



ENVIRONMENTAL IMPACT ASSESSMENT REPORT

TEN-T Priority Route Improvement Project, Donegal Chapter 8: Human Health



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List of Abbreviations

The following is a list of abbreviations used within this chapter of the Environmental Impact Assessment Report (EIAR).

Ten-T List of Abbreviations used in 'Human Health' Chapter of this EIAR

List of Abbreviations

CAWT	Cooperation and Working Together
EB	Eastbound
ED	Electoral division
EUPHA	European Public Health Association
HIA	Health Impact Assessment
HIF	Healthy Ireland Framework
HLE	Healthy life expectancy
IAIA	International Association for Impact Assessment
IEMA	Institute of Environmental Management and Assessment
IPH	Institute of Public Health
NEET	Not in Education, Employment, or Training
NPF	National Planning Framework
SB	South bound
TII	Transport Infrastructure Ireland
WB	West bound

8 HUMAN HEALTH

8.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) assesses likely significant population health effects of the (Trans European Transport Network (TEN-T) Priority Route Improvement Project, Donegal, hereafter referred to as “the Proposed Development” or the “Project”.

Population health means ‘*the health outcomes of a group of individuals, including the distribution of such outcomes within the group*’ (Kindig & Stoddart, 2003)

Human Health in Environmental Impact Assessment (EIA) takes a public health approach, meaning it reaches conclusions on the health outcomes to defined populations, rather than the health outcomes of individuals. Guidance explaining that this is the correct approach is set out in Section 8.3.1. Where there are not significant population health effects, it can reasonably be expected that there would not be high severity and widespread individual level health outcome changes.

The Proposed Development represents a key opportunity for improving population health outcomes for the people of Donegal and those visiting the area. This aligns with the Healthy Ireland policy position to improve people’s health and wellbeing (Department of Health, 2019). It also aligns with the National Planning Framework (NPF) section 6.2 on healthy communities and section 9.4 of the NPF on creating a clean environment for a healthy society (Government of Ireland, 2025). The NPF states:

“Our health and our environment are inextricably linked. Specific health risks that can be influenced by spatial planning include heart disease, respiratory disease, mental health, obesity and injuries. By taking a whole-system approach to addressing the many factors that impact on health and wellbeing and which contribute to health inequalities, and by empowering and enabling individuals and communities to make healthier choices, it will be possible to improve health outcomes, particularly for the next generation of citizens.”

This chapter has been prepared by RPS and meets the EIA requirements in relation to assessing the likely significant, beneficial and adverse effects of the Proposed Development on human health. The chapter follows guidance and good practice, giving the public health perspective of impacts. In so doing, the chapter:

- Takes a population health approach to assessing physical and mental health outcomes (TII, 2025).
- Considers the wider determinants of health, that may be significantly affected directly or indirectly
- Assesses the potential for health inequalities to vulnerable groups
- Considers opportunities to improve the Proposed Development to further benefit population health.

The potential for the Proposed Development to change population health outcomes may arise from various health pathways. The effects on physical and mental health link to impacts discussed throughout this EIAR. In particular, the health assessment draws inputs from the following chapters:

- Chapter 4: Project Description
- Chapter 6: Traffic & Transport
- Chapter 7: Population
- Chapter 12: Air Quality
- Chapter 14: Noise & Vibration
- Chapter 15: Material Assets- Agriculture
- Chapter 16: Material Assets- Non-Agriculture
- Chapter 18: Landscape & Visual

The health assessment takes as its input the residual effect conclusions of other EIA technical topic chapters. In this regard the health assessment relies on the mitigation measures set out in those chapters and does not repeat them. This avoids duplication and keeps the assessment proportionate.

Furthermore, the scope of the Human Health chapter has been kept proportionate, considering only those determinants of health with the potential for likely and significant population health effects. Issues such as land, soils and hydrogeology (Chapter 10: Land & Soil) and water quality (Chapter 11: Water) include appropriate standard good practice mitigation measures to appropriately break pollution linkage pathways that could pose a risk to population health. For example, see Chapter 10: Land & Soil in relation to private water supplies and how risks are avoided through committed mitigation.

8.2 Competent Experts

This chapter has been prepared by RPS and meets the EIA requirements in relation to assessing the likely significant, beneficial and adverse effects of the Proposed Development on human health. The competent experts who authored this chapter are Ryngan Pyper, Senuri Mahamithawa and Lisa Nelson.

- Katie Hirono (PhD MPH BA) Associate Director of Health and Social Impact at RPS, Competent Expert for Health Impact Assessment (HIA) including Health in Environmental Assessments. Qualifications: PhD, MPH, BA. Professional memberships: Faculty of Public Health; European Public Health Association; Past President, Society of Practitioners of Health Impact Assessment. Experience: Dr Hirono is a public health practitioner specialised in HIA, health inequalities, public participation and health policy. She has over 14 years' experience working in the US, Australia and the UK and has contributed to numerous (50+) HIAs throughout her career. Dr Hirono works with the private and public sectors to integrate health into decision-making, including for Environmental Impact Assessments (EIA) for major infrastructure schemes. She also advises professional bodies on good practice and has led capacity building on HIA for Public Health Authorities.
- Senuri Mahamithawa (MSc DIC, BSc, AISEP, AFPH) Principal Consultant (Health and Social Impact) at RPS, Competent Expert for HIA including Health in Environmental Assessments. Qualifications: MSc (DIC) in Environmental Technology (specialising in Environmental Health and Epidemiology), and a BSc in Biology (Hons). Professional memberships: Associate member of the Faculty of Public Health, and an Associate member of ISEP (formerly IEMA). Experience: Senuri has 8 years of experience as a professional consultant within the health and environmental impact assessment sectors, leading on over 50 health assessments, including comprehensive HIAs, rapid HIAs and health in EIA. Senuri has extensive experience in a wide range of infrastructure projects including major road and rail, airports and aviation, energy facilities (including nuclear), renewables (including solar and wind, and their grid connections), waste management, residential and mixed-use developments, urban expansions, and other commercial developments. Senuri has co-authored a WHO paper on circular economy and HIA, as well as presenting UK best practice on assessing health within EIA for the European Public Health Association.
- Lisa Nelson (MPH, BSc, AISEP) is a Consultant in Health and Social Impact at RPS. She is a Competent Expert for HIA including Health in Environmental Assessments. Qualifications: Master of Public Health (specialising in Epidemiology), and a BSc in Environmental Science and Health (Hons). Professional Memberships: Associate member of ISEP (formerly IEMA). Experience: Lisa has 3 years' experience in HIA, including authoring multiple comprehensive HIAs, contributing to over 30 integrated health chapters in EIA, and completing more than 10 rapid HIAs. Lisa has experience in a wide range of infrastructure projects including road, rail, aviation, renewables, waste management, industrial and residential. Additionally, Lisa has one year's experience in health risk assessment within the mining sector.
- Ryngan Pyper (MA PGDip CEnv MISEP PFPH) was the Director of Health and Social Impact at RPS and led the HIA team until 2025. He is a Competent Expert for Health Impact Assessment (HIA) including Health in Environmental Assessments. Qualifications: MA & BA Hon in Biological Sciences, Postgraduate Diploma (distinction) in Public Health, Graduate Diploma in Law, Postgraduate Diploma (distinction) in Legal Practice. Professional memberships: Faculty of Public Health registered public health practitioner; Honorary Research Fellow and Member of the World Health Organization (WHO) at the University of Liverpool; IEMA Full Member and Chartered Environmentalist, member of the Impact Assessment Steering Group. European Public Health Association. International Association for Impact Assessment, Health Section Chair. Experience: Ryngan has over 18 years' experience as a

professional consultant, leading on over 30 comprehensive HIAs (standalone or integrated), as well as numerous checklist (rapid) HIAs. Ryngan is first author of the IEMA Guide: Competent Expert for Health Impact Assessment including Health in Environmental Assessments (2024) and delivers HIA training. Ryngan has also authored national and international guidance and WHO publications on HIA and Health in Environmental Assessments.

8.3 Methodology

8.3.1 Legislation and Guidance

The following legislation in Table 8-1 is relevant to the assessment of the effects on human health.

Table 8-1: Health Legislation

Legislation	Description
S.I. 296/2018 - European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (Government of Ireland, 2018) and S.I. No. 279/2019 - European Union (Roads Act 1993) (Environmental Impact Assessment) (Amendment) Regulations 2019.	Sets the requirement to consider the likely significant effects on human health.
The Safety, Health and Welfare at Work etc Act 2005 (as amended) (Government of Ireland, 2005)	Sets out general duties on employers, including ensuring, so far as is reasonably practicable, that employees and individuals at the place of work who are not employees are not exposed to risks to their safety, health or welfare.
The Environmental Protection Agency (EPA) Act 1992 (as amended)	Governs environmental exposures, including provisions in relation to nuisance.
Directive (EU) 2024/2881 of the European Parliament and of the Council on ambient air quality and cleaner air for Europe	Sets the regulatory thresholds for air quality in Europe.
S.I. 549/2018 – European Communities (Environmental Noise) Regulations 2018 and S.I. 663/2021 – European Communities (Environmental Noise) (Amendment) Regulations 2021 (as amended) (Government of Ireland, 2018)	Sets a common approach to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise.

The following guidance in Table 8-2 has informed the assessment.

Table 8-2: Health Guidance

Guidance	Description
Transport Infrastructure Ireland (TII), Population and Human Health Assessment of Proposed National Roads – Standard (TII, 2025)	This Standard sets out the required approach for population and human health assessment for National Road projects in accordance with EIA legislative requirements and relevant TII guidelines and standards.
Institute of Environmental Management and Assessment (IEMA) 2022 guidance on health in EIA series, effective scoping (Pyper, et al., 2022a) and determining significance (Pyper, et al., 2022b).	EIA practitioner guidance on assessing human health, applicable to Republic of Ireland and Northern Ireland. Guidance sets out principles and methods of assessment.

Guidance	Description
Environmental Protection Agency (EPA). Guidelines on the information to be contained in Environmental Impact Assessment Reports, 2022 (Environmental Protection Agency, 2022).	The EPA present a health protection position statement on the coverage of health in EIA. The wider public health remit is covered by the IPH 2021 and IEMA 2022 guidance.
Institute of Public Health (IPH), Guidance, Standalone Health Impact Assessment (HIA) and health in environmental assessment, 2021 (Institute of Public Health, 2021)	This Republic of Ireland and Northern Ireland guidance sets current good practice for the assessment of human health in EIA, including assessment methods. This updates the 2009 guidance from the IPH.
International Association for Impact Assessment (IAIA) and European Public Health Association (EUPHA). A reference paper on addressing Human Health in EIA (2020), and academic discussion of the same (Cave, et al., 2021).	This international consensus piece informed the IPH 2021 guidance. The publication explains EIA for public health stakeholders and sets out transparent assessment approaches adopted by the IPH.
IAIA. HIA International Best Practice Principles, 2021 (Winkler, et al., 2021).	Confirms the relationship between HIA and EIA. Confirms the application of HIA principles when undertaking health in EIA.
IEMA and the Faculty of Public Health. Health in Environmental Impact Assessment: a primer for a proportionate approach, 2017 (Cave, et al., 2017).	General principles of health in EIA. This guidance remains a relevant citation but is largely superseded by the IPH 2021 guidance and IEMA 2022 publications.

It is helpful to clarify that guidelines listed in Table 8-2 direct that a population health outcomes approach should be adopted. This approach is consistent with the European Commission EIA guidance (European Commission, 2017) which states that “*environmentally related health issues ... would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population.*” This follows the European Commission guidance (European Commission, 2001) on assessing the health impacts of its own work programs, which takes the approach of assessing the effects on “*the health of the population*”.

The World Health Organisation policy brief on incorporating health into environmental assessments (WHO, 2023) directs a focus on “*the potential for population health effects that are likely and significant*”. This is consistent with the WHO publication on health in EIA (World Health Organization, 2022) which states that “*good practice for human health in ... EIA is met when ... the focus is on assessing the likely significant effects of a proposal on population health outcomes*”. That WHO publication specifically cites the IPH guidance (Pyper et al., 2021) and EUPHA guidance (Cave et al., 2020) as approaches that represent good practice. The former directs to take a “*population health outcome perspective*”. The latter confirms “*EIA takes a population health approach.*”

In addition, regard has been had as appropriate to World Health Organization advisory guidelines, e.g. for air quality (WHO, 2021) and noise (WHO, 2018). The application of such guidelines for health in EIA is described by IEMA (2022), (Institute of Public Health, 2021) and (Cave, et al., 2021). Regard has also been had to the TII Population and Human Health Assessment Standard (PE-ENV-01108) (TII, 2025) which states “*The thresholds used to determine significance in EIA are set for the protection of human health. Whilst they do not represent the levels at which the onset of measurable health effects occurs in a population, these thresholds represent an established and widely accepted level at which effects are considered to be significant in EIA terms. It is not possible to predict the risk of adverse health outcomes for an individual, since exposure-response functions are based on population data which includes a wide range of individual responses.*” page 110.

The conceptual models/tools of the IEMA 2022 guidance informed the health assessment, specifically Part 7, Table 7.1 (sensitivity), Table 7.2 (magnitude) and Table 7.4 (significance). This is a robust best practice approach that can be applied consistently and transparently to all determinants of health. The approach is compliant with the TII Standard, 2025, but the IEMA model includes additional public health concepts including mortality and morbidity considerations.

The project commenced planning and design prior to the TII 2025 standard being issued. Alignment with the TII 2025 standard has been achieved as far as reasonably practicable as allowed for within the standard (TII, 2025).

8.3.2 Human Health Study Area

The Proposed Development comprises of three sections. The human health study area (zone of influence) has regard to localised health effects and wider health effects. These are discussed below:

- Bio-physical health determinants (such as changes to air quality and noise exposure) are likely to have a localised impact as potential change in hazard exposures are limited by physical dispersion characteristics. Social and behavioural determinants (such as changes to lifestyle and community factors) are likely to have both localised and wider impacts.
- For localised effects, the study area for baseline statistics relating to health effects focus on electoral divisions (EDs), with county Donegal and Ireland averages as comparators. Where data for EDs has not been available, statistics relating to county Donegal are collected using the Ireland average as a comparator.

The human health study area for each section has been defined by the EDs through which the Proposed Development passes. This selection of EDs reflects a proportionate approach for the purposes of characterising the sensitivity of the population to localised effects. The Human Health Study Area includes all populations with the potential to experience likely significant effects. In some cases, these may extend beyond the proportionate selection of EDs we have used to characterise worst-case impacts and sensitivity (e.g. in relation to geographic proximity and levels of deprivation).

Regard is also given to the study areas of other EIAR chapters and site-specific health effects are discussed as appropriate with reference to place names of the GeoHive map viewer, which may extend beyond ED administrative boundaries.

The following geographically defined human health populations are used in the assessment:

Table 8-3: Human health study area for the Proposed Development

Human Health Study Area	Geographic Area	Health determinants impacted
Site specific study area	Communities (and associated isolated dwellings) affected by the new road alignments as set out in Figure 8-2 , Figure 8-3 and Figure 8-4 below	<ul style="list-style-type: none"> ▪ Air Quality ▪ Noise and Vibration ▪ Open space, leisure and play ▪ Transport modes, access and connections ▪ Understanding of risk
	Electoral divisions (EDs) for each respective section of road as set out below in Figure 8-1 including: <ul style="list-style-type: none"> ▪ Section 1: Dooish, Goland, Stranorlar, Lettermore, Convoy ▪ Section 2: Letterkenny Rural, Magheraboy, Manorcunningham ▪ Section 3: Manorcunningham, Kinraigy, Treantaghmucklagh, Feddyglass, Clonleigh North, Clonleigh South 	<ul style="list-style-type: none"> ▪ Air Quality ▪ Noise and Vibration ▪ Open space, leisure and play ▪ Transport modes, access and connections ▪ Understanding of risk
Local study area	Donegal County	<ul style="list-style-type: none"> ▪ Transport modes, access and connections ▪ Employment
Regional study area	Ulster Province	<ul style="list-style-type: none"> ▪ Open space, leisure and play ▪ Transport modes, access and connections ▪ Employment
National study area	Ireland (and beyond for international travel and transboundary effects)	<ul style="list-style-type: none"> ▪ Transport modes, access and connections ▪ Employment

The Human Health Study Area has also included and had regard to the communities in Strabane, Northern Ireland, which are in close proximity to Section 3 of the Proposed Development, to consider the potential for transboundary effects. These communities are defined by the following Data Zones and Electoral Area:

- Data Zones of Sperrin C, Derg A, Sperrin D, Sperrin E, Sperrin H
- Sperrin Electoral Area (EA) and
- Northern Ireland

Site specific communities discussed reflect geographically localised issues due to the Proposed Development, particularly where these coincide with higher levels of health vulnerability at Electoral Division (ED) level, e.g. due to deprivation. Deprivation statistics have been collected at ED level as an indicator of baseline health sensitivity for communities affected by the Proposed Development. For example, the statistics show particular disadvantage in three EDs located in Section 3 of the Proposed Development including Kinraigy, Clonleigh North and Clonleigh South.

As administrative boundaries do not necessarily define the boundaries of potential health effects, particularly mental health effects, the health chapter uses the administrative boundaries to broadly define representative population groups, including in relation to sensitivity, rather than to set boundaries on the extent of potential effects. However, the Human Health Study Areas represent the locations that would drive any likely significant population health effect, i.e. where the great majority of the impact and community responses to them are anticipated to occur. Any effects beyond the study areas would not change the conclusions reached in relation to the likely significant population health effects of the Proposed Development.

The health assessment has regard to the zones of influence defined by EIAR Chapter 6: Traffic & Transport, Chapter 7: Population, Chapter 12: Air Quality, Chapter 14: Noise & Vibration and Chapter 18: Landscape & Visual, which are inter-related technical disciplines for the health assessment. Those chapters provide data inputs to the health assessment. Those zones of influence are relevant and inform the health chapter's consideration of effect magnitude.

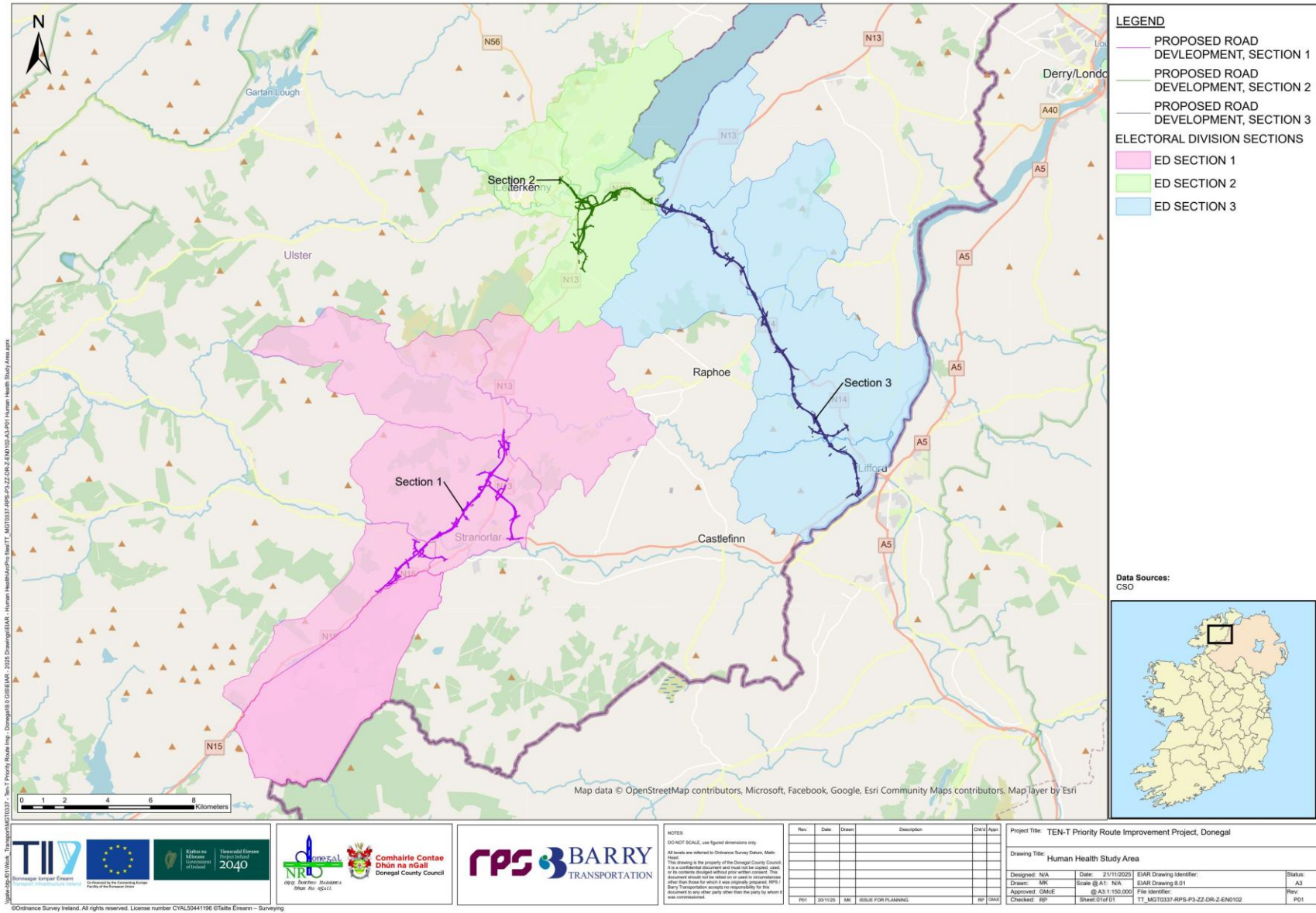


Figure 8-1: Human Health Study Area Sections

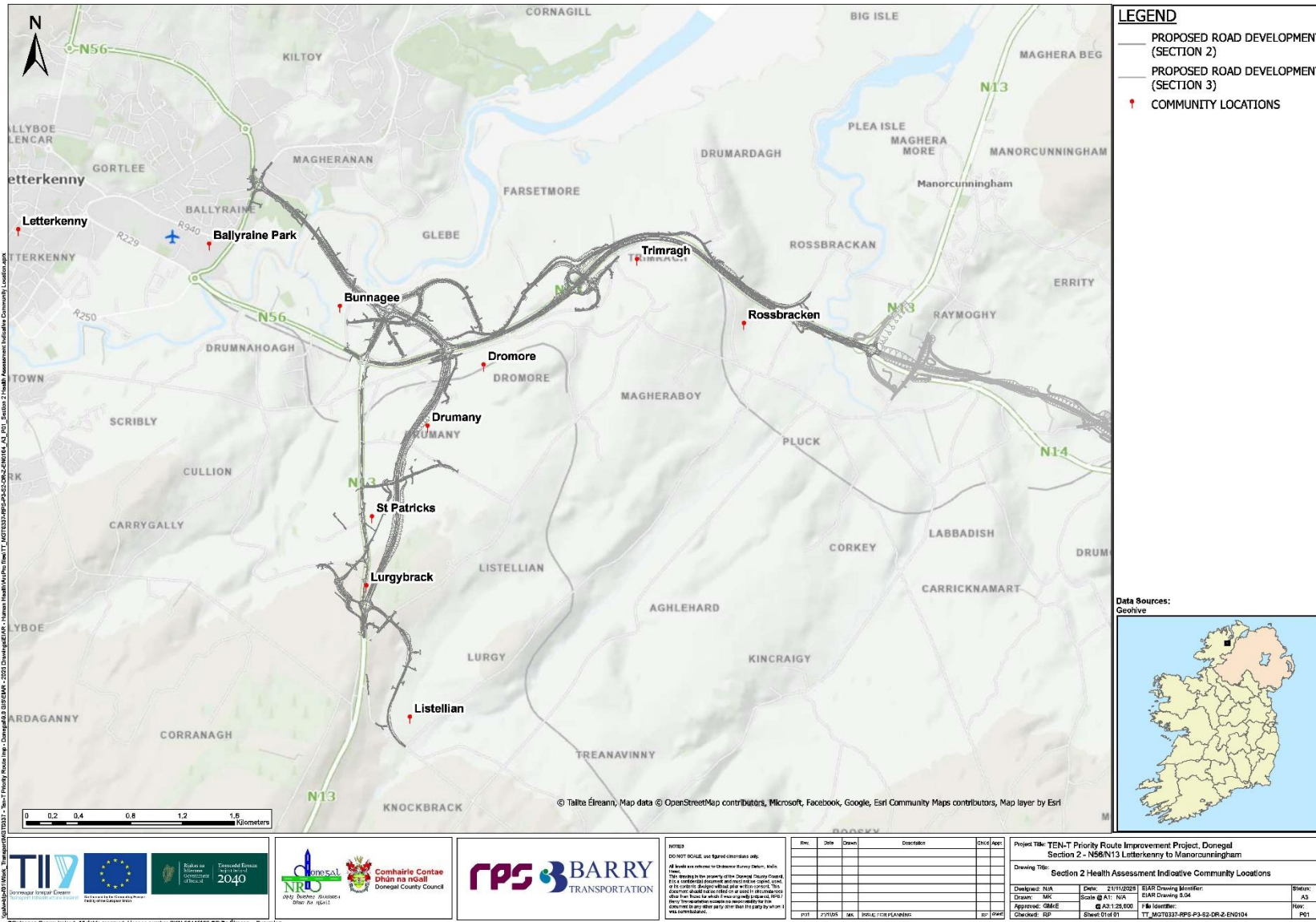


Figure 8-3: Indicative Community Locations – Section 2

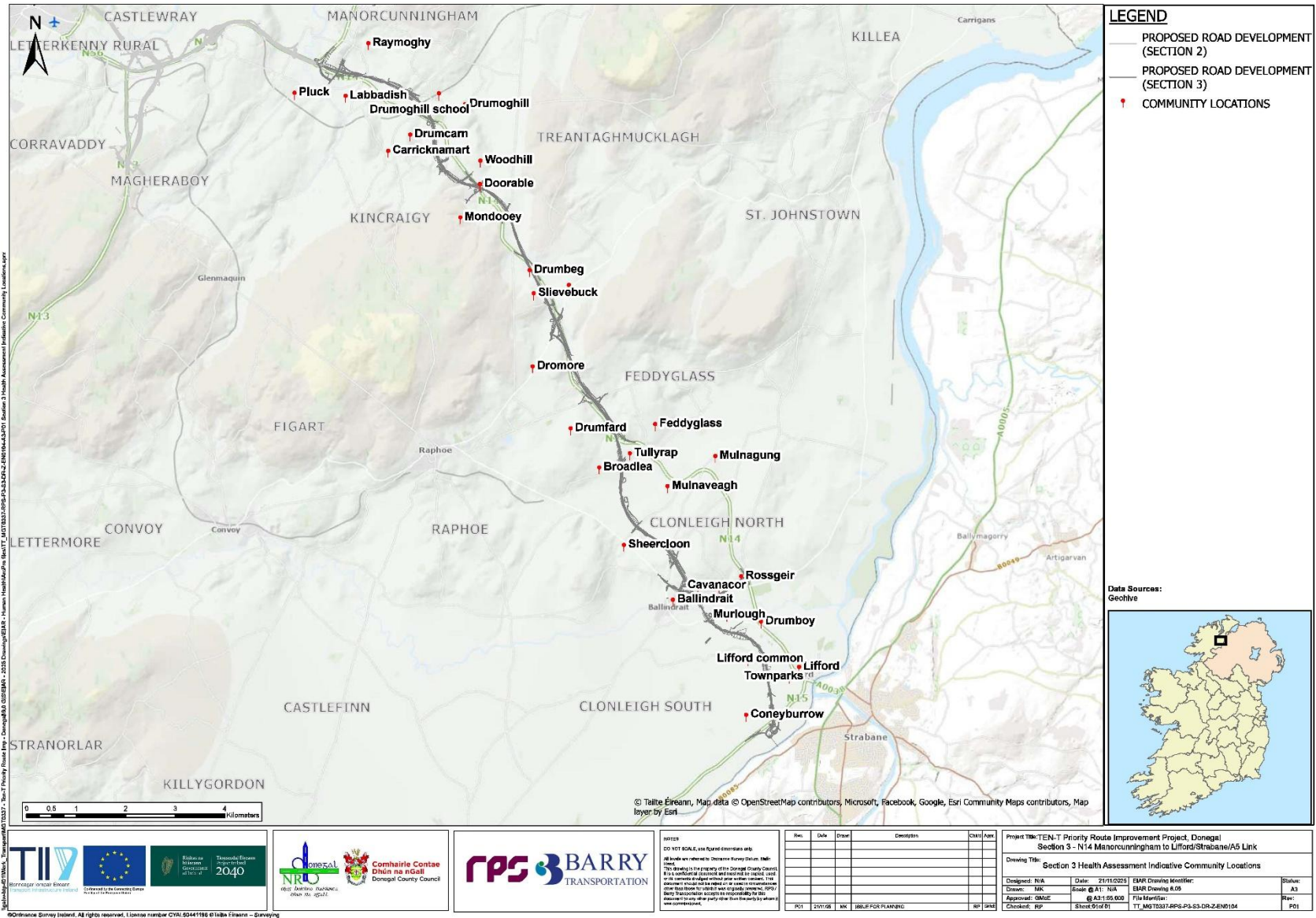


Figure 8-4: Indicative Community Locations – Section 3

8.3.3 Data Sources

As the TII 2025 Standard states: *“In most cases, surveys will not be undertaken specifically to inform the health baseline, although survey data from other topic baseline assessments may be used”*, data from the inter-related technical disciplines have been used to inform the health assessment (e.g. Chapter 14: Noise & Vibration references the GeoDirectory). Data informs the health assessment by identifying potential receptors and community assets for these disciplines, such as schools, residential properties, walking and cycling routes, as well as tourism and recreational amenities. No separate health field surveys have been undertaken, as these were not required for this assessment. The health analysis is informed by scheme-wide consultation that occurred during the non-statutory public consultation. The following data sources have informed the health baseline assessment:

- Central Statistics Office (CSO) Small Area Population Statistics (SAPS) Interactive Mapping Tool (Central Statistics Office, 2022a)
- CSO StatBank (Central Statistics Office, 2020)
- Pobal HP Deprivation Index (Pobal, 2022a)
- Google Earth Pro 2025 aerial and street level photography
- Open Data Ireland 2025
- Geodirectory

8.4 Policy Context

The following policies are associated with the Human Health Assessment:

- National Planning Framework (NPF), 2023 (Government of Ireland, 2025)
- Ireland Health Framework (HIF) (2019-2025), 2019 (Department of Health, 2019)
- Roadmap for Social Inclusion (2020-2025), 2021 (Government of Ireland, 2023)
- Transport Infrastructure Ireland Sustainability Implementation Plan, 2021 (TII, 2021)
- Local health priority issues, various

8.4.1 National Planning Framework (NPF)

The following provisions from the NPF are supported, and the Proposed Development has been designed to align with and deliver on these objectives, as discussed below.

The NPF (Government of Ireland, 2025) states that *“Good access to a range of quality education and health services, relative to the scale of a region, city, town, neighbourhood or community is a defining characteristic of attractive, successful and competitive places. Compact, smart growth in urban areas and strong and stable rural communities will enable the enhanced and effective provision of a range of accessible services”* (p.2). The Proposed Development aligns with this policy by improving accessibility in County Donegal to a range of health promoting goods and services including education and healthcare.

Chapter 6, Section 6.1: People, Homes and Communities states that the NPF can effect change in some dimensions that contribute to quality of life, most importantly the natural and living environment: *“This is why place is intrinsic to achieving good quality of life - the quality of our immediate environment, our ability to access services and amenities, such as education and healthcare, shops and parks, the leisure and social interactions available to us and the prospect of securing employment, all combine to make a real difference to people’s lives.”* (p.79). The Proposed Development supports this objective by improving journey times, safety and connectivity, which in turn supports access to employment, healthcare, education and social amenities across County Donegal, thereby enhancing overall quality of life.

Chapter 6, Section 6.2: Healthy Communities notes that “*Decisions made regarding land use and the built environment, including transportation, affect these health risks in a variety of ways, for example through influencing noise, air and water quality, traffic safety, opportunities for physical activity and social interactions as well as access to workplace, education, healthcare and other facilities and services [...]*” (p.80). The Proposed Development would deliver safer transport infrastructure that reduces traffic risks, enhances air quality through improved traffic flow, and creates opportunities for healthier and more sustainable travel choices.

It recognises that the “*places in which we live, work, and play can affect both our physical and mental well-being. Communities that are designed in a way that supports physical activity, e.g. generously sized footpaths, safe cycle lanes, safe attractive stairways and accessible recreation areas, all encourage residents to make healthy choices and live healthier lives. Countries with extensive cycle infrastructure report higher levels of cycling and lower rates of obesity*” (p.81). The Proposed Development aligns with this objective by providing substantial improvements to active travel infrastructure, including segregated cycle links, new pedestrian facilities and park-and-share hubs, enabling healthier and more sustainable lifestyle choices.

Section 6.2 contains two policy objectives which relate to healthy lifestyles:

- NPO 36: “*Support the objectives of public health policy including Healthy Ireland Framework and the National Physical Activity Plan, though integrating such policies, where appropriate and at the applicable scale, with planning policy*” (p.80). The Proposed Development supports Healthy Ireland Framework objectives by embedding health considerations into planning through improved road safety, promoting physical activity and ensuring equitable access to essential services.
- NPO 37: “*Ensure the integration of safe and convenient alternatives to the car into the design of our communities, by prioritising walking and cycling accessibility to both existing and Proposed Developments, and integrating physical activity facilities for all ages*” (p.82). The Proposed Development integrates safe and convenient alternatives to car use with new walking and cycling routes.

National Strategic Outcome (NSO) 3 relates to strengthening rural economies and communities. One of the targets includes: “*Invest in maintaining regional and local roads and strategic road improvement projects in rural areas to ensure access to critical services such as education, healthcare and employment*” (p.159).

An overarching aim of the NPF is “*Creating a clean environment for a healthy society*” through:

- “*Promoting Cleaner Air - Addressing air quality problems in urban and rural areas through better planning and design.*”
- “*Noise Management - Incorporating consistent measures to avoid, mitigate and minimise or promote the pro-active management of noise*” (p.123)

National Policy Objective 93 addresses air quality, and states: “*Improve air quality and help prevent people being exposed to unacceptable levels of pollution in our urban and rural areas through integrated land use and spatial planning that supports public transport, walking and cycling as more favourable modes of transport to the private car, the promotion of energy efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions.*” (p.129). The Proposed Development improves air quality for various communities in County Donegal through improved traffic flow, redistribution of traffic and sustainable travel.

National Policy Objective 94 addresses noise, and states: “*Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans*” (p.129). The impacts (positive and negative) of the Proposed Development in relation to noise are addressed in Section 8.10 and 8.11, this includes that localised traffic noise in bypassed communities is reduced.

National Policy Objective 38 addresses social inclusion, and states: “*Plan for a more diverse and socially inclusive society that targets equality of opportunity and a better quality of life for all citizens, through improved integration and greater accessibility in the delivery of sustainable communities and the provision of*”

associated services” (p.82). The Proposed Development contributes towards improved quality of life in County Donegal and also improves accessibility in a largely rural area, to a range of health promoting goods and services including education, healthcare and employment.

One of the goals for rural development under National Strategic Outcome 3: Strengthened Rural Economies and Communities is to “Invest maintaining regional and local roads and strategic road improvement projects in rural areas to ensure access to critical services such as education, healthcare and employment” (p.159). The Proposed Development improves accessibility in County Donegal, a largely rural area, to a range of health promoting goods and services including education, healthcare and employment.

8.4.2 Healthy Ireland Framework (HIF) 2019-2025

HIF states that “many health and wellbeing indicators are affected by individuals’ personal lifestyle choices. For example, the World Health Organisation attributes 60% of the disease burden in Europe to seven leading risk factors: hypertension, tobacco use, alcohol misuse, high cholesterol, being overweight, low fruit and vegetable intake and physical inactivity. The effects of these risk factors can be minimised if individuals can be motivated and supported to make healthier choices. To be effective, action to control the determinants of health must include developing understanding and skills, and promoting informed health choices” (p.14) (Department of Health, 2019).

This recognises that some of the health outcomes are influenced by factors beyond the control of the Proposed Development, including lifestyle choices. However, it also recognises that opportunities for physical activity and being able to afford and access healthy food is paramount to public health. The Proposed Development would have an influence by providing active travel facilities and improving accessibility and connectivity through the new road infrastructure.

The four goals of Healthy Ireland are relevant and have informed the assessment:

- Goal 1: Increase the proportion of people who are healthy at all stages of life.
- Goal 2: Reduce health inequalities.
- Goal 3: Protect the public from threats to health and wellbeing.
- Goal 4: Create an environment where every individual and sector of society can play their part in achieving a healthy Ireland.

8.4.3 Roadmap for Social Inclusion 2020-2025

The introduction states that “Education, health, housing, employment and social integration (i.e. a person’s sense of “connectedness” with their community) are all factors that contribute to a person’s overall sense of well-being or welfare” (p.10) (Government of Ireland, 2023)

8.4.4 Transport Infrastructure Ireland Sustainability Implementation Plan 2021

The plan states that “Sustainable transport solutions can positively impact our health and well-being, while enabling our access to services, education and employment opportunities. We believe that more liveable spaces and places can be achieved through the improved design and planning of our transport system.” (TII, 2021)

8.4.5 Local Health Priority Issues

The Healthy Donegal initiative states that the Donegal Local Community Development Committee will help create and sustain a healthy place for people to be born, grow, live, work and age in, through the development and implementation of the Healthy Ireland programme in County Donegal.

Donegal falls within the Healthy Ireland Community Healthcare Organisation Area 1, the implementation plan (Department of Health, 2019) for which sets the following relevant challenges:

- “Rurality and lack of public transport infrastructure feature across the area and have a serious impact on access to services.
- Lifestyle factors such as low levels of physical activity, obesity and poor mental health, continue to impact on the future health and wellbeing of our population.
- Although unemployment rates have significantly improved, there is a legacy of higher rates of unemployment and long-term unemployment especially in border counties.
- Cross-border working between the Republic of Ireland and Northern Ireland’s health and social care services is well established. As a result of the signing of the Ballyconnell Agreement in 1992, the Cooperation and Working Together (CAWT) partnership was formed. CAWT is the cross-border health and social care partnership between the HSE in the Republic of Ireland, and the Southern and Western Health and Social Care Trusts in Northern Ireland. There is clear evidence that risk factors for long term ill health and multiple deprivations are more prevalent in the border region, with individuals affected to a greater degree by obesity, physical inactivity, smoking and alcohol (CAWT Strategic Plan 2014-2022). In relation to mental health indicators, there are areas within the border region in which depression and/or anxiety are more prevalent.”

8.4.5.1 County Donegal Development Plan (2024-2030)

The County Donegal Development Plan (Donegal County Council, 2024) contains various policy objectives to protect and enhance health and wellbeing within Donegal, including the encouragement of active travel means (such as walking and cycling) to contribute to health and active lifestyles, with consideration of road safety; and consideration of access to health facilities when building new developments such as housing.

The Plan notes that “*sustainable, healthy, socially inclusive and culturally vibrant communities with an optimal quality of life are dependent on a wide range of childcare and education, recreational, healthcare, social and cultural infrastructure/facilities for all sectors of society in accessible locations and within a built environment which encourages active lifestyles*”

The County Donegal Development Plan in respect of the TEN-T Priority Route Improvement Project, highlights the benefits of the Proposed Development on health including “*reducing journey times, reducing traffic and thus freeing up road space in our towns and villages for sustainable transport modes (i.e. walking, cycling and public transport), providing new walking and cycling infrastructure as part of the scheme and improving access to health and education services*”. This also includes supporting better health outcomes for citizens at cross-border catchments through improved movement across the Northern Ireland border and shared healthcare services.

8.5 Non-Statutory Public Consultation

Non-statutory public consultation was undertaken as part of the preparation of the EIAR and earlier at constraints and option selection stages. No responses in relation to human health were received from the consultation.

8.6 Assessment Criteria and Assignment of Significance

8.6.1 General approach

This section sets out the methodology used to assess the likely significant human health effects of the Proposed Development. The generic scheme-wide approach to the assessment methodology is set out in Chapter 1: Introduction of the EIAR.

This section sets how the generic approach is amended to address the specific needs of the EIA human health assessment. Namely criteria for sensitivity, magnitude and significance that inform a professional judgment and reasoned conclusion as to the public health implications of the Proposed Development.

This assessment has been conducted to proportionately align with the 2025 TII Population and Human Health Assessment Standard (TII, 2025) as far as is judged reasonably practicable given the TII Standard was published after the Proposed Developments design and assessment was well advanced.

Where significant adverse population health effects are identified, including for vulnerable groups, then mitigation has been proposed to avoid or reduce the effects. Mitigation is secured as part of the Proposed Development design or development consent. In line with good practice the Proposed Development takes a proportionate approach to identifying opportunities to enhance beneficial population health effects, including for vulnerable groups.

Cumulative effects are considered, including inter-related effects of the Proposed Development in Chapter 19: Interactions & Cumulative Effects. This analysis considers how the same geographic or vulnerable group populations may be affected by more than one change in relevant health determinants, for example the combined effects of changes in air quality and noise on population health outcomes.

Where proportionate, the need for monitoring has been considered, including relevant governance.

8.6.2 Determinants of Health, Risk Factors and Health Outcomes

The chapter uses the World Health Organization (WHO) definition of health, which states that health is a “*state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*” (WHO, 1948).

The chapter also uses the WHO definition for mental health, which is a “*state in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community*” (WHO, 2022).

Health and wellbeing are influenced by a range of factors, termed the ‘wider determinants of health’. Determinants of health span environmental, social, behavioural, economic and institutional factors. Determinants therefore reflect a mix of influences from society and environment on population and individual health.

Impacts of the Proposed Development that result in a change in determinants have the potential to cause beneficial or adverse effects on health, either directly or indirectly. The degree to which these determinants influence health varies, given the degree of personal choice, location, mobility and exposure.

The Proposed Development affects determinants of health. Determinants of health are factors which contribute to health. Determinants influence risk factors. A risk factor is a state, behaviour or environment that changes susceptibility to a specific disease, ill health or injury (WHO, 1998). Risk factors affect health outcomes. A health outcome is a change in the health status of an individual, group or population.

A change in a determinant of health affects does not equate directly to a change in population health. Rather the change in a determinant alters risk factors for certain health outcomes. The assessment considers the degree and distribution of change in these pathways. The analysis of health pathways focuses on the risk factors and health outcomes that are most relevant to the determinants of health affected by the Proposed Development. As there are both complex and wide-ranging links between determinants of health, risk factors and health outcomes, it would not be proportionate or informative for an assessment to consider every interaction.

Typically, the change in a risk factor may need to be large, sustained and widespread within a population for there to be a significant influence on public health outcomes (Pyper et al., 2022b).

8.6.3 Population Health Approach and Vulnerable Groups

In line with the TII Population and Human Health Standard, a population health approach has been taken, informed by discussion of receptors within the other technical chapters of the EIAR. The TII guidance states “*the approach adopted for health assessment, and more generally within the field of public health, is to consider effects at a population level. The terms ‘health effect’ or ‘health outcome’ in this Standard refer to changes in population health, rather than individual health*”.

For each determinant of health, the human health chapter identifies relevant inequalities through consideration of the differential effect to the 'general population' of the relevant human health study area and effects to the 'vulnerable population group' of that study area. The vulnerable population group being comprised of relevant sensitivities for that determinant of health. The following population groups have been considered:

- The 'general population' including residents, visitors, workers, service providers, and service users.
- The 'vulnerable group population'.

The methods draw on the list of vulnerable population groups set out in IEMA 2022, Table 9.2. The following six broad population groups are used to inform a consistent narrative on potential health inequalities across the assessment, people falling into more than one group may be especially sensitive:

- **Young age:** Children and young people (including pregnant women and unborn children).
- **Old age:** Older people (particularly frail elderly).
- **Low income:** People on low income, who are economically inactive or unemployed/workless.
- **Health status:** People with existing poor health. Those with existing long-term physical or mental health conditions or disability that substantially affects their ability to carry out normal day-to-day activities; people who identify as neurodivergent.
- **Social disadvantage:** People who suffer discrimination or other social disadvantage, including relevant protected characteristics under the Irish Human Rights and Equality Commission Act 2014¹ or groups who may experience low social status or social isolation for other reasons.
- **Access and geographical factors:** People experiencing barriers in access to services, amenities and facilities and people living in areas known to exhibit high deprivation or poor economic and/or health indicators.

The following general characterisations of how the 'general population' may differ from 'vulnerable group populations' were considered when scoring sensitivity. These statements are not duplicated in each assessment and apply (as relevant) to the issues discussed for both construction and operation. These statements have had regard to the baseline set out in Section 8.8.1.

- In terms of life stage, the general population can be characterised as including a high proportion of people who are independent, as well as those who are providing some care. By contrast, the vulnerable group population can be characterised as including a high proportion of people who are providing a lot of care, as well as those who are dependant, see demographic data presented in Chapter 7: Population.
- The general population can be characterised as experiencing low deprivation. However, the professional judgment is that the vulnerable group population experiences high deprivation (including where this is due to pockets of higher deprivation within low deprivation areas), see Figure 8-19.
- The general population can be characterised as broadly comprised of people with good health status. Vulnerable groups, however, tend to include those parts of the population reporting bad or very bad health status, see Figure 8-7 and Figure 8-8. Vulnerability may also relate to conditions or a health status with hyper sensitivities, including to noise and visual change, for example associated with autism.

¹ For example, disadvantage by reference to the following factors: gender; civil status; family status; sexual orientation; religious belief; age; disability; race, including colour, nationality, ethnic or national origin; or membership of the Traveller community.

- The general population tends to include a large majority of people who characterise their day-to-day activities as not limited. The vulnerable group population tends to represent those who rate their day-to-day activities as limited a little or limited a lot, see Figure 8-8.
- Based on a professional judgement the general population's resilience (capacity to adapt to change) can be characterised as high whilst the vulnerable group population can be characterised as having limited resilience.
- Regarding the usage of affected infrastructure or facilities, the professional judgement is that the general population are more likely to have many alternatives to resources shared with the Proposed Development. For the vulnerable group population, the professional judgement is that they are more likely to have a reliance on shared resources.
- The general population includes the proportion of the community whose outlook on the Proposed Development includes support and ambivalence. The vulnerable group population includes the proportion of the community who are uncertain or concerned about the Proposed Development.

Heightened vulnerability is rarely due to a single cause and people may experience multiple forms of vulnerability due to intersecting social processes that result from inequalities (e.g., socioeconomic status and income).

As all development has the potential for adverse effects to some particularly vulnerable individuals, the role of assessment conclusions is not to set a threshold of 'no harm' from development, but to show where, at a population level, the harm should weigh strongly in the balance alongside the development's benefits for health and other outcomes.

In some situations, an effect may only be relevant to a few individuals, indicating that a population health effect would not occur. As stated by guidance: "*Where the effect is best characterised as only affecting a few individuals, this may indicate that a population health effect would not occur. Such individuals should still be the subject of mitigation and discussion, but in EIA and public health terms the effect may not be a significant population health change*" (Pyper et al., 2022b, p. 23)

The assessment covers relevant populations within two groups. The general population for the geographical area, notably new and existing local residents, and the vulnerable group population for the area. The latter is a sub-population comprised of the vulnerabilities listed above. The differentiation of these two groups allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

For the purposes of the assessment the sensitivity score of the vulnerable group population is used to ensure that the potential for health inequalities is taken into account in the population health significance conclusions.

8.6.4 Temporal Scope

The temporal scope of the assessment is consistent with the period over which the Proposed Development will be carried out and therefore covers the construction and operational periods. It is anticipated that construction will take place over an approximate three-year period. The assessment does not place an end date on the operations of the Proposed Development, i.e. no decommissioning of the Proposed Development is envisaged.

The following temporal scope definitions set out in the EPA (2022) guidelines provide consistency of terminology:

- Momentary Effects are those lasting from seconds to minutes.
- Brief Effects are those lasting less than a day.
- Temporary Effects are those lasting less than a year.
- Short-term Effects are those lasting one to seven years.
- Medium-term Effects are those lasting 7 to 15 years.

- Long-term Effects are those lasting 15 to 60 years.
- Permanent Effects are those lasting over 60 years.

8.6.5 Determining Effect Significance

Following the approach set out in the TII Population and Human Health Standard (TII, 2025) the determination of health significance uses a qualitative framework that applies to all determinates of health, i.e. applies equally to determining the public health implications of air quality, noise, lifestyle, transport, community identity and socio-economic changes.

The assessment of EIA health significance is an informed expert judgement about what is important, desirable or acceptable for public health with regards to changes triggered by the Proposed Development. These judgements are value-dependant (underpinned by scientific data but also informed by professional perspectives) and are context-dependent (judgements reflect relevant social, economic and political factors for the population) (European Commission, 2017).

The determination of significance has two stages:

- Firstly, the sensitivity of the receptor affected, and the magnitude of the effect upon it are characterised. This establishes whether there are a relevant population and a relevant change to consider.
- Secondly, a professional judgement is made as to whether the expected change in a population's health outcomes would be significant in public health terms. This judgement is explained using an evidence-based narrative setting out reasoned conclusions.

In accordance with the TII Standard, informed by the EPA Guidelines, this assessment considers the following factors:

- Magnitude and spatial extent of the effects
- Nature of the effects
- Transboundary nature of the effects
- Intensity and complexity of the effects
- Probability of the effects -likelihood
- Expected onset, duration, frequency and reversibility of the effects
- Cumulation of the effects with the effects of other existing and/or approved projects
- Possibility of effectively reducing the effects

Table 8-4, Table 8-5, and Table 8-7 together summarise the assessment methodology that have been adopted. This approach shows how the general EIA methods of using sensitivity and magnitude to inform a judgement of significance, are applied for human health. The approach uses professional judgement, drawing on consistent and transparency criteria for sensitivity and magnitude. It also references relevant contextual evidence to explain what significance means for human health in public health terms. For sensitivity, magnitude and significance the judgments are based on the most relevant criteria, it is likely in any given analysis that some criteria will span score categories.

The health assessment uses qualitative analysis following the TII Standard 2025, IEMA 2022 and IPH 2021 approach. This draws on qualitative and quantitative inputs from other EIAR topic chapters. This is considered the most appropriate methodology for assessing wider determinants of health proportionately, consistently and transparently.

The criteria for defining sensitivity are outlined in Table 8-4 adopted from the TII Population and Human Health Standard (Table 5.12), with supplementary considerations from IEMA 2022 guidance to ensure a comprehensive evaluation. Additional considerations from IEMA 2022 guidance have been included in italics.

Table 8-4: Health Sensitivity Methodology Criteria

Category/ Score	Indicative criteria
High	<p>High levels of deprivation (including pockets of deprivation); reliance on a resource shared between the population and the project, existing wide inequalities between the most and least healthy; high levels of anxiety or concern (about project impacts) within the community; high proportion of people within community have disabilities preventing them from participating in daily activities; high proportion of dependents within the community requiring a lot of care; people with very poor health status; and/or people with very low capacity to adapt to changes in health determinants.</p> <p><i>A community whose outlook is predominantly anxiety or concern; People who are prevented from undertaking daily activities.</i></p>
Medium	<p>Moderate levels of deprivation; few alternatives to a resource shared between the population and the project, existing widening inequalities between the most and least healthy; moderate levels of anxiety or concern (about project impacts) within the community; moderate proportion of people within community have disabilities limiting (but not preventing) daily activities; moderate proportion of dependents within the community requiring a lot of care; people with poor health status; and/or people with limited capacity to adapt to changes in health determinants.</p> <p><i>A community whose outlook is predominantly uncertainty with some concern; People who are highly limited from undertaking daily activities.</i></p>
Low	<p>Low levels of deprivation; many alternatives to a resource shared between the population and the project, existing narrowing inequalities between the most and least healthy; low levels of anxiety or concern (about project impacts) within the community; low proportion of people within community have disabilities limiting (but not preventing) daily activities; low proportion of dependents within the community requiring a lot of care; people with fair health status; and/or people with fair capacity to adapt to changes in health determinants.</p> <p><i>A community whose outlook is predominantly ambivalence with some concern; People providing or requiring some care.</i></p>
Very low/ Negligible	<p>Very low levels of deprivation; no shared resource between the population and the project, existing narrow inequalities between the most and least healthy; support for the project within the community; limited number of people within community have disabilities limiting (but not preventing) daily activities; independent people (not a carer or dependent); people with good health status; and/or people with high capacity to adapt to changes in health determinants.</p> <p><i>A community whose outlook is predominantly support with some concern</i></p>

The criteria for defining magnitude are outlined in Table 8-5 adopted from the TII Population and Human Health Standard (Table 5.13), with supplementary considerations from IEMA 2022 guidance to ensure a comprehensive evaluation. Additional considerations from IEMA 2022 guidance have been included in italics.

Table 8-5: Health Magnitude Methodology Criteria

Category/ Score	Indicative criteria
High	High exposure or scale, permanent or long-term duration; continuous event; severity of impact related to changes in morbidity (physical or mental health) for very severe illness/injury outcomes <i>or mortality</i> ; majority of the population affected; substantial changes to service quality that impacts health outcome; <i>permanent change</i>
Medium	Medium exposure or scale; medium-term duration, frequent event; severity of impact related to moderate change in quality of life; large minority of the population affected, moderate changes to service quality that impacts health outcomes; <i>gradual reversal</i>
Low	Low exposure or scale; short-term duration, occasional event; severity of impact related to limited change in quality of life; small minority of the population affected, limited changes to service quality that impacts health outcomes; <i>rapid reversal</i>
Negligible	Negligible exposure or scale; very short-term duration, one off frequency event; severity of impact related to negligible change in quality of life; very few people affected, no changes to service quality that impacts health outcomes; <i>immediate reversal once activity is complete</i>

The criteria for defining significance are outlined in Table 8-6 adopted from the TII 2025 Standard and the IEMA 2022 guidance.

Table 8-6: Assessment Matrix (Indicative)

Magnitude of Impact	Sensitivity			
	High	Medium	Low	Negligible
High	Major	Moderate or major	Moderate or minor	Minor or negligible
Medium	Moderate or major	Moderate	Minor	Minor or negligible
Low	Moderate or minor	Minor	Minor	Negligible
Negligible	Minor or negligible	Minor or negligible	Negligible	Negligible

The IEMA four-category criteria for defining significance are set out in Table 8-7. These are related to the EPA seven-scale significance terminologies shown in Figure 8-5 below, which informs the TII 2025 Standard.

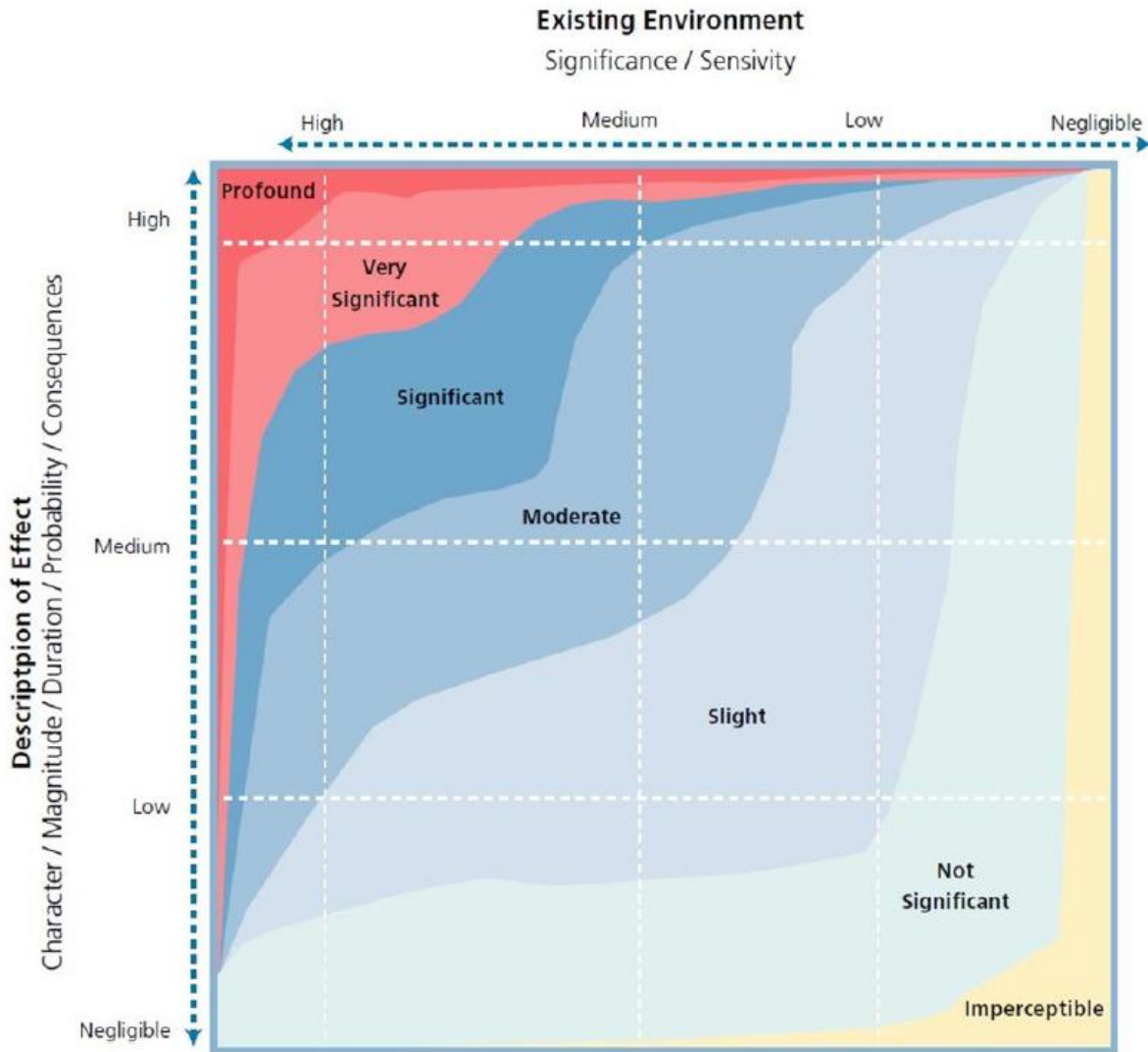


Figure 8-5: EPA Significance of Effect Matrix- Informs the TII, (2025) Approach to Assessing Significance

Where the matrix offers more than one significance option, professional judgement is used to decide which option is most appropriate. How the EPA seven-category significance terminologies correspond with the IEMA four-category significance terminologies is set out in Table 8-7 to ensure compatibility across these approaches.

Table 8-7: Health Significance Methodology Criteria

IEMA four-category terminologies	Indicative criteria	EPA seven-category terminologies
Major (significant)	<p>The narrative explains that this is significant for public health because (select as appropriate):</p> <ul style="list-style-type: none"> ▪ Changes, due to the project, have a substantial effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size (magnitude and sensitivity scores), and as informed by consultation themes among stakeholders, particularly public health stakeholders, that show consensus on the importance of the effect. ▪ Change, due to the project, could result in a regulatory threshold or statutory standard being crossed (if applicable). ▪ There is likely to be a substantial change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a causal relationship between changes that would result from the project and changes to health outcomes. ▪ In addition, health priorities for the relevant study area are of specific relevance to the determinant of health or population group affected by the project. 	Profound/Very Significant
Moderate (significant)	<p>The narrative explains that this is significant for public health because (select as appropriate):</p> <ul style="list-style-type: none"> ▪ Changes, due to the project, have an influential effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size, and as informed by consultation themes among stakeholders, which may show mixed views. ▪ Change, due to the project, could result in a regulatory threshold or statutory standard being approached (if applicable). ▪ There is likely to be a small change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a clear relationship between changes that would result from the project and changes to health outcomes. ▪ In addition, health priorities for the relevant study area are of general relevance to the determinant of health or population group affected by the project. 	Significant/Moderate (it is a professional judgement whether moderate is significant or not significant in EIA terms in a given context).
Minor (not significant)	<p>The narrative explains that this is not significant for public health because (select as appropriate):</p> <ul style="list-style-type: none"> ▪ Changes, due to the project, have a marginal effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size of limited policy influence and/or that no relevant consultation themes emerge among stakeholders. ▪ Change, due to the project, would be well within a regulatory threshold or statutory standard (if applicable); but could result in a guideline being crossed (if applicable). ▪ There is likely to be a slight change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is only a suggestive relationship between changes that 	Slight/Not significant (it is a professional judgement whether slight is significant or not significant in EIA terms in a given context).

IEMA four-category terminologies	Indicative criteria	EPA seven-category terminologies
	<p>would result from the project and changes to health outcomes.</p> <ul style="list-style-type: none"> ▪ In addition, health priorities for the relevant study area are of low relevance to the determinant of health or population group affected by the project. 	
<p>Negligible (not significant)</p>	<p>The narrative explains that this is not significant for public health because (select as appropriate):</p> <ul style="list-style-type: none"> ▪ Changes, due to the project, are not related to the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size or lack of relevant policy, and as informed by the project having no responses on this issue among stakeholders. ▪ Change, due to the project, would not affect a regulatory threshold, statutory standard or guideline (if applicable). ▪ There is likely to be a very limited change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is an unsupported relationship between changes that would result from the project and changes to health outcomes. ▪ In addition, health priorities for the relevant study area are not relevant to the determinant of health or population group affected by the project. 	<p>Imperceptible/ Not significant</p>

A single assessment conclusion on significance is reached for each determinant of health. This conclusion has regard to the potential for significant health inequalities by considering effects to both the general population and vulnerable group sub-populations. This aligns with the approach recommended by TII 2025 and IEMA 2022.

8.6.6 Key Parameters for Assessment

A proportionate and evidence-based approach to the EIA health chapter scoping has been undertaken. Scoping has followed the IEMA 2022 list of determinants of health and population groups (Pyper et al., 2022a). The list of determinants in IEMA 2022 aligns with the types of determinants identified by the TII 2025 Standard in Figure 2.4.

This chapter covers the following issues:

- **‘Bio-physical environment’**, the following are considered:
 - **Changes to local air quality** (road and construction traffic emissions and potential dust nuisance) are discussed. Including both potential for adverse effects during construction and redistributed effects during operation. For example, the potential for benefits of less traffic, including HGVs, and less congestion that may improve air quality in the areas of higher population density, i.e. within bypassed communities.
 - **Changes in noise exposure** are discussed, particularly night-time noise that may be detrimental to population health where sleep is disturbed to a high degree. Changes in the distribution of day-time noise are also considered in relation to chronic effects of transport noise on health. The latter may include the potential to change levels of traffic noise near to schools, where educational outcomes for young people are considered.
- **Health related behaviours:** The effects on active travel and physical activity are considered. This includes any disruption to active travel routes during construction; as well as the enhancements that support physical activity from the finished scheme. Supporting people to be active, and the amenity value of the routes or facilities, is an important determinant of physical and mental health.

- **Social environment:** Changes in local transport nature and flow rates are considered, particularly in relation to the schemes benefits to road safety. Other considerations include the influence on journey times that may affect routine or emergency healthcare access. The potential for benefits to community cohesion and social capital within bypassed communities from reduced dominance of road traffic in public spaces are considered. Community identity is a determinant of wellbeing and is influenced by aesthetic elements of the landscape and townscape. There is potential for a range of effects.
- **Economic environment:** Good quality employment and levels of income are strong predictors of health, including for dependants. Dependants include vulnerable groups such as children, the frail elderly and people with long-term health conditions that require high levels of care. The assessment considers how the Proposed Development affects direct, indirect and induced employment opportunities (positively and negatively), and what influence this may have on population health.

8.6.7 Limitations of the Assessment

The population health assessment partially draws from and builds upon the technical outputs from the air quality, noise, material assets and transport assessment appendices, and as a consequence are bound by the same limitations and assumptions therein applied. It is, however, considered that the information available provides a suitable basis for assessment.

The baseline provides a description of the population, including metrics that relate to particular health outcomes relevant to vulnerability. However, some individuals or groups of people may not conform to this overall profile.

This assessment is based on publicly available statistics and evidence sources. No new primary research or bespoke analysis of non-public data was undertaken for the assessment. The approach taken aligns as far as reasonably practicable with TII 2025 and IEMA 2022 guidance and is considered appropriate and proportionate.

The assessment of effects on human health relies on the use of reasonable assumptions, professional judgement, and the above guidance to determine the significance of effects.

The methods take into account that a change in a determinant of health does not equate directly to a change in population health outcomes. Rather the change in a determinant alters risk factors for certain health outcomes. The assessment considers the degree and distribution of change in these pathways. The analysis of health pathways focuses on the risk factors and health outcomes that are most relevant to the determinants of health affected by the Proposed Development. As there are both complex and wide-ranging links between determinants of health, risk factors and health outcomes, it would not be proportionate or informative for an assessment to consider every interaction.

The health chapter has been informed by wider consultation for the Proposed Development and good practice methods have been used to proportionately reflect HIA elements as appropriate to EIA, these include a wider determinants of health scope and consideration of vulnerable groups and health inequalities. Such limitations do not affect the robustness of the assessment for EIA purposes.

The following steps have been taken to allow confidence in the EIA health assessment conclusions:

- Methods are used that combine different types of evidence and expert opinions to inform the assessment.
- The scientific literature reviews undertaken give priority to high quality study design, such as systematic reviews and meta-analysis, and strength of evidence.
- Quantitative inputs for other assessments have been used, which included model validation, as described in other chapters.
- The health assessment has been cautious, with conservative assessments, for example in taking account of non-threshold effects and vulnerable group findings.
- The health assessment has been transparent in its analysis and follows good practice.

Regarding the application of the precautionary principle in public health, this is discussed by the WHO (World Health Organization, 2004). The WHO note how the precautionary principle is a two-stage test, requiring both uncertainty and serious threats to health, i.e. large effect sizes indicated by available evidence. The WHO describe health impact assessments (such as this health assessment) as a “*compass to guide public health decisions under uncertainty*” and that “*a centrepiece of precautionary assessment is environment and health assessment, which weighs the science of hazards and exposure. In this step, evidence of risk and uncertainty is examined to determine the possibility (and plausibility) of a significant health threat and the need for precautionary action.*” Such an approach has been taken by this health assessment, which considers levels of exposure, extent of the population exposed and the scale of change in relevant risk factors for health outcomes. The precautionary principle has been appropriately applied and there are no unassessed impacts with both uncertainty and serious threats to health.

Overall, the author is satisfied that the data and evidence available are sufficient to conduct a robust assessment of the likely significant effects outlined in this chapter. The information used provides an adequate basis for identifying, assessing, and drawing conclusions on the likely significant population health effects associated with the Proposed Development.

8.7 Scope of the Assessment

A proportionate and evidence-based approach to the health chapter scoping has been undertaken. Scoping has followed the IEMA list of determinants of health and population groups (Pyper et al., 2022a). The following issues are assessed in Sections 8.10 and 8.11:

Construction

- Air quality
- Noise and Vibration
- Open space, leisure and play
- Transport modes, access and connections
- Employment

Operations

- Air quality
- Noise
- Open space, leisure and play
- Transport modes, access and connections
- Community identity and society
- Employment
- Public understanding of risk

Effects which are not considered to have the potential for ‘likely significant population health effects’ have been scoped out of the Chapter 8 assessment. This is in line with a proportionate assessment as set out in guidance (Pyper et al., 2022a). A summary of the effects scoped out is presented in Table 8-8.

Table 8-8: Issues Scoped Out of the EIAR Human Health assessment

Potential impact	Justification
Health related behaviours	
Physical activity	<p>Construction: To avoid duplication of assessment on similar issues within the IEMA 2022 guidance, temporary disruption of access to public rights of way (PRoW) and open spaces, potentially affecting recreational activities and physical activity levels are considered under 'Open space, leisure and play' as described in Section 8.10.2.</p> <p>Operation To avoid duplication of assessment on similar issues within the IEMA 2022 guidance, community physical activity is addressed in Section 8.11.3.1 and Section 8.11.1.2.</p>
Risk taking behaviour	<p>Construction Issues of community health behaviours being detrimentally affected by the presence of the workforce are scoped out. This reflects a workforce of professionals who are assumed to return to their usual place of residence during periods of leave. The workforce is unlikely to be sufficiently large in number to affect local markets, e.g., for alcohol, cigarettes or gambling, to an extent which could significantly affect community health.</p> <p>Operation The scale of operational workforce numbers to check and maintain the Proposed Development are not anticipated to affect risk taking behaviour to an extent that could influence population health effect for the same reasons as stated for construction phase. This impact is therefore scoped out.</p>
Diet and nutrition	<p>Construction and Operation As confirmed in Chapter 15- Material Assets: Agriculture, the Proposed Development would result in temporary and permanent loss of agricultural land during construction and operation. However, when considered in the context of overall agricultural land use and food production at a national scale, the magnitude of this loss is not considered significant. The extent of farmland loss is not expected to affect agricultural output in a manner that would influence the availability, accessibility, or affordability of food, including healthy foods, at a population level. Accordingly, no significant population health effects related to diet and nutrition are anticipated as a result of the Proposed Development. This impact is therefore scoped out.</p>
Social environment	
Housing	<p>Construction The majority of workers are assumed to be based in the regional area, returning to their usual place of residence when not working. Where temporary accommodation is required, this would be existing B&B/hotel bed spaces, as is typical for the construction industry. It is not expected that use of temporary accommodation would be on a scale to significantly displace local residents; adversely affect seasonal tourism; or otherwise affect housing availability. There is not expected to be a loss of residential housing or permanent loss of outdoor spaces associated with dwellings. Housing effects are scoped out.</p> <p>Operation The scale of operational workforce numbers to check and maintain the Proposed Development are not anticipated to affect housing to an extent that could influence population health effects for the same reasons as stated for construction phase. This impact is therefore scoped out.</p>
Relocation	<p>Construction and Operation The Proposed Development includes land take associated with Compulsory Purchase Order (CPO). Chapter 16- Material Assets: Non-Agriculture considers the effect of CPOs on non-agricultural properties. Chapter 16 concludes that the Proposed Development will not result in a significant effect on non-agricultural properties when considered at a national or county level. While some individual-level effects related to property acquisition and relocation have been identified in Chapter 16, these effects are not considered to be of a scale or magnitude that would give rise to significant effects on population health. On this basis, relocation effects are scoped out of this chapter.</p> <p>CPOs relating to agricultural properties are scoped out as explained above under 'Diet and Nutrition'.</p>

Potential impact	Justification
Community safety	<p>Construction and Operation</p> <p>As shown in Table 20.6 and Table 20.7 of Chapter 20: Major Accidents and Disasters, all potential major accidents and disasters related to the construction and operation of the Proposed Development have been scoped out as there are no impacts likely to occur. For this chapter, where surface excavations are undertaken these would be within controlled work areas, including use of appropriate fencing and notifications as required. Best practice measures would be secured through suitable management plans. The risk to the public from accidental injury, e.g., falls or drowning is scoped out. There are not anticipated to be community safety or security issues associated with worker behaviour in communities. The Proposed Development will have appropriate safeguarding and modern slavery policies. The potential for widespread actual or perceived crime that could affect population health is unlikely. Electrical risks to the public would be avoided through the design, including fencing of above ground electrical infrastructure. These impacts are therefore scoped out.</p>
Community identity, culture, resilience and influence	<p>Construction</p> <p>Transient effects along the road network, including due to temporary lighting and temporary changes in views, are not expected to influence community identity or disrupt community gatherings to an extent that could affect population health. This impact is therefore scoped out.</p>
Social participation, interaction and support	<p>Construction and Operation</p> <p>The Proposed Development will not directly affect land used for community interaction (e.g., meeting places, village greens, community centres, that promote community voluntary, social, cultural or spiritual participation). As reported in Chapter 7: Population the Proposed Development is not anticipated to have significant impacts on nearby communities due to severance. This impact is therefore scoped out.</p> <p>Indirect impacts to facilities that support social participation, interaction and support including the Indian Community Centre, are assessed in Chapter 7: Population. To avoid duplication these have not been assessed here. This issue is therefore scoped out of the health assessment.</p>
Economic environment	
Education and training	<p>Construction</p> <p>The potential to adversely affect access to schools is limited as the Proposed Development is being built off-line away from residential and other sensitive receptors (including schools). A large influx for workers, including those bringing families, is not expected, so changes to educational capacity or quality are unlikely and are scoped out.</p> <p>Operation</p> <p>The scale of operational and maintenance road transport is not likely to affect journey times or access to schools. This impact is therefore scoped out. A large influx for workers, including those bringing families, is not expected, so changes to educational capacity or quality are unlikely and are scoped out.</p>
Bio-physical environment	
Climate change and adaptation	<p>Construction and Operation</p> <p>Embodied carbon and climate altering pollutant emissions are not of a scale to have the potential for population level effects associated with climate change. This impact is scoped out.</p>
Water quality or availability	<p>Construction and Operation</p> <p>The issue of effects to public drinking water infrastructure is scoped out. This is on the basis that disruption of the existing water utilities network will be avoided, including through diversions if appropriate, see discussion under 'built environment'.</p>
Land quality	<p>Construction and Operation</p> <p>Construction works, as well as materials handling and storage arrangements associated with the proposed changes is such as to ensure that the soil environment remains protected and in accordance with existing planning conditions.</p> <p>Occupational risk will be managed in line with health and safety legislation, including standard best practice protective equipment and management measures. Operational activities are not anticipated to result in public exposures to contaminated soils as no soil movement or disruption is anticipated and any pollution linkage pathways to soils are avoided by appropriate mitigation.</p>

Potential impact	Justification
	Operation activities are unlikely to require excavations or result in land quality related risks to public health. This impact is therefore scoped out.
Institutional and built environment	
Health and social care services	<p>Construction</p> <p>Effects on health and social care are scoped out. The construction workforce is assumed to comprise predominantly workers resident within the regional area, as set out in Chapter 7: Population. Construction workers resident in Ireland would have access to healthcare services through Health Service Executive (HSE) entitlements and/or private health insurance, irrespective of their place of residence.</p> <p>The Proposed Development is not expected to result in large-scale in-migration of workers with dependants who would require access to local health or social care services. Health protection measures such as screening and immunisations are expected to continue from the workers' usual place of residence. Similarly, routine dental appointments are assumed to be with the worker's dental practice close to their usual place of residence.</p> <p>As no large-scale population influx is anticipated, the Proposed Development is not expected to generate additional demand on local health or social care services during construction. While facilities such as St Joseph's Hospital, and Archview Lodge Nursing Home are recognised as sensitive receptors and have been considered in relation to potential air quality, noise and equity impacts during construction (see Section 8.10.1.1, Section 8.10.1.2 and Appendix 8.1), impacts on health and social care services from increased service demand are scoped out.</p> <p>Impacts on access to health and social care services during construction are assessed under Transport modes, access and connections in section 8.10.3.1. To avoid duplication, this issue is scoped out here.</p> <p>Operation</p> <p>Minimal operational workforce numbers are anticipated to operate and maintain the road network. Accordingly, no measurable increase in population or service demand is anticipated. The Proposed Development is therefore not considered likely to result in significant population-level effects on health or social care services during operation. This issue is therefore scoped out.</p> <p>Impacts on access to health and social care services during operation are assessed under Transport modes, access and connections in section 8.11.3.1. To avoid duplication, this issue is scoped out here.</p>
Built environment	<p>Construction</p> <p>The potential for the project to affect existing features of the built environment that are supportive of population health has been considered and scoped out. The Proposed Development would have a relatively low impact. Similarly, the position of existing services, such as water and sewer systems will be taken into account in planning the construction techniques used. Appropriate diversions will occur to avoid disruption to such services. This impact is therefore scoped out.</p> <p>Operation</p> <p>The Proposed Development's infrastructure would have a very limited long-term impact on land use patterns, with the main change relating to the new road network. Appropriate buffer zones will be maintained between the road network and communities. These impacts are therefore scoped out.</p>
Wider societal infrastructure and resources	<p>Construction</p> <p>The Proposed Development would not generate public health benefits at this stage. This issue is scoped out.</p> <p>Operation</p> <p>To avoid duplication of assessment on similar issues within the IEMA 2022 guidance, the operational transport infrastructure benefits are assessed under the 'Transport modes, access and connections' and 'Open space, leisure and play' health determinants in Section 8.11.2. 'Wider societal infrastructure and resources' as a health determinant is scoped out.</p>

8.8 Existing Environment

The Proposed Development comprises three sections of strategic transport corridors in Donegal that form the TEN-T Priority Route Improvement Project as prioritised in the NPF (Project Ireland 2040) and the National Development Plan 2018-2027 (Government Ireland, 2018).

The three sections are summarised as follows:

- **Section 1** – N15/N13 Ballybofey / Stranorlar Urban Region
- **Section 2** – N56/N13 Letterkenny to Manorcunningham
- **Section 3** – N14 Manorcunningham to Lifford / Strabane / A5 Link

Subsequent sections of this chapter describe the existing environment as it relates to the entire Proposed Development, as well as the three separate sections as set out above where appropriate.

8.8.1 Human Health Baseline

Different communities have varying susceptibilities to health impacts and benefits as a result of social and demographic structure, behaviour and relative economic circumstances.

The aim of the following information is primarily to put into context the local health circumstances of the communities surrounding the Proposed Development, drawing from available statistics. Where possible, data has been collected for the ED, to compare against the national (Ireland) average.

The baseline data presented below reflects average values calculated for each road section within the Proposed Development. A detailed breakdown of the individual data for each ED is included in Appendix 8.2 of this chapter for further reference.

For Section 1, data from the EDs of Dooish, Goland, Stranorlar, Lettermore, and Convoy were compiled and averaged to produce the overall figures presented.

For Section 2, the average values were calculated using data from Letterkenny Rural, Magheraboy, and Manorcunningham.

For Section 3, the average values were calculated using data from Manorcunningham, Kincaig, Treantaghmucklagh, Feddyglass, Clonleigh North, and Clonleigh South EDs.

The baseline is a reference point for judging changes due to the Proposed Development. It aids in identifying, informing and refining healthy urban design features tailored to support local community health needs, and the delivery of public health objectives/priorities.

Other aspects of baseline conditions, that are pre-cursors to health outcomes, are set out in:

- Chapter 6: Traffic & Transportation: Existing severance caused by congestion and delays, road traffic accident hotspots.
- Chapter 12: Air Quality (Section 12.5).
- Chapter 14: Noise & Vibration on sensitive receptors.
- Chapter 7: Population (Section 7.3) on residential properties, public rights of way (non-motorised users), nursing/care homes, schools, sports and leisure facilities, places of worship.

These are not duplicated here.

The following indicators are presented and have informed conclusions on population health sensitivity. These indicators link to relevant health outcomes; however public health indicators are not available for all

health outcomes considered by this assessment. Whilst small area data is the most informative for project level effects, the available indicators do not all have this resolution. The summary provided is proportionate and appropriate for impact assessment purposes.

8.8.1.1 Life Expectancy and Relevant Physical Health Indicators

8.8.1.1.1 Life Expectancy

Recent (2022) life expectancy statistics are only available at the national (Ireland) level. Life expectancy in Ireland at birth in 2022 was 80.9 for males and 84.2 for females. Life expectancy is increasing with male life expectancy consistently lower than female life expectancy (Figure 8-6).

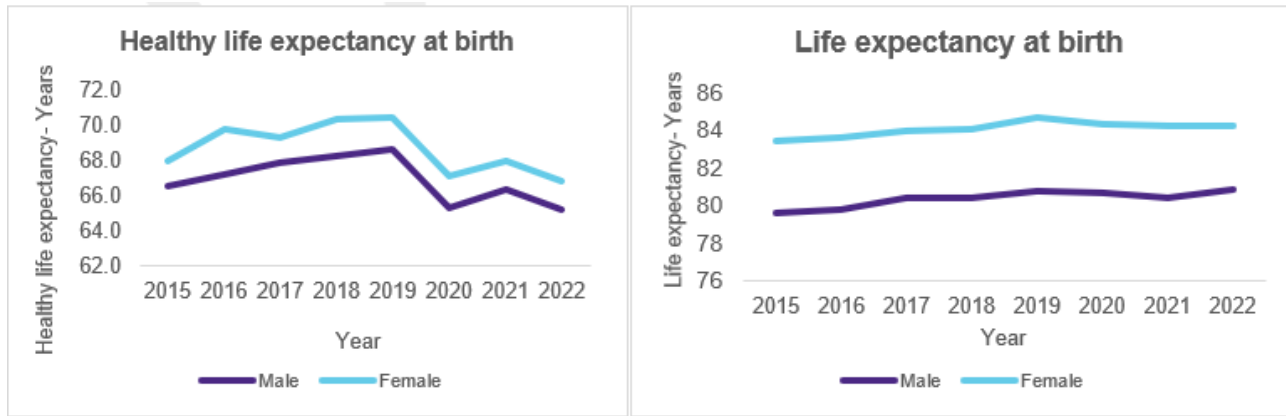


Figure 8-6: Healthy life expectancy (left) and life expectancy at birth in Ireland (right): (Source - (Central Statistics Office, 2024; Eurostat, 2023))

Healthy life expectancy (HLE) statistics (i.e. the number of years a person is in good health) are only available at the national (Ireland) level. Healthy life expectancy for both males and females has been increasing over the past decade (between 2009 and 2019). However, there is a decrease in healthy life expectancy (HLE) for both males and females in 2020, which is likely attributable to the Covid-19 pandemic. In 2022, healthy life expectancy in Ireland was 65.2 for males 66.8 for females, a decline from 2021.

8.8.1.1.2 General Health Status

The self-reported health condition of all residents aged 16 years and above in the site-specific study area, the Donegal County and Ireland is depicted in Figure 8-7.

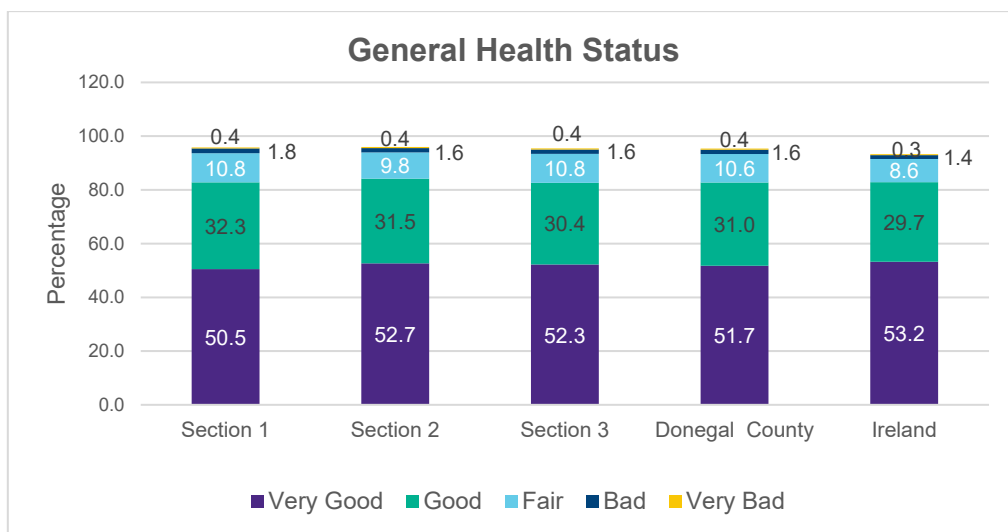


Figure 8-7: General Health Status in the site-specific study area (Source: Central Statistics Office, 2022a)

This figure illustrates that the majority of the population in each section reported being in very good or good health, consistent with national averages. A very small minority reported ‘bad health’ (1.6 -1.8%) and ‘very bad health’ (0.4-0.5%). Ireland generally has a higher population reporting “very good” health and the lowest “fair” and “bad” health, compared to Donegal and the individual sections. However, general health in the site-specific study area remain broadly in line with the national trends.

8.8.1.1.3 Disability

Figure 8-8 shows the percentage of people reporting a disability across different sections of the proposed road development, Donegal County, and Ireland.

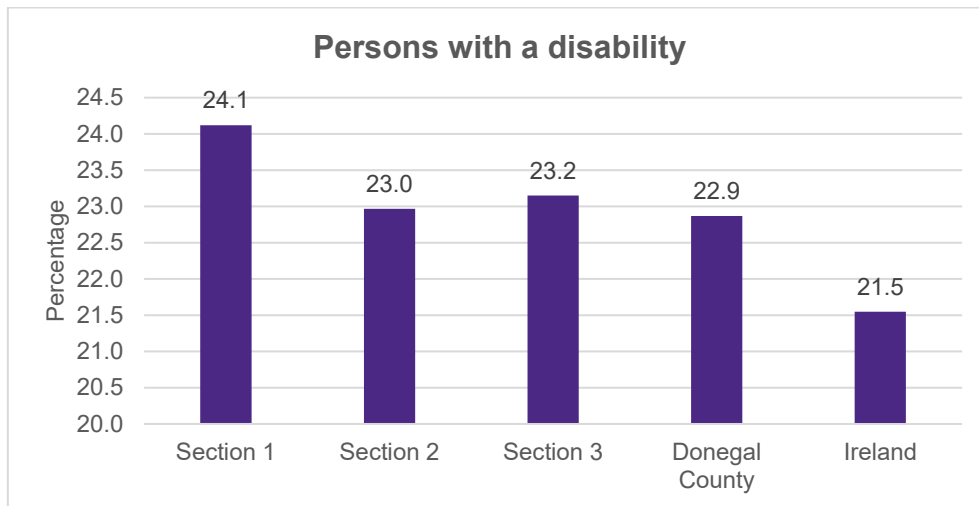


Figure 8-8: Persons with disability in the site-specific study area (Source: Central Statistics Office, 2022a)

Section 1 has the highest percentage (24.1%), exceeding both the Donegal (22.9%) and national (21.5%) averages. Sections 2 (23.0%) and 3 (23.2%) have similar disability rates to Donegal but remain slightly above the national average. This suggests that disability prevalence is generally higher in the site-specific study area compared to Ireland as a whole, with Section 1 having the most significant difference.

8.8.1.1.4 Morbidity

The rate of procedures on the cardiovascular and respiratory systems in Donegal County is illustrated in Figure 8-9 and used as a proxy for morbidity in the study area.

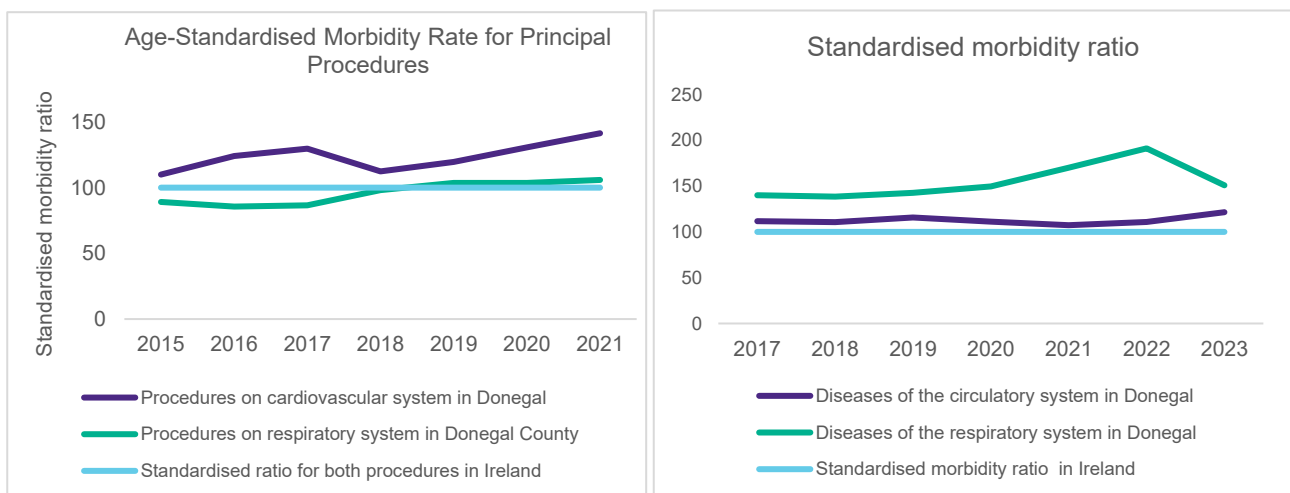


Figure 8-9: Age standardised rate for principal procedures and standardised morbidity ratio in Donegal (Source: (Central Statistics Office, 2023)

As shown in the left graph, procedures related to the cardiovascular system have fluctuated over the years between 2015 and 2021 but have consistently remained above the standard ratio for procedures in Ireland (100). An overall increase in the rate of cardiovascular procedures is observed from 2015 to 2021, rising from 110 to 141 per 100,000 population. On the other hand, procedures related to the respiratory system were below the national standard ratio for Ireland between 2015 and 2018, with a slight increase observed from 2019 to 2021, rising from 98 to 106 per 100,000 population, slightly above the national standard rate.

The right graph shows the standardized morbidity ratio for diseases of the circulatory and respiratory systems. Both diseases have consistently been above the national standard ratio for Ireland from 2017 to 2023, with respiratory diseases being the highest. A slight increase is observed in diseases of the circulatory system between 2022 and 2023, rising from 111 to 121 per 100,000 population. A decline is observed in diseases of the respiratory system, dropping from 191 to 150 per 100,000 population, though both remain above the national standard ratio.

As shown in Figure 8-10, the morbidity ratio for road accidents in Donegal County has consistently been higher than the national standard ratio for Ireland (100) from 2017 to 2023. The highest ratio was recorded in 2022, at 131.59 per 100,000 population, exceeding the national standard. In 2023, a decline was observed, with the ratio falling to 120.99 per 100,000 population; however, this figure still remains above the national average.

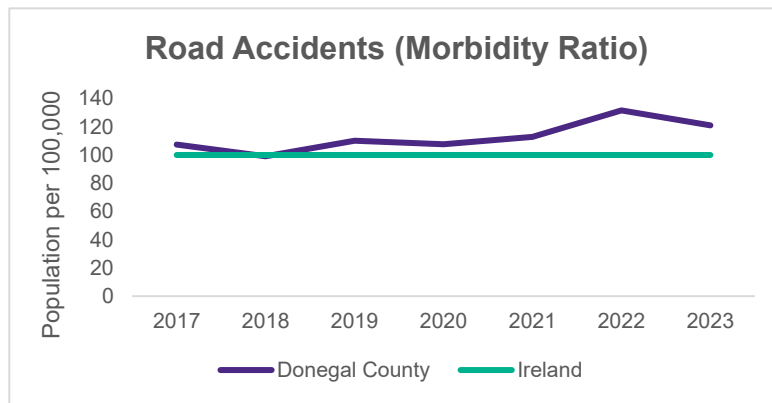


Figure 8-10: Morbidity ratio for land transport accidents in Donegal County in comparison to Ireland (Source: (Central Statistics Office, 2023))

8.8.1.1.5 Mortality

Overall, the age standardised all-cause mortality rate in Donegal County (927.98 per 100,000 population) is slightly lower than the national average (936.84 per 100,000 population) in 2022, and has fluctuated between low and high between 2015 and 2022. This is illustrated in Figure 8-11.

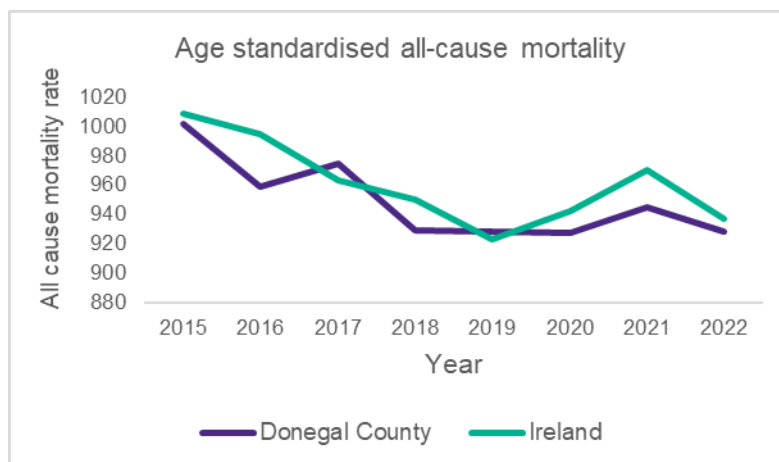


Figure 8-11: Age-standardised all-cause mortality for Donegal County and Ireland: (Source Central Statistics Office, 2022b)

Mortality from circulatory diseases in Donegal County has fluctuated over the years from 2017 to 2022. A slight decline in the rate was observed in 2022 from 285.89 to 244 per 100,000 population, which is slightly lower than national average of 265.82 per 100,000 in 2022. This is illustrated in Figure 8-12.

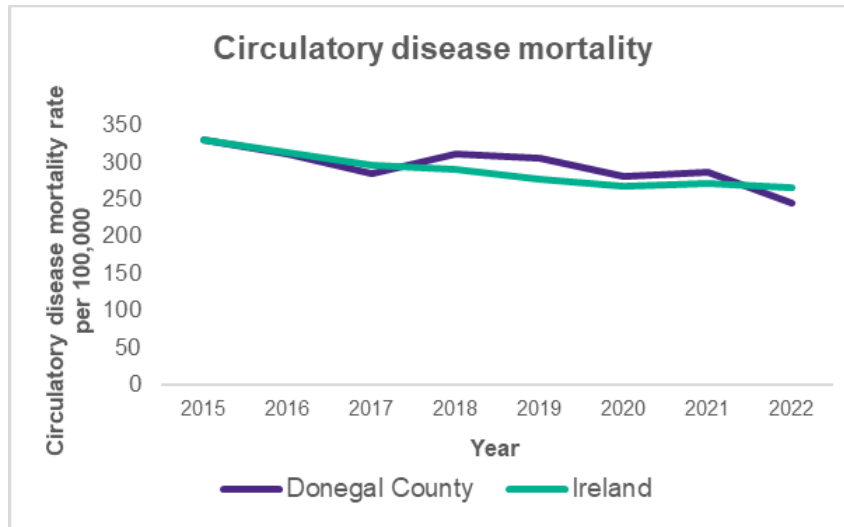


Figure 8-12: Circulatory disease mortality (Source- Central Statistics Office, 2022b)

As shown in Figure 8-13, mortality from respiratory diseases in Donegal County has been consistently lower than the national average between 2017 and 2022. An increase in respiratory disease mortality was observed between 2016 and 2017, with the rate higher than the national average during these years. Recent trends show a sharp increase from 83.86 per 100,000 deaths in 2021 to 94.61 in 2022. Despite this increase, respiratory mortality in Donegal County remained lower than the national average in 2022.

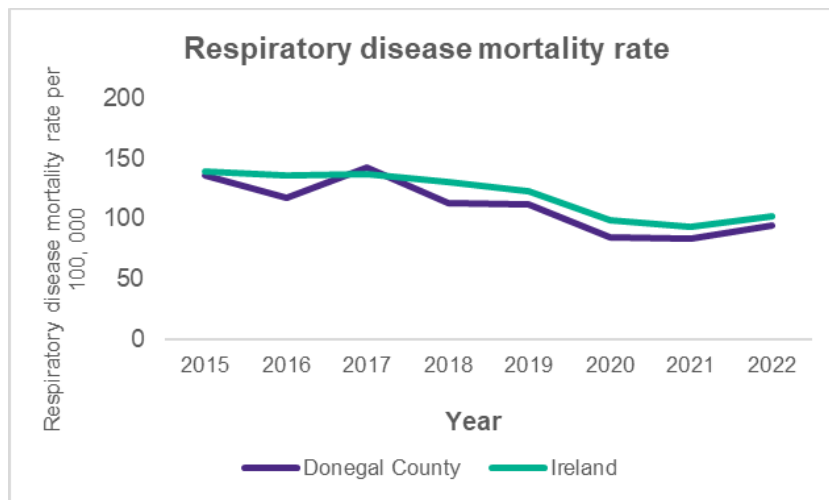


Figure 8-13: Respiratory diseases mortality rate in Donegal County and Ireland (Source: Central Statistics Office, 2023)

8.8.1.2 Employment

Figure 8-14 shows, labour force participation rates in Donegal have been consistently lower than the national average from 2011 to 2022 and unemployment rates have been consistently higher than the national average in the same period. However, a sharp decline in unemployment rate is observed in the county from 26% in 2011 to 10.6% in 2022, an improvement in the performance of the county. This aligns with the national trend.

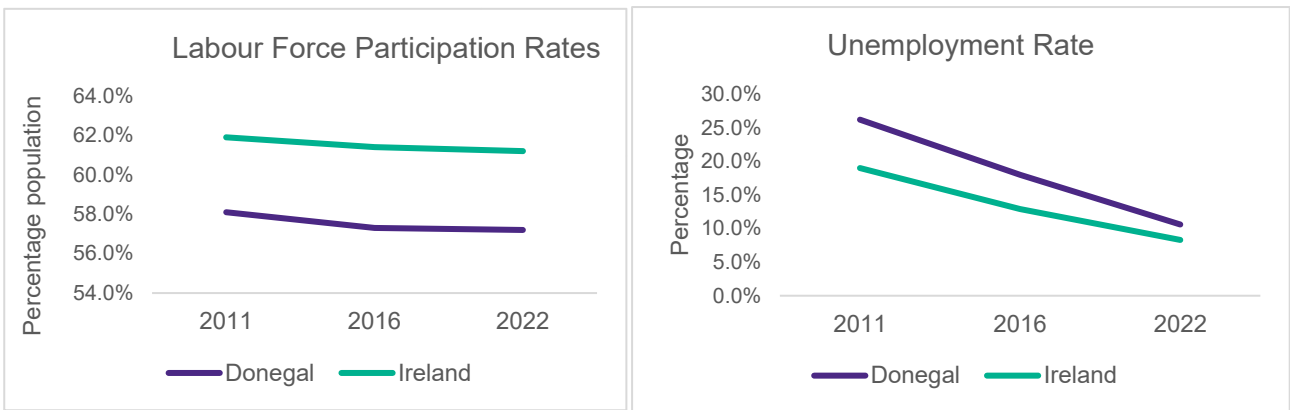


Figure 8-14: Employment (left) and unemployment (right) rates in Donegal County and Ireland
 (Source: Central Statistics Office, 2023)

8.8.1.3 Age distribution

Figure 8-15 illustrates the age distribution across different sections of the Proposed Development, in comparison to Donegal County and Ireland.

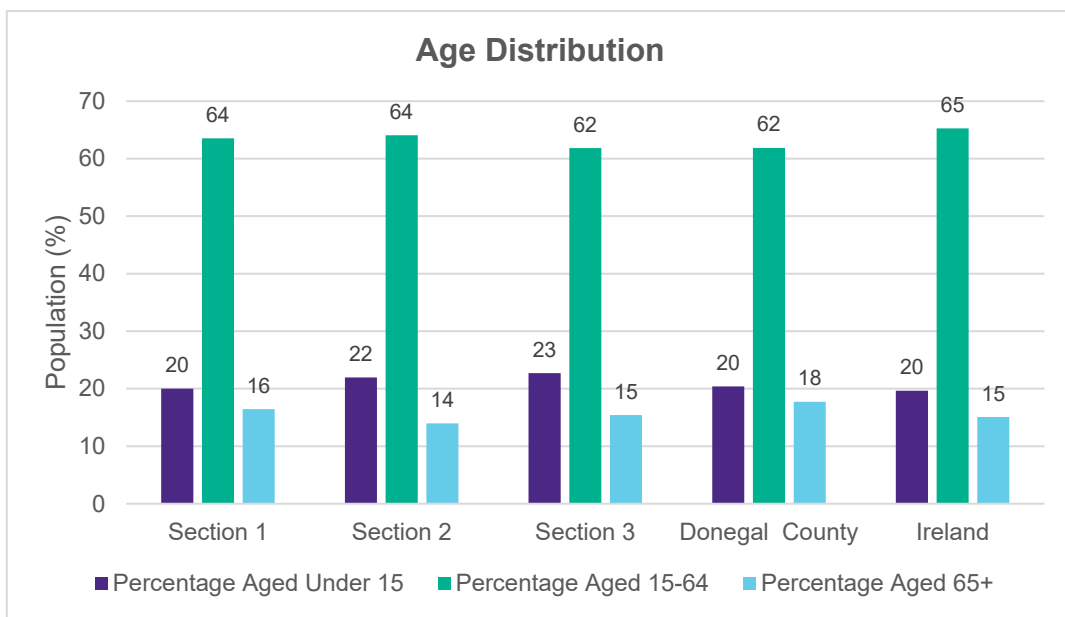


Figure 8-15: Age Distribution across the Proposed Development (Source: Central Statistics Office, 2022a)

The proportion of the population aged 0–14 in Section 1 (20%) is similar to that of Donegal County (20%) and Ireland (20%), while in Sections 2 (22%) and 3 (23%), it is slightly higher. Sections 1 and 2 both have a higher percentage of the population aged 15–64 (64%) compared to Donegal County (62%) but are similar to the national average (65%). In contrast, Section 3 (62%) has a slightly lower proportion of this age group than the national average. The percentage of the population aged 65 and over is relatively low across all sections, with Section 2 having the lowest at 14% and Section 1 the highest at 16%, both of which are comparable to the national average (15%). Overall, Sections 1 and 2 have a higher proportion of the working-age population (15–64), while Section 3 has the highest percentage of individuals aged under 15. The data suggests a younger demographic in Sections 2 and 3 relative to the overall averages for Donegal and Ireland.

8.8.1.4 Gender

In terms of gender distribution (Figure 8-16), Section 2 has a similar proportion of males (49.8%) compared to the county average (49.6%) and the national average (49.4%). Likewise, the percentage of females in Section 2 (50.2%) is consistent with the county average (50.4%) and the national average (50.6%). In contrast, Sections 1 and 3 have a higher proportion of males (50.4% and 50.9%, respectively) than the county and national averages, while the proportion of females is lower (49.6% and 49.1%, respectively).

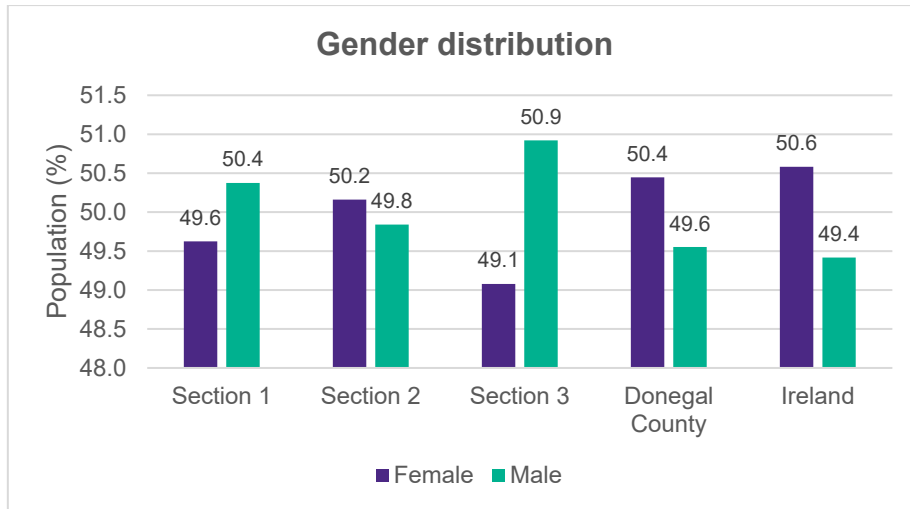


Figure 8-16: Sex Distribution in the Study Area (Source: Central Statistics Office, 2022a)

8.8.1.5 Ethnicity

Figure 8-17 presents the ethnic composition across different sections of the Proposed Development, in comparison to Donegal County, and Ireland.

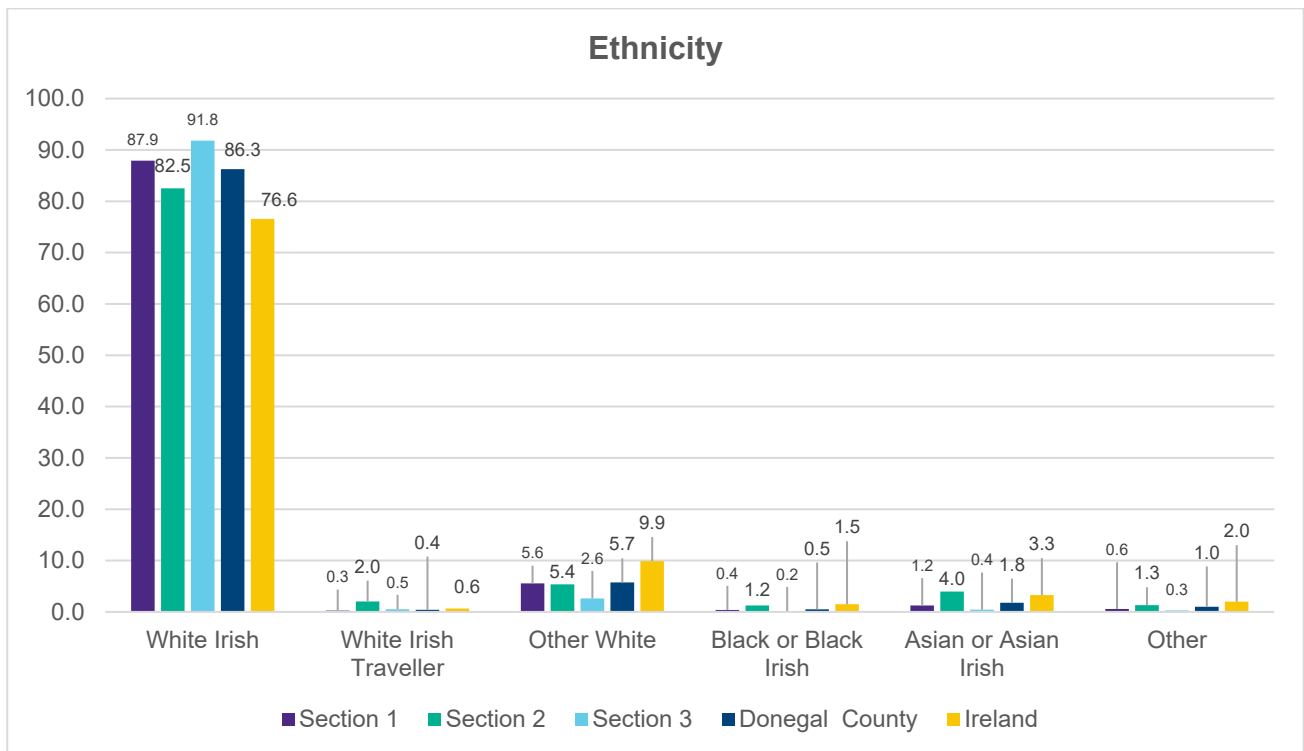


Figure 8-17: Ethnicity Distribution in the Study Area (Source: Central Statistics Office, 2022a)

The majority population in all areas is White Irish, with Section 3 having the highest proportion (91.8%), followed by Section 1 (87.9%) and Section 2 (82.5%), all exceeding the national average (76.6%). The White Irish Traveller population is highest in Section 2 (2.0%) compared to Donegal (0.4%) and Ireland (0.6%). Black or Black Irish and Asian or Asian Irish populations are minimal across the sections, with Section 2 having slightly higher percentages (1.2% and 4.0%, respectively) than Donegal and Ireland. Overall, the sections have a higher proportion of White Irish individuals compared to the national average, with some variation in minority representation, particularly in Section 2, which has the highest percentage of White Irish Travellers and Asian or Asian Irish populations.

8.8.1.6 Active Travel

Figure 8-18 shows, overall, active travel levels across the study area are lower than the county and national averages.

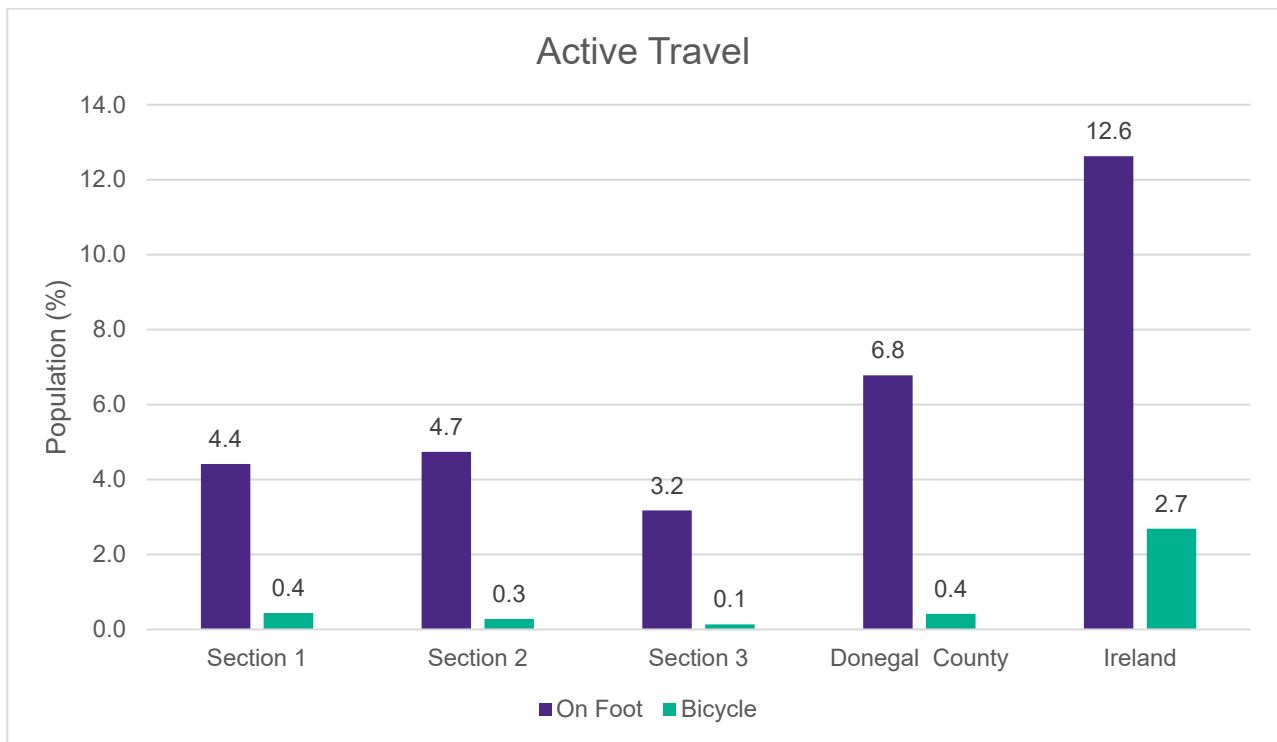


Figure 8-18: Active Travel to Either Work, School or College in the Study Area in Comparison to Ireland (Source: Central Statistics Office, 2022a)

An average of 4.4% of people in Section 1 travel to work, school, or college on foot, and 0.4% travel by bicycle. These averages are significantly lower than those for Donegal County (6.8% on foot and 0.4% by bicycle) and Ireland (12.6% on foot and 2.7% by bicycle). Similarly, in Section 2, an average of 4.7% of people travel on foot and 0.3% by bicycle, both of which are lower than the county and national averages. In Section 3, 3.2% of people travel on foot and 0.1% by bicycle, which is also lower than the county and regional averages and relatively low compared to other sections.

8.8.1.7 Northern Ireland Baseline Summary

Figures 19-24 of Appendix 8.2 illustrate the baseline health data for data zones in Northern Ireland that are in proximity to Section 3 of the Proposed Development. This has been included in relation to consideration of transboundary and cumulative effects, which are assessed in Chapter 19: Interactions & Cumulative Effects. Overall, general health in Sperrin EA and its data zones closely aligns with the national average, with half the population (40-50%) reporting 'very good' health and a third (26-30%) reporting 'good' health. Only a tenth of the population reports either being in 'bad' or 'very bad' health (8-13%).

Regarding disability and long-term health conditions, the majority of the population reports not being limited by any disability or long-term health condition. However, Sperrin C (14% and 13%), Sperrin E (16% and 17%) and Sperrin H (16% and 19%) data zones show a high proportion of the population reporting to be either 'limited a little' or 'limited a lot' by a disability compared to the national average (13% and 11%).

In assessing age distribution, Derg A Data Zone has the highest proportion of young people (24%), while Sperrin E has the lowest at 14%. Sperrin H has the highest elderly population, with 24% aged 65 and above whereas Derg A has the lowest at 9%. Overall, the population distribution shows that approximately 20% of the population is aged 0-14, 65% are aged between 15-64, and 18-20% are aged 65 and above. The majority of the population in the data zones and Sperrin EA are White, with only a very small proportion of the population (0-3%) belonging to other ethnic groups.

Considering active travel, Sperrin H Data Zone has the highest proportion of people who walk or cycle to work (18%) or school (40%). These are higher than the national averages for Ireland, where 7% walk or cycle to work and 21% walk or cycle to school. Sperrin E also has a higher population who walk or cycle to work (16%) and to school (26%). In contrast, Sperrin C, Derg A, Sperrin D have lower rates of active travel compared the national averages

8.8.1.8 Deprivation

Deprivation² statistics are derived for EDs within sections 1, 2 and 3 of the Proposed Development, using the Pobal All-Island HP Deprivation Index (2019). As shown in Figure 8-19, deprivation levels in the study area are relatively high with all EDs in Section 1 and Section 2 ranking as 'Marginally below average'. Three EDs in Section 3 including Kinraigy, Clonleigh North and Clonleigh South show even higher deprivation compared to other EDs, ranking as 'Disadvantaged'. The remaining EDs in Section 3, also categorise as 'Marginally below Average'. Donegal County also ranks as 'Marginally below average', suggesting overall high deprivation in the study area. Deprivation is further discussed as part health equity assessment in Appendix 8.1.

8.8.1.9 Sensitive receptors

The following sensitive receptors to the Proposed Development changes as reported in Chapter 12: Air Quality and Chapter 7: Population are noted. These are indicative facilities that confirm the presence of vulnerable group populations for the health assessment. In addition, there will be sensitive individuals in all communities whose health may be disproportionately affected by changes in the environment and social conditions arising from the Proposed Development.

Section 1 of the Proposed Development:

- Tiny Tots Playgroup
- Beechwood Pre-school
- Scoil Naisunta Seiseadh Ui Neill
- Scoil Mhuire
- Dooish National School
- Robertson National School
- Finn Valley College
- St Columbas College
- Our Lady of Perpetual Succour
- Church of Mary Immaculate
- Stranorlar Presbyterian Church

² Derivation reflects an increased sensitivity due to lack of ownership of or access to assets, including those that support good health. Deprivation differences between areas are indicative of social gradients, which are central to the consideration of health inequalities.

- Stranorlar Reformed Presbyterian Church
- St, Mary's Church or Ireland
- Strangriff House Nursing Home

Section 2 of the Proposed Development:

- Wonder Years Childcare Centre
- St. Patricks National School (Drumkeen)
- Ballyraine National School
- Letterkenny Institute of Technology
- Letterkenny Christian Fellowship
- Letterkenny Indian Community Centre
- Archview Lodge Nursing Home

Section 3 of the Proposed Development:

- Naomi Colmcille/Drumoghill National School
- Ray National School
- St Patricks National School (Murlough)
- Lifford National School
- The Moss, Drumoghill Football Club
- Busy Bee Playschool
- Lifford Community Hospital
- St. Columba's RC Church
- St. Patrick's Church, Clonleigh Parish
- Ballindrait Presbyterian Church

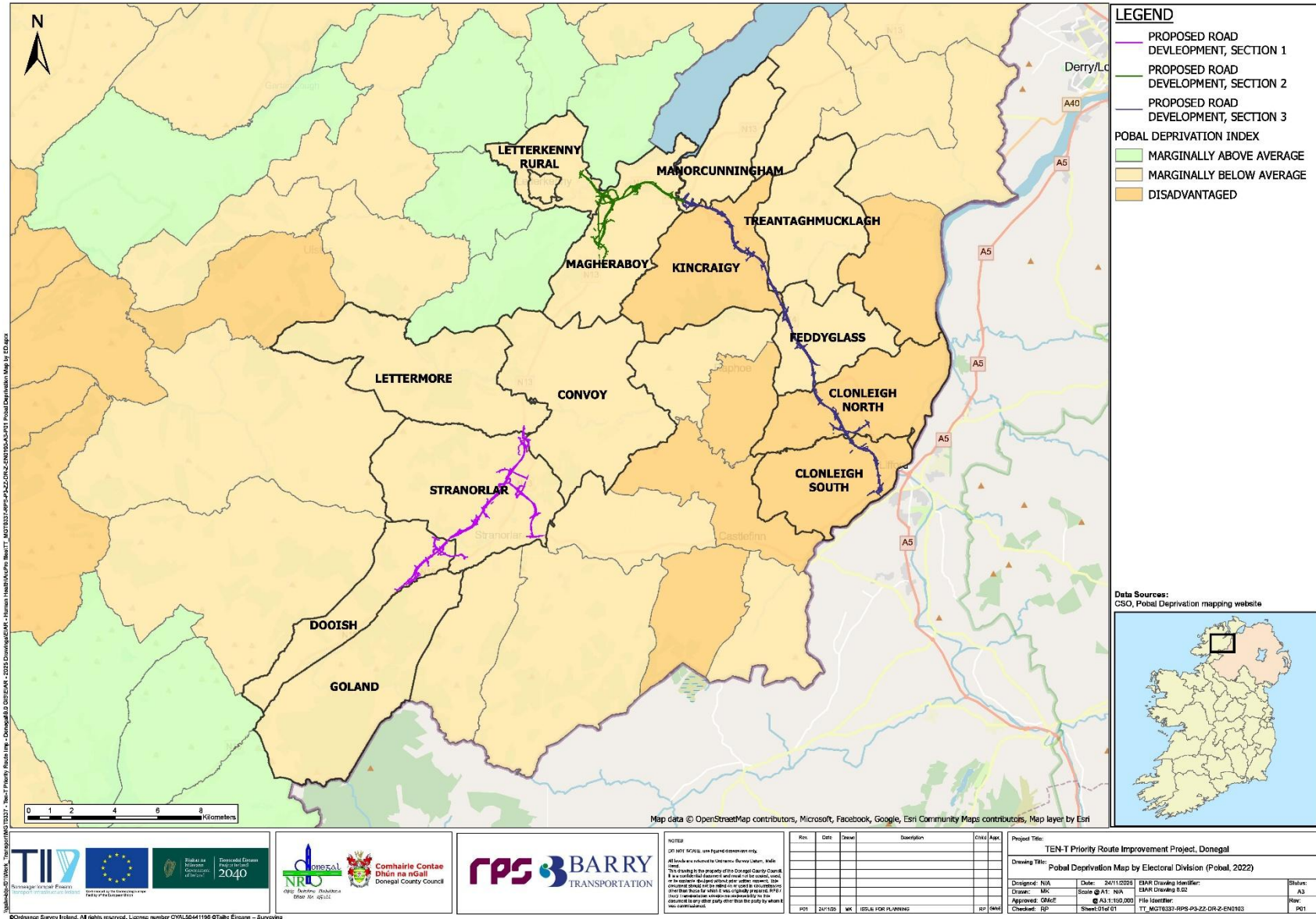


Figure 8-19: Pobal Deprivation Map by Electoral Division (Pobal, 2022b)

8.9 Literature on Relevant Health Determinants

The following evidence summarises key points from the scientific literature that have been taken into account in reaching professional judgments as to the likely significant population health effects of the Proposed Development.

A scoping literature review of relevant determinants of health was undertaken to inform the professional judgments of the human health assessment. The project relates to health determinants and vulnerable groups that are relatively well established and understood by public health. Consequently, detailed bespoke literature reviews were not required. The literature reviews undertaken used PubMed and Google Scholar, focusing on literature from the past 15 years in English. A PICO search strategy was used focusing on determinant of health and vulnerable group terminologies from the IEMA 2022 and IPH 2021 guidance as search terms. To ensure good quality studies were used the review focused on findings from systematic reviews and meta-analyses where these are available. Grey literature was avoided. To ensure good strength of evidence the review focused on studies that reported good aetiology and strength of effect. To ensure external validity UK context studies were favoured, although other high-income country contexts were also considered. These study selection decisions were pragmatic professional judgements appropriate to a scoping review. The results were critically appraised by the HIA team to ensure a balanced representation of scientific consensus.

8.9.1 Biophysical Environment

8.9.1.1 Air Quality

Environmental air pollution is associated with increased risk of cardiovascular diseases. Environmental pollution exerts its detrimental effects on the heart by developing pulmonary inflammation, systemic inflammation, oxidative stress, endothelial dysfunction and prothrombotic changes (Meo and Suraya, 2015). The adverse effects on health of particulate matter (PM) and nitrogen dioxide (NO₂) indicates that the effects occur at air pollution concentrations lower than those in guidelines (WHO, 2021). Long term exposure to particulate matter is associated with incidence of coronary events, and this association persists at levels of exposure below the current European limit values (Cesaroni et al., 2014). The magnitude of the long-term effects of NO₂ on mortality is at least as important as that of PM_{2.5}. The role of NO₂ is independent of that of PM_{2.5} (Faustini et al., 2014). Age is the most consistent effect modifier of the association between short-term exposure to particulate matter and death and hospitalization, with older persons experiencing higher risks. In addition to physiological changes that accompany age, older persons likely have different indoor/outdoor activity patterns, occupational exposures, and social networks. The very young may also be susceptible. Children face higher risks because their biological systems are under development, they breathe more air per body weight than do adults, and they typically spend more time outdoors (Bell et al., 2013). Those with lower socio-economic status (SES) face higher particulate matter associated risks, although there is only limited/suggestive evidence for modification by educational level, income, and employment status. SES could modify particulate matter associated health risks through differences in access to health care, baseline health status, occupational exposures, and nutrition (Bell et al., 2013). The evidence suggests adverse effects of ambient air pollutants exposure (especially for PM) on type 2 diabetes and that diabetic patients might be more vulnerable to air pollutants exposure (Liu et al., 2019; Yang et al., 2020). Elevated air pollution episodes across a wide area are significantly associated with an increase in ambulance dispatch data, including those for cardiac arrest, all-respiratory, and asthma dispatches (Sangkharat et al., 2019).

8.9.1.2 Noise and Vibration

Noise is an important public health issue. It has negative impacts on human health and well-being and is a growing concern (Government of Ireland, 2018). Noise is pervasive in everyday life and can cause both auditory and non-auditory health effects (Basner et al., 2014). Noise is linked to health outcomes such as annoyance, sleep disturbance, cardiovascular and metabolic disease, and cognitive impairment in schoolchildren (Peris and Fenech, 2020; WHO, 2018). Physiologically, noise leads to oxidative stress, vascular dysfunction, autonomic imbalance, and metabolic abnormalities (Münzel et al., 2018b). Environmental noise can initiate physiological stress responses in an individual that leads to a cascade of effects including a rise in heart rate and in levels of stress hormones (Guski et al., 2017). These responses influence risk factors for cardiometabolic health issues including blood pressure, blood sugar and blood fats and long-term exposure may affect mental health and lead to diseases such as diabetes, heart attack, and stroke (Münzel et al., 2018b, 2018a, 2017).

According to a systematic review of evidence by the European Environmental Noise Guidelines, there's fairly strong evidence that road traffic noise can slightly increase the risk of ischaemic heart disease (a type of heart disease caused by narrowed arteries) (WHO, 2018). Some studies also suggest a small link with high blood pressure and stroke, though the findings are less consistent and not always strong (WHO, 2018). A consistent finding across many studies is that people exposed to road traffic noise often feel annoyed or disturbed by it, especially when noise levels rise above 50 decibels. Even though most of these studies relied on people's opinions and feelings, the association was strong and clear with increase in noise leading to increase in annoyance (WHO, 2018).

There is also strong evidence identifying an association between sleep disturbance and road traffic noise (WHO, 2018). Adults who live in noisy areas are more likely to report disturbed sleep, especially as noise levels rise at night. This includes having trouble falling asleep or waking up more often (WHO, 2018). In terms of vulnerable groups, the results from sleep studies in children have suggested that they are less likely to awaken to noise events than adults, with a difference in sensitivity of approximately 10 dBA (Basner and McGuire, 2018). While the link is clearer in adults, the evidence for sleep problems in children is much weaker (WHO, 2018). However, despite being less sensitive, children are still considered a vulnerable group due to their developmental state and also because of the difference in their sleep patterns. Children have earlier bedtimes and longer sleep durations than adults, which may overlap with periods not accounted for by night-time metrics (Basner and McGuire, 2018). Children are also more vulnerable for cognitive effects of noise. They are not per se more vulnerable as a group, but more at risk because of less-developed coping strategies, and they are in a sensitive developmental period. This is indicative of a life phase effect rather than an age effect. Children seem to be less vulnerable for awakenings due to noise but more vulnerable for physiological effects during sleep and related motility (van Kamp and Davies, 2013). Evidence does not indicate that the elderly are more vulnerable to noise in terms of annoyance and sleep disturbance. Age-specific comparisons rather show an inverted U-shaped relation and indicate that both young and older people are less at risk as far as annoyance and disturbance are concerned. But, possibly, the elderly are more vulnerable regarding cardiovascular effects, and this may be a combined effect of air pollution and noise (van Kamp and Davies, 2013).

8.9.2 Social environment

8.9.2.1 Open Space, Leisure, and Play

The availability of a natural environment and attractive views of nature within an individual's living environment are important contributors to physical activity. People's experiences in using the natural environment can enhance attitudes toward physical activity and perceived behavioural control via positive psychological states and stress-relieving effects, which lead to firmer intentions to engage in physical activity (Calogiuri and Chroni, 2014). Improvements in health behaviour influence health outcomes like mortality, chronic diseases, mental and obesity disorders (Salgado et al., 2020). Physical activity can improve cognitive and mental health, particularly improvements in physical self-perceptions, which accompanied enhanced self-esteem (Lubans et al., 2016). Access to greenspace has beneficial associations with all-cause and stroke-specific mortality, cardiovascular disease morbidity, cardiometabolic factors, mental health, low birth weight, physical activity and sleep quality (Yang et al., 2021). There is evidence of an inverse association between surrounding greenness and all-cause mortality. Physical activity may explain only 2% of the association between green spaces and mortality. Other pathways include: attenuation of air pollution, noise, and heat-island effects; and stress reduction and improved relaxation and restoration (Rojas-Rueda et al., 2021). Type 2 diabetes is a growing public health concern in children, adolescents and adults, which for adults can double the risk of depression and mental health comorbidity (McVoy et al., 2023). Leisure-time physical activity is significantly associated with decreased risk of diabetes (Huai et al., 2016). Engaging in leisure activities promotes wellbeing, particularly in those who are retired, with frequency and diversity of leisure opportunity being more important than over time spent on leisure (Kuykendall et al., 2015). Transportation noise has the potential to affect health through various pathways. Because noise is a psychosocial stressor it is linked to physical activity, use of green spaces and social interactions. Greenness, having access to quiet areas, and covering noise sources either visually or acoustically with natural features seems to decrease people's negative responses to noise (Peris and Fenech, 2020).

Walking and cycling for transportation (i.e. active transportation), provide substantial health benefits from increased physical activity. Health gains exceed detrimental effects of traffic incidents and air pollution exposure (Mueller et al., 2015). Active transport to work or school was significantly associated with improved cardiovascular health and lower body weight (Xu et al., 2013). The provision of convenient, safe and

connected walking and cycling infrastructure is at the core of promoting active travel (Winters et al., 2017). Physically active transport (i.e. walking or cycling) has been directly related to increased residential density, street connectivity, mixed land use and amenities within a walkable distance (Thomson et al., 2008, p. 20). An activity friendly neighbourhood that is walkable, dense, accessible, equipped with walk/cycle facilities and safe from traffic is associated with more active transportation to school in children (D'Haese et al., 2015). Traffic calming and presence of playgrounds/recreation areas are associated with more walking and less pedestrian injury amongst children (Rothman et al., 2014).

8.9.2.2 Transport Modes, Access and Connections

Transportation is an important social determinant of health. The primary function of transport is the movement of people and goods between places, enabling access to employment, economic, and social opportunities as well as to essential services. Transport which is affordable and accessible may be viewed as an important determinant of health by facilitating access to key socio-economic opportunities. Inadequate transport provision may add to social exclusion among already vulnerable groups (Thomson et al., 2008). Transportation barriers disproportionately affect the most vulnerable groups of society who carry the highest burden of chronic diseases; therefore, it is critical to identify interventions that improve access to transportation. Transportation services offered in combination with other tailored services improve health outcomes (Starbird et al., 2019). *“Improving neighbourhood walkability, quality of parks and playgrounds, and providing adequate active transport infrastructure is likely to generate positive impacts on activity in children and adults.”* (Smith et al., 2017).

Injuries and deaths caused by motor-vehicles are indisputable and already closely monitored with many effective interventions in place to minimise this harm (Thomson et al., 2008). Road traffic accidents as an unexpected traumatic event, may not only lead to death or serious physical injuries, but also puts survivors at an increased risk for a wide range of psychiatric disorders, particularly acute stress disorder (Dai et al., 2018; Lin et al., 2018). Child and adolescent bicycling is beneficial, but injuries occur and can be severe and costly. Lower SES, and riding on the road or pavements is associated with bicycling injury (Embree et al., 2016). Bicycle-related injuries involving motor vehicles are associated with a high incidence of head injuries and extremity fractures. Age plays a critical role in the severity and anatomic distribution of injuries sustained, with a stepwise increase in mortality with increasing age (Lustenberger et al., 2010).

Transportation barriers are important to healthcare access, particularly for those with lower incomes. Transportation barriers lead to rescheduled or missed appointments, delayed care, and missed or delayed medication use. These consequences may lead to poorer management of chronic illness and thus poorer health outcomes (Syed et al., 2013).

8.9.3 Socio-economic Environment

8.9.3.1 Employment

There is strong evidence for a protective effect of employment on depression and general mental health. Pooled effect sizes showed favourable effects on depression (OR=0.52; 95% CI 0.33 to 0.83) and psychological distress (OR=0.79; 95% CI 0.72 to 0.86) (van der Noordt et al., 2014). Unemployment is associated with poor health outcomes, with more negative health effects linked to lower SES and unemployment due to health reasons, whilst a strong social network is beneficial in reducing the health effects of unemployment (Norström et al., 2014). The long-term unemployed carry a markedly higher burden of disease, particularly mental illness, than employed persons and those who are unemployed only for a short time. The burden of disease increases with the duration of unemployment (Herbig et al., 2013). Job insecurity likely has an adverse effect on mental health (Rönnblad et al., 2019). Job insecurity can pose a comparable threat to health than unemployment (Kim and von dem Knesebeck, 2015). The evidence that large income differences have damaging health and social consequences is strong and in most countries inequality is increasing. Narrowing the gap will improve the health and wellbeing of populations (Pickett and Wilkinson, 2015). Socioeconomically disadvantaged children are at higher risk of consuming poor diets, in particular less fruits and vegetables and more non-core foods and sweetened beverages (Zarnowiecki et al., 2014). Socioeconomically disadvantaged children and adolescents are two to three times more likely to develop mental health problems. Low SES that persisted over time is strongly related to higher rates of mental health problems. A decrease in SES is associated with increasing mental health problems (Reiss, 2013). Improvements in socioeconomic determinants positively impact population health. Improvements in indicators like income, education, employment status and ethnic inclusion, are likely to result in a reduction in

mortality and morbidity outcomes, improving overall population health (Salgado et al., 2020). Increased educational attainment is associated with better health outcomes and delayed mortality. Education is an important indicator of SES and is associated with subsequent income, employment, social networks, and behaviours (Byhoff et al., 2017).

8.10 Construction Stage Impacts

This section assesses the potential for impacts arising during the construction stage of the Proposed Development. The assessment is carried out under the headings of biophysical environment (including air quality and noise); open space, leisure and play; safe and cohesive communities and socio-economic conditions.

The construction stage for the Proposed Development (all three road sections) is expected to take place over approximately 60 months, if all three sections are constructed at the same time or 36 months for each section if constructed in phases. The construction activities comprise several distinct activities. Some of these activities are sequential and some are concurrent. The effects at any given location are therefore typically of a much shorter duration.

The construction works and compounds are described in full in the description of the Proposed Development (Chapter 4: Project Description). The construction workforce is described in Chapter 7: Population. The locations for the construction compounds for Section 1, 2 and 3 are presented in Table 8-9.

Table 8-9: Construction Compounds

Section	Location	Service Range (Chainage)
Section 1	Lifford Road Tie In (near local quarry) within CPO	CH.3+150 – Ch. 3+550
Section 2	L-1064 (Raphoe Road) Southern Tie-in	CH.0+350 – Ch. 0+680
Section 3	Pluck	Mainline 0+900m – 1+100m
Section 3	Drumoghill	Mainline 2+600m
Section 3	Sheskinapoll	Mainline 6+600m-6+800m

An important feature of the health assessment is the consideration of localised community effects, beneficial and adverse. This section has therefore been informed by a review of the Proposed Development and the following points are illustrative of the localised construction related issues relevant to the health assessment. The review findings are summarised for each of the three sections of strategic transport corridors in Donegal: Table 8-10 for Section 1, Table 8-11 for Section 2 and Table 8-12 for Section 3. These points inform all the population health conclusions within this section on construction. The community locations are shown on Figure 8-2 for Section 1, Figure 8-3 for Section 2, and Figure 8-4 for Section 3.

Table 8-10: Representative Communities for All Localised Construction Health Effects: Section 1

Project activity location reference, including highway name and chainage (Ch.) reference:	Localised population health effects relate to the following community(s) (including associated isolated dwellings) or specific receptor(s):
Section 1: new alignment at "L-6564 Connector" Ch. 0+300 - Ch. 0+900 and Dooish Junction ("Mainline 1.1" Ch. 0+00 – Ch. 0+500 and "Mainline 1.2 Ch. 0+00 – 0+600).	Meencarrigagh and Goland
Section 1: new alignment at "Mainline 1.2" Ch. 0+900 – Ch. 1+200	Cappry
Section 1: Ballybofey Junction, new alignment at "Mainline 1.2" Ch. 1+200 – Ch. 2+500 and "Ballybofey link road" Ch. 0+00 – Ch. 0+850	Cappry
Section 1: "Ballybofey link road" Ch. 0+850 – Ch. 2+050	Ballybofey, including the housing areas off the R252, along Blue Cedars then The Park, as well as the housing areas around Aishling Court off the N15
Section 1: the connection of the "Ballybofey link road" Ch. 2+050 to the existing N15 in Ballybofey	Ballybofey, including the housing areas around Hawthorn Close
Section 1: new alignment at "Mainline 1.2" Ch. 2+500 – Ch. 4+450	Aghaseil, Drumboe Lower and Magherapaste
Section 1: new alignment at "Mainline 1.2" Ch. 4+450 – Ch. 6+000	Backlees, Drumboe Upper and Dunwiley
Section 1: new alignment at "Mainline 1.2" Ch. 6+000 – Ch. 7+250	Teevickmoy
Section 1: new alignment at "N15 Primary Road Connector" Ch. 0+00 – Ch. 0+700, associated link roads and "Tircallan Junction"	Tircallan
Section 1: new alignment at "Mainline 1.2" Ch. 7+500 – Ch. 8+550, Meenavoy Junction" and "Mainline 1.3" Ch. 0+00 – Ch. 0+592	Meenavoy Lower
Section 1: new alignment at "N15 Primary Road Connector" Ch. 1+000 – Ch. 3+086 and "Treanamullin Junction"	Castlebane, Mullandrait and Treanamullin. Notably St Joseph's Hospital is approximately 250 m west of the proposed "Treanamullin Junction", with works on the "Treanamullin Tie In" within 100 m.

Table 8-11: Representative Communities for All Localised Construction Health Effects: Section 2

Project activity location reference, including highway name and chainage (Ch.) reference:	Localised population health effects relate to the following community(s) (including associated isolated dwellings) or specific receptor(s):
Section 2: new alignment at "Listellian Junction", including: "L-1064 Connector" Ch. 0+00 - Ch. 1+326 "Mainline 2.1" Ch. 0+00 – Ch. 0+200 "L1094 Connector" Ch. 0+00 – Ch. 0+538 and "Mainline 2.2" Ch. 00 – Ch. 1050	Listellian, Notably, St Patrick's National School is approximately 200 m from the new "Mainline 2.2" Ch.1000 alignment.
Section 2: new alignment at "Bonagee Junction" and "Dromore Junction", including: "Mainline 2.2 Ch. 1+000 – Ch. 2+364 and "Mainline 2.5" Ch. 0+00 – Ch. 0+442	Bunagee and Drumany, including a construction compound close to "Mainline 2.5" Ch. 0+100.
Section 2: new alignment at "Mainline 2.6 Ch. 0+00 – Ch. 0+500, including the "R245 Tie In" and the "N56 Tie In"	Letterkenny on Ramelton Road. Notably the point of connection to the existing N56 is next to the Ballyraine Park Health Centre. The building also accommodates Rossan College education centre, Ballyraine pharmacy, Keegan School for speech and drama, HSE child and family services, The Pilates and exercise clinic and Donegal denture clinic.
Section 2: new alignment at "Trimragh Eastbound (EB) Junction" and "Trimragh westbound (WB) Junction", including: "L-11141 Connector" Ch. 0+00 – Ch. 0+900, "L1154 Connector WB" Ch. 0+00 – Ch. 0+340 and "L1154 Connector EB" Ch. 0+00 – Ch. 0+305	Dromore
Section 2: works at "Mainline 2.4" Ch. 3+000 – Ch. 3+300	Rossbrackan

Table 8-12: Representative Communities for All Localised Construction Health Effects: Section 3

Project activity location reference, including highway name and chainage (Ch.) reference:	Localised population health effects relate to the following community(s) (including associated isolated dwellings) or specific receptor(s):
Section 3: works at "Pluck Roundabout", the "LX 3014 Link North" and other associated works	Pluck and Raymoghly
Section 3: works at "Drumoghill Link", "Mainline" Ch. 1+000 – Ch. 2+800 and other associated works	Drumoghill, Labbadish and Drumcarn
Section 3: works at "Drumoghill Junction South Link", "Mainline" Ch. 4+000 – Ch. 4+700 and other associated works	Doorabble and Woodhill
Section 3: works at "Ballinalecky Junction Link North" and "Ballinalecky Junction Link South" with the R236, "Mainline" Ch. 7+200 – Ch. 8+200 and other associated works	Carrickadawson and Slievebuck
Section 3: new alignment at "Mainline" Ch. 8+500 – Ch. 11+200 and other associated works	Dromore, Drumbeg, Drumdaf, Tullyrap, Broadlea and Feddyglass
Section 3: new alignment at "Mainline" Ch. 11+200 – Ch. 13+000 and other associated works	Mulnaveagh and Sheercloun
Section 3: new alignment at "Mainline" Ch. 14+500 – Ch. 14+800 and other associated works crossing the R264	Murlough
Section 3: new alignment at "Mainline" Ch. 15+900 – Ch. 16+300 and other associated works	Lifford Common, Drumboy and Lifford
Section 3: new alignment at "Mainline" Ch. 13+400 – Ch. 14+500, "Ballindrait Junction", works to the L-2444 and other associated works	Ballindrait, Cavanacor and Tyleford
Section 3: new alignment at "Mainline" Ch. 17+200 – Ch. 17+500, "Lifford Junction" and other associated works	Townparks, Crrick Naslate, Coneyburrow and Curraghalane

8.10.1 Biophysical Environment

8.10.1.1 Air Quality

This section discusses changes to air quality during construction of the Proposed Development, and related effects on human health. Construction of the Proposed Development has the potential to result in dust effects from construction activities and construction compounds, as well as vehicle and plant emissions from construction traffic and activities.

This section has been informed by Chapter 12: Air Quality, which sets out relevant assessment findings and mitigation measures that have been taken into account.

The Chapter 12: Air Quality assessment indicates, with reference to regulatory standards and baseline conditions, that the construction of the Proposed Development would result in up to **slight adverse** changes (not significant) for dwellings within 50m of the Sections 1, 2 and 3 of the Proposed Development.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible:

- The source is air pollutants (particularly Nitrogen Dioxide (NO₂) and particulate matter (PM₁₀) from construction emissions and construction dust).
- The pathway is diffusion through the air.
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3).
- The sub-population vulnerable due to:
 - Young age vulnerability (children and young people).
 - Old age vulnerability (older people).
 - Health status vulnerability (people with existing poor respiratory or cardiovascular health).
 - Access and geographical vulnerability (people for whom close proximity to the Proposed Development change increases sensitivity).

The assessment covers these populations within two groups: The general population of each section's study area (see Chapter 12: Air Quality) and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

Construction activities that produce dust relate to the coarser fractions of PM₁₀ and potential nuisance from dust deposition on property. The great majority of anthropogenic PM_{2.5} health effects relate to combustion related processes, particularly changes in transport patterns, solid fuel burning from space heating or industrial processes that use fossil fuels. These have limited relevance to construction activities.

Whilst the focus of discussion in this health chapter differentiates between coarse PM during construction and fine PM during operation, the health outcomes of PM₁₀ and PM_{2.5} are not distinguished in this assessment. This reflects that both are typically present (though the relative proportions change) and that the evidence base does not consistently distinguish their effects particularly given that PM_{2.5} is a subset of PM₁₀. However, generally, elevated concentrations of PM_{2.5} are considered of greater concern due to their greater potential to interact within the body.

For construction dusts, the main health outcomes are likely to relate to exacerbation of existing conditions, such as asthma or chronic obstructive pulmonary disease (COPD) (i.e. airway inflammation by coarse PM) and to reductions in wellbeing associated with annoyance or reduced amenity. Whilst other outcomes (e.g. cardiovascular events) may be relevant in the event of brief high concentrations, such elevated exposures are expected to be avoided though the embedded standard good practice mitigation discussed in Chapter 12: Air Quality, Section 12.3.3.

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in Section 8.6.3. The general population comprise those members of the community who live, work and study at a distance where high levels of dispersion and deposition would greatly limit the effects any change in exposure due to the Proposed Development. Furthermore, most people enjoy *good* respiratory health (e.g. are not asthmatic) and are not at a life stage (e.g. infant or frail elderly) with particular sensitivity to air quality.

The sensitivity of the vulnerable group population is **high**. This reflects that the sub-population includes a high representation of *dependants*, both children, elderly and those receiving care due to poor health (e.g. the Archview Nursing Home). For example, existing respiratory conditions including asthma and COPD and type 2 diabetes would increase sensitivity. People likely to be most affected by the Proposed Development are those either living close to the new road alignment or construction compounds (see receptors listed in Chapter 12: Air Quality).

Magnitude of impact

Chapter 12: Air Quality reports that:

- Section 1: There are approximately 334 properties worship located within 100m of the Proposed Development. On implementation of the dust minimisation plan, mitigation measures and ongoing monitoring the impact of construction dust, is considered 'short term slight adverse', which is not significant in EIA terms.
- Section 2: There are approximately 383 properties located within 100m of the Proposed Development. Archview Lodge Nursing Home, St Patricks National School (Lurgyback) and Donegal Training Centre are also located within 100m of the Proposed Development. On implementation of the dust minimisation plan, mitigation measures and ongoing monitoring the impact of construction dust, is considered 'short term slight adverse', which is not significant in EIA terms.
- Section 3: There are approximately 255 properties located within 100m of the Proposed Development. It is noted that St Patrick's National School (Murlog) and St Patrick's Curch, Clonleigh are also located within 100m of the Proposed Development. On implementation of the dust minimisation plan, mitigation measures and ongoing monitoring the impact of construction dust, is considered 'short term slight adverse', which is not significant in EIA terms.
- Regarding construction traffic emissions, the significance of the predicted air quality impact is 'short erm slight adverse' which is not significant. This is due to the majority of the Proposed Development being built offline from the existing network, and construction materials will be transported via haul routes within the site, away from residential properties and other sensitive receptors.

For population health, the magnitude of change due to the Proposed Development is **low**. As reported in Chapter 12: Air Quality, for the whole Proposed Development, the construction dust impacts on the identified sensitive receptors are predicted to be of local spatial extent, short term duration and intermittent. A comprehensive set of mitigation measures and dust monitoring would be implemented during the construction phase, to further minimise construction dust impacts. Occasionally, weather conditions may coincide with construction activities to generate higher levels of dust. This can cause temporary annoyance, and for people with existing poor health, higher levels of coarse dust in the air can exacerbate some conditions (e.g. asthma). Coarse PM is larger and heavier and so it is deposited more quickly. This means that the concentration of coarse PM in the air reduces rapidly as it gets further from the source. The potential for nuisance-type dust effects is therefore expected to be occasional and limited in extent. Deposition rates are slower for finer PM and affect a wider area and thus, potentially, a greater number of people. However,

exposure is expected to be very low due to the finer PM being typically a relatively small component of construction dusts and the effects of dispersion would reduce concentrations over distance. At these levels it is unlikely that there would be discernible changes in the risk of developing a new health condition or of exacerbating an existing condition. Such changes would be *short-term*, with a *very minor* influence on *quality of life* and/or *morbidity* (rate of an illness or health status within a population) risk for respiratory and cardiovascular conditions for a *very few* people. Most effects would *rapidly* reverse, with *no* discernible influence for healthcare services.

Significance of effect

Based on the consideration of sensitivity and magnitude, as well as the equity analysis in Appendix 8.1, the following population health significance conclusion has been reached.

Project wide, the construction air quality effects are considered **minor adverse (not significant)**. This assessment conclusion reflects that whilst the scientific literature establishes a *causal* effect relationship between changes in air quality and health outcomes, the changes would result in a *very limited* effect in the health baseline of the site-specific study area population. This finding takes into account non-threshold effects of PM particularly on the vulnerable sub-population. The temporary and slight reduction in air quality is not expected to affect health inequalities.

8.10.1.2 Noise and Vibration

This section discusses changes in noise and vibration exposure during construction of the Proposed Development particularly night-time noise that may be detrimental to population health where sleep is disturbed to a high degree. Changes in the distribution of day-time noise are also considered. The latter may include the potential to change levels of traffic noise near to schools, where educational outcomes for young people are considered.

This section has been informed by Chapter 4: Project Description and Chapter 14: Noise & Vibration, which sets out relevant assessment findings and mitigation measures that have been taken into account.

Chapter 14: Noise & Vibration concludes that construction noise and vibration will have a range of residual effects from not significant to significant with consideration of proposed noise mitigation measures. Significant effects are for temporary and infrequent activities such as tree felling.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible:

- The source is noise generated by construction activities.
- The pathway is pressure waves through the air.
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3).
- The sub-population vulnerable due to:
 - Young age vulnerability (children and young people)
 - Old age vulnerability (older people)
 - Health status vulnerability (people with existing poor physical or mental health and people who identify as neurodivergent where this increase sensitivity to noise)

- Low-income vulnerability (people living in deprivation, including those on low incomes may have fewer resources to adapt, those who are economically inactive may spend more time in affected dwellings)
- Access and geographical vulnerability (people for whom close proximity to the proposed changes increases sensitivity)

The assessment covers these populations within two groups. The general population of each section study area (see Chapter 14) and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

During construction, there is potential for noise and vibration to temporarily arise from construction works, road works and movement of construction related vehicles.

The literature highlights cardiovascular effects, annoyance and sleep disturbance (and consequences arising from inadequate rest) as being the main pathways by which population health may be affected. The literature also notes the potential for chronic noise to have a detrimental effect on learning outcomes (e.g. noise distracting and affecting communication within classrooms). Whilst the literature supports there being thresholds at which effects (such as annoyance and sleep disturbance) are likely, it also acknowledges the subjective nature of responses to noise. In this regard noise effects can be considered to have non-threshold effects, with characteristics other than sound levels also determining the influence on health outcomes. The health assessment has regard to the population groups identified in the literature that may be particularly sensitive. Vulnerability may also relate to conditions or a health status with hyper sensitivities, including to noise change, for example associated with autism.

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in Section 8.6.3. The general population comprise those members of the community in *good* physical and mental health and with resources that enable a *high* capacity to adapt to change. Additionally, most people live, work or study at a distance from the affected parts of the local road network where construction noise and vibration would be unlikely to be a source of concern.

The sensitivity of the vulnerable group population is **high**. This reflects that the sub-population includes a high representation of *dependants*, both children (including students at nearby schools and education facilities identified in Section 8.6.3), elderly and those receiving care due to poor health (e.g. Archview Lodge Nursing Home). This sub-population may experience existing *widening* inequalities due to living in areas with increasing noise and *moderate* and *high* deprivation, with *limited* capacity to adapt to changes. Vulnerability particularly relates to those living close to the construction activities and construction compounds, including those spending more time in affected dwellings, e.g. due to low economic activity, shift work or *poor* health. People who are *concerned* or have high degrees of *uncertainty* about construction noise and vibration and its effect on their wellbeing may be more sensitive to changes in noise.

Magnitude of impact

As reported in Chapter 14: Noise & Vibration there will be temporary impacts during the establishment of site compounds and site clearance due to tree felling, demolition, earthworks, rock extraction, rock processing, construction of structures, and landscaping. Mitigation measures are proposed including noise barriers at various sites to minimise noise due to tree felling, rock extraction, demolitions, earthworks and road formations; and use of mufflers or sound reduction equipment to reduce noise from machinery. Following mitigation, construction noise for Sections 1, 2 and 3 is predicted to be within limits (except for tree felling) set to be protective of health and the environmental impacts due to noise are considered to be short term in duration and generally localised in extent. There is potential for temporary significant adverse residual impacts for some noise sensitive receptors within 25m of construction works during high intensity work such as site clearance, demolition, earthworks, or rock breakout. Activity will be mobile due to the linear nature of the Proposed Development and intensity of the works will vary. Chapter 14: Noise & Vibration also concludes that impacts due to construction traffic noise are predicted to be low and the expected effects are predicted to range from 'slight' to 'moderate', which is not significant in EIA terms. The assessed significance

of impacts for construction vibration ranges from 'not significant' to 'moderate', which is not significant in EIA terms.

Donegal County Council (DCC) will ensure that residents are kept informed of upcoming works and given advance notice of any disruptive works and traffic management measures as set out in the Construction Traffic Management Plan included at Appendix C4.02 in Volume C: Technical Appendices.

As reported in Chapter 4: Project Description, most of the construction for the Proposed Development takes place offline from the existing road network. Accordingly, the majority of materials that are generated within the site (i.e. earthworks) will be moved along haul routes within the site and will not require transportation along the National, Regional and Local Road networks. These internal site haul routes are generally located remotely from existing housing, so will avoid high volumes of HGVs transporting earthworks along the public road network, passing close to residential properties and other sensitive receptors. Chapter 4: Project Description and the Environmental Operating Plan (EOP) confirm noise and vibration mitigation, including the use of appropriate construction hours, best practice measures and the mitigation measures described above.

For population health, the magnitude of change due to the proposed construction works is **low**. In terms of construction activities, the *small* scale of change in noise and vibration levels is likely to predominantly relate to a *very minor* change in quality of life and/or cardiovascular and mental wellbeing morbidity for a *large minority* of the community populations along the new routes. The changes would be of *short-term* duration and relate to *frequent* construction related noise and vibration exposures. The duration of impact at any given location will be limited due to the transitory nature of construction works. Construction works will be off-line i.e. built separate from the existing highway in predominately rural setting locations, which increases separation distance from communities and reduces disruption. Prolonged periods of construction noise at night or daytime disruption of educational activities at schools are not anticipated. Construction works will be undertaken between 07:00 and 19:00 during weekdays and 08:00 and 16:00 on Saturday. As stated in Chapter 7: Population works immediately adjacent to educational facilities shall be carried out during school holiday periods where reasonably practicable, to limit disruption.

The greatest potential for effects is likely for the *very few people* who are closer to areas where high-noise equipment or plant items are sited during construction. These include activities such as tree-felling (i.e., chainsaw, mulcher and woodchipper) during site compound set-up and site clearance, demolition, rock extraction, rock processing, culvert construction, road formation and paving and landscaping. As noted in Chapter 14: Noise and Vibration; tree cutting activities will be limited in duration, such events would therefore be *occasional* and of *short-term* duration. Demolition will extend over several days with impacts at a given location *brief*. Rock extraction will extend over a 24-month period across various locations. Impacts at any given location would therefore be of *temporary* and *short-term* in duration and relate to *frequent* events. Screening from topography and other surrounding buildings would further reduce impacts. Rock processing activities will be *continuous* for the majority of any given day and a setback of 50m from sensitive receptors will be maintained. With mitigation, the scale of change in noise due to rock processing is considered to be *medium and short-term* for a *very few people*. Similarly for culvert construction, it is anticipated that actual noise levels will be lower and it is unlikely that all plant will be operating simultaneously. The overall scale of change in noise due to culvert construction would therefore be *medium* for a *very few people*. Landscaping, and road formation and paving would be mobile over a duration of 12 months with impacts at any given location expected to be *temporary*.

In terms of construction traffic noise on population health, given the wide spatial extent of the Proposed Development, the transient nature of the localised impacts, and the use of internal site haul routes located remotely from existing housing (which would avoid high volumes of HGVs on public road networks passing close to residential properties and other sensitive receptors), the scale of change in noise due to construction traffic is considered to be *small* for a *small minority* of the population of existing communities along the Proposed Development. The changes would be of *short-term* duration and relate to *frequent* construction related noise and vibration exposures.

Significance of effect

Based on the consideration of sensitivity and magnitude, as well as the equity analysis in Appendix 8.1, the following population health significance conclusion has been reached.

Construction noise impacts of the whole Proposed Development are considered to result in a **minor adverse (not significant)** effect on population health. This assessment conclusion also reflects that although the scientific literature indicates a *clear association* between elevated and sustained noise disturbance and reduced health outcome, the changes would result in a *very limited* effect in the health baseline of the site-specific study area population. The short term and localised construction noise effects are not expected to affect health inequalities. In line with TII 2025 Standard, individual level effects to a small number of people are noted, and are appropriately targeted for mitigation, but do not result in a population health effect. The level of effect is not expected to affect the ability to deliver local or national health policy.

8.10.2 Open Space, Leisure and Play

The Proposed Development has a range of implications for existing and future active travel supporting infrastructure, such as walkways and cycle paths within and between communities. See Chapter 6: Traffic Transport and Chapter 4: Project Description for further details.

This section considers the effects on active travel and physical activity due to any disruption to active travel routes during construction. Supporting people to be active is an important determinant of physical and mental health.

This section has been informed by Chapter 6: Traffic & Transport Population (Figure 6-24) and Chapter 7: Population (Section 7.4.2.3), which set out relevant assessment findings and mitigation measures that have been considered.

Chapter 6: Traffic & Transportation Assessment concludes that although there will be some temporary short-term traffic impacts on the local road network, following the implementation of mitigation measures, there will be no major impacts during the construction phase of the Proposed Development.

Chapter 7: Population concludes that with mitigation in place, there will be some temporary to short-term slight negative effects on recreation, amenity, and journey characteristics on the local population during the construction phase.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible:

- The source is potential construction disruption and disturbance to the public footpaths, cycle routes, open spaces, sports and leisure facilities.
- The pathway is behavioural change in levels of physical activity.
- Receptors are residents in the local communities near the construction activities.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3).
- The sub-population vulnerable due to:
 - Young age, specifically children who are overweight or who have low physical activity levels.
 - Older age, specifically the elderly for whom familiar routes with appropriate mobility considerations play a part in regular exercise.
 - Low income, specifically people with limited access to alternative physical activity opportunities or means of transport.
 - Health status vulnerability, specifically conditions where physical activity would be beneficial to physical or mental health.

- Access and geographical factors, specifically the population who have limited access to natural green space accessed by the routes affected by the Proposed Development.

The assessment covers these populations within two groups. The general population of each section study area (see Chapters 6 and 7) and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups, allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

Active travel health effects may relate to physical health (e.g. cardiovascular health) and mental health conditions (e.g. stress, anxiety or depression) associated with obesity and levels of physical activity.

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been considered and are listed in Section 8.6.3. The general population comprise those members of the community in good physical and mental health and with greater resources to respond to change. Most residents are unlikely to make regular use of the public footpaths, open spaces and sports or leisure facilities affected by the Proposed Development and would likely have a high capacity to adapt by selecting alternative routes or physical activity opportunities to avoid any temporary disruption or disturbance.

The sensitivity of the vulnerable group population is **high**. This reflects that the sub-population includes a high representation of dependants, both children, elderly and those receiving care due to poor health. This sub-population may have fewer resources and less capacity to adapt to changes. The population may therefore be more reliant on the affected routes, open spaces and sports or leisure facilities with greater likelihood that any disruption or disturbance could affect physical activity behaviours.

Magnitude of impact

As reported in Chapter 7: Population, the North West trail, Barnesmore Gap, Donegal Cycle Route, and the Lifford section of the Lifford-Strabane Greenway are of importance. There will be temporary closures or rerouting of existing active travel facilities and access to facilities by non-motorised users (NMUs) during the construction phase. With mitigation, these impacts are anticipated to be slight, temporary to short term and alternative arrangements will be made for access. Access to recreational areas including Troopers Hill / Creggan Forest and Dromboe Woods serving Ballybofey/ Stranorlar communities will remain available via Temporary Traffic Management (TTM). Effects are considered to be temporary, imperceptible to slight adverse which is not significant in EIA terms.

Chapter 6: Traffic and Transportation Assessment concludes that with the implementation of the mitigation measures that have been identified, there will be no major impacts during the construction phase of the Proposed Development.

For population health, the magnitude of change due to the Proposed Development is **low**. As described in Chapter 6: Traffic and Transportation Assessment there would be construction management practices that reduced disturbance and adverse effects on surrounding amenity during the construction works. The scale of change is therefore considered *small* and *short-term*. Only *minor* changes in morbidity for cardiovascular and mental health outcomes would be expected for a *small minority* of the population due to the temporary disruption during construction works. Most adverse effects on health behaviours and outcomes would be temporary and would be expected to *reverse* on completion of the construction works. Sustained behavioural change due to the Proposed Development change is not expected

Significance of effect

Project wide, the significance of the population health effect for this determinant of health is **minor adverse** (not significant). The professional judgment is that there would, at most, be a very *slight* adverse change in the health baseline for the site-specific populations. This conclusion reflects that physical activity is a public health priority and the scientific literature on the benefits of physical activity to health is well established however, the level of change due to the Proposed Development is small and is appropriately mitigated by standard good practice measures that minimise disruption and disturbance. The change is unlikely to result

in significant differential or disproportionate effects between the general population (low sensitivity) and the vulnerable sub-population (high sensitivity). Consequently, no widening of health inequalities would be expected, and no influence is expected on the ability to deliver local or national health policy.

8.10.3 Safe and Cohesive Communities

8.10.3.1 Transport Modes, Access and Connections

This section considers how construction affects public health through changes in road safety and accessibility, including travel times for road users and emergency services. It is noted that most of the construction for the Proposed Development takes place offline from the existing road network, with new road sections completed before being integrated and old sections closed off, thereby minimising disruption.

This section has been informed by Chapter 6: Traffic & Transport, which sets out relevant assessment findings and mitigation measures that have been considered.

Chapter 6: Traffic & Transportation assessment concludes following the implementation of mitigation measures, there will be no major impacts during the construction phase of the Proposed Development.

For road safety, health effects may be associated with the severity or frequency of road traffic incidents. For accessibility, health effects may be associated with emergency response times or non-emergency treatment outcomes associated with delays or non-attendance.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible:

- The source is temporary and permanent modifications to the highway network through the course of construction works, the presence of construction vehicles and traffic restrictions on the existing network, e.g. to safeguard highways workforces connecting new and existing sections.
- The pathway is changes in driver delay and accidents and safety. These factors also influence emergency response times.
- Receptors are local road users, including those using motor vehicles as well as pedestrians and cyclists, as well as emergency services using the road network.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3).
- The 'local' population of County Donegal.
- The sub-population vulnerable due to.
 - Young age vulnerability (children and young people as potentially more vulnerable road users).
 - Old age vulnerability (older people as potentially more vulnerable road users)
 - Health status vulnerability (people with existing poor physical and mental health in relation to health trip journey times)
 - Low-income vulnerability (people living in deprivation, including those on low incomes for who good quality employment may be particularly beneficial)
 - Access and geographical vulnerability (people who experience existing access barriers or who rely on the affected routes, including healthcare and other amenities).

The assessment covers these populations within two groups. The general population of each section study area (see Chapter 6) and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups, allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

The scientific literature indicates that there is an association between the transport changes, road safety and accessibility. The literature does not identify particular thresholds for effects. The assessment has had regard to the population groups identified in the literature that may be particularly sensitive. For example, children, pregnant women and cyclists (particularly older cyclists) are generally more vulnerable in terms of road safety. People with lower socio-economic status typically face more transportation barriers in accessing health care.

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in section 8.6.3. This reflects that most people in the local area (County Donegal) would only make occasional use of the affected section of the road network. It also includes those for whom the road network affords *many alternative* routes. The general population comprise those members of the community with a *high* capacity to adapt to changes in access, including changes in healthcare access, for example due to greater resources and good physical and mental health.

The sensitivity of vulnerable population groups is considered **high**. In this context, vulnerability relates to several factors, including mode of travel, where pedestrians and cyclists are more exposed to road safety risks; age, with younger and older people being more susceptible to severe accidents; *reliance* on services accessed via the affected road network (such as travel to schools); and residence in areas of *moderate* deprivation. Deprived populations may already face more access barriers compared to general population and therefore be more sensitive to access changes. Low incomes may compound access barriers by *limiting* adaptive response. Vulnerability also includes those accessing health services (emergency or non-emergency) at times and locations affected by congestion (e.g. St Joseph's Hospital). Ambulance services (and the recipients of their care) are particularly sensitive to delays in response times (time taken to arrive and stabilise the patient). Ambulances are generally less affected by congestion due to the priority given to them travelling under blue lights. People in *poor or very poor* health may be more frequent users of healthcare service and therefore be more sensitive to access changes.

Magnitude of impact

Chapter 6: Traffic and Transportation Assessment reports that existing traffic movements on the local and regional road network will generally not be restricted by the proposed construction works. The Proposed Development will ensure the minimum possible disturbance to local residents and existing traffic. Chapter 6 concludes that with the implementation of the mitigation measures that have been identified, there will be no major impacts during the construction phase of the Proposed Development.

For population health, the magnitude of change due to the Proposed Development is **low**. This reflects that:

- As identified in Chapter 6: Traffic & Transportation assessment, in relation to accessibility to community and education facilities (e.g. St Patricks National School and the Indian Community Centre in Section 2) no significant adverse impacts are anticipated. As stated in Chapter 6, existing cyclist and pedestrian movements will be facilitated throughout the construction period. Temporary traffic restrictions will be detailed in the appropriate traffic management plans.
- In relation to road safety, the scale of change in accidents would be small to negligible, with the duration of such change short-term. The frequency of any incidents would be one-off or occasional, with severity related to a very minor change in risk of injury or mortality (though with outcome reversal gradual or permanent). The expectation is that very few people would be affected, with no or slight implications for healthcare services. Temporary crossing points will be required for each of the national, regional, and local roads crossed by the Proposed Development. The crossings will require local traffic management that shall be in accordance with TII guidelines on traffic management plans, the traffic signs manual, and the Safety, Health & Welfare at Work (Construction) Regulations, 2013 (as amended), when required.

In relation to health-related travel times and accessibility to health supporting services, the scale of change in delays could be *low* and *short-term*. The majority of works would be undertaken offline, resulting in a limited effect on road users during much of the construction period. The frequency with which health related journeys may be affected is likely to be *occasional* for most people though for a *few people*, severity could relate to a *small* change in risk for morbidity or mortality associated with time critical treatment. Ambulance services (and the recipients of their care) are particularly sensitive to delays in response times (time taken to arrive and stabilise the patient). Even with the delays described in Chapter 6: Traffic & Transportation assessment, the priority given to ambulances travelling under blue lights would be expected to reduce any changes in journey times. Mitigation in terms of early and ongoing information sharing with emergency and healthcare services is discussed below. Due to the temporary nature of the construction works, and the ability of road users to adapt to planned and well-signposted roadworks, any construction-related delays are not expected to result in meaningful changes to travel behaviour. Accordingly, delays are not anticipated to significantly influence population-level health outcomes associated with access to social infrastructure, including outdoor recreational spaces, retail facilities, employment, and educational establishments.

Significance of effect

Project wide, the significance of the population health effect for this determinant of health is **minor adverse (not significant)**. This conclusion reflects that road safety and access to health supporting services are specific public health priorities and there is causal association that is supported by the scientific literature. However, transport effects of construction are likely to have a *very limited* influence on the population health baseline for the site-specific and local study areas in relation to road safety and journey times including health related travel and emergency response times. The change due to the Proposed Development is appropriately mitigated by standard good practice measures that minimise disruption and disturbance, as described in Chapter 6. Such changes are unlikely to be influential for delivery of local health policy and are unlikely to widen health inequalities through differential or disproportionate effects to vulnerable groups.

8.10.4 Socio-economic Environment

8.10.4.1 Employment

This section considers the health implications of increased employment and economic impacts during construction.

This section has been informed by Chapter 7: Population, which set out relevant assessment findings and mitigation measures that have been considered.

Chapter 7: Population concludes that the Proposed Development will have a moderate to profound short term effect (positive) on the economy because of construction employment and associated increased spending.

Employment is an important determinant of health and well-being both directly and indirectly by making health-promoting resources available to an employee and any dependants. The socio-economic benefits associated with employment are improved living conditions and the potential to make healthier choices, e.g. eating a healthier diet and undertaking more physical activity. If members of the community are employed, this can also generate indirect economic activity.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible:

- Source: Direct and indirect job creation and economic activity.
- Pathway: Level of income and employment linked to spend on health supporting resources.
- Receptor: People of working age (and their dependants).

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3).
- The 'local' population County Donegal.
- The regional population of Ulster Province
- The sub-population vulnerable due to:
 - Young age vulnerability (young adults as employees or apprentices, and children and young people as dependants)
 - Old age vulnerability (older people as dependants)
 - Health status vulnerability (people with existing poor physical or mental health, including as dependants)
 - Low-income vulnerability (people living in deprivation, including those on low incomes for whom good quality employment may be particularly beneficial)

The assessment covers these populations within two groups. The general population of each section study area (see Chapter 7) and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups, allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

The scientific literature indicates that there is a clear association between employment opportunities and health and wellbeing outcomes. The literature does not identify thresholds for effects. The assessment has had regard to the population groups identified in the literature that may be particularly sensitive. For example, those who are unemployed, on low incomes or have low job security, including where children are consequently socioeconomically deprived.

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been considered and are listed in section 8.6.3. This reflects that most people would already be within stable employment that would be unaffected by the Proposed Development (or being a dependant of such a person).

The sensitivity of the vulnerable sub-population is **high**. The health of vulnerable groups is particularly sensitive to employment. Vulnerability in this case relates to people and their dependants who are on low incomes or who are unemployed. Young people, including leaving education or early in their careers may have the most to gain from an increase in good quality job opportunities. Future young or older people may also come to rely on those employed.

Magnitude of impact

As reported in Chapter 7: Population, locally, at any given time it is likely that there will be 400-500 workers on site which will contribute to local economic intake. The wider benefits arise as construction works will generate demand for inputs and services locally, regionally and nationally, providing an economic benefit to the local, regional and national economy. This will generate a moderate to profound short-term effect on the economy.

For population health, the magnitude of change due to the Proposed Development is **low**. The scale of change is considered to be *small* and predominantly relates to maintaining people in existing construction related jobs over the short-term. The benefits of good quality employment contribute to quality-of-life, as well as being protective against adverse changes in morbidity (i.e. avoiding economic hardship or unemployment which are associated with poor physical and mental health outcomes). Effects are likely to relate to *minor* changes that would be experienced by a *small minority* of the local population (including through indirect benefits to dependants). Whilst the benefits may gradually diminish or *reverse* after construction is

completed, the experience and upskilling during this time is likely to lead to a continuity of employment that would maintain the health benefits. This would be important particularly for young adults starting their careers, including those on apprentice schemes. Whilst construction activities have inherent occupational risks, the operation of appropriate health and safety practices means that it is unlikely that there would be an impact on healthcare services.

Significance of effect

Project wide, the significance of the population health effect for this determinant of health is **minor beneficial (not significant)**. The professional judgment is that there would be a slight beneficial change in the health baseline for the local population. This conclusion reflects that the scientific literature establishes a *clear* relationship between good quality employment and factors that promote health or are protective against poor health, particularly mental health. The scale and nature of employment is not expected to widen existing health inequalities.

8.11 Operational Stage Impacts

As detailed in Chapter 6: Traffic & Transport and Section 8.11.3.1 of this chapter, once operational, the Proposed Development will provide for improved journey times and amenity along the existing and new road network. The transfer of traffic associated with the Proposed Development will facilitate the reallocation of road space to different road users and will also facilitate greater cycling facilities. As a result, there will be a positive impact on general journey amenity and indirectly, health of the local population.

8.11.1 Biophysical environment

The environmental consideration section of this health assessment has been informed by the following localised operational redistributions of traffic related air quality and noise emissions. The overall trend is of several smaller communities experiencing greater proximity to traffic emissions, whilst several large communities benefit from bypasses.

The review findings are summarised for each of the three sections of strategic transport corridors in Donegal, Table 8-13 for Section 1, Table 8-14 for Section 2 and Table 8-15 for Section 3. The community locations are shown on Figure 8-2 for Section 1, Figure 8-3 for Section 2, and Figure 8-4 for Section 3. Distribution of impacts across the study area including an assessment of health inequities and inequalities is provided in Appendix 8.1 of this chapter.

Table 8-13: Representative Communities for Localised Operational Air Quality and Noise Health Effects: Section 1

Project activity location reference, including highway name and chainage (Ch.) reference:	Direction of Impact	Localised population health effects relate to the following community(s) (and associated isolated dwellings) or specific receptor(s):	Electoral Division
Section 1: New alignment at "L-6564 Connector" Ch. 0+00 - Ch. 1+000	Positive	The changes would bring traffic emissions further from Gorland.	Goland
	Negative	The changes would bring traffic emissions closer to the community of Meencarrigagh	Dooish
Section 1: New alignment at "Mainline 1.2" Ch. 0+900 – Ch. 1+200	Positive and Negative	The changes would bring traffic emissions closer to the community of Cappry but may also reduce traffic flows through Cappry along the L-6584 (Cappy Lane) from the L-2794 towards the R252.	Dooish
Section 1: "Mainline 1.2" Ch. 00 – Ch. 2500, "Ballybofey link road" Ch. 0+00 – Ch. 0+850 and Ballybofey Junction	Positive	The changes would reduce emissions in the larger settlement of Ballybofey.	Stranorlar
	Negative	The changes would bring traffic emissions closer to the community of Cappry	Dooish
Section 1: "Ballybofey link road" Ch. 0+850 – Ch. 2+050	Positive and Negative	The changes would bring traffic emissions closer to the Ballybofey housing areas off the R252, along	Stranorlar

Project activity location reference, including highway name and chainage (Ch.) reference:	Direction of Impact	Localised population health effects relate to the following community(s) (and associated isolated dwellings) or specific receptor(s):	Electoral Division
		Blue Cedars then The Park. This community is likely to experience a redistribution of traffic emission effects with increased emission from the new "Ballybofey link road" to the south and "Mainline 1.2" to the west and lesser effects from the existing R252 to the north and west. Similarly, the community area of Aishling Court to the south of The Park would be likely to experience a redistribution of emissions with increased traffic emissions from the north (from the new "Ballybofey link road" and reduced emissions from the south (from the existing N15).	
Section 1: The connection of the "Ballybofey link road" Ch. 2+050 to the existing N15 in Ballybofey	Negative	The changes would bring traffic emissions closer to parts of the community of Ballybofey, including the housing areas around Hawthorn Close.	Stranorlar
Section 1: New alignment at "Mainline 1.2" Ch. 2+500 – Ch. 4+450	Negative	The changes would bring traffic emissions closer to parts of the communities of Aghaseil, Drumboe Lower and Magherapaste	Stranorlar
	Positive	The changes would reduce emissions in the larger settlement of Stranorlar.	Stranorlar
Section 1: New alignment at "Mainline 1.2" Ch. 4+450 – Ch. 6+000	Negative	The changes would bring traffic emissions closer to parts of the communities of Backlees, Drumboe Upper and Dunwiley.	Stranorlar
Section 1: New alignment at "Mainline 1.2" Ch. 6+000 – Ch. 7+250	Negative	The changes would bring traffic emissions closer to parts of the community of Teevickmoy.	Stranorlar
Section 1: New alignment at "N15 Primary Road Connector" Ch. 0+00 – Ch. 0+700, associated link roads and "Tircallan Junction"	Negative	The changes would bring traffic emissions closer to parts of the community of Tircallan. A small number of farm properties become enclosed by the combination of the existing N13 and the new "N15 Primary Road Connector" and "Tircallan South Bound ³ (SB) Link".	Stranorlar
Section 1: New alignment at "Mainline 1.2" Ch. 7+500 – Ch. 8+550, Meenavoy Junction" and "Mainline 1.3" Ch. 0+00 – Ch. 0+592	Positive	The changes would bring traffic emissions further from parts of the community of Meenavoy Lower, with the new junction further to the west of the main part of the settlement. This is likely to being benefits.	Stranorlar
Section 1: New alignment at "N15 Primary Road Connector" Ch. 1+000 – Ch. 3+086 and "Treanamullin Junction"	Negative	The changes would bring traffic emissions closer to parts of the communities of Castlebane, Mullandrait and Treanamullin, including St Josephs Hospital.	Stranorlar

³ Traffic heading south.

Table 8-14: Representative Communities for Localised Operational Air Quality and Noise Health Effects: Section 2

Project activity location reference, including highway name and chainage (Ch.) reference:	Direction of impact	Localised population health effects relate to the following community(s) (and associated isolated dwellings) or specific receptor(s):	Electoral Division
Section 2: New alignment at "Listellian Junction", including: "L-1064 Connector" Ch. 0+00 - Ch. 1+326 "Mainline 2.1" Ch.0+00 – Ch. 0+200 "L1094 Connector" Ch. 0+00 – Ch. 0+538 and "Mainline 2.2" Ch. 0+00 – Ch. 1+050	Positive and Negative	The changes would bring traffic emissions further away from parts of the community of Listellian. However, some parts of Listellian would experience increased traffic emissions from the combination of proximity to the new "Mainline 2.2", "L-1064 Connector" and the existing N13. At St Patricks National School traffic emissions are likely to reduce to the west on the existing N13, although emissions may increase to the east on the new "Mainline 2.2" Ch.1+000.	Magheraboy
Section 2: New alignment at "Bonagee Junction" and "Dromore Junction", including: "Mainline 2.2 Ch. 1+000 – Ch. 2+364 and "Mainline 2.5" Ch. 0+00 – Ch. 0+442	Positive and Negative	The changes would bring traffic emissions closer to parts of the communities of Bunagee and Drumany, though potentially also reduce traffic emissions for those to the western side of these settlements close to the existing N13 and N14.	Letterkeny Rural
Section 2: New alignment at "Mainline 2.6 Ch. 0+00 – Ch. 0+500, including the "R245 Tie In" and the "N56 Tie In"	Positive and Negative	The changes would bring traffic emissions closer to parts of the community of Letterkenny on Ramelton Road. The new road construction and operation may cause some disruption and disturbance at Ballyraine Park Health Centre. Other areas of Letterkenny are likely to benefit with traffic reduced at the current N14 connection with the N56 further south.	Letterkeny Rural
Section 2: New alignment at "Trimragh EB Junction" and "Trimragh WB Junction", including: "L-11141 Connector" Ch. 00 – Ch. 900, "L1154 Connector WB" Ch. 0+00 – Ch. 0+340 and "L1154 Connector EB" Ch. 0+00 – Ch. 0+305	Negative	The changes would bring traffic emissions closer to parts of the community of Dromore.	Magheraboy
Section 2: New alignment at "Mainline 2.4" Ch. 3+000 – Ch. 3+300	Positive	The changes would reduce traffic emissions on the L-5494 through the community of Rossbrackan.	Magheraboy

Table 8-15: Representative Communities for Localised Operational Air Quality and Noise Health Effects: Section 3

Project activity location reference, including highway name and chainage (Ch.) reference:	Direction of impact	Localised population health effects relate to the following community(s) (and associated isolated dwellings) or specific receptor(s):	Electoral Division
Section 3: Works at "Pluck Roundabout", the "LX 3014 Link North" and other associated works	Negative	The changes would bring traffic emissions closer to parts of the communities of Pluck and Raymoghly.	Magheraboy and Manorcunningham
Section 3: Works at "Drumoghill Link", "Mainline" Ch. 1+000 – Ch. 2+800 and other associated works	Negative	The changes would bring traffic emissions closer to parts of the communities of Drumoghill, Labbadish and Drumcarn, including the Drumoghill school. Some dwellings would be between the existing N14 to the south and the new road alignment to the north.	Kincraigy
Section 3: Works at "Drumoghill Junction South Link", "Mainline" Ch. 4+000 – Ch. 4+700 and other associated works	Negative	The changes would bring traffic emissions closer to parts of the communities of Doorabble and Woodhill.	Kincraigy
Section 3: Works at "Ballinalecky Junction Link North" and "Ballinalecky Junction Link South" with the R236, "Mainline" Ch. 7+200 – Ch. 8+200 and other associated works	Negative	The changes would bring traffic emissions closer to parts of the communities of Carrickadawson and Slievebuck.	Kincraigy (for Slievebuck Fedyglass (for Carrickadawson)
Section 3: New alignment at "Mainline" Ch. 8+500 – Ch. 11+200 and other associated works	Positive	The changes would bring traffic emissions further from parts of the communities of Dromore, Drumbeg, Drumdaf and Fedyglass	Fedyglass
	Negative	The changes would bring traffic emissions closer to some properties in Tullyrap and Broadlea.	Fedyglass
Section 3: New alignment at "Mainline" Ch. 11+200 – Ch. 13+000 and other associated works	Positive	The changes would bring traffic emissions further from the community of Mulnagung.	Clonleigh North
	Negative	The changes would bring traffic emissions closer to parts of the communities of Mulnaveagh and Sheerclon.	Clonleigh North
Section 3: New alignment at "Mainline" Ch. 14+500 – Ch. 14+800 and other associated works crossing the R264	Positive	The changes would bring traffic emissions further from the community of Rossgeir.	Clonleigh North
	Negative	The changes would bring traffic emissions closer to parts of the community of Murlough.	Clonleigh North
Section 3: New alignment at "Mainline" Ch. 15+900 – Ch. 16+300 and other associated works	Positive	The changes would bring traffic emissions further from the more densely populated areas of Drumboy and Lifford.	Clonleigh North
	Negative	The changes would bring traffic emissions closer to parts of the communities of Lifford and Lifford Common.	Clonleigh South
Section 3: New alignment at "Mainline" Ch. 13+400 – Ch. 14+500, "Ballindrait Junction", works to the L-2444 and other associated works	Positive	The changes would bring traffic emissions further from the communities of Tyleford and Rossgeir.	Clonleigh North
	Negative	The changes would bring traffic emissions closer to parts of the communities of Ballindrait and Cavanacor	Clonleigh North
Section 3: New alignment at "Mainline" Ch. 17+200 – Ch. 17+500, "Lifford Junction" and other associated works	Positive	The changes would bring traffic emissions further from the more densely populated areas of Lifford.	Clonleigh South
	Negative	The changes would bring traffic emissions closer to parts of the communities of Townparks, Crrick Naslate, Coneyburrow and Curraghane	Clonleigh South

8.11.1.1 Air Quality

This section discusses changes to local air quality during operation of the Proposed Development, and related effects on human health. Operation of the Proposed Development has the potential to result in redistributed effects, with benefits of less traffic through larger settlements, such as Ballybofey (in Section 1), but slight reductions in air quality where the new road alignment passes closer to smaller settlements, e.g. Drumboe (Magherpaste) (in Section 1).

This section has been informed by Chapter 12: Air Quality, which sets out relevant assessment findings and mitigation measures that have been considered.

The Chapter 12: Air Quality assessment indicates, with reference to regulatory standards and baseline conditions, that the operation of the Proposed Development will result in a net reduction in exposure to traffic pollution that will range in scale from neutral to moderate beneficial impact to air quality for properties located within 100m of the existing alignment. For the properties located along the proposed alignment, there will be a net increase in exposure to air pollution that will range in scale from long term neutral to substantial adverse impact to air quality. . The Proposed Development also includes for active travel which will result in a long term beneficial impact on air quality which is considered significant in EIA terms.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible:

- The source is air pollutants (particularly NO₂ and PM₁₀ and PM_{2.5}) from road traffic emissions.
- The pathway is diffusion through the air.
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3).
- The sub-population vulnerable due to:
 - Young age vulnerability (children and young people)
 - Old age vulnerability (older people)
 - Health status vulnerability (people with existing poor respiratory or cardiovascular health)
 - Low-income vulnerability (people living on low incomes may have fewer resources to adapt, those who are economically inactive may spend more time in affected dwellings)
 - Social disadvantage vulnerability (people in areas of greater deprivation)
 - Access and geographical vulnerability (people for whom proximity to the Proposed Development change increases sensitivity).

The assessment covers these populations within two groups. The general population of each section study area and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups, allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

In general, the scientific literature suggests the potential for an association between air quality emissions and health and wellbeing effects. The link is primarily between PM and health effects (particularly for PM_{2.5}). Exposures relating to NO₂ are also relevant. Whilst the literature supports there being thresholds set for health protection purposes, it also acknowledges that for PM and NO₂ there are non-threshold health effects

(i.e. when there is no known exposure threshold level below which adverse health effects may not occur).

The assessment has identified population groups that may be particularly sensitive to air quality effects. For example, young children are particularly susceptible to air pollution because of their developing lungs, high breathing rates per bodyweight, and amount of time spent exercising outdoors. Other vulnerable groups include the sick (e.g. people with type 2 diabetes), the elderly, and pregnant women.

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been considered and are listed in section 8.6.3. The general population comprise those members of the community who live, work and study at a distance where high levels of dispersion and deposition would greatly limit the effects any change in exposure due to the Proposed Development. Furthermore, most people enjoy *good* respiratory health (e.g. are not asthmatic) and are not at a life stage (e.g. infant or frail elderly) with particular sensitivity to air quality.

The sensitivity of the vulnerable group population is **high**. This reflects that the sub-population includes a high representation of *dependants*, both children, elderly and those receiving care due to poor health. For example, existing respiratory conditions including asthma and COPD and type 2 diabetes would increase sensitivity. People likely to be most affected by the Proposed Development are those either living on roads that will experience reduced traffic flow (sensitive to beneficial changes), or residents of dwellings closer to the new road sections who may experience increased traffic emissions (sensitive to adverse changes).

Magnitude of impact

As reported in Chapter 12: Air Quality (Tables 12-30, 12-31, and 12-32), data indicates that the levels of airborne pollution for Section 1, Section 2 and Section 3 receptors will remain below the statutory limits for the protection of human health and the WHO guidelines for all future scenarios.

In Section 1, NO₂ PM₁₀ and PM_{2.5} concentrations are predicted to decrease, for representative receptors in Goland, Meenavoy, Tircallan, and Ballbofey as the proposed route diverts traffic away from these receptors. NO₂, PM₁₀ and PM_{2.5} concentrations are predicted to increase for representative receptors of Ironworks, Drumboe (Magherapaste), and Teevickmoy as the proposed route will run adjacent to these residential properties currently located away from the major traffic on the existing N13 and N15. Neutral to moderate adverse effects are therefore identified in Chapter 12 for those receptors close to the proposed route and neutral to moderate beneficial impacts are identified for receptors along the existing road. Moderate adverse impacts are identified for 2 receptors (R2 and R4), which consists of one property at R4 and three properties at R2. Moderate beneficial impacts are identified for one property at R1.

In Section 2, air quality is predicted to be enhanced at St Patricks National School, Letterkenny Christian Fellowship, Archview Lodge Nursing Home, Ballyraine National School and the 232 properties within 100m of the existing road. Air quality will be slightly worsened for an isolated dwelling and farm in Drumany and a group of residential properties in Rossbracken as the proposed route will traverse closer than the existing N13. Neutral to slight adverse impacts are identified in Chapter 12 for the majority of receptors close to the proposed route, and a substantial adverse impact for the one isolated dwelling in Drumany. Neutral to moderate beneficial impacts are identified for receptors along the existing road.

In Section 3, air quality is predicted to be enhanced for representative receptors near the R236 intersection, in Tullyrap/Feddyglass, Murlough and Lifford National School. It will be slightly worsened for representative receptors in Mondooy Lower and Beachwood Grove. Neutral to slight adverse effects are identified in Chapter 12 for those receptors close to the proposed route and neutral to slight beneficial impacts are identified for receptors along the existing road.

For population health, the magnitude of change due to the Proposed Development is **low**. It is noted that the Proposed Development results in a decrease in traffic emissions for a *large minority* of the population. Such beneficial changes would be *long-term*, with a *minor* influence on *morbidity* risk for respiratory and cardiovascular conditions. It is also noted that *very few* people would experience a *small* scale of increase in traffic emissions due to closer route alignments and increased route capacity, and thus greater overall vehicle movements. Additionally, two sensitive receptors in Section 1 and one sensitive receptor in Section 2 would experience a *medium* scale of increase for PM_{2.5}. Such adverse changes would also be *long-term*, with a *minor* influence on *morbidity* risk for respiratory and cardiovascular conditions.

Significance of effect

Based on the consideration of sensitivity and magnitude, as well as the equity analysis in Appendix 8.1, the following population health significance conclusions have been reached. Project wide there are two significance conclusions, one for populations experiencing a beneficial effect and one for populations experiencing an adverse effect.

For the health assessment, the redistribution of air quality away from the populations along the existing N13, N15, N56 and N14, that benefit from bypasses is considered **minor beneficial (not significant)**. This assessment conclusion reflects that whilst the scientific literature establishes a *causal* effect relationship between changes in air quality and health outcomes, all air quality changes are predicted to be *well within* statutory standards set for health protection. The changes would over time be expected to result in a *slight* positive effect in the health baseline of the site-specific populations. This finding takes into account non-threshold effects of NO₂ and PM_{2.5}, particularly on the vulnerable sub-population. The slight improvement in air quality within these locations may have a *marginal* effect on reducing inequalities, driven by people experiencing higher baseline air quality being exposed to less air pollution. These changes are supportive of delivering health-related planning policy.

For the populations along the Section 1, 2 and 3 of the Proposed Development who would be newly exposed to increased emissions from traffic, the significance of effect is considered **minor adverse (not significant)**. This assessment conclusion reflects that whilst the scientific literature establishes a *causal* effect relationship between changes in air quality and health outcomes, PM₁₀ and NO₂ changes are predicted to be *well within* statutory standards set for health protection. For PM_{2.5}, changes in Sections 1 and 3 are predicted to be *well within* statutory standards, however in Section 2, they are *approaching* the new limit to be imposed under the EU Directive from 1st January 2030. At a population level, these changes would over time be expected to result in a *very slight* negative effect in the health baseline of the site-specific populations. This finding is driven by non-threshold effects of NO₂ and PM_{2.5}, particularly on the vulnerable sub-population. The slight reduction in air quality within these locations may have a *marginal* effect on widening health inequalities in some cases where people experiencing elevated deprivation are exposed to increased air pollution. Temporary maintenance activities during operation have been considered but due to their transitory and temporary nature are not considered to give rise to significant population health effects.

8.11.1.2 Noise and Vibration

This section discusses changes in traffic noise exposure during operation of the Proposed Development. The assessment is informed by the Chapter 14: Noise & Vibration modelling, which uses an L_{den} metric that has regard to both daytime and night-time noise exposures. Changes in both daytime and night-time noise are considered important to public health, with increasing evidence of the long-term chronic effects of transport noise on population health. The Proposed Development scheme results in both a redistribution of noise effects as well as providing additional capacity for increased vehicle moments overall.

This section has been informed by Chapter 14: Noise & Vibration, which sets out relevant assessment findings and mitigation measures that have been considered.

Chapter 14: Noise & Vibration concludes that, the Proposed Development will result in a positive aggregate residual effect. Therefore, the Proposed Development as a whole is judged to have a significant positive effect for road traffic noise within the study area. This will result in beneficial environmental and health effects on the general population in the study area.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible:

- The source is noise generated by additional road traffic.
- The pathway is pressure waves through the air.
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3).
- The sub-population vulnerable due to:
 - Young age vulnerability (children and young people)
 - Old age vulnerability (older people)
 - Health status vulnerability (people with existing poor physical or mental health and people who identify as neurodivergent where this increase sensitivity to noise)
 - Low-income vulnerability (people living on low incomes may have fewer resources to adapt, those who are economically inactive may spend more time in affected dwellings)
 - Social disadvantage vulnerability (people in areas of greater deprivation)
 - Access and geographical vulnerability (people for whom the proximity to Proposed Development change increases sensitivity)

The assessment covers these populations within two groups. The general population of each section study area and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

The key health outcomes relevant to this determinant of health are cardiovascular health and mental health conditions (e.g. stress, anxiety or depression). Sleep disturbance is particularly associated with night-time vehicle movements, though the day-time rest of some vulnerable groups (such as the very young, elderly, or shift workers) could potentially be affected. Cognitive performance in children, particularly at school is also a potential outcome. The scientific literature indicates that there is an association between cardio-metabolic health outcomes and long-term transport noise exposures.

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in section 8.6.3. The general population comprise those members of the community in *good* physical and mental health and with resources that enable a *high* capacity to adapt to change. Additionally, most people live, work or study at a distance from the affected parts of the local road network where changes in transport noise are unlikely to be a source of concern.

The sensitivity of the vulnerable group population is **high**. This reflects that the sub-population includes a high representation of *dependants*, both children, elderly and those receiving care due to poor health. This sub-population may experience existing *widening* inequalities due to living in areas with increasing transport noise, and classified as *disadvantaged and extremely disadvantaged* in terms of deprivation, with *limited* capacity to adapt to changes. Vulnerability particularly relates to those living close to the affected roads, including those spending more time in affected dwellings, e.g. due to low economic activity, shift work or *poor* health. People who are *concerned* or have high degrees of *uncertainty* about transport noise and its effect on their wellbeing may be more sensitive to changes in noise. Vulnerability may also relate to conditions or a health status with hyper sensitivities, including to noise change, for example associated with autism.

Magnitude of Impact

As reported in Chapter 14: Noise & Vibration:

- The Proposed Development results in an overall positive impact with a decrease in the number of receptors experiencing the greatest transport noise effects (predicted noise levels greater than 60 dB Lden) in the majority of cases.
- In Section 1, the Proposed Development will divert traffic north of Ballybofey/ Stranorlar reducing traffic noise in the town centres. The proposed route is close to residences in Meencarrigagh and Cappry, Magherapaste and Meenavoy Lower. There are several noise sensitive receptors on Chapel Street and Chapel Lane in Stranorlar who are predicted to experience increases in noise however these have not been identified to require mitigation. 11 residential receptor locations (identified in **Chapter 14**, Table 14-54) would experience greater traffic noise levels (exceed the design goal of 60dB Lden) due to the new alignments and have been identified as requiring mitigation including noise barriers.
- In Section 2, the Proposed Development will divert traffic from the N13 and N56 roads. Several noise sensitive receptors on the L1114 and the N56 north of the development would experience increases in noise however these have been identified to be not significant in Chapter 14. 15 residential and 1 healthcare facility (identified in Chapter 14, Table 14-56) would experience greater traffic noise levels (exceed the design goal of 60dB Lden) due to the new alignments and have been identified as requiring mitigation including noise barriers.
- In Section 3, the Proposed Development would be relatively close to the communities along the existing N14 from the Pluck Roundabout to Mulnaveagh. The proposed route would bypass Mulnaveagh, Rossgeir, Drumboy, Townparks and Lifford. Nine residential receptor locations (identified in Chapter 14, Table 14-58) would experience greater traffic noise levels (exceed the design goal of 60dB Lden) due to the new alignments and have been identified as requiring mitigation including noise barriers.
- Following mitigation, Chapter 14 concludes that, overall, the Proposed Development will result in a positive aggregate residual effect across the three sections. This will result in beneficial environmental and health effects on the general population in the study area.

For population health, the magnitude of change due to the Proposed Development is **low**.

In terms of beneficial effects to population health, a *large minority* of the community populations benefiting from the bypasses are likely to experience a *small to medium* scale of change in noise levels. This is likely to support to a *minor* reduction in cardiovascular and mental wellbeing morbidity. The changes would be of *permanent* and relate to *frequent* transport related noise exposures.

In terms of adverse effects due to closer route alignments and increased route capacity, and thus greater overall vehicle movements, a *small minority* of the community populations close to the new road alignments may experience a *small-scale* increase in noise levels. The exposures are likely to be *low* after taking into account the mitigation described in Chapter 14. The exposure changes would be *permanent*, with a *minor* influence on risk factors for cardiovascular and mental health morbidity outcomes. For a *very few* people noise levels could be greater due to closer road alignments. In line with TII 2025 Standard, the individual level effects to a very few people are noted, and are appropriately targeted for mitigation, but would not result in a population health effect. The level of effect is not expected to affect the ability to deliver local or national health policy.

Significance of effect

Based on the consideration of sensitivity and magnitude, as well as the equity analysis in Appendix 8.1, the following population health significance conclusions have been reached. Project wide there are two significance conclusions, one for populations experiencing a beneficial effect and one for populations experiencing an adverse effect.

For communities benefiting from the new road alignment providing a bypass or increasing the distance from traffic, operational noise impacts of the Proposed Development are considered to result in a **minor beneficial (not significant)** effect on population health. This reflects a *slight* beneficial change in the health baseline for the site-specific populations driven by transport noise reductions in areas of higher population density. The conclusion has regard to scientific literature indicating a *clear association* between long-term exposure to transport noise and health outcomes.

For communities that would be closer to the new road alignments along Sections 1, 2 and 3 as identified in Table 8-13, Table 8-14 and Table 8-15 above, the operational noise impacts of the Proposed Development are considered to be **minor adverse (not significant)**. This reflects a *slight* change in the health baseline for the site-specific populations driven by transport noise increase. The conclusion has regard to scientific literature indicating a *clear association* between long-term exposure to transport noise and health outcomes. Whilst no significant population health effect is anticipated from operational noise exposures, there is the potential that *very few* people could experience significant residual noise exposures at a small number of receptors identified above. Temporary maintenance activities during operation have been considered but due to their transitory and temporary nature are not considered to give rise to significant population health effects.

Overall, the redistribution of noise may have a *marginal* effect on reducing inequalities, with the burden of elevated transport noise more evenly distributed across the population (moving traffic further away from most dwellings). These changes are supportive of delivering health-related planning policy. It is noted that in Section 3 there may be a slight reduction in health equity due to areas of higher deprivation experiencing slight increases in traffic noise. See further discussion in Appendix 8.1.

8.11.2 Open Space, Leisure and Play

This section considers, in terms of population health outcomes, the effect of operational highways infrastructure and traffic flows on active travel (walking and cycling) and use of open spaces, and sports and leisure facilities.

The active travel considerations have been informed by the following localised operational infrastructure improvements (not exhaustive) that have been considered by the health assessment.

The review findings are summarised for each of the three sections of strategic transport corridors in Donegal, Table 8-16 for Section 1, Table 8-17 for Section 2 and Table 8-18 for Section 3. The community locations are shown on Figure 8-2 for Section 1, Figure 8-3 for Section 2, and Figure 8-4 for Section 3.

Table 8-16: Representative Communities for Localised Operational Healthy Lifestyle Effects: Section 1

Project activity location reference, including highway name and chainage (Ch.) reference:	Localised population health effects relate to the following community(s) or specific receptor(s):
Section 1: New alignment at "L-6564 Connector" Ch. 0+350 – Ch. 0+1600	The proposed active travel network route and Park and Share / Cycle Facility 1.01 are both expected to support active travel.
Section 1: New alignment at "Mainline 1.2" Ch. 0+00 – Ch. 8+550	The proposed active travel network route and Park and Share / Cycle Facilities 1.02 and 1.03 are all expected to support active travel.
Section 1: New alignment at "Mainline 1.2" Ch. 3+000 cycleway / accommodation underpass N15P030 and "Mainline 1.2" Ch. 3+250 pedestrian / mammal underpass N15P032	The facilities are expected to maintain active travel connectivity for the communities of Aghaseil and Drumboe Lower.
Section 1: The "N15 Primary Road Connector" Ch. 0+00 – Ch. 3+086 to "Treanamullin Junction"	The proposed active travel network is expected to support active travel.

Table 8-17: Representative Communities for Localised Operational Healthy Lifestyle Effects: Section 2

Project activity location reference, including highway name and chainage (Ch.) reference:	Localised population health effects relate to the following community(s) or specific receptor(s):
Section 2: The proposed active travel network route connecting St Patricks School to the community areas of Listellian and further afield	The improvements are likely to support active travel to school.
Section 2: "Mainline 2.1" Ch. 0+00 – Ch. 0+200 "Mainline 2.2" Ch. 0+00 – Ch. 2+364 "Mainline 2.5" Ch. 0+00 – Ch. 0+442 "Mainline 2.6" Ch. 0+00 – Ch.1+403 "L-11141 Connector" Ch. 0+00 – Ch. 1+277 "L-5494 Connector" Ch. 0+00 – Ch. 2+000 and "Mainline 2.4" Ch.3+100 – Ch.3+650. Furthermore, active travel routes are supported with connectivity to Park & Share / Cycle Facility 2.01.	The proposed active travel network route is expected to support active travel, including long distance stretches.
Section 2: "Bonagee Junction", "Dromore Junction", "Mainline 2.5 and the connection between the existing N13 and "Dromore Local roundabout"	The changes enclose a facility with Astro Turf pitches, the amenity of which may be affected, potentially reducing the community use of this commercial facility for physical activity.
Section 2: "Dromore Junction", "Mainline 2.2" Ch.2+300 affects an existing east-west aligned long distance cycle route along the L-1114.	Connectivity is maintained with Overbridge N13S2O023. Other active travel route connectivity in the vicinity is maintained by Pedestrian Underpasses N56P019 and N56P018.
Section 2: New alignment at "Mainline 2.6 Ch. 0+00 – Ch. 0+950	The new road passes through an area of open green space between Letterkenny and the River Swilly. The public access and amenity value of this land for physical activity may be reduced.
Section 2: Underpass N13XAPA	The retention of the existing underpass for the community of Trimragh is noted and is likely to maintain active travel connectivity.
Section 2: Footbridge N1S2F231 at "Mainline 2.4" Ch. 3+150	The changes would provide a safer pedestrian crossing and continuity of the active travel network for the community of Rossbrackan.

Table 8-18: Representative Communities for Localised Operational Healthy Lifestyle Effects: Section 3

Project activity location reference, including highway name and chainage (Ch.) reference:	Localised population health effects relate to the following community(s) or specific receptor(s):
Section 3: The new Offline Cycletrack along Section 3 and Park and Share / Cycle Facilities close to Pluck Roundabout and Lifford Junction	The changes are expected to support active travel. Overbridges, such as N140003, that provide active travel crossing points are also beneficial.
Section 3: Works at "Drumoghill Link", "Mainline" Ch. 2+600 – Ch. 3+200	The changes take traffic further away from the Moss Drumoghill Football Club, potentially improving amenity and community use for physical activity.
Section 3: New alignment at "Mainline" Ch. 15+900 – Ch. 16+300 and other associated works	The changes would bring traffic emissions closer to a central recreational area of hardstanding used for sports in Croaghan Heights, Lifford. The amenity of this location may be affected with potential discouragement of physical activity.
Section 3: The proposed active travel network improvements and community links around Ballindrait Junction and the L-2444	The changes are expected to support active travel, including the crossing facilitated by Underbridge N14A140.

Project activity location reference, including highway name and chainage (Ch.) reference:	Localised population health effects relate to the following community(s) or specific receptor(s):
Section 3: Lifford Junction provides the connectivity that allows a new crossing of the border, including an active travel network connection.	Works on either side of the river Finn are in areas of open space, the amenity value of which is likely to be affected for their respective communities.

This section has been informed by Chapter 6: Traffic & Transport and Chapter 7: Population, which set out relevant assessment findings and mitigation measures that have been considered.

Chapter 6: Traffic & Transport concludes that operation of the Proposed Development will result in an **overall beneficial** effect on traffic, existing and new public transport services, and active travel (walking and cycling) routes on the local and regional road network.

Chapter 7: Population concludes the Proposed Development will have **profound positive** long-term effects on accessibility and connectivity to services and recreational facilities/routes in the area. There may also be some **localised slight negative** effects on journey times that will affect individual properties.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible.

- The source is operational highways improvements to active travel infrastructure. Consideration is also given to the blocking up and alternatives provided for some existing routes, as well as to how operational traffic disturbance affects use of footpaths, cycle routes, open spaces, sports and leisure facilities.
- The pathway is behavioural change in levels of physical activity.
- Receptors are residents in the local communities near the construction activities.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3).
- The sub-population vulnerable due to:
 - Young age, specifically children who are overweight or who have low physical activity levels.
 - Older age, specifically the elderly for whom familiar routes with appropriate mobility considerations play a part in regular exercise.
 - Low income, specifically people with limited access to alternative physical activity opportunities or means of transport.
 - Health status vulnerability, specifically conditions where physical activity would be beneficial to physical or mental health.
 - Access and geographical factors, specifically the population who have limited access to natural green space accessed by the routes affected by the Proposed Development.

The assessment covers these populations within two groups. The general population of each section study area and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups, allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been considered and are listed in section 8.6.3. The general population comprise those members of the community in good physical and mental health and with greater resources to respond to change. Most residents are unlikely to make regular use of the public footpaths, open spaces and sports or leisure facilities affected by the Proposed Development and would likely have a high capacity to adapt by selecting alternative routes or physical activity opportunities to avoid any temporary disruption or disturbance.

The sensitivity of the vulnerable group population is **high**. This reflects that the sub-population includes a high representation of dependants, both children, elderly and those receiving care due to poor health. This sub-population may have fewer resources and less capacity to adapt to changes. The population may therefore be more reliant on the affected routes, open spaces and sports or leisure facilities with greater likelihood that any disruption or disturbance could affect physical activity behaviours.

Magnitude of impact

As reported in Chapter 6: Traffic & Transport and Chapter 7: Population there would be a substantial improvement to active travel infrastructure, including new bridges and underpasses, cycle links and facilities. The Proposed Development includes c.66km of new 3m wide, separated active travel facilities. This is distributed as follows: 21.4km as part of Section 1, 15.6km as part of Section 2 and 29km as part of Section 3. Additionally there are 8 no. new Park and Share facilities in total; 3 no. of which will be provided along Section 1, 1 no. along Section 2 and 4 no. along Section 3. Connections to existing Active Travel Networks (ATNs) will be provided. Active travel links to existing local recreational amenities and communities will also be provided including:

- To Cappry Rovers sports facility, Holywell and Dromboe Woods, Dunwiley Ring Fort and to the community at Meenavoy where the existing road will be downgraded in Section 1
- To St. Patrick's National School and to the Donegal Cycle Route at Dromore in Section 2
- To the church and school at Murlog, to part of the Northwest Greenway Route 3 (Strabane to Lifford) and connections to the local road network to accommodate a potential future greenway on the disused rail line at Drumoghill in Section 3.

Multiple junctions are provided to maintain connectivity with the existing road network for all road users, including NMUs, supporting access for communities using facilities in Ballindrait, Ray, Drumoghill, and Murlog.

Chapter 6: Traffic & Transport summarises the anticipated benefits of the Proposed Development which include improved wellbeing for recreational users, improved journey quality for cyclists, and reduced mortality. Overall, Chapter 6 concludes the Proposed Development will have a positive impact.

For population health, the magnitude of change due to the Proposed Development is **medium**. While a number of existing accesses would be closed, alternative routes are provided to maintain connectivity. In addition, the alignment of certain new road sections would bring the road infrastructure closer to some community assets, areas of open space, and public rights of way, which may influence patterns of use in these locations. At the same time, reduced traffic levels within bypassed communities may create safer and more attractive conditions for active travel, with the potential to encourage walking and cycling for shorter journeys. The scale of change is considered *medium*, with both positive and negative effects extending into the *long-term*; however, the positive influences are anticipated to predominate. A *minor* change in morbidity for cardiovascular and mental health outcomes would be expected for a *large minority* of the population, associated with permanent improvements in opportunities for active travel. Over time this may contribute to a *slight* beneficial effect on healthcare service capacity as a result of increased population-level physical activity.

Significance of effect

Project wide, the significance of the population health effect for this determinant of health is **moderate beneficial (significant)**. The professional judgment is that there would be a *small* beneficial change in the health baseline for the site-specific populations. This conclusion reflects that physical activity is a public health priority and the health benefits of physical activity are well established in the scientific literature. Improved conditions for active travel may deliver greater relative benefits for population groups who are more reliant on walking and cycling for physical activity, including those on lower incomes, with the potential to contribute to a reduction in existing health inequalities.

8.11.3 Safe and Cohesive Communities

8.11.3.1 Transport Modes, Access and Connections

This section considers changes in local transport nature and flow rates, particularly in relation to the schemes benefits to road safety. Other considerations include the influence on journey times that may affect routine or emergency healthcare access.

The following connectivity considerations have informed the health assessment. These relate to how localised operational infrastructure changes (not exhaustive) affect issues of severance, safety at crossings and journey times.

The proposed road alignment and structures are shown in EIAR Drawings in Volume D: Book of Drawings, and more specifically 4.01 (Section 1), 4.02 (Section 2) and 4.03 (Section 3).

The review findings are summarised for each of the three sections of strategic transport corridors in Donegal, Table 8-19 for Section 1, Table 8-20 for Section 2 and Table 8-21 for Section 3. The community locations are shown on Figure 8-2 for Section 1, Figure 8-3 for Section 2, and Figure 8-4 for Section 3.

Table 8-19: Representative Communities for Localised Operational Road Safety and Community Identity Health Effects: Section 1

Project activity location reference, including highway name and chainage (Ch.) reference:	Localised population health effects relate to the following community(s) or specific receptor(s):
Section 1: Overbridge N15O011	The overbridge maintains connectivity between the L-6584 and L2794 near Cappry.
Section 1: Underbridge N15U031	The underbridge maintains connectivity on the L-2754 near Drumboe Lower.
Section 1: Overbridge N15O040	The overbridge maintains connectivity on the L-2784 and L2734 near Magherapaste.
Section 1: new alignment at "Mainline 1.2" Ch. 4+450 – Ch. 4+850	The changes require three road closures as part of the Proposed Development in the community of Drumboe Upper. Connectivity is maintained via the "L-2724 Connector" and Underbridge N15U047.
Section 1: Overbridge N15O057	The overbridge maintains connectivity on the L-7094 near Drumboe Upper.
Section 1: New alignment at "Mainline 1.2" Ch. 6+000 – Ch. 7+000	The changes require two road closures as part of the Proposed Development in the community of Teevickmoy. Connectivity is maintained via the "L-7084 Connector" and Overbridge N15O069.
Section 1: New alignment at "Mainline 1.2" Ch. 7+500 – Ch. 8+550	The changes require five road closures as part of the Proposed Development in the community of Meenavoy Lower. Connectivity through Meenavoy Lower is maintained via the "L-6674 Connector" and Overbridge N15O084. Two of the road closures affect the L-66742. Connectivity is less direct, with no crossing, but a diversion via Meenavoy Lower, including the "L-66742 Tie In". A very few people may experience a degree of community severance.
Section 1: Overbridge N15O028	The overbridge maintains connectivity for the L-2714 near Castlebane.

Table 8-20: Representative Communities for Localised Operational Road Safety and Community Identity Health Effects: Section 2

Project activity location reference, including highway name and chainage (Ch.) reference:	Localised population health effects relate to the following community(s) or specific receptor(s):
Section 2: Overbridge N13S0013	The overbridge maintains connectivity for the L-5784 near Lurgybrack.
Section 2: Underbridge N56U011	The underbridge maintains connectivity for the L-11142 near Bunagee.
Section 2: "Trimragh EB Junction" and "Trimragh WB Junction"	The changes maintain connectivity for the community of Trimragh, including following the removal of the existing L-1154 direct crossing of the N13.
Section 2: Closure of the L-5494 on the south side of the existing N14 alignment at "Mainline 2.4" Ch. 3+150	The changes would potentially cause some severance effects for the community of Rossbrackan. Access north across the N14 via the "Pluck Junction" is a longer route but likely mitigates this effect for road journeys. Footbridge N1S2F231 provides continuity of access for pedestrians, supporting active travel.
Section 2: New alignment at "L-5494 Connector" near Rossbraacken	The changes maintain N13 EB access to the Wonder Years Childcare Centre on the L-5494.

Table 8-21: Representative Communities for Localised Operational Road Safety and Community Identity Health Effects: Section 3

Project activity location reference, including highway name and chainage (Ch.) reference:	Localised population health effects relate to the following community(s) or specific receptor(s):
Section 3: Overbridge N14O003	The overbridge maintains connectivity for the L-1294 near Pluck as well as connectivity following the closure of accesses to the N14 on the L6006.
Section 3: Underbridge N14U026	The underbridge maintains connectivity for the L-1274 near Durmoghil, Underpass N14A027 supports local access and Underbridge N14U034 maintains connectivity on L-5574 near Carricknamart.
Section 3: Underbridge N14U044	The underbridge maintains access near Doorable and Mondooy where the L5524-1 Doorable access to the N14 is closed. Similarly Overbridge N14O051 maintains access between the N14 and L-1214 near Doorable.
Section 3: Overbridge N14O051	The overbridge maintains access near for the L-1214 Galdonagh and Overbridge N14O062 maintains access for the LX3014 Sheshkinpoll.
Section 3: Overbridge N14O076, "Ballinalecky Junction Link North" and "Ballinalecky Junction Link South"	The overbridge maintain access near Slievebuck to the R236, mitigating the closure of the L5604-1 access to the existing N14.
Section 3: Overbridge N14O108	The overbridge maintains access to the L-6104 near Tullyrap and Broadlea.
Section 3: Underbridge N14U122	The underbridge maintains access to the L-2323 between Mulnaveagh and Sheercloon.
Section 3: Underbridge N14U146	The underbridge maintains access to the R264 near Murlough.
Section 3: Overbridge N14O161	The overbridge maintains access to the L-6144 near Lifford Common and Lifford.
Section 3: Underbridge N14A140	The underbridge maintains access to the L-6144 near Lifford Common and Lifford.
Section 3: Lifford Junction provides the connectivity that allows a new crossing of the border, across the River Finn.	The connection would improve connectivity between the Republic of Ireland and Northern Ireland.

This section has been informed by Chapter 6: Traffic & Transport, which sets out relevant assessment findings and mitigation measures that have been taken into account.

Chapter 6: Traffic & Transport concludes that operation of the Proposed Development will result in an **overall beneficial** effect on the local road network.

Chapter 7: Population concludes the Proposed Development will have **significant positive** effect in terms of improved safety and amenity of the road network for all categories of users.

There are the wider transport network benefits of the bypasses improving the journey time of those currently travelling within and passing through Donegal. There are also benefits for travel by people in the wide province of Ulster and across the border. Within bypassed communities there are expected to be local reductions in journey times due to reduced overall traffic and congestion. Both the local and wider journey time improvements are expected to benefit routine and emergency healthcare access. The changes also benefit road safety and active travel, including due to providing new pedestrian and cycle infrastructure and connections.

For road safety, health effects may be associated with the severity or frequency of road traffic incidents. For accessibility, health effects may be associated with emergency response times or non-emergency treatment outcomes associated with delays or non-attendance.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible:

- The source is vehicles on the road network.
- The pathway is changes in driver delay and accidents and safety. These factors also influence emergency response times.
- Receptors are local road users, including those using motor vehicles as well as pedestrians and cyclists, as well as emergency services using the road network.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3)
- The 'local' population of County Donegal
- The sub-population vulnerable due to:
 - Young age vulnerability (children and young people as potentially more vulnerable road users)
 - Old age vulnerability (older people as potentially more vulnerable road users)
 - Health status vulnerability (people with existing poor physical and mental health in relation to health trip journey times)
 - Low-income vulnerability (people living in deprivation, including those on low incomes for whom good quality employment may be particularly beneficial)
 - Access and geographical vulnerability (people who experience existing access barriers or who rely on the affected routes, including healthcare and other amenities).

The assessment covers these populations within two groups. The general population of each section study area and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been considered and are listed in section 8.6.3. This reflects that most people in the local area (County Donegal) would only make occasional use of the affected section of the road network. It also includes those for whom the road network affords *many alternative* routes. The general population comprise those members of the community with a *high* capacity to adapt to changes in access, including changes in healthcare access, for example due to greater resources and good physical and mental health.

The sensitivity of the vulnerable group population is **high**. Vulnerability in this case is linked to mode of travel, including pedestrians and cyclists being more sensitive to road safety changes; age (young people and older people) being more vulnerable to accident severity; those *reliant* on services accessed on affected sections of the road network (e.g. traveling to schools); and those in areas of *moderate* deprivation. Deprived populations may already face more access barriers compared to general population and therefore be more sensitive to access changes. Low incomes may compound access barriers by *limiting* adaptive response. Vulnerability also includes those accessing health services (emergency or non-emergency) at times and locations affected by congestion. Ambulance services (and the recipients of their care) are particularly sensitive to delays in response times (time taken to arrive and stabilise the patient). Ambulances are generally less affected by congestion due to the priority given to them travelling under blue lights, but journey times may benefit from the road improvements. People in *poor or very poor* health may be more frequent users of healthcare service and therefore be more sensitive to access changes.

Magnitude of impact

Chapter 6: Traffic and Transportation Assessment concludes that the Proposed Development will see changes to the local, regional and national road network and traffic flows. The modelling work undertaken to assess the traffic impacts of the Proposed Development indicates that there will be an overall positive traffic benefit associated with the Proposed Development. Further, the Proposed Development will provide benefits to existing and new public transport services and walking and cycling routes on the adjoining local and regional road network. Regarding road safety, quantitative data in Chapter 6: Traffic and Transportation Assessment shows an overall positive impact in terms of accident reduction. The benefit comes from the reduction in collisions both in number and severity.

For population health, the magnitude of change due to the Proposed Development is **medium**. This reflects that:

- In relation to road safety, whilst such events remain occasional, the closing of many accesses onto the main highway route, with alternative access via junctions improves road safety. The overall design parameters of the road support safe driving conditions. Furthermore, the inclusion of pedestrian crossing bridges and underpasses, as well as separate cycleways and footpaths in places supports separation from vehicle traffic. These factors contribute to a medium scale of change in road safety that would be expected to accrue over the long-term with fewer incidents. Severity relates to a minor change in risk of injury or mortality (though with outcome reversal gradual or permanent). Very few people would be affected, with no or slight implications for healthcare services.
- In relation to journey time, the change for those undertaking both short local journeys within bypassed communities and long-distance travel on the wider highway network is of *medium* scale, with the *majority* of road users experiencing *frequent* benefits. Such reductions in journey times are expected to continue over the long-term, though with diminishing benefits where there are traffic growth trends. Where the journey time reduction relates to healthcare access the change is likely to result in a *minor* change in risk for morbidity or mortality associated with time critical treatment. The frequency with which health related journeys may be affected is likely to be *occasional*, with a *small minority* of people affected and only *slight* beneficial implications for healthcare services.

Significance of effect

Project wide, the significance of the population health effect for this determinant of health is **moderate beneficial (significant)**. The conclusion reflects that the benefits to road safety and journey times are of a scale that is likely to have an *influential* effect on the delivery of health policy that benefits from improved community connectivity and reduced accident risk. The change may contribute to a *slight* improvement in the local population health baseline.

8.11.3.2 Community Identity and Society

This section considers the potential for changes to community cohesion and social capital within a redistribution of road transport and road transport infrastructure. Areas benefiting from bypasses are likely to experience reduced dominance of road traffic in public spaces. Rural areas with new road alignments passing through them may experience a change in identity. Community identity is a determinant of wellbeing and is influenced by aesthetic elements of the landscape and townscape, including major transport infrastructure. There is potential for a range of effects. Community identity in bypassed settlements may be enhanced by the road network changes not only reducing traffic, but also making such locations a deliberate destination rather than a place passed through on a major transport route.

See Section 8.11.1 of this chapter for a list of localised changes in the alignment and dominance of the road network close to communities. These changes have been taken into account in considering the change in community identity.

This section has been informed by Chapter 18: Landscape & Visual (including Appendix 18.01 Figures 1a to 37a) and Chapter 7: Population, which sets out relevant assessment findings and mitigation measures that have been taken into account.

Chapter 18: Landscape and Visual concludes that following the implementation of appropriate mitigation, there is potential for **moderate to major** landscape and visual effects on some individual properties, however overall mitigation planting will help integrate the Proposed Development to the existing landscape.

Chapter 7: Population concludes that there is potential for **moderate to significant** severance effects at a small number of residential properties, however elsewhere, potential for community severance is **neutral** or at worst, slight negative. The Proposed Development will also result in **moderate positive** effects on tourism, community amenity, access to community facilities, and land use.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible:

- The source is environmental change due to the new bypasses and the changes in traffic dominance and disturbance through and past affected communities that influence social and economic factors.
- The pathways are cues, visual or auditory, and economic opportunities that contribute to behaviour and a sense of identity, as well as a greater proportion of social interactions due to a more conducive environment.
- Receptors are residents in affected communities, as well as visitors.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3).
- The sub-population vulnerable due to:
 - Young age, specifically children and young people using public areas of affected communities for social networking or those with strong views about the future identity of their communities.

- Old age, specifically long-term residents who may hold strong views about the past, present and future identity of their communities.
- Social disadvantage, specifically those experiencing social isolation for whom a less traffic dominated centre may enhance connectivity and opportunities to build social networks.
- Low income, specifically those who are reliant on visitor revenues.
- Access and geographical factors, specifically those closest to the new and existing roads that experience the greatest changes in traffic flows.

The assessment covers these populations within two groups. The general population of each section study area and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

Health effects may be associated with mental health conditions (e.g. stress, anxiety or depression) due to underlying social determinants influencing community cohesion. The scientific literature broadly indicates that favourable psychosocial environments (environments about which people feel positive and which support social interactions) are associated with better health and that unfavourable psychosocial environments are associated with poorer health. The literature does not identify thresholds for effects.

Sensitivity of receptor

The sensitivity of the general population is **medium**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been considered and are listed in section 8.6.3. The new transport infrastructure is likely to be a prominent feature of the natural and economic landscape of the communities it passes through, bringing changes in opportunities as well as access and amenity. The general population of affected rural communities are therefore likely to have an interest in, and awareness of, the Proposed Development, with potential for many people to feel *uncertain* as to the impacts. Most residents affected by the scheme are likely to have a *reliance* on, or few alternatives to, the resources affected, including the road networks themselves and the community assets whose setting is affected.

The sensitivity of the vulnerable group population is **high**. Vulnerability in this case is particularly linked to the proportion of people who have strong expectations that their community or way of life would be changed to a large degree by the Proposed Development. Outlooks may range from *support* to *concern*. People living in homes with direct views of the new bypasses, or adjacent to roads that experience a large change in traffic flows, may be particularly sensitive, with *very low* capacity to adapt. This includes people with a heightened sensitivity to visual change, for examples associated with neurodiversity. Some of those who are reliant on visitor related incomes may also have *limited* capacity to adapt, e.g. to bypass communities as a destination rather than passing trade. Those reliant on the public centres of bypassed communities for social networking, particularly those with risk of social isolation, may be more sensitive to a more favourable psychosocial environment. The very few people affected by compulsory purchases are considered sensitive to the social and economic effects of such a change, including where it affects their established family ties and social networks, as well as places of work, education and religious worship. Long-term residents and people with conditions such as dementia, may be particularly sensitive to changes in community cohesions and social isolation.

Magnitude of impact

As reported in Chapter 18: Landscape and Visual:

- In Section 1, locally significant visual effects are predicted to occur during the operational phase of the Proposed Development. These effects will occur long-term, gradually decreasing as the Proposed Development becomes an established feature within the overall view. Pre-mitigation, moderate to significant adverse effects are predicted for representative receptor locations at Kilross (in the vicinity of the N13 and L6674 junction), Dunwiley, Ballybofey. Profound to very significant adverse effects are identified for receptor location at Drumboe cottages.

- In Section 2, pre-mitigation, moderate to very significant effects are identified for representative receptor locations at Ballyraine Park, Letterkenny, Trimragh, Dromore, and dwellings near the local roads L5784, L1094, L5794, and L1154. These effects will occur long-term, gradually decreasing as the Proposed Development becomes an established feature within the overall view.
- In Section 3, pre-mitigation, moderate to very significant effects are identified for representative receptor locations at Woodhill, Carrickadawson, Mulnaveagh (dwellings near the L2424), Ballindrait, Lifford, Strabane (Urney Road, Northern Ireland) and dwellings near local roads L1294, L5524, and L2374. These effects will occur long-term, gradually decreasing as the Proposed Development becomes an established feature within the overall view.
- Visual effects would be slightly reduced by the establishment of replacement or new screening woodland mix that will offset views towards the Proposed Development and its infrastructure and traffic on the road from properties. With mitigation, the identified impacts reduce to moderate to major significance (significant). However, as planting takes time to mature and provide its mitigation benefits, the health assessment considers both the before and after mitigation impacts in reaching its conclusions as to the population health effects.

Chapter 7: Population concludes:

- On housing and development land and business, overall, improvements to the standard of the local road network will have a profound positive long-term effects on those living and working in the area.
- On population growth, the Proposed Development is predicted to result in a moderate to profound positive effect.
- A positive slight impact is predicted due to direct employment relating to the maintenance of the new road network.
- On tourism, a permanent, positive and slight to moderate effect is identified with regards improved active travel links.
- A profound positive effect in the long-term is identified relating to the accessibility to and amenity of community facilities such as hospitals in Stranorlar, Letterkenny and Lifford, The Atlantic Technological University, Donegal campus in Letterkenny, St. Patrick's National School in Letterkenny, and the Clonleigh Resource Centre in Lifford.

For population health, the magnitude of change due to the Proposed Development is **medium**. The scale of change is considered to be *medium*. The effects are *long-term* with effects experienced *frequently or continuously*. The expectation is that the benefits to community identity and wellbeing will persist, whilst adverse influences *gradually* decline as there is adaptation to views and increased screening as planting matures. The benefits are expected for most of the populations of affected communities. Adverse effects are expected for a *small minority*. In both cases the changes relate to *minor* effects on mental health related morbidity and quality of life.

Significance of effect

Project wide, the conclusion of the assessment for human health is that the significance of the effect would range from **moderate adverse (significant)** to **negligible adverse (not significant)** with regard to visual impacts, and up to **moderate beneficial (significant)** for socioeconomic impacts. The improvements to the psychosocial environment within bypassed communities and economic opportunities of these communities as destinations are likely to positively influence community identity with long-term benefits to community cohesion and mental health. Where the setting of homes or community assets is affected, this has the potential for some adverse influence. The inclusion of both adverse and beneficial scores reflects that the population response would be highly subjective and is likely to encompass a range of views. Some people may focus on the economic and travel benefits of the new bypasses. Other people may focus on the reduction in landscape amenity inherent to the proposed bypasses. The overall change in the local health baseline is likely to be *small* and driven by the beneficial influences. These changes are supportive of healthy planning policy. Where compulsory purchases are required at a small number of dwellings mitigation measures have been agreed with impacted landowners. Further details on compulsory purchase orders are set out in Chapter 15- Material Assets: Agriculture and Chapter 16- Material Assets: Non-Agriculture This is unlikely to be discernible in terms of its population health effect.

8.11.4 Socio-economic Conditions

This section considers the health implications of increased employment and economic impacts during operation.

This section has been informed by Chapter 7: Population, which set out relevant assessment findings and mitigation measures that have been considered.

Chapter 7: Population concludes that the Proposed Development will have a **significant positive** (indirect) effect on the local economy through improved connectivity and amenity within the town centre which will encourage economic activity. It will also have a **slight positive** impact on employment through limited operational employment opportunities and improved access to workplaces and services.

Employment is an important determinant of health and well-being both directly and indirectly by making health-promoting resources available to an employee and any dependants. The socio-economic benefits associated with employment are improved living conditions and the potential to make healthier choices, e.g. eating a healthier diet and undertaking more physical activity. If members of the community are employed, this can also generate indirect economic activity.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible:

- Source: direct and indirect job creation and economic activity, including access to employment.
- Pathway: level of income and employment linked to spend on health supporting resources.
- Receptor: people of working age (and their dependants).

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3).
- The 'local' population of County Donegal.
- The 'regional' population of the province of Ulster.
- The sub-population vulnerable due to:
 - Young age vulnerability (young adults as employees or apprentices, and children and young people as dependants).
 - Old age vulnerability (older people as dependants).
 - Low-income vulnerability (people living in deprivation, including those on low incomes for whom good quality employment may be particularly beneficial).
 - Poor health vulnerability (people with existing poor physical or mental health, including as dependants).

The assessment covers these populations within two groups. The general population of each section study area and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been considered and are listed in section 8.6.3. This reflects that most people would already be within stable employment that would be unaffected by the Proposed Development (or being a dependant of such a person).

The sensitivity of the vulnerable sub-population is **high**. The health of vulnerable groups is particularly sensitive to employment. Vulnerability in this case relates to people and their dependants who are on low incomes or who are unemployed. Young people, including leaving education or early in their careers may have the most to gain from an increase in good quality job opportunities. Future young or older people may also come to rely on those employed. Improved access to employment opportunities may particularly benefit those on low incomes.

Magnitude of impact

Chapter 7: Population reports that the Proposed Development will remove strategic traffic from the town centres of Ballybofey and Stranorlar, enhancing the town centre amenity, which tends to attract visitors to those areas and increase footfall with resultant potential for increased business for certain service providers. This will support job creation in Letterkenny, Ballybofey, Lifford and other areas of the study area. This is assessed to be a moderate positive effect on the economy because of increased employment / economic activity within the study area arising from improved accessibility. Some, direct employment will also be generated relating to the maintenance of the new additions to the road and active travel facility network (resurfacing, landscaping, drainage maintenance etc.). This effect is assessed to be imperceptible to slight, positive and long-term.

For population health the magnitude of change due to the Proposed Development is **low**. The scale of indirect new employment due to the improved highway network is considered to be *small* in the local and regional economy context. General employment benefits linked to improved access to job opportunities are predominantly expected to be filled by existing residents extending their commuting range (rather than causing an influx of new residents to communities). The effects are expected to be greatest at the local level, but also extend to the regional level. Although some businesses, i.e. those that benefit from passing trade, are likely to experience a reduction in trade as a result of the Proposed Development, overall benefits of the Proposed Development to the local economy are considered greater. New good quality long-term roles (in terms of remuneration, working hours, working conditions and job security) are considered particularly likely to contribute to long-term population health benefits. Benefits are likely to relate to *minor* changes in quality of life and morbidity for a small minority of the local and regional population (including through indirect benefits to dependants).

Significance of effect

Project wide, the significance of the population health effect for this determinant of health is **minor beneficial (not significant)**. The professional judgment is that there would be a *slight* beneficial change in the health baseline for the local population. This conclusion reflects that the scientific literature establishes a *clear* relationship between good quality employment and factors that promote health or are protective against poor health, particularly mental health. The scale and nature of employment is not expected to widen existing health inequalities.

8.11.5 Public Understanding of Risk

This section presents findings on a group of issues where the common factor is the potential for a population health effect related to concern about an issue, affecting mental health and wellbeing, rather than the likelihood of an actual level risk to public health.

Project features and expectations about a project can be understood in different ways by different people. This assessment considers these views, ways that health and well-being might be affected and a course of action. The aim is to find a way to address and allay concerns that people might have, inform communications and consultation elements of the Proposed Development and contribute towards reducing anxiety.

The term 'understanding' is used in preference to 'perception'. An understanding of a topic or an issue is something that can develop and that can be debated and shared. The term 'perception' can imply views that do not align with scientific analysis and are given less credence.

The population health effect is considered likely because there is a plausible source-pathway-receptor relationship established in the scientific literature, the occurrence of which in the particular context of the Proposed Development is considered plausible:

- Source: proximity of new road to communities where public understanding of risks differ from the actual risks that are derived from scientific studies
- Pathway: anxiety, stress and a sense of powerlessness can have adverse effects on health and mental well-being while a sense of control is beneficial to health and well-being
- Receptor: residents in affected communities, as well as visitors.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of communities close to the new road alignments and modifications (Sections 1, 2 and 3).
- The sub-population vulnerable due to:
 - Young age vulnerability (children and young people)
 - Old age vulnerability (older people)
 - Health status vulnerability (people with existing poor mental health may be more sensitive to changes that concern them and people who identify as neurodivergent may be concerned about increase sensitivity to noise or visual change)
 - Low-income vulnerability (people living on low incomes may feel they have fewer resources to adapt to changes that concern them, those who are economically inactive may spend more time in affected dwellings and may therefore feel more concerned about the changes)
 - Social disadvantage vulnerability (people in areas of greater deprivation)
 - Access and geographical vulnerability (people for whom the proximity to the Proposed Development change increases sensitivity)

The assessment covers these populations within two groups. The general population of each section study area and the vulnerable sub-population for this area. The latter is a comprised of the vulnerabilities listed above. The differentiation of these two groups allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

The scientific literature identifies the following general points relevant to potential effects and health outcomes. The way risks are understood has important influences on health behaviour (Ferrer and Klein, 2015). Awareness of risk can affect mental, physical and emotional wellbeing, and can be worse when it is accompanied by uncertainty (Luria et al., 2009). The ultimate goal of dialogue between regulators and communities is to produce an informed public (Sinisi, 2004). Trust, credibility, competence, fairness and empathy are of great importance (Sinisi, 2004) and the routine monitoring and clear communication of results can greatly increase trust, empower people and reduce fear factors (WHO, 2013). The views that people hold can be associated with low-grade illnesses (e.g. headaches or hypertension) and can be exacerbated when there is uncertainty (Sinisi, 2004).

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been considered and are listed in section 8.6.3.

Most people in the study area live, work or travel at a separation distance from the Proposed Development where concerns about the changes would not be likely to influence mental health and wellbeing. This group also includes that proportion of the population who are ambivalent or not concerned about visual change, traffic, air quality or noise emissions as affecting their health.

The sensitivity of the vulnerable sub-population is **high**. This reflects that the sub-population includes people who may be uncertain or concerned about visual change, traffic, air quality or noise emissions, and this may exacerbate existing mental health conditions or be a source of stress and anxiety in itself. This may particularly be the case for people with near views and/or who live in close proximity to the new road network. Low incomes or existing deprivation may contribute to a limited sense of control and reduced capacity to obtain further information.

Magnitude of impact

The magnitude of change due to the Proposed Development is **low**. The level of actual risk exposures is *low* to *negligible*, however the scale of change that may contribute to community concern is considered to be *medium*. The frequency and duration of effects would vary, as although the changes underpinning the concern would be *continuous* and *long-term*; the responses to them are likely to reduce over time as new norms are established and anticipated impacts that cause concern give way to the actual experience of impacts (which are assessed in this chapter as being within public health protection standards). Health outcome associated with public understanding of risks (concern) would therefore likely be *short-term* and *occasional*, with the severity predominantly related to a *minor* change in quality-of-life and mental health related morbidity for a *very few* people within the population. Such individual level effects are unlikely to have implications for health service capacity. For many people there is likely to be a *rapid* reversal of effects should their concerns be responded to and resolved to their satisfaction. In line with TII 2025 Standard, the individual level effects to a very few people are noted but would not result in a population health effect.

Significance of effect

Project wide, the significance of the population health effect is **minor adverse** (not significant). The professional judgment is that there could be a *very limited* adverse change in the health baseline for the site-specific study area population. This conclusion reflects that the actual risks would be well within regulatory standards and that most members of the public would expect this to be the case. This conclusion also reflects scientific understanding of the impact of uncertainty or concern about environmental risks on mental health. At most the Proposed Development change may have a *marginal* influence on population health inequalities. The level of effect is not expected to affect the ability to deliver local or national health policy.

8.12 Mitigation Measures

The following measures are in addition to those set out in other parts of the EIAR.

8.12.1 Construction Phase

8.12.1.1 Biophysical environment

Air quality: None beyond those set out in Chapter 12: Air Quality.

Noise: None beyond those set out in Chapter 14: Noise & Vibration.

8.12.1.2 Open space, leisure and play

Provide appropriate wayfinding information for diversions such as being advertised online and signposting, including approximate journey times on the routes. Wayfinding to destinations should be clearly signposted.

8.12.1.3 Safe and cohesive communities

Additional mitigation includes early and ongoing information sharing with road users and emergency and healthcare services with regard to any temporary road closures, diversions or lane closures. Provide appropriate access mitigation for the Letterkenny Ballyraine Park Health Centre.

8.12.1.4 Socio-economic conditions

As far as reasonably practicable, take steps with construction apprenticeships and training schemes to target advertising to and encourage applications from young people in the local (Donegal) area who are Not in Education, Employment, or Training (NEET). Young people who are NEET are at a critical intervention point for public health. Targeted support at this stage can have a substantial effect on the health of this group and their future dependants. This is a low-cost measure with a high societal return.

8.12.2 Operational Phase

8.12.2.1 Biophysical Environment

Air quality: None beyond those set out in Chapter 12: Air Quality.

Noise: None beyond those set out in Chapter 14: Noise & Vibration.

8.12.2.2 Open Space, Leisure and Play

None beyond those set out in Chapter 6: Traffic & Transport and Chapter 7: Population.

8.12.2.3 Safe and Cohesive Communities

Transport modes, access and connections: None beyond those set out in Chapter 6: Traffic & Transport

Community identity and society: None beyond those set out in Chapter 18: Landscape and Visual and Chapter 7: Population.

8.12.2.4 Socio-economic Conditions

None beyond those set out in Chapter 7: Population.

8.12.2.5 Public Understanding of Risk

No further human health mitigation is recommended.

8.13 Residual Predicted Impacts

8.13.1 Construction Phase

8.13.1.1 Biophysical Environment - Air Quality

No change, remains **minor adverse** effect (not significant).

8.13.1.2 Biophysical Environment – Noise and Vibration

No change, remains **minor adverse** effect (not significant).

8.13.1.3 Open Space, Leisure and Play

No change, remains **minor adverse** effect (not significant).

8.13.1.4 Safe and Cohesive Communities- Transport

No change, remains **minor adverse** effect (not significant).

8.13.1.5 Socio-economic Conditions

No change, remains **minor beneficial** effect (not significant).

8.13.2 Operational Phase

8.13.2.1 Biophysical Environment - Air Quality

No change, remains **minor beneficial** effect (not significant).

8.13.2.2 Biophysical environment – Noise and Vibration

No change, remains **minor beneficial** (not significant) and **minor adverse** effect (not significant).

8.13.2.3 Open Space, Leisure and Play

No change, remains **moderate beneficial** (significant) effect. Widespread and sustained provision of active travel is likely to be influential to the delivery of health policy, as physical activity benefits many health outcomes, particularly for sensitive groups.

8.13.2.4 Safe and Cohesive Communities - Transport

No change, remains **moderate beneficial** effect (significant).

8.13.2.5 Safe and Cohesive Communities - Community Identity and Society

No change, remains a range from **moderate adverse (significant)** to **negligible adverse (not significant)** with regard to visual impacts, and up to **moderate beneficial (significant)** for socioeconomic impacts.

8.13.2.6 Socio-economic Conditions

No change. Although mitigation measures set out in section 8.12.1.4 may lead to more significant benefits to young people who are NEET, the overall population effect remains **minor beneficial** (not significant).

8.14 Cumulative Effects

The cumulative human health effect of the Proposed Development and other large developments in the area are detailed in Chapter 19: Interactions & Cumulative Effects.

8.15 Transboundary Effects

The Proposed Development is entirely located within the Republic of Ireland.

For the health assessment, transboundary effects relate to the role of the Proposed Development in facilitating improved connectivity and ease of movement between the Republic of Ireland and Northern Ireland. The Proposed Development is adjacent to the border with Northern Ireland at Lifford / Strabane. The Proposed Development includes the N14/N15 to A5 Link at the eastern end of Section 3. This comprises a connection from the N14/N15 Lifford Junction, south of Lifford, across the River Finn to the border with Northern Ireland. This will then connect to a proposed Trunk Road T3 which in turn connects to the proposed A5 Western Transport Corridor (A5 WTC) to be pursued by the Department for Infrastructure in Northern Ireland.

The proposed N14/N15 to A5 Link including the proposed bridge over the River Finn (i.e. the link between the N14/N15 Lifford Junction and a proposed Trunk Road T3) will not be constructed until such time as a proposed Trunk Road T3 / Section 1 of the A5 WTC has been constructed or is under construction.

If Section 1 of the proposed A5 WTC and Trunk Road T3 (both Northern Ireland) are not constructed, then the N14/ N15 to A5 Link (Republic of Ireland) will also not be constructed. In this scenario, the Proposed Development will not result in new transboundary routes or enhancements to existing cross border connections, therefore no transboundary effects to human health receptors are anticipated.

If Section 1 of the proposed A5 WTC and Trunk Road T3 are constructed and the N14/N15 to A5 Link is also constructed, transboundary effects on human health receptors may arise through improved cross-border accessibility.

Improved connectivity between the Republic of Ireland and Northern Ireland is a positive effect and is supported by relevant cross-border policy objectives. The Proposed Development more effectively links Letterkenny, through Lifford and Strabane, to Derry. It also provides an improved link from Letterkenny to Dublin, via the A5 at Strabane, crossing the border twice, to link with the N2 in County Monaghan.

Letterkenny (Republic of Ireland), Derry and Strabane (Northern Ireland) collectively form the North West City Region and are partners in the North West Strategic Growth Partnership. The Proposed Development supports transboundary cooperation and shared economic and social development within this cross-border region.

While the primary policy drivers for the Proposed Development derive from EU policy, including the Proposed Development, there are synergies with cross-border strategies and the potential for transboundary benefits within Northern Ireland, particularly within the North West City Region.

Chapter 6: Traffic & Transport Assessment reports that the A5 WTC, in combination with the Proposed Development, would deliver benefits in terms of reduced journey times. However, Chapter 6 also concludes that the presence of the A5 WTC is not expected to result in improvements in overall network performance beyond those delivered by the Proposed Development alone.

Significant adverse transboundary effects are not anticipated. Lifford and Strabane are established border towns with existing cross-border connections, and the Proposed Development would enhance existing links. In addition, no road diversions or closures are proposed during construction of the N14/N15 to A5 Link (Republic of Ireland) and a proposed Trunk Road T3 (Northern Ireland), therefore no adverse construction transboundary effects are anticipated.

On this basis, no new or materially different population health effects are expected to arise as a result of transboundary impacts associated with the Proposed Development, in the event that the N14/N15 to A5 Link, Trunk Road T3 and Section 1 of the A5 WTC are in place.

8.16 Summary

Table 8-22: Summary of Potential Environment Effects, Mitigation and Monitoring

Description of impact	Measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Mitigation measures	Residual effect	Proposed monitoring
Construction							
Environmental conditions – Air quality	See Chapter 12	Low	General population: Low Vulnerable group population: High	Minor adverse	None	Minor adverse	None
Environmental conditions – Noise	See Chapter 14	Low	General population: Low Vulnerable group population: High	Minor adverse	None	Minor adverse	None
Healthy Lifestyles	See Chapters 6&7	Low	General population: Low Vulnerable group population: High	Minor adverse	Appropriate wayfinding information for diversions	Minor adverse	None
Safe and Cohesive Communities – Transport	See Chapter 6	Low	General population: Low Vulnerable group population: High	Minor adverse	Early and ongoing information sharing with road users, and emergency and healthcare services	Minor adverse	None
Socio-economic Conditions	See Chapter 7	Low	General population: Low Vulnerable group population: High	Minor beneficial	Preferential employment/apprentice and training for NEET	Minor beneficial	None
Operation							
Environmental conditions – Air quality	See Chapter 12	Low	General population: Low Vulnerable group population: High	Minor beneficial	None	Minor beneficial	None
Environmental conditions – Noise	See Chapter 14	Low	General population: Low Vulnerable group population: High	Minor beneficial	Post completion noise survey.	Minor beneficial	None

Description of impact	Measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Mitigation measures	Residual effect	Proposed monitoring
Healthy Lifestyles	See Chapters 6&7	Medium	General population: Low Vulnerable group population: High	Moderate beneficial	Physical activity promotion campaign coinciding with new active travel infrastructure	Moderate beneficial	None
Safe and Cohesive Communities – Transport	See Chapter 6 & 7	Medium	General population: Low Vulnerable group population: High	Moderate beneficial	None	Moderate beneficial	None.
Safe and Cohesive Communities – Community identity and society	See Chapters 7 & 18	Medium	General population: Medium Vulnerable group population: High	Moderate adverse to Moderate beneficial	None	Moderate adverse to Moderate beneficial	None
Socio-economic Conditions	See Chapter 7	Low	General population: Low Vulnerable group population: High	Minor beneficial	None	Minor beneficial	None

8.17 References

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