2015 Galway City*)

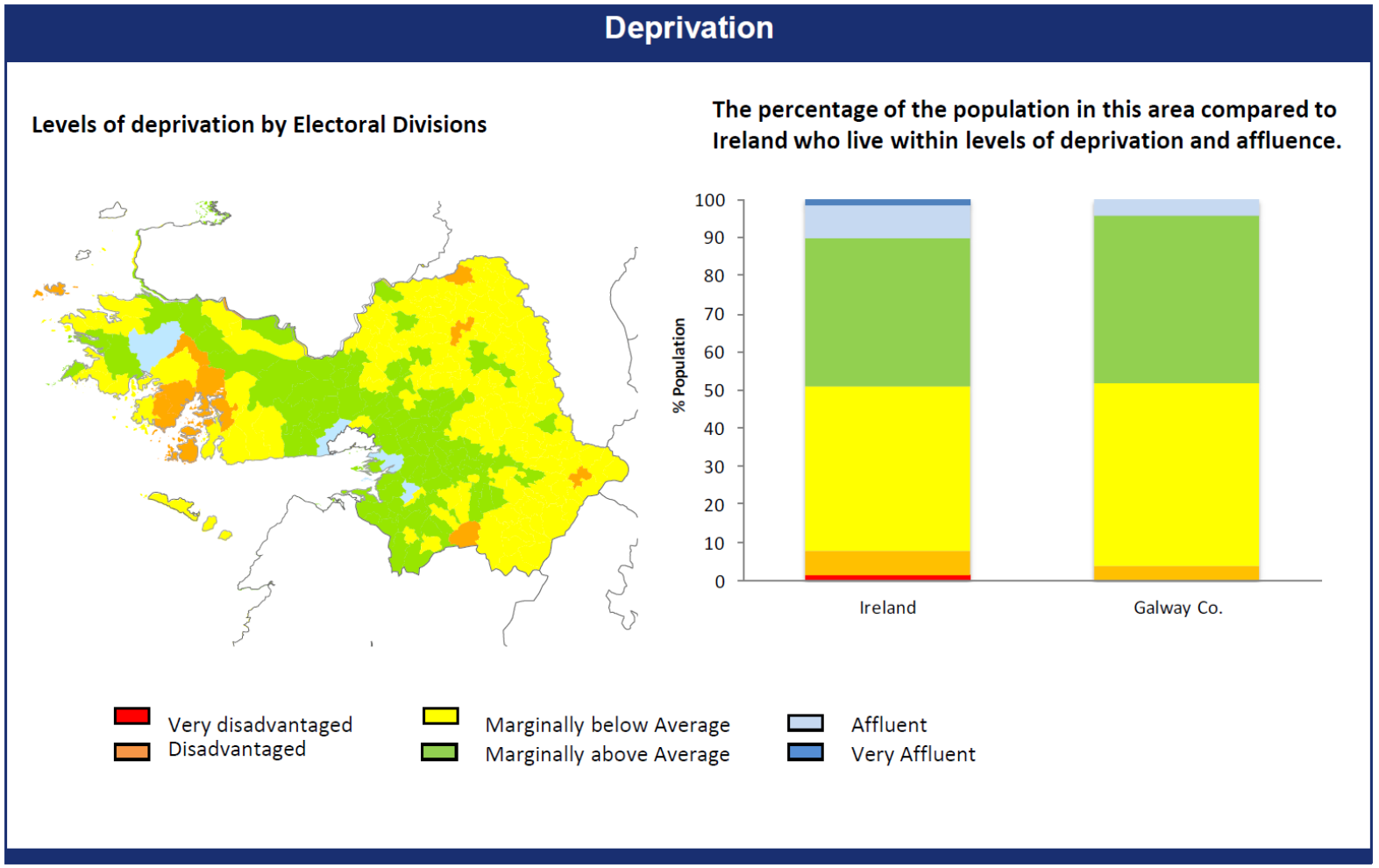


Note: There are parts of Galway City which score relatively highly on the Pobal Deprivation Index including the ED which contains the neighbourhood of Newcastle and areas close to the city centre.

When one looks at the deprivation map for Galway County (see **Plate 18.3** below), one can see an area described as affluent, immediately to the north and west of Galway City. Again as noted above, the data shown on the map are averages and the scale of the map covers a relatively large area and does not give a true reflection of what is happening on a smaller more local scale. Areas which are categorised as affluent will contain small areas which are disadvantaged and similarly areas shown as disadvantaged will contain individuals or groups of considerable advantage.

A copy of the Health Profile reports for Galway City and Galway County are included in **Appendix A.18.1** and **A.18.2** respectively.

Plate 18.3: Deprivation Map for Galway County (*Extract from Health Profile 2015 Galway County*)



18.3.6 Irish Language

18.3.6.1 Context

Irish (or Gaelic) is the national and first official language of the Republic of Ireland and it is among the official languages of the European Union. Despite its official status, the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2009 declared the Irish language as "definitely endangered" and stated that it may be on its way to disuse. The Census of 2016 recorded that of 1.76 million people in the Republic of Ireland who indicated they could speak Irish, 73,803 said they speak it daily outside the education system, a fall of 3,382 on the 2011 figure.[14] A further 111,473 said they spoke it weekly, while 586,535 said they spoke it less often. Over one in four (421,274) said they never spoke Irish. Of the 73,803 daily Irish speakers (outside the education system), 20,586 (27.9%) lived in Gaeltacht areas.

Irish was the predominant language of the Irish people for most of our recorded history. By the tenth century Middle Irish was spoken throughout Ireland, Scotland and the Isle of Man; indeed, a common Gaelic literary language was used in Ireland and Scotland until the 15th century. Though Gaelic power and culture suffered in the century after the Anglo-Norman invasion, by the end of the thirteenth century "confidence had returned and the educated families of Gaelic Ireland embarked on a 300-year period of tremendous energy in the production of poetry, legal commentaries, translations of European medical treatises and works of genealogy and Irish history."[15] However by the seventeenth century, the language had lost its ascendancy and the dominant land-owning, merchant and professional classes were English.[16] As a result of economic pressures and British government prohibition of the use of Irish in public life, by the eighteenth and early nineteenth century, Irish was largely the language of the poorest sections of society. The Great Famine (1845 – 1849), and the socio-economic upheaval that followed, decimated the language. However, by the end of the nineteenth century, a vibrant language revival movement emerged in the form of the Gaelic League (Conradh na Gaelige). The creation of the Irish Free State institutionalised the language and

... government efforts to promote Irish, especially by maintaining the viability of the Gaeltacht, the remaining Irish-speaking areas, and insisting on compulsory instruction in schools, have thus far attained only limited success.[17]

The term "Gaeltacht" describes areas where the Irish language is considered the vernacular language. Ireland's Gaeltacht's were defined by a Government-appointed commission in 1926 and the boundaries were redrawn in 1956. It amounts to a total of 155 District Electoral Divisions, covering extensive parts of counties Donegal, Mayo, Galway and Kerry, all of which are on the western seaboard, together with parts of counties Cork, Meath and Waterford.

[14] CSO 2017, 65.
[15] Duffy, 2000, 44.
[16] *Duffy, Atlas of Irish History, 2000*, 94.
[17] *Duffy, Atlas of Irish History, 2000*, 94.

Consolidated figures for numbers of speakers and volume of Irish use in the Gaeltacht, have been available since the mid-1920s with the government-appointed "Coimisiún na Gaeltachta" report of 1926 and the population census of the same year. The former recommended that the Gaeltacht, which until then had no administrative existence, be defined on a two-tier basis – what came to be known as *Fíor Ghaeltacht* (above 80% Irish-speaking) and *Breac-Ghaeltacht* (between 25% and 80% Irish-speaking).

The *Comprehensive Linguistic Study of the use of Irish in the Gaeltacht* (2007)[18] conducted on behalf of the Department of Community, Rural and Gaeltacht Affairs (now the department of Art, Culture and Gaeltacht) updated these definitions into categories based on percentage of daily Irish speakers and sociolinguistic profiles for each type of community:

- Category A (over 67% Irish-speaking)
- Category B (between 44% and 66%)
- Category C (less than 40%)

The position of the Irish language in the Gaeltacht is very fragile as a result of continuous erosion by a wide array of forces including the mass media, the provision of State services through English, popular culture and the historical and contemporary dominant status of the English language in Irish society. Furthermore, there has been a weakening of the language as a result of people coming to live in the Gaeltacht from elsewhere who have little or no Irish. While there is evidence that there is a high level of awareness of the importance of Irish in the community life of the Gaeltacht, there has been a major reduction in the numbers of parents using Irish as the first language of the household and in the use of Irish among young people in the Gaeltacht. With respect to the education system, primary schools contribute greatly in supporting and fostering the language as a community language, but post-primary education is frequently provided outside the Gaeltacht area and/or within a local town where English usage is more prevalent. For a multitude of reasons, Irish has almost ceased to be, and in some cases no longer is, the community language in a number of Gaeltacht areas.

The Government's *20-Year Strategy for the Irish Language 2010 - 2030*[19], has the principal objective of increasing on an incremental basis the use and knowledge of Irish as a community language. Specifically, the Government's aim is to ensure that as many citizens as possible are bilingual in both Irish and English. It is an integral component of the Government's Irish language policy that close attention be given to its place in the Gaeltacht, particularly in light of research which indicates that the language's viability as a household and community language in the Gaeltacht is under threat.

The total population of all Gaeltacht areas in April 2016 was 96,090[20], down 0.6 per cent from 96,628 in 2011. Of these, 63,664 or 66.3 per cent, indicated they could

[18] Comprehensive Linguistic Study of the use of Irish in the Gaeltacht – Principle Findings and Recommendations – 2007: Research Report prepared for the Department of Community, Gaeltacht and Rural Affairs (http://www.pobail.ie/en/AnGhaeltacht/LinguisticStudyoftheGaeltacht/)
[19] http://www.ahrrga.gov.ie/app/uploads/2015/07/20-Year-Strategy-English-version.pdf
[20] CSO 2017, 69.

speak Irish, while 20,586 (21.4% of the total) indicated they spoke Irish daily outside the education system. This represents a fall of 11.2 per cent on the 2011 daily Irish speakers figure of 23,175. The number of people in Gaeltacht areas who indicated they spoke Irish less often than weekly decreased by 0.7 per cent from 16,244 to 16,137.

There are a large number of pre-school, educational, arts, sports, entertainment and employment organisations working on the ground throughout the Gaeltacht. These include community-based companies supported by Udarás na Gaeltachta. There are also a sizeable number of language-based enterprises operating through Irish. The following important organisations are based in the Galway Gaeltacht: Acadamh na hOllscolaíochta, TG4, RTÉ Raidió na Gaeltachta and An Coimisinéir Teanga.

18.3.6.2 The Galway Gaeltacht

The Galway Gaeltacht is the most populous of the country's Gaeltacht areas. It stretches for approximately 100km from Baile Clár, east of Galway City to Cloch na Rois in West Connemara. According to the 2011 Census, there were 48,907 people living in the Galway Gaeltacht. Of those aged 3 or over (a figure of 46,703), 66.3% (or 30,978), indicated an ability to speak some level of Irish. A total of 13,790 stated that they spoke some level of Irish every day (representing 29.5% of the population of the Galway Gaeltacht over the age of 3 years old). Approximately 15,300 of the total Galway Gaeltacht population resides within the suburbs of city.[21]

In 1926, the rural districts with the highest proportion of Irish-speakers were situated in the western half of the country. In 1956, the official Gaeltacht boundaries were officially revised. While the total Gaeltacht population in the state fell by nearly one fifth, the Galway Gaeltacht had an overall loss of just 1%; however, the Fíor–Ghaeltacht areas declined by 12%. The larger Breac-Ghaeltacht areas, which included Galway City, maintained their 1926 level.

The patterns of language usage in the Galway Gaeltacht during the period closely resemble those of 1926. Again, only three rural districts – Galway, Oughterard and Clifden – contained significant proportions of households in which Irish was the sole or main language in normal use. However, in all districts, there is evidence of a shift towards English. The revision of the Gaeltacht boundaries was designed to positively impact on Irish language use in both Breac- and Fíor–Ghaeltacht areas. It redefined the Galway Gaeltacht almost entirely within the boundaries of the three most western and rural districts – Galway, Oughterard and Clifden, omitting English-speaking pockets in these areas, and the Breac-Ghaeltacht areas in the eastern rural districts of Galway. Within the 1926 boundaries, the Gaeltacht in 1956 contained a population of 104,896, but the revised boundaries had a population 28,878.

Between 1956 and 1971, overall population levels in the Galway Gaeltacht declined, but then showed a sharp increase in the 1970s; however, patterns were different between the Galway rural districts and remaining areas. In the 1956-71 period, population levels in this district were stable, while in the 1971-81 period, they increased by 45%. By contrast, Clifden and Oughterard experienced

[21] Galway City Council (2016, 99)

significant population loss until 1971; after which only slight gains were seen up to 1981. Many of these changes are clearly related to the growth of Galway City, with the areas closest to the city experiencing the strongest population growth – in the region of 43%. As the population increased, the ratio of Irish speakers decreased. In the coastal zone between Galway City and Indreabhán (Inverin), population increased by 24%, but there was a language shift to English, particularly close to the city. In Bearna, for example, only 60% of the population were classed as Irish speakers, however this ratio increased to 92% towards the west of the county. Very high levels of Irish speaking (+90%) in the Galway islands were maintained.

Both the demographic and linguistic trends in the country's Gaeltacht areas forced a major reappraisal of government policy in the late 1950s and 1960s. This reappraisal included the abandonment of the policy of relying on agriculture for a sound economic base, and in the provision of a Government department dedicated to the Gaeltacht. As late as 1966, 72% of the workforce of the Galway Gaeltacht was still employed in agriculture. Over the following 15 years, this decreased to 41%. The establishment of Údarás na Gaeltachta in 1980 saw a greater emphasis on industrial development within Gaeltacht areas. From the 1970s onwards, Galway City grew increasingly important as a centre of third-level education and employment. In the recent 2016 Census, amongst the cities in the state, Galway City and its suburbs had the highest proportion of population who spoke Irish on a daily basis (3%).[22]

18.3.6.3 Planning context

The 2000 Planning and Development Act outlined the principle that all Local Authority County Development Plans should set out objectives in relation to the linguistic heritage of Gaeltacht areas within the county in question, these should include:

> *The protection of the linguistic and cultural heritage of the Gaeltacht including the promotion of Irish as the community language, where there is a Gaeltacht area in the area of the development plan*[23]

Subsequent Planning and Development Regulations (2001) from the Department of the Environment, Heritage and Local Government contain, within Article 33, the basis for the requirement that a Language Impact Assessment be prepared for a planning application within a Gaeltacht area.

Significant further requirements for public bodies to ensure better availability and a higher standard of public services, including the planning process, through Irish were enforced under the Official Languages Act, 2003.

The Gaeltacht Act 2012 was enacted with two primary objectives: (a) to provide for a new definition for the Gaeltacht and (b) to make amendments to the structure and functions of Údarás na Gaeltachta. The Act envisages that the Gaeltacht will in future be based on linguistic criteria instead of on geographic areas which has been

[22] http://www.cso.ie/en/releasesandpublications/ep/p-cp10esil/p10esil/gag/
[23] Planning and Development Act 2000, Section 10.2m

the position to date. Language planning at community level will be central to the new definition of the Gaeltacht.

Both Galway City and County Councils have policy goals and objectives in relation to the Gaeltacht and the Irish Language. Of most relevance to the Galway Gaeltacht has been the County Council's *Gaeltacht Local Area Plan 2008–2018* (which was amended in 2013). However, the Variations No. 2a and 2b to the Galway County Development which were adopted incorporate the Bearna Local Area Plan as amended and Gaeltacht Local Area Plan (LAP) as extended into the County Development Plan respectively[24]. This proposed variation, in conjunction with the County Development Plan, will inform and manage the future development of the Bearna and Gaeltacht areas. The Gaeltacht LAP as extended consists of the plan context, strategy, overview of the Districts and settlement plans for An Cheathrú Rua and An Spidéal. A number of other settlements in the Gaeltacht have their own Local Area Plan, for example Maigh Cuillin has a plan in situ until 2019.

18.3.6.4 Language Profile

The proposed road development traverses the following Electoral Divisions (EDs):

- Bearna (part) (County Galway) (CSO Area Code ED 27044)
- Bearna (Galway City) (CSO Area Code ED 26003)
- Rahoon (CSO Area Code ED 26015)
- Dangan (Galway City) CSO Area Code ED 26006
- Galway Rural (Part Rural) (CSO Area Code ED 27052)
- Mionlach (CSO Area Code ED 26010)
- An Caisleán Gearr (CSO Area Code ED 26004)
- Baile An Teampaill (Part Rural) (CSO Area Code ED 27042)
- Baile An Bhriotaihg (CSO Area Code ED 26002)
- Ballybaan (CSO Area Code ED 26001)

Of these, the EDs of Rahoon, Dangan, Galway Rural (Part Rural) and Ballybaan are not within Gaeltacht district, while the western portion of Baile an Teampaill (Ballintemple) is within the Gaeltacht. The proposed road development extends through an area of the Galway Gaeltacht which abuts and surrounds Galway City. Since the 1980s, this area has experienced rapid population growth and urban expansion. Critically the majority of the population is not of Gaeltacht origin and the use of Irish as the "family" language has continued to decline.

Table 18.13 below presents the percentage Irish speaking population (aged 3 years and over) in the District Electoral Divisions through which the proposed road development passes, and percentage of daily Irish use in 2011 and 2016. For this study, daily usage is defined by the number of people (a) speaking Irish daily within

24 http://www.galway.ie/en/services/planning/developmentplansandpolicy/galwaycountydevelopmentplan2015-2021/

and outside the education system and (b) those speaking Irish daily outside the education system only.

Table 18.13: Language usage within the District Electoral Divisions through which the proposed road development will pass (based on CSO Small Area Population Statistics 2011 and 2016)

District Electoral Division	Total Population aged 3 or over		% Irish-Speaking		% Daily Irish Use	
	2011	2016	2011	2016	2011	2016
26003 Bearna (Galway City)	13,564	14,461	52.1%	50.0%	5.6%	4.8%
27044 Bearna (part) (County Galway)	3,462	3,586	66.4%	65.8%	7.9%	6.4%
27052 Galway Rural (Part)	123	146	65.0%	49.3%	8.9%	6.8%
26015 Rahoon	2,854	2,946	42.5%	42.8%	4.0%	2.8%
26006 Dangan (Galway City)	3,572	4,021	50.53%	47.3%	3.2%	2.4%
26010 Mionlach	4,823	4,960	44.8%	43.3%	3.5%	2.9%
26004 An Caisleán Gearr	3,912	3,894	37.0%	35.8%	2.6%	2.6%
27042 Baile An Teampaill (Part Rural)	1,402	1,424	50.7%	50.1%	2.1%	2.9%
26002 Baile An Bhriotaihg	865	915	39.2%	36.9%	3.2%	2.7%
26001 Ballybaan	11,482	12,271	33.8%	31.6%	1.8%	1.8%

These figures indicate that the daily usage of Irish (outside of the education system) within the environs of the proposed road development varies from just less than 2% to less than 8% (though the highest percentage was recorded within the least populated Electoral Division (Galway Rural ED 27052)). It is fair to say that while Irish is a community language within the study area for the proposed road development, it is far from being a dominant or significant one.

18.4 Characteristics of the Proposed Road Development

A detailed description of the proposed road development and construction activities are provided in **Chapter 5, Description of Proposed Road Development** and **Chapter 7, Construction Activities**. This section outlines the characteristics and activities of the proposed road development of relevance to human beings, population and human health.

18.4.1 Construction phase

An east to west build sequence is likely to be adopted and construction may be completed in two concurrent phases or a single overall contract:

- Phase 1 – N6 Coolagh to N59 Letteragh Junction – 9.9km (Including the N59 Link Road North and South)
- Phase 2 – N59 Letteragh Junction to R336 Coast Road west of Bearna - 7.5km

It is estimated that the main construction period will last for approximately 36 months. A variety of construction activities will occur simultaneously at a number of locations along the proposed road development, but will be phased at any particular location.

Construction of the proposed road development will include activities such as excavation, embankment and structural construction, tunnelling, piling, rock breaking and movement of materials within the fenced off working area. This will generate noise, dust and movement of machinery which will impact on human beings, population and human health. The duration of these works will vary. Construction will be undertaken using internationally accepted methods, for example working hours and noise and screens and in a manner which will minimise, as much as possible, any disturbance to the local residents and road users. Refer to **Chapter 7, Construction Activities** for further details of construction activities. Refer to **Chapter 16, Air Quality and Climate** and **Chapter 17, Noise and Vibration** for details on potential air and noise impacts during construction.

The proposed road development has been designed to avoid as many residential properties as possible, but given the built environment and the linear development of the city with housing along most roads radiating out of the city, its construction will unfortunately and unavoidably result in a number of property demolitions or acquisitions in particular areas. At some locations, a high proportion of the total number of properties in a cluster will be acquired as part of the proposed road development. As well as the direct adverse impact on the householders themselves, this will present a varying negative impact on remaining residents depending on the strength of community interaction that has evolved at each location and the sustainability of community facilities such as schools.

Commencing the description at Bearna, much of the construction work here will occur in a rural setting. However, the high number of one-off dwellings in this area will result in the demolition of some properties. Other residents will be in close proximity to construction works and associated impacts. To the north of Bearna, an

overbridge is proposed between the Foraí Maola Road (Na Foraí Maola Junction) and the L5387 Troscaigh Road (Troscaigh Junction) to provide continued access in a north-south direction along both roads. At Ch. 2+500 the proposed road development will sever the L-13215 Ann Gibbons Road with access to the north provided instead by the L1321 Bearna to Moycullen Road which will meet the proposed road development at the Bearna East Roundabout. Temporary realignments will be required on the Aille Road to allow for bridge construction and traffic management at other locations where local roads cross the construction works.

A signalised junction (Cappagh Road Junction) is proposed between the proposed road development and Cappagh Road. This junction will facilitate access to the proposed road development for the community of Boleybeg to the north and for the Western Distributor Road to the south, enabling use of the proposed road development as an alternative to the R336 through Bearna for many journeys. A crèche is also located to the north of the proposed roundabout at Cappagh Road.

Another signalised junction with the Ballymoneen Road (Ballymoneen Road Junction) provides for access to the Rahoon Road and the hinterland around it including Ballyburke, as well for journeys to the communities of Boleybeg and Keeraun to the north-west and Mincloon to the south. A temporary night-time closure of Rahoon Road will be required to facilitate overbridge construction.

The N59 Link Road North and South will be constructed in a largely rural area. Six local access roads will be constructed on the southern section as required, including a realigned entrance to the Rosán Glas Estate. However, there will be a minimum impact on local traffic as most of this section is offline of the current road network. New link road access will be provided to the Gateway Retail Park, replacing the existing access from the Gort na Bró roundabout with a signalised junction. The N59 Letteragh Junction itself will entail large-scale construction works including the excavation of cuttings. A temporary night-time closure of Letteragh Road will be required to facilitate overbridge construction.

The proposed road development then crosses the N59 Moycullen Road in Dangan in the vicinity of the Ard na Locha and Augnacurra estates north of the junction with Circular Road. Night-time closures of the N59 Moycullen Road will be required along with temporary traffic management for diversions. The construction of the River Corrib Bridge will occur through an area of high recreational value at the NUIG Sporting Campus.

East of the River Corrib, a temporary diversion of Coolough Road may be required during the construction phase. The proposed road development will be elevated on a viaduct structure (Menlough Viaduct) east of the Coolough Road before entering the proposed Lackagh Tunnel from where it proceeds to connect with the N84 Headford Road at a grade separated junction. Temporary night-time closure of existing roads may be required at locations such as the Menlo Castle Bóithrín, Bóthar Nua and An Seanbóthar where overbridges are to be constructed.

A temporary diversion of School Road will also be necessary to allow for bridge construction. Major construction works will be required in the vicinity of the N84 Headford Road and N83 Tuam Road and temporary night time closures and diversions may be required. A grade separated junction is proposed with the N83

Tuam Road. An access road connecting with the N83 Tuam Road will provide a connection to six residential properties within the established community of Cappanabornia. Major excavation works will be required on the hill on the eastern side of N83 Tuam Road and for the Galway Racecourse Tunnel. The Parkmore Link Road and City North Business Park Link will be constructed in advance to maintain access. Further east, temporary night time closures of the R339 Monivea Road and Briarhill Business Park Road may be necessary. The existing junction with R339 Monivea Road is regularly congested by commuting traffic heading to the nearby office parks and construction traffic management will be required to minimise construction impacts.

18.4.2 Operational phase

Once operational, the proposed road development will enable the reallocation of existing road space within the city to public transport and smart mobility measures and provide an additional crossing of the River Corrib. This will alleviate congestion within Galway City which will result in reduced air and noise pollution. It will facilitate a more efficient public transport system and the provision of a multi-modal choice of travel including walking and cycling. The transfer of traffic will provide for improved journey times and journey amenity for all road users as well as reduced community severance along existing roads and a reduction in traffic noise along sections of these roads. There will also be positive impacts on general amenity and potentially the well-being and health of the local population due to the transfer of a proportion of the current high volume of traffic from existing busy urban streets. The proposed road development itself will facilitate the crossing of the River Corrib without having to negotiate the city and improve connectivity for the city either side of the River Corrib. It will also provide essential city street links to better distribute traffic.

18.5 Evaluation of Impacts of the Proposed Development

18.5.1 Introduction

This section of the chapter evaluates the potential impacts for the ‘Do-Nothing’ scenario followed by an assessment of impacts for the ‘Do-Something’ scenario during the construction phase and then the operational phase under the headings of journey characteristics, amenity, community severance, economics and tourism, Irish Language and human health.

18.5.2 ‘Do-Nothing’ Impact

18.5.2.1 Journey characteristics

The ‘Do-Nothing’ scenario of the proposed road development assumes the proposed road development is not built and that traffic management plans within the Galway City area are not in place. There is likely to be a continuation and worsening of the poor journey characteristics experienced at present due to traffic

congestion. In line with traffic growth factors, traffic volumes will continue to increase along existing routes accessing Galway City. Over half of Galway's working population commutes from surrounding areas and must enter the city via one of the main radial arteries, often connecting to the congested existing N6 to reach employment destinations in the east or west. Regular delays, especially at peak hours, will continue as a characteristic of poor journey time reliability. Rat-runs on local roads which are not designed for such traffic volumes will continue to increase which has an associated safety risk. Such congestion would also undermine the potential to fully realise future development objectives such as the Ardaun LAP. Opportunities for improved public transport and the promotion of sustainable modes of transport such as walking and cycling will be restricted by the need to accommodate vehicle traffic flow.

18.5.2.2 Amenity

The high volume of private and commercial vehicle traffic within the city will also continue to provide for poor journey amenity and discourage walking and cycling together with the associated health benefits. The continuing need to accommodate traffic flow in response to a rising trend in traffic volumes will restrict opportunities to dedicate extra space to pedestrians, cycling and public transport, and make it more difficult for the city to realise its objective of concentrating new development within the city boundary. In addition, the general amenity of people living alongside the existing N6 and other major access roads will continue to be effected by traffic noise and poor air quality.

18.5.2.3 Community severance

The need to accommodate traffic flow restricts opportunities to provide crossing facilities. Combined with the poor journey amenity noted above, this will maintain the high levels of community severance that are currently experienced along major roads such as the existing N6 and could confine some vulnerable groups such as elderly people and children within particular communities surrounded by busy roads. The preceding demographic analysis highlights the presence of relatively high levels of disability in neighbourhoods surrounding the existing N6.

18.5.2.4 Economic and tourism

High traffic volumes combined with congestion will stifle economic development and limit the ability of Galway City and its environs to realise its status as a Gateway City. The city's ability to attract new business and investment will be greatly constrained by regular traffic congestion and poor journey time reliability. A 'Do-Nothing' scenario will also remove the opportunity for improved connectivity to economically peripheral communities in the west of County Galway. Although Galway City is already a major destination for tourism, the potential for tourism development will be inhibited by a continuation of the high level of traffic volumes and congestion. The experience of visitors may be diminished by delays experienced traversing the city and by the experience of heavy congestion on city streets. In particular, high traffic volumes and congestion experienced in an

unfamiliar city will reduce the willingness of tourists travelling by car to enter the city centre to visit key destinations and to contribute to the local economy.

18.5.2.5 Irish Language

In the 'Do-Nothing scenario, the proposed road development is not built, the Irish language usage profile of Galway City and its suburban periphery is likely to be unchanged. However, settlements and industrial activity located within the Gaeltacht areas further west of the city will continue to experience peripherality and disadvantage in terms of long commuting times and transportation delays. The lack of adequate connectivity has been identified as a significant barrier to the long-term sustainable economic development of the Gaeltacht by agencies such as Údarás na Gaeltachta.

18.5.2.6 Human Health

Traffic demands in Galway City and its environs will continue to grow whether the proposed road development proceeds or not (**Chapter 6, Traffic Assessment and Route Cross-Section**). The number of people living in Galway City and its environs has increased and is likely to continue do so as set out in the zoned areas in the City Development Plans. The most recent Census 2016 shows that the population of Galway City has increased by 5.8% since 2011 to 79,934.

Negative impacts (dust, noise, nuisance, etc.) currently experienced by people from traffic congestion on existing routes will continue and potentially increase as traffic increases.

From a noise point of view, the increase in traffic demands on the existing road network will result in increased noise levels over and above the current scenario at properties located along the main national and regional roads. Noise levels at properties identified as 'hot spots' and areas for noise management within the Galway City Noise Action Plan (2013–2018) will remain above the threshold noise levels for noise management and are likely to be further increased as a result of increased traffic volumes. Refer to **Chapter 17, Noise and Vibration** for further details on noise impacts in the 'Do-Nothing' scenario.

In the 'Do-Nothing' scenario, traffic congestion will persist within Galway City and its environs with vehicles continuing to go through congested city centre routes with slow average speeds giving the potential for greater particulate emissions. Particulate emissions have received particular attention in recent years given increasing evidence of their health effects.

In the 'Do-Nothing' scenario, there would also be potential adverse impacts on social interaction and inclusion due to a persistence of high levels of severance along existing roads and the potential that this has for containing populations within particular neighbourhoods combined with the direct discouragement to the movement of sensitive groups. The risk of road accidents will continue, particularly for pedestrians and cyclists, due to the need to ensure traffic movements which may restrict opportunities for new dedicated crossing facilities and a reduced availability of road space for footpaths or cycle lanes.

18.5.3 'Do-something' - Potential Construction Impacts – Socio-Economics

18.5.3.1 Introduction

As discussed in **Section 18.4.1**, the proposed road development will entail a significant level of construction works over a period of approximately 36 months, although works in individual locations may continue for a few days to a few months. For the most part, construction work will occur in a rural setting, but in some locations there are concentrations of houses, distinct communities or a high density of individual properties. There are potential impacts in relation to residential property demolitions, temporary road closures or diversions, construction traffic and general amenity. Refer to **Chapter 7, Construction Activities** for further details of construction activities.

18.5.3.2 Journey characteristics

Temporary realignments, temporary night-time closures and stop-go arrangements will be required where minor roads meet construction works. Most impacts associated with these arrangements are likely to be imperceptible to slight negative in extent. The temporary diversion of Aille Road will not impact significantly on accesses or use of the road. Temporary night-time closures will present a slight impact at Rahoon Road and Letteragh Road.

Construction works in the area of the N59 Link Road South will occur in a largely rural area and present only slight impacts on local traffic movement. Along the mainline of the proposed road development, only temporary night-time closures of the N59 Moycullen Road are anticipated during which diversions will be provided.

The temporary diversion of Coolough Road (Bóthar Nua) will not impact significantly on access or use of the road. Likewise, a temporary diversion of School Road, Castlegar will not impact significantly on access to Castlegar National School (which includes Beoga pre-school), the nursing home or residential properties as it is a diversion which is immediately off-line of the existing road within the proposed road development.

Major construction works will be required in the vicinity of the N84 Headford Road and N83 Tuam Road. Temporary night time closures and diversions may be required on the N84 Headford Road, N83 Tuam Road, Briarhill Business Park Road and R339 Monivea Road and this will present some slight to moderate negative impacts on the journey time for people using the road at this time.

Refer also to **Table 18.14** and **Table 18.15** which summarises socio-economic impacts, mitigation measures and residual impacts in relation to journey characteristics during construction.

18.5.3.3 Amenity

General amenity

West of River Corrib

In some cases, residents will be in close proximity to construction works with consequent implications for noise emissions, air emissions and visual impacts. During the construction phase noise monitoring will be undertaken at the nearest sensitive locations to ensure construction noise limits are not exceeded. The selection of monitoring locations will be based on the nearest sensitive buildings to the working area as detailed in **Chapter 17, Noise and Vibration**. Refer to **Chapter 17, Noise and Vibration**, **Chapter 16, Air Quality and Climate**, and **Chapter 12, Landscape and Visual** for details on specific respective impacts.

For example, at Na Foraí Maola and the Troscaigh Road, there are over 30 properties that are located close to the route of the proposed road development and which could experience noise or air quality impacts due to construction works. The same observation applies to the proposed signalised junction with Cappagh Road where a crèche is also located. Material excavation, including the likely use of blasting, will be required at Ballard and at Letteragh. There is a cluster of properties in the community of An Chloch Scoilte close to the first of these blasting locations. See also **Chapter 17, Noise and Vibration** and **Chapter 16, Air Quality and Climate** for more details on construction noise and air impacts. Refer to **Chapter 9, Soils and Geology** for details on the blasting locations. Refer to **Chapter 12, Landscape and Visual** for details on visual impacts during construction at this location and other locations across the length of the proposed road development.

During the construction of the N59 Link Road North, there is a likelihood of impacts due to visual intrusion in the vicinity of Barnacranny, including St. James' Church, Bushypark and for visitors to its cemetery (see also **Chapter 12, Landscape and Visual** and **Chapter 17, Noise and Vibration**). To the south, works will be of a moderate scale, including for residential areas located beside connecting access roads from the N59 Link Road South. Only slight to moderate impacts on general amenity prior to mitigation would be anticipated, for example where the link road will be constructed along the edge of the Rosán Glas estate in Rahoon, including realignment works at the entrance to the estate, and similarly slight negative impacts due to realignment of Gort na Bró Road where this provides access to Gort na Bró estate. By comparison, the N59 Letteragh Junction itself will entail large-scale construction works including the extensive excavation of cuttings. Although in a largely rural area, these excavation works will present negative amenity impacts on the nearby small communities at An Chloch Scoilte and Knocknabrona and a proportion of other properties in Ard na Locha and Aughnacurra. See also **Chapter 17, Noise and Vibration**. Similarly, construction works on the N59 Link Road North will entail the excavation of a cutting before its connection with the N59 Moycullen Road. St. James' National School, Bushypark is located close to the construction works for the proposed road development, but neither the school nor its playing fields are located within the proposed development boundary. The route of the mainline of the proposed road development crosses the N59 Moycullen Road at Ard an Locha. Again, refer to the

relevant chapters noted above for specific details on potential air, noise and visual impacts at specific locations.

To the east of the N59 Moycullen Road, the design of the proposed road development includes a viaduct across the NUIG Sporting Campus rather than an embankment and therefore provides for permeability beneath the proposed road development, reducing the potential impacts on the campus. The construction of this viaduct however, will have a very significant negative impact on local amenity, including the use of playing fields during the pre-mitigation phase. The sporting campus covers a large area and consists of a number of playing pitches for hockey, GAA and rugby, a sports pavilion and a running track. There will be a direct impact on part of the sports pavilion and on two playing pitches, one of which has flood lighting with the other having planning for conversion to a 3G pitch with flood lighting. During the construction phase, the central part of the Sporting Campus will become a construction site for a period of approximately 18 months. Access across the site will be maintained, but restricted for safety purposes. Construction traffic and works for the River Corrib Bridge will be managed to minimise interference with sporting activities and spectators. The existing sports pitches adjacent to the River Corrib will be unavailable for use while replacement pitches are constructed over a period that is likely to be nine months. However, as set out in **Chapter 15, Material Assets Non-Agriculture**, alternative pitch facilities will be provided to replace the existing pitches directly impacted by the proposed road development. The new facilities will include a floodlit 3G GAA pitch and a floodlit 3G training area. Associated site infrastructure will be provided for the drainage of these pitches along with furniture such as ball-stop netting and modification of the sports pavilion. Once these facilities are constructed they will be available for use within approximately one month.

The viaduct will extend to a bridge crossing of the River Corrib. Access to the bank of the River Corrib which is used as a local amenity and the river itself will be restricted at times during construction. The elevated works will have an impact on amenity use (see also **Chapter 12, Landscape and Visual**, and **Chapter 17, Noise and Vibration**), although the scale of the construction works on the bridge could also attract other temporary interest from members of the public wishing to view the bridge construction.

East of River Corrib

East of the River Corrib there will be a slight negative amenity impact resulting from the location of a proposed construction compound off Menlough Castle Bóithrín. The proposed road development will be elevated on a viaduct structure (Menlough Viaduct) after the Coolough Road. This will introduce construction noise and visual impacts (see **Chapter 12, Landscape and Visual**, and **Chapter 17, Noise and Vibration**). The existing An Seanbóthar unsurfaced road provides a loop connection for occasional walking between the communities of Coolagh and Menlough. It will be used by some construction traffic to access the works and this will impact on local amenity use. Upgrading of the bóithrín will be required to allow for this construction traffic and a subsequent connection to an emergency exit road for eastbound traffic entering the proposed tunnel. Given that the lane is currently free of motorised traffic with the exception of farm access, its use for construction

traffic will present a moderate negative impact for some local people who use the Bóithrín for amenity.

The Lackagh Tunnel is located away from residential or amenity use. At the N84 Headford Road, a large proportion of the total number of residential properties will be acquired within the vicinity of the proposed N84 Headford Road Junction. Noise impacts are likely for adjacent properties which remain. The same observation applies in Castlegar in the vicinity of Hynes Bóithrín and School Road. Whilst there is no direct impact on Castlegar National School, the school does have an autistic facility which would be sensitive to construction noise which is assessed below in **Section 18.5.5**. Again, refer to **Chapter 12, Landscape and Visual**, **Chapter 15, Material Assets Non-Agriculture**, **Chapter 16, Air Quality and Climate** and **Chapter 17, Noise and Vibration** for specific details on air, noise, visual and material asset impacts at specific locations.

An impact on general amenity will apply for at least six households at Cappanabornia which are located beside the N83 Tuam Road. This impact arises from the construction of a new access road in the vicinity of the N83 Tuam Junction and the visibility of construction works on the hill facing these properties on eastern side of the N83 Tuam Road (refer to **Chapter 12, Landscape and Visual**).

A construction works programme will be agreed with Galway Racecourse for the proposed 230m cut and cover tunnel. The programme will involve the cessation of construction works during the summer/autumn racing schedule to avoid disruption to participants and spectators of the racing events. Refer also to economic impacts in **Section 18.5.3.5 - Economic** below.

Residential demolitions and acquisitions

From the outset of the design of the proposed road development every effort was made to avoid property demolitions where possible. However, there are still unfortunately and unavoidably a number of property demolitions that are necessary for the construction of the proposed road development and to secure the many benefits of the proposed road development. A total of 44 residential properties will require demolition with an additional 10 residential properties to be fully acquired.

Refer to **Chapter 15, Material Assets Non-Agriculture** for the precise nature of these potential impacts.

The demolition or acquisition of these properties will be a major negative impact of the proposed road development, both for the occupants and at a community level. There will be a clear and very significant impact on the occupants themselves. In addition, where neighbouring or nearby properties remain, there is likely to be a negative impact, of varying significance, on community ties and the amenity of remaining residents.

<u>West of River Corrib</u>

Five residential properties will be demolished at Na Foraí Maola and two residential properties will be acquired. In addition, one landholding with full planning permission for the construction of a residential property will require full acquisition. The boundary of the community is ill-defined and most of these properties are of relatively recent construction. Nevertheless, there are just over 20 residential

properties at this location which includes a cul-de-sac off the local road. Consequently, the impact of the loss of five properties is likely to have a significant negative impact for this small community. Two further properties are being acquired in the community of Ballard where residential development stretches along two minor roads to the north.

One residential property will be demolished at Ballyburke, one off the L-1323 Letteragh and two will be demolished and one acquired at Letteragh. Approaching the N59 Moycullen Road, one property will be acquired and one property demolished at Bushypark beside the N59 Link Road North. Near Dangan, two properties will be demolished and one acquired at Ard na Locha, an estate of four houses and two sites for dwellings, and five properties will be demolished and one acquired in Aughnacurra Crescent, an estate of 14 residential properties. (refer to **Chapter 15, Material Assets Non-Agriculture**). These estates function as small communities which are separated from other residential development along the N59 Moycullen Road. Given the size, the level of impact will have an effect at a community level. The high proportion of premises impacted presents a very significant negative impact on the amenity of the remaining residents.

East of River Corrib

East of the River Corrib, two properties will be demolished in Menlough. Construction of the proposed N84 Headford Road Junction will require the demolition of 14 residential properties at this location out of a total of 22. The loss of a high proportion of established properties in this area represents a major impact for the occupants of the neighbouring houses that are directly affected. While there have been changes in occupancy in recent years and neighbourhood interaction is somewhat discouraged by the heavy traffic on the road, the demolitions will nevertheless present a significant negative community impact on remaining properties. Some occupants may return to live in the immediate area or north of the proposed road development where there are pockets zoned for residential development, although most land to the north of the proposed road development is not currently zoned as residential.

To the east, nine residential properties are proposed for either acquisition or demolition in Castlegar, along Hynes Bóithrín (two demolitions) and on School Road (four demolitions and two acquisitions). A strong sense of community exists here, noting also the community focus on the school. While the number of demolitions is fewer than at the N84 Headford Road, a similar scale of negative impact can be expected on both those directly affected and on those who remain.

Three residential properties are due for demolition in Cappananbornia on the east side of the N83 Tuam Road. One further property is proposed for demolition in Ballybrit and two in Briarhill.

Refer also to **Tables 18.13** and **Table 18.14** which summarises socio-economic impacts, mitigation measures and residual impacts in relation to severance during construction.

18.5.3.4 Community Severance

While any physical severance will be temporary in nature, the construction work in the west of the study area, for example at Na Foraí Maola and Cappagh will introduce a sense of social severance between properties and between areas north and south of the proposed road development even though physical connectivity is maintained. Social severance is likely to be felt most acutely by local residents where family members or friends are located on the far side of the proposed road development. However, given that the scale of construction works here will be less than for locations to the east of the River Corrib, this will be slight in degree. The L13215 Ann Gibbons Road will be permanently severed by the proposed road development and this is discussed further under operational impacts in **Section 18.5.4**.

As discussed in **Section 18.5.3.3**, while restrictions will apply for reasons of safety, continuous access will be maintained to the riverbank walk (or temporary diversion of same) and to the current small number of pitches to the north of the proposed River Corrib crossing at the NUIG Sporting Campus. The more significant severance will therefore be psychological rather than physical.

More significant construction related severance will occur in Castlegar where the effect will be of moderate significance despite the maintenance of connectivity.

It is proposed that construction traffic will travel from the western distributor road north along the Cappagh Road to gain site access. Most residential development is to the east of the Cappagh Road and crossing facilities are provided at the Cappagh Park sports complex. Similarly, it is proposed that construction traffic will travel north along the Coolough Road (Bóthar Nua) to gain site access. Construction traffic along the N84 Headford Road south of the proposed junction will present a slight negative severance impact, although new pedestrian crossing facilities are included in the design of the proposed road development along the N84 Headford Road.

18.5.3.5 Economic

The construction works will generate demand for inputs and services. CSO data indicates a gross construction multiplier of 1.5. As this value encompasses all forms of construction including house building, the figure for infrastructure could be somewhat lower given the more intensive use of machinery and import content. On the other hand, the bulky nature of many construction inputs should ensure that much of the income is retained within the State. Many of these inputs will be purchased across Ireland and will therefore contribute to the national economy, although some purchases, of services in particular, will likely to be made from the local businesses providing an economic benefit to these and to local employment.

Through the construction phase there will be some variation in the numbers of staff working on site. It is anticipated there will be 250-270 staff directly employed on site, rising to 300 staff at peak construction. This level of employment will provide a positive economic impact to the local economy in terms of spending on food and accommodation, although a proportion of workers are likely to already reside in

Galway. The employment multiplier implies the creation of one additional full-time equivalent jobs for every two people employed full-time on the project.

West of River Corrib

Impacts on the NUIG Sporting Campus are as described above under **Section 18.5.3.3 – Amenity**. The impact on sports pitches and the sports pavilion during construction can also be expected to have a slights economic impact due to loss of income from use by non-university clubs.

East of River Corrib

A very significant impact is anticipated on a business located on the N84 Headford Road which bottles water and distributes fruit and vegetables. The impact arises from the effect of landtake on one warehouse and an impact on the company's raw material supply.

The proposed road development will cross Lackagh Quarry which is currently inactive. Whilst the quarry is currently inactive there are rock reserves in the upper bench of the quarry. Refer to **Chapter 9, Soils and Geology** for details on potential impacts on future quarry reserves.

At the N83 Tuam Road, the alignment of the proposed road development between here and the eastern end of the Galway Racecourse Tunnel requires the acquisition of a builders providers store and landtake from other commercial businesses. Businesses, including a car dealership and the An Post sorting centre, could be affected by the need for traffic management during construction. The extensive nature of the works associated with the N83 Tuam Road Junction is likely to have a temporary impact on the visibility for customers of the car dealership, although this can be mitigated. There is also potential for environmental impacts on businesses adjacent to the racecourse in the Parkmore Business Park, some of which are engaged in activities that are potentially sensitive to vibration and air quality. See **Chapter 16, Air Quality and Climate** and **Chapter 17, Noise and Vibration**.

The proposed Galway Racecourse Tunnel will entail the acquisition of lands and the demolition of stables. It is proposed that the stables will be replaced with temporary stables for the duration of the construction of the proposed tunnel until such time as the permanent stables are provided. Both temporary and permanent stables will need to be of at least equivalent quality to the existing stables. Wells used for watering of the track will also be impacted. Works on the tunnel itself will be timed for periods outside of the racing calendar so as to avoid amenity and economic impacts on the functioning of the racecourse See **Chapter 16, Air Quality and Climate**, **Chapter 17, Noise and Vibration** and **Chapter 15, Material Assets Non-Agriculture** for further detail on these impacts and how they will be mitigated and minimised so as not to interfere significantly with business activities.

Approaching the existing Lynch Junction at Briarhill, the construction phase will have an impact on a car dealership located on the edge of the Briarhill Business Park. This will involve landtake mainly from an area that is currently used for customer parking and there will be a need to reconfigure existing services such as

the car wash, fuel pump and underground fuel tanks, parts store and waste facilities. In principle, these can be fitted within the residual lands.

18.5.3.6 Tourism

The construction phase will not have a significant impact on tourism as the construction works are, for the most part, located away from areas visited by tourists. The alignment of the proposed road development means that evidence of construction works will be largely outside of the city centre and would not, for the most part be visible to tourist traffic. Tie-ins with the existing N6 will not impact significantly on traffic flow and the attraction of the city for tourism. Traffic diversions on the N59 Moycullen Road, N84 Headford Road or N83 Tuam Road are only proposed to occur at night and as such should not affect tourist traffic. The main potential issue would be racing events at the Galway Racecourse, but as noted above, construction of the cut-and-cover tunnel will proceed intermittently over a three year period to avoid disruption of racing events. Other tourist destinations include the River Corrib corridor and the NUIG Sporting Campus. Construction of the River Corrib Bridge will have a slight temporary negative amenity impact due to works affecting the impact on the natural setting.

Refer also to **Table 18.14** and **Table 18.15** which summarise socio-economic impacts, mitigation measures and residual impacts in relation to economic activity during construction.

18.5.3.7 Ecosystem Services

Ecosystem services provide many varied benefits that humans freely gain from the natural environment. A properly functioning ecosystem has the capacity to regulate and support the natural environment that contributes to human well-being under categories such as (having regard to the Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (2013)):

- provisioning services e.g. wild foods, crops, forage and fresh water
- regulating services e.g. filtration of pollutants by wetlands, climate regulation through carbon storage, water cycling, pollination and protection from erosion
- cultural services e.g. recreation, spiritual and aesthetic values, education
- supporting services e.g. soil formation, photosynthesis and nutrient cycling

The environmental assessment of the proposed road development has considered potential impacts on ecosystem services through the assessment of the environmental factors (pathways) through which ecosystem services could be affected such as water, soils, air, noise and general amenity and relied on the assessment detailed in **Chapter 8, Biodiversity** in terms of potential impacts to biodiversity and indirectly to ecosystem services. There are no impacts identified in those assessments which would result in a significant residual impact on ecosystem services during the construction of the proposed road development.

18.5.3.8 Summary

In summary, the construction phase will have mostly slight negative impacts on journey characteristics due to local traffic diversions. More major works would be necessary for the N84 Headford Road and N83 Tuam Road, but any diversions are proposed to occur at night when traffic levels are lowest. There will be visual, air quality and noise impacts on properties closest to the works which are addressed in **Chapter 12, Landscape and Visual**, **Chapter 16, Air Quality and Climate** and **Chapter 17, Noise and Vibration**, but the principal impact relates the residential demolitions and acquisitions required at various locations within the study area (ref **Chapter 15, Material Assets Non-Agriculture**). In three cases, the demolitions represent a high proportion of the total number of properties at a specific location. While subject to financial compensation as part of the compulsory purchase process, this negative impact will be realised most notably by the occupants, but significant impacts can also be expected at the community level addressed in this chapter due to impacts on local identity and community interactions. Significant construction impacts apply to the NUIG Sporting Campus which will be addressed through mitigation measures during the construction phase and further mitigation measures to maintain the integrity of the complex in the following operational phase (see **Section 18.6** below for the proposed mitigation measures).

18.5.4 'Do-Something' Potential Operational Impacts – Socio-Economics

18.5.4.1 Overview

Once operational, the proposed road development will attract traffic from the city centre and this in itself will provide for improved journey times and journey amenity along existing roads. The transfer of traffic will facilitate the reallocation of road space to public transport and the provision of walking and cycling facilities. As a result, there will be positive impacts on general and journey amenity and the health of the local population. The proposed road development will facilitate vehicle crossings of the River Corrib without having to negotiate the city centre and will provide essential links with city arteries to better distribute traffic. This new River Corrib crossing will also provide connectivity back to the city on both the east and west side of the river. There will be positive impacts for Galway City's economy due to improved accessibility and connectivity for commerce, goods movement, tourism and commuting. There will also be positive impacts for areas in the west of the county for which there will be improved connectivity to the east of the country and further potential for economic growth and tourism.

The operational phase of the proposed road development will also introduce some negative impacts, for example noise and visual intrusion, to areas that are currently quiet and semi-rural. It will also introduce an element of social severance between people living north and south of the proposed road development, who, in principle, will remain part of the same wider community.

18.5.4.2 Journey characteristics

The proposed road development will improve connectivity for Galway City and its environs and also areas in the west of Galway County, including access to the N59 Moycullen Road (for Moycullen, Oughterard and Clifden) and the R366 Coast Road (for Rossaveal and Connemara). Connectivity will be improved between the M6 east of Galway, the M17, the N83 Tuam Road, N84 Headford Road and N59 Moycullen Road. The transfer of a proportion of traffic to the proposed road development will help to relieve the level of traffic currently experienced on the existing N6. It will also provide opportunities for new facilities for pedestrians and cyclists as detailed in the Galway Transport Strategy (GTS).

Refer also to **Table 18.14** and **Table 18.15** which summarise socio-economic impacts, mitigation measures and residual impacts in relation to journey characteristics during operation.

West of River Corrib

As the proposed road development commences to the west of Bearna, it is expected to have a significant positive impact by attracting much of the current traffic flow away from the village of Bearna and the western suburbs of Galway City. This will be particularly significant during the morning and evening peak periods when congestion can occur from the 'Twelve Pins' junction in Bearna all the way into the city or due to vehicles accessing shops in the centre of the village. A reduction in traffic and a significant positive impact is anticipated in the village as a reduced level of traffic is predicted to remain on this section of the existing R336 (see **Chapter 6, Traffic Assessment and Route Cross-Section**). The Bearna LAP proposes that the village centre would, in due course, be provided with an inner relief road such that some of this impact could be expected to occur in the future even in a 'Do-Minimum' scenario. Variation No. 2a to the Galway County Development Plan (2015-2021) which has been adopted incorporates the Bearna LAP into the County Development Plan. However, while a relief road on its own would involve through traffic being directed through built-up parts of Bearna, the proposed road development moves this traffic out of the village core.

The Bearna East Roundabout will facilitate access to the proposed road development for the numerous residential households in the vicinity and to community facilities to the north of Bearna including the Bearna GAA Club and the Barna Golf and Country Club. This improved connectivity represents a net moderate positive impact, although some local residents could experience slight delays in accessing community facilities due to the longer journey to cross the proposed road development where currently there is direct access via a single local road. The Bearna East Roundabout will also provide a link to the N59 Moycullen Road although the current poor standard of this road towards the northern end means that most people wishing to make this connection are more likely to use the N59 Letteragh Junction.

A signalised junction (Cappagh Road Junction) will provide access from the proposed road development to the communities of Cappagh, Boleybeg to the north and to the Western Distributor Road and wider Knocknacarra area to the south. A lot of individual residential development has occurred here in recent years and this

junction, along with others in this section, will provide a net moderate positive impact in terms of improved local connectivity and journey amenity while also reducing pressure on unsuitable minor roads. It will also improve journey amenity and contribute to the positive impact of traffic reductions in Bearna. The Cappagh Road Junction also provides connectivity to a crèche which is located to the north of the proposed road development.

Overall, the traffic projections indicate that there is likely to be a modest transfer of traffic from the Western Distributor Road to the proposed road development. The Ballymoneen Road Junction would have a moderate positive impact by providing connectivity to Ballyburke and the Western Distributor Road. The connection north to Rahoon Road via Ballymoneen Road is narrow so most other traffic is expected to use the proposed N59 Link Road South from Letteragh Junction.

The proposed N59 Letteragh Junction itself will be a grade separated junction connecting the proposed road development with link roads to Rahoon Road and the N59 Moycullen Road and will provide a very significant positive improvement in connectivity between the western suburbs of Galway and regional destinations. The N59 Link Road South will also provide a connection with the Letteragh Road and thereby also a connection with the dispersed residential communities of Drum and Tonabrocky. As with the above connections to local communities, this will provide for positive impacts on connectivity and journey amenity given the narrow and sub-standard design characteristics of some local roads. The proposed N59 Link Road South will distribute traffic, from the proposed road development, within the suburban area via its connections with several existing local roads to connect with residential areas, retail parks and community facilities. This will provide a degree of relief from traffic pressure in an area which is currently subject to regular congestion.

The connection provided in the other direction by the N59 Link Road North will relieve the congestion currently experienced by traffic attempting to access the N59 Moycullen from the city, including tourist and other traffic heading towards Clifden. Compared with a ‘Do-Nothing’ scenario, relief from congestion would apply especially at the Browne Roundabout given that right hand turns are prohibited from the preceding junction between the existing N6 and Newcastle Road Upper. The connection would provide a very significant positive impact to journey characteristics. Based on traffic predictions, it would reduce slightly the volume of vehicles on the N59 Moycullen Road into Galway City including Circular Road, Thomas Hynes Road and Newcastle Road Upper where educational and other community facilities are located.

Connectivity for pedestrians and cyclists is provided for in the design of the proposed road development. Crossing facilities for pedestrians are proposed for the junctions at Bearna East, Cappagh and Ballymoneen. A pedestrian footpath is included along the N59 Link Road North and a pedestrian crossing sequence will be included in the signalised junction proposed between the N59 Link Road North and the N59 Moycullen Road. The N59 Link Road North and South will include public lighting and pedestrian refuge islands at junctions. A cycle path will be included along the N59 Link Road South. Cyclists will, however, be encouraged to use the shorter existing urban routes which in most cases will provide more appropriate connections between origins and destinations. Traffic will have been

reduced on many of these roads as a consequence of the proposed road development.

East of River Corrib

The N84 Headford Road Junction will permit vehicles using the proposed road development to access Ballindooley, Ballinfoyle, Headford, Ballinrobe and other communities such as Cong to the north of Galway City. As with the N59 Letteragh Junction, it will also permit direct access to the proposed road development without the need to enter Galway City. As such, the junction provides a significant positive impact on journey time and amenity to regional locations. The improved connection will also provide people living in Ballinrobe with the option of using the proposed road development for journeys to Dublin and the east as an alternative to the N5 or the lower capacity R661 and N60 roads through Claremorris.

The new accessibility provided by N83 Tuam Road Junction and the Parkmore Link Road to the City North, Ballybrit, City East and Parkmore Business Parks represents a profoundly positive impact on journey characteristics and for the city's economy given the number of companies located here (see **Section 18.5.4.5** below). The Parkmore and City North Business Park Link Roads will provide accessibility to the Parkmore Industrial Estate to the north and to the Ballybrit and City East Business Parks and Morris Junction to the south. The improved accessibility will significantly reduce peak time congestion at the junction between Ballybrit Crescent, the R339 Monivea Road and the existing N6 at the Lynch Junction. The same observation applies at the Morris Junction with the existing N6.

On-road cycle tracks are proposed for the Parkmore Link Road and the City North Business Park Link Road. Lands to the south are zoned for new development and will benefit from the improved accessibility. The connectivity provided by the Coolagh Junction represents no change with the existing baseline situation, but the transfer of much traffic to the proposed road development will relieve traffic pressure relative to the existing junction and reduce delays at the existing Lynch Junction.

18.5.4.3 Amenity

Journey amenity

The combination of new connectivity and transference of traffic provided by the proposed road development and discussed under journey characteristics will have the effect of reducing journey time in many cases, but also of relieving congestion along the existing N6.

Refer also to **Table 18.14** and **Table 18.15** which summarise socio-economic impacts, mitigation measures and residual impacts in relation to amenity during operation.

<u>West of River Corrib</u>

A slight negative impact will arise from the increase in traffic predicted to occur along the R336 between the centre of Bearna Village and the Bearna West

Roundabout on the proposed road development, although there are no community facilities on this stretch of road.

The transfer of traffic to the proposed road development will reduce the level of traffic currently using the local road network to the north of Bearna and linking onto the Rahoon Road and Letteragh Road to avoid the congestion on the R336 and the Western Distributor Road.

The transfer of traffic to the proposed road development will reduce the level of residual traffic on the R336 and Seamus Quirke Road together with the prospect of congestion on these roads and at the Browne Junction providing at least a moderate positive impact. This will present an opportunity to provide continuous urban cycle lane facilities and more pedestrian and cycling crossing facilities in line with the GTS with a lesser risk of such facilities adding to congestion (see **Section 18.7.3 Cumulative Impacts**).

East of River Corrib

The proposed road development will reduce traffic on the existing N6 western approach to the Kirwan Roundabout, also reducing the prospect of congestion at this location despite a prediction of higher traffic volumes on the N84 Headford Road. This will provide a slight to moderate positive journey amenity impact. It will also present an opportunity to provide improved cycle lane and pedestrian facilities in line with the GTS.

The transfer of traffic to the proposed road development will reduce the level of traffic currently using the local road network between the N84 Headford Road and the N83 Tuam Road, along School Road, Castlegar, to avoid the congestion on the existing N6.

Given the access to the city provided by the proposed road development, traffic volumes at the junction between the N83 Tuam Road and the existing N6 are predicted to be slightly higher (3.7%) under a medium growth scenario by the Design Year (2039). Consequently, there is no change in journey amenity for drivers wishing to use the existing junction between School Road or Bothar an Chóiste to Castlegar and the N83 Tuam Road, although peak time use by commuters of this minor road will be reduced by the availability of the proposed road development itself and by reduced traffic on the existing N6 west of the N83 Tuam Road Junction. A 36% reduction in AADT is predicted on the existing N6 in Ballybrit under a medium growth scenario compared with the 'Do-Minimum' scenario, along with reduced traffic at the Lynch Junction and Ballybrit Crescent Junction in Briarhill, and at the junction between the existing N6 and the R446 at Doughiska. At all these locations, there will be at moderate-significant positive impact on journey amenity. There will also be opportunities to provide improved facilities for the safety and journey amenity of pedestrians and cyclists.

For users of the proposed road development itself the journey amenity of drivers and passengers using the River Corrib Bridge will be enhanced by the view north and south along the river, including of the ruins of Menlo Castle. This represents a slight positive impact on journey amenity, but one realised by the large number of people using the proposed road development including tourists travelling west to Connemara.

General amenity

West of the Corrib

Traffic volumes on the section of the proposed road development to the north of Bearna are expected to be over 11,000 AADT under a medium growth scenario by the Design Year (2039), but will vary seasonally given summer tourism traffic. General amenity impacts relating to environment effects such as visual intrusion and noise are likely where residential properties are located close to the proposed road development, for example at the Cappagh Road Junction where private properties are located to the immediate north and south. These impacts are addressed in **Chapter 12, Landscape and Visual** and **Chapter 17, Noise and Vibration**. A large increase in traffic volumes will occur on the Cappagh Road albeit from a low baseline level. This will affect the amenity of a small number of properties to the south towards the suburban residential area where the road is necessarily wider. A large increase in traffic volumes is also predicted for the Ballymoneen Road, north and south of the proposed junction.

No significant amenity impact at a community level is presented by the proposed N59 Link Road North and South from the proposed N59 Letteragh Junction. On the southern link, traffic is distributed onto several minor roads and the road itself is largely separated from residential development. The northern link connects with the N59 Moycullen Road immediately to the north of Bushypark Church.

St. James' School in Bushypark is located a short distance to the south of the proposed road development, but the school lies outside the proposed development boundary. There will be a slight residual negative general amenity impact on use of the playing ground due to the traffic noise, although this will be mitigated by screening. The remaining houses in the estates at Ard na Locha and Aughnacurra will incur an amenity impact due to the proximity of the proposed road development (see **Chapter 17, Noise and Vibration**).

There is a negative general amenity operational impact to the east of the N59 Moycullen Road where the proposed road development will be elevated above the NUIG Sporting Campus on a viaduct prior to the crossing of the River Corrib. Whilst the provision of a viaduct structure will provide access to the north and south of the Sporting Campus and the River Corrib during the operational phase, maintaining connectivity and permeability beneath the proposed road development, the NUIG Sporting Campus will require a new Sporting Campus Plan and Strategy. A best fit analysis was undertaken as part of the assessment which identified the possible reconfiguration of the Sporting Campus, part of which includes the replacement of the two pitches with a a floodlit 3G sports pitch and 3G training area and associated site infrastructure such as ball netting (refer to **Chapter 15, Material Assets Non-Agriculture**). From an amenity perspective there is also a negative impact on visitors to Menlo Castle on the east bank of the river. The positive impact on journey amenity for drivers on the proposed road development must also be acknowledged in this context.

East of River Corrib

To the south of the N84 Headford Road junction, a 38% increase in traffic is predicted to the Kirwan Roundabout, representing a moderate negative amenity

impact, noting also the presence of Saint Francis National School and Ballinfoyle Church on this road. Additional pedestrian crossings have recently been provided on the N84 Headford Road.

Whilst there is no direct impact on Castlegar National School, the school does have an autistic facility which would be sensitive to traffic noise (see **Chapter 17, Noise and Vibration** and **Section 18.5.5** below). The proposed road development will have a positive impact by reducing traffic volumes on School Road, Castlegar, which, along with Bóthar an Chóiste, is currently used by morning and evening commuters as a rat-run (see **Section 18.5.4.4** below). Spellman's Boithrín is currently unsurfaced and in poor condition, but forms part of a circular walk that is used daily for access to the school. The nearby Hynes' Boithrín will be severed, but mainly provides only farm access to fields. Alternative access will be provided from School Road, Castlegar to these farm lands. (see **Chapter 14, Material Assets Agriculture**).

At the Parkmore Link Road, east of the N83 Tuam Road, a crossing point is included in the design of the proposed road development to allow for an historic mass path connecting Castlegar and the small community of Parkmore and a historic graveyard to a mass rock beside Galway Racecourse (see **Chapter 13 Archaeology, Architectural and Cultural Heritage**). Only light use is made of the path, but it is well maintained by the local community. There will be a significant negative residual impact on amenity use of the path compared with the existing environment due to the extensive new road network.

The proposed location of the Galway Racecourse Tunnel means that there will be no direct amenity impacts on the racecourse racing events during operation. New permanent access will be available to the N83 Tuam Road via the Parkmore Link Road and much improved access will be possible from the existing N6 such that the net impacts will be positive.

18.5.4.4 Community severance

Distinct physical severance is presented by two permanent road closures proposed along the length of the proposed road development. The first of these is at the northern end of Anne Gibbons Road in the western section of the study area. For most local residents, the severance impact is only slight, but occupants of properties closest to the proposed road development would entail a diversion to the south before returning north on the Bearna to Moycullen Road. Hynes Boithrín will also be severed, but currently provides access solely to fields and some amenity use.

West of River Corrib

The proposed road development will result in a projected reduction in traffic volumes in the east of Bearna Village by over 73% in the Design Year (2039) under a medium growth scenario compared with the 'Do-Minimum' Scenario. This will have a significant positive impact in terms of relief from severance especially away from crossing facilities during peak periods. This significant positive impact applies especially to the use of community facilities. A positive impact will also apply to the Church of Mary Immaculate and to Bearna Primary School on the R336 to the east of the village. Although there are tentative plans for the school to transfer to a

new location at some time in the future, most parents must currently drop off their children at the roadside.

To the north, there will be an impact on neighbourhood or social severance as the proposed road development runs between residences at Na Foraí Maola. A similar impact can be anticipated on the Troscaigh Road where there is another cluster of residential properties. A degree of physical severance will arise from the additional distance required to reach the proposed overbridge at Ch. 1+375 from either location, particularly for local residents walking to nearby friends or family. However, the new connectivity provided between the two settlements also provides for relief from severance as currently there is no physical connection between the two communities. A significant impact will arise from the severance of the Ann Gibbon's Road. This will require residents at the northern end of the road to access locations to the north by detouring 800 metres south to the junction with the Bearna Moycullen Road. Most traffic on this road heads south into Bearna Village, but some of residents also travel north to enter the city via Paddy's Cross and Rahoon Road.

Elsewhere in this area, to mitigate physical severance, crossing facilities for pedestrians have been included in the design of the proposed road development where junctions exist. There will be a residual level of social severance for scattered communities and housing to the north of the proposed road development as many people express a sense of attachment to Bearna Village.

At Cappagh Road there are properties on either side of the proposed junction, but physical severance will be slight as crossing facilities are available. However, traffic volumes are expected to increase to the south of the junction, potentially affecting access to pitches located to the west of the Cappagh and presenting a slight negative impact, mainly for cyclists given the presence of crossing facilities.

The N59 South Link Road will connect to the Western Distributor Road via Millars Road in Gort na Bró Road. As a result, there will be additional traffic on this road, but this represents only a slight new severance impact on the Gaelscoil Mhic Amhlaigh and Millars Lane soccer pitches, both of which are already well-serviced with pedestrian crossing facilities. New residential development is also proposed for this location. The N59 Link Road North avoids any severance impact until its connection with the N59 Moycullen Road just north of St. James' Church in Bushypark. Most access to the church is by car and traffic volumes are only predicted to increase slightly, although a footpath does run along the western side of the N59 Moycullen Road and signalised crossing facilities are proposed for the junction between the N59 Link Road North and the N59 Moycullen Road.

The elevation of the proposed road development above playing fields at the NUIG Sporting Campus provides no direct physical severance impact, but rather an impact on amenity. Traffic volumes are predicted to reduce slightly in the Design Year compared with a 'Do-Nothing' scenario on Thomas Hynes Road and Newcastle Road, but no significant change in existing severance is anticipated.

East of River Corrib

The proposed road development will introduce a degree of social severance between the small historic community of Coolagh and Menlough to the north. To

the east, at the N84 Headford Road Junction, there will be moderate physical and social severance due to the presence of the junction. Physical severance along the N83 is already high due to current traffic volumes, although any new severance is minimised by the inclusion of signalised crossings at the slip roads to the proposed road development. Some new severance can be expected on the Headford Road south due to the increased traffic volumes that are predicted into the city.

No significant severance will be experienced in Castlegar, including for students at Castlegar National School, local residents or for visitors to the new nursing home. Commuting traffic using School Road, Castlegar as a 'rat run' is expected to be reduced due to the availability of the proposed road development. To the east at the proposed N83 Tuam Road Junction there is social severance between a line of private properties in Two-Mile-Ditch on the road to the north of the junction and the community of Castlegar. Current pedestrian journey amenity is poor in this area and will be slightly improved by the inclusion of a footpath in the design. Any severance of the Lisheen (fort) at Parkmore east of Galway Racecourse during the construction phase will be mitigated in the operational phase by the new access road and parking provided to the south of the proposed road development.

Refer also to **Table 18.14** and **Table 18.15** which summarises socio-economic impacts, mitigation measures and residual impacts in relation to severance during operation.

18.5.4.5 Economic

The proposed road development will deliver a profoundly positive impact for the Galway economy due to improved accessibility and connectivity for commerce, goods movement and commuters. There will also be positive impacts for communities in the west of the county for whom there will be improved connectivity to the east of Country Galway. There will be improved accessibility for very many businesses, but also direct and indirect negative impacts on others due to the route of the proposed road development.

West of River Corrib

Some loss of passing trade can be expected for a few businesses in Bearna and on the R336, including a small service station due to the transfer of traffic from the R336 to the proposed road development. As local traffic is expected to remain on the existing road these impacts will be slight.

The N59 Link Road North and South will provide much improved access for both customers and deliveries to the Gateway Retail Park and to business parks located off the N59 Moycullen Road and Newcastle Road Upper. Some of the congestion in the vicinity of Browne Roundabout and along Seamus Quirke Road will be relieved benefitting retail and other businesses in these locations. This improved access represents a significant positive impact.

East of River Corrib

Lackagh Quarry is no longer an active quarry. However, there are quarry reserves in the upper benches, some of which will be sterilised as a result of the proposed road development (refer also to **Chapter 9, Soils and Geology**). On the east side

of the N84 Headford Road, improved new access will be provided to one commercial business property, although construction works will impact on part of the business' raw material source (see **Section 18.5.3.5**). This impact will be addressed as part of the land acquisition process and financial compensation.

At the N83 Tuam Road, whilst the proposed road development will present some temporary visibility impacts on a car dealership during construction (see **Section 5.3.5**), it will be provided with improved and safer access to the business from the City North Business Park Link in the operational phase. The proximity of the business to the proposed road development will also be a positive factor for familiarity and accessibility. The improved access to the An Post sorting centre located here represents a significant positive impact for this business.

The proposed Parkmore Link Road will provide new access between the N6 and N83, including use of Morris Junction. Currently the only access to the numerous business parks in the area is from the existing N6 and as a result there is major congestion occurring on a daily basis, particularly during peak hour traffic. Consequently, the new link road will provide a profoundly positive economic impact by facilitating connectivity and accessibility for deliveries to numerous businesses and for employees. This link road will also facilitate the provision of the walking, cycling and bus routes as set out in the GTS for the Ballybrit, City East and Parkmore Industrial estates, with the added health benefits of being able to walk or cycle to work.

The Parkmore Link Road will make use of an existing cul-de-sac access road serving Hewlett Packard and Boston Scientific. Boston Scientific recently acquired lands to the east of the existing IDA road comprising the former APC site, a total area of 12.6 hectares. The alignment of the link road has been designed to take account of Boston Scientific's plans to expand the existing facility and utilise the acquired APC site. This expansion involves the redevelopment of the existing buildings and their integration with the new facilities within the APC site. The first phase of the expansion plans includes the construction of a building immediately adjacent to and interlinked with the existing northern building. This will allow product and people to move throughout the expanded site without the need to move from a controlled sterile environment. Elsewhere, it will be necessary for vehicles and workers to cross the link road to access other parts of the landholding that are included in future phases of the expansion plans. Through traffic on the Parkmore Link Road will interrupt the movement of product and people within the Boston Scientific campus. A negative impact can be expected due to severance, but the proposed Parkmore Link Road itself will have a net positive impact by providing a direct transport link, which will be well serviced by public transport between the Parkmore and Ballybrit Business Parks, the N83 Tuam Road, the existing N6 and the proposed road development.

The proposed road development will pass below the Galway Racecourse in a dedicated tunnel. Some modest net loss of car parking is likely, but new permanent stables and facilities will be provided to replace those demolished during construction. These stables and facilities will need to be of an equal or higher standard to the existing buildings. Event day access is already available to the N83 Tuam Road, but this access will be much improved due to the Parkmore Link Road. When all measures are realised, a net positive economic impact can be anticipated.

By improving access between the existing N6 and the business parks in this area, the proposed road development will reduce congestion at Ballybrit Crescent Junction and Lynch Junction and this will have a positive impact on access to businesses at this location. This improved accessibility will apply also to a car dealership on the edge of Briarhill Business Park, although this may be accompanied by some loss of customer parking space and the presence of an elevated section of the proposed road development which will affect visibility from Ballybrit Crescent. The dealership's visibility to the east will be reduced, but it will remain very visible from the existing N6 and highly visible from the proposed road development. A positive impact will derive from the effect of reduced congestion at the Ballybrit Crescent Junction.

18.5.4.6 Tourism

Once operational the proposed road development will provide for improved connectivity between the important tourism destinations of Connemara and West County Galway and points of arrival to the east. This will help to sustain tourist numbers and to provide new tourism development opportunities while contributing to the economic development in a peripheral economic region. The proposed road development will enter an attractive rocky area west of the River Corrib that is typical of Connemara. This landscape therefore represents a gateway to the West. Visitors will quickly experience this setting following the elevated vista of the river. At present, this landscape is only encountered west of Bearna. Overall, the proposed road development's contribution to tourism represents a very significant positive impact.

A significant positive impact also arises from the reduction in congestion along the existing N6 and other roads into Galway City due to the transfer of a proportion of traffic to the proposed road development. This will also contribute to making the city more accessible, encouraging visitors to County Galway and the West to travel into the centre of the city to see attractions with less anxiety over traffic conditions. Combined with the potential for the reallocation of road space to pedestrians and cyclists provided by the GTS, this will contribute positively to the tourism experience in Galway. A positive introduction to Galway will also be provided by the new crossing of the River Corrib which will enhance journey amenity and encourage people to visit this part of the city's fringe. Improved access to the Galway Racecourse, including from the north, could also help to stimulate event attendance.

18.5.4.7 Ecosystem Services

There are no impacts identified which would result in a significant residual impact on ecosystem services during the operation of the proposed road development.

18.5.4.8 Summary

The operational phase will provide for significant, and in some cases very significant or profound, positive impacts on journey time, connectivity and journey amenity affecting journeys for all purposes and benefitting people living in the city or in its outskirts, businesses and visitors or tourist traffic. Particular positive

impacts apply to the new connectivity between the existing N6 and N83 Tuam Road, improved connectivity for people living in rural areas in the west of the study area, and to reduced congestion along urban parts of the existing N6. The improved connectivity to West County Galway will stimulate economic development in this region, strengthening the integrity of the Galway Gaeltacht and the Irish language. The transfer of a proportion of through traffic will benefit people living in the vicinity of the existing N6 and provide an opportunity to improve additional public transport and facilities for pedestrians and cyclists under the Galway Transport Strategy. There are some negative impacts in terms of social severance (but less so physical severance) and the general amenity of people living in rural areas near the proposed road development to which they might have been attracted by the prevailing peacefulness of the surroundings. There will be very significant impact on the NUIG Sporting Campus as a result of the proposed road development. A flood lit 3G sports pitch and 3G training pitch and associated site infrastructure such as goal post netting will replace the lost pitches, but a new Sporting Campus Plan and Strategy will be required (refer to **Chapter 15, Material Assets Non-Agriculture**). Overall, the net effect of socio-economic aspects relating to Human Beings is assessed to be a distinct positive impact.

18.5.5 Irish Language - Potential Construction and Operational Impacts

There is a low-level of daily Irish usage among the population of the area directly affected by the proposed road development, and where it exists, the use of Irish is particularly concentrated in an education context. While population is increasing; the use of Irish-language is not growing in parallel. The proposed road development will not have any significant impact on the use of Irish into the future. However, it is noted that an improved road network would facilitate further migration and economic growth into the wider Galway Gaeltacht and as the west of County Galway have higher levels of unemployment and deprivation than the areas around Galway City, the proposed road development, by improving access to employment opportunities to the east of the city, will facilitate Irish speakers to commute more easily from their own communities and lessen the need to re-locate for economic reasons. Equally the proposed road development will make Gaeltacht areas to the west of Galway City more attractive for residential and commercial development as a result of a greatly improved road network. In this context, it will be the responsibility of Galway County Council, Galway City Council and Údarás na Gaeltachta among others to ensure that the use of the Irish language is promoted and encouraged among new residents.

Amongst the guiding principles that inform the proposed Gaeltacht Plan (Galway County Council 2017) is that the Planning Authority will “support an appropriate level of services and infrastructure to support existing and future growth and sustainable development in a manner that protects and is complementary to the environment, heritage, character and amenities of the Gaeltacht villages.”

In the course of consultation undertaken for this assessment, Údarás na Gaeltachta have indicated that they are in favour of the development of the N6 Galway City Ring Road (GCRR) around Galway City as it will “give more efficient access to

the Gaeltacht area and the Connemara area west of the city". Údarás na Gaeltachta[25] stated that the new road would have a "very beneficial impact effect" on attracting new industries to the Gaeltacht and Connemara area, encouraging existing business to expand and would support existing businesses to have a more efficient access to their markets and personnel. Overall, it is considered that the proposed road development will have a positive impact on the economic and social viability of the entire Gaeltacht area.

In conclusion, the proposed road development will have a *Moderate Positive Impact* on the status of Irish as a community language within the Galway Gaeltacht area.

18.5.6 Human Health - Potential Construction and Operational Impacts

This section addresses health impacts under three main headings as per the methodology discussed in **Section 18.2.5.4 - Health Protection**, **Section 18.2.5.5 - Health Improvements** and **Section 18.2.5.6 - Improving Services**. Health protection covers the health effects of the proposed development arising from noise, vibration, air emissions, water and soil contamination and psychological issues. These are all discussed further below.

18.5.6.1 Health Protection

Noise

It is noted that despite the extents of the proposed road development and the overall construction period, the potential noise impact on any individual receptor during construction will be limited as the activity in any one location will be limited in scale and time. Thus, the potential for human health effects will be similarly limited.

The potential noise impacts are assessed in **Chapter 17, Noise and Vibration** in accordance with the relevant NRA Guidelines. The results of the baseline noise monitoring and potential impacts which are described in full in **Chapter 17, Noise and Vibration** have been compared against the relevant noise guidelines to determine if any human health effect is likely.

As discussed previously in **Section 18.2.5.4**, the potential health effects of noise can include

- Noise-Induced Hearing Impairment
- Interference with Speech Communication
- Disturbance at schools
- Sleep Disturbance
- Hypertension and Cardiovascular Disease

[25] Correspondence from Tadhg Ó Conghaile, Stiúrthóir Forbatha Réúigiunach Pobail & Pleanála Teanga, Údarás na Gaeltachta, dated 21 December 2017

As noted in **Section 18.2.4.5**, any effects demonstrated are more likely at higher noise levels. Many effects are only demonstrated with ambient noise in excess of 70dB. The results of the noise assessment detailed in **Chapter 17, Noise and Vibration** indicate that there is no receptor which will receive this volume of noise for any sustained period therefore health effects of noise from the proposed road development will not be significant. This is discussed further below.

Construction Phase

The noise assessment detailed in **Chapter 17, Noise and Vibration** identified that during the construction phase of the proposed road development there is potential for some temporary moderate to significant impacts on nearby residential and business properties due to noise emissions from certain construction activities. The application of binding noise limits and hours of operation, along with implementation of appropriate noise control measures, will ensure that potential noise impacts are kept to a minimum. As detailed in **Section 7.6.2** of **Chapter 17, Noise and Vibration** the construction contract documents will clearly specify the construction noise criteria which the construction works must operate within which align with the Schedule of Commitments included in the CEMP in **Appendix A.7.5**. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise* and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001 and the NRA *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes* 2013. Therefore, significant noise impacts during construction will not arise and no adverse health effects are predicted during construction.

Operational Phase

The noise assessment for the operational phase of the proposed road development indicates that without mitigation measures the potential noise levels at a number of receptors exceeded the specified noise mitigation criteria and necessary mitigation measures have been specified. Once such measures are implemented, it was shown that the vast majority of locations comply with the adopted criterion. For those minor areas which do not meet the design goal, the predicted noise level for the operational phase is within 3dB of the design goal or less than the predicted noise level in the do-minimum scenario.

Many properties along the existing roads that currently experience high levels of traffic will experience a notable reduction in noise levels depending on the distance from the road, traffic volume changes and speed reductions.

Baseline noise levels are important to consider when assessing human health impacts. Human perceptions of sound intensity are such that changes of less than 3dB are usually not perceived. If noise levels do not increase by at least 3dB there will be no adverse outcome over than experienced prior to the change. In this regard a threshold of 3dB is appropriate to identify a change in noise levels which can be reliably perceived by humans.

As mentioned earlier the WHO night time noise guidelines are for communities rather than individual residences and in addition it is important to remember that

the levels are not thresholds. Nevertheless, individuals will always be concerned with the potential effects on them and therefore, it is useful to use these levels in attempting to attribute significance to changes in noise levels.

The significance of human health impacts as per the criteria referred to above in **Table 18.7** are as follows:

- If the L_{night} immediately outside a residence is below 55dB the Human Health impact is Imperceptible
- If the existing L_{night} immediately outside a residence is below 55dB and it increases by more than 3dB but remains below 60dB the Human Health impact is Slight Negative
- If the existing L_{night} immediately outside a residence is below 55dB and it increases by more than 3dB and to a level above 60dB the Human Health impact is Moderately Negative.

As mentioned above the proposed road development, by diverting traffic away from heavily populated areas overall has benefits in terms of community night-time noise. Therefore, the overall health effect would be positive. However, this is of little comfort to individuals who actually experience an increase in noise and the potential noise impacts on individual properties have been assessed and mitigation measures proposed in **Chapter 17, Noise and Vibration**.

Site Specific Operational Noise Impacts

Ch. 0+000 to 2+800 (R336 to Bearna East Roundabout)

The vast majority of receptors are below 55dB L_{night} in this area. At Bearna West Roundabout there is only a predicted increase of 1dB over the 'Do-Nothing' scenario at levels above 55dB L_{Night}. Therefore, no negative human health impacts are predicted.

Ch. 2+800 to 7+600 (Bearna East Roundabout to N59 Letteragh Junction)

All receptors are below 55dB L_{Night} in this area. Therefore, no adverse human health impacts are predicted.

Ch. 7+600 to 9+300 (N59 Letteragh Junction to River Corrib Bridge)

The vast majority of receptors are below 55dB L_{Night} in this area. At Bushypark along the N59 Moycullen Road where levels are above 55dB L_{Night}, there is only a predicted increase of 1dB over the 'Do-Nothing' scenario. In addition, some of the receptors around the N59 Moycullen Road are predicted to have L_{Night} above 55dB but there is relatively little change from the 'Do-Nothing' scenario with no increase in excess of 2dB. Therefore, no adverse human health impacts are predicted.

St James's School at Bushypark is not identified as having any significant negative impact.

Ch. 9+300 to 12+100 (River Corrib Bridge to N84 Headford Road Junction)

The vast majority of receptors are below 55dB L_{Night} in this area. Any that are above this level show little of no change from 'Do-Nothing' Scenario. Therefore, no negative human health impacts are predicted.

Ch. 12+100 to 14+000 (N84 Headford Rd Junction to N83 Tuam Road Junction)

The vast majority of receptors are below 55dB L_{Night}. At the N83 Tuam Road Junction where predicted levels are above 55dB L_{Night}, there is only a predicted increase of 1 or 2dB over the 'Do-Nothing' scenario. Therefore, no negative human health impacts are predicted.

Castlegar National School and the associated Beoga Pre-school are not identified as having any significant negative impact. This is of particular significance given the specific facilities at Castlegar School for children suffering from Autistic Spectrum Disorder.

Ch. 14+000 to 17+500 (N83 Tuam Rd Junction to Coolagh Junction)

The vast majority of receptors are below 55dB L_{Night} in this area. While some receptors are predicted to be above 55dB L_{Night}, there is only a predicted increase of up to 3dB, but not over 3dB, over the 'Do Nothing' scenario in those cases.

The Galway Clinic does go above 55dB L_{Night} but as mentioned the change is only 3dB. This is less than the more than 3dB threshold mentioned above so the impact on the Galway Clinic is assessed as Imperceptible. Therefore, no negative human health impacts are predicted.

Overall using the criteria for the significance of human health impact detailed in **Table 18.6** the impact rating in relation to noise is slight and no negative human health impacts are predicted.

Vibration

The potential vibration impacts as a result of the proposed road development both during construction and operation have been assessed in **Chapter 17, Noise and Vibration**. Overall the predicted impact from vibration is very low and characterised as not significant. While there may be some degree of local vibration transmitted during some aspects of construction, such as blasting or drilling, these will typically be of short duration and very localised and occur only during construction hours. Given the short duration it will not have any negative health impacts.

The potential vibration impact during the operational phase as detailed assessed in **Chapter 17, Noise and Vibration** is predicted as being not significant. Therefore there will be no negative health impacts.

Using the criteria for the significance of human health impact detailed in **Table 18.6** above the potential impact caused by vibration is assessed as Imperceptible.

Air Quality

As discussed previously in **Section 18.2.4.5**, provided the air quality standards are not exceeded one can be confident that there will be no adverse effect on human health due to air emissions. This is discussed further below.

As is detailed in **Chapter 16, Air Quality and Climate**, certain sensitive receptors have been identified in the study area for the proposed road development and dusts that are likely to be generated during the construction phase are normally heavier

and larger particles. As these are heavier, they tend to fall rapidly to the ground and have a very limited level outside the actual construction site. There are potential occupational health issues for the works which would require for example the use of respiratory protection equipment in certain phases. However, as also pointed out in **Chapter 16, Air Quality and Climate**, in the event of such large dust leaving the site, by nature of its' relatively large size, that is greater than 10 microns, it is not respirable and will not have significant human health effects.

It is also noted that despite the extents of the proposed road development, the potential air quality impact on any individual receptor will be limited as the activity in any one location will be limited in scale and time. Thus, the potential for human health effect will be similarly limited.

The potential air quality impacts are assessed in **Chapter 16, Air Quality and Climate** in accordance with the relevant TII Guidelines. The results of the baseline air quality monitoring and potential impacts which are described in full in **Chapter 16, Air Quality and Climate** have been compared against the reliable air quality standards both during the construction and operational phases to determine if any health effect is likely.

The proposed road development is predicted to have a negligible impact on air quality, as defined in **Chapter 16, Air Quality and Climate**[26], across the study area during the construction phases and as such an imperceptible impact on human health. Whilst some areas of the study area will l experience a slight negative impact on air quality during the operational phase all air quality levels will remain well within air quality standards and as such there will be an imperceptible impact on human health. Site specific impacts during operation are further detailed below.

Site Specific Operational Air Impacts

Ch. 0+000 to 5+650 (R336 to Ballymoneen Road Junction)

These areas are predicted to have a negligible[26] air quality impact during the operational phase and therefore there will be no health effect.

Ch. 5+650 to 7+600 (Ballymoneen Road Junction to N59 Letteragh Junction)

This area is identified as having a slight negative impact at the N59 Moycullen Road in terms of NO_2 in the operational phase but this is a relative increase only and all levels remain well within air quality standards. All other impacts on air are assessed as negligible and therefore there will be no health effect.

Ch. 7+600 to 9+300 (N59 Letteragh Junction to River Corrib Bridge)

This area is predicted to have a negligible[26] air impact during the operational phase and therefore there will be no health effect.

Ch. 9+300 to 12+100 (River Corrib Bridge to N84 Headford Road Junction)

Some receptors in this area are identified as having a slight negative impact in terms of NO_2 in the operational phase but this is a relative increase only and all levels

[26] Where the impact magnitude of the changes in concertation of PM_{10} is imperceptible, then the impact description is negligible.

remain well within air quality standards. All other impacts on air are assessed as negligible[26] and therefore there will be no health effect.

Ch. 12+100 to 14+000 (N84 Headford Rd Junction to N83 Tuam Road Junction)

Some receptors in this area are identified as having a slight negative impact in terms of NO_2 in the operational phase but this is a relative increase only and all levels remain well within air quality standards. All other impacts on air are assessed as negligible[26] and therefore there will be no health effect.

Ch. 14+000 to 17+500 (N83 Tuam Rd Junction to Coolagh Junction)

This area is predicted to have a negligible[26] air quality impact during operational phase and therefore there will be no health effect.

Water

As is identified in **Chapter 10, Hydrogeology** and **Chapter 11, Hydrology** no negative impact from either surface water, or groundwater is anticipated. In this regard human health effects will not occur.

The hydrogeology assessment concluded that given the mitigation proposed there is a slight residual impact from the proposed road development with respect to groundwater quality as a resource. In terms of the quantity of groundwater available within the aquifer (the yield of the resource) there will be an imperceptible effect at the regional scale. It did state that some individual wells will be affected in terms of flow or water quality, however there will be no impact in potable water quality as alternative supplies will be utilised if necessary. At all times water quality standards will be observed to ensure public health.

In addition, the River Corrib is the main source of water for the city of Galway. Abstraction of the water is located 1.7km downstream from the proposed River Corrib Bridge and therefore at risk to pollution from the proposed road development, particularly during the construction phase. Stringent mitigation and control of potential polluting activities associated with construction activities will be implemented which will significantly reduce the risk of impact.

The operational phase also presents a pollution risk to this supply both from accidental spillages and from routine road run-off discharges. Design pollution control measures have been put in place to reduce the risk.

Given that all residual water supplies will comply with water quality standards the potential impacts on human health are assessed as Imperceptible.

In addition, in the broader context, the flood risk assessment has demonstrated that there is no significant flooding impact arising from the proposed development and hence no potential impact on human health.

<u>Water quality</u>

As detailed in **Chapter 10, Hydrogeology** and **Chapter 11, Hydrology**, there has been considerable attention given to ensuring that there will be no adverse effect on water quality. Where necessary mitigation measures are put in place to ensure continued supply of high quality and safe drinking water. The vast majority of

residences in the area receive their water by mains which will continue to be monitored in the normal way.

No adverse effect on water quality is predicted and therefore there will be no health effect.

Flooding

The design of the construction and operational phase of the proposed road development has considered the risk of flooding at every step. This applies particularly of course to the area in the immediate vicinity of the River Corrib. The design of the construction of the River Corrib Bridge and ancillary works will ensure that there is no increased risk of flooding and indeed flood protection measures have been included and therefore there will be no health effect.

Soils

Soil Contamination

As detailed in **Chapter 9, Soils and Geology** there are no known areas of contaminated lands crossed by the proposed road development. While it is not anticipated that any of the construction or operational works would lead to soil contamination the contractor will be obliged to monitor the construction at all stages. In the event that any source of contamination is identified, in excavation or other means, this would have to be addressed at that time in consultation with statutory bodies such as the EPA. This will ensure that even in the unlikely event a source of contamination is discovered that appropriate mitigation measures will be put in place to ensure no adverse effect on human health.

Radon

The area of Galway which the proposed road development traverses is in a high radon area. As noted previously in **Section 18.2.5.7**, it is only when radon builds up in buildings that are inhabited by human beings that the health risk occurs. During construction, there will be excavations and tunnelling activities. This will have the potential to cause some release of radon. However, this will almost instantaneously be dissipated and will be harmless. Radon escape from rock will take the path of least resistance. Radon is escaping all the time but when it escapes to the open air there are no health effects.

The excavation and tunnelling activities will, if it has any effect at all on radon, and it is most likely that it will have none, actually divert radon away from residences rather than towards them as the radon may find an easier route to surface via the excavations rather than its current route. That is people which may be at risk because they live and work in a high radon area, will be not be at a higher risk because of the proposed construction or indeed operation of the proposed road development.

The potential human health impact of the construction and operational phases of the proposed road development with regards to radon are assessed as imperceptible.

Psychological

As set out in **Chapter 15, Material Assets Non-Agriculture**, the proposed road development has been designed to avoid as many properties as possible but given the built environment and the linear development of the city with housing along every road radiating out of the city its construction will unfortunately and unavoidably result in a number of property acquisitions or demolitions. Numerous alternatives have been considered as detailed in **Chapter 4, Alternatives Considered**, however the conclusion of the consideration of the alternatives is that the proposed road development represents the optimum transport solution and has avoided the greatest number of known and immovable constraints and is the option that overall has the least environmental impact taking all other potential environmental impacts into account. The people living in these homes have genuine concerns that their lives will be adversely affected. Many have lived in the area many years or indeed all of their lives. In the event of an approval of the Protected Road Scheme and Motorway Scheme and approval under Section 51 of the Roads Act 1993 (as amended), by An Bord Pleanála and subject to the availability of funding, Notice to Treat will be served firstly on owners, lessees and occupiers of the dwelling houses and commercial properties to be acquired, within six months of the scheme becoming operative, unless an application has been made for Judicial Review, in which case the Notice to Treat[27] will be served in accordance with the provisions of Section 217 (6A) of the Planning and Development Act 2000 as inserted by the Compulsory Purchase Orders (Extension of Time Limits) Act 2010. Compensation will be agreed or determined by the property arbitrator as soon as possible after service of Notice to Treat. After compensation has been agreed or determined and satisfactory title has been produced, part payment can be made while the claimant remains for an agreed period in the property to be acquired. This will facilitate the claimant in removing uncertainty and will facilitate arrangements being made, as early as possible, to secure a replacement property.

The community will also experience annoyance from the temporary impacts of traffic management and other effects during the construction phase. As against this there is the potential reduction in annoyance amongst road users in the operational phase where there are reduced journey times.

Whilst individual annoyance cannot be discounted, annoyance in itself is not a health effect. There is no evidence that there are any significant effects on human health from simply transient levels of annoyance. In these circumstances the negative impacts is assessed at Slight. In addition, while there may be positive impacts of reduced annoyance for those not stuck in traffic there is little evidence of positive impacts on human health and the positive impact is assessed also as Slight.

It is worth noting that the proposed road development will remove a lot of congestion from the city centre and the potential for conflict between vehicular traffic and pedestrians and cyclists, thereby reducing the potential number of collisions and possible fatalities. Not only would the avoidance of fatalities and

[27] This notice requests landowners to submit their claim for compensation for lands being taken under the Protected Road Scheme or Motorway Scheme. This is the initial step in the acquisition of property and lands.

serious injuries have a very significant positive impact on an individual basis, any such injury or fatality would have a huge adverse impact on the individual's family, friends and colleagues such as that there can be a wider impact on the psychological health of the community.

The Do-Nothing scenario has potential for adverse psychological impacts. Progressively longer journey times and uncertainty will be associated with increased annoyance at least and at worst impact on psychological health.

As detailed in **Section 18.5.3** and **18.5.4** the proposed road development will cause a degree of physical and social severance. Where severance does occur there is potential for psychological impact. Loneliness can occur if someone feels cut off for example. As against this there may be positive psychological effects where improved connectivity permits greater ease of movement around the city. This would potentially facilitate closer connections with friends or relatives which might be deterred if journeys were perceived to be lengthy or difficult.

Overall, therefore, the assessment of the psychological impact on a population of community basis will be overall positive. However, one cannot escape the fact that certain individuals particularly those whose homes are to be compulsory acquired may not experience the community benefit.

18.5.6.2 Health Improvement

As detailed in **Section 18.5.3** and **18.5.4**, the proposed road development has the potential to bring with it, significant socio-economic benefits. It will facilitate transport of goods and people in a timely, reliable and efficient manner. The full economic benefit will be realised once the proposed road development is completed. Accessibility to businesses and community facilities in Galway City and its environs and the Business Parks in Parkmore and Ballybrit will be better facilitated by the proposed road development and the resulting reduction in congestion. It will also bring with it benefits to business and public facilities in Galway City centre by reducing noise and air pollution. This all translates into an increased potential for economic prosperity for the Western Region, with Galway City as a thriving city at the core, which in turn will play a part in reviving the Irish economy.

Whilst the benefits are applicable to Galway City and County, it may be particularly felt in the West of Galway. As was identified earlier in this chapter, the deprivation map detailed in the HSE Health Profile for County Galway identifies many of the most deprived areas of Galway County as being to the west of the city in Connemara. These areas are amongst those most likely to get a socio-economic benefit from the proposed road development. As set out in **Section 18.2.5.5** an improvement in socio-economic circumstances can contribute to improving the health and wellbeing of socio-economically deprived communities. It therefore follows that the socio-economic benefits of the proposed road development will also contribute to health benefits.

The provision of an additional crossing of the River Corrib will facilitate the reduction of congestion on city centre roads, and allow the reallocation of road space in the city network to non-motorised modes of transport, thereby facilitating

the effective implementation of all the elements contained in the Galway Transport Strategy, namely the improvement of public transport, cycling and walking measures and provides the opportunity for health improvements.

As detailed in **Chapter 3, Need for the Proposed Road Development**, the proposed road development will enable the reallocation of existing road space within the city to public transport and smart mobility measures and as such facilitate the full implementation of the GTS. It will facilitate a more efficient public transport system and provide for of a multi-modal choice of travel including walking and cycling. Analysis of the traffic model shows a 21% increase in cycling with the full implementation of the GTS with a small decrease in walking largely due to people switching from walking to cycling or public transport, however, there will be an overall benefit in terms of opportunities to exercise and the associated health benefits. The increased opportunities to exercise due to an environment more amenable to walking and cycling, will also facilitate the social interaction among neighbours which may be currently be inhibited by excessive traffic all of which provide significant opportunities for health improvement.

Increased opportunities for exercise also has the potential to bring benefits in terms of human health. Exercise is a well-recognised method of reducing risk in terms of obesity, diabetes, hypertension, cardiovascular disease and osteoporosis amongst other conditions. There are also significant psychological benefits and studies have consistently shown self-reported well-being is significantly higher in those who frequently exercise.

One of the project objectives as set out in **Chapter 3, Need for the Proposed Road Development** is safety. The proposed road development is designed to optimal safety levels. It is well established that roads which are designed to safe standards are associated with reduced accident levels. The proposed road development also has the added benefit of moving the traffic away from pedestrian traffic reducing the opportunities for pedestrian injury or death. It introduces opportunities for safer travel for cyclists with the introduction of cycle measures included in the GTS.

The proposed road development would further improve access to health care through enhanced public and private transport connectivity, and may facilitate faster and safer emergency response through improved road capacity and resilience. Ambulances being able to get to an emergency situation in minutes as opposed to being delayed in heavy traffic has obvious benefits for health and could potentially be lifesaving. The study by Lyon et Al, referenced in the literature review in **Section 18.2.5.7**, reinforces this point by showing that there is an improved survival rate with out-of-hospital cardiac arrests with more rapid response times from the emergency services. This improvement is equally important in relation to the heading below under improving services.

18.5.6.3 Improvement of Access to Services

For vehicle drivers the ability to access services will be improved by the proposed road development. The diversion of traffic away from busy city centre streets will mean that people will be able to access shops, restaurants, cinemas and other services easier with less delays.

Similarly, for people needing to cross the city centre to access services, they will be facilitated by the proposed road development. This will be particularly so for those living on the west of the River Corrib. There will also be a more efficient and reliable connectivity to the national road network. This is particularly important in an Irish context as many major health services are situated in Dublin for example, the new National Children's Hospital.

There is also the potential for the proposed road development to improve access to services for non-motorised transport users to reach key services. As previously mentioned the diversion of traffic away from the city centre will facilitate public transport both in the form of buses and taxis. Reduction in traffic will also facilitate cycling and pedestrian access to services particularly around currently heavily used city streets.

It is clear therefore that with regards to access to services the proposed road development impact is overwhelmingly positive. That being said, certain individuals albeit very few, who are living or accessing areas in the immediate vicinity of the proposed road development, would for reasons of severance or road closures have to detour somewhat from their current routes. Once they do access the transport links, however, they too will benefit from improved access to services.

18.5.6.4 Summary

In summary, health protection covers the health effects of the proposed development arising from noise, vibration, air emissions, water and soil contamination and psychological issues. The results of the baseline noise monitoring and potential impacts set out in **Chapter 17, Noise and Vibration** have been assessed and no negative human health impacts are predicted as a result of noise emissions. The predicted impact from vibration is very low and characterised as not significant. Therefore, the potential impact caused by vibration is assessed as Imperceptible.

The proposed road development is predicted to have a negligible[28] impact on air quality across the study area during the construction phases and as such an imperceptible impact on human health. Whilst some areas of the study area will experience a slight negative impact on air quality during the operational phase all air quality levels will remain well within air quality standards and as such there will be an imperceptible impact on human health.

Given that all residual water supplies will comply with water quality standards the potential impacts on human health are assessed as Imperceptible. No adverse effect on water quality is predicted and therefore there will be no health effect. In addition, in the broader context, the flood risk assessment has demonstrated that there is no significant flooding impact arising from the proposed road development and hence no potential impact on human health. There are no predicted impacts on human health as a result of soil contamination or radon.

[28] Where the impact magnitude of the changes in concertation of PM_{10} is imperceptible, then the impact description is negligible.

The people living in homes to be acquired or demolished for the construction of the proposed road development have genuine concerns that their lives will be adversely affected. Many have lived in the area many years or indeed all of their lives.

The proposed road development will remove a lot of congestion from the city centre and the potential for conflict between vehicular traffic and pedestrians and cyclists, thereby reducing the potential number of collisions and possible fatalities. The proposed road development will cause a degree of physical and social severance. Where severance does occur there is potential for psychological impact. Loneliness can occur if someone feels cut off for example. As against this there may be positive psychological effects where improved connectivity permits greater ease of movement around the city. This would potentially facilitate closer connections with friends or relatives which might be deterred if journeys were perceived to be lengthy or difficult.

Overall, therefore, the assessment of the psychological impact on a population of community basis will be overall positive. However, one cannot escape the fact that certain individuals particularly those whose homes are to be compulsory acquired may not experience the community benefit.

The potential impacts of the proposed road development in the operational phase will be largely positive with significant opportunities for health improvements. These include, but are not limited, to improved access to services including emergency services, the potential for socio-economic development with the associated health improvements. The provision of an additional crossing of the River Corrib will facilitate the reduction of congestion on city centre roads, and allow the reallocation of road space in the city network to non-motorised modes of transport, thereby facilitating the effective implementation of all the elements contained in the Galway Transport Strategy, namely the improvement of public transport, cycling and walking measures and provides the opportunity for health improvements with the increased opportunities for exercise. The proposed road development would further improve access to health care through enhanced public and private transport connectivity, and may facilitate faster and safer emergency response through improved road capacity and resilience.

18.6 Mitigation Measures

18.6.1 Socio-economics

Specific proposed mitigation measures for potential socio-economic impacts are listed in **Tables 18.13** and **18.14**, many of which have been included in the design of the proposed road development. These include the provision of crossing facilities at the Foraí Maola Road, Troscaigh Road, Bearna to Moycullen Road L1321, Cappagh Road and Ballymoneen Road junctions to facilitate pedestrian and/or cyclist crossings of the proposed road development. Pedestrian crossing facilities are also proposed at the terminus of the N59 Link Road North Junction at the N59 Moycullen Road (Bushypark Junction) and at the slip road connections with the N84 Headford Road Junction. Cycle lanes are proposed to facilitate access to the Miller's Lane pitches and Gort na Bró and at the N84 Headford Road Junction.

The following specific mitigation measures are proposed to improve journey amenity, amenity and minimise severance:

- Provide pedestrian crossing facilities at junctions with minor roads serving local rural communities
- Provide temporary visual screening from construction works at St. James' Church Cemetery in Bushypark and at St. James' School, Bushypark
- Provide pedestrian crossing facility at Bushypark Junction with N59 Link Road North during construction and operation
- Avoid any prolonged severance and minimise duration of use by construction traffic of An Seanbóthar
- Provide for alternative access along the bank of the River Corrib, along with prior advice for walkers, if access restrictions apply due to construction of the overhead bridge crossing
- Phase construction works to minimise impacts on racing events at Galway Racecourse
- Provide directional signage for access to car dealership and An Post sorting centre on N83 Tuam Road during construction
- Provide pedestrian crossing facilities at N84 Headford Road Junction during construction and operation
- Provide a footpath within the proposed development boundary along School Road, Castlegar
- Provide directional signage for a Briarhill Business Park, including a car dealership located here during both the construction
- Take measures to ensure that cul-de-sacs or adjacent lands are not used for illegal parking in the operational phase

Outside of the proposed development boundary associated with the proposed road development itself, it is recommended that the relevant authorities take measures to enhance the local connectivity provided and consequently its value and acceptability to the local community. Whilst not required as part of the proposed road development it will provide further benefits for the community. Such measures could include the widening of sections of narrow, currently substandard rural roads in the western section of the study area. The extension of public footpaths and cycle paths included in the design to ensure that these are not isolated, but provide connectivity to community facilities and other pedestrian and cyclist facilities.

The proposed road development will facilitate the implementation of the walking, cycling and public transport measures set out in the GTS. The transference of traffic from the existing N6 through Galway City to the proposed road development will provide an opportunity for improved pedestrian and cycle paths and crossing facilities, including continuity at major junctions and a modal shift to alternatives to the private car. Improved walking and cycling journey amenity is contingent on these appropriate facilities being provided. When implemented, such facilities will provide a significant improvement to pedestrian and cyclist journey amenity combined with reduced severance.

As discussed in **Chapter 15, Material Assets Non-Agriculture**, the proposed road development traverses the NUIG Sporting Campus on a viaduct. During construction, restricted access across the construction area at the NUIG Sporting Campus facilities will be maintained.

Alternative pitch facilities will be provided to replace the existing pitches directly impacted by the proposed road development. The facilities include a floodlit 3G GAA pitch and a floodlit 3G training area and associated site infrastructure for the drainage of these pitches and furniture such as ball-stop netting. The proposed road development also intercepts the existing sports pavilion resulting in direct impacts to its western end and the building will be modified as follows:

- the existing western plant room, 1 no. changing room, 1 no. storage area, 1 no. weights area and associated access hallways on both ground floor and upper levels will be demolished
- the western plant room and its associated plant will be relocated
- construction and reconfiguration of the internal and external walls, roof, windows and door locations

Temporary stables will be provided for Galway Racecourse during the construction of the proposed road development until such time as the Galway Racecourse Tunnel is complete and the permanent stables are constructed.

18.6.2 Irish Language

Mitigation measures proposed to protect the Irish Language are as follows:

- During construction, all public notifications and all public project updates are to be provided in both Irish and English languages
- While it is expected that day-to-day communications involved in the construction of the proposed road development will be through the English language, the Main Contractor shall have the capacity to communicate and correspond through the use of the Irish language and to devote adequate and proportionate staff resources to dealing with any individual wishing to correspond and communicate through the Irish language
- Placenames shall be cited in accordance with the relevant Placename Order issued under the Official Languages Act 2003

18.6.3 Human Health

Mitigation measures proposed for the potential air quality, noise, water and soils are specified in **Chapter 9, Soils and Geology**, **Chapter 10, Hydrogeology**, **Chapter 11, Hydrology**, **Chapter 16, Air Quality and Climate** and **Chapter 17, for Noise and Vibration** and the key mitigation measures which apply to human health are outlined below and are also in the respective chapters listed above. The implementation of these mitigation measures, emissions, including air and noise will be adequately controlled to ensure no adverse effect on human health.

18.6.3.1 Noise

The key noise mitigation measures include:

- Use of a Low Noise Road Surface
- Use of noise barriers as detailed in **Table 17.14**
- Control measures for construction works. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring. The contractor will be required to conduct construction noise predictions prior to works taking place and put in place the most appropriate noise control measures depending on the level of noise reduction required at any one location. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise* and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001
- Construction hours will mostly take place during daytime hours Monday to Friday. It will be necessary to work overtime (including weekends) and night shifts at certain critical stages during the project. Over the expected 36-month construction phase there will be up to 10 weeks of night-time working along different sections of the proposed road development primarily to facilitate bridge works over existing roads
- During the construction phase noise monitoring will be undertaken at the nearest sensitive locations to ensure construction noise limits outlined in **Table 17.1** of **Chapter 17, Noise and Vibration** are not exceeded. It is recommended that noise control audits are undertaken at regular intervals throughout the construction programme, as part of the noise and vibration management of the construction of the proposed road development which will be set out in the construction contract requirements
- In terms of blast design control, specific guidance will be obtained from the recommendations contained within *BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Vibration* in relation to blasting operations in addition to experienced blast control techniques used by the contractor. Ref **Chapter 17, Noise and Vibration** for further details
- In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, the following measures shall be implemented during the construction period:
    - A clear communication programme will be established to inform adjacent building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to exceed perceptible levels. The nature and duration of the works will be clearly set out in all communication circulars
    - Alternative less intensive working methods and/or plant items shall be employed, where feasible
    - Appropriate vibration isolation shall be applied to plant, where feasible

- Cut off trenches to isolate the vibration transmission path shall be installed where required
- In the case of impact piling or demolition works for instance, a reduction in the input energy per blow shall be considered where required
- Monitoring will be undertaken at identified sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values

- Property condition surveys will be offered for all buildings within 50m of the proposed development boundary and those within 150m of proposed blasting works along the proposed road development. Property condition surveys will also be carried out at buildings and structures considered appropriate relative to their proximity to the works.

18.6.3.2 Air

The implementation of 'standard mitigation for air' as state in the TII Guidelines include:

- Spraying of exposed earthwork activities and site haul roads during dry weather
- Provision of wheel washes at exit points
- Control of vehicle speeds and speed restrictions. It is proposed that site traffic is restricted to 20km/hr. This will help to minimise the occurrence of dust re-suspension
- Sweeping of hard surface roads

In addition, the following measures will be implemented:

- A public communication strategy will be implemented by the Contractor which will outline procedures to inform members of the community on activities that may be disruptive, further details are contained in **Appendix A.7.5 Construction Environmental Management Plan**. This appendix also includes details of a complaints register which will be implemented during the construction phase
- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor through regular servicing of machinery
- During dry periods when dust generation is likely or during windy periods, construction areas and vehicles delivering material with dust forming potential will also be sprayed with water, as appropriate
- Areas where materials will be handled and stockpiled will be positioned away from main site access roads. These areas will also be designed to minimise their exposure to wind – all stockpiles shall be kept to the minimum practicable height with gentle slopes
- There shall be no long-term stockpiling on site and storage time will be minimised

- Material drop heights from plant to plant or from plant to stockpile will be minimised
- Water suppression will be used during the demolition of buildings
- Crushing and concrete batching plant will be located as far from sensitive receptors as is reasonably practicable. All storage bins and transfer points will be covered. Silos will be fitted with reverse jet air filters
- Dust screens will be implemented at locations where there is the potential for air quality impacts during the construction phase, i.e. at locations where sensitive receptors are located within 100m of the works
- Employee awareness is also a most important way that dust may be controlled on any site. Staff training and the vigilant management of operations ensure that all dust suppression methods are implemented and continuously inspected
- Dust deposition monitoring will be conducted at a number of locations in the vicinity of the proposed road development. At a minimum, monitoring will be carried out at the two nearest sensitive receptors at locations where works of a 'major' scale is proposed while works are taking place in proximity, refer to **Section 16.5.3.1** of **Chapter 16, Air Quality and Climate**.

18.6.3.3 Water and Soil

The key water and soil measures to prevent pollution, flooding and soil contamination include:

- Measures have been incorporated into the design of the proposed road development will protect water quality and soils and also prevent any significant flooding, thus avoiding any potential health impacts
- During construction, the contractor shall implement the Construction Environmental Management Plan as set out in **Appendix A.7.5**

18.6.3.4 Demolitions and Acquisitions – Psychological Effects

In the event of an approval of the Protected Road Scheme and Motorway Scheme and approval under Section 51 of the Roads Act 1993 (as amended), by An Bord Pleanála and subject to the availability of funding, Notice to Treat will be served firstly on owners, lessees and occupiers of the dwelling houses and commercial properties to be acquired, within six months of the scheme becoming operative, unless an application has been made for Judicial Review, in which case the Notice to Treat[29] will be served in accordance with the provisions of Section 217 (6A) of the Planning and Development Act 2000 as inserted by the Compulsory Purchase Orders (Extension of Time Limits) Act 2010. Compensation will be agreed or determined by the property arbitrator as soon as possible after service of Notice to Treat. After compensation has been agreed or determined and satisfactory title has been produced, part payment can be made while the claimant remains for an agreed

[29] This notice requests landowners to submit their claim for compensation for lands being taken under the Protected Road Scheme or Motorway Scheme. This is the initial step in the acquisition of property and lands.

period in the property to be acquired. This will facilitate the claimant in removing uncertainty and will facilitate arrangements being made, as early as possible, to secure a replacement property.

18.7 Residual Impacts

18.7.1 Socio-economics

18.7.1.1 Journey characteristics

Once operational, the proposed road development will provide a very significant positive residual impact in terms of improved connectivity across and beyond the city, including to national roads via the junctions included as part of the proposed road development. This will maximise the transfer of cross-city movements to the new road infrastructure, thus releasing and freeing the existing city centre and inner suburbs from congestion caused by traffic trying to access a city centre bridge to cross the River Corrib. Residual impacts respective to each identified impact and impact type are listed in the final column of **Table 18.14** and **Table 18.15**.

18.7.1.2 Amenity

The proposed road development will have a positive residual impact on journey amenity on most city roads by encouraging a transfer of through and other traffic, reducing congestion particularly at major junctions. Some transference of traffic will occur to arterial roads connecting with junctions on the proposed road development, but overall the reduction in traffic on the major road arteries will provide a residual positive contribution to journey and general amenity in the city. There will be particular benefits for pedestrians and cyclists as the transfer of traffic will allow for an improvement in relevant facilities together with opportunities for more public transport as proposed in the GTS.

The pattern of residential development in the study area means that the construction of the proposed road development will impact directly on a high proportion of residential properties at several locations. There will be an inevitable very significant negative impact on most of the householders who are directly impacted by compulsory purchase. As the proportion of properties to be acquired or demolished at three locations is high in relation to the total number of properties in that area, a significant negative residual impact could occur at a community level for those households that remain.

There will be a significant residual amenity impact on visitors to Menlo Castle on the east bank of the river due to the presence of the River Corrib Bridge. The residual impacts on NUIG Sporting Campus remain as very significant in the absence of a new University Sports Masterplan. The proposed road development will be elevated across the Sports Campus, removing the two centrally located grass GAA pitches. In tandem with this the existing context of the existing sporting changing facilities setting and curtilage will be altered completely. An appropriate

level of master planning and implementation of the following would reduce the residual impact to moderate:

1. The Sporting Campus at Dangan will require a new Sporting Campus Plan and strategy to re-accommodate the removed pitches and ancillary Sports Pavilion. This must be in line with the University's overall strategic sport's vision
2. The removal of the existing sports fields will require replacement by similar or more likely improved facilities which allow for the more intensive use of the remaining reduced Campus footprint
3. Utilities, roads and access and egress routes around the Campus will require complete re-planning to re-integrate with the proposed road development
4. The remaining sports pitches will require remodelling to accommodate a more intensive use of the existing Campus footprint
5. The landscape setting of the existing Campus will need to be developed to screen the visual effects of the proposed River Corrib Bridge from the surrounding pitches
6. Ancillary supporting facilities such as car parking and changing facilities will require remodelling

The residual impact on NUIG Sporting Campus post compensation cannot be assessed as the compensation to be agreed as part of the land acquisition is outside the scope of the EIA process.

18.7.1.3 Community Severance

The transfer of through and other traffic from more central areas of the city will allow space for improved and new crossing facilities for both pedestrians and cyclists in line with the GTS. Crossing facilities are also included for junctions between national, secondary and local roads and the proposed road development. These facilities will have the effect of reducing any residual impact arising from severance due to the road development itself.

18.7.1.4 Economic

The improved connectivity will help to stimulate economic development and the potential for development of the tourism sector in West County Galway. The proposed road development will have a significant positive residual impact in this regard. The availability of connections between the proposed road development and existing business parks in the west, and especially the east, of the city will also have a very significant, and in some cases, profoundly, positive economic impact due to improved access to these businesses. However, some businesses will be directly impacted by the route of the proposed road development and a few of these will be acquired or their current operations modified. These negative impacts will be addressed as part of the land acquisition process and financial compensation.

18.7.2 Irish Language

The proposed road development is expected to have a Moderate Positive residual impact on the status of Irish as a community language within the Galway Gaeltacht area.

18.7.3 Human Health

18.7.3.1 Health Protection

From a community perspective overall, there are potential benefits in terms of human health protection. These arise from overall reductions in noise levels in built-up areas and potential improvements in air quality in these areas. Unfortunately, there are individuals who have slight negative impacts because of their proximity to the proposed road development. The implementation of the mitigation measures will result in a residual slightly positive impact.

Similarly, from a psychological health point of view overall from community perspective the impacts of the proposed road development are assessed as being positive. Again, there are individuals who may be adversely affected and principal among these are likely to be those whose homes are to be compulsorily acquired. The residual impact will be positive.

18.7.3.2 Health Improvements

There is the potential for a very significant opportunity for health improvements associated with the proposed road development. These include the potential for economic development as well as tourism which in itself is associated with an improvement in health status. There is the potential for improvements in social health with a reduction in unemployment and particularly long-term unemployment. Such a potential if realised will bring with it benefits including reduced inequality in society. There is also potential for increased opportunity to exercise. There is the potential for reduced traffic accidents with a corresponding reduction in mortality and morbidity. Ease of access and egress has the potential to improve social interaction. It also will allow quicker and more reliable access for emergency services such as ambulances. The residual impact will be positive.

18.7.3.3 Improvement of Access to Services

There is potential for significant improvement in access to services. The benefits of this apply to both the residents of Galway City and beyond. Easier access to national road network will allow greater availability of national services such as major hospitals and others. This may be of particular benefit to those living to the west of the city including as far as Connemara. Decreased traffic in built-up areas of Galway City will allow easier access to the services such as retail, cinema, restaurants and other services. It may also encourage people outside of Galway, who are currently deterred from entering the city by traffic concerns to visit and access the services. The residual impact will be very positive.

18.7.4 Cumulative Impacts

Cumulative impacts are defined as the combination of many minor impacts creating one larger, more significant impact (NRA, 2009 and EPA 2017). Cumulative impacts consider existing stresses on the natural environment as well as developments that are underway and in planning.

Following a review of the committed projects and the planning files for Galway City and County Council, the cumulative impacts of the proposed road development on human beings, population and human health with the following have been assessed:

- The planning registers for Galway City and County Council
- M17 Galway to Tuam Road Project (operational)
- N18 Oranmore to Gort Road Project (operational)
- N17 Tuam Bypass (operational)
- M6 Motorway (operational)
- M6 Motorway Service Area (Rathmorrissy Interchange) (pre-planning)
- N59 Maam Cross to Oughterard Road Project (consented and pre-construction)
- N59 Maigh Cuilinn (Moycullen) Bypass Road Project (consented and pre-construction)
- Galway Harbour Port Extension (planning stage)
- Galway Transport Strategy (GTS), which includes the following:
    - Investigation of prospective sites to the east of the city for Park and Ride
    - Bearna Greenway
    - Galway to Oughterard (part of the Galway to Clifden) Greenway
    - Galway City to Oranmore (part of the Galway to Dublin) Cycleway
- Galway City Development Plan 2017–2023
- Galway County Development Plan 2015–2021
- Bearna Local Area Plan 2007–2017
- Gaeltacht Local Area Plan 2008–2018
- Údarás na Gaeltachta's Strategic Plan 2014–2017
- Ardaun Local Area Plan 2018–2024

No projects or plans other than those listed in this chapter were identified as having potential cumulative impacts.

18.7.4.1 Socio-Economics

The proposed road development will improve accessibility both within and to/from Galway City and connectivity between areas outside of the city including Connemara, the East and North West. As a result, there are significant potential positive impacts which will benefit economic and regional development, including

tourism. The proposed road development will have a positive cumulative socio-economic impact with the proposed roads projects listed above and with the proposed the Galway Harbour Project.

The proposed road development could also stimulate new physical commercial or tourism development. These developments would be subject to planning assessment given the objectives set out in the Galway City and Galway County Development Plans to consolidate development and to provide for balanced sustainable development. They will also be subject to Appropriate Assessment to avoid any adverse impacts on sensitive landscapes and natural habitats. These considerations apply also to the largely rural area surrounding the city, noting that the proposed road development will be used for a proportion of commuting journeys as well as for regional journeys. The transfer of some of these journeys to the proposed road development away from the existing N6 is a significant positive impact, but any cumulative impacts on settlement patterns will be monitored and addressed in future development and local area plans.

The proposed road development will provide an opportunity to fully implement the GTS and to provide for improved public transport and facilities for pedestrians and cyclists. For example, the reduced volume of traffic on the existing N6 will present an opportunity to greatly improve the continuity of cycle lanes, including at junctions, and to add more pedestrian crossings, while minimising impacts on traffic flow. Once implemented, this will have a very significant impact on safety and the journey amenity of pedestrians and cyclists, and on general environmental quality if this contributes to a modal transfer from vehicles. In summary the cumulative impacts of the projects and plans listed above in association with the proposed road development are positive.

18.7.4.2 Irish Language

Having considered the proposed road development in tandem with other relevant plans or projects identified above, it is considered that no significant negative cumulative impact upon the status of Irish as a community language will occur.

18.7.4.3 Human Health

It is not considered that there will be any negative cumulative effects on human health. The distances between the projects noted above and the proposed road development results in no cumulative noise or air quality impacts. There is potential that reduced journey times and fewer unforeseen delays could have a potential benefit on psychological health. Any projects which make roads safer and reduce the probability of road accidents and fatalities can only be seen in positive terms from a human health perspective. The cumulative health benefits of the proposed road development with the GTS are further assessed below.

Quantification of cumulative health benefits with the GTS

The cumulative health benefits of the proposed road development with the GTS were assessed by using the Western Regional Model to quantitatively measure some

of the health, accessibility and social inclusion[30] impacts once the proposed road development and the GTS were fully implemented.

[30] It should be noted that this analysis represents an assessment of those elements of Health, Accessibility and Social inclusion which can be measures using model outputs from the WRM. As such, these outputs are not representative of all the benefits/disbenefits which result from the implementation of the GTS under these categories.

Physical Activity Analysis

The assessment indicates that the total number of people cycling, over a 24-hour period in Galway City, will increase by approximately 21% cyclists as a result of the implementation of the GTS and associated cycling infrastructure improvements. This increase in cyclists will result in a reduced risk of premature deaths for those who are new to cycling and currently exercise infrequently. By comparison, results from the assessment indicate that pedestrian trips (trips which use walking only to get from origin to destination) in Galway City are expected to decrease marginally (less than 1% reduction) across the full 24-hour period. The reduction in pedestrian activity in Galway City is mostly as a result of people transferring to cycling or using the improved public transport services implemented as part of the Galway Transport Strategy.

Accessibility Analysis

The changes in accessibility for key locations were determined on a zone by zone basis. This was undertaken using a visual representation of the changes in journey times between the 'Do-Nothing' and 'Do-Something' Scenarios for cycling, public transport and private car. **Plates 18.4** to **18.6** below represent the changes in journey time (on average) required to access NUIG, GMIT, Galway University Hospital, Galway Clinic, Bons Secours and the industrial estates at Ballybrit and Parkmore when the GTS has been implemented for car, cycling and public transport. **Plate 18.4** illustrates that, in general, most zones experience a decrease in car journey times. There are however, a small number of zones, mostly in the city centre, which are expected to experience an increase in car journey times to access key sites. This is as a result of the public transport priority measures, such as private vehicle restrictions on Salmon Weir Bridge, which make accessing these areas by car more difficult.

Plate 18.4: Changes in Car Accessibility

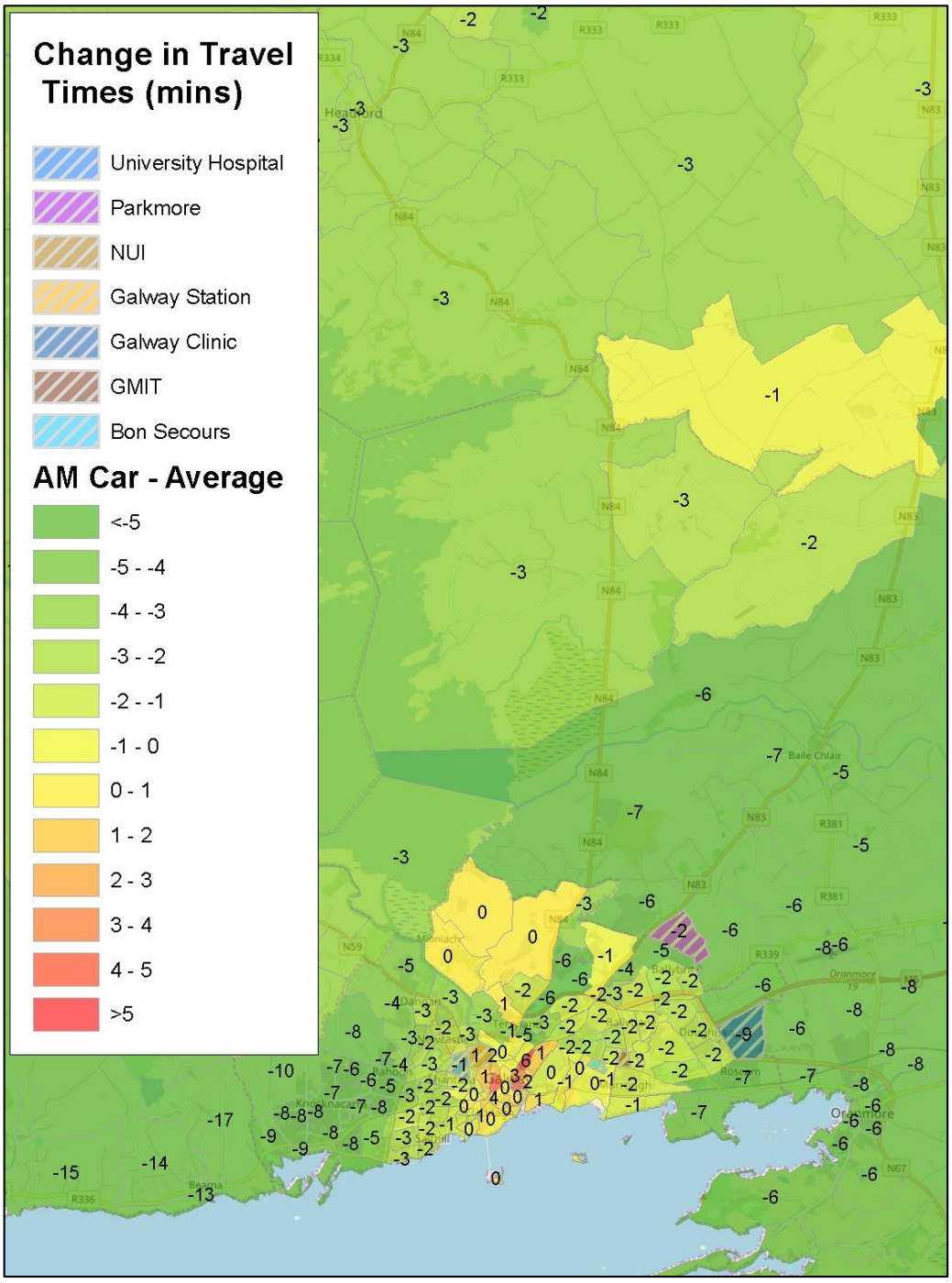


Plate 18.5 illustrates that all zones will experience improved cycling journey times.

Plate 18.5: Changes in Cycling Accessibility

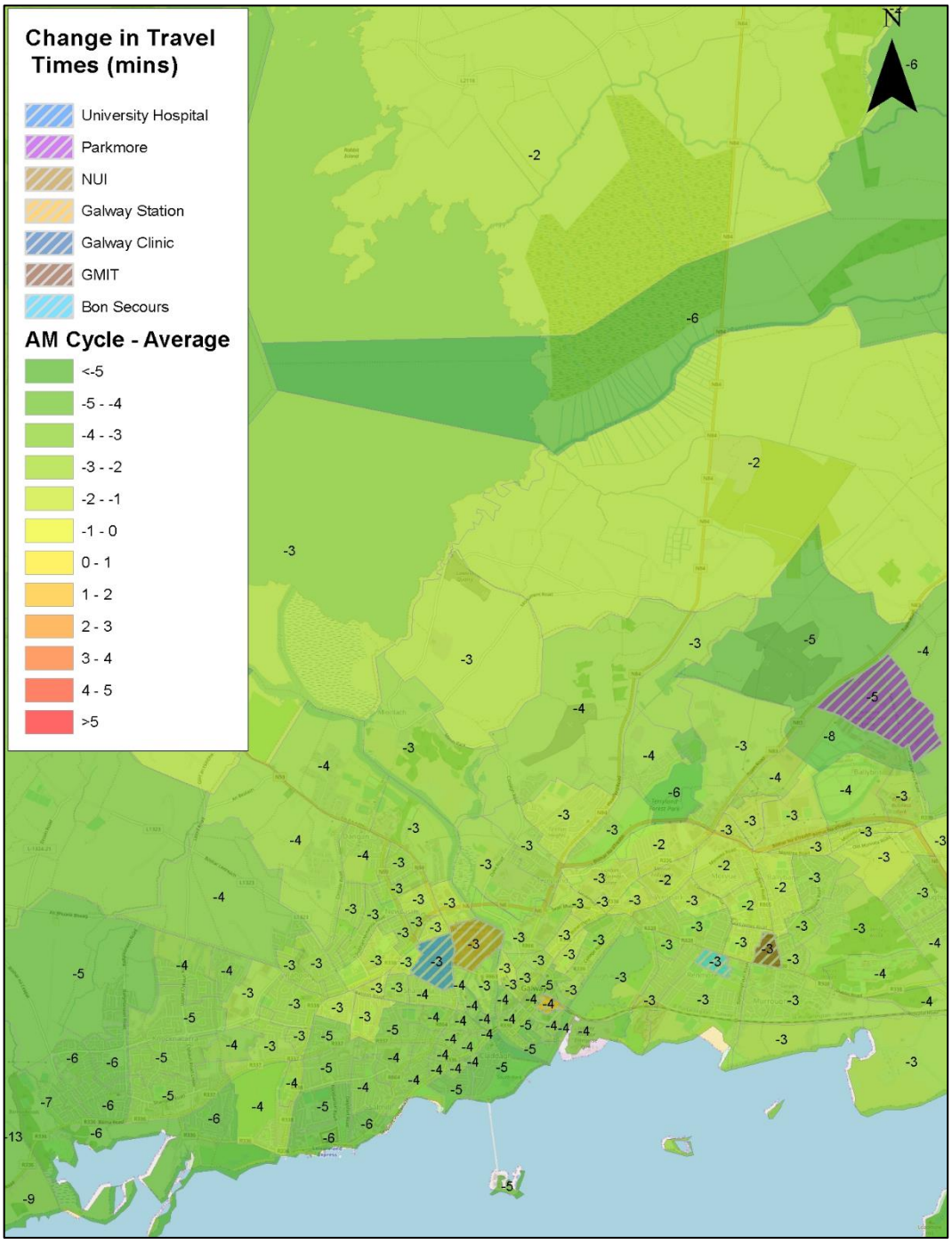
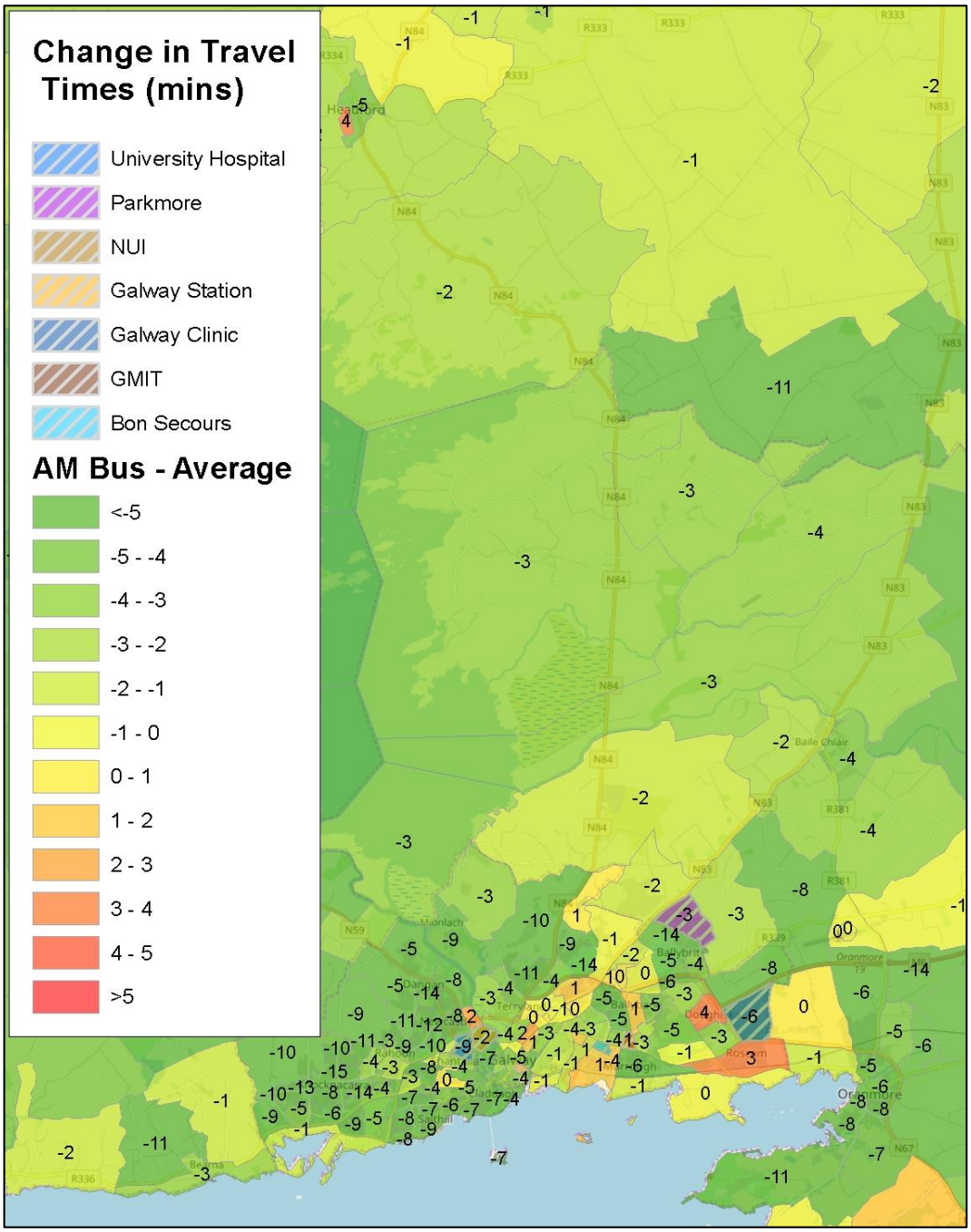


Plate 18.6 illustrates that, in general, most zones experience a decrease in public transport journey times. There are however, a small number of zones which are expected to experience an increase in public transport journey times as they will not be served as directly by public transport once the changes in bus routes proposed as part of the GTS are implemented.

Plate 18.6: Changes in Public Transport Accessibility



Social Inclusion Analysis

Outputs from the traffic model have also been used to assess the impacts of the Galway Transport Strategy in terms of Social Inclusion. For this assessment, the outputs from the economic module (produced using the software Tuba) were used to visually identify which locations would benefit or suffer disbenefits as a result of the GTS. The benefits in this instance are measures in terms of journey time saving. These benefits/disbenefits were then compared against the deprivation index for the same locations to illustrate graphically how the benefits of the proposed road development are distributed among affluent and less affluent areas. **Plates 18.7** and **18.8** below illustrate the car trips and public transport trips benefits

experienced by each model zone following the implementation of the GTS measures and compare these to the deprivation index for that zone.

Plate 18.7: Social Inclusion - Car

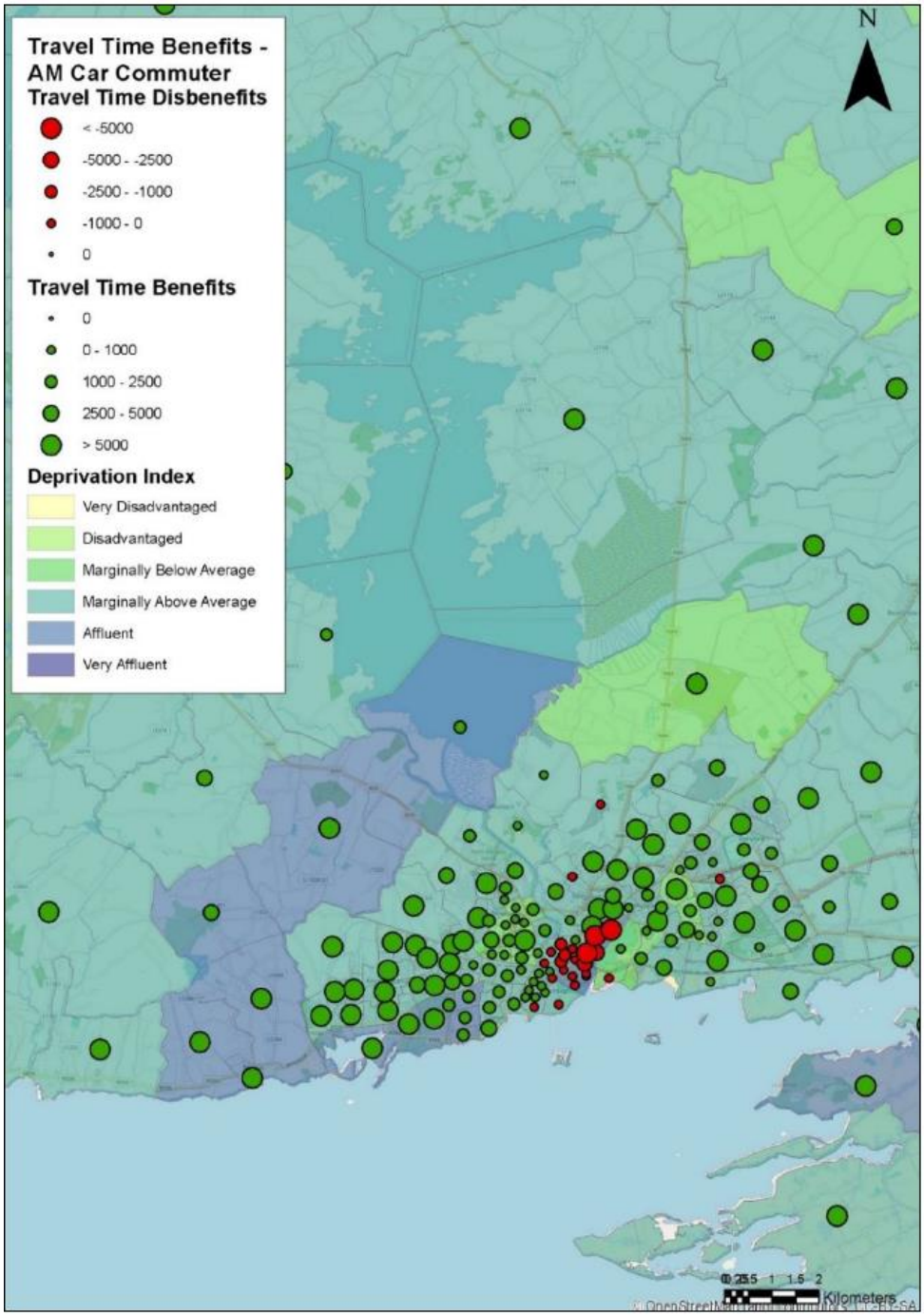
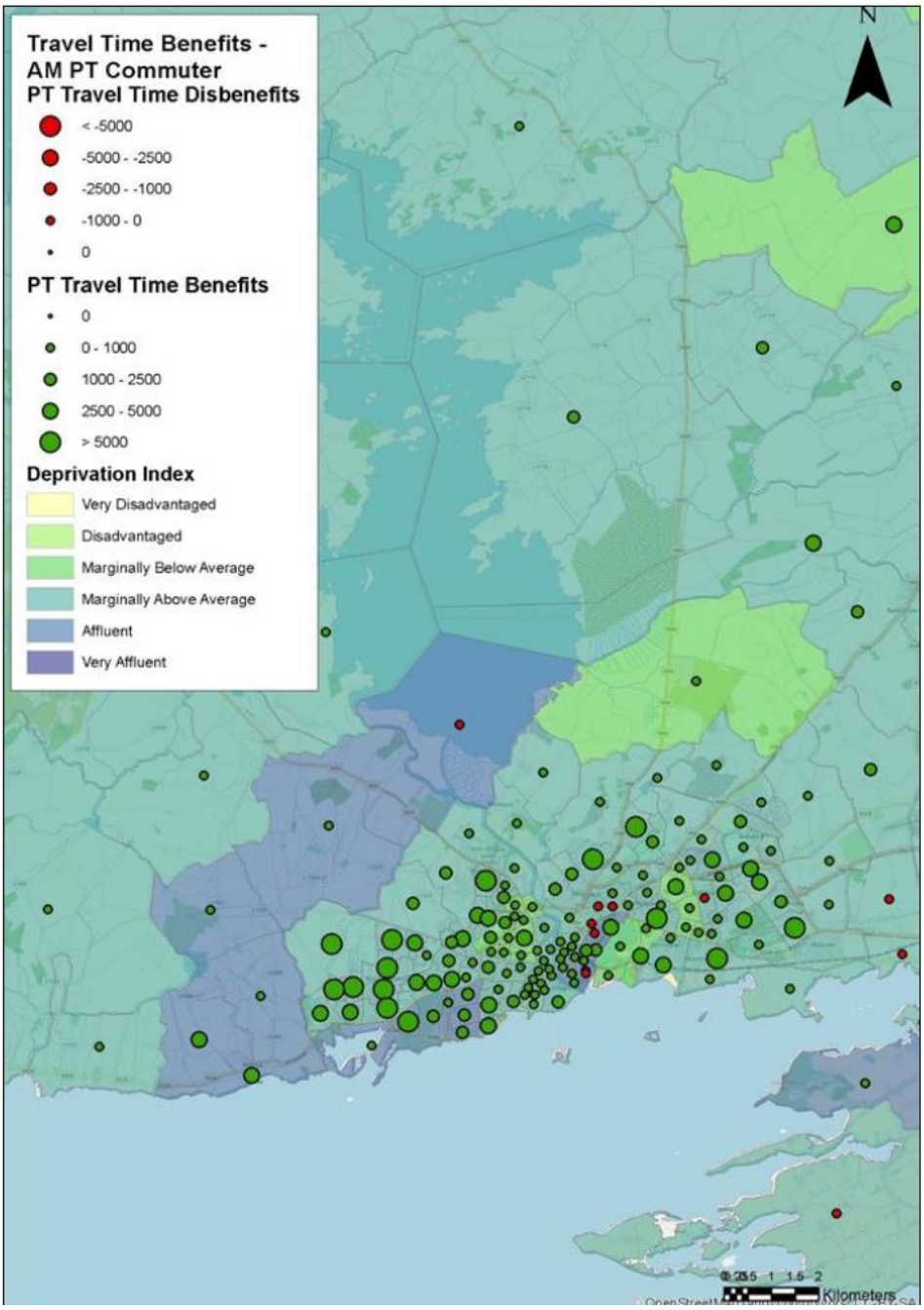


Plate 18.8: Social Inclusion – Public Transport



These maps show that most zones will experience an improvement in journey times for all trips from those zones. Some city centre zones however, will experience increase in journey times by car following the implementation of the GTS measures. This is a result of public transport priority measures and public realm enhancements in the city centre which will increase travel time for some car trips into and around the city centre. With respect to **Plate 18.8**, a small number of zones are seen to experience marginal disbenefits as a result of bus route changes which give these zones less direct access to the public transport network. Comparison of these benefits with the deprivation index show that, in general, the benefits of the proposed road development are distributed evenly between disadvantaged and more affluent areas.

18.8 Summary

18.8.1 Socio-Economics

A socio-economic assessment of the proposed road development was carried out and focused on aspects such as journey patterns, amenity and community severance, business, tourism, employment, ecosystem services and use of the Irish language. Data for the assessment was collected primarily through a review of relevant documents and information gathered through the extensive public consultation. This data was supported by site and home visits and local discussions with residents, businesses, schools and representatives of other community facilities. Furthermore, a Language Impact Assessment (LIA) for the proposed road development was undertaken.

A summary of socio-economic impacts, mitigation measures and residual impacts is provided in **Tables 18.14** and **18.15** below. Overall, the proposed road development will provide a much needed bypass of Galway City for regional traffic heading to destinations to and from the west of Galway, such as Connemara, to the rest of Ireland. As such, it will provide a very significant reduction in journey times. It will improve the accessibility of Galway City to its main markets by facilitating the crossing of the River Corrib without the need to go through the central suburbs of the city and connect to the national road network. This will increase the connectivity of key strategic services within Galway, such as NUIG and Galway University Hospital, to the national road network. It will also improve the accessibility of Gaeltacht areas to the remainder of the county and country, thereby facilitating reductions in the economic and social disadvantages of the Gaeltacht areas. It will also reduce the journey times of traffic heading to various parts of the city from destinations in its rural hinterland, including areas such as that north of Bearna. This will open up new opportunities for residents to access more distant parts of Galway City, for instance for employment.

The transfer of this traffic from more central locations will improve journey amenity for all users of the existing road infrastructure. In particular, it will open up road space for the provision of improved and more continuous pedestrian and cycle facilities and provide opportunities for new public transport in line with the objectives of the GTS. The transfer of traffic will contribute to improve amenity and general well-being of communities living within or beside busy urban roads. Community severance will be reduced through a moderation or reversal of the trend towards increased road traffic and through the opportunity to provide new crossing facilities.

The proposed road development has been designed to avoid as many residential properties as possible, but given the distribution of development and the presence of linear development of the city with housing along most roads radiating out of the city, its construction will unfortunately and unavoidably result in a number of property demolitions or acquisitions with some concentrations in particular areas. At some locations, a high proportion of properties will be acquired as part of the proposed road development. As well as the direct negative impact on the householders themselves, this will present a varying negative impact on remaining residents and at a community level depending on the strength of community

interaction that has evolved at each location and the sustainability of community facilities such as schools. There will, also be some loss of amenity for a small number of residents living in the vicinity of the proposed road development, particularly in the east of the study area and where major junctions are located. In several locations, and particularly in Na Foraí Maola and the vicinity of the N59 Moycullen Road, the N84 Headford Road and in Castlegar, there will be a significant impact on local communities due to the need to acquire or demolish a high proportion of existing properties during construction in these areas. The proposed road development will have an impact on approximately 6.750ha of lands zoned residential by Galway City and County Council.

The eastern section of the proposed road development impacts several businesses. It will cross Lackagh Quarry which is currently inactive. Whilst the quarry is currently inactive, parts of the upper benches will be sterilised as a result of the proposed road development. At the N84 Headford Road, a very significant impact is anticipated during the construction phase on a company located here which bottles water and distributes fruit and vegetables. The impact arises from the effect of landtake on one warehouse and an impact on the company's raw material supply. At the N83 Tuam Road there will be impacts on commercial properties, with the acquisition of a builders' providers store and landtake from other businesses. A car dealership and An Post sorting centre could be affected by the need for traffic management during construction, but will have safe access in the operational phase of the road. There will also be an acquisition of a builders' providers store at Ballybrit and some landtake from a car dealership at Briarhill. All of these impacts will be addressed as part of the land acquisition process and through financial compensation, but again these businesses represent the livelihoods of many individuals and so impacts will be moderate to significant. The proposed road development will have an impact on approximately 8.100ha of lands zoned commercial or industrial by Galway City Council.

The proposed road development will have a very significant negative residual impact on the NUIG Sporting Campus at Dangan, although this can be reduced to moderate with appropriate master planning as described in **Section 18.7.1.2**. Two pitches, one of which has planning permission for conversion to a 3G pitch with flood lighting, and part of a sports pavilion will be lost. A new 3G pitch and training pitch with flood lighting will be provided as a replacement. The sports facility will be permanently impacted by the presence of an overhead viaduct carrying the road towards the crossing of the River Corrib. There will be no physical severance, but the crossing will impact on the amenity of users of the sports facility and amenity use of the riverside.

The proposed location of the Galway Racecourse Tunnel means that there will be no direct amenity impacts on the racecourse business or racing events during operation. New permanent access will be available to the N83 Tuam Road via the Parkmore Link Road and much improved access will be possible from the existing N6 such that the net impacts will be positive.

Furthermore, the proposed road development will have a significant positive impact on the Galway economy by reducing traffic congestion which currently constrains economic growth and competitiveness. The improved connection provided with destinations to the west of Galway City will have a positive impact on the potential

for economic development and continued growth in tourism numbers. The transfer of a proportion of traffic from existing urban roads could also help to draw more visitors into the city with consequent benefits for tourism-related businesses and the economy. Similarly, the improved connectivity with Connemara and locations to the west will help to attract tourism investment and related economic development.

Ecosystem services provide many varied benefits that humans freely gain from the natural environment. A properly functioning ecosystem has the capacity to regulate and support the natural environment that contributes to human well-being. The potential impacts on ecosystem services were considered through the assessment of the environmental factors (pathways) through which ecosystem services could be affected such as water, soils, air, noise and general amenity and relied on the biodiversity assessment in terms of potential impacts to biodiversity and indirectly to ecosystem services. There are no impacts identified in those assessments which would result in a significant residual impact on ecosystem services during the construction of the proposed road development.

18.8.2 Irish Language

In relation to the Irish language, there is a low-level of daily Irish usage among the population of the area directly affected by the proposed road development, and where it exists, the use of Irish is particularly concentrated in an education context. While population is increasing, the use of Irish as a community language is not growing in parallel. The proposed road development will not have any significant impact on the use of Irish into the future. However, it is noted that an improved road network may facilitate further migration and economic growth into the wider Galway Gaeltacht and as the west of County Galway have higher levels of unemployment and deprivation than the areas around Galway City, the proposed road development, by improving access to employment opportunities to the east of the city, will facilitate Irish speakers to commute more easily from their own communities and lessen the need to re-locate for economic reasons. Equally, as noted above, the proposed road development will make Gaeltacht areas to the west of Galway City more attractive for residential and commercial development. In this context, it will be the responsibility of Galway County Council, Galway City Council and Údarás na Gaeltachta among others to ensure that the use of the Irish language is promoted and encouraged among new residents.

18.8.3 Human Health

The potential health impacts due to the proposed road development were also assessed. The health assessment in the context of EIA focuses the attention of the assessment on likely significant effects, i.e. on effects that are deemed likely to occur and, if they were to occur, would be expected to be significant (as per the requirements of the EIA Directive).

The health assessment focused on three main areas: *health protection, health improvement and improving services*. A review of current and emerging guidance on assessing health in EIA was undertaken in addition to a literature review on the impacts of health from road developments.

18.8.3.1 Health Protection

The data collected in relation to the protection of human health focused on the results of technical assessments (such as noise, air, soil and water) dealt with elsewhere in **Chapter 9, Soils and Geology**, **Chapter 10, Hydrogeology**, **Chapter 11, Hydrology**, **Chapter 16, Air Quality and Climate** and **Chapter 17, for Noise and Vibration** and their mitigation to establish any potential hazard directly attributed to what is proposed.

These technical assessments provided elsewhere in the EIA Report use standards[31] (such as air quality standards) in order to identify whether significant impacts will arise or not. It is important to point out that health standards do not only exist to protect robust groups within the population, but are primarily intended to protect the vulnerable. The standards are set at levels for which there will be no significant health effects, but do not exclude each and every effect, i.e. slight or moderate health effects are possible even below the levels at which health based standards would apply.

Construction noise is expected to have some negative effects; however it will be short term and limited by work practices and restricted working hours. The results of the noise modelling carried out for the operational phase shows that there may be potential noise impacts on residential properties adjacent to the proposed road development, but that the implementation of low noise road surfacing and noise barriers will mitigate these potential impacts. The noise assessment also shows that there will be a benefit for a significant number of people within the city due to a proportion of current traffic being transferred from their current routes. On the basis of WHO night-time noise guidelines, there will be beneficial effects for the community living along existing roads where traffic will be reduced. Those few residences that may exceed the 55dB level do so by only small margins and are not considered to be enough to have significant health impacts.

Air quality has been considered in both the construction and operational phases. Given the proposed mitigation measures with regards to control of dust and other air emissions during the construction phase and the relative limited period of time duration, air quality impacts are not expected to have an adverse effect on human health during the construction phase. Detailed modelling based on worst case traffic scenarios identify that Air Quality Standards will not be breached thereby protecting the vulnerable such as asthmatics, the elderly, the very young or the sick in general.

Adverse effects on soils, water quality or quantity are not predicted either during the construction or the operational phases.

Whilst some annoyance during the construction phase is to be expected, this will be of limited duration and is not usually considered to be a health effect. There are potential psychological benefits in terms of reduced journey times, unforeseen delays etc. as well as movement of traffic away from currently congested and more populated areas. The transfer of a proportion of traffic to inherently safer roads, together with the prospect of reduced traffic accidents and fatalities is also an

[31] The term standards in this instance covers guidelines for example noise guidelines as such standard are not currently available.

important potential benefit. This does not take away from the adverse effects on individuals whose homes are to be compulsorily acquired. As noted above, the proposed road development has been designed to avoid as many properties as possible, but there remains a significant number of property acquisitions and, although subject to financial compensation[32], it is important to recognise that these individuals may experience stress and anxiety as a result of this process.

18.8.3.2 Health Improvement and Improvement of Access to Services

The data used to assess opportunities for health improvements and access to services included information gathering during the extensive public consultations including a meeting with University Hospital Galway and data extracted from the traffic model to identify accessibility to services.

There is potential for socio-economic gain including economic growth and development of tourism as a result of the proposed road development and it is well recognised that improved socio-economic status will have a positive impact on health outcomes. There is potential for increased employment and reduced unemployment particularly long-term unemployment. If this is achieved, there will also be benefits in terms of social health including decreased social inequality.

Other opportunities for health improvements associated with the proposed road development include a potential decrease in road traffic accidents, the potential for creating opportunities for improved public transport and an improved environment for cycling and walking within the city centre roads previously occupied by heavy traffic.

The cycling measures of the GTS, which can be fully implemented once the proposed road development is operational, will lead to a considerable increase in cyclists within Galway City. This increase in cycling will lead to an overall increase in the health benefits for those who currently do not cycle. The substantial improvements in cycling and public transport infrastructure due to the GTS will result in a marginal decrease in pedestrian activity (less than 1%) as some existing pedestrians are expected to switch from walking to public transport and cycling.

A quantification of some of the accessibility and social inclusion benefits of the proposed road development and all the GTS measures demonstrate that there will be improvements in accessibility and social inclusion for almost all parts of Galway City. In general, the measures will lead to reduced journey times by all modes and will improve accessibility to key locations within the city and more importantly none of the more disadvantaged areas experience any disbenefits.

There is potential for more efficient access to emergency services including ambulances as a result of the proposed road development. There is also the potential for increased opportunities to exercise with the associated health benefits.

[32] Compensatory measures for the loss of land, buildings and other injurious affection will form part of the land acquisition process and will be agreed at a later date with a valuer. Compensation does not form part of the EIA process and is therefore not considered further.

There are significant opportunities for improved access to services. This will include those living within Galway City and its environs and those in the west of Galway. For those within Galway City and its environs, reduced traffic along city streets will facilitate access to services including health centres. For those living outside of Galway City there is the potential for improved access to the national road network and thereby access to other services including national hospitals. For those who require to cross the city centre to access services the proposed road development offers particular benefits. While this would be of benefit to all, it will be of particular benefit those living to the west of the River Corrib.

Overall, therefore the impacts of the proposed road development on human health are primarily positive. From a community perspective, there are clear benefits in terms of health protection, opportunities for health improvements and access to services. There are however a limited number of individuals, primarily those living close to the proposed road development for whom there may be slight adverse outcomes in terms of noise and air quality. These will be minimised through the use of mitigation measures.

18.8.3.3 Summary

In summary from a human health perspective, the proposed road development will have no significant adverse effects on human health and the proposed road development and the full implementation of the GTS will have positive impacts on human health.

Table 18.14: Summary of Construction Impacts - Socio-economic

Nature of Impact	Location / Sub-Group	Current situation	Construction Impact	Significance	Duration	Extent	Proposed Mitigation	Residual Impact
Journey characteristics	Major roads: N59 Moycullen Road, N84 Headford Road, N83 Tuam Road, R339 Monivea Road	n/a	Temporary night time closures and diversions of these roads which carry significant traffic including at night	Slight to Moderate negative	Short term	Medium	Traffic management to minimise delays	Slight negative
Journey characteristics	Where minor roads meet construction works	n/a	Slight diversions or Stop / go arrangements	Imperceptible to slight negative	Short term	Medium	Traffic management to minimise delays	Imperceptible
Journey characteristics	Rahoon Road & Letteragh Road	n/a	Temporary night time closures	Slight negative	Short term	Few	Avoid extended night time closures	Imperceptible to Slight negative
General amenity	Rosán Glas estate	n/a	Construction of link road beside estate and new access connection	Slight to moderate negative	Short term	Medium	Minimise access disruption to estate. Temporary visual screening	Slight negative
General amenity	Gort na Bró estate	n/a	Realignment of Gort na Bró Road which provides access to estate	Slight negative	Short term	Medium	Minimise access disruption to estate and gaelscoil.	Imperceptible to Slight negative
General amenity	Bushypark Church	Local community facilities	Construction traffic movements impacting on use of church and adjacent cemetery	Slight negative	Short term	Medium	Traffic management and temporary visual screening from construction works	Imperceptible to slight negative
General amenity	NUIG Sporting Campus	Sports and amenity use	Noise and visual impacts, loss of use of playing pitches and modification of the sports pavilion, as the central part of the	Very significant negative	Medium term	Many	Construction traffic and works for the River Corrib Bridge will be managed to minimise	Significant negative

Nature of Impact	Location / Sub-Group	Current situation	Construction Impact	Significance	Duration	Extent	Proposed Mitigation	Residual Impact
			sporting campus will become a construction site				interference with sporting activities and spectators. Provision of a floodlit 3G GAA pitch, a floodlit 3G training area and associated site infrastructure such as drainage of these pitches and ball-stop netting and modification of the sports pavilion	
General amenity	River Corrib crossing	Amenity use	Noise and visual impacts	Mix of positive and significant negative for different receptors	Medium term	Medium	Minimise duration of any restrictions on access below the bridge works and advice of alternative routes	Moderate negative – positive on balance.
General amenity	An Seanbóthar	Amenity use	Construction vehicle movement	Moderate negative	Short term	Few	Avoid severance and minimise duration of use by construction traffic	Slight to Moderate negative
General amenity	Cappanabornia (beside N83 Tuam Road)	Residential area of 6 houses with direct access to the N83 Tuam Road	Construction of new access road to dwelling and removal of direct access to the N83 Tuam Road. Visual impacts due to the construction of the proposed N83 Tuam Road Junction	Significant negative	Medium term	Few	Minimise disruption to access. Visual and noise barriers. Refer also to **Chapter 12, Landscape and Visual** and	Moderate negative (access)

Nature of Impact	Location / Sub-Group	Current situation	Construction Impact	Significance	Duration	Extent	Proposed Mitigation	Residual Impact
							Chapter 17, Noise and Vibration	
General amenity – property demolition and acquisition (private level)	Route of proposed road development	Rural area with a high number of one-off dwellings and semi-urban areas	Demolitions of 44 and acquisition of 10 dwellings	Significant to Profound negative (owners & occupants)	Permanent	Many	In the event of an approval of the Protected Road Scheme and Motorway Scheme and approval under Section 51 of the Roads Act 1993 (as amended), by An Bord Pleanála and subject to the availability of funding, Notice to Treat will be served firstly on owners, lessees and occupiers of the dwelling houses and commercial properties to be acquired, within six months of the scheme becoming operative, unless an application has been made for Judicial Review, in which case the	Subject to financial compensation as part of the compulsory purchase process

Nature of Impact	Location / Sub-Group	Current situation	Construction Impact	Significance	Duration	Extent	Proposed Mitigation	Residual Impact
							Notice to Treat33 will be served in accordance with the provisions of Section 217 (6A) of the Planning and Development Act 2000 as inserted by the Compulsory Purchase Orders (Extension of Time Limits) Act 2010. Compensation will be agreed or determined by the property arbitrator as soon as possible after service of Notice to Treat. After compensation has been agreed or determined and satisfactory title has been produced, part payment can be made while the claimant remains for an agreed period in the property to be acquired. This will	

[33] This notice requests landowners to submit their claim for compensation for lands being taken under the Protected Road Scheme or Motorway Scheme. This is the initial step in the acquisition of property and lands.

Nature of Impact	Location / Sub-Group	Current situation	Construction Impact	Significance	Duration	Extent	Proposed Mitigation	Residual Impact
							facilitate the claimant in removing uncertainty and will facilitate arrangements being made, as early as possible, to secure a replacement property. Refer Chapter 15, (community level) Material Assets	
General Amenity - demolitions (community level)	Na Foraí Maola / Troscaigh	Semi-dispersed community	Acquisition or demolition of 7 properties (+1 site with planning for a dwelling) with impact on local community	Significant negative (wider community)	Long term	Medium	Public Communications Strategy as set out in the CEMP which will include procedures to inform members of the community who will be directly affected by the construction phase on schedules for any activity of a particularly disruptive nature which is likely to impinge on their property.	Significant to Moderate negative

Nature of Impact	Location / Sub-Group	Current situation	Construction Impact	Significance	Duration	Extent	Proposed Mitigation	Residual Impact
General Amenity - demolitions (community level)	Ard an Locha	Small residential estate	Acquisition or demolition of 3 properties (+2 site with planning for a dwelling) with impact on wider community	Very significant negative (wider community)	Long term	Few	Consult and liaise with residents in local community	Significant negative
General amenity – demolitions (community level)	Aughnacurra, Bushypark	Small residential estate	Acquisition or demolition of 6 properties representing a high proportion of the wider community	Very significant negative (wider community)	Long term	Medium	Consult and liaise with residents in local community	Significant negative
General amenity – demolitions (community level)	N84 Headford Road,	Linear residential development, mainly on one side of road	Demolition of 14 properties representing a high proportion of the wider community	Very significant negative (wider community)	Long term	Medium	Consult and liaise with residents in local community	Significant to negative
General amenity – demolitions (community level)	Castlegar	Residential area including school and other community facilities	Acquisition or demolition of 7 properties representing a high proportion of the wider community	Very significant negative (wider community)	Long term	Medium	Consult and liaise with residents in local community	Significant negative
Severance	Locations north and south of the proposed road development in west of study area, School Road, N59 Moycullen Road, N84 Headford Road & N83 Tuam Road	No north-south severance, but high traffic volumes on some roads	Physical and social severance during construction phase	Moderate to slight negative	Short term	Few-medium	Allow for vehicle, pedestrian / cycle crossing	Slight negative
Severance	N84 Headford Road	High volume of existing traffic	Road to be used by construction traffic	Slight negative	Short term	High	Minimise vehicle movements during peak traffic hours	Imperceptible to Slight negative

Nature of Impact	Location / Sub-Group	Current situation	Construction Impact	Significance	Duration	Extent	Proposed Mitigation	Residual Impact
Severance	NUIG Sporting Campus	n/a	Construction of proposed bridge over River Corrib	Significant negative	Short term	Medium	Maintain continuous, if restricted access	Slight negative (physical severance)
General economic	NUIG Sporting Campus	Rental of sports pitches and facilities and some related use of accommodation.	Some loss of this income due to unavailability of pitches.	Slight negative	Short term	Medium	-	Slight negative
Economic	Business on the N84 Headford Road	Business which bottles water and distributes fruit and vegetables	Landtake on one warehouse and an impact on the company's raw material supply and potential business impact	Very significant negative	Long term	1 business	Subject to financial compensation as part of the compulsory purchase process	Subject to financial compensation as part of the compulsory purchase process
Economic	Business on the N83 Tuam Road	Hardware / builders providers	Full acquisition of business	Very significant negative	Permanent	1 business	Subject to financial compensation as part of the compulsory purchase process	Subject to financial compensation as part of the compulsory purchase process
Economic	Business on the N83 Tuam Road	Car dealership	Dust and noise impacts during construction. Partial landtake and possible effect on visibility of business during construction	Moderate negative	Short term	1 business	Noise and dust control measure during construction. Signage to direct accessibility	Slight-moderate negative
Economic	Business on the N83 Tuam Road	Postal business	Partial landtake. Traffic management and access	Slight to moderate negative	Short term	1 business	Signage to direct accessibility	Slight negative

Nature of Impact	Location / Sub-Group	Current situation	Construction Impact	Significance	Duration	Extent	Proposed Mitigation	Residual Impact
Economic	Businesses in Parkmore Business Park	Business park	Potential impact from noise, dust or vibration during tunnel works	Slight to Significant negative	Short term	Medium (approx. 6 businesses)	Noise and dust control measure during construction. Tunnel works will be undertaken in compliance with the CEMP in **Appendix A.7.5**	Imperceptible to slight negative
Economic	Galway Racecourse	Galway Racing Festival and tourism venue	Partial landtake, construction of a cut-and-cover tunnel, removal of stables, temporary loss of some car parking and some other facilities	Significant negative	Short term	Principally one business	Works phased to minimise racing events. Replacement of stables and well	Slight negative during construction.
General amenity (trainers & spectators)	Galway Racecourse	Major community and tourism facility	Cut-and-cover tunnel construction. Temporary loss of car parking	Potentially significant negative	Medium term	Many	Construction works phased to minimise impacts on racing events	Slight negative during construction
Economic	Car dealership Briarhill Business Park	Business visible from existing N6 and Ballybrit Crescent	Dust and noise impacts during construction. Partial landtake requiring a reconfiguration of services on the residual lands and possible effect on visibility of business during construction	Very significant negative	Some short term, mostly long term	1 business	Noise and dust control measure during construction. Signage to direct accessibility	Significant negative
Economic	Tourism	Attraction of city as a tourist destination significantly affected by traffic congestion	Construction work located away from city centre and existing through routes. Possible impact on traffic movements on N59	Slight negative	Short term	Many businesses dependent on tourism	Minimise road closures or diversions	Imperceptible (during construction)

Nature of Impact	Location / Sub-Group	Current situation	Construction Impact	Significance	Duration	Extent	Proposed Mitigation	Residual Impact
			Moycullen Road, N84 Headford Road & N83 Tuam Road					

Table 18.15: Summary of Operational Impacts - Socio-economic

JOURNEY CHARACTERISTICS								
Nature of Impact	**Location / Sub-Group**	**Current situation**	**Operational Impact**	**Significance**	**Duration**	**Extent**	**Proposed Mitigation**	**Residual Impact**
Journey time and connectivity	Regional	Long and congested connection between M6 east of Galway and N83 Tuam Road, N59 Moycullen Road and R336 west	Much reduced travel time and avoidance of regular congestion	Profound positive	Long term	Very many	-	Profound positive
Journey time	Mainly local Galway City	Prolonged journey time on existing N6 through Galway City and regular congestion.	Reduced incidence or scale of congestion due to transference of much traffic	Very significant positive	Long term	Very many	-	Very significant positive
Journey time	Bearna and western Galway suburbs	Regular delays in Bearna Village particularly during morning and peak hours including the holiday season	Transference of high proportion of traffic from Bearna Village and reduced incidence of congestion	Significant positive	Long term	Many	-	Significant positive
Connectivity	Small communities and residential development north of Bearna Village	Access to the city and east only via minor roads with light traffic	Direct access to proposed road development via Bearna East Roundabout	Significant positive	Long term	Medium	-	Significant positive
Connectivity	Between proposed road development and Boleybeg / Western Distributor Road	Access to the city and east via minor roads with light traffic or Western Distributor Road	More direct access to the proposed road development via Cappagh Road Junction	Moderate positive	Long term	Many	-	Moderate positive
Connectivity	Ballymoneen and Western suburbs	Dependence on Western Distributor Road for access	Direct access to the proposed road development via Ballymoneen Junction	Moderate positive	Long term	Many	-	Moderate positive

JOURNEY CHARACTERISTICS								
Nature of Impact	**Location / Sub-Group**	**Current situation**	**Operational Impact**	**Significance**	**Duration**	**Extent**	**Proposed Mitigation**	**Residual Impact**
Connectivity	N59 Moycullen Road	Poor access between N59 Moycullen Road north of Galway and Rahoon or the busy existing N6 to the south	Alternative access via links road north and south of N59 Letteragh Junction to the proposed road development. Relief from congestion at Browne Junction.	Very significant positive	Long term	Very many	-	Very significant positive
Connectivity	N84 Headford Road	Access between N84 Headford Road and Kirwan Roundabout	Alternative access from the N84 to the proposed road development	Significant positive	Long term	Many	-	Significant positive
Connectivity	N83 Tuam Road	Access between N83 Tuam Road and Connemara or local business parks	Access to proposed road development from the N83 Tuam Road Junction	Very significant positive	Long term	Very many	-	Very significant positive
Connectivity	Parkmore Link Road	Limited access between the Parkmore Business Park, the N83 Tuam Road and the existing N6	Access to Parkmore, City East and Ballybrit Industrial Estates	Profound positive	Long term	Very many		Profound positive
Journey time	Ballybrit Crescent and Lynch Junctions	Frequent congestion and delay at these junctions and with existing N6 traffic	Transference of traffic to proposed road development and Parkmore Link Road providing for reduced traffic delays and congestion	Very significant positive	Long term	Very many	-	Very significant positive

AMENITY – Journey amenity								
Nature of Impact	**Location / Sub-Group**	**Current situation**	**Operational Impact**	**Significance**	**Duration**	**Scale**	**Proposed Mitigation**	**Residual Impact**
Journey amenity	R336 between centre of Bearna Village and Bearna West Roundabout	Existing R336 can be busy, especially at weekend and during holiday season	Increase in traffic on this section, but mainly during week days	Slight negative	Long term	Medium	None proposed	Slight negative
Journey amenity (traffic-related)	Browne Roundabout & Seamus Quirke Road	Regular congestion at these locations particularly during peak hours and weekends	Transfer of a proportion of traffic to the proposed road development and reduced risk of congestion	Moderate positive	Long term	Very many	Implementation of GTS measures to improve journey amenity for pedestrian and cyclists	Significant positive
Journey amenity (traffic-related)	Kirwan Roundabout	Regular congestion at this location and at the Bodkin Roundabout	Transfer of a proportion of traffic to the proposed development and reduced risk of congestion	Slight-Moderate positive	Medium – long term	Very many	Opportunity to improve journey amenity for pedestrian and cyclists	Significant positive
Journey amenity (traffic-related)	N83 Tuam Road / existing N6 junction	Regular congestion at this location	Transfer of a proportion of traffic to the proposed road development, but also facilitating traffic on the proposed road development to the city centre via the N83 Tuam Road	Slight negative to Slight positive	Medium – long term	Very many	None proposed	Slight negative to Slight positive
Journey amenity (traffic-related)	Lynch Junction and Doughiska Junction	Regular congestion at these locations	Transfer of a proportion of traffic to the proposed development and reduced risk of congestion	Moderate-significant positive	Medium – long term	Very many	Opportunity to improve journey amenity for pedestrian and cyclists	Moderate positive

AMENITY – Journey amenity								
Nature of Impact	**Location / Sub-Group**	**Current situation**	**Operational Impact**	**Significance**	**Duration**	**Scale**	**Proposed Mitigation**	**Residual Impact**
Journey amenity (views)	River Corrib Bridge	N/a	Elevated view for drivers north and south of the River Corrib Corridor including of Menlo Castle	Moderate positive	Long term	Very many	-	Moderate positive-

AMENITY – General amenity								
Nature of Impact	Location / Sub-Group	Current situation	Operational Impact	Significance	Duration	Scale	Proposed Mitigation	Residual Impact
General amenity (environmental)	Cappagh Road and Ballymoneen Road	Quiet rural area. Scattered residential development with suburban development to south	Impacts on general amenity due to increased traffic volumes	Significant negative	Long term	Medium	Screen planting and noise mitigation where required. Refer also to **Chapter 12, Landscape and Visual** and **Chapter 17, Noise and Vibration**	Moderate negative
General amenity (environmental)	Northern link from Letteragh Junction	Scattered residential development	Impacts on general amenity due to noise or visual intrusion	Significant negative	Long term	Few	Screen planting and noise mitigation where required. Refer also to **Chapter 12 Landscape and**	Moderate to Significant negative

AMENITY – General amenity								
Nature of Impact	Location / Sub-Group	Current situation	Operational Impact	Significance	Duration	Scale	Proposed Mitigation	Residual Impact
							Visual and **Chapter 17, Noise and Vibration**	
General amenity (environmental)	Bushypark & Aughnacurra	Residential development	Impacts on general amenity due to noise or visual intrusion	Significant negative chapters	Long term	Medium	Screen planting and noise mitigation where required. Refer also to **Chapter 12, Landscape and Visual** and **Chapter 17, Noise and Vibration**	Moderate to Significant negative
General amenity (environmental)	St. James' National School, Bushypark	School and playing grounds	Impacts on general amenity due to noise or visual intrusion	Significant negative	Long term	Medium	Screen planting and noise mitigation where required. Refer also to **Chapter 12, Landscape and Visual** and **Chapter 17, Noise and Vibration**	Moderate negative
General amenity (environmental)	NUIG Sporting Campus	Sports pitches	Proposed road development on a viaduct splitting the sporting campus in two requiring a reconfiguration of	Very Significant negative	Long term	Many	Provision of a floodlit 3G GAA pitch, a floodlit 3G	Very significant but can be reduced to

AMENITY – General amenity								
Nature of Impact	Location / Sub-Group	Current situation	Operational Impact	Significance	Duration	Scale	Proposed Mitigation	Residual Impact
			pitches, the modification of the sports pavilion and a new Sporting Campus Plan and Strategy				training area and associated infrastructure for such as drainage of these pitches, as ball-stop netting and modification of the sports pavilion.	moderate subject to appropriate master planning. Subject also to financial compensation as part of the compulsory purchase process
General amenity (environmental)	River Corrib and river banks	Riverside walk and Menlo Castle	Noise and visual impacts from proposed river bridge	Significant negative	Long term	Medium	Retain existing vegetation. Noise barriers. Refer also to **Chapter 12, Landscape and Visual** and **Chapter 17, Noise and Vibration**	Significant negative
General amenity	School Road, Castlegar	Narrow road used partly as a commuting rat-run and with discontinuous roadside footpaths.	Transfer of ‘rat run’ traffic from School Road to the proposed road development	Slight positive	Long term	Medium	Overbridge on School Road to include footpath and extend to at least to tie-in with existing road	Moderate positive

AMENITY – General amenity								
Nature of Impact	Location / Sub-Group	Current situation	Operational Impact	Significance	Duration	Scale	Proposed Mitigation	Residual Impact
General amenity	Mass path Parkmore	Quiet and well-maintained footpath elevated above surrounding area	Severance of path, but with new connectivity and informal crossing facility, but also loss of amenity value	Significant negative. (Positive on connectivity)	Long term	Few	Screen planting	Significant negative (Positive on connectivity)
General amenity (environmental)	Galway Racecourse	Horse racing	Proposed road development placed in tunnel beside racecourse. Improved access and reduced congestion.	Slight positive	N/a	Very many	N/a	Slight positive

SEVERANCE								
Nature of Impact	**Location / Sub-Group**	**Current situation**	**Operational Impact**	**Significance**	**Short / Long term / perm**	**Scale**	**Proposed Mitigation**	**Residual Impact**
Relief from severance	Bearna Village	Some severance in the centre of the village especially at peak times	Transfer of much traffic to the proposed road development	Significant positive	Long term	Medium	-	Significant positive
New severance and relief from severance	Na Foraí Maola and Troscaigh	Rural area with scattered linear residential development	Social and physical severance. Foraí Maola road diverted to Troscaigh Junction. But also positive impact of new connection with Troscaigh	Moderate negative. Moderate positive	Long term	Few	Diversion of local road included in design	Moderate negative. Moderate positive
New severance	L13215 Ann Gibbons Road	Rural area with scattered linear residential development	Road severed. Most community facilities to south, but north bound traffic will now have to divert south and to the Bearna Moycullen Road	Significant negative for householders on northern end of the Ann Gibbons Road	Long term	Few	-	Significant negative
New severance	North of Bearna Village	Rural area with scattered linear residential development	Crossing facilities mitigate physical severance, but psychological severance created between areas to north and south	Moderate negative	Long term	Many	Include pedestrian crossing facilities at junctions	Slight negative
New severance	Cappagh Road	Low traffic volumes	Higher traffic volumes presenting new severance at sports pitches to south	Moderate negative	Long term	Medium	Crossing facilities in place, but impact outside of area of-proposed road development	Moderate negative
New severance	Gort na Bró Miller's Lane	Light traffic	Some additional traffic	Slight negative	Long term	Medium	None proposed	Slight negative

SEVERANCE								
Nature of Impact	**Location / Sub-Group**	**Current situation**	**Operational Impact**	**Significance**	**Short / Long term / perm**	**Scale**	**Proposed Mitigation**	**Residual Impact**
New severance	Coolagh and Menlough	Narrow rural roads	Degree of new social severance due to presence of proposed road development	Slight negative	Long term	Medium	-	Slight negative
New severance	N84 Headford Road to existing N6	Moderate traffic volumes	Increase in traffic accessing proposed N84 Headford Road Junction and physical presence of junction	Moderate negative	Long term	Medium	Provide pedestrian crossing facilities at community facilities.	Slight negative

ECONOMIC								
Nature of Impact	**Location / Sub-Group**	**Current situation**	**Operational Impact**	**Significance**	**Short / Long term/ permanent**	**Scale**	**Proposed Mitigation**	**Residual Impact**
Passing trade	R336 and Bearna	Some passing trade including for service stations on R336 Coast Road / Tuam Road	Reduction in passing traffic but improved access to premises	Slight negative	Long term	Few	None proposed	Slight negative
Access	Gateway Business Park	Access via Seamus Quirke Road subject to regular congestion	Alternative of more direct access to proposed road development	Significant positive	Long term	Medium	-	Significant positive
Access	N59 Moycullen Road &	Business park access via N59 Moycullen Road subject to congestion and indirect access to existing N6.	Alternative of access to proposed road development via link road	Significant positive	Long term	Medium	-	Significant positive

ECONOMIC								
Nature of Impact	**Location / Sub-Group**	**Current situation**	**Operational Impact**	**Significance**	**Short / Long term/ permanent**	**Scale**	**Proposed Mitigation**	**Residual Impact**
	Newcastle Road Upper							
Access	Car dealership and postal centre on the N83 Tuam Road	Direct access on to busy N83 Tuam Road	Improved access to N83 Tuam Road from start of City North Business Park Link. Good visibility of businesses maintained	Moderate positive	Long term	Two businesses	-	Moderate positive
Access	Parkmore Business Park, City East and Ballybrit Industrial Estates	Limited access between the Parkmore Business Park, the N83 Tuam Road and the existing N6.	Much improved access to N83 Tuam Road and proposed road development	Profound positive	Long term	Very many	-	Profound positive
General economic	Galway Racecourse	Access via existing N6 and event day access to N83 Tuam Road	Requirement to replace stables and other facilities. Proposed tunnel to the north of the racetrack. Improved general access, including to the N83 Tuam Road	Net moderate positive	Long term	One major business and ancillary businesses, including during events	-	Net moderate positive
Access	Briarhill Business Park	Access to existing N6	Reduced congestion expected at Ballybrit Crescent and Lynch Junction. New access north to N83 Tuam Road via Parkmore Link Road	Significant positive	Long term	medium	-	Significant positive

ECONOMIC								
Nature of Impact	**Location / Sub-Group**	**Current situation**	**Operational Impact**	**Significance**	**Short / Long term/ permanent**	**Scale**	**Proposed Mitigation**	**Residual Impact**
Access, land take	Car dealership, Briarhill Business Park	Access to existing N6	Reconfiguration of services on the residual lands are required with improved access with the reduced congestion on the existing road network	Negative impact from landtake combined with some positive impact from improved access	Long term	One business	Provide directional signage	Subject to financial compensation as part of the compulsory purchase process
Tourism	Galway City and locations to west	High congestion in city and poor connectivity to Connemara	Reduced congestion and improved connectivity	Very significant positive	Long term	Very many	-	Very significant positive

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