6 Population and Human Health

6.1 Introduction

The 2014 EIA Directive (2014/52/EU)[1], as transposed into Irish legislation, amended the topics to be be addressed in an EIAR and has replaced 'Human Beings' with 'Population and Human Health'.

In preparing this chapter, consideration has been given to the other inputs to this EIAR including, in particular, the chapters addressing Air Quality and Climate, Noise and Vibration, and the separate reports addressing Construction and Environmental Management Plan.

Population and Human Health comprise an important aspect of the environmental impact assessment to be undertaken by the competent authority. Any significant impact on the status of human health, which may be potentially caused by a development proposal, must therefore be comprehensively addressed.

The 'Guidelines on the information to be contained in Environmental Impact Assessment Reports[2]', published by the EPA states that *"In an EIAR, the assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc."*

This chapter of the Environmental Impact Assessment Report (EIAR) focuses primarily on the potential likely and significant effects on Population, which includes Human Beings, and Human Health in relation to health effects/issues and environmental hazards arising from the other environmental factors. The potential effects and mitigation measures are considered in the following broad areas of investigation:

- Population
- Employment
- Community
- Human Health

6.2 Consultation

ORS/JSA have been commissioned to assess the potential effects of the Proposed Development in terms of Population and Human Health during the construction and operational phases.

The principal members of the EIA team involved in this assessment include the following persons:

- **Lead Author**: Luke Wymer – B.A., MRUP, Dip. Environmental and Planning Law, Dip PM, Adv. Cert. Environmental Management. Current Role: Executive Director of John Spain Associates. Experience *ca*. 7 years.

[1] European Union, *EIA Directive 2014/52/EU:* Directive - 2014/52 - EN - EIA - EUR-Lex (europa.eu)
[2] EPA, *Guidelines on the information to be contained in environmental Impact Assessment Reports:* Error: 404 Whoops! Page does not exist. | Environmental Protection Agency (epa.ie)

- **Co-Author:** Mark Fitzgibbon – B.A., MRUP. Current Role: Graduate Planner. Experience *ca*. 1 year.
- **Project Coordinator & Co Author:** Luke Martin - B.A. (MOD) (Natural Sciences), M.Sc. (Sustainable Energy and Green Technology), CEnv, MIEnvSc. Current Role: Senior Environmental Consultant. Experience *ca*. 12 years.
- **Project Coordinator & Reviewer:** Oisín Doherty – B.Sc. (Geography with Environmental Science), MSc. (Environmental Management), CEnv, MIEnvSc. Current Role : Senior Environmental Consultant. Experience *ca*. 14 years.

Consultation was undertaken between the Applicant, ORS/JSA and other members of the planning/design team in order to obtain information required to assess the potential construction and operational phase effects on Population and Human Health.

6.3 Assessment Methodology & Significance Criteria

6.3.1 Desktop Study

At the time of writing there is no specific guidance from the EU Commission on the 2014 EIA Directive to indicate how the new term 'Human Health' should be addressed. However, the European Commission's Guidance on the preparation of the Environmental Impact Assessment Report (2017) does reference the requirement to describe and, where appropriate, quantify the primary and secondary effects on human health and welfare. Moreover, the European Commission guidance states the following in relation to the assessment of Human Health:

"Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population."

In accordance with this approach to Human Health espoused in the Commission Guidance, this chapter addresses Human Health in the context of other factors addressed elsewhere in further detail within the EIAR. Relevant factors identified include inter alia water, air quality, noise, and the risk of major accidents and disasters.

In addition, this chapter of the EIAR has been prepared with reference to recent national publications which provide guidance on the 2014 EIA Directive including the Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018) and the Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA in 2022.

Moreover, the following guidance published by the Institute of Environmental Management and Assessment [IEMA] in November 2022 has been utilised in the preparation of this chapter:

- The IEMA Guide to Effective Scoping of Human Health in Environmental Impact

Assessment.
- The IEMA Guide to Determining Significance for Human Health In Environmental Impact Assessment.

The IEMA Guide on Scoping of Human Health states the following *inter alia*:

"*EIA is a legal requirement for certain types of public and private projects and follows a structured process. EIA informs an application for consent to proceed with a project and is a key public health and environmental sustainability activity.*

It aims to ensure potential positive health impacts and prevent potential negative health impacts of a project. Improving population health and reducing inequalities in health has an intrinsic value that is of huge importance to all communities and it is a highly cost-effective policy objective."

With regard to the selection of a study area for assessing human health impact, the IEMA (2022) guide on scoping for human health assessment states the following:

"Using a single geographically defined neighbouring community (site-specific population) to cover a range of effects across different wider determinants of health can provide appropriate flexibility and is proportionate. If there are clearly distinct localities from which a project's activities occur (e.g. communities along a linear development) it would it be appropriate to present multiple separate site-specific geographic populations.

Reporting should have regard to the geographic audiences most relevant to the health effects of the project. The populations of relevant geographic areas should be defined to aid understanding of the individual and combined health effects due to the project. For projects of a linear nature (e.g. cable, pipeline, road or rail infrastructure), reporting structure should allow the localised conclusions for relevant geographic areas to be understood separately. This does not require that every community has a separate reporting section, but that relevant localised effects should be discussed as appropriate."

The 2018 EIA Guidelines published by the Department of Housing, Planning and Local Government (DHPLG) state that there is a close interrelationship between the SEA Directive and the 2014 EIA Directive. The Guidelines state that the term 'Human Health' is contained within both of these directives, and that a common interpretation of this term should therefore be applied. A comprehensive desk study was undertaken to assess the potential effects of the Proposed Development on Population and Human Health. This study involved the collation and assessment of data from the following sources:

- Central Statistics Office (CSO) Census Data 2011 - 2022[3].
- Waterford City and County Council Website.
- Waterford City and County Development Plan 2022 - 2028[4].
- Regional Spatial and Economic Strategy for the Southern Regional Assembly[5] (RSES).
- Environmental Protection Agency (EPA).
- Pobal HP Deprivation Index[6].
- OSI Mapping and Aerial Photography to classify land use and identify amenity sites.

[3] Central Statistics Office: Employment, Occupation, Industry and Commuting - CSO - Central Statistics Office
[4] Waterford City and County Council (2022) *CDP:* Waterford City & County Development Plan 2022–2028 - Waterford City & County Council (waterfordcouncil.ie)
[5] Southern Regional Assembly (2020) *RSES:* https://www.southernassembly.ie/regional-planning/rses
[6] Pobal (Nd) *Pobal HP Deprivation Index:* Pobal HP Deprivation Index Launched - Pobal

- Composting & Anaerobic Digestion Association of Ireland (CRÉ).
- Code of Practice for Chemical Agents, HSA 2016.
- Chemical Agents and Carcinogens Code of Practice 2021, HSA[7].
- Section 20 of the Safety, Health, and Welfare at Work Act 2005.

6.3.2 Field Work

A site walk-over was conducted by ORS consultants on the 13th December 2023 to gain an understanding of the site and the surrounding environment. Representatives of the applicants also met face to face with stakeholders within a 1km radius of the Proposed Development.

6.3.3 Impact Assessment Methodology

Once the identification of the baseline environs was conducted, the available data was then utilised to identify and assess the potential effects posed by the development on the Population and Human Health receptors withing the area.

6.3.3.1 Population Sensitivity

The assessment of significance of an impact is a professional appraisal based on the sensitivity of the receptor and the magnitude of effect. Within any area, the sensitivity of individuals in a population will vary.

The Health Impact Assessment Guidance provided by the Institute of Public Health (IPH, 2021) provides a conceptual model of the different components of sensitivity in the public health context (refer to **Figure 6.1**). The conceptual model utilises criteria (segments) and indicative classifications (levels) to underpin a finding on the sensitivity of a receptor.

The resulting outcome may be summarised as high, medium, low or negligible sensitivity to change resulting from a Proposed Development.

The existing sensitivity of the receiving environment (in terms of Population and Human Health) has been appraised for the study area with a desk-based assessment of routine demographic and health indicators, rather than the use of surveys or collection of primary data.

This includes analysis of existing data (as available) from the Central Statistics Office (CSO) and Pobal to gain a profile of the baseline population information and the sensitivity to change within the study area.

Topographical maps and Google maps, along with the information contained within the Planning Report and other application documents have also been used to inform the baseline description of the area in terms of existing economic activity, employment, community infrastructure, emergency services, tourism and recreation amenities.

[7] HAS (2021) *Chemical Agents and Carcinogens Code of Practice 2021:* Chemical Agents and Carcinogens Code of Practice 2021 - Health and Safety Authority (hsa.ie)

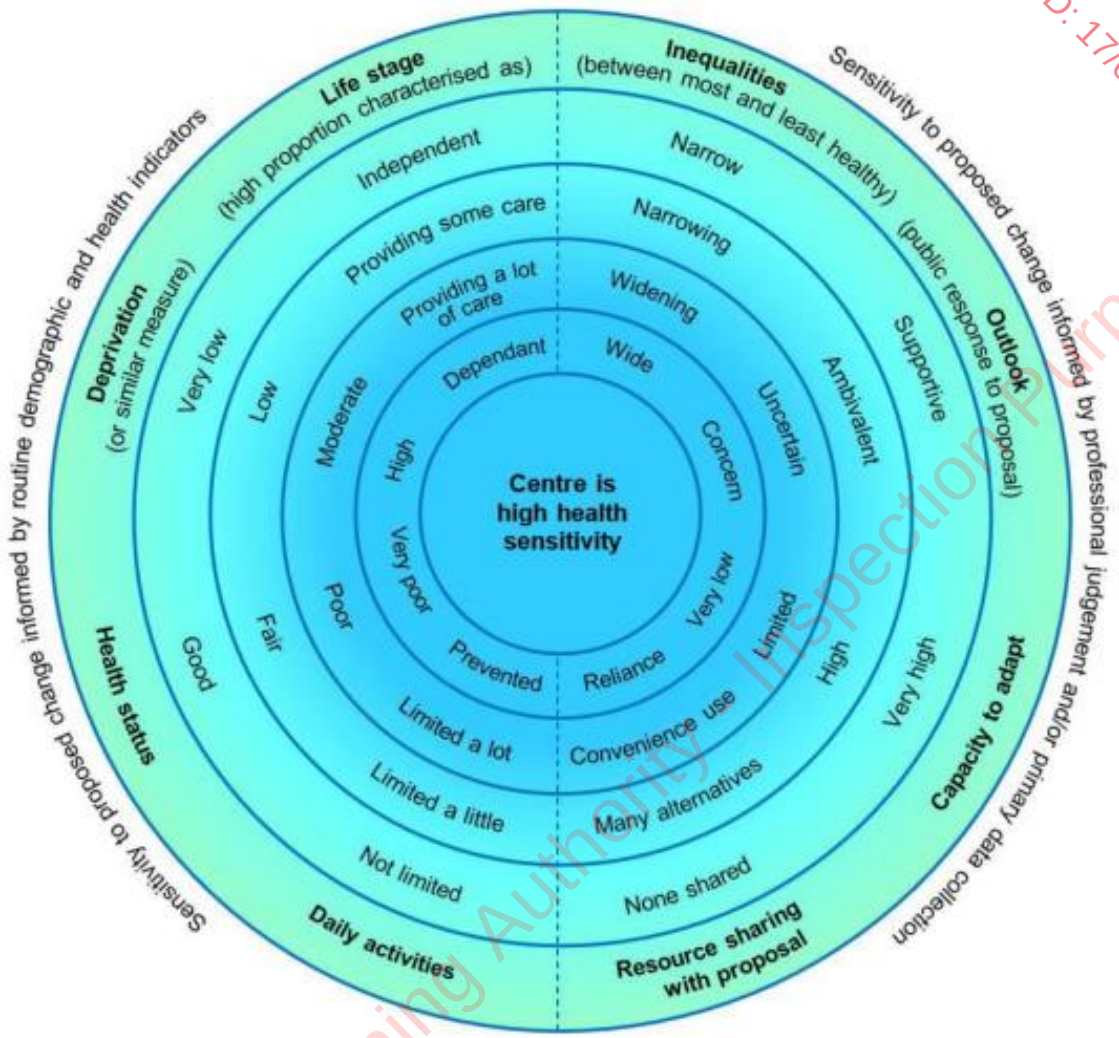

Figure 6.1: Extract from Figure T09 – Health Sensitivity Conceptual Model [IPH 2021]

6.3.3.2 Impact Magnitude

Magnitude considers the characteristics of the change which would affect the receptor as a result of the proposal.

The IPH 2021 Health Impact Assessment Guidance provides a conceptual model of the different components of sensitivity (**Figure 6.2** below refers). In a similar framework to the conceptual model for sensitivity, this model provides different components of magnitude. It uses criteria (segments) and indicative classifications (levels) underpin a finding on impact magnitude. The conclusion from this model can be summarised as a high, medium, low or negligible magnitude of change.

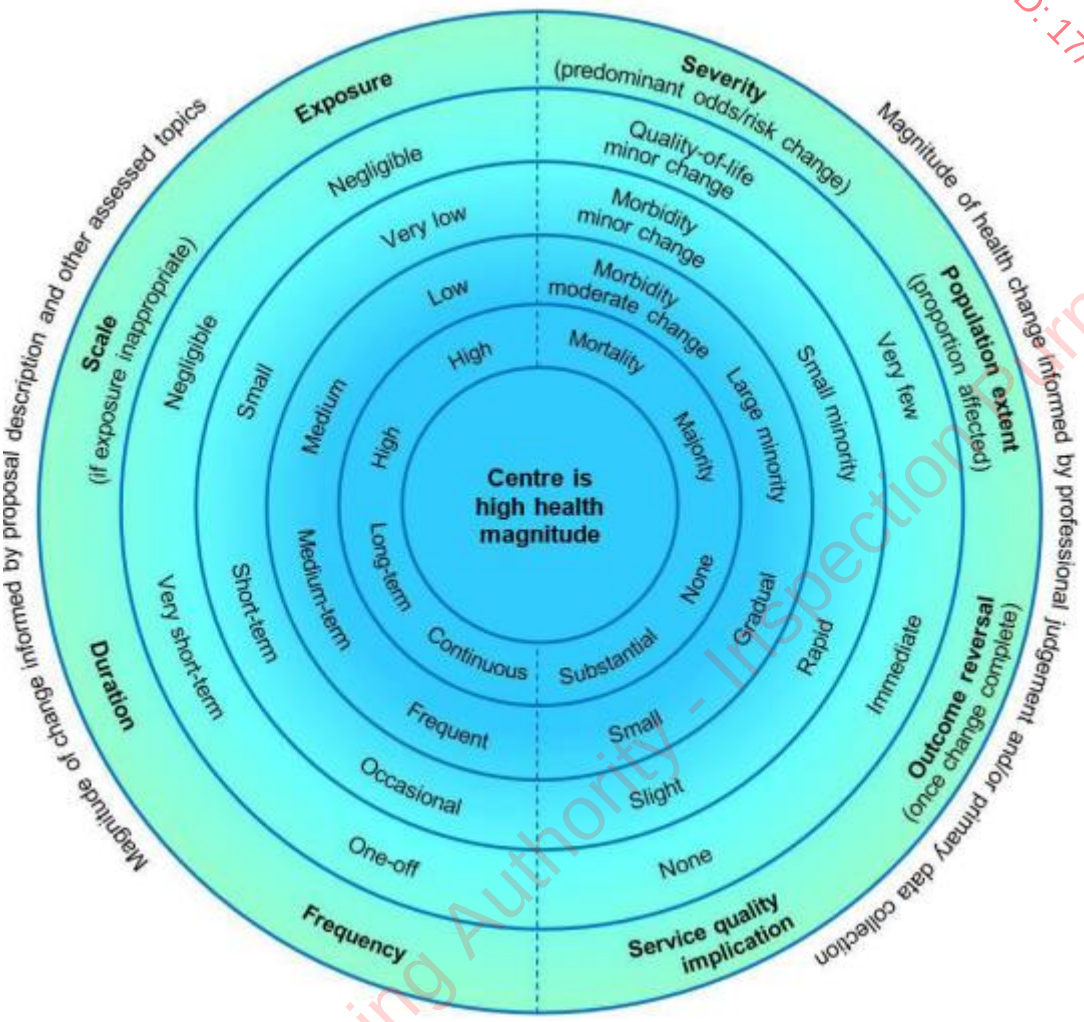

Figure 6.2: Extract from Figure T11 – Health Magnitude Conceptual Model [IPH 2021]

6.3.3.3 Significance

The IPH Guidance states that "*Significance relies on informed, expert judgement about what is important, desirable or acceptable with regards to changes triggered by the proposal in question."*

The assessment of the significance of effects in this assessment is a professional appraisal and has been based on the relationship between the magnitude of the effects and the sensitivity of the receptor.

The Health Impact Assessment Guidance (IPH, 2021) sets out a conceptual model of the different components of significance (**Figure 6.3** below). It uses criteria (segments) and indicative classifications (levels) to explore, and explain, a finding that a health effect is significant or not significant.

The Health Impact Assessment Guidance (IPH, 2021) model brings together different types of evidence, e.g. scientific literature, public health priorities, regulatory standards and health policy. The model thus not only take into account a range of evidence sources, but also a

diversity of professional perspectives, e.g. academics, public health practitioners, regulators and policy makers.

The model below, includes the factors of magnitude of impact and the sensitivity of receptors as determined by the conceptual models discussed above. This assessment typically relies on regulatory thresholds, where there would be formal monitoring by regulators, to set out the acceptability or desirability of change to population health. The determination of significance also has regard to health priorities, the relevant scientific literature, health policy context, and responses to consultation.

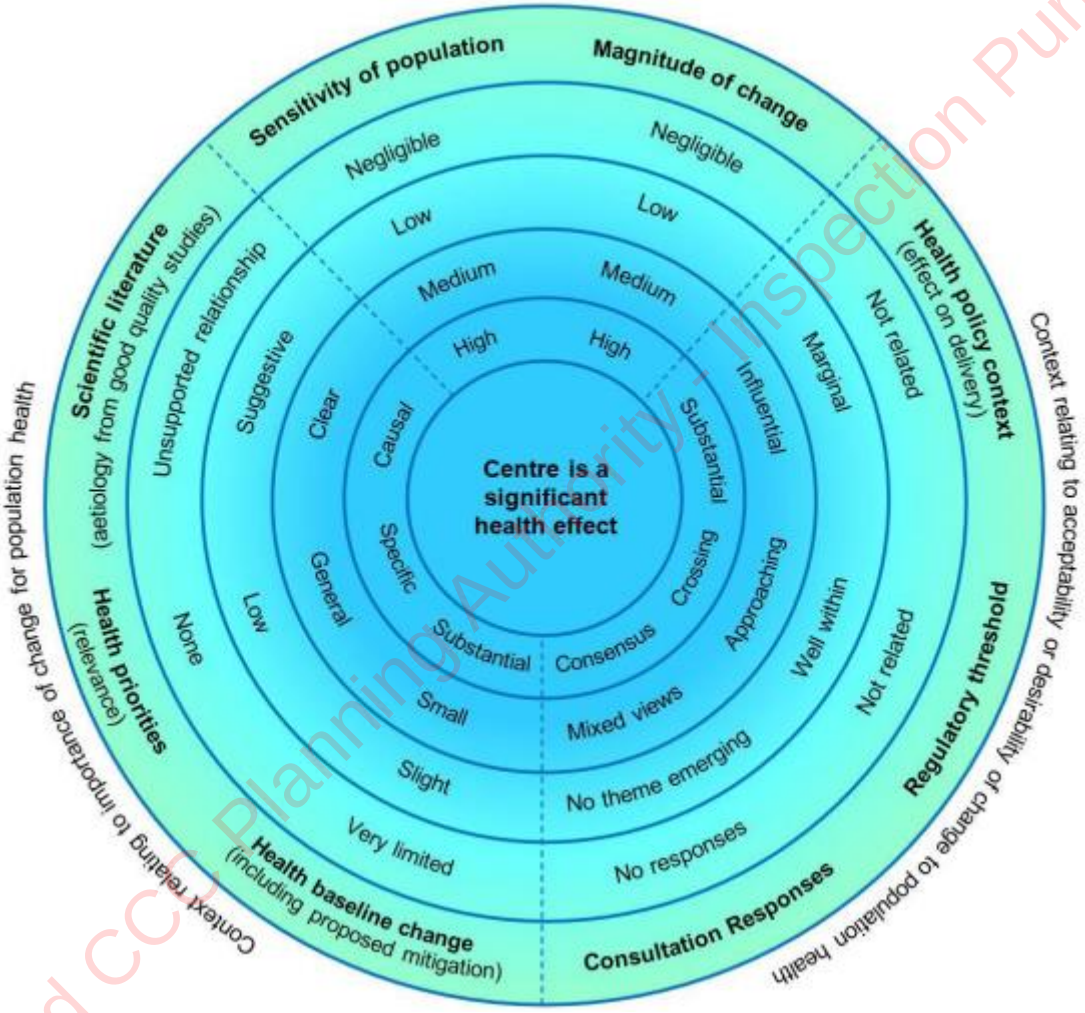

Figure 6.3: Extract from Figure T12 – Health Significance Conceptual Model [IPH 2021]

This chapter also has regard to the guidance on determining impact significance for human health in Environmental Impact Assessment, as provided within the 2022 IEMA Guide. The guidance highlights the importance of aggregating accurate and representative baseline data to help determine the sensitivity of a population, with Table 7.1 of the Guide providing a methodology for rating health sensitivity, Table 7.2 providing a methodology for health magnitude rating, and Table 7.4 providing a categorisation of significance depending on indicative criteria.

The generic indicative EIA Significance Matrix provided within the 2022 EPA Guidelines was also taken account of in the prediction of significance and the categorisation of effects carried out within this EIAR Chapter.

This chapter of the EIAR document focuses primarily on the potential likely and significant effect on Population, which includes Human Beings, and Human Health in relation to health effects/issues and environmental hazards arising from the other environmental factors. Where there are identified associated and inter-related potential likely and significant effects which are more comprehensively addressed elsewhere in this EIAR document, these are referred to. The reader is directed to the relevant environmental chapter of this EIAR document for a more detailed assessment.

6.3.3.4 Human Health Risk Assessment (On-Site)

The assessment of significance of an impact is a professional appraisal based on the sensitivity of the receptor and the magnitude of effect. Within any area, the sensitivity of individuals in a population will vary.

Once the identification of the baseline environs was conducted, the available data was then utilised to identify and assess the potential effects posed by the Proposed Development on the Population and Human Health receptors within the area.

Appraisal of Impact

- Direct Impact: where the existing baseline in the immediate vicinity of the Proposed Development is altered by activities associated with the construction or operational phases of said development.
- Indirect Impact: where the baseline beyond the Proposed Development is altered by activities associated with the construction or operational phases of said development.
- No Significant Impact: The Proposed Development has neither a positive or negative impact upon the local population or human health.

Human Health

The methodology used in the assessment of Human Health in this Chapter was guided by the US Environmental Protection Agency (US EPA) in their Human Health Risk Assessment process. This assessment methodology follows a 4-step process:

- Hazard Identification
- Dose-Response Assessment
- Exposure Assessment
- Risk Characterisation

Hazard Identification

Examines whether a stressor (impact) has the potential to cause harm to humans and/or ecological systems, and if so, under what circumstances.

Dose-Response Assessment

Examines the numerical relationship between exposure and effects.

Exposure Assessment

Examines what is known about the frequency, timing, and levels of contact with a stressor.

Risk Characterisation

Examines how well the data support conclusions about the nature and extent of the risk from exposure to environmental stressors.

6.4 Description of the Receiving Environment

6.4.1 Background

A description of the relevant aspects of the current state of the environment (baseline scenario) in relation to Population and Human Health is provided below. Specific environmental chapters in this EIAR provide a baseline scenario relevant to the environmental topic being discussed. Therefore, the baseline scenario for separate environmental topics is not duplicated in this section; however, in line with guidance provided by the European Commission, the EPA and the DHPLG, the assessment of effects on Population and Human Health refers to those environmental topics under which human health effects might occur, e.g. noise, water, air quality etc.

This section of the chapter provides the baseline information in relation to Population and Human Health that exists in the vicinity of the Proposed Development. The Proposed Development occupies a total area of approximately 7.7 hectares and is situated in townlands of Curraghnagarraha, Reatagh, and Curraghballintlea, Co. Waterford. This is a rural area surrounded by predominantly agricultural uses. The site itself is adjacent to an intensive agricultural use in the form of an existing piggery. The settlement of Carrick-on-Suir is located approximately 2.9km to the north west. The site comprises agricultural pastureland and is immediately surrounded by agricultural pastureland.

The receiving environment is described below under the following headings:

- Population and Settlement Patterns
- Employment
- Community
- Human Health (Off-Site Receptors)
- Human Health (On-Site Receptors)

6.4.2 Population and Settlement Patterns

Table 6.1: Land Use & Settlement Patterns

Location in relation to site	Land Use
North	Agricultural land, forestry and dispersed rural housing. Carrick-on-Suir is located c. 2.5km northwest of the site.
South	Farmland and hedgerows, beyond which lies a local road, adjacent to the site boundary and a large-scale piggery located c. 160m south east of the site.
East	Farmland, forestry and hedgerows.
West	Farmland, forestry and dispersed rural housing.

The Proposed Development site is located in a sparsely settled rural area known as Curraghnagarraha, in the Electoral Division (ED hereafter) of Fenoagh, approximately 2.5km southeast of the built-up settlement area of Carrick-On-Suir, Co. Tipperary. This is a rural area beyond the outskirts of Carrick-on-Suir, as indicated in **Figure 6.4**. Surrounding land use and settlement patterns are summarised in **Table 6.1**

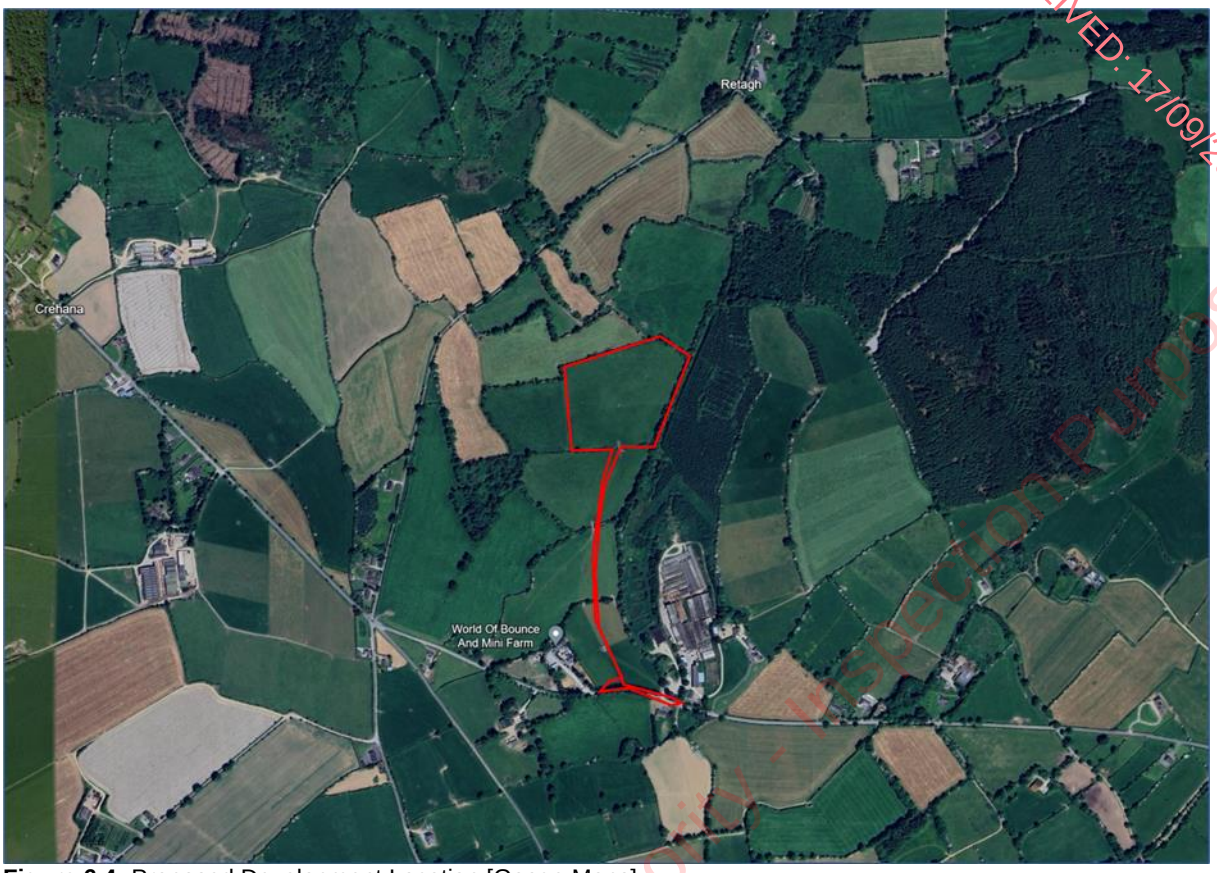

Figure 6.4: Proposed Development Location [Googe Maps]

6.4.2.1 Population Trends

The Proposed Development is situated in the centre of the Fenoagh ED which sits within the administrative boundary of Waterford City and County Council; approximately 2.5km southeast of the built-up area of Carrick-on-Suir.

Table 6.2 summarises census data for electoral divisions in the vicinity of the Proposed Development. In the years between the 2016 and 2022 census, the population of Ireland has increased by 387,274 people (8.13%). During that period, the population of Waterford county increased by 11,187 people (+9.63%).

Table 6.2: Population Trends for the Subject Site's Surrounding Areas 2016-2022 [CSO]

Area	2016	2022	% Change 2016-2022
Ireland	4,761,865	5,149,139	+8.13%
Waterford City and County Council	116,176	127,363	+9.63%
Fenoagh (ED)	214	236	10.28%

The population growth of the Fenoagh ED (10.28%) has increased at a rate which is broadly consistent with the county (9.63%) and at a swifter rate than the Country (8.13%).

6.4.2.2 Age Profile

The age profile of the population in the area is an important parameter as it provides a good

insight into the potential labour force and assists in defining the sensitivity of the local population.

Table 6.3 shows the age profiles at county and local level of the study area for 2022.

Table 6.3: Age Profile from County to Local Level 2022 [CSO]

Area	0-14	15-24	25-44	45-64	65+	Total Persons
Waterford City and County Council	24,463 (19.21%)	15,981 (12.55%)	32,600 (25.60%)	33,287 (26.14%)	21,032 (16.51%)	127,363
Fenoagh (ED)	47 (19.92%)	29 (12.29%)	62 (26.27%)	54 (22.88%)	44 (18.64%)	236

This table indicates that in the study area at ED level, the dominant age grouping is 25-44 and 45-64, consistent with the age profile at a county level. Within the Fenoagh ED, the percentage of the population above 65 is notably lower than that of the county. The dependency ratio within the study area is dealt with in further detail below.

6.4.2.3 Life Stage (Age Dependency)

The Health Impact Assessment Guidance[8] (IPH, 2021) outlines that life-course analysis is often used in public health and reflects differing health sensitivities and needs at different ages. Typically, children and older people are particularly sensitive to change, due to being dependents. Dependents are defined for statistical purposes as people outside the normal working age of 15-64. Dependency ratios are used to give a useful indication of the age structure of a population with young (0-14) and old (65+) shown as a percentage of the population of working age (15-64).

A low dependency ratio indicates that there is a larger proportion of working population age (15-64) years as compared to young (0-14) and old (65+). Conversely, a high dependency ratio indicates that there is a larger proportion of young (0-14) and old (65+) as compared to working population age. High dependency ratio can also indicate if some groups are more likely to be at home during the day (for example, due to childcare, or in the case of retired persons) and would therefore be more likely to be impacted by a development within the area.

Age dependency ratios are available through the Pobal Online Geo-Profiling tools[9] which are based on the national Census.

The age dependency ratio for the study area is shown in **Table 6.4** below. From these dependency ratios we can tell that the study area is less dependent when compared to the Country as a whole. This indicates a relatively 'independent' population within the study area as compared to the Country as a whole, which can be defined as per the conceptual model as 'providing some care' to 'providing a lot of care'. Since 2016, the age dependency ratio has decreased by 1.16% in the Fenoagh ED and have also marginally reduced in the county, going against the national trend of increasing dependency rates.

[8] IPH (2021) *Health Impact Assessment Guidance:* Health Impact Assessment Guidance: A Manual and Case Study | Institute of Public Health
[9] Gov of Ireland / EU, *Pobal Maps:* Pobal Maps

Table 6.4: Age Dependency Ratio within the Study Area [Pobal Geo-Profiling, 2022 Census]		
Area	Age Dependency Ratio for Census Year	
	2016	**2022**
Ireland	52.70	53.20
Waterford City and County Council	35.74	35.72
Fenoagh (ED)	39.72	38.56

6.4.3 Socioeconomics

6.4.3.1 Education

Census data presenting the highest level of education completed by people living in the study area community is presented in **Table 6.5**. The data shows that the subject area has a larger percentage of the population (5.52%) with a Postgraduate Diploma or Degree in comparison to nearby Carrick-on-Suir (3.35%). This is similar with the percentage of the population with an Honours Bachelor's Degree, Professional Qualification or both (10.43% compared to 6.49%). The Fenoagh ED has a lower proportion of the population (3.07%) with no formal education in comparison with Carrick-on-Suir (4.06%). However, it must be noted that the results show that the Fenoagh ED has a notably lower percentage of the population with an Honours Bachelor's Degree, Professional Qualification or both / Postgraduate Diploma or Degree and a slightly higher percentage with no formal education in comparison with the county level.

Table 6.5: Highest Level of Education Completed Locally and at County Level in 2022 for Key Educational Levels [CSO]						
Area	No Formal Education	Primary Education	Upper Secondary	Honours Bachelor's Degree, Professional Qualification or both	Postgraduate Diploma or Degree	Total Persons
Waterford City and County Council	1,765 (2.07%)	6,945 (8.15%)	16,008 (18.78%)	10,395 (12.20%)	7,483 (8.78%)	85,219
Carrick-on-Suir (town)	160 (4.06%)	442 (11.20%)	861 (21.82%)	256 (6.49%)	132 (3.35%)	3,946
Fenoagh (ED)	5 (3.07%)	6 (3.68%)	36 (22.09%)	17 (10.43%)	9 (5.52%)	163

6.4.3.2 Deprivation

The Health Impact Assessment Guidance referred to previously in this chapter (IPH, 2021) outlines that impact assessments should consider whether the population is already stressed by limited resources or unusually significant burdens as well as whether groups could be affected that have reduced access to financial, social, and political resources.

Deprivation differences between areas are indicative of social gradients, which are central to the consideration of health inequalities and resulting effects.

Deprivation statistics for Ireland are available from the Pobal HP Deprivation Index that shows the overall affluence and deprivation. This index draws on data from the national Census and combines three dimensions of relative affluence and deprivation: Demographic Profile, Social

Class Composition and Labour Market Situation that are measured by ten key socio-economic indicators from the Census of Population.

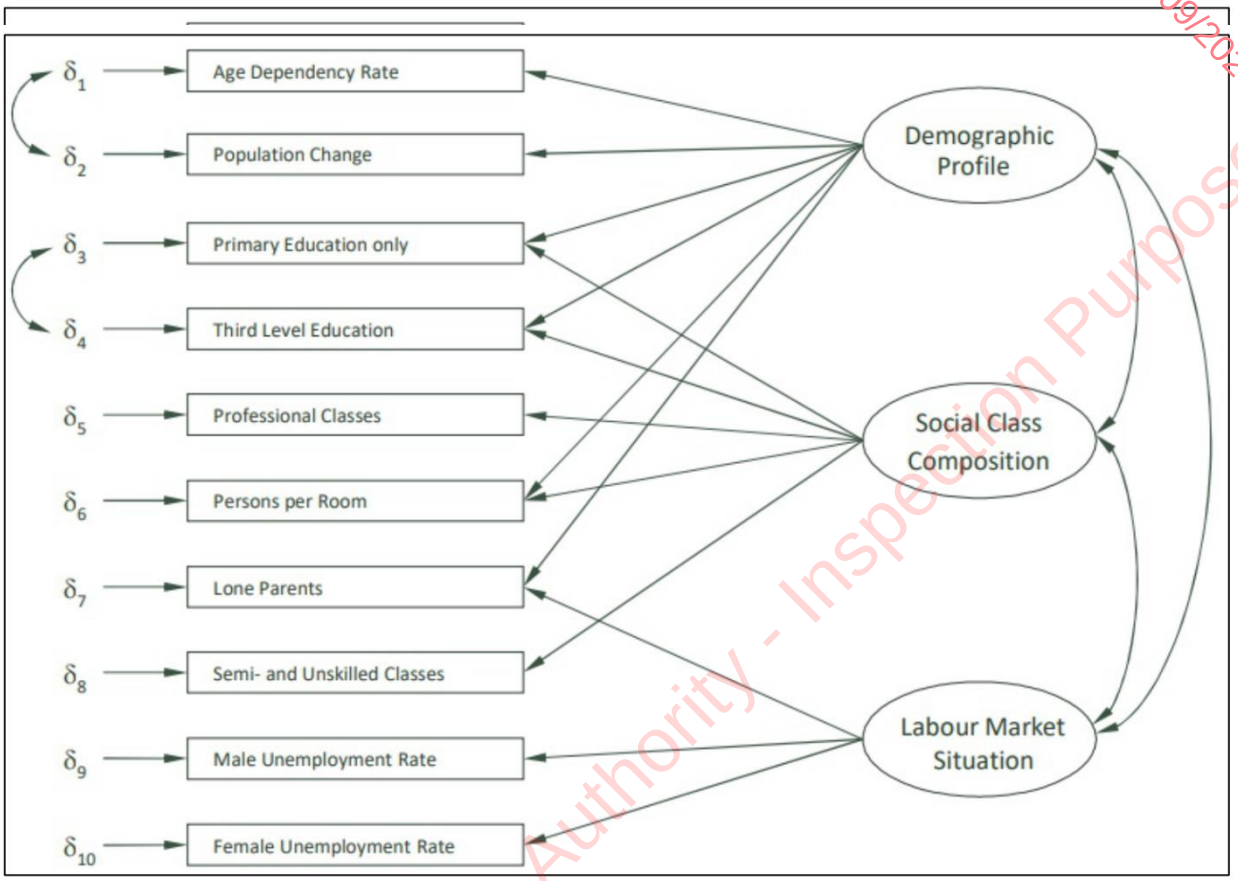

Figure 6.5: Basic Model of the Pobal HP Deprivation Index

The Pobal HP Deprivation Index Relative Index Score allows for the provision of descriptive labels with the scores, which are grouped by standard deviation as seen in **Table 6.6** below.

In order to make a uniform assessment using the conceptual model as set out in **Figure 6.1** above a relative Population Sensitivity the Deprivation Score of 'Very disadvantaged', or 'Extremely disadvantaged' would represent a high sensitivity. Conversely, an 'Extremely affluent' or 'Very affluent' would represent a very low sensitivity.

Table 6.6: Pobal HP Index Relevant Index Score Labels [Pobal HP Deprivation Index]

Deprivation Score	Pobal HP Description	Sensitivity of Population
>30	Extremely affluent	Very low
20 to 30	Very affluent	Very low
10 to 20	Affluent	Low
0 to 10	Marginally above average	Low
0 to -10	Marginally below average	Moderate
-10 to -20	Disadvantaged	Moderate
-20 to -30	Very disadvantaged	High
< -30	Extremely disadvantaged	High

The data in **Table 6.7** shows the Pobal HP Deprivation Index Relevant Index Scores[10] for the

[10] Pobal, *Pobal HP Deprivation Index:* Pobal HP Deprivation Index Launched - Pobal

Study Area based on the 2022 Census. These figures show for the year of 2022 that the study area is 'marginally above average' in comparison with the county, which is 'marginally below average'. This indicates a moderate/low population sensitivity (deprivation) within the study area. Pobal have not released deprivation scores for the Country as a whole for 2022, so comparison to the national average is not possible, however it is noted that, for comparison purposes, the area of Dublin County displays a deprivation level of 2.69 (marginally above average).

Table 6.7: Deprivation Score within the Study Area [Pobal HP Deprivation Score, 2022 Census]

Area	Deprivation Score	Pobal HP Description
Waterford City and County Council	-1.22	Marginally below average
Fenoagh (ED)	1.68	Marginally above average

6.4.4 Employment

6.4.4.1 Economic and Employment Activity

The CSO's Quarterly Labour Force Survey (which has now replaced the Quarterly Household Survey) for Q3 2023, indicated that there was an annual increase in employment within the State by 89,600 or 3.4% to 2,706,400 in the 12 months to Q4 2023. There were 117,700 unemployed people aged 15-74 years in Q4 2023 using International Labour Organisation (ILO) criteria, with an associated unemployment rate for those aged 15-74 of 4.2%, up from 4.1% in Q4 2022.

The unemployment rate among those aged 15-24 years (the youth unemployment rate) was 9.4% in Q4 2023, up from 9.1% in Q4 2022.

The estimated Labour Force (i.e. the sum of all persons aged 15-89 years who were either employed or unemployed) stood at 2,824,100 in Q4 2023, a rise of 3.5% (94,700) from Q4 2022. The estimated workforce participation rate in Q4 2023 was 65.4%, up from 64.6% in Q4 2022.

An estimated 592,400 or 21.9% of those in employment worked part-time and 23.6 % of those in part-time employment were classified as underemployed (i.e. they would like to work more hours for more pay).

In the year to Q4 2023 the age group with the highest employment rate was the 35-44 year-old group, which was unchanged from a year previously at 84.0%. The lowest employment rate by age was observed in the 15-19 year old cohort at 28.1%. All other age groupings saw an increase in employment rate with the exception of 55-59 year olds, where there was a decline of 1.8 p.p. to 72.3%.

The ESRI quarterly economic commentary for Spring 2024 notes that the Irish labour market continues to perform robustly and is now operating close to capacity. In addition, inflation is expected to decline throughout 2024 with a return to growth in real incomes. This is borne out by the latest CSO data on inflation, which records a rate of inflation of 1.6% in the year to April 2024. Irish inflation peaked at almost 10% year-on-year in the middle of 2022 and has fallen steadily over the last 12 months.

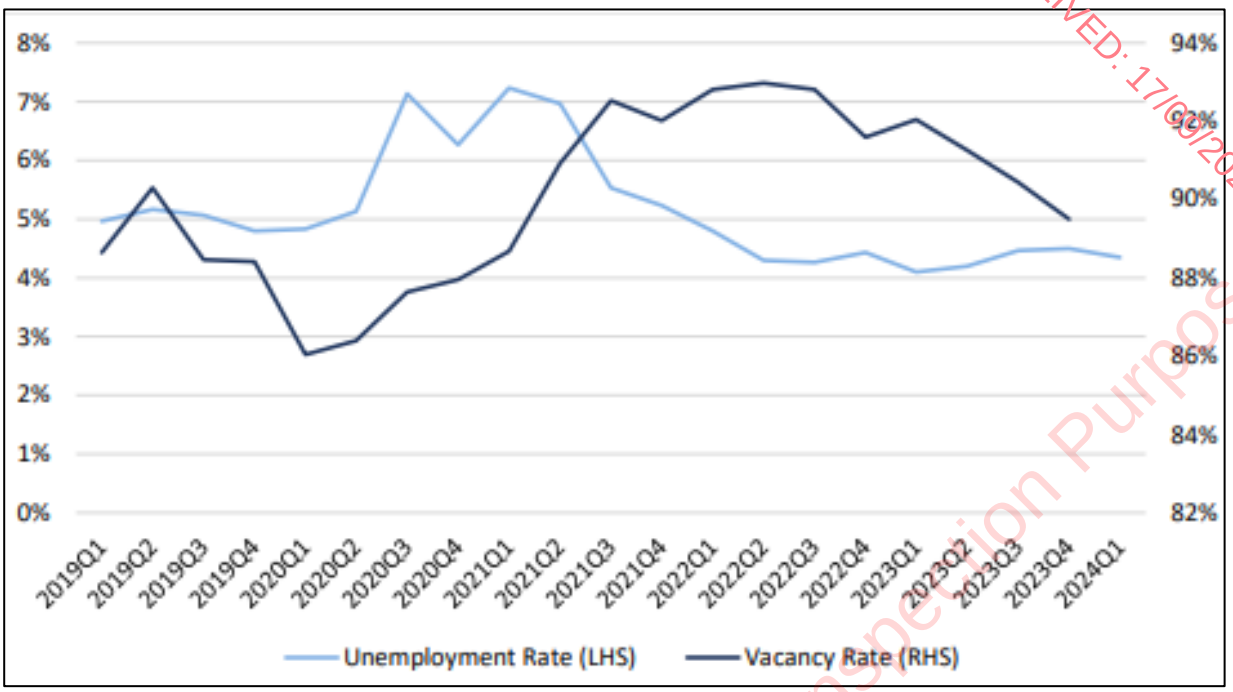

Figure 6.6: Unemployment by Quarter and Job Vacancy Rate within the State (Source: ESRI)

The above sources demonstrate that the national economy and employment levels are experiencing positive trends, which is also accompanied by reduced inflation since the peak in 2022 following the Russian invasion of Ukraine. Overall, the ESRI Quarterly Commentary concludes that developments in the labour market reflect the fact that the domestic economy is growing at a more moderate pace but still operating close to capacity.

6.4.4.2 Waterford City and County Development Plan

The County Development Plan (CDP hereafter) is a statutory document prepared by the Planning Authority in accordance with the requirements of the Planning & Development Act 2000 (as amended) and the Planning & Development Regulations 2001 (as amended).

The purpose of the CDP is to provide a strategic framework, setting out key policies and objectives for a new integrated land use strategy, and the proper planning and sustainable development of the county. The CDP is designed to set out the key policy context for the development of the county and is set within a hierarchy of national and regional spatial plans and guidelines. The Waterford City and County Development Plan[11] 2022 - 2028 took effect in July 2022. The Waterford City and County Development Plan states the following objectives relating to employment and economic activity.

Policy objective 'ECON 13 – Rural Resources' states:

"To facilitate farm or rural resource related enterprises and diversification, including food production and processing on farm/ agricultural holdings, mineral and aggregate extractive industry, aquaculture and marine, the circular economy, and proposals which support rural tourism initiatives which are developed upon rural enterprise, social enterprise, natural/ cultural heritage assets and outdoor recreational activities, subject to the capacity of the site and the

[11] Waterford CC&C (2022) *Waterford City & County Development Plan 2022-2028:* Waterford City & County Development Plan 2022 – 2028 | Waterford City & County Council (waterfordcouncil.ie)

location to facilitate the proposal."

Section 4.7 'Rural and Marine Economy' of the CDP states:

"The Council acknowledges that the development of rural enterprise and employment opportunities are vital to sustaining the rural economy and will continue its support of the sector through appropriate policy formulation and support for rural based enterprises and supporting infrastructure".

6.4.4.3 Central Statistics Office – Census 2022

The percentage of people aged 15 and over who participate in the labour force, as opposed to having another status such as student, retired or homemaker – is known as the labour force participation rate. It is measured as the number in the labour force (at work or unemployed) expressed as a percentage of the total population ages 15 and over.

According to the 2022 Census, there was an 2.75% (3 as a % of 109 – unemployed as a % of 'at work' and 'short/long term unemployed') within the Fenoagh ED. This is compared with the national average unemployment rate of 8% and a county unemployment rate of 7.9% in 2022.

'Managerial and technical' occupies the largest socio-economic group within the Fenoagh ED (31.78%). 'Skilled manual' and 'non-manual' occupied the second and third largest groups (20.34% and 15.25%). The smallest socio-economic group identified within the ED was 'unskilled' at 2.12%.

6.4.5 Community

The two principal aspects of the community surrounding the subject site can be defined as follows:

- The residential community
- The working community

6.4.5.1 Residential Community

The site of the Proposed Development is located approx. 478m north-east of the R677, c. 310m east of a county road and 390m north of a further additional country road. The closest established residential area is located at the built-up area of Carrick-on-Suir (approx. 2.5km north-west of the subject site). There are also residential units located sparsely, in a closer proximity from c. 448m north, 720m east, 415m south and 468m west.

6.4.5.2 Working Community

The working community in the vicinity of the subject site comprise primarily of agricultural and forestry-based employment. Other employment within the wider vicinity includes a driving range (c. 1.05km north) and a national school (approx. 1.93km west).

6.4.6 Human Health (Off-Site Receptors)

6.4.6.1 Health Status (General Health)

The CSO as part of the census records conducted an overall self-reported measure of

population health within the State. Areas with a poor health status are typically considered to be of a higher sensitivity and more susceptible to change in environmental conditions.

Table 6.8 below shows the self-reported measure of population health within the study area compared to the State and the nearby town of Carrick-on-Suir. This shows that 56.36% of the area self-reports their health as 'very good', which is greater than county and national trends, and considerably higher than the figure for the nearest town.

Table 6.8: Self-Reported Measure of Population Health [CSO, 2022 Census].

Area	% Population Describing their General Health					
	Not Stated	Very Bad	Bad	Fair	Good	Very Good
Ireland	346,824 (6.7%)	16,843 (0.3%)	72,556 (1.4%)	444,895 (8.6%)	1,527,027 (29.7%)	2,740,994 (53.2%)
Waterford City and County Council	8,718 (6.85%)	437 (0.34%)	1,849 (1.45%)	11,643 (9.14%)	38,260 (30.04%)	66,456 (52.18%)
Carrick-on-Suir (town)	317 (5.51%)	51 (0.89%)	162 (2.82%)	704 (12.24%)	1,895 (32.95%)	2,623 (45.60%)
Fenoagh (ED)	13 (5.51%)	0 (0%)	8 (3.39%)	13 (5.51%)	69 (29.24%)	133 (56.36%)

Ability to Perform Daily Activities

People's ability to perform day-to-day activities is relevant to population sensitivity, particularly where there are changes in access to services or community amenities. Persons with disabilities can also be more susceptible to the changes in environmental conditions. The CSO as part of the census records an overall self-reported measure of persons with disabilities within Ireland.

Table 6.9 details the number of persons with a disability compared to the population as a whole. The data shows that the study area has a lower % of persons with a disability as that of the county and national average; indicating that for persons within the area there is not a higher percentage of persons who experience restrictions on daily activity in comparison the State as a whole.

Table 6.9: Persons with a Disability [CSO, 2022 Census]

Area	Persons with a Disability	Population	% Persons with a Disability
Ireland	1,109,557	5,149,139	21.5%
Waterford City and County Council	29,204	127,363	22.93%
Carrick-on-Suir (town)	1,634	5,752	28.41%
Fenoagh (ED)	41	236	17.37%

6.4.6.2 Summary of Population Health Sensitivity

The sensitivity of the surrounding area had been considered on the details of the published data available from CSO and Pobal. The study area (ED) has seen population growth between the 2016 and 2022 census. The Pobal HP Deprivation Index shows the area to be marginally above average indicating a low population sensitivity (deprivation) within the study area (this is relatively consistent with the County as a whole, which has a marginally below average score).

There is a lower than average age dependency ratio, therefore a large proportion of the population is within working age range in the ED, thus considered as largely independent and judged to be not sensitive to change. The information presented above for the study area

shows that a high proportion (56.36%) of the population within the ED describe their health status as 'very good' and a low proportion as 'bad' or 'very bad'. The data shows that the study area has a lower percentage of persons with a disability than the county and national average indicating that for persons within the area, there are relatively few restrictions on daily activities.

The population within the study area is therefore not particularly sensitive to change, with a ranking of low to moderate sensitivity.

6.4.7 Human Health (On-Site Receptors)

An anaerobic digestion plant is considered to be a biological treatment facility, the operation of which can have the potential for a variety of exposure scenarios involving a range of factors including:

- Engineering specification.
- Abatement technologies.
- Hydrogeology.
- Topography.
- Type and quantity of waste accepted.
- Biogas generation.

In the absence of appropriate mitigation, the primary hazards to human health at a biogas facility is mainly associated with uncontrolled air and water discharges.

Pest Control

Rodents can be harmful since they may transfer viruses, micro-organisms, parasites etc. and may, therefore, represent an important factor for the spreading of various diseases. Control of rodents is a mandatory prerequisite for any waste management facility. Flies and birds can also pose a problem, where they are attracted to raw waste.

Due to the nature of wastes being accepted at the site, feral animals, flies and other vermin may be attracted to the site. Vermin maybe attracted to the facility in search of food sources. Pests such as rodents and flies can not only be a nuisance to users and neighbours, but they can also transfer germs and disease and affect the ecological balance of an area.

Sources of potential public health risks associated with vermin and other pest animals include:

- Transmission of disease.
- threat to native flora and fauna.
- threat to livestock.

There is no reason that waste being handled in the reception buildings will give rise to litter. The proposed treatment facility will process biodegradable waste in a controlled environment.

Diverting biodegradable waste from landfills and through the Anaerobic Digester treatment facility will reduce the overall odour potential to the environment.

Due to the nature and rural location of the proposed plant and the probable populous of vermin already present which may be displaced by the construction works, It is intended to employ a specialist pest control firm for the duration of the project to ensure the regular monitoring and

control of any vermin present on site or disturbed within the works area as a result of construction work.

Dose-Response Assessment

A dose-response assessment examines the relationship between exposure and effects. The greater the dose to which a receptor (individual) is exposed the greater the likelihood of an adverse response and/or the greater the severity of that response.

The threshold is the level of an agent below which one would expect no adverse response. Human health is one of the fundamental considerations during the formulation of statutory and international standards of safety in relation to dose, exposure, and risk. Such standards are covered in statutory legislation relating to air quality, noise, hydrogeology. **Table 6.10** contains a summary from the Health and Safety Authority on Gas Exposure Limits relevant to AD plants.

Table 6.10: Gas Exposure Limits (Ireland) Code of Practice for Chemical Agents, [HSA 2016]

Gas	Properties	Hazardous Atmosphere	Workplace Exposure Limit (8hr Reference Period)
CO_2	Colourless and odourless gas. Heavier than air.	8 % v / v, danger of asphyxiation.	5000ppm
NH_3	Colourless and pungent-smelling gas. Lighter than air.	Above 30 – 40 ppm mucous membranes, respiratory tract and eyes become irritated. Above 1000 ppm breathing difficulties, potentially inducing loss of consciousness.	20ppm
CH_4	Colourless, odourless gas. Lighter than air.	4.4–16.5%	1000ppm
H_2S	Highly toxic, colourless gas. Heavier than air. Smells of rotten eggs	Above a concentration of 200 ppm the sense of smell becomes deadened and the gas is no longer perceived. Above 700 ppm, inhaling hydrogen sulphide can lead to respiratory arrest.	5ppm

Exposure Assessment

Examines what is known about the frequency, timing, and levels of contact with a stressor (agent). Health based standards rely on the dose response relationship and try to identify by scientific means the threshold below which no significant health effects would occur. When standards are scientifically set by reliable and recognised or statutory agencies, they are a useful method in assessing the effect of any proposed change.

Risk Characterisation

Risk assessment seeks to characterise the nature and magnitude of human health or environmental risk. In this step, data on the dose-response relationship of an agent are integrated with estimates of the degree of exposure in a population to characterise the likelihood and severity of potential impact.

6.5 Description of the Proposed Development

6.5.1 Introduction

Consideration of the characteristics of the Proposed Development allows for a projection of the level of impact on any particular aspect of the environment that could arise. In this chapter the potential impact on Population and Human Health is assessed.

The development will consist of the following:

- Construction of 3 no. digesters (c. 15.5m in height), 2 no. digestate storage structures (c. 15.5m and 12m in height), 4 no. pump houses (c. 2.59m in height), a liquid feed tank (c. 4m in height), located in the northeastern section of the site.
- Construction of 4 no. pasteurisation tanks (each c. 6m in height), a post pasteurisation cooling tank (c. 4m in height) and pre fertiliser manufacturing tank (c. 4m in height) located in the centre of the site.
- Construction of a part single-storey and part two-storey reception hall (with a gross floor area (GFA) of c. 2,113 sq.m and an overall height of c. 16.5m) to accommodate reception and storage areas, a laboratory, panel room, tool store, workshop, located in the northwestern section of the site.
- Construction of a single-storey solid digestate storage and a nutrient recovery building (with a GFA of c. 880 sq.m and an overall height of c. 12.4m) located to the south of the reception hall, in the central section of the site.
- Odour abatement plant and equipment and a fuel tank will be provided to the south of the solid digestate storage and nutrient recovery building.
- 2 no. CO_2 tanks (c. 10.7m in height), a CO_2 loading pump (c. 2.5m in height), CO_2 auxiliaries (c. 2.6m in height), CO_2 liqueufactor (c. 8.2m in height), a CO_2 compressor (c. 5.9m in height), a CO_2 pre-treatment skid (c. 3.5m in height), and associated plant including a backup boiler / biomethane boiler and a Compressed Natural Gas compression unit / biogas compression system located in the southern portion of the site.
- A H_2S washing tower (c. 7.8m in height), a biogas treatment skid (c. 4.1m in height), a combined heat and power (CHP) unit and panel room (c. 10m in height), a biogas compression system, a biogas upgrading module, and an emergency biogas flare (c. 11.3m in height), also located within the southern section of the site.
- Construction of a two-storey office and administration building with an overall height of c. 8.5m and a GFA of c. 272sq.m, located within the western area of the site, adjacent to the main site access.
- Construction of a grid injection unit (c. 2.75m in height) within a fenced compound, an ESB substation (c. 3.4m in height and a GFA of c. 23.5 sq.m), and 2 no. propane tanks located in the south-western portion of the site.
- Alterations to the existing public road (c. 475m to the south of the main site area) including provision of boundary setbacks and replacement planting, providing a new site entrance and access road to serve the development.
- Associated and ancillary works including parking (6 no. standard, 3 no. EV and 1 no. disabled parking spaces and bike storage for 10 no. bikes), a weighbridge, solar PV arrays at roof level, wastewater treatment equipment, bunding and surface treatments, attenuation pond, boundary treatments, lighting, services, lightning protection masts, drainage, landscaping, and all associated and ancillary works."

6.6 Likely Significant Effects

6.6.1 Do-Nothing Scenario

Under the 'Do Nothing' scenario there would be no change to the current land use of the Proposed Development site. If the Proposed Development does not proceed as planned there would be no additional impact on the following receptors:

- **Local Population & Employment** - The failure of the Proposed Development to proceed will not lead to any profound or irreversible consequences. However, the opportunity to deliver additional employment opportunities into the rural economy will be lost as will the opportunity to contribute to specific objectives in the City and County Development Plan and the 2024 Climate Action Plan, which promotes renewable energy generation.
- **Community** - It is likely that the perceptions of the community would remain unchanged. However, the immediate economic and social benefits that would be forthcoming and experienced if the development were to progress would be foregone.
- **Land Use** - The failure of the Proposed Development to proceed will most likely see the land remaining as agricultural land.
- **Human Health (Off-Site)** - If the Proposed Development were not to proceed this greenfield site would remain in its existing form and there would be no impact on Human Health. However, the unique opportunity of providing renewable energy to the national grid will be missed, given the current economic climate and rising energy costs this Proposed Development provides a safeguard for the area and the country's energy needs.
- **Human Health (On-Site)** – Under the do-nothing scenario, it is likely that the risks associated with uncontrolled pests and vermin on the surrounding the area, livestock and ecological receptors will be significantly reduced, in the absence of the Proposed Development, particularly in uncontrolled conditions (i.e. in the absence of mitigation), however, the production of a biobased fertiliser presents an opportunity to introduce a high-quality fertiliser with reduced pathogens compared to slurries and manures.

The Do-Nothing scenario would also be considered sub-optimal in the context of the national and county targets for the adoption of renewable energy sources, and in the context of anthropogenic climate change. Furthermore, an opportunity to introduce a bio-based fertiliser, with reduced pathogen content into the local bioeconomy would be missed.

6.6.2 Receptor Sensitivity

The sensitivity of the receptors identified are summarised in **Table 6.11**.

Table 6.11 – Receptor Sensitivity			
Receptor	**Receptor Importance**	**Receptor Sensitivity**	**Rationale**
Local Population & Employment	Low to moderate	High	The Proposed Development provides employment opportunities to the local area and surrounds, also with the potential to provide renewable energy.
Community	Low to moderate	Low	The overall economic and social benefits that the development would bring to the area would not be experienced by the community in the event of the development not occurring.
Human Health (Off-Site)	Low to moderate	Low	If the Proposed Development were not to proceed this greenfield site would remain in its existing form and the unique opportunity of providing renewable energy will be missed.
Human Health (On-Site)	High	High	The development will result in a situation where human health will be put at risk due to typical hazards associated with the construction and operation of the proposed facility.

6.6.3 Sources - Construction Phase

Potential construction phase effects are considered in detail below and summarised in **Table 6.12.**

6.6.3.1 Population

The construction phase is not considered to have any significant impact on the population of the surrounding area, as it is expected that the work force will primarily travel from their existing place of residence to the construction site, rather than reside in the area during the construction phase of the development.

The construction phase may result in a marginally increased population in the wider area due to increased construction employment in the area, however, this would be temporary in nature and the effect would be imperceptible.

Activities associated with the construction phase are anticipated to have ***positive, slight, temporary*** effects on the local population.

6.6.3.2 Employment

The Proposed Development will provide important construction / engineering and related employment. The construction phase will also have secondary and indirect 'spin-off' effects on ancillary support services in the area of the Proposed Development, such as retail services, together with wider benefits in the aggregate extraction (quarry) sector, building supply services, professional and technical professions etc. These beneficial effects on economic activity will be largely temporary but will contribute to the overall future viability of the construction sector and related services and professions over the construction period.

Activities associated with the construction phase are anticipated to have ***positive, slight, temporary*** effects on employment within the area.

6.6.3.3 Community

It is acknowledged that the construction phase of the project may have some short-term negative effects on local residents. Such effects are likely to be associated with construction traffic and possible nuisances associated with construction access requirements. These effects are dealt with separately and assessed in **Chapter 9: Air, Odour and Climate**, **Chapter 10: Noise and Vibration** and **Chapter 12: Traffic and Transportation** of the EIAR.

Given the overall scale of the Proposed Development, some potential effects may occur locally during the construction phase. It is expected that these short term temporary localised effects may be experienced by those residing, working, and visiting the area. Such effects would include an increase in daytime noise levels in the area as a result of the machinery being used for construction purposes and also by construction traffic accessing the Proposed Development.

Activities associated with the construction phase are anticipated to have ***negative, slight, temporary*** effects on the local community.

6.6.3.4 Installation of Gas Pipeline

The proposed gas pipeline connecting to the existing Gas Networks Ireland pipeline along the R680 will be installed underneath the new facility access road, the Scrouty Road and the L4031 local road. This is an indicative routing of the pipeline to the site and is subject to change pending detailed network modelling and design. The final pipeline will be designed, consented and delivered by Gas Networks Ireland in accordance with the following standard: *I.S. 328 2021 Gas transmission — Pipelines and pipeline installations*.

Installation of the pipeline will involve temporary excavation work and will result in disturbance of the underlying soil and subsoil. This may have an effect on the exposed soil and subsoil with implications for the soil surface with regard to stock piling and mobile plant. The trenches will be backfilled shortly after excavation following the installation of each section. Trenching along a road network will give rise to asphalt waste material. If unproperly managed these materials can pose a risk to Human Health due to the presence of Polycyclic Aromatic Hydrocarbons (PAHs). Increased incidences of lung, skin, and bladder cancers are associated with occupational exposure to PAHs.

Activities associated with the construction phase as summarised in **Table 6.12** are anticipated to have ***negative, slight and temporary*** effects on health and safety in the area.

6.6.3.5 Human Health (On & Off Site)

All new developments will give rise to some associated short-term effects and disturbances to the surrounding areas. The construction methods employed and the hours of work proposed will be designed to minimise potential effects. The Proposed Development will comply with all Health & Safety Regulations during the construction of the project. Where possible, potential risks will be omitted from the design so that the impact during the construction phase will be reduced.

The Health and Safety policy, procedures and work practices of the Proposed Development will conform to all relevant health and safety legislation both during the construction and operational stages of the Proposed Development. The Proposed Development will be designed and constructed to best industry standards, with an emphasis being placed on the health and

safety of employees, local residents and the community at large.

Activities associated with the construction phase as summarised in **Table 6.12** are anticipated to have ***negative, slight, and temporary*** effects on health and safety in the area.

Table 6.12 – Construction Phase Effects Summary

Receptor	Sensitivity Rating	Potential Environmental Effects	Quality	Significance	Duration
Local Population	Low to moderate	Potential minor increase in population during construction.	**Positive**	**Imperceptible**	**Temporary**
Employment	Low to moderate	Will provide jobs during the construction phase. May attract other sources of employment to the area.	**Positive**	**Slight**	**Temporary**
Community	Low to moderate	Wear and tear on the infrastructure. Construction traffic. Risk to air/noise.	**Negative**	**Slight**	**Temporary**
Installation of Gas Pipeline	Low to moderate	materials can pose a risk to Human Health due to the presence of Polycyclic Aromatic Hydrocarbons (PAHs).	**Negative**	**Slight**	**Temporary**
Human Health (Off-Site)	Low to moderate	Risk to health from construction methods. Impact of disturbance, air and noise impacts during construction.	**Negative**	**Slight**	**Temporary**

6.6.4 Sources - Operational Phase

Potential operational phase effects are considered in detail below and summarised in **Table 6.13**.

6.6.4.1 Population

The Proposed Development will have no likely significant effect on the existing population. No residential element is proposed as part of the development hence no impact will occur on the local population in this regard.

Given the scale of the Proposed Development, it will not increase the potential working population of the area. There will not be any significant increase in traffic levels to the local road network as outlined within the Traffic and Transport Assessment submitted as part of the application.

There will be no notable increase in demand for community/recreational facilities arising from the completion of the Proposed Development as it will not introduce any resident population to the area. Any demand for additional shopping facilities and services will be met by the existing retailing facilities at Carrick-on-Suir and other nearby settlements. There is no increased visitor population anticipated to the area as a result of the Proposed Development being completed.

Overall, the Proposed Development is likely to have a positive impact on the population in terms of employment and economic benefit in the long term.

Activities associated with the operational phase are anticipated to have ***positive, moderate, long-term*** effects on the local population, via the creation of long-term, sustainable employment to support the local population.

6.6.4.2 Employment

The Proposed Development will offer direct employment in the Anaerobic Digestion Facility, while also supporting existing employment opportunities on surrounding farms. Further indirect employment will be created as a result of the added benefits of the development, such as surrounding businesses catering for employee subsistence and hauliers transporting feedstock/waste materials to the plant. The Proposed Development, if undertaken, will be of considerable benefit to the area in terms of employment provision and economic gain leading to a positive, medium-term effect which is significant in the context of its rural location.

The Proposed Development can support between 70-75 jobs in the immediate area (consisting of c. 5 full time jobs in the plant, 13 jobs supported in the applicant's operational team, c. 45 contractors, and an estimated c. 10 third party local suppliers), specifically across rural locations, and protect existing farming employment. The Proposed Development can therefore contribute to reversing the trend of employment losses in the agricultural sector.

Activities associated with the operational phase are anticipated to have ***positive, significant, long-term*** effects on employment within the area.

6.6.4.3 Community

The Proposed Development may have the following potential effects:

- Increased traffic levels, both vehicular and pedestrian in the surrounding area (**Chapter 12: Traffic and Transport**).
- Effects on local services and commercial facilities.

The adjoining residential communities may experience the above effects in a number of ways. The community may experience a slight change in mobility as a result of increased traffic on the road network. An alteration to the actual physical environment of the area may affect the spatial perceptions of the community living in the area. These aspects are dealt with in further detail within the Chapter 12: Traffic and Transportation and Chapter 11: Landscape and Visual Impact chapters of this EIAR.

Activities associated with the operational phase are anticipated to have ***neutral, slight, long-term*** effects on the community within the area.

6.6.4.4 Human Health

According to the CRÉ '*Guidelines for Anaerobic Digestion in Ireland*',

"Generally incidents and accidents occur during the operation of the plant and are either caused by equipment failure, improper equipment utilization, or plain human errors. Death causing accidents are generally related to gas poisoning (Hydrogen Sulphide and Ammonia) in open and confined spaces. Proper confined space training and portable gas detection should

be mandatory for all biogas plant operators".

The main potential health hazards associated with a typical biogas facility are as follows:

- Prolonged low-level exposure to gases (asphyxiation, nausea).
- Exposure to hazardous substances (methane, waste, chemicals).
- Electrical hazards (Electrocution arising from plant equipment or CHP).
- Mechanical Hazards (falling, crushing, severing).
- Biological agents (infection, allergic/toxic reaction, exposure to endoparasites).

Pest Control

The presence of vermin or insect pests in or around any waste management facility is a health hazard. Management must have a pest and vermin control standard operating procedure in place, which effectively controls any such presence and prevents possible contamination risk.

Activities associated with the operational phase are anticipated to have ***negative, moderate, long-term*** effects on the local pest control.

Fugitive Emissions

The main hazards to the environment from an AD plant are fugitive emissions of biogas, and feedstocks escaping from production facilities. Such emissions generally occur from structural faults or process failures within the plant pipework, CHP unit or the primary digestate tank.

Hazardous Substances

At an AD plant there is the potential presence of substances that could be toxic, corrosive, sensitising, or carcinogenic such as processing aids, oils, effluent, wastes and gases. Potential hazards include:

- Risk of asphyxiation/poisoning from fermentation gases/biogas.
- Release of toxic gases such as hydrogen sulphide during mixing.
- The use of additives and auxiliary materials with hazardous properties (e.g. carcinogenic properties).

Biological Agents

A biological agent is any micro-organism, cell culture or human endoparasite which may cause an infection, allergy, toxicity or otherwise create a hazard to human health. An AD plant utilises biological material to synthesise biomethane hence a variety of biological agents may be present in feedstock, digestates and biogas condensates. Biological agents have the potential to enter and harm humans via the following pathways:

- Inhalation of aerosols containing mould, bacteria or endotoxins which may be present in silage or dry poultry manure.
- Inhalation of mycotoxins and other microbiological metabolic products from visibly mouldy wastes which may cause acute toxic effects.
- Biological hazards from rodent birds and other animals and their excrement. (Weil's disease).

Electrical Hazards

Regardless of plant type there will be electrical infrastructure on site that has the potential to be hazardous such as CHP units, pumps, agitators, measuring devices. Electrical hazards mainly occur when any such equipment becomes faulty. Hazards include:

- Electric shock through an individual's body. (working too close to overhead powerlines/faulty electric cables on site).
- Electrical or magnetic fields (circulation of induction currents) posing a danger to people with pacemakers installed.
- Static electrical shock.

Mechanical Hazards

Moving mechanical parts may pose hazards such as falling, impact, crushing, cutting. Such hazards are most prevalent in close proximity to rotating parts, around moving vehicles, or from working at height. Repair and maintenance activities in particular have the potential for accidents when inadequate protection measures are applied.

Gas Hazards

Biogas is composed of different gases and this mixture can vary depending on the feedstock mixture used to produce the gas. Common gases contained in biogas include carbon dioxide, methane, ammonia, and hydrogen sulphide.

Explosion and Fire Hazards

One of the main hazards at an AD plant is the risk of explosion. The mixture of gases can form an explosive atmosphere under certain conditions. Such explosive atmospheres can ignite and cause extensive damage and serious or fatal injuries.

Malpractice - Operative Health and Safety

Hazards due to bad work practice from those involved in the plant or other unauthorised persons.

Activities associated with the operational phase could have ***negative, moderate to significant, long-term*** effects on human health in the absence of mitigation.

Major Accidents

Under the Control of Major Accident Hazards Involving Dangerous Substances (COMAH) Regulations 2015 (S. L No. 209 of 2015), P2 Flammable gases (methane) are subject to a threshold quantity of 10 tonnes meaning that any biogas facility storing less than 10 tonnes of Methane will fall outside of the COMAH Regulations. At full operation, the Proposed Development will store less than 3.72 tonnes of flammable gas, and is, therefore not a COMAH regulated site.

Potential operational phase effects in the absence of mitigation are summarised in **Table 6.13**.

Table 6.13 – Operation Phase Effects Summary					
Receptor	**Sensitivity Rating**	**Potential Environmental Effects**	**Quality**	**Significance**	**Duration**
Local Population	Low to moderate	No material impact on the existing local population. Likely to have a positive impact on the population in terms of employment and economic benefit in the long term.	**Positive**	**Moderate**	**Long-term**
Employment	Low to moderate	Creation of significant employment benefit for the local study area. Further indirect employment will be created as a result of the induced benefits of the development.	**Positive**	**Significant**	**Long-term**
Community	Low to moderate	The community may experience a slight change in mobility as a result of increased traffic on the road network.	**Neutral**	**Slight**	**Long-term**
Human Health (Off-Site)	Low to moderate	Air emissions from CHP, Biomethane Boler and Odour Treatment System. Projected ambient concentrations including background levels fall within all National and EU ambient air quality limit values and, thus, will not cause any effect on human health.	**Neutral**	**Imperceptible**	**Long-term**
Human Health (On-Site)	Moderate	**Pests** The presence of vermin and insect pests in or around any waste management facility is a health hazard. Management must have a pest and vermin control standard operating procedure in place, which effectively controls any such presence and prevents possible contamination risk.	**Negative**	**Moderate**	**Long-term**
Human Health (On-Site)	High	Fugitive Emissions	**Negative**	**Moderate to significant**	**Long-term**
		Hazardous Substances			
		Biological Agents			
		Electrical Hazards			
		Mechanical Hazards			
		Gas Hazards			
		Explosion and Fire Hazards			
		Malpractice - Operative Health and Safety			
		Major Accidents			

6.7 Mitigation Measures

6.7.1 Construction Phase

Potential effects during the construction phase will be minimised through the implementation of the Construction Environmental Management Plan which will be submitted to the council prior to construction.

6.7.1.1 Population

It is considered that the Proposed Development is unlikely to generate any significant adverse impact on the demography of the area, either during the construction phase or the operational phase, and will have positive economic effects. Therefore, no mitigation measures are required during the operational phase.

6.7.1.2 Employment

The Proposed Development will have a positive effect on employment levels in the area and as such no mitigation measure are required.

6.7.1.3 Community

It is considered that the Proposed Development is unlikely to generate any adverse effect on the community of the area either during the construction phase or the operational phase and would actually have positive economic effects. Therefore, no further mitigation measures are required.

6.7.1.4 Installation of Gas Pipeline

The trenches will be backfilled shortly after excavation following the installation of each section of gas pipeline.

Any Asphalt waste material will be correctly segregated and disposed of by a licenced contractor, therefore limiting the risk to human health.

The final pipeline will be designed, consented and delivered by Gas Networks Ireland in accordance with the following standard: *I.S. 328 2021 Gas transmission — Pipelines and pipeline installations.*

6.7.1.5 Human Health

Adverse health and safety effects during the construction phase will be minimised through the implementation of the Construction Management Plan on site.

6.7.2 Operational Phase

Potential effects to the local population, employment and community are neutral to positive hence no mitigation measures are recommended for these receptors. The following measures are recommended for human health.

6.7.2.1 Human Health

Pest Control

Actions and Procedures

Pest control will be regularly carried out and results of bait station checks recorded. The management of the facility will be responsible for the pest program including the chemicals used or actions carried out by independent pest control companies. The activity records of bait stations checks are to be clear and unambiguous and must include any follow up action including preventive measures required by the management.

Chemicals

Any pest control chemical held at the establishment shall be in a clearly designated secure cabinet or facility used only for pest control. The keys to this facility are to be controlled and limited as far as possible. Persons issued with keys are to be nominated in the standard operating procedure. Chemicals used shall be approved and used only in accordance with the instrument of approval.

Physical Barriers

Physical barriers prevent pests entering buildings or eliminate their presence. The barrier must be effective and usually a combination of deterrents is required to achieve the purpose. The effectiveness of these barriers is a key indicator of the effectiveness of the company preventative maintenance program such as self-closing doors mounted in such a way that light cannot be seen between the rubber door seal and the floor or door jam.

Cleaning, Sanitation and Housekeeping

A broad scope cleaning and sanitation program is necessary to control and prevent pests and vermin presence within the establishment.

The Cleaning and Sanitation standard operating procedure should include:

- Removal of food sources which may attract pests and vermin in production and storage areas and operatives' amenities and compete with baits.
- Cleaning pools of water remaining on the floor of reception building and amenities after the cleaning operation to provide a dry environment.
- Cleaning of high-traffic personnel thoroughfares during the day and at the end of the shifts Boot cleaning facilities associated with reception building should be provided to prevent material being carried outside.
- Cleaning of the operatives' lunchroom after each main work break and again at the end of the production shift.
- Routine cleaning of personnel lockers.

Corrective Action

Corrective action for pest and vermin control shall incorporate relevant parts of this program and needs to be specific to each establishment. Must include what is to be done if pests or vermin are detected.

Responsibilities

The On Plant Supervisor is responsible for:

- Recommending the establishment pest control standard operating procedure.
- Monitoring the effectiveness of the pest control standard operating procedure.
- Monitoring chemical usage.

Fugitive Emissions

The following design specifications can help minimise the risks associated with the hazard of biogas escaping:

- Make all civil and process works as gas tight as possible.
- Automatic flare system (burn biogas during CHP downtime).
- Over-pressure release device.
- All digestate storage tanks gas-tight.
- Appropriate, calibrated measuring devices.

Hazardous Substances

The OSH Framework Directive (89/391/EEC) lays down the obligation of the employers to evaluate the risks to the safety and health of workers which includes the following:

- General principles of prevention.
- Elimination of risks and accidents.
- Informing, consultation and balanced participation and training of site operatives.
- Permit-to-work system verifying operatives aware of SOP's.
- Material Safety Data Sheet recorded and maintained.

Biological Agents

Rigorous cleaning and controls at each step in the biogas supply chain will avoid careless contamination and the spread of disease at all stages.

Electrical Hazards

All workers coming into contact with electrical networks should have up to date electrical safety training. Training should be considered if the electrical network is being altered or upgraded. Refresher courses ensure experienced electrical operatives and professionals are familiar with the latest health and safety guidelines and best practices.

Mechanical Hazards

Most of the risks related to mechanical hazards can be reduced to acceptable levels by applying a risk reduction strategy. If this is impossible, the hazards must be isolated from people by guards that maintain a safety distance between the danger zone and the people, with the main result being to reduce access to the danger zone.

Gas Hazards

The workplace exposure limit is the time weighted average concentration of a substance in air at the workplace over a specified reference period at which no acute or chronic harm to the health of employees is expected to be caused. Actions to prevent gas related illness and injuries include:

- Adequate signage demarcating potentially gaseous atmospheres, prohibiting mobile phones and naked flames.
- Permit-to-work system.
- Calibrated and functioning detection devices.
- Adequate employee education and refresher courses.
- Limited work scheduled in confined spaces.

Explosion and Fire Hazards

Explosive atmospheres are mitigated by the following forms of protection:

- Primary Explosive Protection: Prevention of formation of explosive atmosphere (i.e. maintain inert atmosphere via ventilation).
- Secondary Explosive Protection: Prevention of ignition (i.e. zones of prohibited mobile phone use/ignition).
- Tertiary Explosive Protection: Reduction of explosion consequences (i.e. PPE, explosion suppression, evacuation procedure).

Malpractice – Operative Health and Safety

Prior to commissioning of the facility detailed standard operating procedures (SOPs) will be drafted which will be implemented during operation of the facility. In accordance with the 'Safety Health and Welfare at Work Act', 2005; 'the Safety, Health and Welfare at Work (Construction) Regulations, 2001' and associated Regulations, a site-specific Safety Statement will be produced which will incorporate all operating procedures at the facility. The site will operate under ISO 45001 management system.

The following measures will be implemented at the facility to minimise the potential for emergency situations:

- All on-site personnel will be adequately trained in relevant areas of employment.
- The facility design will be regularly reviewed for potential safety hazards.
- The facility will be designed to incorporate standby/backup plant in emergency situations.
- Adequate fire detection and fire-fighting infrastructure will be incorporated into the site design.
- All staff will be supplied with appropriate personal protective equipment (PPE).

6.8 Cumulative Effects

The potential cumulative effects of the Proposed Development on Population and Human Health have been considered in conjunction with the ongoing changes in the surrounding area. Visits to the Proposed Development and surrounding area and desk-based review of online planning files have been undertaken to identify the existing pattern of development, nearby uses, and any permitted / ongoing developments of relevant to the current proposals in the context of Population and Human Health.

The cumulative effects of the proposed construction and operation of a biogas facility near Carrick-on-Suir with other developments in the area are reviewed in this section with specific regard to the local population.

Air Odour and Climate

The assessment of the effects on Air, Odour and Climate (Chapter 9) has established that the emissions to atmosphere during the construction and operational stages will not affect human health.

Air dispersion modelling was completed to evaluate the potential effects of the planned development regarding EU ambient air quality standards which were established with the objective of protecting human health. As shown by the model results, projected ambient concentrations including background levels fall within all National and EU ambient air quality limit values and, thus, will have no effect on human health.

The predicted levels show that additional mitigation, other than the proposed Odour Treatment System, is not required.

Construction and operation phase mitigation measures are outlined in **Chapter 9: Air, Odour & Climate**.

Noise and Vibration

The assessment of the effects on Noise and Vibration (Chapter 10) has established that the noise emissions during the construction and operational stages will not affect human health.

Construction and operation phase mitigation measures are outlined in **Chapter 10: Noise and Vibration.**

6.8.1 Construction Phase

The mitigation measures outlined in the CEMP and above should be applied throughout the construction phase of the Proposed Development. This will ensure any significant cumulative effects on the local population and the greater environment are prevented.

6.8.2 Operational Phase

The cumulative effects on the local Population and on Human Health for the operational phase of the Proposed Development arise primarily from a slight increase in demand for services in the area, and due to increased employment in the area in combination with wider trends of increasing employment. By taking the mitigation factors into account and promoting sustainable use of all material assets this will help with the anticipated increase in the demand for local services and resources. Given the nature and scale of this development any potential cumulative effects of this Proposed Development will be minor.

6.9 Residual Effects

According to Environmental Protection Agency guidelines, Residual Impact is described as *'the degree of environmental change that will occur after the proposed mitigation measures have taken place.'* The mitigation strategy above recommends actions which can be taken to reduce or offset the scale, significance and duration of the effects on the surrounding populations.

6.9.1 Population

The Proposed Development will have no likely significant adverse effects, whether direct or indirect, on the population of the surrounding areas during the construction or operational phases.

Both direct and indirect employment will be created during the construction and operational phases of the development and as such the proposal will provide a significant economic benefit to the population of the surrounding area.

Following implementation of the mitigation measures proposed in **Section 6.7**, the residual impacts are anticipated to be ***positive, slight to moderate, long-term*** effects on the local population.

6.9.2 Employment

The Proposed Development will give rise to new employment opportunities in terms of the direct employment during the construction phase. There would also be indirect employment opportunities arising from the construction work taking place as a result of this proposal. These opportunities would include an increase in business for local services such as builders' suppliers as well as shops and other such tertiary industries.

The Proposed Development will provide for a significant gain to the area in terms of employment provision.

Following implementation of the mitigation measures proposed in **Section 6.7**, the residual effects are anticipated to be ***positive, moderate to significant, long-term*** effects on local employment.

6.9.3 Community

It is considered that the Proposed Development is unlikely to generate any adverse effect on the demography of the area either during the construction phase or the operational phase and would actually have positive economic effects.

Following implementation of the mitigation measures proposed in **Section 6.7**, the residual effects are anticipated to be ***neutral, slight, long-term*** effects on the local community.

6.9.4 Human Health

Provided the actions and procedures outlined in **Section 6.7** are rigidly adhered to, the Proposed Development will have no likely significant adverse effect in relation to pest control, whether direct or indirect on the surrounding areas during the construction or operational phases.

Following implementation of the mitigation measures proposed in **Section 6.7**, the residual effects are anticipated to be ***negative, slight and long-term*** effects on Pest Control.

The various human health parameters discussed in this chapter also interact with many other aspects of the environment. The residual effects in relation to these aspects are detailed in the individual chapters as follows:

- Chapter 9 – Air, Odour and Climate.
- Chapter 10 - Noise and Vibration.

Following implementation of the mitigation measures proposed in **Section 6.7**, the residual effects are anticipated to be, ***neutral, slight, long-term*** effects on Human Health.

6.9.5 Residual Impact Summary

The overall impact anticipated during the construction phase of the project following the implementation of suitable mitigation measures is considered to be ***neutral to positive, imperceptible to slight,*** and ***long-term***.

6.9.6 Monitoring

6.9.6.1 Population

No post development monitoring measures concerning population will be necessary.

6.9.6.2 Employment

No post development monitoring measures concerning population will be necessary.

6.9.6.3 Community

No post development monitoring measures concerning population will be necessary.

6.9.6.4 Human Health

Pest Control

Following implementation of the mitigation measures proposed in **Section 6.6**, the residual effects are anticipated to be ***negative, slight, and long-term*** effects in relation to Pest Control.

Other

The monitoring requirements in relation to Human Health aspects are detailed in the individual chapters as follows:

- Chapter 9 – Air, Odour and Climate
- Chapter 10 – Noise and Vibration

Following implementation of the mitigation measures proposed in **Section 6.7**, the residual effects are anticipated to be, ***negative, slight, and long-***term with respect to Human Health.

6.10 Summary of Significant Effects

The aspects of the environment considered for this assessment are Population, Employment, Community, and Human Health. Whilst the development proposals have the potential to cause detriment to the sensitive receptors identified, the recommended mitigation measures will ensure that the risk of potential effects are reduced to negligible.

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6.11 Statement of Significance

The significance of impact upon the Population, Employment, Community, and Human Health have been assessed for during both the construction and operational phases.

Where a potential impact has been identified, the significance of impact upon these receptors ranges from minor to moderate.

Where a potential effect has been identified, mitigation measures have been provided which once implemented reduce the impact of significance to ***' negligible'.*** The mitigation steps are presented in **Section 6.7.**