



Chapter 7

Human Health

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7. HUMAN HEALTH

7.1 Introduction

This chapter addresses the potential human health impacts relating to the construction and operational phases of the proposed West Clare Railway Greenway Section 1: Kilrush to Kilkee (hereafter referred to as 'the proposed development'). The proposed development will provide an active-travel facility linking the towns of Kilrush and Kilkee via the village of Moyasta, offering an alternative to travel along the N67, a busy national road which does not safely accommodate non-vehicular traffic. In this chapter, the potential human health impacts of this project will be considered in a comprehensive sense.

According to the World Health Organisation (WHO), health is defined as '*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*' (Constitution of the World Health Organisation, 1946). Actual and perceived health effects may arise from various stages of the proposed development and may be present throughout the course of the project or only apparent within discrete stages. The European Commission (EC, 2017) state that human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive. These impacts are dealt with throughout this Environmental Impact Assessment Report (EIAR) and this chapter is supported by and should be read in conjunction with these chapters outlined below:

- Chapter 5: Traffic and Transportation
- Chapter 6: Population
- Chapter 9: Land and Soils
- Chapter 10: Hydrology
- Chapter 12: Air Quality
- Chapter 13: Climate
- Chapter 14: Noise & Vibration
- Chapter 17: Material Assets & Land
- Chapter 18: Major Accidents & Disasters;
- Appendix A4.1: Construction and Environmental Management Plan (CEMP) in Volume 4 of the EIAR

This chapter sets out the relevant legislation, policy and guidance (section 7.2) which has informed this assessment, the methodology used (section 7.3), the receiving environment (section 7.4) and impacts which may arise as a result of this development upon human health, including impacts from the construction and operational phases (Section 7.5). Section 7.6 sets out mitigation measures to avoid / minimise impacts identified, and details of any residual impacts are described in Section 7.8. A list of reference material used to compile this chapter is contained in Section 7.9.

7.2 Legislation, Policy and Guidance

7.2.1 Legislation

The Human Health Chapter has been developed in accordance with the EU EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment ("the EIA Directive"), and the Roads Act, 1993 (as amended).

7.2.2 Policy Context

Relevant policy documents at national and regional level that have informed this chapter are listed in Chapter 2 Policy Context and Need for the Proposed Development of the EIAR, in addition to the below local policy documents:

- Clare County Development Plan 2023-2029;
- Clare Local Economic Development Plan 2024-2030;
- Clare Climate Action Plan 2024-2029.

7.2.3 Guidelines

The documents listed in Chapter 1 'Introduction' of this EIAR have guided this assessment, in addition to the following guidance:

- TII (December 2025) *Population and Human Health Assessment of Proposed National Roads – Standard PE-ENV-01108*;
- National Roads Authority (NRA) / Transport Infrastructure Ireland (TII) (November 2008) *Environmental Impact Assessment of National Road Schemes – A practical guide, Revision 1* PE-ENV-01114;
- Institute of Public Health Ireland (2021) *Health Impact Assessment Guidance: A Manual*;
- United States Environmental Protection Agency (US EPA) (2014) *Framework for Human Health Risk Assessment to Inform Decision Making*;
- International Association for Impact Assessment (IAIA) and European Public Health Association (EUPA) (hereafter referred to as the IAIA and EUPHA Guidance) (2020) *Human Health: Ensuring a High Level of Protection. A reference paper on addressing Human Health in Environmental Impact Assessment*;
- IEMA (2020) *Health Impact Assessment in Planning*;
- WHO (2018) *Environmental Noise Guidelines for the European Region* (hereafter referred to as the WHO Noise Guidelines);
- IEMA (2022a) *Determining Significance for Human Health in Environmental Impact Assessment*.

7.3 Methodology

7.3.1 Study Area

Transport Infrastructure Ireland's (TII) Population and Human Health Assessment of Proposed National Roads - Standard PE-ENV-01108 (TII, 2025) recommends that a Zone of Influence (hereafter 'Zol') of 500m from the proposed development boundary should be used to focus the assessment of population and human health impacts. In accordance with these guidelines, the primary Zol is defined by the Electoral Divisions (EDs) that are wholly and / or partially contained within 500m of the proposed development. It is recognised that transport infrastructure can influence activities across a wide area, especially in an urban environment. For this reason, a wider buffer area of 1km is also included to fully inform this assessment.

In accordance with TII 2025 Guidelines, baseline data has been assessed across the Electoral Divisions (EDs) that are wholly and / or partially contained within the Zol, as presented in Table 7-1 and shown in Plate 7-1 below and Figure 6.1 in Volume 3 of this EIAR. It is worth noting that both the primary (500m) and wider (1km) Zols are located in the same EDs, no additional EDs are captured in the wider Zol. As such, a single Zol of 1km is applied to this project.

Table 7-1 Electoral Divisions (EDs) Wholly and / or Partially Contained in the Zone of Influence (Zol)

Area	EDs
Zol	Kilkee
	Kilfearagh
	Einagh
	St. Martin's
	Kilrush Rural
	Kilrush Urban

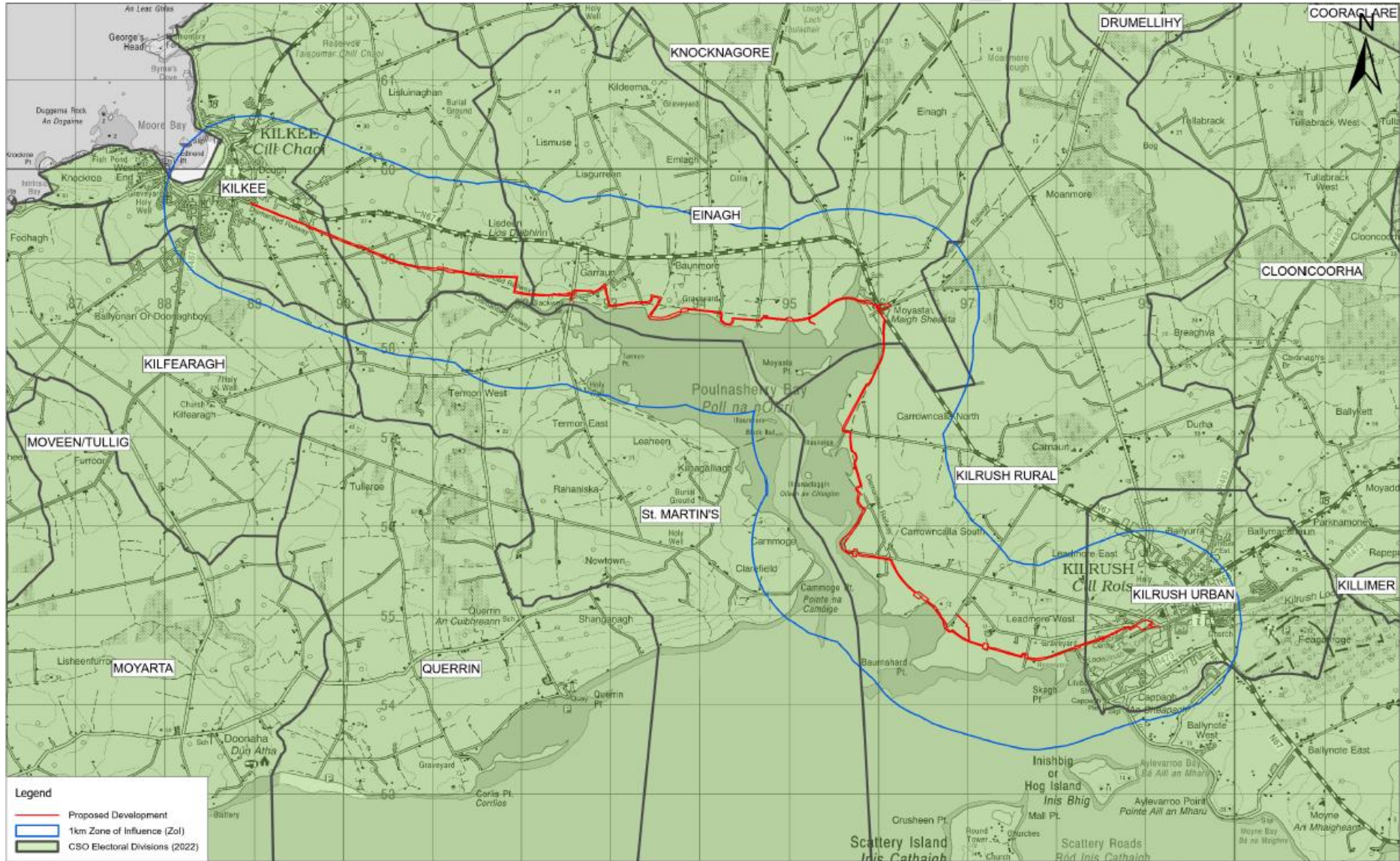


Plate 7-1 Electoral Divisions (EDs) wholly and/or partially contained in the Zone of Influence (ZoI)

7.3.2 Desktop Study

The human health assessment requires baseline information on the community health profile. Data sources used to inform this assessment include:

- Population, demographic and health data from Census 2022 and 2016 by the Central Statistics Office (CSO); Pobal and Institute of Public Health (IPH) and Health Service Executive (HSE);
- Review of aerial photography including Google Earth to inform observations of settlement / development patterns, and transportation routes,
- Consideration of the issues and/or concerns raised during public consultation as part of the design and EIA process.
- Other relevant environmental data considered during the various environmental assessments contained in this EIAR particularly traffic, noise, air and climate, water, land and soil, material assets, landscape and visual impacts, etc.

7.3.3 Site Visit

A site visit and walkover survey of the site of the proposed development was undertaken on 13th of February 2026.

7.3.4 Consultation

Relevant feedback received from statutory, non-statutory groups, the public, community groups, and private individuals on the preferred option has helped informed this assessment. The key consultation phases include:

- Non-statutory EIA Scoping Report.
- Public Consultation 1 (September 2021)
- Public Consultation 2 (September 2022)
- Public Consultation 3 (March 2024)

The feedback received during public consultation is summarised in Section 1.5 of Chapter 1 Introduction of this EIAR which has informed this chapter.

7.3.5 Assessment Methodology

7.3.5.1 Source-Pathway-Receptor Approach

This section describes the process of identifying the likely significant health effects as a result of the proposed development. TII's '*Population and Human Health Assessment of Proposed National Roads – Standards*' (TII, 2025) recommends the use of a source-pathway-receptor relationship approach as follows:

- A 'source' is a change to a health determinant resulting from the construction or operation of the project.
- A 'pathway' is the means by which the change is transmitted to a receptor or receptors.
- A 'receptor' is a population with the potential to experience a health effect as a result of its location, sensitivity or behaviour.

Mitigation by design has been taken into consideration when applying the source -pathway -receptor approach. An example of the source-pathway-receptor approach is provided in the TII Guidelines and has been replicated in Plate 7-2 below.

Source Project Element	Effect on Health Determinant(s)	Pathway Means of Transmission	Receptor Sensitive Population	
Provision of improved cycle routes and crossings	Improved opportunities for physical activity, safety and connectivity	Local community will experience improved cycling provision	New routes and crossings will be used by the local community	Scope in ←
Earthworks and construction of foundations	Ground contamination – potential mobilisation of contaminants	Contamination contained through required mitigation measures in Environmental Management Plan	Users of public footpath alongside construction site and residents of nearby housing	Scope Out →
Land take required to construct project	Green space and physical activity – loss of land from playing fields	Local community will experience reduced access to this resource	Playing fields are used by local community and sports clubs	Scope in ←

Plate 7-2 Example of source-pathway-receptor approach (Source Figure 5.6 of TII 2025 Guidelines (TII, 2025))

The proposed West Clare Railway Greenway Section 1 project is a transport infrastructure project. Human health impacts related to transport infrastructure can arise as a result of a variety of factors and interactions across environmental receptors, e.g., traffic accidents or safety issues, air and noise pollution, impacts on water quality, flooding, which have the potential to cause a threat to the health of populations and the wider environment. Therefore, all aspects of the environment influence human health to some degree or another.

Although somewhat outdated, the information contained in the Institute of Public Health (IPH) published *Health Impacts of Transport* (2005), which analysed the impact pathways from transport to human health, is still relevant today (**Error! Reference source not found.**) and has been utilised in the source-receptor-approach to facilitate with the identification of the likely direct and indirect significant effects on human health. The main impacts can be summarised as road traffic injuries, air pollution, noise pollution, effects on physical activity, and effects on community (social networks, social capital and social inclusion).

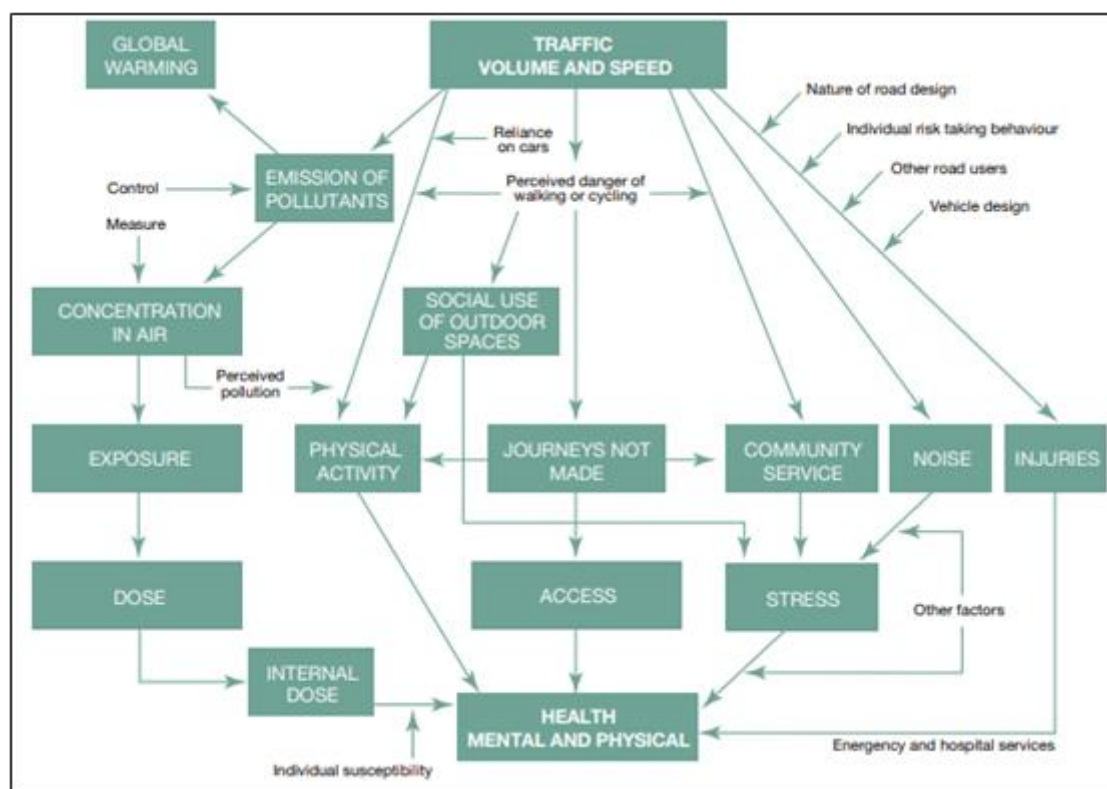


Plate 7-3 Pathways from Transport to Health Outcomes (IPH, 2005)

Human Health Determinants:

In accordance with the TII (2025) Guidelines titled '*Population and Human Health Assessment of Proposed National Roads – Standard*', this chapter will examine the Human Health attributes and characteristics associated with:

- Community and Lifestyle
- Socio-economic factors
- Environmental conditions
- Climate resilience

Community and Lifestyle

The assessment on community and lifestyle takes into consideration the likely negative psychosocial hazards relating to the new developments such as nuisance and anti-social behaviour. Demolition and property acquisition of private property or community facility can also have impacts on occupants themselves and also at community level, due to impacts on community ties and amenity of residents, local economy, etc.

Positive impacts on the community and lifestyle are also considered which can manifest in the form of improved connectivity, particularly for pedestrians and cyclists and as a result of regeneration associated with land use changes, increased economic prosperity and improved road safety.

Due to the subjectivity relating to psychosocial effects it is not possible to use a standard based approach in this aspect of the assessment.

Socio-economic factors

This assessment considers the potential impacts from the proposed development on socio-economic factors such as employment, and access to health and social infrastructure.

Transport developments can have negative effects on employment if there is potential for direct acquisition of a business, or if there is potential for indirect effects as a result of loss of income by reducing the potential for passing trade, for example construction of a bypass. Alternatively, positive effects are likely if the transport development directly provides employment during construction or operation or increases potential income for other businesses by improving connectivity to these economic operators. Similarly, potential socio-economic impacts on the wider area will be undertaken by considering the development's potential to enhance or sever connectivity to health and social infrastructure.

Environmental conditions

Health based standards are set by bodies such as the World Health Organisation (WHO) and the European Union (EU). The standards are environmental health thresholds set for a range of environmental parameters to ensure no adverse health effects on the most vulnerable in society. For example, air quality and noise levels are set at levels to protect the vulnerable, not the robust. These standards are set to ensure scientific analysis (i.e. modelling) is undertaken on the baseline environment which includes an analysis of the likely changes in the receiving/baseline environment as a result of the proposed development to predict potential human health effects. This results in a level of certainty in relation to the potential effects (positive or negative) before a project is developed. This scientific analysis provides decision makers with a clear methodology outlining what information was used, data gaps and any assumptions that were made in order to provide a comprehensive assessment of impacts on human health.

Regardless of the methodology, psychological effects or well-being effects are difficult to measure as these effects are more subjective in nature. It must also be recognised that there are uncertainties in relation to assessing impacts on individuals due to availability of health data about individuals and the difficulty in predicting effects on individuals, which could be based on a variety of assumptions. Subsequently, the existing receiving environment and relevant health-based standards assessment are relied upon to arrive at conclusions relating to likely human health effects on the community. Health-based standards are outlined in the respective EIAR Chapters listed above and are summarised below.

Human Health Impacts from Emissions to Air

Air quality is generally classified as good in Ireland. However, traffic is a key pressure on air quality and is the main cause of air quality problems in our larger towns and cities (EPA, 2024a). Vehicles emit a range of air pollutants including nitrogen oxides (NO_x), particulate matter (PM₁₀ and PM_{2.5}), black carbon and volatile organic compounds (VOCs), particularly present in urban areas and areas with high congestion levels.

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set.

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland are set out in Directive (EU) 2024/2881 of the European Parliament and of the Council of 23 October 2024 on ambient air quality and cleaner air for Europe (recast). This directive supersedes EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (CAFE Directive). It sets out new air quality standards for pollutants to be reached by 2026 and 2030 which are more closely aligned with the World Health Organisation (WHO) air quality guidelines and also includes limit values applicable until 2030.

In relation to the proposed development, the applicable limit values are for nitrogen dioxide (NO₂) and particulate matter (as PM₁₀ and PM_{2.5}) which are set out in Table 12.1 in EIAR Chapter 12 Air Quality.

Institute of Air Quality Management (IAQM) guidelines (IAQM, 2024) was used to assess the impact of dust emissions from construction and demolition activities, based on the scale and nature of the works and the sensitivity of the area to dust impacts, as outlined in Chapter 12 Air Quality of this EIAR.

As per Chapter 5 Traffic and Transportation in Volume 2 of this EIAR, it has been determined that construction and operation stage traffic is not predicted to exceed the criteria outlined in the *TII guidance Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2025a). Therefore, a detailed air quality assessment of construction and operation stage traffic emissions has been scoped out as there is no potential for significant impacts to air quality.

Human Health Impacts from Noise and Vibration

According to the WHO, noise is the second greatest environmental cause of health problems, after air quality (EPA, 2024a). Excessive noise can seriously harm human health, affect mental health and people's daily activities, including in sensitive receptors such as residential properties, schools, workplace and during amenity or leisure time. The WHO (2018) states that noise can lead to auditory and non-auditory effects on human health, including hearing loss, tinnitus, psychological and physiological distress, cognitive impairment, sleep disturbance and annoyance.

EPA (2024a) states that *“at least one in five people in the EU is exposed to long-term noise levels considered harmful to their health. Health issues related to these exposures include annoyance, sleep disturbance, cardiovascular and metabolic issues (EEA, 2023a). There is also evidence of an association between transport noise and cognitive impairment in children (EEA, 2023a).*

The assessment and management of noise from the infrastructural transport sources (roads, rail, and airports) are governed by the Environmental Noise Directive and associated 2006 Environmental Noise Regulations (S.I. 140 of 2006).

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. In order to set appropriate construction noise limits for the development, EIAR Chapter 13 Noise and Vibration has undertaken an assessment of significance as per British Standard BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise.

The approach adopted in EIAR 13 Noise and Vibration calls for the designation of a noise sensitive locations into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

BS 5228-1:2009+A1:2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 14.1 of EIAR Chapter 14 set out the values which, when exceeded, signify a significant effect at the façades of residential receptors (replicated in Table 7-2 and Table 7-3, below).

For the appropriate assessment period (i.e. daytime in this instance) the ambient noise level is determined through a logarithmic averaging of the measurements for each location and then

rounded to the nearest 5dB. If the construction noise exceeds the appropriate category value, then a significant effect is deemed to occur.

Table 7-2 Maximum Permissible Noise Levels at the Façade of Dwellings During Construction (Source: EIAR Chapter 13 Noise and Vibration)

Assessment category and threshold value period (L _{Aeq})	Threshold value, in decibels (dB)		
	Category A _A	Category B _B	Category C _C
Daytime (08:00 – 19:00) and Saturdays (08:00 – 14:00)	65	70	75
Evenings and weekends ^D	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

- A. Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
- B. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.
- C. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.
- D. 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

Table 7-3 Significance of Effects Relating to Construction Noise Levels (CNL) (Source: EIAR Chapter 13 Noise and Vibration)

Guidelines for Noise Impact Assessment Significance (DMRB)	CNT per Period	EPA EIAR Significance Effects	Determination
Negligible	Below or equal to baseline noise level	Not Significant	Depending on CNT, duration & baseline noise level
Minor	Above baseline noise level and below or equal to CNT	Slight to Moderate	
Moderate	Above CNT and below or equal to CNT +5 dB	Moderate to Significant	
Major	Above CNT +5 to +15 dB	Significant, to Very Significant	
	Above CNT +15 dB	Very Significant to Profound	

Table 7-4 presents the DMRB (2011) likely impacts associated with change in traffic noise levels. The corresponding significance of impact presented in the EPA (2022) guidelines is presented alongside this for consistency in wording and terminology for the assessment of impact significance.

The significance of changes in noise levels in terms of impact on human health are interpreted with regard to the criteria outlined in Table 7-4 and the results from Chapter 14 of this EIAR.

Table 7-4 Likely Human Health Impact Associated with Change in Traffic noise levels (Source: EIAR Chapter 14 Noise and Vibration)

Magnitude of Impact	Increase in Traffic Noise Level (dB)
Negligible	Less than 1.0
Minor	Greater than or equal to 1.0 and less than 3.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Major	Greater than or equal to 5.0

Human Health Impacts from Emissions to Hydrology and Hydrogeology

Emissions standards and pathways that affect human health relating to hydrology and hydrogeology include water quality. Construction and operational activities pose a risk to watercourses, particularly contaminated surface water run-off from construction activities entering the watercourses e.g., as a result of accidental spillages. Impacts to sources of drinking water are also sensitive and will be considered as a human health issue in this context.

Human Health Impacts from Emissions to Soil

Consideration of likely emissions to and from a project relating to contamination of soil or the potential to uncover contaminated land due to previous land uses (e.g., landfill, industrial, manufacturing uses) have the potential to affect human health. During construction activities there is potential to unearth or uncover previously buried materials or contaminants and, depending on the nature of the contamination, may have the potential to negatively affect human health if not appropriately addressed. EIAR Chapter 9 Land and Soils notes that as the proposed development is running along a historical railway line, contaminated soils are likely to be encountered which may pose a risk to human health. Additionally, there are likely to be hotspot areas of contamination at decommissioned maintenance, depot, stations, etc. along the old railway route. The available mapping does not indicate the presence of current or historical waste facilities, landfills or dumps, however, there is anecdotal evidence to suggest the proposed Kilrush trailhead includes a historical landfill site but historical mapping and the results of ground investigation works do not support this, with the made material at assessed at the site confirmed to be inert based on preliminary investigations.

Radon is a naturally occurring radioactive gas that originates from the decay of uranium in rocks and soils. It is colourless, odourless, and tasteless and can only be measured using special equipment. Radon rises up through the ground to disperse in the air and only becomes a health hazard when it is trapped in buildings. The EPA’s radon risk map will be used to identify the risk of radon within the Zol of the proposed development.

Climate resilience

Critical national infrastructure, such as the road network is at risk of damage and disruption due to increased climate-related hazards (Department of Transport, 2024) such as storms and flooding. EIAR Chapter 13 Climate considers the proposed development’s vulnerability to climate change effects, including flooding. This involves an analysis of the sensitivity and exposure of the development to climate hazards which together provide a measure of vulnerability. Findings of EIAR Chapter 13 will be reviewed and summarised in this Chapter in relation to human health.

Identification of Vulnerable Groups

The human health assessment will first examine the sensitivity of the population in the Zol and identify sensitive receptors and vulnerable groups. The population baseline characteristics or the community profile is required to inform the assessment of the impacts of the proposed

development on human health and this informs the identification of potential vulnerable groups in the environment. TII 2025 Guidelines (TII, 2025) define vulnerable groups as those whose *“health is more likely to be affected because their characteristics or circumstances mean they are either more likely to be exposed to an impact, or more likely to experience a health effect resulting from exposure”*.

Children and adolescents constitute a vulnerable group as they lack the experience and judgement displayed by adults. Studies also show that they may be more sensitive than adults to noise and air pollution and other environmental impacts. Elderly people also constitute a vulnerable group, but this can vary depending on a number of factors including level of income, education, deprivation and individual preferences or genetics. However, an assumption can be made that older populations move slower than their younger counterparts, particularly when moving around in traffic and public places. Older persons are also more vulnerable to health conditions than their younger counterparts. Persons with health conditions are considered to be vulnerable to changes in the environment as they may require specific support or facilities. Ease of access to medical and community facilities become very important in maintaining health and quality of life outcomes for all cohorts. Vulnerable groups in general have greater sensitivity to air pollution and potential effects on the respiratory system and cardiovascular system. There are many reasons for this, including the possible presence of other medical conditions such as respiratory or cardiovascular disease. Some subtle changes in the environment have the potential to have an adverse effect that would not be experienced by a younger, more resilient person. Other vulnerable groups also include the mobility impaired or mentally ill.

Sensitivity of Health Receptors

Criteria for assessing population sensitivity is set out in TII 2025 Guidelines (TII, 2025) as shown in Table 7-5 below. The assessment of sensitivity of a receptor population will be based on information contained in the health baseline. Other information may also be considered, such as stakeholder feedback. A commentary will be provided explaining how the sensitivity of a population has been determined, with reference to baseline information and other evidence.

Table 7-5 Health Receptor Sensitivity Criteria (adapted from TII 2025 Guidelines (TII, 2025))

Sensitivity Category	Indicative Criteria
High	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.
Medium	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.
Low	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

Sensitivity Category	Indicative Criteria
	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.
Very Low / Negligible	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.

Magnitude of Impacts

As per the TII 2025 Guidelines (TII, 2025), Table 7-6 below provides criteria used to assess the magnitude of impacts on population receptors at construction and operation phase of the proposed development.

Table 7-6 Magnitude of Health Impact Criteria (adapted from TII 2025 Guidelines (TII, 2025))

Sensitivity Category	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; majority of the population affected; substantial changes to service quality that impacts health outcomes.
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.
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.
Very Low / 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.

Significance of Effects

The purpose of the human health assessment is to identify the likely significant effects of the proposed development. It usually follows that impacts of human health nature are a function of:

- The magnitude of change (positive or negative) to a health determinant.
- The sensitivity of the receptor population and distribution of effects within the population, including vulnerable groups.
- The nature and severity of potential health outcomes, supported by evidence.
- Relevant contextual factors such as regulatory standards, stakeholder views, public perceptions, local health policies and programmes.

This human health assessment addresses effects at a community level rather than for individuals or identifiable properties, although impacts for individual properties are discussed where these are significant or located within close proximity to the proposed development.

The significance criteria to assess human health effects is defined in Table 7-78, adapted from the EPA 2022 Guidelines.

Table 7-78 Significance criteria in the assessment of human health impacts (adapted from EPA)

Impact Level	Significance Criteria
Imperceptible	An effect capable of measurement but without significant human health consequences.
Not significant	An effect which causes noticeable changes in the character of the environment without affecting the community human health sensitivities.
Slight	A slight/ small effect which causes noticeable changes in the reported symptoms of the population without affecting the community human health sensitivities (morbidity or mortality).
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging community's human health baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment affecting human health (morbidity or mortality).
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment affecting the community's human health (morbidity or mortality which can be).
Profound	An effect which changes a sensitive characteristic of the environment that profoundly affects the human health status of the community.

The criteria used to describe the potential effects is outlined in Table 7-9 below, which is adapted from the EPA 2022 Guidelines. As mentioned above, the significance is largely determined by the relationship between the sensitivity of the existing environment and the magnitude of the potential impact.

Table 7-9 Criteria used to describe human health effects (adapted from the EPA, 2022)

Quality of Effects:	
Positive	A change which improves human health.
Neutral	No effects, or effects that are imperceptible on human health, within normal bounds of variation or within the margin of forecasting error.
Negative	A change which reduces human health.
Describing the Extent and Context of Effects:	
Extent	Describe the size of the area, the number of sites, and the proportion of populations' human health affected by an effect.
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Probability of the Effects:	
Likely effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measure are properly implemented.
Describing the Duration and Frequency of Effects:	

Quality of Effects:	
Momentary effects	Effects lasting from seconds to minutes
Brief effects	Effects last less than a day
Temporary effects	Effects lasting less than a year
Short-term effects	Effects lasting one to seven years
Medium-term effects	Effects lasting seven to fifteen years
Long-term effects	Effects lasting fifteen to sixty years.
Permanent effects	Effects lasting over sixty years
Reversible effects	Effects that can be undone, for example through remediation or restoration.
Frequency of effects	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hour, daily, weekly, monthly, annually).
Note 1:	<i>for the purposes of planning consent procedures</i>

The assessment of significance relates to the identification and assessment of potential human health effects on the community. It is recognised that some individuals may have a different response to effects than others. Examples might include vulnerable groups, such as the elderly, very young, people with health conditions or the sick. As such, and as a worst-case scenario, this assessment focuses on the assessment of potential impacts on vulnerable groups.

The EPA 2022 *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* state that, “*The evaluation of effects on these pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure or risk. These standards are in turn based upon medical and scientific investigation of the direct effects on health of the individual substance, effect or risk. This practice of reliance upon limits, doses and thresholds for environmental pathways, such as air, water or soil, provides robust and reliable health protectors [protection criteria] for analysis relating to the environment.*”

Therefore, this assessment has taken account of the relevant guidelines and limit values or thresholds which are listed in the other specialists’ environmental assessments contained in this EIA, specifically: Chapter 9 (Land and Soils as it relates to contaminated land), Chapter 10 (Hydrology), Chapter 12 (Air Quality), Chapter 13 Climate, and Chapter 14 (Noise and Vibration). This human health assessment relies on the findings of the specialist assessments contained within this EIA.

Therefore, this assessment has taken account of the relevant guidelines and limit values or thresholds which are listed in the other specialists’ environmental assessments contained in this EIA, specifically: Chapter 8 (Soils and Geology as it relates to contaminated land), Chapter 9 (Hydrology), Chapter 11 (Air Quality), Chapter 12 Climate, and Chapter 13 (Noise & Vibration). This human health assessment relies on the findings of the specialist assessments contained within this EIA.

Combined Impacts

TII 2025 Guidelines states that “increased health effects may arise from a combination of impacts on health determinants such as traffic flows, noise, air emissions, visual impacts and/or severance”. This means that multiple individual effects may lead to compounding effects on communities which may lead to an overall change in magnitude of effects on health determinants which may be greater than the sum of the individual impacts. Where there are two or more types of significant impact on health determinants in an area containing sensitive populations or receptors, the potential for increased health and wellbeing effects associated with combined impacts will be considered.

7.3.6 Difficulties Encountered

There were no difficulties encountered when preparing this chapter.

7.4 Receiving Environment

7.4.1 Introduction

The following paragraphs identify the types of human health receptors that could be sensitive to the proposed development within the Zol.

The proposed development is a greenway mainly following the alignment of the abandoned West Clare Railway through rural areas between the settlements of Kilrush and Kilkee in County Clare, via the village of Moyasta. A trailhead will be provided in Kilrush adjacent to the Marina in lands owned by Clare County Council. A smaller trailhead / car park will be provided at Moyasta. There are already adequate existing parking and tourist amenity facilities in Kilkee (See Chapter 5).

The proposed development will create a continuous route between key settlements, providing a transport corridor for vulnerable road users which will be predominantly segregated from motorised traffic. It will also provide views across the wider landscape and information for users on both the natural and built heritage of the region along the way.

Human Health Baseline

According to the 2022 Census, the majority of the population in County Clare reported they were in very good or good health, with 82.6% of the population providing this response. This statistic is marginally below the State average of 82.9%. The study area itself shows a significant decrease in overall good health compared to the County and State, with 72.7% of individuals stating good health and 3.2% of respondents having bad or very bad health, compared to the State average of 1.7%. The decrease in healthy individuals observed in the study area may be attributed to the higher percentage of over 65s resident in the Zol.

Table 7-10 General Health Status of Population (CSO, 2022)

Region	General Health			
	Very Good / Good	Fair	Very Bad / Bad	Not Stated
State	82.9%	8.6%	1.7%	6.7%
County Clare	82.6%	9%	1.8%	6.6%
Study Area	72.7%	14.4%	3.2%	9.7%

Table 7-11 Persons with Disability by Electoral Division

Electoral Divisions	Total population	Persons with Disability	% persons with disability
Kilkee	1214	317	26%
Einagh	312	75	24%
Kilrush Rural	738	176	24%
Kilrush Urban	2,790	826	30%
St. Martin's	95	26	27%
Kilfearagh	373	95	25%

In 2015, Lenus, the Irish Health Repository, prepared health profiles for all Local Authorities areas. Key data from the health profile for County Clare (HSE Public Health Profile Working Group, 2015) are identified below:

- The overall birth rate is 14.4 and birth rates to those aged under 20 is 9.1 which is lower than the national figures of 15.8 and 12.3 respectively.
- Has the highest incidence nationally of female breast cancer and lowest incidence nationally of female lung cancer.
- Has a lower-than-average cancer mortality rate for all ages.
- Has a better than average uptake rate of immunisation at 24 months for 3rd 6 in 1 of 97% and for immunisation uptake at 24 months for MMR1 of 94%.

7.4.2 Vulnerable Groups

Age Dependency Ratio

Table 7-12 below summarises the age profile of the Zol. Overall, the age profile of the Zol is significantly older than the State average, with below-average numbers of 0 to 14-year-olds, 15 to 24-year-olds and 25 to 44-year-olds. There are significantly higher rates of over 65s in the Zol, over 8% higher than the State average. Clare County overall shows an older population also, though the county population trends more closely reflect the national average.

Table 7-12 Age Demographics in the Zol, County and State (CSO, 2022)

Area	% of Population by Age Group				
	0 – 14	15 – 24	25 – 44	45 – 64	65+
State	19.7%	12.5%	27.6%	25.1%	15.1%
Clare County	19.5%	12.4%	24%	27.1%	16.9%
Zol Average*	17.2%	10.3%	21.7%	27.1%	23.6%

*Average of EDs within 1km of the proposed development

The six EDs which compose the environs of the proposed greenway each have higher proportions of over 65s than the State and County average. The lowest percentage of over 65s is within the Kilrush Rural ED, with 17.8% of the population being over 65, while Kilfearagh and Kilkee EDs have an average of over 26% over 65s. Conversely, each ED in the Zol has below average rates of 0 to 14-year-olds. The lower numbers of children observed in these EDs aligns with the aged population that lives in this area. The populations within these EDs are long-established and have lower than expected numbers of young people due to limiting factors such as a lack of public transport and employment opportunities (Séan Ó Riordáin and Associates, 2022)

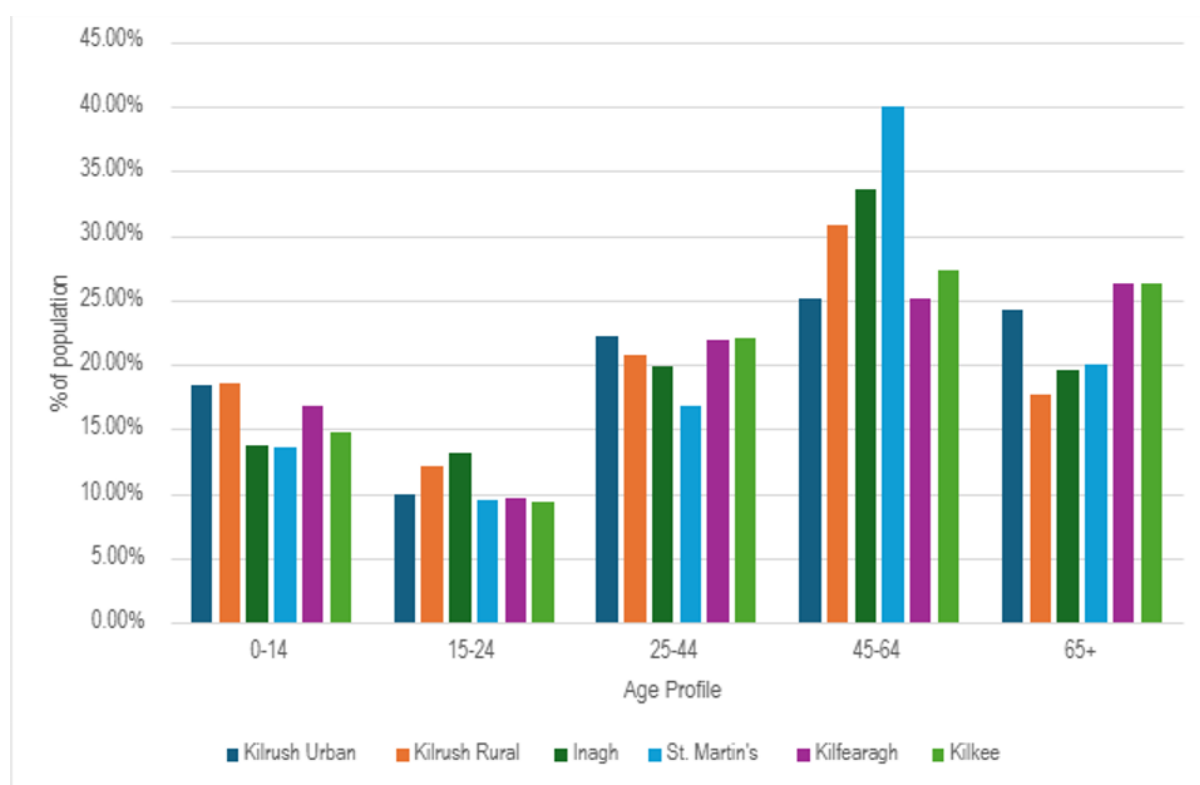


Plate 7-4 Age profile for EDs contained, or are partially within the Zol

The age dependency ratio is the population ratio of those typically not in the labour force, i.e. children under 15 and adults over 65, to those typically within the labour force, i.e. 15 to 64. This ratio provides an indication of the pressure upon working forces to support services for dependents. The average age dependency ratio of the Zol in 2022 was 63%, indicating a significant portion of the population does not partake in the labour force. The average age dependency ratio of the Zol in 2022 was 63%, indicating a significant portion of the population does not partake in the labour force, and is significantly higher than the State average of 35%. This statistic is concerningly high compared to the State average Age Dependency Ratio of 35%. Einagh ED has the lowest Age Dependency Ratio at 50%. Three of the six EDs have dependency ratios greater than 70%, namely Kilrush Urban ED, Kilrush Rural ED and Kilkee. These are the most urban EDs in the Zol and also the three largest, though they each have below-average numbers of under 15s, which would indicate that there is a higher portion of population who are aged 65 and over.

Disability

In Ireland, there were a total of 1,109,557 people who stated they had a disability in Census 2022, accounting for approximately 22% of the population, showcasing an increase on the 2016 figure of 643,131. As of the 2022 Census, there are 27,213 individuals with a disability in County Clare, representing 21.3% of the county population. The percentage of the population disabilities was reviewed at ED level in Table 7-13. The number of carers in County Clare is 8,245 (CSO, 2022).

Table 7-13 Persons with Disability by Electoral Division

Electoral Divisions	Total population	Persons with Disability	% persons with disability
Kilkee	1,214	317	26%
Einagh	312	75	24%
Kilrush Rural	738	176	24%

Electoral Divisions	Total population	Persons with Disability	% persons with disability
Kilrush Urban	2,790	826	30%
St. Martin's	95	26	27%
Kilfearagh	373	95	25%

7.4.3 Levels of Deprivation

The Haase and Pratschke (HP) Deprivation Index measures the relative affluence or disadvantage of a geographical area (Pobal, 2022). The HP Deprivation Index is based upon 10 key indicators such as the proportion of skilled professionals, employment, education, age dependency and the rate of lone parents.

The Pobal HP Index 2022 score for County Clare was 0.11, indicating that it is 'marginally above average'. The HP Pobal Deprivation Index scores for the Zol are included in Table 7-14 below.

Table 7-14 HP Pobal Deprivation Index Scores in the Zol

Electoral Divisions intersecting the Zol	Index score	Description
Kilkee	-11.02	Disadvantaged
Einagh	-2.08	Marginally below average
Kilrush Rural	-0.13	Marginally below average
Kilrush Urban	-16.3	Disadvantaged
St. Martin's	0.91	Marginally above average
Kilfearagh	-8.47	Marginally below average

Overall, the Zol experiences above average rates of deprivation, namely in settlements of Kilkee and Kilrush Urban which are both classified as disadvantaged. As the proposed development is located in West Clare, it falls within the region examined in the Clare Local Economic and Community Plan (LECP) 2023-2029. Objective 1.3 of the Clare LECP is to *'reduce persistent poverty, by being proactive in the delivery of supports and services that address the challenges of poverty including access to all services and amenities across the county with particular attention paid to ensuring the availability of affordable childcare.'* This plan is overseen and implemented by the Clare County Council alongside the Clare Local Community Development Committee. The Clare LECP highlights inadequate transport links in Kilrush as a barrier to education. Objective 2.1 of the plan is *'To promote and facilitate access to training, education, skills development and personal development for all people in Clare.'* The Local Economic and Community Plan aims to improve the quality of life experienced by the county-wide population, through social and economic improvements.

7.4.4 Crime

Two Garda stations lie within the Zol, Kilkee Garda Station and Kilrush Garda Station. Crime records per region are provided as part of the Census data. Plate 7-5 below shows crime rate trends in the Southern Region, which includes County Clare alongside Kerry, Cork, Limerick and Tipperary. The State crime rates in 2018 to 2023 are also shown below in Plate 7-6.

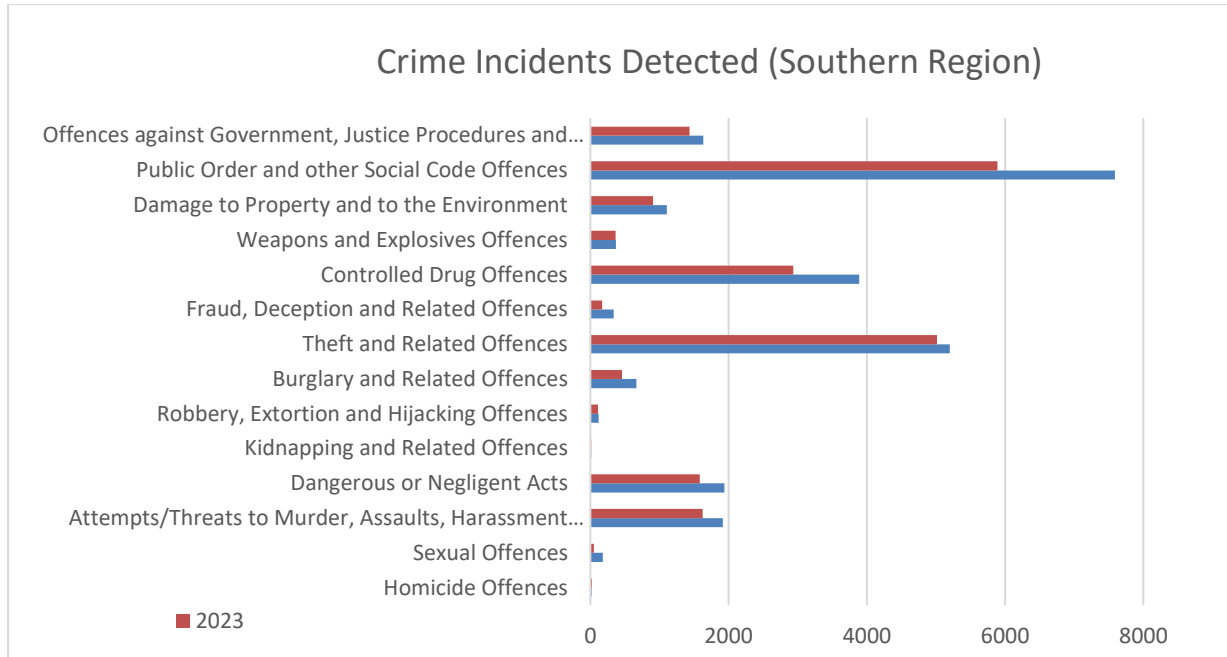


Plate 7-5 Crime incidents detected in the Southern Region for years 2018 and 2023.

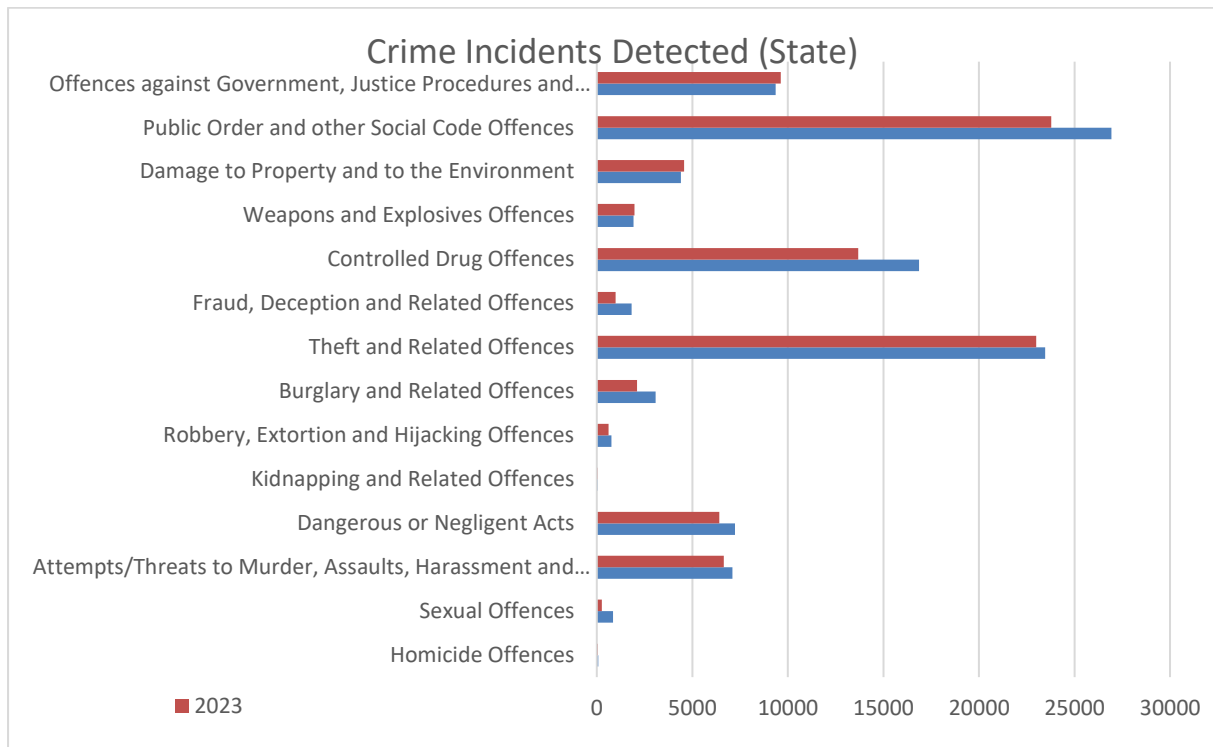


Plate 7-6 Crime incidents detected in the State for the years 2018 and 2023

7.4.5 Noise Environment

To inform EIAR Chapter 14 Noise and Vibration, an environmental noise survey has been conducted along the proposed development route in order to quantify the existing noise environment.

In summary, the prevailing ambient noise environment varied at different locations across the study area which are broadly summarised as follows:

- Quiet rural roads and more remote areas with minimal vehicle traffic, dominated by natural sounds such as birdsong, occasional aircraft overhead, distant dog barking, and foliage noise. Noise levels in these areas were typically measured in the range of 36 to 50 dB L_{Aeq} .
- Small rural settlements and residential estate areas where noise sources included local road traffic, pedestrian movements, light vehicle activity, and occasional construction noise. Noise levels in these areas were typically measured in the range of 42 to 56 dB L_{Aeq} .
- Busy road locations adjacent to main routes such as the N67 and R473, where dominant noise sources were heavy traffic including buses and heavy goods vehicles. Noise levels in these areas were typically measured in the range of 56 to 71 dB L_{Aeq} .

7.4.6 Air Quality Environment

AWN Consulting (AWN) have been engaged by Roughan & O'Donovan (ROD) on behalf of Clare County Council (CCC) to prepare an assessment of Air Quality for Section 1 of the West Clare Railway Greenway.

In terms of air monitoring and assessment, the proposed development is within Zone D (EPA, 2025). The long-term monitoring data has been used in EIAR Chapter 12 Air Quality to determine background concentrations for the key pollutants in the region of the proposed development. Based on the information reviewed, the air quality in the Zone D area is generally good, with concentrations of the key pollutants generally well below the relevant pre-2030 limit values (40 $\mu\text{g}/\text{m}^3$ for NO_2 , 40 $\mu\text{g}/\text{m}^3$ for PM_{10} , and 25 $\mu\text{g}/\text{m}^3$ for $\text{PM}_{2.5}$).

7.4.7 Climate

EIAR Chapter 13 Climate reviewed the data published by the EPA in 2025 which indicates that Ireland exceeded, without the use of flexibilities, its 2024 annual limit set under EU's Effort Sharing Decision (ESD) (EU 2018/842) by 1.03 MtCO_{2e}. The current estimates of National greenhouse gas emissions (including LULUCF) in 2024 are 12.0% below 2018, well off the National Climate ambition of a 51% reduction by 2030. The data indicate that from 2021- 2024 Ireland has used 82.8% of the 295 Mt CO_{2e} Carbon Budget for the five-year period 2021-2025. This leaves 17.5% of the budget available for 2025, requiring a substantial 10.3% annual emissions reduction for 2025 to stay within budget.

In terms of climate vulnerability, EIAR Chapter 13 Climate determined that the baseline climatology for the area of the proposed development and Clare region shows evidence of high rainfall across the year. Mild winters with average minimums >3°C and relatively mild summers with average maximums of 17°C however, EIAR Chapter 13 Climate determined that this maximum is not significant for extreme heat or prolonged drought impacts.

7.4.8 Hydrological Environment (Flood Risk)

EIAR Chapter 10 Hydrology describes the receiving hydrological environment relative to the proposed development. The proposed development lies within the Shannon Estuary North Catchment (HA 27). The catchment includes the area drained by the River Fergus and all streams entering tidal water between Thomand Bridge and George's Head, County Clare. The area extending southeast is the Mouth of the Shannon (HAs 23;27) classified as a Coastal Waterbody, discharging into the Poulmasherry Bay. River waterbodies status for Termon_010 and Moyasta_10 waterbodies intersecting the proposed development are Good and Moderate respectively, according to the River Waterbody WFD Status 2016-2021. The River Waterbody Wood_020 at Kilrush has been classified as having 'Moderate' status, while River Waterbody Wood_010 is classed as 'Good'. The proposed Greenway is unlikely to change the status of the rivers in terms of the WFD 3rd Cycle projected risk rating, which is "Review" and "At Risk" for the river waterbodies intersected by the study area at present.

According to the Office of Public Works (OPW) Catchment Flood Risk Assessment and Management (CFRAM), Kilkee and Kilrush are indicated as liable to flood due to estuarine/coastal waters. The R473 at Cappagh, Kilrush town and Kilkee town are identified as locations where repeated flooding occurs. The area around the Moyasta_010 riverbody, including Moyasta village, is classified as having medium probability to flood, while Kilkee_Lower_010 river and Wood_020 river are classified as having high probability of flooding. A Site-Specific Flood Risk Assessment (SSFRA) has been completed for the proposed development. A short section of the existing railway in urban Kilkee is subject to Fluvial flood risk from the Atlantic Stream and will be protected from the 1% AEP flood by the Kilkee Flood Relief Scheme. Approximately 23% of the existing railway is subject to coastal flood risk.

7.4.9 Hydrogeology (Including Drinking Water)

According to EIAR Chapter 11 Hydrogeology, all groundwater bodies nationally are identified as Drinking Water Protected Areas (DWPA) according to the Environmental Protection Agency (EPA). The bedrock beneath the Zol is classed as a locally important aquifer. There are no drinking water rivers or public water supplies within the area, though there are boreholes and wells for agricultural and domestic use. The presence of low permeability soils in the area could limit the potential for contamination to infiltrate into the underlying aquifer. The estimated average groundwater recharge rates range from 1 – 200 mm/yr. It is likely that the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA are groundwater fed. Groundwater vulnerability is predominantly moderate to low in the area around Poulmasherry Bay and west towards Kilkee, with small areas of rock at or near the surface. Areas of Extreme and High Vulnerability occur within the Zol, particularly east around Kilrush.

7.4.10 Soils and Geology (Including Contaminated Land)

EIAR Chapter 9 Land and Soils notes that due to the nature of the urban / made ground deposits that the proposed development traverses, presence of contaminants is likely to be encountered. Ground investigation slit trenches to be undertaken during detailed design will aim to identify contaminants in these urban deposits. The proposed development is running along a historical railway line, as a result contaminated soils are likely to be encountered. Additionally, there are likely to be hotspot areas of contamination at decommissioned maintenance, depot, stations, etc. along the old railway route. The available mapping does not indicate the presence of current or historical waste facilities, landfills or dumps.

There is anecdotal evidence to suggest the proposed Kilrush trailhead was used as a historical landfill site, however historical mapping and the results of ground investigation works do not support this with the made material assessed at the site confirmed to be inert based on preliminary investigations. Further detail is provided in Chapter 9 Land and Soils.

7.4.11 Major Accidents and Disasters

Human health is at risk of negative impacts due to the occurrence of major accidents and disasters (MADs), i.e., hazards to which human beings are exposed, resulting in major negative impacts (such as severe injury or death), which require the use of resources beyond those of the Applicant or its appointed representatives to manage (adapted from IEMA/ISEP, 2020). Chapter 19 of this EIAR assesses the potential of the proposed development to cause MADs and its vulnerability to the negative effects of external MADs. Hazard classes taken into consideration included extreme weather events, extreme geological and tectonic events, major infrastructural failures, nuclear events, major air and water pollution events, major traffic accidents, industrial accidents, works-related accidents, and malicious attacks. In terms of industrial accidents, the MADs impact assessment has considered the potential for effects and impacts in relation to Seveso Sites in the vicinity of the proposed development. As part of this

assessment, one Seveso Site were identified within 10km of the proposed development. The Seveso site is located approximately 6.4km from the proposed development and is not situated within the consultation distance radii of any of these sites. For further information in relation to MADs, refer to Chapter 19 of this EIAR.

7.4.12 Human Health Sensitivity

Taking into consideration the deprivation scores for the EDs within the Zol, it is considered that the health sensitivity of the Zol is 'high'. Just one out of six EDs within the Zol is not considered to be at a disadvantage in terms of the HP Deprivation Index. Three of the five remaining EDs are classed as 'marginally below average', while the other two are classed as 'disadvantaged'. This deprivation score is reflected in the high proportion of elderly, poorer overall health and lower education rates of the area. Life expectancy is linked to social deprivation and people in more deprived areas live shorter lives on average and have poorer health (TII, 2025). People in poorer health are more sensitive to environmental changes in air quality and noise, for example, as a result of construction. The high age dependency ratio puts pressure on existing resources to adequately care for a large vulnerable group, individuals considered to be of 'high' sensitivity.

7.5 Description of Potential Impacts

In accordance with the TII Standards for Population and Human Health Assessment, the following sections provide an overview of the predicted impacts on human health during construction and operation phases of the proposed development, considered under four health determinants:

- Community and Lifestyle
- Socio-economic factors
- Environmental conditions
- Climate resilience

The health sensitivity of the community is considered to be 'high' for the purposes of this assessment. As discussed in Section 7.4.3, Overall, the Zol experiences above average rates of deprivation, with just one ED, St. Martin's, being classed as 'marginally above average' by the Pobal Deprivation Index. As deprivation is widespread across the Zol, it can be determined that the population here is more vulnerable to health impacts and less adaptable to changes in the human health baseline. Therefore, the sensitivity of the community has been classified as 'high'. Further to this, assessing the community human health sensitivity as 'high' accounts for the most vulnerable groups within the community. Environmental health standards are set to protect the vulnerable and not the robust who are generally more resilient to changes in their environment. As such, potential impacts on vulnerable groups (including children, adolescents, elderly and persons with health conditions) have been assessed under the aforementioned health determinants where pathways are present between the construction works (i.e. the source), and the population, including vulnerable groups (i.e. the receptors).

7.5.1 Potential Construction Impacts

Community and Lifestyle

Road Safety

The proposed development works will primarily take place offline, with limited construction works along public roads. An increase in construction traffic may increase collision risk, particularly at access points to construction sites and along haulage routes. Vulnerable persons in the population (the very young, elderly or persons with health conditions) are likely to be more at risk in this respect. The successful contractor will be required to prepare a

Construction Traffic Management Plan (CTMP) in advance of the commencement of works, in order to ensure the safety of site personnel and members of the public and to minimise construction phase-related traffic delays and disruptions. The proposed development is not likely to significantly increase the risk of accidents and collisions during construction.

Social Cohesion, Community Facilities and Community Severance

The proposed development will not introduce new severance during construction phase of the proposed development. Access to existing community facilities, including health services, education facilities, places of worship, community centres as well as outdoor amenity areas will be maintained as such, negative significant effects on human health are not likely to occur. This is therefore scoped out as access between communities of Kilkee, Moyasta, Kilrush and rural areas will be maintained for all users.

The construction phase of the proposed development has the potential to create disturbance, nuisance and / or annoyance among local residents and workers; particularly due to the generation of noise, dust and visual impacts, which may temporarily affect mental health and cognitive abilities. The community is also likely to experience annoyance from the temporary impacts of traffic management and other effects related to construction activities during the construction phase. Whilst individual annoyance cannot be discounted, annoyance in itself is not a health effect. There is no evidence that there are any significant effects on human health from transient levels of annoyance. In these circumstances, the negative impacts are assessed as *slight* due to the linear nature of the proposed development. As there will be no night time works, and through the implementation of standard good practice construction site measures, and mitigation measures prescribed elsewhere in this EIAR (particularly the implementation of the Construction Environmental Management Plan (CEMP) and its constituent plans, it is considered that the construction phase of the proposed development will not result in any negative significant psychosocial effects on the community, including vulnerable groups as a result of the proposed development.

Crime and Personal Safety

Construction workers will be exposed to a risk of potential accidents occurring while working at heights, and at or near water. The Environmental Operating Plan (EOP) will be required to address these risks and detail measures to address health and safety risks as appropriate. The EOP also requires the contractor to implement a Health and Safety Plan. Overall, *negative, not significant, short-term* effects during the construction phase are predicted.

Socio-economic factors

Land and property

Private houses or commercial premises will not be acquired or demolished for the purposes of the proposed development, however permanent land take within some private and commercial properties will be required. This may include boundary walls, hedgerows and the public or private roadbed. The significance of effects range between *slight to not significant, permanent* and *negative* effects on the properties as detailed in Chapter 6 Population (residential) and Chapter 18 Material Assets and Land (Non-Agricultural) (commercial). The Compulsory Purchase Order (CPO) will provide for compensation to those affected landowners. However, it is recognised even with this statutory mitigation, in the form of compensation, there may be some negative psychological impacts on property owners.

As discussed in EIAR Chapter 6 Population, the proposed development will directly employ approximately 250 construction personnel over the 24 month construction period. By providing and encouraging employment and training opportunities for local residents, socio-economic circumstance is likely to be improved, having a *positive, short-term* effects on health within the communities. The operation of existing local businesses will not be impacted by the

proposed works, and as such, the proposed development will not have any direct significant impacts on job security for employees and employers at existing economic operators.

Environmental conditions

Emissions to Air

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 250 m of a construction site, the majority of the deposition occurs within the first 50 m (IAQM, 2024). EIAR Chapter 12 Air Quality details the air quality baseline and the assessment relating to the proposed construction works. Dust emission magnitude for construction activities and earthworks is assessed in EIAR Chapter 12 as being 'large' in scale, while the magnitude of dust emission due to trackout is considered 'small', given there will be less than 20 HDV movements per day during the construction phase. A conservative estimate of the current annual mean PM₁₀ concentration in the vicinity of the proposed development is 11 µg/m³ and there are more than 10 high sensitivity receptors within 20m of the site boundary. As a result, the sensitivity of the area to human health has been assigned as 'low' in EIAR Chapter 12. Taking into consideration the dust emission magnitude and the sensitivity of the area, the risk of dust impacts on human health has been classified as 'low' risk for earthworks and construction, and negligible for trackout in EIAR Chapter 12, prior to mitigation.

Noise and Vibration Emissions

EIAR Chapter 14 Noise and Vibration details the methodology and detailed assessment results of potential noise and vibration effects including those on human health. This section provides a summary of the noise and vibration assessment that is of relevance to this chapter.

Noise levels associated with construction have been calculated in Chapter 14 Noise and Vibration and indicate that the predicted construction noise level at noise sensitive properties within 60m of the site works is above the relevant construction noise criteria, i.e. the level at which a potential significant impact could be expected to occur at noise sensitive locations. Works are assumed to progress in a linear manner, limiting the duration of construction in proximity to a given NSL, within the duration of the construction programme. Therefore, in the absence of noise mitigation, a *negative, significant to very significant, and temporary impact* is likely. At distances greater than 60m predicted construction noise levels are lower, therefore any impact is expected to be *negative, moderate, and temporary*. The majority of NSLs in the vicinity of the proposed bridge and underpass works in the vicinity of Lisdeen, Carrowncalla and Moyasta are located at distances of approximately 70m or greater from the works, where construction noise impacts are predicted to be *negative, not significant to moderate, and temporary*.

In terms of construction vibration, excavations will be made using standard excavation machinery which typically do not generate appreciable levels of vibration close to the source. Taking this into account and considering the distance the sensitive receivers are from the works, i.e. 10m at a minimum, and the attenuation of vibration levels over distance, the resultant vibration levels are expected to be well below a level that would cause disturbance to building occupants or even be perceptible. The associated impact is considered to be *neutral, imperceptible, and temporary*.

Emissions to Hydrology

EIAR Chapter 10 Hydrology provides a detailed assessment of the proposed development on the hydrological environment. Potential impacts on hydrological TWB were assessed in relation to the following:

- Impacts on the Water Quality QE due to greenway earthworks

- Impacts on the Water Quality QE due to bridge repairs
- Impacts on the Water Quality QE due to uncontrolled discharge from construction sites
- Impacts of the Water quality QE due to concrete works

The assessment identified that the majority of the works had the potential for negative, *slight, direct* or *indirect temporary* impacts on water quality. *Significant* impacts were only anticipated on Termon East_010 RWB Water Quality QE due to concrete works on bridge sites at Lisdeen.

The implementation of mitigation measures as outlined in Section 9.5.4 of EIAR Chapter 9 are anticipated to minimise impacts of water quality. The runoff impact of the proposed scheme on hydrology is expected to be *imperceptible*. Contaminant concentration in surface water runoff is based on traffic density, and projected traffic volumes will remain below the AADT threshold for pollution impacts on receiving waters.

Emissions to Hydrogeology

In terms of water quality impacts during the construction phase, EIAR Chapter 11 Hydrogeology identifies that there is potential for contamination to be encountered along the route of the former West Clare Railway corridor, due to the historic land use. In an unmitigated scenario the works required to remove the sleepers and contaminated soils have the potential to mobilise contaminants and leach into the aquifer which may result in an *'unlikely', negative, moderate to significant* and *short-term* impact on the receiving groundwater environment at the proposed development.

There is a potential risk associated with the cementitious materials used during construction works, including the construction of pavements and other structures (i.e., bridge foundations) and the accidental release of deleterious materials (e.g., fuels or other hazardous materials being used onsite), through the failure of secondary containment or a materials handling accident at the site, that have the potential to impact on the underlying groundwater beneath the site. Overall, the use of deleterious materials at the proposed development may result in an *unlikely, negative, moderate to significant* and *short-term* impact on the receiving groundwater environment.

Flood events during construction may have the potential to mobilise contaminants during the construction phase. All works will be undertaken in accordance with the CEMP and SSFRA (ROD, 2025b), with measures put in place to mitigate this risk (e.g., seasonal phasing of the works). In the absence of mitigation, it is considered that this could result in an *unlikely, negative, moderate to significant* and *temporary* effect on the receiving hydrogeological environment depending on the nature of the incident.

The construction compounds will be located at the proposed trail head locations, with several smaller satellite compounds located along the route at access points. There will be no unauthorised discharge of water (groundwater or surface water runoff) to ground during the construction phase of the proposed development. Therefore, as the necessary permits or authorisation will be obtained for the discharge of any water from the site, the potential impacts will have been adequately assessed and mitigated as part of the statutory consent and there will be a *likely, neutral, imperceptible* and *temporary* effect on the receiving hydrogeological environment.

Emissions from Soil

Based on available data reviewed as part of EIAR Chapter 9 Land and Soils, it is likely that contaminated soils will be encountered over the course of the proposed development. During the construction stage, construction workers or personnel who are anticipated to be in contact with the ground will be required to wear personal protective equipment (PPE) to minimise and

avoid health and safety related risks of dealing with contaminated soils. *Negative, imperceptible* effects on human health are likely.

Climate resilience

EIAR Chapter 13 Climate scoped out a detailed climate change risk assessment (CCRA), however consideration has been given to the impact of climate change on the proposed development. Potential impacts of climate change on Human Health during construction include:

- Flood Risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding.
- Increased temperatures potentially causing water scarcity and prolonged periods of hot weather.
- Reduced temperatures resulting in ice or snow and [possible hazard to working conditions].
- Major Storm Damage, including wind damage and coastal flooding from storm surge.

During the construction phase consideration will be given to the project's vulnerability to climate impacts. During construction, the Contractor will be required to mitigate against the effects of extreme rainfall / flooding through site risk assessments and method statements. The Contractor will also be required to mitigate against the effects of extreme wind / storms, temperature extremes, through site risk assessments and method statements. Temperatures can affect the performance of some materials; this will require consideration during construction. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Taking above measures into consideration, the likely effects on health of construction workers from climate related hazards are likely to be *negative, slight to imperceptible, and short-term*.

7.5.2 Potential Operational Impacts

Community and Lifestyle

Road Safety

By providing dedicated, segregated and continuous pedestrian and cyclist infrastructure, the proposed development will improve road safety for these users and is likely to reduce the overall likelihood of traffic accidents by removing the need to share road space with traffic. The persons whom the proposed development will benefit most are NMUs, including vulnerable groups, and it is noted that there have been two NMU fatalities on the N67 in recent years. The greenway will provide safe access to a variety of basic community facilities such as schools, pharmacies and urban centres which otherwise require NMUs to travel along the N67, a busy national road with speed limits of up to 100km/hr. Segregating NMUs from the N67 will greatly enhance the safety of road users and improve traffic flow. Not surprisingly, research has shown that provision of safe and convenient walking and cycling infrastructure reduces the likelihood of pedestrians and cyclists being killed or injured (Pucher & Dijkstra, 2003). In terms of road safety, *moderate to significant, positive, long-term to permanent* human health impacts are likely for pedestrians and cyclists, including vulnerable groups, during the operational phase of the proposed development.

Social Cohesion, Community Facilities and Community Severance

The proposed development will significantly improve pedestrian and cyclist connectivity between the communities of Kilrush, Kilkee and Moyasta. It will also improve active travel facilities to access community amenities and facilities, including existing medical, education, religious, recreational and open space facilities in the Zol, having positive psychological impacts on people requiring these services, including vulnerable groups.

Access to green spaces for communities has a plethora of health benefits. According to the World Health Organization (WHO), green spaces support health “*through physical activity, stress reduction and improved community cohesion through social interaction*” (HSE, 2022). The proposed development will provide enhanced connectivity between communities and to additional green spaces such as Gallery Park, Brew’s Bridge and other open green spaces with seating areas in the urban areas of Kilrush and Kilkee.

The proposed development will help to reduce inequalities for those dependent on active travel modes of transport by providing enhanced pedestrian and cyclist facilities that are segregated from general traffic, making it a more attractive alternative way of travel. The greenway will also serve as an attraction, promoting sustainable tourism. In its operational phase, the proposed development will have *direct, permanent, significant, positive* impacts upon human health.

Opportunities for Physical Activity

There is potential for the proposed development to have wider positive societal health promotion effects that may be associated with the provision of segregated pedestrian and cyclist infrastructure. Many studies have shown that individuals with physical activity of more than the minimum recommended tend to be healthier (WHO, 2020). A 2014 literature review (Kelly *et al.*, 2014) found that walking and cycling significantly reduces the risk of all-cause mortality, whereby a standardised dose of 11.25 MET¹ hours per week result in an average mortality risk reduction of 11% for walking and 10% for cycling. This is due to a strong continuous dose – response relationship between physical activity and human health, whereby each increase in physical activity induces additional health benefits. From a human health perspective this can translate into improved ‘fitness’ and reduced risk of cardiovascular and chronic diseases (McKinney *et al.*, 2016; Sothorn *et al.*, 1999; Vogel *et al.*, 2009; Warburton *et al.*, 2006) and premature death (McKinney *et al.*, 2016; Vogel *et al.*, 2009), as well as cognitive and mental health benefits (McKinney *et al.*, 2016; Saxena *et al.*, 2009; Vogel *et al.*, 2009); and from an economic perspective, reduced public health costs and workplace absenteeism, and increased productivity (Cadilhac *et al.*, 2011; Hafner *et al.*, 2020; Katzmarzyk *et al.*, 2000; Shephard, 1986).

Land use planning and transport patterns can influence physical activity and / or inactivity of populations which in turn can influence lifestyle factors and human health outcomes. Transport patterns that promote walking, cycling and sustainable modes of travel can reduce sedentary lifestyle, increasing activity and improve health outcomes. Research has demonstrated that the availability of dedicated, segregated cycleways, short cycle trip distance and proximity of cycleways to green space are positively associated with increased rates of cycling in cities; while perceived and real traffic danger, long cycle trip distance, and distance from cycleways are negatively associated (Buehler & Dill, 2016; Dill & Carr, 2003; Fraser & Lock, 2011; Nelson & Allen, 1997; Pucher *et al.*, 2010; Winters *et al.*, 2012). Research also indicates that utilitarian / commuter cycling (i.e. cycling primarily for purposes other than exercise) in cities with dedicated cycling infrastructure can achieve quite high average levels of physical activity, in and of itself (Dill, 2009).

Provision of segregated cycleways can also promote equality in cycling. Parents, inexperienced cyclists and other risk-averse individuals are substantially less likely to cycle (Garrard *et al.*, 2008, Winters *et al.*, 2012; Winters & Teschke, 2010) and female commuter cyclists express a strong preference for segregated cycleways (Garrard *et al.*, 2008).

¹ ‘MET’ = ‘metabolic equivalent’, the ratio of work metabolic rate to the resting metabolic rate. One hour of ‘walking to work or class’ is roughly equivalent to 4.0 MET hours, while the equivalent figure for casual cycling is 4.0 MET hours. (Ainsworth *et al.*, 2011).

Segregated cycling facilities proposed as part of the proposed development may be more appealing to the aforementioned groups of individuals by minimising their interaction with the general traffic. As such, the proposed development is likely to promote uptake of cycling among the risk-averse individuals and contribute to their daily physical activity.

Obesity in Ireland is a significant health issue that can be linked to travel mode as well as lifestyle factors. The operational phase of the proposed development is likely to promote greater levels of physical activity over the long-term by providing high quality walking and cycling infrastructure, providing a new, safer, and more pleasant route through the area, as well as providing links to other active travel routes, namely the Eurovelo 1 route. It may be expected to support an increase in absolute cycle journeys in the wider area, and promote a modal shift away from other, less active modes of personal mobility. As discussed above, by promoting greater uptake of walking and cycling, the proposed development is also likely to result in mental health benefits associated with these types of physical activities (Kelly *et al.*, 2018; McKinney *et al.*, 2016; Roe & Aspinall, 2011; Saxena *et al.*, 2005; Vogel *et al.*, 2009).

Overall, the proposed development is likely to increase the shares of active modes of travel in the area, such as walking and cycling resulting in human health benefits. It will also provide facilities to meet the recommended levels of physical activity which is an objective of the 'National Physical Activity Action Plan 2024-2029', primarily for the population of Co. Clare and visitors. The proposed development will have *positive, significant, long-term to permanent effect* for the community, including vulnerable groups.

Socio-Economic Factors

The proposed development is likely to bring more visitors to the settlements of Kilrush, Moyasta and Kilkee and the Loop Head Peninsula, having a positive effect on existing businesses. As outlined in EIAR Chapter 7 Population, in the Opening Year the average daily usage of the greenway is estimated to consist of c. 500 pedestrian and c. 320 cyclist trips which equates to approximately 295,000 trips per annum. User numbers will fluctuate seasonally, with greater user numbers predicted during the summer – see Chapter 5. As well as having positive impacts on existing businesses, the proposed development may indirectly generate additional employment or business opportunities due to the increased number of visitors to the area, especially in the hospitality sector.

Environmental conditions

Emissions to Air

EIAR Chapter 12 Air Quality scoped out the requirement for a detailed air dispersion modelling assessment. As per Chapter 5 Traffic and Transportation in Volume 2 of this EIAR, it has been determined by the traffic specialist that operation stage traffic is not predicted to exceed the criteria outlined in Section 12.3.4.2 of EIAR Chapter 12. Therefore, a detailed air quality assessment of operation stage traffic emissions is not required. *No significant* operational stage effects of air quality upon human health are predicted.

Noise and Vibration

The predicted noise effect during the operational phase (as per Chapter 14, Noise and Vibration) is assessed as two discrete impacts- Walking and Cycling impacts and Activity at Car Parking Areas impacts.

The primary activity during the operational phase will comprise members of the public walking and cycling along the West Clare Railway Greenway. Noise generated by walking and cycling cannot be readily quantified, as there is no significant noise source associated with these activities. It is therefore expected that noise levels at nearby noise sensitive receivers will

remain well below the recommended external noise criteria. As a result, *no significant* change in the existing noise environment is anticipated.

Car parking facilities are proposed at the trailheads at Kilrush and Moyasta, with additional informal parking provision already available in Kilkee. Vehicular movements associated with these facilities will be intermittent and limited in nature.

The proposed car parking areas are generally located at a distance from the nearest noise sensitive receivers. Typical noise levels measured approximately 20 m from the boundary of a busy car park during peak periods are of the order of 42 dB LAeq,T, which is comfortably below the recommended external noise criteria set out in Section 14.3.3. On this basis, noise impacts arising from the operation of the car parking areas are not predicted to be significant. The associated impact is considered to be *negative, slight, and long-term*.

Emissions to Hydrology

The route of the proposed greenway has been selected, as far as is practicable, to utilise existing infrastructure and to minimise impacts on surface hydrological features.

The trail head car parks at Moyasta and Kilrush are located close to waterbodies and represent a source of hydrocarbon pollution during the operational phase. EIAR Chapter 9 states that the trail head carparks will be constructed from permeable materials and be provided with appropriate bio retention features to minimise environmental impacts. The impact of the proposed bridges on the hydromorphology of the rivers that they span is *imperceptible*. Culvert construction is limited to minor streams and tributaries and will *not significantly* impact longitudinal or lateral connectivity within the wider river networks. As the greenway will be used for recreational purposes, the only significant sources of hydrocarbons during the operational phase will be from bicycles and low intensity vehicular traffic for maintenance. Wear rates of the paved surface will be low hence the greenway does *not represent a significant source* of water pollutants, impacting upon human health, during its operational phase.

Emissions to Hydrogeology

During the operational phase of the proposed development, there is limited potential for any negative significant impact on the receiving hydrogeological environment, taking into account the design and nature of the proposed development.

The proposed development will require the removal of potential sources of historic contamination (i.e., wooden railway sleepers and surrounding soils). Removing the source of potential contamination is considered to have a *likely, positive, slight' and permanent* impact on the receiving groundwater environment.

Emissions from Soil

The use of herbicides will be required to control invasive species along the Greenway route as outlined in Chapter 8 (Biodiversity) of this EIAR. This is anticipated to have an *imperceptible, permanent* effect upon Land and Soils. Herbicides will be used in accordance with the European Communities (Plant Protection Products) Regulations, 2012 (S.I. No. 159 of 2012) and the (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012) (as amended). Herbicides will be used exclusively by trained personnel, under appropriate weather conditions, and at the lowest effective dosage. When possible, non-chemical control techniques like manual removal will be given priority.

As greenway users are highly unlikely to come into direct contact with the herbicide, the receptor sensitivity is classified as 'low'. The magnitude of impact is considered 'low' given the anticipated frequency of this interaction occurring. As a result, the anticipated impact of

Land and Soils upon Human Health is considered *indirect, slight, permanent* and *negative*. Once the mitigation measures outlined in Section 8.6 of EIAR Chapter 8 are put in place, any remaining effect on Human Health is expected to be Imperceptible during the operation phase.

Climate Resilience

EIAR Chapter 13 Climate determined the vulnerability of the proposed development to a variety of climate related hazards which have the potential to impact upon human health. The hazards identified in this assessment include:

- Extreme temperatures
- Flood risk
- Extreme wind
- Coastal flooding
- Coastal erosion
- Wildfire

Extreme temperatures

The likelihood of extreme cold events in the future is projected to decrease reducing their overall exposure and risk. Extreme heat (+30°C) is equally unlikely and the design of the proposed development has incorporated these considerations with thresholds for materials accommodating these extremes. This, in addition to the proposed design specifications indicates that both extreme temperatures (cold and heat) are *not considered a significant risk* to human health.

Flood risk

The Site Specific Flood Risk Assessment (SSFRA) undertaken for the proposed development classified a greenway as a Less Vulnerable Development in relation to fluvial flood risk. The surfacing of the greenway will not significantly increase runoff rates in the area or impact existing flow paths. The proposed trailheads are classified as Less Vulnerable Development in relation to fluvial flood risk as per the SSFRA. The risk of fluvial flood risk to the proposed development is categorised as *low* based on the findings from the SSFRA.

Future increases in rainfall due to climate change may elevate the risk of surface water (pluvial) flooding. The risk of pluvial flooding affecting the operation of the greenway itself will be mitigated by ensuring the filter drains and associated pipe networks are sized accordingly for the area being drained. Therefore, pluvial flood risk to human health is categorised as *low*.

The proposed offline sections of the greenway will not impact coastal flood risk locally, or are to be constructed within coastal flood zone C. The proposed greenway will not significantly raise the surface level of the existing railway and will largely retain existing watercourse crossings and drainage infrastructure along the route. Based on the information in the SSFRA the risk of coastal flooding to the proposed development and its users is considered *low*.

Extreme Wind

Extreme wind poses a risk to human health during the operational phase due to risk of structural damage and risk of debris or vegetation striking users. Wind exposure to landscaping and vegetation has been considered in the design. At detail design stage, appropriate plant species will be selected that are suitable for the site conditions and able to withstand the climate and conditions of the west coast of Ireland and minimise the potential for impact from fallen trees and debris on active travel users. The selection of native species allows for the inclusion of well-adapted species selected for their proven tolerance to local soil and climatic conditions.

Coastal Erosion

In relation to County Clare, 10-20% of the coastline is currently deemed at risk from erosion as described in EIAR Chapter 13 Climate. In relation to the area of the proposed development, the OPW Coastal Erosion mapping was reviewed. This includes areas of projected erosion for the 2050 period. Based on this information, the proposed development is not within an area of projected coastal erosion. However, increasing sea levels may increase erosion rates in the future.

The proposed development generally includes buffer distances between the greenway and the coast, primarily by following the old railway line. Overall, the vulnerability of the proposed development and its users to coastal erosion is 'low'.

Wildfire

As part of the proposed development there will be breaks in hedgerows at field and access gates which will reduce the risk of fire spreading in these areas. The areas of the development in proximity to Kilkee and Kilrush are at reduced risk to wildfire due to their more built up area. Provided adequate breaks in vegetation are included within the development design the risk of significant wildfire is 'low'.

7.6 Mitigation Measures

7.6.1 Construction Phase

As a result of this human health assessment the following mitigation measures are required to be implemented:

- All mitigation measures set out in the other specialist chapters of this EIAR – particularly Chapters 5 (Traffic and Transportation), 6 (Population), 9 (Land and Soils), 10 (Hydrology), 11 (Hydrogeology), 12 (Air Quality), 13 (Climate), 14 (Noise and Vibration), and 19 (Major Accidents & Disasters) – will be fully implemented by the responsible parties.
- A Construction Traffic Management Plan (CTMP) will be developed and implemented by the Contractor(s) to address all modes of transport during the construction stage and will be agreed with Clare County Council prior to the commencement of the construction phase.
 - a) The CTMP will be required to maximise the safety of the workforce and the public and to minimise traffic delays, disruption and maintain access to properties.
 - b) The CTMP will be required to minimise disruption to economic operators, including marine operations and users, residential properties and will ensure access is maintained throughout the works, including along haulage routes and in vicinity of the construction site(s) for vehicles, pedestrians, cyclists, and economic operators at all times.
- Prior to the commencement of construction phase, the contractor will develop and implement all mitigation measures detailed in Chapter 4 (Description of the Proposed Development); this is to include development of Construction Environmental Management Plan (CEMP) and associated traffic management proposals to address all modes of transport and will be required to be agreed with Clare County Council prior to construction stage.
 - The CEMP will be required to maximise the safety of the workforce and the public and minimise traffic delays, disruption and maintain access to properties.
 - The CEMP will also address temporary disruption to traffic signals, footpath access and the management of pedestrian crossing points.

- The contractor shall provide an appropriate information campaign for the duration of the construction works.
- Prior to the commencement of the construction phase, the Project Supervisor Construction Stage (PSCS) will prepare a Construction Health and Safety Plan, which addresses all relevant construction phase health risks, including potential exposure to contaminated land, risks associated with working at heights and adjacent to / over water.

All construction works will be short-term in nature and will be carried out in line with the relevant legislation and standard best practice measures, thereby minimising the impact to human health. The contractor will work within stringent construction limits and guidelines to protect surrounding populations and amenities.

7.6.2 Operation Phase

The mitigation measures identified in this section along with those specific mitigation measures described in EIAR Chapter 5 Traffic and Transportation, Chapter 6 Population, Chapter 12 Air Quality, Chapter 13 Climate, Chapter 14 Noise and Vibration, and Chapter 15 Landscape and Visual Amenity will be fully implemented. All mitigation measures are included in Chapter 21 Summary of Mitigation and Monitoring Measures of this EIAR.

The following additional mitigation measures shall be implemented:

- In the event of hazardous weather conditions which may cause flooding, Clare County Council shall adhere to the measures contained in the latest Clare Major Emergency Plan to warn users of flood risk along section(s) of the greenway.

7.7 Monitoring

Monitoring measures have not been identified as part of this assessment.

7.8 Residual Effects

The residual effects on community and lifestyle, and socioeconomic factors, are as identified in Section 7.5 of this Chapter. Residual impacts on environmental conditions and climate resilience following mitigation are described below:

Air Quality Emissions

Provided the mitigation measures outlined in Section **Error! Reference source not found.** in EIAR Chapter 12 Air Quality are implemented throughout the construction phase of the proposed development, the predicted residual air quality impacts during the construction phase are *short-term, direct, localised, negative and not significant*.

No significant residual effects are predicted for the operational phase of the proposed development.

Noise and Vibration Emissions

During the construction phase of the proposed development there is the potential for significant impacts on nearby noise sensitive properties due to noise emissions from construction activities. The application of binding noise limits, hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise impacts are minimised and will have a *negative, not significant to significant, and temporary* impact on the surrounding environment.

Taking into account the low levels of vibration generated at close distances to piling rigs and excavations the vibration impacts are *neutral, imperceptible, and temporary*.

Once operational, potential impacts associated with the greenway are expected to be low in noise, i.e. people walking and cycling, limited to vehicular activity near car parking areas and occasional maintenance works along the route and as such, significant impacts on human health are not likely.

Hydrogeology

Following the implementation of mitigation measures stipulated in EIAR Chapter 11 Hydrogeology, the residual effects regarding the construction and operational phases of the proposed development are considered '*imperceptible*' to the receiving hydrogeological environment and considered not significant.

Hydrology

EIAR Chapter 9 Hydrology assesses that the impacts on the existing hydrological environment will be minimised following the implementation of mitigation measures. The runoff impact of the proposed scheme on hydrology is expected to be *imperceptible*. Contaminant concentration in surface water runoff is based on traffic density, and projected traffic volumes will remain below the AADT threshold for pollution impacts on receiving waters.

Emissions to Soils

Following the implementation of mitigation measures identified in EIAR Chapter 8, *negative, not significant and short-term* effects are predicted during the construction stage with regards to risk of construction workers coming into contact with contaminated land. During operation phase, no negative significant residual effects are expected.

Climate Resilience

In relation to climate change vulnerability, there are no significant residual risks to the proposed development due to climate change following the implementation of mitigation measures identified in EIAR Chapter 13 Climate which reduced the residual risks to 'low'. The residual effect of climate change on the proposed development is therefore *direct, long-term, negative and not significant*.

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