

17 Population and Human Health

17.1 Introduction

This chapter describes the likely significant effects of the proposed development on population and human health (i.e. socio-economic and public health aspects respectively) during construction and operation. It should be noted that **Chapter 19** separately addresses likely significant effects of possible unplanned events (i.e. accidents or disasters).

Chapter 4 provides a description of the proposed development whilst **Chapter 5** provides a full description of the strategy for construction. The following aspects are particularly relevant to the population and human health assessment:

- Design:
 - Aspects relating particularly to the design and location of the Alps SWO and stormwater storage, interceptor sewers and WwTP where these facilities are in proximity to residential and commercial properties or in areas publicly accessible in Arklow town.
- Construction:
 - Construction of all infrastructure, including the interceptor sewers and removal of existing sewers, especially along the Avoca River and in the centre of Arklow town.
 - Potential disturbance to local community, tourism and economy due to construction works, including associated effects on traffic (i.e. pedestrian, cyclist and vehicle movement) and amenity associated with visual, air quality, noise and vibration effects.
 - Likely significant effects on human health including the effects of emissions including noise and emissions to air and water from plant and equipment.
 - Likely significant effects on human health associated with disturbance and annoyance, including construction traffic and how that may interact with human health.
- Operation:
 - Likely significant effects of the proposed development on community, tourism and future development in Arklow town.
 - Operation of the long sea outfall and SWOs, including during periods following heavy rainfall or storm conditions, and associated amenity.
 - Operation of the WwTP including emissions to air from the vent stacks and movement of operational vehicles to the WwTP site.
 - Likely significant effects on human health including potential positive effects associated with improved water quality and consideration of the health consequences of a do nothing or a do minimum scenario.

17.2 Assessment Methodology

17.2.1 General

Population aspects of relevance to this assessment include journey patterns, amenity and community severance, business, tourism and employment opportunities. Other aspects relevant to the local community such as unplanned events, natural amenity, built and natural heritage, material assets and nuisance are dealt with in other chapters of this EIAR.

Human health aspects are primarily considered through an assessment of the environmental pathways by which health may be affected (i.e. the determinants of health) such as air, noise, water or soil. The assessment on human health therefore draws on the findings of other sections of the EIAR as necessary to ensure that the likely significant effects that have the potential for significant effects on human health are considered herein.

17.2.2 Guidance and Legislation

17.2.2.1 Population

This assessment has been undertaken with due regard to the overarching EIA guidance (described in **Section 1.4.3 of Chapter 1**) and Fáilte Ireland guidance¹.

The assessment of effects relevant to human beings in the local area (i.e. the local population) has been undertaken in line with these guidelines. Specifically, the EPA Guidelines² advise on types of effects including cumulative and in-combination effects which are particularly important for socio-economic aspects of effects on people, for instance between wastewater collection network capacity and the nature and extent of existing and proposed residential and non-residential development.

17.2.2.2 Human Health

No specific guidance on the definition for human health has been defined to date and in addition, no specific guidance on the assessment of human health in the context of EIA has been issued to date. The relevant topic-specific guidance that has been considered includes the following:

- The World Health Organisation (WHO) (2009) Night time Noise Guidelines for Europe;
- US EPA (2016) Health Impact Assessment Resource and Tool Compilation;
- WHO (1999) Guidelines for Community Noise;
- IEMA (2017) Health in Environmental Impact Assessment - A Primer for a Proportionate Approach;

¹ Fáilte Ireland (2011) Guidelines on the Treatment of Tourism in an EIS

² Environmental Protection Agency (2017) Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017)

- Institute of Public Health Ireland (2009) Health Impact Assessment Guidance;
- WHO (2005) WHO Air Quality Guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide;
- British Standards Institution (2014) 5228-1 and 2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites. Noise and Vibration³;
- EPA (2016) Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4);
- Air Quality Standards Regulations 2011;
- European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI No 272 of 2009) as amended by the European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2012 (S.I. No. 327 of 2012); and the European Communities Environmental Objectives (Surface Water) (Amendment) Regulations 2015 (SI No. 386 of 2015); and
- Bathing Water Quality Regulations 2008 (SI No 79 of 2008) as amended by Bathing Water Quality (Amendment) Regulations 2011 (SI No 351 of 2011) and Bathing Water Quality (Amendment) Regulations 2016 (SI No 163 of 2016)

Specific Guidance on the Human Health is discussed further in **Section 17.2.7.3**.

17.2.3 Study Area

The principal study area has been determined as the site (i.e. all areas within the planning boundary for the proposed development), specifically residential, commercial and industrial areas adjacent to the Avoca River such as Main Street and the Bridgewater Shopping Centre. The wider study area is the greater Arklow urban area, i.e. the settlement of Arklow and its environs as defined by the Arklow LAP.

For the assessment of effects during construction, the relevant study area includes those areas frequented by people in the immediate environs of the working areas as well as those receptors who might be impacted by ancillary activities such as construction traffic.

For the assessment of effects during operation, the wider study area includes all receptors that may be impacted by the proposed development including primarily, those who live and work in the Arklow town, as well as those who may come in contact with the proposed development, including recreational users around the Avoca River and the coastal and offshore areas within the Irish Sea.

³ British Standards Institution (BSI) (2014) 5228-1 and 2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites. Noise and Vibration

17.2.4 Site Visits

Site visits were undertaken on 2 May 2018 and 10 July 2018 to examine the nature of existing land use in the study area, the principal areas of pedestrian and traffic movement and to witness the extent and nature of leisure activities in Arklow town.

17.2.5 Consultation

Informal meetings took place on the above dates with local businesses, the marina, sailing club, rowing club and sea scouts to discuss the interaction with the existing environment and the likely significant effects of the proposed development.

17.2.6 Categorisation of the Baseline Environment

An assessment of population and human health requires that an understanding of the baseline environment and local community is acquired through background research, site visits, and discussions with local people and community representatives where necessary. Specifically, data has been collected by means of:

- Primary data sources (e.g. demographic data from Census 2016 and preceding Census data produced by the Central Statistics Office [CSO]⁴);
- Design drawings of the proposed development (Refer to Volume 3);
- Street maps of the study area⁵ obtained in May – July 2018;
- Other relevant environmental baseline data gathered and considered as part of this EIAR, especially traffic and air quality, noise, landscape and visual assessments;
- A review of relevant planning documentation including the Wicklow County Development Plan and the Arklow LAP (Refer to **Chapter 6** for further detail);
- Observation of local settlement, travel patterns and amenity activity along with identification of community facilities; and
- Available community health profiles including the Health Profile completed by Lenus and the HSE⁶ for the area.

⁴ CSO 2016 Census results (2018, and 2011 Census results (2012). Available from: <https://www.cso.ie/en/census/> [Accessed 3 May 2018]

⁵ For example Bing Maps, Google Maps and Tourist Office Map and Guide

⁶ <http://www.lenus.ie/hse/bitstream/10147/584031/1/Wicklow.pdf>

17.2.7 Impact Assessment Methodology

17.2.7.1 Sensitive Receptors

The EPA guidance⁷ indicates that the neighbouring occupied premises and land uses that should be considered as ‘sensitive receptors’ include the following:

- Homes;
- Hospitals;
- Hotels and holiday accommodation;
- Schools and rehabilitation workshops;
- Tourism and recreational facilities; and
- Economic facilities such as visitor attractions based on cultural/historic or natural assets.

17.2.7.2 Population Assessment

This section sets out the methodology that has been used to assess the likely significant effects of the proposed development on population. The purpose of the assessment is to identify the likely significant effects on the local community and users of the proposed development during construction and operation, along with the likely economic significant effects at the local and regional level.

Likely significant effects are categorised in accordance with the EPA Guidelines⁸. Significant effects are compared between the Do-Nothing and the Do-Something scenarios and arise from direct, indirect, secondary and cumulative effects on environmental conditions. Significant effects can be positive, neutral or negative. It usually follows that the significance of an effect depends, among other considerations, on:

- The location and character of the local environment;
- The sensitivity of the local population and its capacity to absorb change;
- The nature of the environmental effect;
- The timing and duration of an effect;
- The scale or extent of the effect in terms of area or population affected;
- The duration, frequency and reversibility of an effect; and
- The probability of an effect’s occurrence.

Effects may be short term, medium term or long term. Construction effects relevant to the assessment are by their nature temporary.

⁷ EPA Advice Notes for Preparing Environmental Impact Statement (Draft Sept. 2015)

⁸ EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft Sept 2015).

The rationale for applying a particular level of significance to an effect as it would affect the worst hit subset of the population is summarised in **Tables 17.11 and 17.12**. The tables summarise:

- The nature of an effect;
- Location and the population subgroup affected;
- The current character of the local environment;
- The likely significant effects due to the proposed development;
- Significance of an effect;
- Duration of an effect (i.e. temporary, short, medium or long term);
- Receptor extent;
- Proposed mitigation; and
- The residual effect.

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

The methodology includes for the assessment of likely significant effects on:

- Journey patterns;
- Amenity;
- Accessibility and community severance; and
- Business, tourism and employment.

Journey patterns

For a development of this nature and scale, effects on journey patterns may arise due to traffic movements from the proposed development that are additional to normal traffic volumes on the existing network or due to road closures or diversions as they affect traffic movement. Effects can also extend to changes in journey time reliability on the local network.

Amenity

Amenity effects arise from the proximity to construction works or disturbance during operation as it affects the pleasantness and perceived safety of the environment for walking, cycling or driving. General amenity effects can arise due to any effect that the proposed development may have on residential quality of life, amenity or recreation due to environmental effects such as noise or visual intrusion, for which specific significance levels are identified in the respective chapters of the EIAR. There are also links between effects on amenity and tourism.

Accessibility and community severance

Accessibility or community severance refers to people's access or use of community facilities from their home or place of work, particularly as it affects facilities used by older people, children or other vulnerable groups such as those with limited mobility and/or disabilities.

Business, tourism and employment

Economic effects can arise during construction from local employment opportunities and purchasing of local inputs, or from the impact of construction works on local economic activity or businesses.

During operation, significant effects (positive or negative) can arise due to changes in the local environment due to a project or displacement of existing economic activity, or from local employment opportunities or inputs to the local economy. There are also potential interactions with other economic activities in the local area as well as with regard to settlement patterns, population change and tourism.

17.2.7.3 Human Health

Overview

This section sets out the methodology that has been used to assess the likely significant effects of the proposed development on human health.

Directive 2014/52/EU of the European Parliament and of the Council referred to Population and Human Health instead of the Human Beings Chapter previously outlined in Council Directive 85/337/EEC which was repealed by Council Directive 2011/92/EEC⁹. As outlined in **Section 17.2.2.2**, no specific guidance on the meaning of the term Human Health has been issued and no specific guidance on the assessment of human health in the context of EIA has been issued to date.

The EPA guidelines² note that:

“while no specific guidance on the meaning of the term Human Health has been issued in the context of Directive 2014/52/EU, the same term was used in the SEA Directive (2001/42/EC)”.

Section 5.26 of the Commission's SEA Implementation Guidance⁹ states the following whilst Paragraph (f) of Annex I of Council Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA Directive) lists the environmental factors including soils, water, landscape, air etc.):

“The notion of human health should be considered in the context of the other issues mentioned in paragraph (f) and thus environmentally related health issues such as exposure to traffic noise or air pollutants are obvious aspects to study”.

⁹ European Commission (EC) Guidance (2003) Implementation of Directive 2001/42 on the assessment of the effects of certain plans and programmes on the environment.

The draft EPA guidelines² note under Section 3.3.6 that the above health assessment approach is consistent with the approach set out in the 2002 EPA Guidelines where health was considered through assessment of the environmental pathways through which it could be affected, such as air, water or soil, viz:

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

The draft EPA guidelines² also note under Section 3.3.6 that in an EIAR:

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

The Institute of Environmental Management and Assessment (IEMA) is the largest professional body for environmental practitioners in the UK and worldwide, with nearly 15,000 members and as such it is an authoritative body on Environmental matters. IEMA issued a discussion document on the methodology of the assessment of Human Health in an Environmental Impact Assessment Report in 2017¹⁰, which it describes as a primer for discussion on what a proportionate assessment of the impacts on health should be in EIA and is a useful document when considering what can and should be assessed in the context of this EIAR. Due regard has been had to the general approach advocated in this document when undertaking this assessment.

One of the messages in the IEMA document¹⁰ in terms of assessing health in EIA, is that there should be a greater emphasis on health outcomes, (that is the potential effects on human health), rather than simply the health determinants, (that is the agents or emissions which could have the potential to have health effects). The IEMA document noted that in EIA, there has previously been a strong focus on just the agents or emission levels (e.g. dust) rather than focusing on the effects of these agents/emission levels on human health. This change in emphasis does not mean a complete change in practice. For example, measurement and modelling of dust levels continues to be an essential part of the health assessment.

¹⁰ IEMA (2017) Health in Environmental Impact Assessment - A Primer for a Proportionate Approach

The IEMA document¹⁰ notes that:

“Public health is defined as the science and art of promoting and protecting health and well-being, preventing ill-health and prolonging life through the organised efforts of society and has three domains of practice: health protection, health improvement and improving services”.

The IEMA document suggests that these three domains should be considered in the assessment of human health in EIA. Examples of health protection issues to be considered could include issues such as chemicals, radiation, health hazards, emergency response and infectious diseases whilst health improvement issues could include lifestyles, inequalities, housing, community and employment. Examples of improving services issues could include service planning, equity and efficiencies. This correlates well with EIA Directive.

The World Health Organization (WHO) defined health in its broader sense in its 1948 constitution as:

“a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity”.

Therefore, whilst the draft EPA guidance² is useful in terms of health protection, for a more holistic assessment as per the IEMA document¹⁰, it is also worthwhile to look at broader health effects in terms of opportunities for improvement of health and for improvement of access to services. While it is important to do this, it is also important not to attribute every conceivable event as being a health effect. To further rely on the WHO definition, a health effect would be something that would have a material impact on somebody’s physical mental and social well-being be that positive or negative.

Therefore, *health protection, health improvement and improving services* are all considered in this assessment of human health effects. The methodology for assessing health protection is considered further below.

Health Impact Assessment and Environmental Impact Assessment

The IEMA document notes that Health Impact Assessment (HIA) and EIA are separate processes and that whilst a HIA can inform EIA practice in relation to human health, a HIA alone will not necessarily meet the requirements of the EIA Directive in relation to human health. Further, HIA is not routinely carried out for major infrastructure schemes in Ireland and it is typically a non-statutory document that is normally prepared on a voluntary basis by developers overseas, e.g. in the UK.

Guidance for performing HIAs has been issued by the Institute of Public Health in Ireland¹¹ and they have outlined that there are considerable difficulties in performing a HIA for a project of this nature. Not least of these is the difficulty of getting baseline health data as it is quite difficult (due to patient confidentiality and other reasons) to accurately determine levels of even relatively common medical conditions in a relatively defined population that might be affected.

¹¹ Institute of Public Health (2009) Health Impact Assessment Guidance

Qualitative and quantitative baseline health data is a vitally important part of the HIA process.

This is because it is first important to determine the baseline health status of the community before it is possible to determine the quantitative impacts that a proposal might have on health. In the absence of accurate baseline data it is very difficult to assess qualitative and quantitative changes that might occur as a result of a project of this nature.

More useful generalised data that might exist for larger areas (such as a city or county) may be used, but these datasets would be at most an estimate of the local baseline and not accurate enough to allow for meaningful interpretation specific to the proposed development. Possible local effects, perhaps due to socio-economic variations or for other reasons would not be evident using data for larger population areas making the process inaccurate. This difficulty is not unique to the proposed development.

The IEMA document¹⁰, for example, notes that the WHO provides an overview of health in different types of impact assessment¹² and presents the WHO perspective on the relationship of HIA to other types of impact assessment as follows:

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

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

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

It is clear therefore that the WHO does not support a stand-alone HIA unless it can be demonstrated to be of advantage over the assessment of population and human health in the EIAR. In this case no such advantage exists and indeed given the lack of baseline data a standalone HIA would add very little to the assessment process. It is for these reasons that this assessment of human health is part of this EIAR and that no stand-alone HIA has been prepared for the proposed development.

It is therefore important to note that this assessment on human health is provided as part of the overall EIAR rather than a stand-alone HIA.

¹² World Health Organization Regional Office for Europe. Health in impact assessments: opportunities not to be missed. 2014

The HIA is defined as a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, programme or project on both the health of a population and the distribution of those effects within the population.

In contrast, the assessment of human health in the context of EIAR focuses the attention of the assessment on likely significant effects, i.e. on effects that are deemed likely to occur and, if they were to occur, would be expected to be significant (as per the requirements of the Directive 2014/52/EU of the European Parliament and of the Council). Conducting a HIA will not necessarily meet the population and human health requirements of the EIA Directive.

Health Protection

The assessment of human health for the proposed development, in terms of health protection, follows the approach set out in the EPA Guidelines², the IMEA guidelines¹⁰ referred to above and in Directive 2014/52/EU of the European Parliament and of the Council⁹. It is also similar in nature to the US EPA guidance¹³. Human Health protection is considered through the assessment of the environmental factors (pathways) through which health could be affected such as air, noise, water and soils. The US EPA guidance¹³ includes a four-step approach which is represented graphically in Figure 17.1.

The 4 Step Risk Assessment Process

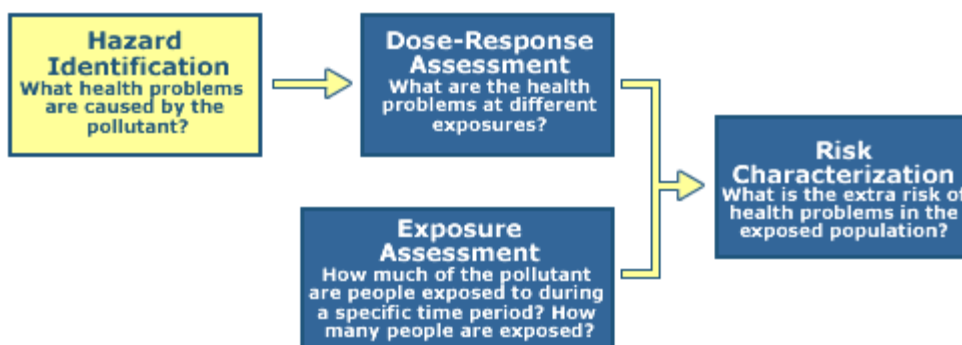


Figure 17.1: Four Step Human Risk Assessment Process

The likely significant effects associated with noise, air, soils and water that could affect human health were identified (Hazard Identification), the scale of these effects (Dose-Response Assessment) and their duration (Exposure Assessment) were assessed and the significance of the likely significant effect on human health was determined (Risk Characterisation).

When using a recognised Health Based Standard, such as one issued by the WHO¹⁴, the dose-response assessment is actually included in the standard.

¹³ US EPA (2016) Health Impact Assessment Resource and Tool Compilation

¹⁴ The World Health Organisation (WHO) (2009) Night time Noise Guidelines for Europe

In other words, the authorities or expert committees which recommended a specific threshold or parameter (i.e. a limit value) in a standard will have inherently taken into account the health problems at the different exposure levels and thus set the limit value within the standard to prevent these health problems (i.e. significant effects on human health) from occurring.

Health Improvement

Projects that have the potential to generate environmental benefits, protect the population from public health dangers as well as support regeneration, reduce unemployment and improve socio-economic circumstance, could contribute to improving the health and wellbeing of communities.

The assessment for the proposed development, in terms of health improvement, includes an assessment of the likely significant effects of the proposed development on the socio-economics of the community (refer to **Section 0** for further detail).

17.3 Baseline Conditions

17.3.1 Context

17.3.1.1 County Wicklow

County Wicklow is located within the Greater Dublin Area (GDA) and its proximity to County Dublin is central to its socio-economic development. Historically, the settlement patterns and economic development of County Wicklow have been heavily influenced by key infrastructure, notably the N11 and the Dublin-Rosslare railway which mainly follow the east coast.

The population in County Wicklow increased by 4.2% to 142,425 between 2011 and 2016 which was slightly above the national average growth of 3.8%. However, a reduction on the previous growth of 8.3% was evident, itself similar to the national average of 8.2%¹⁵. Just over 46% of the population of County Wicklow are under the age of 35 years, while 13% are aged over 65 years¹⁶.

17.3.1.2 Arklow Town

Arklow town is located in the southern part of County Wicklow. The Arklow Municipal District has a population of 26,185¹⁷ while the urban settlement had a population of 13,163¹⁸. Arklow serves a large area of rural County Wicklow, possessing commercial and retail facilities, a small hospital, primary schools, four secondary schools, leisure and cultural facilities.

¹⁵ Central Statistics Office (www.cso.ie/en/statistics/population)

¹⁶ Central Statistics Office (www.cso.ie/en/statistics/population)

¹⁷ Arklow LAP

¹⁸ Central Statistics Office (census.cso.ie/sapmap)

It has industrial infrastructure including a shipping and fishing port, is connected by the Dublin-Rosslare railway line and located close to the M11 motorway connecting Dublin with Gorey which is due to be extended beyond Enniscorthy with onward access to Wexford town and Rosslare.

Arklow town has no wastewater treatment at present and untreated wastewater is currently released from various discrete outfalls directly into the Avoca River. The town has also experienced significant flooding in recent decades due to combinations of heavy rainfall and high tides.

17.3.2 Character

Arklow town is bisected by the Avoca River. It has a natural setting on the coastline of the Irish Sea that is conducive to amenity, recreation and economic activities associated with fishing and the port. Much retail and other commercial activity in Arklow town is located along Main Street, including Upper and Lower Main Street, the latter extending east of Bridge Street.

Newer larger scale retail development and social facilities are located in and around the Bridgewater Shopping Centre on North Quay and Mill Road. Some port related industrial activity is found on North Quay and around the harbour area at the southern end of South Quay. Other industrial activity is found in industrial and business parks closer to the M11. Arklow Bridge has been widened in recent years to provide an improved pavement for pedestrian crossings on both sides of the bridge. Arklow Bridge is the only river crossing in Arklow connecting the two halves of the town.

Arklow town possesses a swimming pool, gyms, a tennis club, pitch and putt, playing fields and other facilities for exercise. There are also numerous opportunities for walking, along South and North Quays and along the seafront, including the northern seafront embankment and Seaview Avenue near where a public skate park and outside exercise equipment have been installed. Six walkways have been also designated around Arklow town taking in locations such as North Quay, South Quay and the harbour. River Walk is also a popular route which loops around a natural area west of the centre to Vale Road. Proposals have been put forward by local community groups to open paths alongside Arklow Marsh which would add to this amenity by providing access beside this proposed Natural Heritage Area.

Arklow South Beach, located to the south of the proposed development (to the south of the harbour mouth) is the principal destination for beach recreation in Arklow town. Water quality here is monitored by the EPA¹⁹ and has been judged to have been excellent for the period 2014 - 2017 based on 23 samples. The sandy section of the North Beach commences further north of Arklow town. No water quality samples have been taken here since 2008, although the beach is 2km north of the Avoca River.²⁰

¹⁹ EPA (2018) Bathing water quality map of Ireland for the 2017 bathing season. <http://epa.ie/pubs/reports/water/bathing/bathingwaterqualitymapofirelandforthe2017bathingseason.html> [Accessed 16 July 2018]

²⁰ Consultation with Water and Environmental Services of Wicklow County Council 24/5/18.

Water-based recreation includes sailing as evidenced by the boats berthed in the river, at the marina on North Quay and in the harbour. Some fishing boats and windfarm maintenance vessels also operate out of the harbour as does the lifeboat. Arklow Sea Scouts and the Rowing Club are active organisations and a Maritime Festival is held in Arklow each year usually in June/July.

The beach and Roadstone jetty are used for local sea fishing, mainly for flat fish (e.g. whiting, flounder) and dog fish. There is only occasional fishing on the Avoca River in the town due to the health issues presented by untreated wastewater, although the river as a whole is a designated salmonid river with high quality beats upstream as outlined in **Section 11.3 of Chapter 11**.

17.3.3 Significance

As discussed in detail in **Chapter 6**, Arklow town has been designated as a Level 3 - Large Growth Town II in the Regional Planning Guidelines and in the County Development Plan. National trends towards lower household size mean that more housing units are likely to be needed in the coming years. The LAP refers to proposals to support a large increase in population, ultimately to 23,000. Zoned land identified in the Arklow LAP already exists to accommodate up to 4,000 residential units. Since the opening of the N11 bypass in 1999, sequential built development has been permitted up to the road boundary. However, where local circumstances allow, Objective H3 of the LAP proposes that efficient use should be made of land resources by aiming for higher density development where appropriate. Infill development is expected to accommodate some of the proposed new residential development.

Relatively few people commute from Arklow town for employment in Dublin when compared with other settlements in County Wicklow which are closer to the capital. As part of the Wicklow/Arklow Core Economic Area, Arklow town is regarded as a major employment centre with a function to attract national and international investment. The focus of industrial development to date has been in the south of the town in the vicinity of the M11 interchange, but the Arklow LAP identifies opportunity sites for additional potential locations, including the Shelton Abbey site on the Avoca River to the west of the M11 flyover. The land use zoning in the Arklow LAP also identifies potential opportunities for development of the maritime sector given the existing infrastructure and services available in the port area through the Waterfront Zoning which applies also to the proposed WwTP site.

Wicklow County Council also plans to improve and widen the retail offering and town centre facilities. In recent years, some of the land on North Quay has been re-developed for mixed use, including apartments and retail facilities, namely the Bridgewater Shopping Centre which opened in 2007. There are remaining areas of derelict land along the waterfront available for new development in accordance with the relevant objectives outlined in the Arklow LAP.

Upstream of Arklow Bridge, along River Walk and within the 'Alps' site, there is a narrow corridor of green space that follows the river channel between the riverfront walkway and the town centre which contains an area identified as an opportunity site for redevelopment in the Arklow LAP.

Downstream of Arklow Bridge, the Avoca River is followed by roads on both sides alongside the waterfront area. The riverside includes the port to the south of the river, the marina to the north and former industrial areas behind these.

Designated waterfront areas are the subject of proposals to realise the potential amenity and tourism value of sites beside the Avoca River.

Arklow town's maritime heritage, built heritage, coastal golf course and beaches underpin this amenity and tourism potential. In addition, the nearby hinterland includes the Vale of Avoca and Brittas Bay for which Arklow could potentially be the gateway. Annual festivals celebrate the town's coastal location, maritime and musical heritage. Accommodation is provided by two small hotels in the centre of town along with the Arklow Bay Hotel on Sea Road, several local B&Bs and a caravan park which together cater for the existing modest flow of tourists visiting Arklow town.

Transport infrastructure includes connections to the M11. There are forward proposals to develop a Port Access Road to the south of Arklow to link the M11/R772 to the Roadstone jetty and South Quays to reduce the volume of heavy good vehicles in the centre of the town. A longer-term goal is the provision of a new bridge across the Avoca River to the west of the town. ²¹

17.3.4 Sensitivity

17.3.4.1 Community Profile

As of 2016, the settlement of Arklow had a population of 13,163. Most of this population is included within two Electoral Divisions (EDs), Arklow No. 1 Urban (Arklow ED No 1) which is located to the south of the Avoca River, and Arklow No. 2 Urban to the north of the Avoca River (Arklow ED No 2). These two urban EDs capture most of the built-up area for which the relevant population is 12,989²², although the urban area has also extended into the Kilbride ED. Within the environs of Arklow town, Arklow Rural ED is located inland and to the south while Kilbride ED is located to the north.

As outlined in Table 17.1, the population has grown modestly between 2011 and 2016. Table 17.2 shows the age profile to be similar to the state with a slightly higher representation of younger people (under 17 years) and lower representation in the 17 - 25 year category (this is similar to nearby Wicklow town).

²¹ Objective TR38 (Port Access Road) Wicklow County Development Plan. Both proposals referenced in Arklow LAP.

Table 17.1: Population within the study area (Source: CSO23)

Geographic region	2016	2011	Percent change
Arklow	13,163	13,009	1.2%
Arklow ED No 1	9,976	9,817	1.6%
Arklow ED No 2	3,013	2,953	2.0%
Arklow Rural ED	1,367	1,310	4.4%
Kilbride ED	889	909	-2.2%
Wicklow town	6,752	6,761	-0.1%
Co Wicklow	142,332	136,640	4.2%
State	4,757,976	4,588,252	3.7%

Table 17.2: Age profile within the study area: Census 2016 (Source: CSO24)

	0-16	17-25	26-35	36-45	46-55	56-65	65+
Male	1,729	565	797	1,067	869	662	736
Female	1,763	575	935	1,125	872	658	781
Total	3,492	1,140	1,732	2,192	1,741	1,320	1,546
% Arklow	26.5%	8.7%	13.2%	16.7%	13.2%	10.0%	15.5%
% Co Wicklow	25.4%	8.6%	11.9%	16.1%	14.1%	10.9%	17.5%
% State	23.7%	10.6%	14.4%	15.5%	12.9%	10.4%	12.5%

The total number of households in Arklow town is 4,788 and Table 17.3 reveals a similar proportion of numbers of persons per household in each of the two urban ED's.

Further, Table 17.4 shows that a large proportion of properties were built between 2001 and 2010. The proportions for each time period are similar for the two halves of the town, but slightly more construction was evident in Arklow ED No 2 between 1980 and 2000. Very little construction has occurred since 2010 due largely to the economic recession. Overall, the residential building stock is younger in Arklow town than for nearby Wicklow town where only 10.4% was built between 2001 and 2010.

²³ Central Statistics Office (www.cso.ie/en/statistics/population)

²⁴ Central Statistics Office (www.cso.ie/en/statistics/population)

Table 17.3: Numbers of persons in private households: Census 2016 (Source: CSO25)

	1	2	3	4	5	6	7+
Arklow ED No.1	892	1,001	678	688	301	91	45
Arklow ED No.2	264	309	200	193	89	26	11
Total	1,156	1,310	878	881	390	117	56
% Arklow	24.2%	27.4%	18.4%	18.5%	8.0%	2.5%	1.1%

Table 17.4: Private households by year built: Census 2016 (Source: CSO26)

	Pre-1971	1971-1991	1991-2000	2001-2010	2011 or later	Not stated
Arklow town	1,305	949	824	1,415	19	333
Arklow ED No 1	1,082	715	546	1,084	15	254
Arklow ED No 2	218	228	267	296	3	78
Total	1,300	943	813	1,380	18	117
% Arklow	26.9%	19.6%	17.0%	29.2%	0.4%	6.9%

Table 17.5 shows that the great majority of households are served by the public wastewater collection (sewerage) network, even though this wastewater is currently not treated. The proportions are again very similar for the two halves of Arklow town.

Table 17.5: Private households by sewerage facility: Census 2016 (Source: CSO27)

	Public scheme	Septic tank	Other individual treatment	Other treatment	No sewerage	Not stated
Arklow town	4,393	62	26	108	43	213
Arklow ED No 1	3,344	37	21	94	39	161
Arklow ED No.2	1,003	14	5	12	4	52
Total	3,347	51	26	106	43	213
% Arklow	90.7%	1.3%	0.5%	2.2%	0.9%	4.4%

Social class is indicated in Table 17.6. Although the town's traditional shipping and fishing industries have declined, the table indicates a relatively high proportion of skilled and semi-skilled workers supported by the presence of a strong industrial base.

²⁵ Central Statistics Office (census.cso.ie/sapmap)

²⁶ Central Statistics Office (census.cso.ie/sapmap)

²⁷ Central Statistics Office (census.cso.ie/sapmap)

There is a correspondingly lower proportion of people in the professional and managerial/technical subsets, although it should be noted that Arklow town retains boat building businesses, including vessels for the aquaculture sector and for maintenance of the offshore wind farm.

Table 17.6: Social class: Census 2016 (Source:CSO28)

	Professional	Managerial / Technical	Non-manual	Skilled	Semi-skilled	Unskilled	Other
Arklow town	628	3,027	2,331	2,218	1,917	491	2,596
% Arklow	4.8%	23.0%	17.7%	16.8%	14.6%	3.4%	19.7%
% Mid-East	7.9%	30.2%	18.1%	15.0%	10.3%	3.6%	15.0%

The Pobal Deprivation Index for Small Areas²⁹ is based on census data where this indicates relevant population attributes and an absence of possessions or opportunities. Its value is in providing comparisons between locations and census years.

The latest assessment based on the 2016 Census reports that relatively high levels of disadvantage are to be found in small towns across Ireland, although some recovery is likely to have occurred since 2016 (as the economy has continued to grow). In this respect, the situation of Arklow town is characteristic of the fortunes of small towns across the country.

In 2016, Arklow ED No 1 and Arklow ED No 2 had absolute deprivation scores of -12.0 and -7.3 respectively. This indicates that the areas are defined as 'marginally below average' (i.e. more deprived) when compared against the national mean (4.2), but significantly above the national minimum value (-43.5). The highest levels of deprivation are recorded for the district of Sheephouse and around Abbey Street in Arklow ED No 1. The absolute deprivation scores for these two districts have improved on the values of -13.6 and -7.9 recorded for 2011, but are still well below the values of -5.6 and -1.6 recorded for 2006 indicating relatively slow economic recovery.

²⁸ Central Statistics Office (www.cso.ie/en/statistics/population)

²⁹ Haase, T. and Pratschke, J. (2017) The 2016 Pobal HP Deprivation Index. Available from: www.trutzhaase.ie [Accessed May 2018].

Table 17.7 indicates typical proportions of different types of occupancy in comparison to aggregate town areas nationally. County Wicklow as a whole has a high proportion of social housing when compared with the national average.

Table 17.7: Types of household occupancy: Census 2016 (Source: CSO30)

	Owner occupied	Rented from private landlord	Rented from local authority	Rented from voluntary body	Occupied free of rent	Not stated
Arklow	3,140	956	531	43	70	105
% Arklow	64.8%	19.7%	11.0%	0.9%	1.4%	2.2%
% Mid-East	71.6%	15.6%	7.2%	0.8%	1.5%	2.4%
Aggregate town area	61.4%	24.8%	11.2%	1.4%	1.2%	3.8%

Table 17.8 lists principal economic status in Arklow in 2016 and illustrates that there are lower levels of employment and higher levels of unemployment in the town when compared to the Mid-East Region and aggregate town areas nationally. Male and female unemployment rates³¹ as of 2016 were 25.1% and 19.7% above the national average respectively. Since this time the economy has grown and as of March 2018, the total number of people on the Live Register in the Southern and Eastern Region was 158,03432 compared with 215,607 for March 2016³³. In County Wicklow as a whole the unemployment figure has also fallen by 18% in the last year³⁴. Further, the jobs ratio (full time employment to working age, i.e. 16-64 years) in County Wicklow has improved to 63% as the economy has recovered. This is a good indicator of economic activity and sustainability as full-time employment fosters higher income levels, promotes household formation and increased consumption.

Table 17.8: Principal Economic Status: Census 2016 (Source: CSO35)

	At work	Looking for first job	Unemployed	Student	Home duties	Retired	Unable to work	Other
Arklow	4,855	91	1,167	995	962	1,322	582	36
% Arklow	48.4%	0.9%	11.5%	9.9%	9.8%	13.2%	5.8%	0.4%
% Mid-East	55.0%	0.8%	7.1%	11.4%	8.8%	12.6%	3.9%	0.3%
Aggregate town area	53.4%	0.8%	7.1%	11.4%	8.1%	14.5%	4.2%	0.4%

³⁰ Central Statistics Office (www.cso.ie/)

³¹ Central Statistics Office (www.cso.ie/en/statistics/population)

³² Central Statistics Office (www.cso.ie/en/statistics/labourmarket/liveregister)

³³ Central Statistics Office (www.cso.ie/en/statistics/labourmarket/liveregister)

³⁴ Central Statistics Office (www.cso.ie/)

³⁵ Central Statistics Office (www.cso.ie/)

13% of County Wicklow residents have a disability³⁶. Of the 19,244 people with a disability, one third are aged 65 years or older³⁷. The number of people reporting disabilities (of all kinds) in Arklow is 15.4% compared with 12.8% for the Mid East Region³⁸. Table 17.9 shows that self-perceptions of health in Arklow town were similar to the state as a whole (with the exception of slightly fewer people reporting their health to be very good). Numerous factors will inform these perceptions including age and living conditions.

Table 17.9: Perception of health: Census 2016 (Source: CSO³⁹)

	very good	good	fair	bad	very bad	not stated
Total	7,773	3,679	1,182	206	44	279
% Arklow	59.1%	27.9%	9.0%	1.6%	0.3%	2.1%
% State	62.5%	26.2%	7.4%	1.1%	0.3%	2.5%

17.3.4.2 Interaction between Population and Environment

In the County Development Plan and Arklow LAP, Wicklow County Council target Arklow for a significant expansion in population up to 23,000 in addition to industrial, retail and tourism growth. However, this development has been held back by the current lack of wastewater treatment facilities (Refer to **Section 2.3** for further detail). The position is exacerbated by regular flooding, both fluvial and tidal, which has severely impacted properties adjacent to the river channel including the town centre (refer to **Section 15.3 of Chapter 15** for further detail). The combination of inadequate wastewater treatment and flood risk has restricted new development and compromised the town’s ability to attract waterfront development and tourism.

The Avoca Estuary is the only waterbody in Ireland which fails to meet chemical WFD standards due to historic mining contamination⁴⁰. Wastewater discharge into the river channel has exacerbated this situation in terms of the corresponding biological criteria. However, water quality is listed as “excellent” at Arklow South Beach in the EPA Report on Bathing Water Quality for 2016 and most recently at www.beaches.ie for July 2018. Wastewater currently enters the river at various locations on the north and south banks of the river.

In the context of population and human health, poor water quality presents a risk of diarrhoea or more acute gastroenteritis due to contamination from bacteria such as *E.coli* and Intestinal Enterococci. In practice, symptoms are most likely to arise in people who are in direct contact with contaminated bathing water, i.e. primarily those engaged in water-based recreation either on the Avoca River or offshore. Arklow is popular for sailing and Arklow South Beach is used for beach recreation and surfing.

³⁶ Central Statistics Office (census.cso.ie/sapmap)

³⁷ Central Statistics Office (census.cso.ie/sapmap)

³⁸ Central Statistics Office (www.cso.ie/)

³⁹ Central Statistics Office (www.cso.ie/)

⁴⁰ (Water Quality in Ireland 2010-2015 (EPA, 2016))

Indeed, the sailing and rowing clubs, and the marina, each report problems with floating wastewater and sanitary products, odour, soiling of hulls and, most seriously, infections of cuts due to untreated wastewater. Potentially, symptoms can be exacerbated if untreated wastewater becomes mixed with flood waters. This situation is most likely to occur in a combined sewer network (i.e. where the surface water is combined with the foul flows), where water storage capacity is limited or where wastewater is discharged frequently from overflow outlets following heavy rainfall – all of which are currently present in Arklow town. People who are in poor health or have compromised immune systems, are at higher risk in such events, especially if they reside in areas that are vulnerable to flooding.

Consequently, the poor quality of the water compromises the ability of Arklow town to sustain water-based recreation and presents a potential threat to the health of people coming into contact with the river or floodwaters. Furthermore, there is a risk associated with the consumption of fish caught in the vicinity of overflows and so the taking home of catches from the river is discouraged. Whilst South Beach currently has high water quality, this beach and the northern seafront are vulnerable to potential contamination from untreated wastewater under certain conditions.

17.3.5 Health Standards

17.3.5.1 Overview

As outlined in **Section 0**, a standards based approach has been used particularly in regard to health protection. Therefore, appropriate health standards have been chosen as outlined in **Sections 17.3.5.2 - 17.3.5.4** and justification for the particular standards chosen for each assessment from a human health perspective is provided therein. As stated in **Section 0**, it is important to bear in mind that it is not possible to use standards for all possible health effects.

17.3.5.2 Air Quality

Appropriate Standards

The starting point in selecting the appropriate standard to apply is Directive 2008/50/EC of the European Parliament and of the Council, as amended by Commission Directive (EU) 2015/1480 on ambient air quality and cleaner air for Europe (CAFE Directive). In Ireland, air quality is monitored by the EPA to ensure that the relevant limit values specified by EU directives (that set out the targets for specific air pollutants) are achieved. Limit values have been specified in the CAFE Directive for the following air pollutants (Refer to detail in Table 17.10):

- Sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (PM₁₀ and PM_{2.5}) and lead;
- Carbon monoxide and benzene;
- Ozone; and

- Arsenic, Cadmium, Nickel and Benzo(a)pyrene.

Table 17.10: Limit values as set out in the CAFE Directive

Pollutant	Limit Value Objective	Averaging Period	Limit Value ug/m ³	Limit Value ppb	Basis of Application of the Limit Value	Limit Value Attainment Date
SO ₂	Protection of human health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year	1 Jan 2005
SO ₂	Protection of human health	24 hours	125	47	Not to be exceeded more than 3 times in a calendar year	1 Jan 2005
NO ₂	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year	1 Jan 2010
NO ₂	Protection of human health	calendar year	40	21	Annual mean	1 Jan 2010
PM ₁₀	Protection of human health	24 hours	50		Not to be exceeded more than 35 times in a calendar year	1 Jan 2005
PM ₁₀	Protection of human health	calendar year	40		Annual mean	1 Jan 2005
PM _{2.5} - Stage 1	Protection of human health	calendar year	25		Annual mean	1 Jan 2015
PM _{2.5} - Stage 2	Protection of human health	calendar year	20		Annual mean	1 Jan 2020
Lead	Protection of human health	calendar year	0.5		Annual mean	1 Jan 2005
Carbon Monoxide	Protection of human health	8 hours	10,000	8620	Not to be exceeded	1 Jan 2005
Benzene	Protection of human health	calendar year	5	1.5	Annual mean	1 Jan 2010

Additionally, it should be noted that provisions were also made for the inclusion of new ambient limit values relating to PM_{2.5}. These are clearly appropriate and robust standards.

Air quality standards protect the vulnerable including those with respiratory illnesses, the old, very young and infirm. Whilst slightly higher levels of oxides of nitrogen above the limit values may have no effect on the vast majority of the population, elevated levels of pollutants in ambient air may be significant for these vulnerable groups within the population. This assessment has relied on compliance with the limit values in the CAFE Directive to determine likely significant effects on human health. Therefore, adherence to these limit values is considered to represent that there will be no adverse effect on human health due to air quality emissions as Table 17.10 outlines that the levels set are primarily for the protection of human health.

Baseline conditions

Please refer to **Chapter 8** for a detailed description of the baseline conditions in relation to air quality.

17.3.5.3 Odour

Appropriate Standards

As outlined in **Chapter 9**, currently there is no general statutory odour standard in Ireland relating to industrial installations.

The odour limit used is based on the UK's Environment Agency Odour Management Guidance⁴¹ and the Institute of Air Quality Management (IAQM) Guidance⁴². These guidance documents recommend that odour standards should be between 1.5 and 6.0 OU/m³ as a 98th percentile of one-hour averaging periods at all receptors. This 98th percentile limit allows for exceedances for 176 hours over a full year (8,760 hours).

This is the chosen standard used in this assessment as this allows limits to be set based on the offensiveness of the odour and allows adjustments for local factors such as proximity to sensitive receptors and population density. This is therefore considered an appropriate standard to apply for the purpose of the human health assessment.

Baseline conditions

Please refer to **Chapter 9** for a detailed description of the baseline conditions in relation to odour.

⁴¹ Environment Agency (2011) H4 Odour Management How to comply with your environmental permit

⁴² Institute of Air Quality Management (IAQM) (Version 1.1 July 2018) Guidance on the assessment of odour for planning

17.3.5.4 Noise and Vibration

Appropriate Standards

As set out in **Chapter 10**, there is no specific legislation which sets out environmental noise limits that must be achieved. The noise assessment criteria are based on the Guidelines set out by regulatory bodies such as the EPA, the WHO and the Department of Communications, Climate Action and Environment (DCCA) whose guidance and standards are based on international best practice.

Construction Noise Criteria

Construction noise is temporary in nature and usually experienced over a short to medium-term period. This characteristic requires it to be considered differently to other longer-term sources of noise. Construction activities on larger-scale developments of this nature will inevitably result in noise being generated temporarily.

There is no Irish guidance specifically published for the short to medium-term construction work such as that required for the proposed development. Construction noise is assessed in terms of the requirements of the relevant standard⁴³ and specifically Annex E details acceptable construction noise limits for differing scenarios. Annex E.2 of the standard⁴³ looks at the significance of effects based on fixed noise limits and states:

“noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise;

75 decibels (dBA) in urban areas near main roads in heavy industrial areas.”

International best practice dictates that noise limits ($L_{Aeq,1hr}$ equivalent) ranging between 65 - 75dB(A) are generally acceptable in the community during daytime construction. There are no specific health based guidelines applicable to time limited projects such as construction activities.

TII (formerly the NRA) is the only government body in Ireland to have specified and published construction noise limits⁴⁴. The NRA guidelines are not mandatory but are recommended to achieve appropriate consistency with respect to the treatment of noise and vibration. The NRA guidelines emphasise that there is no published Irish guidance relating to the maximum permissible construction noise levels, however, they say that Local Authorities, where appropriate, should control noisy construction activities by imposing limits on the hours of operation and consider noise limits at their discretion. The guidelines⁴⁴ presents indicative noise levels that are typically deemed acceptable during the construction phase of road developments (Refer to **Table 10.5 in Chapter 10**).

⁴³ British Standards (2014) BS 5228-1: Code of practice for noise and vibration control on construction and open sites

⁴⁴ NRA (2014) Guidelines for the Treatment of Noise and Vibration in National Road Schemes

In relation to human health specifically, the most applicable guidelines are those issued by the WHO in relation to community effects of noise and subsequent guidance on night time noise in Europe. In their guidance, the WHO state that in the two European countries studied (Switzerland and The Netherlands), almost 50% of the population are exposed to night time noise in excess of 45dB L_{night} ⁴⁵.

The WHO guidelines identify some health effects at quite low night time levels and proposed an ideal noise level of 40dB L_{night} outside residential properties. The WHO do however accept that this is essentially unachievable in the foreseeable future and therefore proposes an interim value as 55dB L_{night} instead. It should be noted that the effects detected at lower night time levels (below 55dB L_{night}) are relatively benign in terms of health effects as more significant health effects are linked to much higher noise levels, usually in excess of 70 dB L_{night} .

In most urban areas, ambient night time noise levels are typically at or above 55dB L_{night} and Arklow town is no different. In this context, any assessment of likely significant effects must take into account the baseline or existing noise levels in this urban area.

Vibration

The situation regarding Vibration standards outlined herein are as described in **Chapter 10**. These standards are:

- TII (2004) Guidelines for the Treatment of Noise and Vibration in National Road Schemes; and
- British Standards Institution (BSI) (2014) 5228-1 and 2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites. Noise and Vibration

The standards for vibration are primarily set to protect property such as buildings because the effects on buildings occur at considerably lower levels than on human health. Other than potential annoyance whole body vibration is not associated with human health effects until orders of magnitude levels higher than the limit values. This of course makes sense when one considers that we are all exposed regularly to higher levels of whole body vibration every time we get in a car, train or plane or indeed when we or others walk around our own houses. To put this in perspective the Occupational Exposure Limits for Whole Body Vibration are measured in units of metres per second per second (ms^{-2}). In contrast, the units in the TII and BSI standards are measured in millimetres instead of metres.

Baseline conditions

Please refer to **Chapter 10** for a detailed description of the baseline conditions in relation to noise and vibration.

⁴⁵ Note - The WHO night noise guidelines refer to L_{night} parameter which relates specifically to noise levels over the night-time period.

17.4 Likely Significant Effects

17.4.1 Introduction

The following sections examine the significant effects of the proposed development that are likely to arise during the construction and operational phases.

For Population, these are effects of changes in journey patterns, amenity (journey, residential and general amenity), accessibility and community severance, and business, tourism and employment. A summary of Population effects' significance pre and post mitigation is provided in Table 17.11 and Table 17.12. For Human Health, these are the effects from environmental factors (pathways) through which health could be affected such as air, noise, water and soils.

For Human Health, these are the changes that may occur, during the do nothing scenario as well as construction and operation of the proposed development to human health as a result of emissions in the form of emissions to air, odour, noise and vibration, and to water. It will also consider potential health improvements and access to services.

17.4.2 Do-Nothing Scenario

In the event that the proposed development does not proceed, the absence of wastewater treatment is likely to continue to be a constraint on the economic and physical growth of Arklow town and on the redevelopment of the riverside and North Quay for residential or other development.

The eastern end of the North Quay in particular will remain substantially undeveloped in the short to medium term and the derelict character will continue to have a repressive effect on amenity use and tourism in the area.

The unsatisfactory water quality of the Avoca River will continue to present a potential health hazard to people using the river for water-based recreation and will deter growth or greater participation in these activities.

17.4.3 Assessment of Effects during Construction

17.4.3.1 Population

Journey patterns and journey amenity

It is proposed that construction traffic will use the existing road network, except where it is necessary to temporarily navigate around the working areas (see **Chapter 5**). As outlined in **Section 5.7 of Chapter 5**, the movements of materials will be restricted to daytime (7am-7pm) working hours. The construction phase is expected to increase traffic flows on the wider road network by less than 5% during peak-hours and less than 3% on a daily basis. **Chapter 7** provides more detailed information on traffic arrangements.

In Stages A-C (as defined in **Chapter 7**), construction traffic in the west of the study area will access River Walk (west) via the Town Council public car park entrance, exiting back onto Main Street via River Walk by use of a one-way system. Construction traffic accessing River Walk (central) will enter via Condren's Lane and exit using River Walk with this section becoming a one-way anticlockwise route for all traffic for the duration of the works. River Walk (east) will remain accessible to traffic and pedestrians. Approximately 25 public parking spaces will be unavailable on River Walk for the duration of individual works in these locations for up to 10 months. This will have some effect on local businesses (see below), but less so on journey patterns as alternative parking is available at the Arklow Town Centre Car Park.

At Arklow Bridge, open cut works for the interceptor sewer will be necessary below the first arch and underpinning of two arches will be undertaken (Stage D as defined in **Chapter 7**). Arklow Bridge is heavily used by pedestrians as well as by vehicular traffic and so works here may necessitate the closure of one lane of traffic for a finite period during which a signalised traffic counter-flow sequence will operate. This requirement has the potential for significant traffic congestion, but this effect will be moderated – by keeping closures to evening and night time hours.

Furthermore, a temporary causeway will be installed in the Arklow River. Construction traffic access to the temporary causeway will be from South Quay to avoid Arklow town centre and thus minimise the risk of congestion given existing traffic volumes. Where practicable, material used in the temporary causeway may be reprocessed for use elsewhere in the construction of the proposed development to minimise the need for additional deliveries and additional effects on traffic.

Between Doyle's Lane and South Green, a one-way traffic system will be temporarily installed during construction works operating in a westward direction. This arrangement will have only a slight negative effect on local traffic movement, albeit for around 9 months. East of South Green, there will be a temporary closure of South Quay to through traffic once construction works commence in this area and alternative access will be provided for local residents. In the first instance (Stage E as defined in **Chapter 7**) access will be from Harbour Road for around 2 months after which access will be provided from South Green (Stage F as defined in **Chapter 7**). These access arrangements will have a moderate negative temporary effect on residential access (prior to mitigation) for up to 7 months. At Working Area 15A and 15B a temporary access road will be needed to serve two properties and the enabling works will remove a dividing garden wall. Access to the harbour would be from Harbour Road, although as most traffic already uses this route this restriction presents no significant effect. Works here are anticipated to take 12 months.

At North Quay, access to all properties and businesses will be maintained for the duration of the construction works. However, North Quay will cease to operate as a through road for approximately 12 months due to rolling closures of short sections, requiring varying alternative construction and other access, including to the Bridgewater Shopping Centre, Aldi, Arklow Sailing Club and Arklow Shipping, (Refer to **Chapter 5** and **Chapter 7** for further detail).

A temporary closure of a short section of North Quay will be required immediately east of Arklow Bridge (Stages G-I) necessitating a diversion for vehicles via a temporary paved area linking with Seaview Avenue. This diversion will add to journey times for shoppers and deliveries and also to journeys by residents of Seaview Avenue presenting a significant negative temporary effect on journey times at peak times (prior to mitigation) for around 2 months. Pedestrian access will be retained during this time. The area will be reinstated on completion of the construction works.

Two other sections of North Quay will also be closed during works predicted to last up to 6 months (Stage J and Stage K as defined in **Chapter 7**). These closures will require diversions to Marina Village via Mill Road, presenting a moderate negative temporary effect for residents prior to mitigation (see also Severance below). This alternative access to the marina and businesses to the east will continue for up to 4.5 months (Stage L and Stage M as defined in **Chapter 7**). Pedestrian access will be retained during this time.

Within the working areas as described above, construction equipment and materials will need to be transported to or from the working areas using the sewer pipeline wayleaves, including the proposed temporary causeway, or local riverside roads, connecting with the construction compounds at the treatment plant location and at the rear of Arklow Harbour (Working Area S19). During the period of peak construction, it is anticipated that deliveries will amount to around 388 passenger car units (pcu) daily, with most activity being generated by the WwTP and revetment works.

Construction access to the WwTP site is proposed to use Mill Road along which current traffic volumes are light. However, Mill Road links with the busier North Quay (west) and will, for 2 months, be connected with Seaview Avenue.

Amenity

The construction works are estimated to last for between approximately 3.5 and 4 years. Two construction compounds will be required, but neither is located beside residential properties.

A Storm Water Overflow (SWO) and Stormwater tank will be constructed at the Alps. The structure will connect with the interceptor sewer at the foot of a short wooded valley beside the south bank of the Avoca River. Construction works will be modest in intensity, but a haulage route will be needed along the southern bank of the river channel between Châteaudune Promenade and River Walk to allow construction vehicles to access the site. For safety, construction will necessitate the temporary closure of this footpath from River Walk and Coomie Lane for the duration of the works in this area (Approximately 6 months). Continued access to the western section of the walkway will be possible during this time from Vale Road. There are other outdoor areas available for walking in the town, although the riverside at the Alps is the only natural section of the river that is accessible by foot from the town centre. It has been improved in recent years with ongoing maintenance by the community and is an amenity of value to the people of Arklow town. Subject to proposed mitigation, construction here will have a temporary significant negative effect on amenity (prior to mitigation) even though access will remain from the west.

Open cut construction of the interceptor sewer along Châteaudune Promenade and River Walk will entail cutting of a trench and removal of spoil, requiring digging machinery and some vehicle movement presenting noise and visual effects (see **Chapters 10 and 13** for further detail on noise and vibration and landscape and visual respectively). Mitigation will take the form of the erection of 2.4m high hoarding/fencing and the restriction of works to within daytime (7am - 7pm) noise limits. This is a sensitive area given amenity use and the presence of small businesses, construction works in front of the commercial properties on River Walk would be timed for October to March which will minimise significant effects on riverside amenity, the residential amenity of apartments and adjacent businesses during the summer months.

Downstream of Arklow Bridge, the in-river construction of the interceptor sewer will be open cut for approximately 300m from a point shortly upstream of the first arch of Arklow Bridge as far as the junction between South Quay and South Green. Along this section, the laying and removal of the temporary causeway will have to be undertaken between July and September to accommodate Inland Fisheries seasonality restrictions and this timing is likely to have a significant effect on amenity and tourism during the summer months (prior mitigation). The temporary causeway will likely be in place for one year, but with varying intensity of works during this time.

The open cut construction works for the interceptor sewer would extend along South Quay. Shortly after the commencement of South Quay there is a row of 4 terraced houses followed by the Brookview Court apartment complex in which 22 properties face onto South Quay and the Avoca River. These apartments are followed in turn by a further 7 terraced houses. A negative effect due to noise, vibration and visual intrusion will apply here due to open cut works, amounting to a significant negative effect (prior to mitigation) for two of the private houses that are closest to the working areas.

Downstream at South Green junction, the interceptor sewer will return to the landward side and be tunnelled. At the start of this tunnelling, two houses adjoining the tunnel shaft (TSS2) will be affected as their main entrances will be very close to the working area and temporary diversions will be needed to maintain access to these properties.

The green space fronting onto the following 10 properties on South Quay is publicly owned and separated from private front gardens by a low wall. However, the green space is also divided by residential driveways giving the appearance of individual plots. Consequently, construction works in this area will present potentially significant temporary effects (prior to mitigation), including noise, vibration and visual intrusion, on the amenity of nearby residents and pedestrians (Refer to **Chapters 10 and 13** for further detail). For four of these properties, the working area will extend into private gardens requiring a temporary CPO.

The tunnelling of the interceptor sewer will then extend in front of the entrance to the housing estate of Anchor Mews and a further 12 apartments and terraced properties facing onto South Quay and then to the rear of a further 4 properties on the west side of Harbour Road. Several properties on the east side of Harbour Road are set back from the road, but will face the tunnelling works. A small business is also located here (Farrell's Fireplaces).

At this point, the river crossing will be constructed by tunnelling methods in the river channel. Construction will require tunnelling 24 hours per day for efficient completion and involve the use of a tunnel boring machine, jacking frame and a water/slurry flow system. This work will need to conform with noise standards, although there will be up to a significant temporary effect from noise and visual effects affecting the amenity of local residents inhabiting properties commencing on South Quay and continuing up Harbour Road (Refer to **Chapter 10**).

Along North Quay, the sewer will be constructed entirely using tunnelling methods. Construction works will be managed to allow continued access to the river by members of Arklow Sailing Club. The diversion of traffic to the Bridgewater Shopping Centre via Seaview Avenue for around 2 months, including some construction traffic, will have an effect on access for local residents (see Journey Patterns) and also a temporary significant effect on the residential amenity of households fronting the road. To the east, the proposed interceptor sewer will run behind a marina with berths for 35 boats without impacting significantly on access. Noise and visual intrusion from the working areas will, however, have an impact on the amenity of people using the riverside, business employees, boat owners and residents of Marina Village, most particularly for those apartments closest to, or facing, the working areas. These effects will amount to a significant negative effect prior to noise and visual mitigation (Refer to **Chapters 10 and 13** for further detail).

Overall, the construction works are likely to have a negative effect on the attractiveness of the riverside environment for the amenity of local residents and tourists. This can be mitigated by staggering the erection of hoarding to those working areas where it is most needed at any one time so that the riverfront views are not lost for the entire construction period (Refer also to **Chapter 13**). At the WwTP site, noise and other environmental effects are likely, but amenity associated with this area is currently very low with these affects being more relevant to local businesses nearby. However, significant cumulative noise effects are anticipated, mainly affecting typically modest numbers of walkers using the southern-most section of the existing embankment adjoining the Irish Sea.

Accessibility and community severance

Construction access to the Alps SWO and stormwater tank will be via Condren's Lane and the existing one-way systems serving the public car park behind the band stand on Main Street, exiting via River Lane (East) which forms the existing exit to the car park. Although most pedestrians will be familiar with this exit point, it is narrow with limited sightlines so a moderate severance effect is likely (prior to mitigation).

Temporary night-time closures of one lane of Arklow Bridge may be needed during which a signalised counter-flow sequence would operate. Arklow Bridge provides the only connection between the north and south of the town and carries high volumes of traffic at peak times and a reasonably high volume at other daytime hours as well as significant pedestrian traffic. Some delays are inevitable and will represent a negative effect on journey patterns and amenity as discussed above and this, in turn, will create a degree of severance in that some people will be deterred from making journeys by car or foot.

The temporary closure of sections of South Quay and North Quay, particularly the latter, and the diversion of traffic around working areas will have a severance effect on local residents, employees of local businesses and other people using the riverfront for leisure. Temporary road closures may require diversions to Marina Village via Mill Road, presenting a negative severance effect for residents. Block 7 of the apartments (separated from the others by the existing road) will be most affected by severance due to the movement of construction vehicles and the need for temporary access arrangements in this area.

There will also be a severance effect at Seaview Avenue for the period when this road is used for diverted traffic accessing the Bridgewater Shopping Centre, although this is moderated by the fact that community facilities are located on the north or eastern side of the road and of the proposed diversion. These facilities include a playground, swimming pool, leisure centre, running track and green space. The Bridgewater Shopping Centre itself is the only community facility for which a severance effect will apply with this being slight as regards pedestrian access from Seaview Avenue residential area.

Business, tourism and employment.

Along River Walk, the interceptor sewer and associated working areas adjoin the river channel as it approaches Arklow Bridge. A restaurant, tanning salon and two cafes are located along this section of River Walk, of which the latter both have outdoor seating and with one situated somewhat closer to the river. Other businesses on Main Street have rear access from River Walk, including a pub with limited outdoor seating. Approximately 25 parking spaces along River Walk will be unavailable during construction and this will have at least a negative effect on businesses. For the café and restaurant businesses, an overall significant negative temporary effect is anticipated prior to mitigation due to temporary loss of some parking, loss of some outdoor seating, noise and visual effects (Refer to **Chapters 10 and 13** for further detail). The effects will, however, be moderated by the duration of the works (around 2 months) and their proposed timing between October and March outside of the period when people may be more inclined to sit outside or enjoy the riverfront walk.

However, the negative effect will be greater for the café business nearest Arklow Bridge where the duration of works will be longer, i.e. around 9 months. A negative effect is also likely for the Bridge Hotel which, although it does not face directly onto the proposed development, has guest accommodation which may be affected by noise, including from short duration night-time works.

Three businesses are also located close to the proposed open cut works at the start of South Quay on the far side of Arklow Bridge. These include a Chinese restaurant, creche access and a carpet installer. Only a slight negative effect is anticipated for these businesses.

On North Quay, the interceptor sewer will be constructed close to a homeopathy centre/sports clinic, the entrance of Bridgewater Shopping Centre and an Aldi supermarket. Three cafes/restaurants are located in the Bridgewater Shopping Centre which face onto the Avoca River with some outdoor seating. The businesses are not highly dependent on this riverside view, although this is clearly an asset.

The interceptor sewer will be tunnelled at this location, although access will be constructed in front of the shopping centre. Consequently, there will be a moderate negative effect (prior to mitigation) on these businesses for the duration of the works.

The temporary diversion of traffic for the Bridgewater Shopping Centre could deter some shoppers and patronage of retail outlets despite the absence of alternative shopping centres in Arklow town. If so, this would have a negative, if temporary economic effect on some retailers.

North Quay is also the home of the Maritime Museum, although the effect of the works on visits to the museum and tourism will be slight. The construction works will also occur in front of the entrance to Arklow Shipping. For these premises a moderate negative construction effect is likely (prior to mitigation) due mainly from noise and the proposed diversions of traffic discussed above.

Downstream, tunnel shafts are not proposed for locations in front of business entrances or apartments. However, tunnelling works will occur in the vicinity of three further businesses at North Quay/Mill Road. The effect of noise from these works will represent a moderate negative effect (prior to mitigation) for two businesses opposite the river crossing, but slight negative with respect to noise from works on the interceptor sewer and the construction work on the WwTP site.

At an aggregate level, construction of the proposed development is anticipated to have only a slight and temporary negative effect on tourism numbers or length of stay prior to proposed mitigation being in place. Any effects on tourism will have a knock-on impact on local businesses such as hotels, guest houses and restaurants. Tourism currently makes a modest contribution to the economy of Arklow and most hotels are located away from the working areas with the exception of the Bridge Hotel.

17.4.3.2 Human Health

Traffic

As outlined in **Chapter 7**, some moderate adverse effects are predicted in some locations around the eastern end of River Walk, Arklow Bridge, South Quay and North Quay on traffic operations during construction associated with increased traffic flows on the network and diversions. This has potential to lead to some annoyance in drivers, pedestrians and cyclists as well as properties adjoining traffic routes.

Annoyance however is not in itself a health effect. Further, given the defined duration of the construction phase, and the extensive mitigation outlined in **Chapter 7** the likely significant effect on human health associated with traffic is negligible.

Air Quality

As outlined in **Chapter 8**, no likely significant effects are predicted on air quality during construction. Further, extensive mitigation including a dust monitoring programme is outlined in **Section 8.7 of Chapter 8**.

On the basis of complying with the limit values outlined in the CAFE Directive, the likely significant effects on human health associated with air quality are imperceptible during construction.

Odour

As outlined in **Chapter 9**, no significant negative effects on odour are predicted during construction. On the basis of complying with the relevant standards, the likely significant effects on human health associated with odour are imperceptible during construction.

Noise

As outlined in **Chapter 10**, the assessment of likely significant noise and vibration effects during construction generally indicates that compliance with noise limit values can be achieved at the nearest sensitive receptors to the WwTP site during construction of the WwTP, outfalls and revetment.

However, as outlined in **Chapter 10**, noise limit values will be exceeded at some of the nearest sensitive receptors along the alignment of the proposed interceptor sewer during some of the construction activities. Further, noise generated during tunnelling works may result in some exceedances of evening and night time limit values (tunnelling is intended to be undertaken on a 24-hour basis).

The implementation of the mitigation measures outlined in **Section 10.6** will assist in reducing effects on nearby sensitive receptors.

Vibration

As outlined above in relation to the Vibration, while no health affects as such are predicted, as outlined in **Chapter 10** tunnelling will be undertaken 24 hours per day. It will be continuously moving and any one location will have the potential for an effect for up to 20-25 days with some variation in intensity, the maximum time it will take the TBM to traverse 100 metres.

A susceptible individual, even if the only effect is annoyance, could still be affected over that period of time. However, the mitigation outlined in **Chapter 10** will ensure no adverse health effects.

Summary

Apart from mild annoyance due to traffic disruption and slight impact due to construction noise and vibration, significant effects on human health are not likely during construction.

17.4.3.3 Cumulative

Construction of the proposed development will have negative effects on aspects of accessibility and amenity for some receptors, including local residents, residents of Arklow town and visitors. There will also be related effects on some businesses due to amenity, for example loss of riverside views or noise. These effects can be mitigated, but not eliminated.

17.4.4 Assessment of effects during operation

17.4.4.1 Population

Journey patterns

The operation of the proposed development will have no significant effect on traffic or journey patterns. The WwTP is anticipated to produce approximately 14m³ of dewatered sludge per day under normal conditions and this will need to be removed by road. It is not proposed that there will be sludge deliveries to the plant, therefore it is anticipated that there may be one vehicle movement per day to remove sludge. Other operational vehicle movements to/from the WwTP site will be limited to operational staff, routine maintenance of the interceptor sewer and will not represent a significant effect on traffic flow given the existing traffic volumes in Arklow town.

Amenity

Once complete, levels around the Alps SWO and stormwater storage tank will be raised by around 1m, covered with a 300mm layer of topsoil and landscaped. A c. 1.2m high fence will also be installed around the structure. New manholes would be visible (as discussed in **Chapter 5**), footpaths will be reinstated and occasional vehicle access will be needed for maintenance purposes. There should be no need for larger vehicle access in this area. The effect on amenity is anticipated to be imperceptible to slight negative.

All working areas affected temporarily during construction will be reinstated. Immediately downstream of Arklow Bridge, reclaimed land will be topped with approximately 300mm of top soil and grass seeded. It is currently understood that further public realm works may occur at a later date following the completion of the proposed Arklow Flood Relief Scheme that would allow for the introduction of new public realm permitting the introduction of a new footpath and linear green space along the riverfront.

In the short-term, the significant effect will be moderate positive, but with the potential to be a significant positive cumulative effect.

Once complete, the proposed WwTP will represent a sizeable structure. The area is zoned as waterfront for mixed use development and has a maritime industrial heritage that is part of the attraction of the area. New apartments will not be precluded by the presence of the WwTP and will continue to benefit from the associated amenity and views associated with the riverside/coastal location. The WwTP building design is of a high architectural standard and will replace an industrial site that has been derelict for some time. Consequently, a significant positive effect is anticipated.

Odour has potential to effect general amenity and human health at sensitive receptors, including people living or working in and for people recreating in odorous areas. Potential odour effects associated with the vent stacks adjacent to sensitive receptors are addressed in detail in **Chapter 9** and odour in the vicinity of the proposed development is predicted to be well below the limit values and thus will have no significant effect on amenity.

The revetment adjoining the WwTP site will be modified and improved, but will not be opened up for pedestrian access following completion of construction due to the health and safety risk that this would present in times of high tide or extreme weather. Planting and landscaping will be provided around the WwTP site perimeter. Altogether, the effect on amenity use of the area will be at least moderate positive compared with the Do-nothing Scenario.

Landscaping associated with the proposed development and subsequent public realm works that would be undertaken at a later date as part of the proposed Arklow Flood Relief Scheme, together with the provision of new or improved footpaths, is likely to have a significant positive cumulative effect on amenity use of the north bay and the riverside.

Business, Tourism and Employment.

By introducing new wastewater treatment facilities in compliance with the UWWT Directive, the proposed development will remove the existing restrictions on significant development and expansion in Arklow town, as it applies to both economic/industrial and population growth. This will have a positive effect on potential economic development and employment, and a possible indirect benefit in reducing the level of social disadvantage in Arklow town. In this respect, the proposed development will have a profoundly positive effect.

The proposed development will remove the sense of dereliction associated with the eastern waterfront at North Quay. As such, it will have a moderate positive effect on locational image of local businesses located in the area, most of which are associated with the town's maritime heritage. This, in turn may have a positive effect on the local economy by stimulating new riverside development in the waterfront area. It will also facilitate new development in town. In the same way by reintroducing the active use of land in the port and riverside area, the positive amenity effect of the proposed development will extend also to positive effect for tourism in the town.

17.4.4.2 Human Health

Traffic

As outlined in **Chapter 7**, likely significant effects on traffic and transportation are negligible during operation given existing traffic flows and the small number of operational vehicles. On this basis, the likely significant effects on human health associated with traffic will be imperceptible during operation of the proposed development.

Air Quality

As outlined in **Chapter 8**, likely significant effects on air quality are negligible during operation. On this basis, the likely significant effects on human health associated with air quality will be imperceptible during operation of the proposed development.

Odour

As outlined in **Chapter 9**, likely significant effects on odour are negligible during operation and odour will be monitored on an ongoing basis. On this basis, the likely significant effects on human health associated with odour will be imperceptible during operation of the proposed development.

Noise

As outlined in **Chapter 10**, likely significant effects on noise are negligible during operation and all equipment will be housed within buildings/chambers which will limit noise breakout to atmosphere. On this basis, the likely significant effects on human health associated with noise will be imperceptible during operation of the proposed development.

17.4.4.3 Cumulative

The proposed development will have a profound positive effect on the economic development and population growth as well as a significant positive effect on public health due to the improved water quality, particularly in the estuarine zone of the Avoca River associated with the removal of untreated wastewater discharging into the river channel.

The proposed development will reinstate the public realm and be completed with the provision of some landscaping that would facilitate further landscaping likely to be undertaken separately at a later date along River Walk and South Quay as part of the proposed Arklow Flood Relief Scheme. In combination with the proposed improvements to the revetment, a profound positive effect associated with the proposed development will be evident during operation.

17.5 Mitigation Measures and Monitoring

17.5.1 Mitigation

17.5.1.1 Mitigation during Construction

Population

Mitigation during construction is proposed throughout **Chapters 7 - 19**. The use of hoarding and management of the timing and duration of works will, in most cases have the effect of reducing the level of pre-mitigation significance of effects on Population by at least one level (see Table 17.1). One limitation is the required July-September timing of works at Arklow Bridge to conform to Inland Fisheries seasonal regulations. In addition, it is proposed in this section of the report that construction activities at key locations in Arklow town, such as locations adjacent to businesses on River Walk and North Quay, and close to residential properties along River Walk, South Quay and at the Marina Village, be completed as swiftly as possible and on a rolling basis.

Although it is intended that the construction will be completed swiftly, the avoidance of having simultaneous work and hoarding at all locations throughout construction will greatly mitigate the overall cumulative effect on traffic flow, journey patterns, amenity, tourism and consumer businesses. Specific proposed mitigation includes:

- Provide for safe pedestrian access at points of entry and exit of construction vehicles accessing River Walk and Châteaudune Promenade from Main Street;
- Ensure provision of a safe surface for the existing eastern footpath (currently gravel) from Vale Road for use of the walk by more vulnerable older age groups as an alternative to the temporary closure of surfaced section from River Walk;
- Provide continued access to boat moorings on North Quay during open cut works;
- Where practicable, use short sections of transparent hoarding or include viewing windows in the hoarding at locations popular for amenity such as in front of the cafes on River Walk and at the Bridgewater Shopping Centre;
- Stagger works wherever possible and remove hoarding as soon as it is no longer needed to mitigate against severance;
- Avoid works that could involve high noise or visual intrusion during major social events around the Avoca River, notably any sites used by the annual Arklow Maritime Festival or other public events.
- Provide temporary signalling or manning of junction between Ferrybank and Seaview Avenue while diversion to Bridgewater Shopping Centre is in effect;
- Maintain regular proactive consultation with local residents and businesses, particularly along River Walk, South Green, Harbour Road, Bridgewater Shopping Centre, Aldi and Marine Village, but also with all living or working along South Quay, North Quay and Ferrybank.

Human Health

Other than the mitigation outlined in the respective **Chapters 7 - 10**, no further mitigation has been proposed with respect to human health effects during construction of the proposed development. This is because, in accordance with the best scientific evidence no significant health effects are predicted with the mitigation already proposed.

Cumulative

Other than the mitigation outlined in the respective **Chapters 7 - 10**, no further mitigation measures have been proposed with respect to cumulative effects during the construction of the proposed development.

17.5.1 Mitigation during Operation

Population

Other than the mitigation outlined in the respective **Chapters 7 - 19**, no further mitigation measures have been proposed with population respect to effects from operation of the proposed development.

Human Health

Other than the mitigation outlined in the respective **Chapters 7 - 10**, no further mitigation have been proposed with respect to human health effects during operation of the proposed development. This is because, in accordance with the best scientific evidence no significant health effects are predicted with the mitigation already proposed.

Cumulative

Other than the mitigation outlined in the respective **Chapters 7 - 19**, no further mitigation measures have been proposed with respect to cumulative effects during the operation of the proposed development.

17.5.2 Monitoring

17.5.1 Monitoring during Construction

Population

Traffic flows should be monitored to ensure that significant delays or congestion are not occurring in Arklow town due to diversions or construction traffic.

Regular proactive consultation should be undertaken with local businesses and a log of complaints/issues raised by stakeholders should be maintained and monitored throughout construction. Where practicable, residents and local businesses should be advised in advance on the timing of works to understand the effect on business turnover or population amenity.

Human Health

Other than the monitoring outlined in the respective **Chapters 7 - 10**, no further monitoring has been proposed with respect to human health effects during operation of the proposed development.

Cumulative

No monitoring has been proposed with respect to cumulative effects from construction of the proposed development.

17.5.2 Monitoring during Operation

Population

Monitoring of the volume of HGV movements to and from the WwTP is proposed. In other respects, the positive effect of the proposed development mitigates the need for further monitoring with regard to population effects from operation of the proposed development.

Human Health

No monitoring has been proposed with respect to human health effects from operation of the proposed development.

Cumulative

No monitoring has been proposed with respect to cumulative effects from operation of the proposed development.

17.6 Residual Effects

17.6.1 Residual Effects during Construction

17.6.1.1 Population

There will be a significant residual effect on local businesses such as cafes and restaurants that have a partial dependence on views of the river and amenity use.

In addition, residual effects on the amenity of people living beside the river and the proposed interceptor sewer is inevitable. These effects will be temporary in nature and will have been moderated by the implementation of the proposed mitigation.

17.6.1.2 Human Health

Other than some annoyance possible as a result of traffic disruption during the construction phase, which will be mitigated by the traffic management plan and some slight negative impact on the closest sensitive receptors due to construction noise, no likely residual effects on human health have been identified.

17.6.2 Residual Effects during Operation

17.6.2.1 Population

The provision of wastewater treatment in Arklow town will reactivate the potential for the economic and residential development providing a profound positive effect for the community and local economy.

The elimination, in so far as possible, of the discharge of untreated wastewater into the Avoca River will have a significant positive effect on water quality and recreational activities associated with the Avoca River, including general tourism and water sports. However, use of the river for direct contact recreation such as swimming may still be compromised by legacy contamination from historical mining that was undertaken in the upper catchment.

17.6.2.2 Human Health

No adverse effect during the construction phase on human health is predicted. Significant positive impacts in terms of public health and socio-economic benefits with resultant benefits for human health are predicted on the basis of having an efficient and adequate wastewater treatment facility.

17.7 References

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