



Environmental Impact Assessment Report (EIAR)

Volume 3 of 6: Environmental Assessment

(Chapter 15) Human Health

Document no: 32105801/EIARC15

Version: Final

December 2025

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Acronyms and Abbreviations

Acronym	Meaning
BPT	Break Pressure Tank
CBS	Community Benefit Scheme
CSO	Central Statistics Office
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EC	European Commission
EPA	Environmental Protection Agency
EU	European Union
FCV	Flow Control Valve
GDA	Greater Dublin Area
GIS	Geographic Information System
ha	Hectare
HGV	Heavy Goods Vehicle
HIA	Human Impact Assessment
HLPS	High Lift Pumping Station
HSE	Health Service Executive
IAIA	International Association for Impact Assessment
ICPT	Infection Prevention and Control Team
IEMA	Institute of Environmental Management and Assessment
IPH	Institute of Public Health Ireland
NEHS	National Environmental Health Service
NO ₂	Nitrogen dioxide
NSL	Noise Sensitive Location
OSI	Ordnance Survey Ireland
PM	Particulate matter
PSD	Pipe Storage Depot
RWI&PS	Raw Water Intake and Pumping Station
RWRM	Raw Water Rising Main
TPR	Termination Point Reservoir
WFD	Water Framework Directive
WHO	World Health Organization
WRZ	Water Resource Zone
WTP	Water Treatment Plant

15. Human Health

15.1 Introduction

1. This chapter reports the assessment of the likely significant effects of the Proposed Project on human health. In accordance with the requirements of the EIA Directive, it identifies, describes and assesses the likely significant effects resulting from the construction and operation of the Proposed Project.
2. This chapter sets out the methodology used, describes the existing population health baseline, examines the predicted effects of the Proposed Project, proposes mitigation measures and identifies residual effects. The assessment has been conducted in accordance with current relevant standards and with regard to current guidance.
3. Table 15.1 outlines the Proposed Project elements. A full description is provided in Chapter 4 (Proposed Project Description) in Volume 2 of this Environmental Impact Assessment Report (EIAR).

Table 15.1: Summary of the Proposed Project Infrastructure

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
Permanent Infrastructure	
Raw Water Intake and Pumping Station (RWI&PS) (Infrastructure Site) County Tipperary	<ul style="list-style-type: none"> • The RWI&PS would be located on a permanent site of approximately 4ha on the eastern shore of Parteen Basin in the townland of Garrynatineel, County Tipperary. In addition, approximately 1ha of land would be required on a temporary basis during construction. • The RWI&PS has been designed to abstract enough raw water from the River Shannon at Parteen Basin to provide up to 300Mld of treated water by 2050. • The RWI&PS site would include a bankside Inlet Chamber, the Raw Water Pumping Station Building, two Microfiltration Buildings, an Electricity Substation and Power Distribution Building, and Dewatering Settlement Basins. The tallest building on the RWI&PS site would be the Microfiltration Buildings which would be 10.9m above finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. • Power for the RWI&PS would be supplied via an underground connection to the existing Birdhill 38 kV electricity substation. • A new permanent access road from the R494 would be constructed to access the proposed RWI&PS site. This access road would be 5m in width and 670m in length. • The RWI&PS site boundary would be fenced with a stock proof fence and a 2.4m high paladin security fence 5m inside the boundary. The site would be landscaped in line with the surrounding environment to reduce its visual impact.
Raw Water Rising Mains (RWRMs) (Pipeline) County Tipperary	<ul style="list-style-type: none"> • The RWRMs would consist of two 1,500mm underground pipelines made from steel that would carry the raw water approximately 2km from the RWI&PS to the Water Treatment Plant (WTP) at Incha Beg, County Tipperary. The water would be pumped from the pumping station at the RWI&PS to the WTP. • Twin RWRMs have been proposed so that one RWRM can be taken out of service for cleaning and maintenance while still providing an uninterrupted flow of raw water through the other RWRM. • The RWRMs would include Line Valves, a Lay-By, Air Valves and Cathodic Protection. • A 20m wide Permanent Wayleave would provide Uisce Éireann with operational access to the RWRMs.

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
<p>Water Treatment Plant (WTP) (Infrastructure Site) County Tipperary</p>	<ul style="list-style-type: none"> The WTP would be located on a permanent site of approximately 31ha at Incha Beg, County Tipperary, 2.6km north-east of the village of Birdhill, and 2km east of the proposed RWI&PS. In addition, approximately 2.5ha of land would be required on a temporary basis during construction. The WTP would treat the raw water received from the RWI&PS via the RWRMs. Once treated, the High Lift Pumping Station (HLPS) would deliver the treated water onwards from the WTP to the Break Pressure Tank (BPT) at Knockanacree, County Tipperary, via the Treated Water Pipeline. The WTP would comprise of a series of tanks and buildings including the Raw Water Balancing Tanks, Water Treatment Module Buildings, Sludge Dewatering Buildings, Sludge Storage Buildings, Clear Water Storage Tanks and HLPS, an Electricity Substation and Power Distribution Building, and the Control Building. The tallest building on the WTP site would be the Water Treatment Module Buildings which would be up to 15.6m above finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. There would also be a potential future water supply connection point at the junction between the permanent access road and the R445. Power for the WTP would be supplied via an underground connection to the existing Birdhill 38 kV electricity substation. Solar panels would be placed on the roofs of the Chemical Dosing Manifold Building, the Water Treatment Module Buildings, Clear Water Storage Tanks and Sludge Storage Buildings, and at a number of locations on the ground to supplement the mains power supply. A new permanent access road from the R445 would be constructed and would be 6m in width and 640m in length. The WTP site boundary would be fenced with a stock proof fence and a 2.4m high palisade security fence 5m inside the boundary. The site would be landscaped in line with the surrounding environment to reduce its visual impact.
<p>Treated Water Pipeline from the WTP to the BPT (Pipeline) County Tipperary</p>	<ul style="list-style-type: none"> The Treated Water Pipeline from the WTP to the BPT would consist of a single 1,600mm underground steel pipeline which would be approximately 37km long. The water would be pumped through this section of the Treated Water Pipeline by the HLPS. The Treated Water Pipeline would include Line Valves, Washout Valves, Air Valves, Manways, Cathodic Protection and Lay-Bys. A 20m wide Permanent Wayleave would provide Uisce Éireann with operational access to the pipeline (this Wayleave has been extended to approximately 30m at some Line Valves to provide access between the Lay-Bys and Line Valves). There would be an additional 10m wide Permanent Wayleave at certain locations for operational access to smaller pipes connecting Washout Valves with permanent discharge locations.
<p>Break Pressure Tank (BPT) (Infrastructure Site) County Tipperary</p>	<ul style="list-style-type: none"> The BPT would be located on a permanent site of approximately 7ha in the townland of Knockanacree, County Tipperary. In addition, approximately 0.8ha of land would be required on a temporary basis during construction. The BPT would be located at the highest point of the pipeline. It marks the end of the Treated Water Pipeline from the WTP to the BPT and the start of the Treated Water Pipeline from the BPT to the Termination Point Reservoir (TPR) in the townland of Loughtown Upper, at Peamount, County Dublin. It would act as a balancing tank and would be required to manage the water pressures in the entire Treated Water Pipeline during flow changes, particularly during start-up and shut-down. The BPT site would include the BPT and a Control Building. The BPT would be a concrete tank divided into three cells covered with an earth embankment. The BPT tanks would be 5m in height and partially buried below finished ground levels. The Control Building would be 7.5m over finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. Access to the BPT site would be via a new permanent access road from the L1064 which would be 5m wide and 794m in length. Power for the BPT would be supplied via an underground connection from the existing overhead power line. Solar panels would be placed on the south facing side of the control building roof, on the BPT and at ground level to the south of the site to supplement the mains power supply. The BPT site boundary would be bounded by the existing hedgerow / tree line with a 2.4m high palisade security fence around the permanent infrastructure. The site would be landscaped in line with the surrounding environment to reduce its visual impact.

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
<p>Treated Water Pipeline from the BPT to the TPR (Pipeline) Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council)</p>	<ul style="list-style-type: none"> The Treated Water Pipeline from the BPT to the TPR would consist of a single 1,600mm underground steel pipeline, approximately 133km long. The water would normally travel through the Treated Water Pipeline by gravity; however, flows greater than approximately 165Mld would require additional pumping from the Booster Pumping Station (BPS) in the townland of Coagh Upper, County Offaly. The Treated Water Pipeline would include Line Valves, Washout Valves, Air Valves, Manways, Cathodic Protection, Lay-Bys and potential future connection points. A 20m wide Permanent Wayleave would provide Uisce Éireann with operational access to the pipeline (this Wayleave has been extended to approximately 30m at some Line Valves to provide access between the Lay-Bys and Line Valves). There would be an additional 10m wide Permanent Wayleave at certain locations for operational access to smaller pipes connecting Washout Valves with permanent discharge locations.
<p>Booster Pumping Station (BPS) (Infrastructure Site) County Offaly</p>	<ul style="list-style-type: none"> The BPS would be located on a permanent site of approximately 2.6ha in the townland of Coagh Upper, County Offaly. It would be located approximately 30km downstream from the BPT. In addition, approximately 3ha of land would be required on a temporary basis during construction. The BPS would be required when the demand for water causes the flow through the pipeline to exceed approximately 165Mld. The BPS site would consist of a single-storey Control Building with a basement below. It would have a finished height of 7.6m above finished ground level. There would also be a separate Electricity Substation and Power Distribution Building. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. Power to the BPS would be supplied from an existing 38 kV electricity substation at Birr, through cable ducting laid within the public road network. There would be ground mounted solar panels on the southern side of the BPS site to supplement the mains power supply. The site would be accessed directly from the L3003. The BPS site boundary would be fenced with a stock proof fence and a 2.4m high palisade security fence between 5m -12m inside the boundary. The site itself would be landscaped in line with the surrounding environment to reduce its visual impact.
<p>Flow Control Valve (FCV) (Infrastructure Site) County Kildare</p>	<ul style="list-style-type: none"> The FCV controls the flows in the Treated Water Pipeline from the BPT to the TPR. It would be a small permanent site of approximately 0.5ha in the townland of Commons Upper in County Kildare. In addition, approximately 0.6ha of land would be required on a temporary basis during construction. It would consist of three 700mm diameter FCVs and three flow meters installed in parallel with the Line Valve and housed within an underground chamber. Access to the FCV site would be directly off the L1016 Commons Road Upper. Power supply to the FCV site would be provided from the existing low voltage network via a combination of overhead lines and buried cables. There would be ground mounted solar panels on the north-eastern side of the site to supplement the mains power supply. Kiosks at the FCV site would house the Programmable Logic Controller, telemetry and power supply for the Line Valve. There would also be a telemetry mast, the top of which would be 14m above finished ground level. The site boundary would be fenced with a stock proof fence and a 2.4m high palisade security fence 5m inside the boundary.

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
<p>Termination Point Reservoir (TPR) (Infrastructure Site) County Dublin (within the administrative area of South Dublin County Council)</p>	<ul style="list-style-type: none"> The TPR would be located on a permanent site of approximately 8.3ha adjacent to an existing treated water reservoir in the townland of Loughtown Upper, at Peamount, County Dublin (within the administrative area of South Dublin County Council) and would have capacity for 75MI of treated water supply. In addition, approximately 1.1ha of land would be required on a temporary basis during construction. It would be located at the downstream end of the Treated Water Pipeline from the BPT to the TPR and would be the termination point for the Proposed Project. It would be at this location that the Proposed Project would connect to the existing water supply network of the Greater Dublin Area Water Resource Zone (GDA WRZ). The TPR would consist of an above-ground storage structure, associated underground Scour Water and Overflow Water tanks and a Chlorine Dosing Control Building. The TPR would be a concrete tank divided into three cells and covered with an earth embankment. The top of the TPR would be 11.2m above finished ground level. The Chlorine Dosing Control Building would be 8.4m over finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. Power for the TPR would be supplied via an underground connection to the existing electricity substation at Peamount Reservoir. There would be solar panels on top of a portion of the northern cell of the TPR to supplement the mains power supply. A new permanent access road from the R120 would be constructed and would be 5m wide and 342m in length. The TPR site would be bounded by the existing hedgerow to the west and existing fence to the east with a 2.4m high palisade security fence around the permanent infrastructure. The site itself would be landscaped in line with the surrounding environment to reduce its visual impact.
Proposed 38 kV Uprate Works – Power Supply to RWI&PS and WTP	
<p>Proposed 38 kV Uprate Works Ardnacrusha – Birdhill (Power Supply) Counties Clare, Limerick and Tipperary</p>	<ul style="list-style-type: none"> The proposed 38 kV Uprate Works would be necessary to deliver adequate electrical power to the RWI&PS and WTP. The proposed works would include the uprating of the existing Ardnacrusha – Birdhill Line and the replacement of polesets/structures with an underground cable along a section of the Ardnacrusha – Birdhill – Nenagh Line. There would also be works at the existing Birdhill 38 kV electricity substation including the provision of a new 38 kV modular Gas Insulated Switchgear Modular Building, new electrical equipment and lighting, together with new fencing and associated works.
Temporary Infrastructure – Required for Construction Phase Only	
<p>Construction Working Width Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council)</p>	<ul style="list-style-type: none"> A Construction Working Width would be temporarily required for the construction of the RWRMs and the Treated Water Pipeline, and the subsequent reinstatement of the land. The Construction Working Width would generally be 50m in width but would be locally wider near features such as crossings, access and egress points from the public road network, Construction Compounds and Pipe Storage Depots.
<p>Construction Compounds Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council)</p>	<ul style="list-style-type: none"> Eight Construction Compounds would be temporarily required to facilitate the works to construct the Proposed Project. Five Construction Compounds would be located along the route of the Treated Water Pipeline at the following Infrastructure Sites: RWI&PS, WTP, BPT, BPS and TPR, with an additional three Construction Compounds located at Lisgarraff (County Tipperary), Killananny (County Offaly) and Drummond (County Kildare). Construction Compounds would act as a hub for managing the works including plant/material/worker movement, general storage, administration and logistical support. The Principal Construction Compound at the WTP would require 30ha of land during construction. The other three Principal Construction Compounds would require land temporarily during construction ranging between approximately 12ha and 16ha. The four Satellite Construction Compounds at the other permanent Infrastructure Sites (excluding the FCV) would require land during construction ranging between approximately 3ha and 12ha.
<p>Pipe Storage Depots Counties Tipperary, Offaly and Kildare</p>	<ul style="list-style-type: none"> Nine Pipe Storage Depots would be temporarily required to supplement the Construction Compounds and would serve the installation of pipe between the WTP and the TPR. Pipe Storage Depots would take direct delivery of the pipe for storage before onward journey to the required location along the Construction Working Width. The Pipe Storage Depots would vary in size and require land temporarily during construction generally ranging between approximately 2ha and 7ha but with one site being larger at 11ha.

* Note all land-take numbers in this table are affected by rounding to one decimal place.

4. The construction of the Proposed Project is anticipated to run from 2028 through 2032, with the first operational year anticipated to be 2033. Construction duration is anticipated to last five years.
5. Since human health is interrelated with various other social, economic and environmental factors (see Section 15.2.1 and Image 15.1 regarding determinants of health) this chapter draws upon information from several other chapters of the EIAR. This chapter should be read in conjunction with the following chapters of this EIAR (Volume 3) and their appendices, which expand upon aspects of the Proposed Project of most relevance to the Human Health assessment.
 - Chapter 6 (Noise & Vibration)
 - Chapter 7 (Traffic & Transport)
 - Chapter 9 (Water)
 - Chapter 10 (Soils, Geology & Hydrogeology)
 - Chapter 11 (Agriculture)
 - Chapter 12 (Air Quality)
 - Chapter 13 (Climate)
 - Chapter 14 (Population)
 - Chapter 16 (Landscape & Visual)
 - Chapter 18 (Material Assets)
 - Chapter 19 (Resource & Waste Management)
 - Chapter 20 (Risk of Major Accidents and/or Disasters).
6. It is noted that Chapter 14 (Population) has considered the potential impacts on the surrounding population relating to factors such as economic activities, tourism, amenity and land use.
7. This chapter focuses on identifying the likely population health outcomes resulting from impacts on the social and biophysical environment, drawing on other assessments within the EIAR. The potential for beneficial population health outcomes is also addressed. Aspects examined in this chapter primarily relate to the plausible pathways by which the Proposed Project is considered to have likely significant effects on local community health.
8. The assessment reported in this chapter has considered the mitigation that has been embedded into the design to avoid or reduce environmental effects. Embedded mitigation is an intrinsic part of the Proposed Project design and therefore the assessment of effects assumes all embedded design measures are in place. Embedded mitigation relevant to this topic is included in Section 15.5.1.
9. This assessment has been undertaken and reported by a team of competent experts. Refer to Chapter 2 (The Environmental Impact Assessment Process) in Volume 2 of this EIAR for a description of the qualifications and expertise of the specialists that have inputted to this chapter.

15.2 Methodology

15.2.1 Key Concepts

10. Population and Human Health, as outlined in Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (the EPA Guidelines) (Environmental Protection Agency (EPA) 2022), is a broad ranging topic which covers the existence, activities and health of people, usually considering people as groups or 'populations'.

11. The proposed development has the potential to affect population and human health in several ways. Aspects examined in this chapter primarily relate to effects from the Proposed Project on socio-economic activities and on local community and population health. The potential effects on population and human health arising from traffic, visual effects, natural amenity, nuisance, built and natural heritage, air and noise emissions, water quality, land contamination and climate change, are dealt with in the specific chapters in this EIAR dedicated to those topics.
12. This assessment adopts the World Health Organization (WHO) constitution definition of 'health', which is 'a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity' (WHO 1948). Mental health is defined as a state of mental well-being that enables people to cope with the stresses of life, realise their abilities, learn well and work well, and contribute to their community (WHO 2022).
13. A range of factors influence health which are known as health determinants. These include an individual's characteristics and lifestyle choices, as well as wider determinants of health such as the social, economic and environmental conditions in which people live. Image 15.1 provides a conceptual illustration of health determinants.

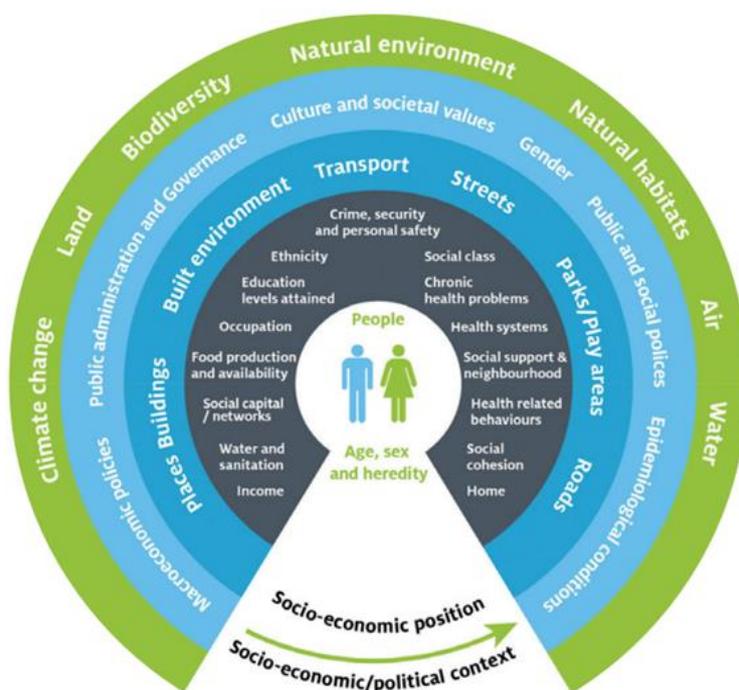


Image 15.1: Determinants of Health (From 'Healthy Ireland' (Department of Health 2013) Developed From Barton and Grant 2006; and Dahlgren and Whitehead 1991)

14. The assessment addresses effects on 'population health', which is defined as the health outcomes of a group of individuals, including the distribution of such outcomes within the group (Kindig and Stoddart 2003, as cited in Pyper *et al.* 2021). This is different from an assessment on individual (clinical) health status. The results of the assessment in this chapter cannot be used to infer how the Proposed Project may affect a specific individual's health status, since that is a personal matter requiring clinical expertise to interpret an individual's private medical history, genetics and personal circumstances, and may vary substantially from the average health of a defined population.

15.2.2 Scope of the Assessment

15. This assessment includes consideration of human health during the Construction Phase and Operational Phase of the Proposed Project. To aid the scoping process, a checklist of health determinants from the Institute of Public Health's Health Impact Assessment Guidance Manual (Pyper *et al.* 2021) was used in combination with the Institute of Environmental Management and Assessment (IEMA) Guide to Effective Scoping in Environmental Impact Assessment (EIA) (Pyper *et al.* 2022a). With regard to both guidance documents, the Human Health assessment has sought to ensure a proportionate scope. Health effects that are considered to be 'likely' and 'potentially significant' require further analysis and have been scoped in. Those issues that are judged to be 'not likely' or 'not significant' have been scoped out. Based on the scoping exercise (see Appendix A15.1: Scope of Health Determinants), the following health determinants are included in the scope of assessment:
- Biophysical environment
 - Air quality (construction dust and construction vehicle emissions during Construction Phase)
 - Water (drinking water and bathing water quality during Construction and Operational Phases)
 - Soil (including ground pollution and agricultural land during Construction Phase)
 - Noise and vibration (plant, processes and vehicle disturbance during Construction and Operational Phases)
 - Social environment
 - Open space, leisure and play (access and amenity of green and blue space and recreation during Construction Phase)
 - Community safety (disease vectors (vermin), injury risks during Construction Phase)
 - Economic environment
 - Employment and income (employment opportunities and impacts on farm businesses during Construction Phase)
 - Wider societal benefits
 - Water infrastructure (benefits of improved water supply infrastructure and a safe, secure and sustainable water supply during Operational Phase)
 - Economic benefits (related to resilient water supplies during Operational Phase)
 - Climate change (during Operational Phase).
16. The rationale behind scoping these determinants into the assessment is set out in Table A15.1 in Appendix A15.1 (Scope of Health Determinants), which also sets out the determinants that have been scoped out and the rationale behind those decisions.
17. The assessment draws on the conclusions from other topic assessments within the EIAR, as set out in Section 15.1. As such, where matters are scoped out of other assessments, they have not been considered in the assessment of human health. This includes:
- Gaseous pollutants from exhaust emissions from construction plant and machinery (as scoped out of the Air Quality assessment (see Section 12.2.1 in Chapter 12: Air Quality))
 - Air quality impacts from all operational activities except operational traffic (see Section 12.2.1 in Chapter 12: Air Quality)
 - Effects on air quality from the operation of the pipeline (see Section 12.2.1 in Chapter 12: Air Quality)
 - Vibration impacts during operation (see Section 6.2.1 in Chapter 6: Noise & Vibration).

18. Only the Commissioning Phase of the washouts, assessed as part of the Construction Phase in Section 15.4.2.3, has the potential for any human health effects from testing and commissioning activities. There would be no human health effects from testing and commissioning activities over and above those assessed for the Construction and Operational Phases in Sections 15.4.2 and 15.4.3. Therefore, as there is no potential for likely significant effects, any other testing and commissioning activities of the Proposed Project have been scoped out and have not been considered further in this assessment.
19. The Proposed Project would deliver nationally important strategic infrastructure with individual elements designed with a lifespan of 80 to 100 years. The strategic importance of the Proposed Project for water supply in the Eastern and Midlands Region is such that there is no plan to decommission these structures and Uisce Éireann is committed to maintaining and repairing them into the future. On this basis it is not likely that the structures will be decommissioned and therefore, decommissioning of the Proposed Project has not been considered further in this assessment.

15.2.3 Study Area

20. Health effects differ between geographical areas (Pyper *et al.* 2022a), therefore, it is appropriate to apply different study areas depending on the health determinant being assessed. The Human Health assessment has had regard to the populations within relevant geographic zones of influence, informed by the study areas applied in the topic assessments where relevant and a consideration of plausible source–pathway–receptor relationships. In this assessment, ‘receptor’ relates to the population with potential to receive a likely significant health impact from a change in health determinant caused by the Proposed Project.
21. Table 15.2 sets out the different study areas applied for the Human Health assessment along with a description of the spatial extents. The populations for each study area are broadly characterised in Section 15.3, while the assessment in Section 15.4 specifies the relevant receptor populations based on the analysis of the impact pathways to population health outcomes. The site-specific and regional study areas are indicated on Figure 15.1, with the local study areas being indicated on Figures 15.2 – 15.64 in Volume 5 of this EIAR.

Table 15.2: Geographic Scope of Human Health Assessment

Study Areas	Description of Study Area
Site-specific study area	Construction workers and/or other population groups within the Planning Application Boundary of the Proposed Project.
Local study area	Typically defined as the population up to 500m from the Proposed Project Infrastructure Sites and associated construction sites. 500m aligns with the study area set for community amenity within Chapter 14 (Population). 500m is a proportionate distance within which to capture receptors likely to be significantly affected by a number of environmental impacts from the Proposed Project such as air and noise emissions. It is a distance in which there is potential for regular interaction between people in local communities and the direct environmental impacts from the Proposed Project sites. This study area may be extended on a case-by-case basis for some health determinants where analysis of source–pathway–receptor relationships shows plausible likely significant health effects on populations further afield, for example in the case of bathing water quality where the study area may be extended to up to 5km downstream, in line with potential impacts on watercourses and the study area set out in Chapter 9 (Water).
Regional study area	Population within the counties in which the Proposed Project would coincide – Clare, Limerick, Tipperary, Offaly, Kildare and South Dublin (see Table 15.1 for list of Proposed Project Infrastructure which identifies the relevant county in which each element is located). While no infrastructure is proposed within County Laois, it is also included in the regional study area due to part of it being within 500m of the proposed Treated Water Pipeline from the BPT to the TPR. This study area captures administrative areas that are relevant for socio-economic health determinants, for example employment and local supply chains.
Wider society	Study area to be defined on a case-by-case basis to capture receptor populations that would be likely to be affected by impacts on aspects such as water security, food security and climate change resilience.

15.2.4 Relevant Guidelines, Policy and Legislation

22. This assessment has been prepared with regard to the following guidelines:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government 2018)
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022)
- European Commission (EC) Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (EC 2017)
- International Association for Impact Assessment (IAIA) and European Public Health Association Human Health: Ensuring a High Level of Protection. A reference paper on addressing Human Health in Environmental Impact Assessment (Cave *et al.* 2020)
- Institute of Public Health Ireland (IPH) Health Impact Assessment (HIA) Guidance Manual for Ireland and Northern Ireland (Pyper *et al.* 2021)
- IEMA Guide to Effective Scoping of Human Health in Environmental Impact Assessment (Pyper *et al.* 2022a)
- IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (Pyper *et al.* 2022b).

23. The assessment reported in this chapter has been prepared to meet the requirements of EIA legislation by focusing on likely significant effects. This is in line with guidelines listed in this section. The IPH updated its HIA Guidance Manual for Ireland and Northern Ireland in 2021¹. The Guidance Manual advises that *'Health can be integrated into other assessments and in so doing, the assessor can draw on the approaches and tools discussed in this guidance, particularly scoping'* (Pyper *et al.* 2021). It goes on to state that *'Compliance with statutory procedures is very important in environmental assessment. The Institute is clear that...EIA does not have to adopt all the HIA methods and tools discussed in this guidance'* (Pyper *et al.* 2021).

24. The IEMA Guide to Effective Scoping of Health in EIA (Pyper *et al.* 2022a) states that:

'The practice of a separate standalone HIA report being appended to the EIA Report to meet the EIA requirement is not recommended. This can result in inconsistencies or duplication, additional demand on public health stakeholder resources, less clearly secured health mitigation or enhancement measures, and lack of clarity as to how the EIA statutory requirements (assessment of likely significant effects) are met.' (paragraph 3.12)

25. The EPA Guidelines state, with regard to the EIA factor of human health, that the *'evaluation of effects on these [environmental] pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure or risk.'* (EPA 2022). The EPA Guidelines therefore consider human health in terms of environmental health issues and health protection. In terms of human health protection, the levels of emissions during the Construction or Operational Phase of the Proposed Project need to be assessed and compared against reliable health-based standards. Reliable sources of the standards may be regulatory such as the European Union (EU), as is the case with the Air Quality Standards, or based on expert opinion such as is provided by the WHO as is the case with the Environmental noise guidelines for the European Region (WHO Regional Office for Europe 2019).

¹ HIA is defined by the IAIA 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'* (Winkler *et al.* 2021).

26. Reference should be made to Chapter 6 (Noise & Vibration); Chapter 9 (Water); Chapter 10 (Soils, Geology & Hydrogeology); and Chapter 12 (Air Quality) for the relevant health-based standards and guidelines concerning issues such as noise, water quality (including drinking water standards), land contamination and air pollution respectively. The Human Health assessment has had regard to these health-based standards and guidelines when determining significance of health effects (see Section 15.2.7).
27. The EC Guidance on the preparation of the Environmental Impact Assessment Report (EC 2017) states:
- ‘Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population’ (footnotes on pages 37-38).*
28. The IEMA Guide to Effective Scoping of Human Health in EIA was published subsequently to the EPA Guidelines and is intended for use by EIA practitioners working in the UK and the Republic of Ireland. It adopts a broader consideration of health to capture wider health determinants that *‘span the bio-physical, social, behavioural, economic and institutional factors’* and provides a basis for scoping across these wider determinants of health. This Human Health assessment has been scoped against wider determinants of health and considers issues of health improvement, health services and health inequalities as well as health protection (see Appendix A15.1: Scope of Health Determinants).

15.2.5 Data Collection Methods

29. The Human Health assessment has primarily involved desk study. The desk study has been undertaken to:
- Establish the population health profile of the study areas
 - Understand the relevant health policy context
 - Establish the scientific evidence base for health outcomes associated with impacts on relevant health determinants.
30. The following sources of data have been used to inform the baseline health context.
- Central Statistics Office (CSO) small area Census 2022 statistics (CSO 2023)
 - 2022 Pobal HP deprivation index data for electoral divisions (Pobal 2023)
 - Ordnance Survey Ireland (OSI) mapping (OSI 2023)
 - Aerial imagery on the Geographic Information System (GIS) platform used for the Proposed Project
 - PRIME2 Geospatial data (OSI 2023)
 - Additional data sources as identified in Chapter 6 (Noise & Vibration), Chapter 7 (Traffic & Transport), Chapter 9 (Water), Chapter 10 (Soils, Geology & Hydrogeology), Chapter 12 (Air Quality), Chapter 13 (Climate), Chapter 14 (Population), Chapter 16 (Landscape & Visual), Chapter 18 (Material Assets), Chapter 19 (Resource & Waste Management), and Chapter 20 (Risk of Major Accidents and/or Disasters).

31. A literature review was undertaken to establish available evidence for links between infrastructure projects similar in nature to the Proposed Project and human health. The literature review has sought out peer-reviewed systematic reviews where available. Systematic reviews provide a summary of all the literature available on a particular topic which meet pre-defined eligibility criteria. These are more helpful as an evidence base as they synthesise the available research and help to reduce the overall level of bias, which may influence an individual research paper.
32. No specific site surveys have been undertaken to inform the Human Health assessment. However, the Human Health assessment draws on the findings of other topic chapters, many of which have involved field surveys.

15.2.6 Consultation

33. Consultation responses from key stakeholders, landowners and the public were reviewed and considered in compiling this chapter. Chapter 2 (The Environmental Impact Assessment Process) of this EIAR sets out the approach the Proposed Project has taken with regard to environmental scoping, in particular the EIAR Scoping Methodology Report (Uisce Éireann 2023) in respect of the Proposed Project and also the Environmental Impact Statement (EIS) Scoping Report² (Irish Water 2016) relating to a previous iteration of the project.
34. The scoping consultation responses relevant to human health received from stakeholders are provided in Table 15.3. Further detail on the Proposed Project consultation is included in Chapter 2 (The Environmental Impact Assessment Process) and responses received are in the Water Supply Project: Eastern and Midlands Region – Consultation Report, which forms part of the Strategic Infrastructure Development planning application for the Proposed Project.

Table 15.3: Principal Human Health Issues Raised During Scoping Consultation

Consultee	Consultation Stage	Comment	Response in EIAR
Health Service Executive (HSE)	Consultation on draft EIS Scoping Report (2016)	The National Environmental Health Service (NEHS) section of the HSE submission outlined that the EIAR should assess the significant impact on health, particularly food production businesses and healthcare facilities within 500m of the Proposed Project.	Potential impacts on health relating to food production businesses within 500m of the Proposed Project are addressed in relation to Community Safety in this chapter (Sections 15.3.8.2 and 15.4.2.6), while healthcare facilities are identified as sensitive population locations where relevant to the assessment of various health determinants. Chapter 14 (Population) considers food businesses and healthcare facilities in the context of accessibility and amenity.
		The concept of health gain should be incorporated into the EIAR. Healthy Ireland – the national policy should be consulted as a number of its key strategies incorporate the built environment. Community funding should also consider health gain.	The assessment addresses potential wider societal health gain from the provision of sustainable water supply. Proposals for the establishment of a Community Benefit Scheme (CBS) form part of the Planning Application documentation for the Proposed Project; however, this is not considered as a mitigation measure in regard to the EIAR. The CBS will work in collaboration with the hosting Local Authorities to support the funding of community initiatives aiming to encourage sustainable economic development, education and environmental protection and enhancement. The CBS could indirectly contribute to health gain through improvements in wider health determinants.

² As set out in Chapter 2 (The Environmental Impact Process), the Environmental Impact Statement Scoping Report (Irish Water 2016) was based on a previous iteration of the project, however, feedback received from stakeholders informed future scoping and design development and has been considered in this chapter where relevant to the Proposed Project.

Consultee	Consultation Stage	Comment	Response in EIAR
Health Service Executive (HSE)	Consultation on EIAR Scoping Methodology Report (2023)	The NEHS stated that clear established health protection standards and evaluation criteria for all emissions into the environment should be used as evaluation criteria prior to any professional judgement. For wider determinants of health, not specific to an emission into the environment, evaluation of significance should be based on authoritative guidance or standards, published research and/or sector and subject-specific methodologies and practices.	The assessment adopts the IEMA methodology for assessment criteria, which incorporates consideration of health protection standards, scientific research and other factors as set out in Table 15.6.
		The NEHS agreed that the assessment should be on a Population Health approach and assessed in a proportionate manner.	The Human Health assessment takes a Population Health approach and has aimed to be proportionate.
		It is beyond the scope of an EIA to evaluate precise dose response impacts on human health. The use of a health protection standard as evaluation criteria that has a dose response built into the standard would be the standard methodology for an EIA.	The Human Health assessment refers to existing health-based standards and applies criteria based on IEMA methodologies where appropriate.
		There are opportunities in the Proposed Project to enhance access to green space and development of recreational and community facilities that support social inclusion and positive mental health strategies.	Noted. Uisce Éireann has commenced discussions around potential community gains with affected local authorities. These relate to three focus themes under employment, education and environment, which are wider determinants of health. Proposals under these themes, including the funding and implementation approach, are still being developed.

35. This advice has been implemented in the Human Health assessment in this chapter of the EIAR.

15.2.7 Appraisal Method for the Assessment of Impacts

15.2.7.1 Impact Assessment Criteria

36. Impact assessment criteria have been adapted from the IEMA Guide to Determining Significance for Health in EIA (Pyper *et al.* 2022b). This guidance has been prepared for use by EIA practitioners working on projects in the UK and Republic of Ireland. It provides a framework of indicative criteria for making judgements on sensitivity, magnitude and significance for health assessment. The guidance states that the *'approach may be adapted depending on the generic EIA sensitivity and magnitude matrix used by the project'*. The framework of assessment criteria has therefore been adapted to align with the EPA Guidelines categories of sensitivity, magnitude and significance.

37. The assessment takes a population health approach. 'Population health' refers to the outcomes of a group of individuals, including the distribution of such outcomes within the group. The determination of sensitivity involves characterising the sensitivity for a defined population likely to be affected. The criteria for determining sensitivity are set out in Table 15.4. While the average local health circumstance across a defined population may be considered good, there may be groups of individuals within that defined population who are particularly sensitive and could experience disproportionate or differential effects. Where appropriate, the assessment has identified sub-populations and vulnerable groups (see Section 15.3.6) deemed likely to be more sensitive to a given impact.

Table 15.4: Human Health Sensitivity Criteria

Level	Indicative Criteria*
High	<ul style="list-style-type: none"> • High levels of deprivation (including pockets of deprivation) • Reliance on resources shared (between the population and the Proposed Project) • Existing wide inequalities between the most and least healthy • A community whose outlook is predominantly anxiety or concern • People who are prevented from undertaking daily activities • Dependants • People with very poor health status • People with a very low capacity to adapt.
Medium	<ul style="list-style-type: none"> • Moderate levels of deprivation • Few alternatives to shared resources • Existing widening inequalities between the most and least healthy • A community whose outlook is predominantly uncertainty with some concern • People who are highly limited from undertaking daily activities • People providing or requiring a lot of care • People with poor health status • People with a limited capacity to adapt.
Low	<ul style="list-style-type: none"> • Low levels of deprivation • Many alternatives to shared resources • Existing narrowing inequalities between the most and least healthy • A community whose outlook is predominantly ambivalence with some concern • People who are slightly limited from undertaking daily activities • People providing or requiring some care • People with fair health status • People with a high capacity to adapt.
Negligible	<ul style="list-style-type: none"> • Very low levels of deprivation • No shared resources; existing narrow inequalities between the most and least healthy • A community whose outlook is predominantly support with some concern • People who are not limited from undertaking daily activities • People who are independent (not a carer or dependant) • People with good health status • People with a very high capacity to adapt.

Adapted from the IEMA Guide to: Determining Significance for Human Health in Environmental Impact Assessment (Pyper *et al.* 2022b) with categories of sensitivity aligned to EPA Guidelines (EPA 2022) terminology.

* Judgement based on most relevant criteria – some criteria will span categories.

38. The magnitude criteria applied for the assessment are set out in Table 15.5. Long-term (15 years or greater), medium-term (seven to 15 years), short-term (one to seven years) and temporary (less than one year) effects are defined as per the EPA Guidelines (EPA 2022).

Table 15.5: Human Health Magnitude Criteria

Level	Indicative Criteria*
High	<ul style="list-style-type: none"> • High exposure or scale • Medium to long term duration • Continuous frequency • Severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/injury outcomes • Majority of population affected • Permanent change • Substantial service quality implications.
Medium	<ul style="list-style-type: none"> • Low exposure or medium scale • Temporary, short-term to medium-term duration • Frequent events • Severity predominantly related to moderate changes in morbidity or major change in quality of life • Large minority of population affected • Gradual reversal • Small service quality implications.
Low	<ul style="list-style-type: none"> • Very low exposure or small scale • Temporary duration (months to a year) • Occasional events • Severity predominantly related to minor change in morbidity or moderate change in quality of life • Small minority of population affected • Rapid reversal • Slight service quality implications.
Negligible	<ul style="list-style-type: none"> • Negligible exposure or scale • Momentary, brief or temporary duration (up to a few weeks) • One-off frequency • Severity predominantly relates to a minor change in quality of life • Very few people affected • Immediate reversal once activity complete • No service quality implication.

Adapted from the IEMA Guide to: Determining Significance for Human Health in Environmental Impact Assessment (Pyper *et al.* 2022b) with categories of magnitude aligned to EPA Guidelines (EPA 2022) terminology.

* Judgement based on most relevant criteria – some criteria will span categories.

39. The judgement of significance relies on an informed professional judgement about what is important, desirable or acceptable with regard to changes triggered by the Proposed Project. In arriving at a conclusion on significance for decision-making purposes, the assessor has considered the following interrelated questions:

- Is the impact important, desirable or acceptable in terms of public health?
- Is the impact important, desirable or acceptable in terms of the affected community's resilience, service provision and wellbeing?

40. The judgement of significance for EIA differs from the concept of statistical significance that is used in scientific research. Evidence-based medicine calls for statistical significance, for example the use of hypothesis testing, P-values or confidence intervals, to determine the likelihood of results being caused by chance. While a piece of health research may demonstrate a statistically significant association between an environmental exposure and a particular health outcome, this would not necessarily translate as significant in EIA terms as, for example, in the context of changes affected by the Proposed Development, the impact on population health may not be of a scale judged to be important to decision making.

41. The judgement of significance is guided by the matrix in Image 2.1 of Chapter 2 (The EIA Process) and has taken account of evidence in scientific literature, the baseline conditions for the population and communities affected, the health priorities of the study area, community concerns identified through consultation, regulatory standards and Ireland’s health and sustainable development policy context. For each conclusion of significance against impacts relating to the assessed health determinants, a reasoned statement is provided. The reasoned statement on significance is guided by the criteria in Table 15.6. It should be noted that not all criteria are relevant to every conclusion made. For decision-making purposes, a significant impact is one classed as ‘Significant’ or higher using the EPA significance classification categories. Impacts which are judged to be ‘Moderate’ or ‘Slight’ may become ‘Significant’ where several such impacts combine and interact on a single community. Such impacts are captured within the assessment where appropriate.
42. Defining the significance of health effects can be subjective, as it is human nature to assess any effect on oneself, family or friends as significant. However, the IEMA Guide to Determining Significance is clear that the assessment should be at population health level. It states that:

‘EIA analysis at the level of individuals would likely mean that all determinants of health conclusions, positive or negative, would be significant on all projects because of the effects to some particularly sensitive individuals. This would be contrary to supporting decision-makers in identifying the material issues. Assessment of EIA significance at the level of individuals is not proportionate’ (paragraph 5.2, Pyper et al. 2022b).

Table 15.6: Human Health Significance Criteria

Level	Indicative Criteria*
Profound	<p>The narrative explains that this is significant for public health because (select as appropriate):</p> <ul style="list-style-type: none"> • Changes, due to the Proposed Project, would compromise the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size (magnitude and sensitivity levels), and as informed by consultation themes among stakeholders, particularly public health stakeholders, that show consensus on the importance of the impact • Change, due to the Proposed Project, would result in a regulatory threshold or statutory standard being crossed (if applicable) • There is likely to be a substantial change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a causal relationship between changes that would result from the Proposed Project and changes to health outcomes • In addition, health priorities for the relevant study area are of specific relevance to the determinant of health or community affected by the Proposed Project.
Very Significant	<p>The narrative explains that this is significant for public health because (select as appropriate):</p> <ul style="list-style-type: none"> • Changes, due to the Proposed Project, have a substantial effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size (magnitude and sensitivity levels), and as informed by consultation themes among stakeholders, particularly public health stakeholders, that show broad consensus on the importance of the impact • Change, due to the Proposed Project, could result in a regulatory threshold or statutory standard being crossed (if applicable) • There is likely to be a sizeable change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a clear relationship between changes that would result from the Proposed Project and changes to health outcomes • In addition, health priorities for the relevant study area are of specific relevance to the determinant of health or community affected by the Proposed Project.

Level	Indicative Criteria*
Significant	<p>The narrative explains that this is significant for public health because (select as appropriate):</p> <ul style="list-style-type: none"> • Changes, due to the Proposed Project, have an influential effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size, and as informed by consultation themes among stakeholders, which may show mixed views • Change, due to the Proposed Project, could result in a regulatory threshold or statutory standard being approached (if applicable) • There is likely to be a small change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is good evidence of a relationship between changes that would result from the Proposed Project and changes to health outcomes • In addition, health priorities for the relevant study area are of general relevance to the determinant of health or community affected by the Proposed Project.
Moderate	<p>The narrative explains that this is not significant for public health because (select as appropriate):</p> <ul style="list-style-type: none"> • Changes, due to the Proposed Project, have a marginal effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size of limited policy influence and/or that limited relevant consultation themes emerge among stakeholders • Change, due to the Proposed Project, would be well within a regulatory threshold or statutory standard (if applicable); but could result in a guideline being crossed (if applicable) • There is likely to be a slight change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is some evidence of a relationship between changes that would result from the Proposed Project and changes to health outcomes • In addition, health priorities for the relevant study area are of partial relevance to the determinant of health or population group affected by the Proposed Project.
Slight	<p>The narrative explains that this is not significant for public health because (select as appropriate):</p> <ul style="list-style-type: none"> • Changes, due to the Proposed Project, have a marginal effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size of limited policy influence and/or that no relevant consultation themes emerge among stakeholders • Change, due to the Proposed Project, would be well within a regulatory threshold or statutory standard (if applicable); but could result in a guideline being crossed (if applicable) • There is likely to be a slight change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is only a suggestive relationship between changes that would result from the Proposed Project and changes to health outcomes • In addition, health priorities for the relevant study area are of low relevance to the determinant of health or population group affected by the Proposed Project.
Not Significant	<p>The narrative explains that this is not significant for public health because (select as appropriate)</p> <ul style="list-style-type: none"> • Changes, due to the Proposed Project, do not affect the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size or lack of relevant policy, and as informed by the Proposed Project having no responses on this issue among stakeholders • Change, due to the Proposed Project, would not affect a regulatory threshold, statutory standard or guideline (if applicable) • There is likely to be a very limited change in the health baseline of the population, including as evidenced by the effect size and/or lack of scientific literature showing any evidence of a relationship between changes that would result from the Proposed Project and changes to health outcomes • In addition, health priorities for the relevant study area are not relevant to the determinant of health or population group affected by the Proposed Project.
Imperceptible	<p>The narrative explains that this is not significant for public health because (select as appropriate)</p> <ul style="list-style-type: none"> • Changes, due to the Proposed Project, are not related to the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size or lack of relevant policy, and as informed by the Proposed Project having no responses on this issue among stakeholders • Change, due to the Proposed Project, would not affect a regulatory threshold, statutory standard or guideline (if applicable) • There is likely to be a very limited change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is an unsupported relationship between changes that would result from the Proposed Project and changes to health outcomes • In addition, health priorities for the relevant study area are not relevant to the determinant of health or population group affected by the Proposed Project.

Adapted from the IEMA Guide to: Determining Significance for Human Health in Environmental Impact Assessment (Pyper *et al.* 2022b) with categories of significance aligned to EPA Guidelines (EPA 2022) terminology.

* Judgement based on most relevant criteria – some criteria will span categories

15.2.8 Construction Flexibility

43. At this stage of the development of the Proposed Project there are a number of points of detail which cannot be finalised. This is due to factors such as unknown site constraints or obstacles that may affect the construction of the permanent infrastructure. Although a high level of ground investigation has been obtained to inform the planning application for the Proposed Project, further site investigations will be undertaken following grant of planning permission. This will inform a confirmed design for construction. This is a standard delivery approach and as a result, for a linear project of this nature, scale and complexity, it is typical that a level of construction flexibility is required. This flexibility in construction is necessary to provide a mechanism to overcome these matters during the later stages of the Proposed Project. The elements which are subject to construction flexibility are summarised in Table 15.7 and this also explains how this flexibility has been accounted for within the assessment reported in this chapter. Chapter 4 (Proposed Project Description) and Chapter 5 (Construction and Commissioning) in Volume 2 of this EIAR provides further detail.
44. The construction works necessary to deliver the permanent design (including the construction flexibility defined in Table 15.7) would take place within the Construction Working Width which defines the extent of the Planning Application Boundary. For the assessment reported in this EIAR this means that the construction works could take place anywhere within the Construction Working Width.
45. The assessment reported in this chapter has taken account of this construction flexibility and assessed all the likely significant effects that could arise. For this assessment, the likely significant effects reported in this chapter would not change regardless of the alignment or location of infrastructure elements within the defined construction flexibility in Table 15.7 (i.e. the difference in effects would be imperceptible for the purpose of the assessment).

Table 15.7: Definition of Construction Flexibility

Design Element	Construction Flexibility	How this has been Applied / Assessed in this Chapter
Pipeline	Treated Water Pipeline and RWRMs horizontal alignment – to allow for construction flexibility to overcome site constraints or obstacles the pipeline could be anywhere within a 20m Pipeline Corridor as defined in Chapter 4 (Proposed Project Description).	For this Human Health assessment, the assessment parameters applied include maximum allowable emissions from the Construction Phase and the Operational Phase of the Proposed Project. This would include maximum dimensions or volumes associated with particular activities, assumptions on the maximum emissions predicted, particularly due to machinery during the Construction Phase or emissions to air due to the presence of more Heavy Goods Vehicles (HGVs) on public roads as described in Chapter 6 (Noise & Vibration) and Chapter 12 (Air Quality) in Volume 3 of this EIAR, assumptions around the percentage on-time for construction activities, distance to receptor populations and assumptions of construction activities or impacts occurring at the same time.
Pipeline	Treated Water Pipeline vertical alignment – to allow construction flexibility to overcome site constraints or obstacles, the vertical alignment of the pipeline could vary between 1.2m and 4.4m to the crown of the pipe. Exceptions would be at proposed trenchless crossing locations (which due to the construction approach would be deeper than 4.4m to crown) and where it has been identified that for hydraulic purposes, the crown of the pipeline would need to be deeper than 4.4m. These have been included in the vertical alignment set out in the Planning Application for the Proposed Project and consequently have been assessed for significant environmental effects as reported in this EIAR. These include e.g. TWB 27100 - 27700 and TWC 2600 - 2750. In these instances, the construction flexibility would be the crown of the pipe not being deeper than that shown in the Planning Application Drawings and not shallower than 1.2m. The excavation needed for the pipeline is assumed to be the largest needed for the lowest vertical parameter set out.	
Valves	The location of valves, and associated pipeline features, that need to be above the pipeline could change if there is a change in the vertical or horizontal alignment of the pipeline, as a result of the construction flexibility defined in the two rows above. The construction flexibility would allow them to move within the 20m Pipeline Corridor. However, the location of these pipeline features would be limited to remaining within the land parcels as identified and assessed within the EIAR (but still remaining within the 20m Pipeline Corridor).	
Outfall connections	To construct the smaller connection pipes between washout valves and washout outfalls, a small amount of construction flexibility would be required to overcome onsite obstacles or constraints. To allow for this, the connecting pipe could be anywhere within a 10m corridor.	
Outfall locations	The outfall headwalls and discharge point would have to move with the alignment of the outfall pipeline, as set out above, and so the discharge point could move within the same 10m construction flexibility. To allow for the headwalls to move 10m either side of the current pipeline alignment, a total construction flexibility width of 20m has been allowed for the headwalls.	

15.2.8.1 Variation in Construction Methods

46. In addition to the construction flexibility defined in Table 15.7 there may also be the potential for variation in the method of construction to be used to build the Proposed Project. This variation would be necessary to deal with, for example, uncertainties in ground conditions or on-site constraints. Chapter 5 (Construction & Commissioning) includes further detail on these, including the reasoning why different techniques may be required. This could include:

- Use of raft foundations or concrete piled foundations at the WTP
- Use of auger bore or pipe jacking for trenchless crossings
- Using trenchless crossing or open excavation for the crossing of low voltage power lines
- Different construction techniques for working in poor ground include peat materials.

47. The assessment reported in this chapter has been based on any of these construction techniques being adopted.

48. In addition, as set out in Appendix A5.3 (Methods of Working in Peat) in Volume 6 of this EIAR, four slightly different methods for constructing the pipeline in areas of peat soils have been defined. To allow for variation in ground conditions it has been assumed for the purpose of the assessment reported in this EIAR that either Method 2, 3 or 4 could be used in areas where the depth of peat is greater than 1m. Where the depth of peat is less than 1m, Method 1 is proposed to be used and it is not expected that there would be any deviation from this methodology. The environmental effects from Methods 2, 3, and 4 would be similar. However, Methods 3 and 4 would result in additional permanent infrastructure in the form of stone pillars (Method 3) or piled supports (Method 4) below the pipeline. Consequently, Method 4 would require piling and as such, would have a slighter greater environmental impact. Therefore, the EIAR is based on the application of Method 4 where the depth of peat is greater than 1m. However, in areas where Methods 2, 3, or 4 could be used, the environmental assessment has considered whether these different methods would result in different likely significant effects and therefore the assessment reported in this chapter has identified the likely significant effects from any of the three techniques. For this assessment, the likely significant effects reported in this chapter would not change regardless of the working in peat method used (i.e. the difference between the methods would be imperceptible for the purpose of the assessment). This is in line with the conclusions of other topic chapters which have informed this assessment.

15.2.9 Difficulties Encountered in Compiling Information

49. There are difficulties in estimating the level of exposure of a defined population to impacts for certain health determinants. For example, it is difficult to ascertain what proportion of their lives each individual within a given population spends in a place that is exposed to the impact and also whether individuals have been exposed to other factors also associated with a given health outcome. It is also difficult to estimate exposure due to the nature of environmental assessment results yielded by the industry standard guidelines applied for various environmental topics. Any such uncertainty is set out in the assessment reported in Section 15.4.

50. The availability of health data in some cases is limited either due to the geographic scale, or the timescale that it covers. For example, the county health profiles available from Lenus are now relatively dated (2015)³, therefore other sources of health data, including most recent census data, have been sought to supplement and update the understanding of health issues within relevant counties. The nature of limitations, as relevant to specific baseline data, is explained in Section 15.4.

51. The information that has informed the assessment is sufficient to identify the likely significant effects. The limitations described in this chapter are not considered to have a material impact on the assessment conclusions because the assessment has been based on suitable and sufficient information and reasonable and robust assumptions.

15.2.10 Cumulative Effects Assessment

52. As noted in Chapter 2 (The Environmental Impact Assessment Process), intra-project cumulative effects are described within respective topic chapters, while inter-project cumulative effects are described in Chapter 21 (Cumulative Effects & Interactions). The EIA Directive includes the consideration of existing projects within the cumulative effects assessment, and this is addressed through a consideration of the incremental impact of the Proposed Project within the context of the existing baseline as described, and where applicable, the carrying capacity of the environment.

³ <https://www.lenus.ie/>

53. Human health can be impacted from multiple sources. Intra-project effects of note in relation to human health include water quality impacts, noise impacts, air quality impacts including dust emissions, contaminated land, and socio-economic impacts. Consideration of these intra-project effects is an integral part of assessing the effect on human health. The assessment of effects on human health has therefore been informed by relevant information collated by other environmental topics, notably the EIAR chapters set out in Section 15.1. These intra-project effects for human health are also summarised in Chapter.

15.3 Baseline Environment

15.3.1 Introduction

54. The following baseline section provides information on the expected population groups present in the site-specific study area, the local study area and the regional study area. It goes on to describe the baseline in relation to the health determinants scoped into the assessment. Evidence from the literature review of links between health determinants and certain health outcomes are included in this section to set out the health context for the issues identified.

15.3.2 Site-Specific Study Area Population

55. The Planning Application Boundary for the Proposed Project is generally confined to agricultural land and roads, therefore, there is generally a very limited baseline site-specific residential population. The exception is a small number of individuals who live in residential properties that are within the boundary for the upgrade works to the Ardnacrusha to Birdhill 38 kV Line and four residences that overlap with some sections of the Planning Application Boundary. These are nine properties total in the following locations:

- Blackwater, County Clare (one property)
- Ardnatagle, County Clare (one property)
- O'Briensbridge–Montpelier, County Limerick (two properties)
- Fairy Hall, County Limerick (one property)
- Dromintobin North, County Clare (one property)
- Clonoghil Upper, County Offaly (one property)
- Ballyannymore, County Tipperary (one property)
- Kilmastulla, County Tipperary (one property).

56. The baseline context for these individuals is that they are already living in proximity to the existing Ardnacrusha to Birdhill overhead electrical line and associated polesets. The locations are all relatively rural (hamlets or villages). Based on the average household occupancy for Ireland (2.74 according to the 2022 census), the baseline site-specific population is estimated to be under 25 people. While it is not feasible to apply statistical health data to such a small population, the site-specific population is assessed as having high sensitivity based on the reliance on shared resources with the Proposed Project (i.e. land and access) and a likelihood that they would be highly conscious of works taking place within 50m of their homes.

57. Approximately 70% of the land within the Planning Application Boundary of the Proposed Project is owner occupied, with the rest being leased or rented on an array of tenancy agreements. The majority of this land is farmed conventionally with fewer than 10 holdings recorded as being farmed organically. In addition, some lands are owned by state and private forestry companies, and Bord na Móna. The total number of agricultural parcels directly intersected by the Planning Application Boundary for the Proposed Project is 451. The farming community is therefore relevant in terms of the site-specific study area as this is the population most likely to be impacted on by the route of the Proposed Project (see Section 15.3.6).

15.3.3 Local Study Area

58. Based on GIS analysis of PRIME2 data (OSI 2023), there are 2,666 residential properties within the local study area (i.e. within 500m of the application site). Based on the average household occupancy for Ireland, this would equate to approximately 7,305 people. The number of residential properties within each county in the local study area, with the estimated population, is set out in Table 15.8.

Table 15.8: Estimated Residential Population in Local Study Area

County	Number of Residential Properties in Local Study Area	Estimated Population ¹
Clare	503	1,378
Kildare	452	1,238
Limerick	98	269
Offaly	906	2,482
South Dublin	88	241
Tipperary	619	1,696
Local study area total	2,666	7,305²

¹ Crudely calculated by multiplying the number of properties with the national average household occupancy of 2.74

² Calculated using the local study area total number of properties multiplied by the national average household occupancy of 2.74 rather than a total for the estimated population column.

59. The distribution of residential properties is indicated on Figures 15.2 – 15.64 in Volume 5 of this EIAR. Pobal HP Deprivation Index data for the electoral divisions which overlap the local study area are all either marginally above or marginally below average socio-economic status, with the exception of three, which show as 'disadvantaged' (see Figures 15.22, 15.23, 15.33, 15.50, 15.51, 15.52 and 15.53) for disadvantaged electoral divisions in the local study area). Two of these disadvantaged electoral divisions (both within County Offaly), have no residential properties within the local study area therefore no population receptor with potential to be affected. However, one of them, within County Kildare, encompasses several residential properties in the Killinagh Lower area (R403 and surrounding lanes, see Figure 15.52 and 15.53). This indicates a population of high sensitivity due to it being a pocket of deprivation. The wider population in the study area is assessed as medium sensitivity based on consideration of the county health profiles (see Section 15.3.4) and the likelihood that this population will likely share some resources (i.e. access routes, local facilities) that would potentially be affected by the Proposed Project (see Table 15.4 for criteria to inform judgement of population sensitivity).
60. There are three educational facilities within the local study area. Scoil Náisiúnta Ard Croine in Ardcroney, Tipperary (see Figure 15.16) is a primary school with 133 pupils enrolled (Department of Education 2025). It is located approximately 400m from the Planning Application Boundary. Shinchill (Killeigh) National School (see Figure 15.39) is a primary school in Killeigh, Offaly, which has 292 children enrolled (Department of Education 2025). It is approximately 360m from the Planning Application Boundary. The Peamount Education (Training) Centre located on R120 Keeloges, Lucan in Dublin (see Figure 15.64) is part of Peamount Healthcare and provides a variety of healthcare training courses for its workforce. It is located approximately 210m from the Planning Application Boundary. The population groups using these facilities are assessed as high sensitivity since they include children (dependants) and healthcare workers who provide care to vulnerable groups.
61. There are five healthcare facilities identified in the local study area. Ashlawn House Nursing Home in Carrigatoher, Nenagh, County Tipperary (see Figure 15.11), is a 29-bed nursing home which also has a separate Alzheimer-related-illness unit for up to 12 residents (Ashlawn House 2025). The Peamount Hospital complex includes various healthcare facilities (see Figure 15.64), including the aforementioned Peamount Education (Training) Centre. Other facilities on the Peamount Road complex, are Peamount Clinic, a Health Centre and a Nursing Home. The complex provides a variety of residential services,

rehabilitation and community healthcare services. It provides 50 beds for older persons' residential care, 15 beds for people with neurological disabilities (St. Brigid's Neuro Disability Unit) and supports 85 people with intellectual disabilities (both on campus and within the community) (Peamount Healthcare 2025). The Peamount Healthcare complex is assessed as a site of high sensitivity due to its vulnerable and dependent population with low capacity to adapt. The site abuts the Planning Application Boundary at the proposed TPR location.

15.3.4 Regional Study Area

62. Health, deprivation and disability data from the census 2022 (CSO 2023) and Pobal HP Deprivation Index (Pobal 2023) have been used to develop updated county-level population health profiles for each of the counties in the regional study area and to establish the average health sensitivity for the county populations. The criteria to help inform the judgement of sensitivity are set out in Table 15.4. Among the criteria are whether there are dependants. Dependants are defined for statistical purposes as people outside the normal working age of 15–64. Dependency ratios are used to give a useful indication of the age structure of a population with young (0–14) and old (65+) shown as a percentage of the population of working age (15–64). For the whole of Ireland at the 2022 census, the age dependency ratio was 53.2% (CSO 2023).

15.3.4.1 Clare County Health Profile

63. The Health Profile relating to Clare County includes the following:

- The total population is 127,938 of which a relatively high proportion is aged 65 and over (16.9%) compared to the national average (15.1%). A lower proportion of the population (12.2%) is aged under 15 years compared to the national average of 13%, while the age dependency ratio for Clare is 57.4% which is higher than the national average of 53.2% (CSO 2023)
- The socio-economic status of Clare's population is classed as marginally above average with a Pobal HP Index of 0.11 (Pobal 2023). The electoral divisions surrounding the Planning Application Boundary in Clare also have levels of deprivation above the average
- Around 83% of the population have 'good' or 'very good' health and 1.8% of the population has 'bad' or 'very bad' health. This is similar to the national average
- The largest cause of death was cancer, and there was a higher proportion of deaths related to respiratory system disease (12.3%, compared to 10.5% nationally)
- The County has similar proportions of people living with a disability compared to the national average, with 7.9% of the population with a disability to a great extent, 13.4% with a disability to some extent and 21.3% with a disability to any extent. This is compared to 7.9%, 13.6% and 21.5%, respectively, for the national figures
- The proportion of carers in Clare is similar to the national average overall, at 6.4% compared to 5.8% nationally. However, a higher proportion of females are carers in Clare compared to the national average.

64. Based on these indicators, the population of Clare is assessed to be of low-medium sensitivity, guided by the criteria in Table 15.4.

15.3.4.2 Tipperary County Health Profile

65. The Health Profile relating to Tipperary County includes the following:

- The total population is 167,895 of which a relatively high proportion is aged 65 and over (17.5%) compared to the national average (15.1%), but a similar proportion is aged under 15 years (13.2%). The age dependency ratio for Tipperary is 59.5% which is higher than the national average

- The socio-economic status of Tipperary's population is classed as marginally below average with a HP Index of -1.92 (Pobal 2023). The electoral divisions surrounding the Planning Application Boundary in Tipperary all have levels of deprivation marginally above or below the average
- Around 83% of the population have 'good' or 'very good' health and 1.9% of the population has 'bad' or 'very bad' health. This is similar to the national average
- The largest cause of death was cancer and there was a lower proportion of deaths related to 'all other causes' (27.8%, compared to 29.1% nationally)
- The County has higher proportions of people living with a disability compared to the national average, with 9.0% of the population with a disability to a great extent, 14.0% with a disability to some extent and 23.0% with a disability to any extent. This is compared to 7.9%, 13.6% and 21.5%, respectively, for the national figures
- The proportion of carers in Tipperary is similar to the national average overall, at 6.3% compared to 5.8% nationally. However, a higher proportion of females are carers in Tipperary compared to the national average and the lone parent ratio (20%) is higher than the national average (17%).

66. Based on these indicators, the population of Tipperary is assessed to be of medium sensitivity, guided by the criteria in Table 15.4.

15.3.4.3 Offaly County Health Profile

67. The Health Profile relating to Offaly County includes the following:

- The total population is 83,150 of which a slightly higher proportion is aged 65 and over (15.6%) compared to the national average (15.1%), while 13.6% of the population are aged under 15 years. The age dependency ratio for Offaly is 56.8% which is higher than the national average
- The socio-economic status of Offaly's population is classed as marginally below average with a HP Index of -3.95 (Pobal 2023). The electoral divisions surrounding the Planning Application Boundary in Offaly mostly have levels of deprivation marginally above or below the average; however, there are two electoral divisions considered disadvantaged
- 83% of Offaly's population reported 'good' or 'very good' general health in the census which was similar to the national average. A higher proportion (2.1%) of Offaly's population reported 'bad' or 'very bad' health compared to the national average, 1.7%
- The largest cause of death was 'all other causes' (31.6%, compared to 29.1% nationally) and there was a lower proportion of deaths related to respiratory system disease (7.7%, compared to 10.5% nationally)
- The County has higher proportions of people living with a disability compared to the national average, with 9.0% of the population with a disability to a great extent, 13.6% with a disability to some extent and 22.6% with a disability to any extent. This is compared to 7.9%, 13.6% and 21.5%, respectively, for the national figures
- The proportion of carers in Offaly is similar to the national average overall, at 6.4% compared to 5.8% nationally. However, a higher proportion of females are carers in Offaly compared to the national average and the lone parent ratio (18%) is higher than the national average (17%).

68. Based on these indicators, the population of Offaly is assessed to be of medium sensitivity, guided by the criteria in Table 15.4.

15.3.4.4 Laois County Health Profile

69. The Health Profile relating to Laois County includes the following:

- The total population is 91,877 of which a relatively low proportion is aged 65 and over (13.0%) compared to the national average (15.1%), while 14.7% is aged under 15 years, which is higher than the national average (13%). The age dependency ratio for Laois is 54.4% which is similar to the national average of 53.2%
- The socio-economic status of Laois's population is classed as marginally below average with a HP Index of -2.02 (Pobal 2023). Several electoral divisions surrounding the Planning Application Boundary in Laois also have levels of deprivation below the average
- Around 83% of the population have 'good' or 'very good' health and 1.8% of the population has 'bad' or 'very bad' health. This is similar to the national average
- The largest cause of death was cancer, and there was a higher proportion of deaths related to cancer (30.8%, compared to 29.0% nationally)
- The County has similar proportions of people living with a disability compared to the national average, with 8.4% of the population with a disability to a great extent, 13.5% with a disability to some extent and 21.9% with a disability to any extent. This is compared to 7.9%, 13.6% and 21.5%, respectively, for the national figures
- The proportion of carers in Laois is similar to the national average overall, at 6.0% compared to 5.8% nationally. However, a higher proportion of females are carers in Laois compared to the national average.

70. Based on these indicators, the population of Laois is assessed to be of medium sensitivity, guided by the criteria in Table 15.4.

15.3.4.5 Limerick County Health Profile

71. The Health Profile relating to Limerick County includes the following:

- The total population is 209,536 of which a relatively high proportion is aged 65 and over (16.0%) compared to the national average (15.1%). A higher proportion of the population (18.8%) is aged under 15 years compared to the national average of 13%, while the age dependency ratio for Limerick is 53.5% which is similar to the national average of 53.2%
- The socio-economic status of Limerick's population is classed as marginally below average with a Pobal HP Index of -0.83 (Pobal 2023). However, the electoral division in proximity to the Planning Application Boundary in Limerick has a level of deprivation that is marginally above the average
- Around 80% of the population have 'good' or 'very good' health and 1.9% of the population has 'bad' or 'very bad' health. This is similar to the national average
- The largest cause of death was cancer, and there was a higher proportion of deaths related to respiratory system disease (12.6%, compared to 10.5% nationally)
- The County has higher proportions of people living with a disability compared to the national average, with 8.8% of the population with a disability to a great extent, 13.8% with a disability to some extent and 22.6% with a disability to any extent. This is compared to 7.9%, 13.6% and 21.5%, respectively, for the national figures
- The proportion of carers in Limerick is the same as the national average overall at 5.8%.

72. Based on these indicators, the population of Limerick is assessed to be of low-medium sensitivity, guided by the criteria in Table 15.4.

15.3.4.6 Kildare County Health Profile

73. The Health Profile relating to Kildare County includes the following:

- The total population is 247,774 of which a slightly lower proportion is aged 65 and over (12.0%) compared to the national average (15.1%), while 14.3% of the population is aged under 15 years which is higher than the national average (13%). The age dependency ratio for Kildare is 50.5% which is lower than the national average
- The socio-economic status of Kildare's population is classed as marginally above average with a HP Index of 3.11 (Pobal 2023). The electoral divisions surrounding the Planning Application Boundary in Kildare mostly have levels of deprivation marginally above or below the average; however, there is one electoral division considered disadvantaged
- A higher proportion of the population of Kildare have 'good' or 'very good' health compared to the national average (86.0%, compared to 82.9%) while 1.5% reported 'bad' or 'very bad' health (compared to 1.7% nationally)
- The largest cause of death was cancer and a higher proportion (31.1%) of deaths was related to this cause compared to 29.0% nationally
- The County has lower proportions of people living with a disability compared to the national average, with 7.1% of the population with a disability to a great extent, 13.3% with a disability to some extent and 20.4% with a disability to any extent. This is compared to 7.9%, 13.6% and 21.5%, respectively, for the national figures
- The proportion of carers in Kildare is similar to the national average overall, at 5.3% compared to 5.8% nationally.

74. Based on these indicators, the population of Kildare is assessed to be of low sensitivity, guided by the criteria in Table 15.4.

15.3.4.7 South Dublin County Health Profile

75. The Health Profile relating to South Dublin County includes the following:

- South Dublin has a lower proportion of population aged 65 and over (13.2%) compared to the national average (15.1%). It has a higher than national average proportion aged under 15 years (14.1%) and the age dependency ratio for South Dublin is 52.6% which is similar to the national average of 53.2%
- The socio-economic status of South Dublin's classed as '*marginally above average*' with a HP Index of 2.69 for the entire county of Dublin (no data are available for South Dublin specifically). The electoral divisions surrounding the Planning Application Boundary in South Dublin mostly have levels of deprivation marginally above or below the average
- 83% of South Dublin's population reported 'good' or 'very good' health (national average 83%), while 1.8% reported 'bad' or 'very bad' health (compared to the national average of 1.7%)
- The largest cause of death was cancer and there was a higher proportion of deaths related to this cause (32.5%, compared to 29.0% nationally). South Dublin also had the highest cancer incidence rates with 1.35% of the population having invasive cancer (minus non-melanoma skin cancer), compared to 0.5% nationally
- The County also has similar proportions of people living with a disability compared to the national average, with 7.6% of the population with a disability to a great extent, 13.5% with a disability to some extent and 21.1% with a disability to any extent. This is compared to 7.9%, 13.6% and 21.5%, respectively, for the national figures
- The proportion of carers in South Dublin is similar to the national average overall, at 5.5% compared to 5.8% nationally. However, the lone parent ratio (21%) is higher than the national average (17%).

76. Based on these indicators, the population of South Dublin is assessed to be of low-medium sensitivity, guided by the criteria in Table 15.4.

15.3.5 Wider Society

77. The Operational Phase of the Proposed Project is designed to provide a sustainable water supply to the Greater Dublin Water Supply Zone. Therefore, the health profiles of local authorities within the GDA have been considered to provide part of the health context for wider societal benefits.

15.3.5.1 Dublin City Health Profile

78. The Health Profile relating to Dublin City includes the following:

- The total population is 592,713 of which a relatively low proportion is aged 65 and over (13.4%) compared to the national average (15.1%), while the percentage aged under 15 years is 10.0%. The age dependency ratio for Dublin is 39.5% which is lower than the national average of 53.2%
- The socio-economic status of Dublin's population is classed as '*marginally above average*' with a HP Index of 2.69 for the entire county of Dublin (no data are available for Dublin City specifically)
- Around 75.8% of Dublin's population have 'good' or 'very good' health and 2.0% of the population have 'bad' or 'very bad' health. This is comparatively worse than the national average with 82.9% having 'good' or 'very good' health and 1.7% of the population having 'bad' or 'very bad' health
- The largest cause of death was 'all other causes' and there was a lower proportion of deaths related to cancer, respiratory and circulatory system diseases, compared to the national average
- Dublin has similar proportions of people living with a disability compared to the national average, with 8.0% of the population with a disability to a great extent, 14.0% with a disability to some extent and 22.0% with a disability to any extent. This is compared to 7.9%, 13.6% and 21.5%, respectively, for the national figures
- The proportion of carers in Dublin is lower than the national average overall, at 4.9% compared to 5.8% nationally.

79. Based on these indicators, the population of Dublin City is assessed to be of low-medium sensitivity, guided by the criteria in Table 15.4.

15.3.5.2 Fingal County Council Health Profile

80. The Health Profile relating to Fingal County includes the following:

- The total population is 330,506 of which a relatively low proportion is aged 65 and over (11.1%) compared to the national average (15.1%), while the proportion aged under 15 years is 14.7%. The age dependency ratio for Fingal is 50.3% which is slightly lower than the national average of 53.2%
- The socio-economic status of Dublin's population is classed as '*marginally above average*' with a HP Index of 2.69 for the entire county of Dublin (no data are available for Fingal specifically)
- Around 84.2% of Fingal's population have 'good' or 'very good' health and 1.4% of the population have 'bad' or 'very bad' health. This is slightly better than the national average with 82.9% having 'good' or 'very good' health and 1.7% of the population having 'bad' or 'very bad' health
- Cancer and 'all other causes' both represented a higher proportion of deaths compared to the national average
- Fingal has lower proportions of people living with a disability compared to the national average, with 6.2% of the population with a disability to a great extent, 12.4% with a disability to some extent and 18.6% with a disability to any extent. This is compared to 7.9%, 13.6% and 21.5%, respectively, for the national figures

- The proportion of carers in Fingal is slightly lower than the national average overall, at 5.2% compared to 5.8% nationally.

81. Based on these indicators, the population of Fingal is assessed to be of low sensitivity, guided by the criteria in Table 15.4.

15.3.5.3 Dun Laoghaire-Rathdown County Health Profile

82. The Health Profile relating to Dun Laoghaire-Rathdown County includes the following:

- The total population is 233,860 of which a relatively high proportion is aged 65 and over (17.1%) compared to the national average (15.1%), while the proportion aged under 15 years is 11.8%. The age dependency ratio for Dun Laoghaire-Rathdown is 54.2% which is marginally higher than the national average of 53.2%
- The socio-economic status of Dublin's population is classed as '*marginally above average*' with a HP Index of 2.69 for the entire county of Dublin (no data are available for Dun Laoghaire-Rathdown specifically)
- Around 88.2% of the population have 'good' or 'very good' health and 1.3% of the population have 'bad' or 'very bad' health. This is better than the national average with 82.9% having 'good' or 'very good' health and 1.7% of the population having 'bad' or 'very bad' health
- The largest causes of death in Dun Laoghaire-Rathdown in 2022 were 'all other causes' and cancer which both had a higher proportion of deaths compared to the national average
- Dun Laoghaire-Rathdown has similar proportions of people living with a disability compared to the national average, with 6.8% of the population with a disability to a great extent, 14.6% with a disability to some extent and 21.4% with a disability to any extent. This is compared to 7.9%, 13.6% and 21.6%, respectively, for the national figures
- The proportion of carers in Dun Laoghaire-Rathdown is the same as the national average overall, at 5.8%.

83. Based on these indicators, the population of Dun Laoghaire-Rathdown is assessed to be of low-medium sensitivity, guided by the criteria in Table 15.4.

15.3.6 Vulnerable Groups

84. 'Vulnerable groups' refers to groups of individuals who '*are not vulnerable per se but are vulnerable in a given context and can include groups such as ethnic minorities, non-Irish nationals, people with disabilities, people who are homeless, people living in poverty, those struggling with addiction and substance abuse, and isolated older people*' (Pyper *et al.* 2021). While a sensitivity rating has been applied to the general population in the local and regional study areas based on average health and deprivation data, there will be vulnerable groups and sensitive individuals within these populations who may be at risk of more severe health outcomes resulting from any potential impacts.

85. Vulnerable groups identified in the local study area are the schoolchildren who attend the primary schools, and residents and patients at the nursing homes and healthcare facilities identified in Section 15.3.3. While certain locations, such as schools and nursing homes, may indicate where vulnerable groups are likely to be present, there is the potential for vulnerable individuals to be found throughout the study area. For example, there is potential for isolated older people and other vulnerable groups throughout the study area. It should be noted that no attempt has been made to identify specific vulnerable individuals as the assessment addresses effects on 'population health' (see Section 15.2.1).

86. The population group most likely to be directly affected during the Construction Phase of the Proposed Project is the farming community. The farming community is judged to be of high sensitivity. This reflects a community living and working in close proximity to the Proposed Project and whose outlook is predominantly uncertainty with some concern. There is significant concern around mental health in the farming community as a generalisation, as farmers can face a combination of factors such as increased regulations and costs, unpredictable weather, isolation and long working hours (Rose *et al.* 2023, Stapleton *et al.* 2022).

15.3.7 Biophysical Environment

15.3.7.1 Air Quality

87. The air quality baseline is presented in Section 12.3 of Chapter 12 (Air Quality). The chapter explains that under the Air Quality Regulations (S.I. No. 739/2022 – Ambient Air Quality Standards Regulations 2022), air quality zones are established. The majority of the population within the local study area would be within air quality Zone D (rural Ireland, including all towns with a population of less than 15,000). The small proportion of the population in the local study area who reside within Dublin South is within air quality Zone A.

88. S.I. No. 739/2022 transposed EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe. However, that directive has since been superseded by Directive (EU) 2024/2881 of the European Parliament and of the Council of 23 October 2024 on ambient air quality and cleaner air for Europe. Directive (EU) 2024/2881 sets out new air quality standards for pollutants to be reached by 2030 which are closer to the recommended values in the WHO Global Air Quality Guidelines (WHO 2021). With the adoption of Directive (EU) 2024/2881, Ireland must transpose this directive into national law (i.e. update the Air Quality Standards Regulations) before December 2026.

89. Table 15.9 provides a summary of the estimated background air pollutant concentrations for nitrogen dioxide (NO₂), particulate matter less than 10 microns in size (PM₁₀) and particulate matter less than 2.5 microns in size (PM_{2.5}) (refer to Section 12.3 of Chapter 12: Air Quality for more information on how these estimates are derived). The table also provides the statutory limit values and WHO Air Quality Guidelines recommended values for reference.

Table 15.9: Summary of Background Air Quality

Pollutant	Baseline Annual Mean Concentration (µg/m ³)		Directive 2008/50/EC Limit Value (µg/m ³) (applicable until 2030)	Directive (EU) 2024/2881 Limit Value (µg/m ³) (to be attained by 2030)	WHO Guideline Annual Average Value (µg/m ³)
	Zone A	Zone D			
NO ₂	14	4	40	20	10
PM ₁₀	11	10	40	20	15
PM _{2.5}	8	7	25	10	5

90. The WHO Global Air Quality Guidelines (WHO 2021) values are more conservative than the statutory limits for Ireland and were developed from a series of systematic reviews of recent air pollution and health studies. The WHO describes air pollution as the single biggest environmental health risk. Health outcomes associated with air pollution include:

- Onset of asthma in children and exacerbation of asthma in children and adults
- Incidence of cardiovascular disease and risk of hospitalisation or death from heart failure
- Incidence of lung cancer, and mixed evidence for associations with other cancers including bladder cancer and breast cancer

- Adverse birth outcomes, including low birthweight, pre-term births and small for gestational age births
- Markers of reduced fertility in men and women
- Rates of all-cause mortality (WHO 2021, EPA 2023).

91. PM_{2.5} is particularly hazardous to human health as it is small enough to bypass the body's defence system and penetrate deep into the respiratory and circulatory system. Often particulate matter contains harmful substances such as heavy metals, sulphurs, carbon compounds and carcinogens, which can have adverse health effects on the heart, lungs and brain (WHO 2021). There is no threshold below which no damage to health is observed for PM_{2.5}.
92. Groups most susceptible to health effects of air pollution are those with pre-existing respiratory or cardiovascular conditions, as well as elderly people and children (WHO Regional Office for Europe 2013, EPA 2023).
93. Road traffic emissions are the main source of NO₂, while domestic solid fuel burning and diesel-fuelled vehicle emissions are the main sources of PM_{2.5}. PM₁₀ often has a greater contribution from natural sources such as sea salt and windblown dust (EPA 2024a).
94. The data in Table 15.9 show that air pollutant concentrations are below the statutory limits, including those to be attained by 2030. However, the baseline NO₂ and PM_{2.5} in Zone A and the PM_{2.5} value in Zone D are above the recommended WHO Guidelines final target values. This would suggest that there could be some measurable impact on health from baseline air pollution, but since levels of pollution are well within the statutory limits set to provide an acceptable protection of human health, this is not a significant baseline health concern for the study area.

15.3.7.2 Noise and Vibration

95. Chapter 6 (Noise & Vibration) presents baseline noise results from a range of monitoring locations. While some sites were located adjacent to busy local or national roads where higher ambient daytime noise levels were recorded, most other locations were relatively rural and experienced low levels of background and ambient noise. The noise environment across the study area was characterised as typical of rural or semi-rural settings. A full presentation of the measured baseline noise levels is provided in Section 6.3 of Chapter 6 (Noise & Vibration).
96. Noise from road traffic is considered the second-greatest environmental risk to population health in Europe (WHO 2011). The most common associated health impacts are annoyance and sleep disturbance. Annoyance for the purposes of health effects associated with environmental noise relates to long term noise annoyance but is considered by the WHO Environmental Noise Guidelines for the European Region as a less serious health effect than self-reported sleep disturbance, although it may be on the causal pathway to cardiovascular disease (WHO Regional Office for Europe 2019). In its Environmental Noise Guidelines for the European Region, the WHO uses a slightly different metric for noise when setting its guideline. It provides a strong recommendation that average road traffic noise exposure should be reduced to below 53dB L_{den}. This guideline level is benchmarked at the level where 10% of a population are likely to be 'highly annoyed'. Noise of this level is relatively widespread in Europe, particularly in urban areas. Based on the daytime noise results for the study area, it is likely that most of the local study area population is exposed to noise levels below the WHO guideline, with the exception of the locations close to national roads.

97. Vibration effects from construction sites on nearby residents or employees in buildings are unlikely to be of a level to cause physical health impacts but may 'disturb, startle, cause annoyance or interfere with work activities' (British Standards Institute, 2014). Table 6.9 in Chapter 6 (Noise & Vibration) sets out the typical human health responses to different ranges of vibration. Due to the rural nature of much of the Local Study Area, it is assumed that most residents are not experiencing perceptible vibration in the baseline environment.

15.3.7.3 Water

98. The only locations identified within the regional study area that are protected for bathing water are in Lough Derg. Lough Derg is popular for water-related recreation (boating, canoeing, water skiing, kayaking, surfing and sub-aqua diving). The lake is also an important fishing location, and is especially famous for brown trout, roach, salmon and bream. Lough Derg is within the regional study area (with parts in County Clare and County Tipperary). The nearest bathing water area is Ballycuggeran, County Clare, which had excellent bathing water quality status in 2023 (EPA 2024b). It is over 6km north-west (and upstream) of the proposed RWI&PS infrastructure site.

99. Parteen Basin (Derg TN water body) is classified under the Water Framework Directive (WFD) as a Drinking Water Protected Area. It had 'Moderate' WFD status in 2016–2021 and was deemed at risk from agricultural sources of pollution (EPA 2024c). Chapter 9 (Water) provides detailed information on the water quality baseline. Baseline information on drinking water supply infrastructure and quality in relation to human health is set out in Section 15.3.10.1.

15.3.7.4 Soil (Including Ground Pollution and Agricultural Land)

100. As previously noted, much of the local study area comprises agricultural fields. The baseline agricultural context is described in Chapter 11 (Agriculture). It identifies that agriculture is the predominant land use within the Planning Application Boundary, with the main farm enterprises being drystock (including beef and sucklers), grassland-based farming, and dairy. Some areas also support arable farming, with crops including winter wheat, winter barley, and spring barley, particularly in counties with higher soil quality such as Kildare and Dublin. There are also some intensive equine enterprises in operation throughout. The land predominantly comprises fine loamy soils, which are well-suited for agriculture due to their favourable drainage and nutrient retention characteristics. Peat soils are also prevalent, especially in the Midlands, and are typically poorly drained and less suitable for productive agricultural use.

101. Potential sources of contaminated land have been evaluated and reported in Chapter 10 (Soils, Geology & Hydrogeology). One small disused petrol station was identified on the R445 at the proposed access road for the WTP. Site investigations and sampling of the nearby stream to be crossed by the proposed access road revealed that soils and surface water pollution concentrations are comparable to natural background metal and hydrocarbon concentrations. No potential contaminated sites are identified at the RWI&PS, WTP, BPT, BPS, FCV and TPR sites. No potential contaminated sites are identified at Construction Compound or Pipe Storage Depot locations. Four potential contaminated land sites were identified within 1km of the Construction Working Width (see Table 10.16 in Chapter 10). Chapter 10 also notes that there is a general potential for pollution from agricultural chemicals on present and past agricultural land, and from buried material which may occur anywhere along the Proposed Project. Potential contaminants include hydrocarbons and asbestos. Chapter 10 (Soils, Geology & Hydrogeology) should be referred to for further information relating to the interpretation of groundwater sampling results.

15.3.8 Social Environment

15.3.8.1 Open Space, Leisure and Play

102. Appendix A14.1 (Population Baseline) identifies baseline tourism and community sites in the local study area, many of which are areas of open space, leisure and play. These include areas of woodland and parkland, as well as sports pitches and other features such as the walking trails at Mount Lucas Windfarm and the Grand Canal which connects Dublin in the east to the River Shannon and is important for walking, fishing, boating (barges) and bird watching.
103. There is a rapidly growing body of research showing that exposure to green and blue space is associated with several positive health outcomes including improved mental health and wellbeing, reduced incidence of type 2 diabetes, reduced all-cause mortality, reduced cardiovascular disease mortality and improved pregnancy outcomes (Zhang *et al.* 2020, Houlden *et al.* 2018, Gascon *et al.* 2015, Gascon *et al.* 2017, Twohig-Bennett and Jones 2018). Furthermore, availability of blue/green outdoor spaces and play facilities also increases physical activity and promotes social cohesion, contributing to overall community wellbeing (Douglas *et al.* 2018; SHEER Wellbeing Project Team 2021; WHO 2023a).

15.3.8.2 Community Safety

104. The Proposed Project would be constructed and operated within predominantly open countryside, generally avoiding towns and villages. Communities most likely to be affected therefore, are hamlets and isolated farms and housing in rural areas. In particular, there is some ribbon development along many of the lanes and roads that cross the local study area and therefore people in these communities may regularly interact with some of the roads that would be used as Haul Roads.
105. In response to scoping comments by the HSE's National Environmental Health Service, the locations of food preparation premises have been identified within the local study area. Twelve premises where food is prepared and/or sold have been identified. There are two public houses within 500m of the 38 kV Uprate Works sites (Dagger's Bar, Blackwater, County Clare; and Matt the Thresher Inn, Birdhill, County Clare). Mona Bar and Darcy's service station are at Mount Lucas, Esker Beg, County Offaly on the R402 (240m and 145m from the Planning Application Boundary respectively, Chainage TWC – 19250). Rudd's Fine Foods manufacturing facility and Aonach Bed & Breakfast are located on the outskirts of Birr within 500m of the access road to the proposed BPS. Monaghan Mushrooms is located near Ticknevin, County Kildare (Chainage TWD – 16500). The Grill Shack, Donadea, Naas, County Kildare is a steakhouse within 500m of the Planning Application Boundary (Chainage TWD – 27500). Connolly's Pub public house is 385m from the Planning Application Boundary (Chainage TWD – 29500). There is a Victorian tea rooms (200m from the Planning Application Boundary) and Barberstown Castle Hotel (350m from the Planning Application Boundary) at Barberstown Roundabout near Baybush (Chainage TWE – 7750). There is also a privately owned luxury hotel (Cliff At Lyons) situated approximately 500m south of the Planning Application Boundary at Chainage TWE – 12500.

15.3.9 Economic Environment

106. In terms of employment, within the regional study area, Kildare has the highest percentage of people participating in the labour market, closely followed by South Dublin, with County Limerick possessing the lowest participation rate. Clare, Tipperary, Limerick and Offaly labour market participation rates are below the national average. The largest employment sector in Ireland in 2022 was the wholesale and retail trade, closely followed by human health and social work and manufacturing. The education; professional, scientific & technical; and construction sectors also make up a large portion of employment. Reference should be made to Appendix A14.1 (Population Baseline) for further detail on the economic and employment baseline.

107. Tourism is extensively dealt with in Appendix A14.1 which considers the potential effects on tourism receptors (i.e. attractions and accommodation (except B&Bs)) within 500m of the Proposed Project. A fundamental requirement of being able to facilitate tourism is a ready supply of potable water. The potential impact on tourism in turn has significant socio-economic effects which need to be considered. Although these impacts are very important outside the Human Health assessment, it is noted that improving the socio-economic status is one of the best ways of improving public health.
108. Employment and socio-economic status can have a significant influence on health and wellbeing. The employment rate of an area is related to life expectancy, and healthy life expectancy. Places with higher levels of economic inactivity tend to have a population with lower healthy life expectancy. The type of work matters for health, as does having sufficient income and forming social connections. Research from the UK shows those with low job security or low job satisfaction are more than twice as likely to report poor health as the average employee. Unemployment is consistently associated with a negative impact on several health outcomes. Research has found links between unemployment and self-rated poor health. There is a similar relationship between unemployment and mental health, including depression, anxiety and levels of self-esteem (The Health Foundation 2025).
109. As economic groups, construction workers and farmers/farm workers have been identified as at higher risk of mental health issues and suicide compared to the general population. Data from the UK Office of National Statistics for 2021 show that construction workers are nearly four times more likely to die by suicide than any other sector (British Safety Council 2023). Data for Ireland on this issue are limited (Health and Safety Authority 2023) but for the period 2008 – 2012 showed that almost half of suicides recorded in Ireland were men working in construction (The Journal 2013) while farmers and farm workers were second on the list of groups most at risk. Research funded by the HSE National Office for Suicide Prevention identified that 23.4% of farmers who participated in a national survey were considered at risk for suicide (i.e. reported having suicidal thoughts and/or urges over the past two weeks) (Russell *et al.* 2023).

15.3.10 Wider Societal Benefits

15.3.10.1 Water Infrastructure and Associated Economic Benefits

110. A literature review was carried out using search terms 'water supply scheme' in PubMed (US National Library of Medicine 2024) on 19 September 2025. PubMed is a widely used online database containing more than 37 million citations and abstracts of biomedical literature. The literature review found that there is a lack of information and few examples of the potential health effects of a project similar to the Proposed Project. However, there is plenty of information on the adverse health effects of not having safe and plentiful water supplies and the impact of this on public health. Public drinking water supplies in Ireland provide high quality drinking water with over 99.8% of samples compliant with bacterial and chemical standards (EPA 2025). A recent WHO report reviews microplastics in different sources of drinking-water (including bottled water, tap water and water exiting Drinking Water Treatment Plants) and the potential risks associated with exposure for human health (WHO 2019). While there is no direct evidence that microplastics are harmful, the report identified potential physical, chemical and biological means by which these could cause harm. It concluded that the human health effects are unknown. There are numerous reports, mainly from developing countries, of very significant adverse effects on public health. While the Proposed Project study area is not directly comparable to a developing country environment, the principle remains the same. The provision of a safe and secure water supply is a public health priority, which is generalisable to any location, including Ireland. The Proposed Project aims to provide secure, reliable, sustainable drinking water supplies to meet growing demands and also aims to prevent similar water supply shortages occurring in the Greater Dublin Area and potentially parts of the Midlands Region in the future.

111. The maximum sustainable supply of water for the Greater Dublin Area is 600 million litres per day. Since 2019, the expansion of the economy and population has increased water demand, meaning that daily water demand exceeded the 600 million litres per day threshold on 80 days in 2023. The River Liffey supplies 85% of Dublin's water, meaning there is significant pressure on water resources (Lee 2024). This baseline issue is a key driver for the Proposed Project.
112. Water shortages have been identified as a constraint to meeting the needs of current and future housing supply for the Eastern and Midlands Region (The Housing Commission 2024). This indicates an indirect pathway by which water supply can affect human health, given that housing is important in determining the health of a population as conceptualised in Image 15.1.

15.3.10.2 Climate Change

113. The WHO identifies that climate change presents a '*fundamental threat to human health*'. It affects the physical environment as well as the social and economic conditions and the functioning of health systems (WHO 2023b). Climate change affects the intensity and frequency of extreme weather events including storms, heatwaves, flooding, droughts and wildfires. These weather and climate hazards affect health both directly and indirectly, increasing the risk of deaths, noncommunicable diseases, the emergence and spread of infectious diseases, and health emergencies. These issues can also affect people's livelihoods, such as reliability of farming due to unpredictable seasons and weather.
114. Chapter 13 (Climate) presents the baseline regarding climate, including climate change predictions for the region under different scenarios. This includes predictions for significant decreases in mean annual, spring and summer precipitation with extended dry periods. This would suggest an increased likelihood of droughts.

15.3.11 Future Baseline

115. As noted in Section 15.3.10.1, the water supply for the Greater Dublin Area is under substantial pressure due to increased demand from economic and population growth. The pressure on water supply infrastructure is expected to continue to grow. Climate change is expected to exacerbate this situation due to the likelihood of drier summers and a subsequent reduction in river flows. This may lead to water supply restrictions and hosepipe bans. Inadequate water supply would constrain economic growth, with subsequent impacts on human health due to threats to housing supply, livelihoods, reduced employment opportunities and socio-economic status. Other aspects of the baseline described above are not expected to change greatly over time.

15.4 Assessment of Effects

116. The following sections present an assessment of the potential significant effects on human health associated with the Construction and Operational Phases of the Proposed Project with respect to the appraisal methods that have been presented in Section 15.2.
117. This section presents an assessment in the absence of mitigation measures, with the exception of embedded mitigation that has been incorporated in the design (e.g. avoiding sensitive features through the siting of the Proposed Project during the optioneering). Mitigation measures have been proposed in Section 15.5 to prevent or reduce the potential significant effects, and the residual effects after the application of mitigation measures are reported in Section 15.6.

15.4.1 Do-Nothing Scenario

118. The Do-Nothing alternative describes the circumstance where no development occurs. Under a ‘Do-Nothing’ scenario, the capacity of the Greater Dublin Area and wider Eastern and Midland regions to provide a sustainable water supply in line with forecasted population growth will be heavily compromised, as set out in the National Water Resources Plan – Framework Plan (Irish Water’s 25 Year Plan for Our Water Assets) (Irish Water 2021) and the Regional Water Resources Plan – Eastern and Midlands (Irish Water 2022). The Do-Nothing scenario would lead to the Eastern and Midlands Region experiencing a projected peak deficit of 280 million litres per day (Mid) of treated water in 2050. Climate change is expected to exacerbate this situation and in the context of the vulnerability of the environment to climate change, the risks to the availability of water detailed in the EPA’s Critical Infrastructure Vulnerability to Climate Change report (EPA 2021) would remain. Further water shortages in the east of Ireland would reduce the available supply which could potentially lead to an unstable water supply for the Eastern and Midlands region.
119. In the long term, the Proposed Project would facilitate potential future water supply connections to communities in a Water Supply Area along its route. This would bring economic benefits to the whole Eastern and Midlands Region and growth in the region, supporting job creation, improved standards of service and quality of life. These benefits will not be realised without the investment in infrastructure provided by the Proposed Project.
120. Inadequate water supply would constrain economic growth, with subsequent negative impacts on human health due to threats to housing supply, livelihoods, reduced employment opportunities and socio-economic status.
121. In light of the above issues, significant negative health impacts are anticipated under a ‘Do-Nothing’ scenario.

15.4.2 Construction Phase

122. The greatest potential for an impact on human health as a result of the Construction Phase would be emissions from the construction activity itself and any increase to traffic. Construction activity can be defined as all activity related to construction. For example, construction of facilities or structures, excavation, tunnelling, removal of trees; and ancillary activity such as movement of construction equipment, bringing materials in and removal of waste from sites, as well as other construction-related activities. The scope of key health determinants potentially affected during the Construction Phase of the Proposed Project are summarised in Table 15.10. Reference should be made to Appendix A15.1 (Scope of Health Determinants) for details of issues scoped out of the assessment.

Table 15.10: Scope of Health Determinants for Construction Phase Assessment

Health Determinants in Construction Phase Scope	Summary of Scope
Biophysical environment	
Air quality	<ul style="list-style-type: none"> Health and wellbeing effects from dust and vehicle emissions arising from construction activities.
Noise	<ul style="list-style-type: none"> Health and wellbeing effects from noise arising from construction traffic and activities.
Water	<ul style="list-style-type: none"> Health and wellbeing effects arising from potential construction impacts on water bodies used for drinking water and amenity.
Soil	<ul style="list-style-type: none"> Health and wellbeing effects arising from potential construction impacts on agricultural land availability and quality Health and wellbeing effects arising from potential impacts from ground contaminants and risks of ground pollution from construction activities.

Health Determinants in Construction Phase Scope	Summary of Scope
Social environment	
Open space, leisure and play	<ul style="list-style-type: none"> Health, safety and wellbeing effects arising from potential impacts on access, quantity and amenity of green and blue spaces and other recreational and leisure assets.
Community safety	<ul style="list-style-type: none"> Vermin Injury risk (including drowning and falls).
Economic environment	
Employment and income	<ul style="list-style-type: none"> Health, safety and wellbeing effects associated with potential employment opportunities during the Construction Phase.

15.4.2.1 Air Quality

15.4.2.1.1 Dust

123. A dust risk assessment has been undertaken and is reported in Chapter 12 (Air Quality) with results summarised in Table 12.31 of that chapter. The assessment concludes that, for each site, the trackout activities during construction present a low risk, demolition activities present a negligible risk, earthworks present a negligible to low risk, and construction activities present a negligible to low risk to human health. Within the overall Construction Working Width (including Pipe Storage Depot, access roads and road egress points) demolition and construction activities present a low risk, and earthworks and trackout activities present a medium risk to human health.

124. As set out in Chapter 12 (Air Quality), the majority of dust released from earth moving and excavating phases of the Proposed Project would mainly be confined to particles of dust greater than 10µm. Particles of dust greater than 10µm pose less of a health hazard than smaller particulate matter as they tend to settle out of the air more quickly and are less likely to be inhaled. However, they can cause irritation, particularly to eyes and nose, and cause annoyance (loss of amenity). The most likely health impacts of dust from the Proposed Project to the general public would be temporary reactions to the visible impacts of dust deposition and soiling. There may also be concern among farmers over the potential impact of dust deposition on their agricultural crops and assets (see also Section 15.4.2.4: Soil for predicted impacts on agricultural food production). The population groups that would be exposed to these health impacts would be those within the site-specific study area (including farmers) and a proportion of those within the local study area (those within a distance of 250m of a specific area of construction work or on a public road within 250m from construction site entrances due to trackout).

125. The sensitivity of the site-specific population would be high, while those in the local study area with underlying health issues such as anxiety, would also have high sensitivity. This reflects that the site-specific population would be more likely to spend extended periods of time close to sites where dust is generated, while those with underlying health issues such as anxiety, are more likely to be concerned. The sensitivity of the general population in the local study area is medium. This reflects that the general population would be more likely to live, work or study at a distance from the Proposed Project, and therefore less likely to be exposed to dust that is generated. The magnitude of change due to the Proposed Project is low. This reflects that due to the linear nature of the Proposed Project, any impact to individual sensitive receptors is likely to occur over only part of the Construction Phase and that there would be rapid reversal of the health impact following completion of activities in any single location. The severity of impact is predominantly related to a temporary change in quality of life for those most affected. The significance of health effect is assessed as negative, Slight, temporary (effect is not significant) for the high sensitivity population groups, and negative, Not Significant, temporary for the medium sensitivity population groups. This reflects that there is only suggestive evidence, based on themes from consultation responses to major projects, that psychological concerns over temporary dust impacts could lead to changes in health outcomes among sensitive groups and that there is an overall lack of evidence of a

significant association between temporary dust nuisance and changes in health outcomes for a general population.

126. Earthworks, demolition and construction activities can be associated with the release of fungal spores into the atmosphere. *Aspergillus* is a ubiquitous organism and is present everywhere but is of particular concern when large scale demolition, excavation and earth-moving activity takes place. The vast majority of people are immune to this, but invasive aspergillosis is a disease which is harmful to people with suppressed immune systems, such as hospital inpatients. Relevant locations in the local study area with highly sensitive groups would therefore be Ashlawn House Nursing Home which is within 185m of the Construction Working Width (Chainage TW – 11900) and the nursing home at the Peamount Healthcare complex which is within 25m of the Construction Working Width at the TPR location. The National Guidelines for the prevention of Nosocomial Aspergillosis During Construction/Renovation Activities (Health Protection Surveillance Centre 2018) deals specifically with construction works occurring within or adjacent to hospitals. Fungal spores are dispersed to no measurable concentration at approximately 250m from the source of the release. The National Guidelines note that the fundamental requirements in preventing aspergillus infection arising from construction works are, first, to reduce the dust generated during construction and, second, to prevent dust infiltration into patient care areas. Works in close proximity to the hospitals will be carried out in accordance with the National Guidelines with dust suppression measures in place, and in consultation with the healthcare setting manager and relevant hospital Infection Prevention and Control Team (ICPT). The National Guidelines set out a risk assessment process for invasive aspergillosis, which includes categorising patients according to their level of susceptibility to invasive aspergillosis. The Guidelines then set out prevention and control measures according to the category of patient risk. Patients in the highest category of susceptibility are normally placed in specially designed units that have highly filtered air to protect them from outside sources, although the National Guidelines allow for the ICPT to identify alternative measures for settings where such filtration facilities are not available. On the basis that the National Guidelines would be followed, the risk of exposure would be negligible and it is assessed that the risk of invasive aspergillosis is negative, Not Significant, temporary.

15.4.2.1.2 *Construction Vehicle Emissions*

127. Chapter 12 (Air Quality) reports the assessment of Proposed Project vehicle emissions during the Construction Phase in relation to the pollutants of NO₂, PM₁₀ and PM_{2.5}. No statutory air quality limit values would be exceeded at any of the modelled receptor locations in the Do-Nothing scenario (i.e. the modelled future year air quality situation in the absence of the Proposed Project but taking into account predicted traffic growth) or the Do-Something scenario (the modelled future year air quality situation with the Proposed Project together with predicted traffic growth). The greatest level of change predicted for any of the modelled locations is 2.9% for PM_{2.5} at a location near the N80. There are two other locations where there is a predicted change of 2% or greater, these being 2% for NO₂ at the location near the N80 and 2.1% for PM_{2.5} at another location near the N52. For all other locations, the predicted level of change between the Do-Nothing and Do-Something scenario is less than 2%.

128. On this basis, even assuming a high sensitivity population (i.e. those more susceptible to air pollution such as the elderly, children, people with respiratory conditions), the magnitude on health is assessed as negligible as there would be a negligible increase in exposure to air pollution and this would be of a temporary duration with very few people affected. The significance of the health effect is assessed as negative, Not Significant, temporary. This is not significant for public health on the basis that the change due to the Proposed Project would be well within statutory limits and would not result in the WHO Air Quality Guidelines (WHO 2021) values being exceeded for NO₂ or PM₁₀. Although the WHO guidelines of 5µg/m³ are exceeded for PM_{2.5} at all modelled receptors, this is the case in both the Do-Nothing and Do-Something scenarios. Additionally, when comparing the Do-Nothing and Do-Something scenarios, the predicted level of change in concentration of PM_{2.5} is less than 2% at 18 of the 20 receptors. Therefore,

there is likely to be a very limited change in the health baseline from the expected effect size and magnitude.

15.4.2.2 Noise and Vibration

129. Section 6.4 of Chapter 6 (Noise & Vibration) reports the assessment of construction noise effects likely to arise from the Construction Phase of each of the components of the Proposed Project before the application of mitigation. Section 6.2.6 of the noise assessment sets out construction noise thresholds of potential significant effects as follows: daytime significance threshold of 65dB $L_{Aeq,T}$ at the nearest noise-sensitive locations (NSLs), evening threshold of 55dB $L_{Aeq,T}$ and night-time threshold 45dB $L_{Aeq,T}$ (refer to Table 6.4 in Chapter 6: Noise & Vibration for more detail). Additionally, to constitute a significant effect, the noise would need to occur for a duration exceeding 10 or more days or nights in any 15 consecutive days or nights and/or a total number of days exceeding 40 in any six consecutive months. The noise assessment predicts that, in a conservative scenario, without mitigation, significant airborne noise effects would be experienced at the following NSLs:

- Two NSLs (including the Peamount Hospital Nursing Home) at the northern perimeter of Peamount Hospital approximately 35m from the TPR site during the construction of the TPR where the noisiest activities are predicted to reach 69dB $L_{Aeq,T}$ (short term)
- Two NSLs (supported living residences) at the south-western perimeter of Peamount Hospital approximately 25m from the access road construction works where the noisiest activities are predicted to reach 77dB $L_{Aeq,T}$ (short term)
- One NSL 40m to the south of an area of the pipeline where piling is indicated to take place between Chainages TWB – 24500 and TWB – 25000. The noisiest activities are predicted to reach 72dB $L_{Aeq,T}$ (short term)
- 47 NSLs at 15 trenchless crossing locations within 220m where the works are expected to occur at night (see Table 6.45 in Chapter 6) (temporary)
- 11 NSLs within 50m of six different temporary infrastructure sites where the noisiest activities for the closest NSLs are predicted to reach 78dB $L_{Aeq,T}$ (short term).

130. The assessment of groundborne vibration reported in Chapter 6 (Noise & Vibration) predicted potentially significant health effects relating to vibration sourced from trenchless crossings and rock breakout activities. This affects 12 residential and business vibration sensitive locations (VSL) in the absence of mitigation measures. The potential population health effects of this are described and assessed below in Section 15.4.2.2.8).

15.4.2.2.1 TPR and Access Road Construction (Peamount Hospital)

131. In the absence of standard noise mitigation, the health impact at the two NSLs at the northern perimeter of Peamount Hospital (including Peamount Hospital nursing home) and the two supported living residences at the south-western perimeter of Peamount Hospital is assessed as medium magnitude on a highly sensitive population group. This reflects that the impact would be short term and, due to the predicted noise levels, has the potential for a major change in quality of life (i.e. due to likely psychosocial impacts). The most likely health effects would be temporary negative impacts on mental wellbeing and sleep disturbance (assuming a likelihood that there may be shift workers and residents sleeping during the day).

132. Impacts on mental wellbeing would most likely be reversible on completion of the construction activities and would not reflect the Environmental Noise Guidelines for Europe (WHO Regional Office for Europe 2019) definition of 'annoyance', which refers to long term noise annoyance. Nevertheless, for the duration of construction activities anticipated to generate significant noise impacts, this has the potential to negatively affect the day-to-day wellbeing of individuals in the hospital exposed and their ability to be productive, cope with normal stresses of life and enjoy social interaction. It may also impact on the quality

of healthcare delivered at the hospital for the duration of works on the TPR. Since most people would likely be inside the nursing home for the majority of the time, the noise levels typically experienced by residents would be lower than the level predicted in Chapter 6 (Noise & Vibration).

133. While there is limited scientific literature that provides evidence on public exposure to construction noise and changes to health outcomes, it is reasonable to infer that noise of the levels predicted at Peamount Hospital has potential to exacerbate stress and anxiety. Given the high sensitivity of the population exposed, which includes Alzheimer patients, the significance of effect on public health is assessed as negative, Significant, short term. It should be noted that in the absence of detailed construction phasing information, the noise assessment presents a conservative scenario which assumes that the noisy activities would occur concurrently, which would be unlikely in reality. Reference should be made to Section 15.5.2 which sets out how proposed mitigation would reduce the significance of this effect.

15.4.2.2.2 *Pipeline Construction*

134. For the one NSL predicted to experience significant noise from the pipeline construction where piling may be required, the magnitude of health impact is assessed as negligible. This reflects that very few people in the site-specific and local study areas would be affected given the length of pipeline route construction and that the impacts would be temporary in duration. The work is expected to take place in the daytime (and early evenings in summer months) when people would be expected to be less sensitive to noise. The most likely health effects would be temporary negative impacts on mental wellbeing. Impacts on mental wellbeing would most likely be reversible on completion of the construction activities and would not reflect the Environmental Noise Guidelines for Europe (WHO Regional Office for Europe 2019) definition of 'annoyance', which refers to long term noise annoyance. The impacts are expected to relate to a minor change in quality of life for those affected, on a temporary basis. The significance of effect on public health is assessed as negative, Not Significant, temporary.

15.4.2.2.3 *Trenchless Crossings*

135. Trenchless crossing construction would involve tunnelling under major crossings such as roadways, railways, canals, watercourses, and possibly high voltage overhead power lines. The works may occur during day or night-time hours as, once started, some aspects of the trenchless crossing techniques cannot be safely stopped. It is assumed that construction activities relating to trenchless crossings would be restricted during the night-time hours to only incorporate the pipe installation and backfilling with restricted HGV movements and no use of circular saws during these periods. The applied night-time noise threshold guideline value is 45dB $L_{Aeq,1hr}$, therefore, significant noise impacts, without mitigation, are predicted to be relatively extensive in area (up to 220m). Prior to mitigation, significant effects are predicted at 24 NSLs within 140m (Significant to Very Significant effect) and 15 NSLs beyond 140m but within 220m (Moderate to Significant effect) at 10 trenchless crossing locations. Significant effects are also predicted for eight NSLs beyond 140m but within 220m (Moderate to Significant effect) at a further five different crossing locations prior to mitigation.

136. For the locations away from the major road crossings, the study area is likely to be relatively tranquil so it is expected that the population would have high sensitivity to noise. In terms of health effect, the most likely health impacts would be brief negative impacts on mental wellbeing and sleep disturbance for some individuals. Impacts have the potential to negatively affect the wellbeing, productivity and social function of affected individuals for a short duration following the night-time construction activities. On the basis that the activities are expected to be of brief duration for most individuals, the magnitude of health impact is predicted to be low. This reflects that the events would be occasional during the Construction Phase and there would be a rapid reversal of impact on completion of the activity. The significance of effect to public health is assessed as negative, Moderate, temporary (effect is not significant).

15.4.2.2.4 *Directional Drilling Locations*

137. There is the potential for directional drilling during both daytime and night-time hours for the provision of power connections along the Proposed Project. The applied daytime threshold is 70dB and the night-time noise threshold guideline value is 45dB which means that significant noise impacts without mitigation are predicted to be up to 350m from the nine locations where directional drilling is proposed. However, the noise assessment concluded there would be no likely significant noise effects from directional drilling as the works would be completed under the temporal threshold of 10 consecutive days/nights in a 15 day period. For the locations away from the major road crossings, the study area is likely to be relatively tranquil so it is expected that the population would have high sensitivity to noise. In terms of health effect, the most likely health impacts would be brief negative impacts on mental wellbeing and sleep disturbance for some individuals. Impacts have the potential to negatively affect the wellbeing, productivity and social function of affected individuals for a short duration following the night-time construction activities. On the basis that the activities are expected to be of brief duration for most individuals, the magnitude of health impact is predicted to be low. This reflects that the events would be occasional during the Construction Phase and there would be a rapid reversal of impact on completion of the activity. The significance of effect to public health is assessed as negative, Moderate, temporary (effect is not significant).

15.4.2.2.5 *Temporary Infrastructure Sites*

138. The noise assessment notes that within 50m of the temporary infrastructure sites there is potential for construction noise levels to exceed the significance threshold of 65dB $L_{Aeq,T}$ at several locations. One NSL approximately 35m from Construction Compound 6, at five NSLs within 50m (nearest at 20m) of Pipe Storage Depot (PSD) 1, at one NSL approximately 40m from PSD3, one NSL approximately 40m from PSD8, two NSLs within 50m (nearest at 30m) from PSD9, and one NSL approximately 20m from PSD10 for the temporary infrastructure sites. The impacts would be short term and, due to the predicted noise levels, have the potential for a moderate change in quality of life. The most likely health effects would be temporary negative impacts on mental wellbeing which would most likely be reversible on completion of the construction activities and would not reflect the Environmental Noise Guidelines for Europe (WHO Regional Office for Europe 2019) definition of 'annoyance', which refers to long term noise annoyance. Nevertheless, for the duration of construction activities anticipated to generate significant noise impacts, this has the potential to negatively affect the day-to-day wellbeing of individuals exposed. The magnitude of health impact is assessed as low. This reflects that very few people in the site-specific and local study areas would be affected and that the impacts would be temporary in duration. The significance of effect on public health is assessed as negative, Moderate, temporary (effect is not significant).

15.4.2.2.6 *Proposed 38 kV Uprate Works and Power Connections*

139. There are instances where the construction noise levels could exceed the day and/or night significance thresholds for NSLs within 25m of the works on weekdays and within 40m on Saturdays. However, the duration of these exceedances would not be over 10 or more days or nights in any 15 consecutive days or nights, or over 40 days in any six consecutive months. Therefore, the threshold exceedances are below a duration where there is the potential for significant effects to occur according to the noise assessment in Chapter 6 (Noise & Vibration). From a human health perspective, the most likely effects would be temporary, negative impacts on mental wellbeing and sleep disturbance. These impacts would most likely be reversible on completion of the construction activities and would not reflect the Environmental Noise Guidelines for Europe (WHO Regional Office for Europe 2019) definition of 'annoyance', which refers to long term noise annoyance. The magnitude of health impact is assessed as negligible as the impacts would relate to a minor change in quality of life on a temporary basis. The significance to public health is assessed as negative, Not Significant, temporary.

15.4.2.2.7 *Other Infrastructure Sites and Construction Traffic Noise on Public Roads*

140. Baseline noise levels are likely to be exceeded creating a Slight to Moderate significance of effect for the WTP, BPT, BPS and FCV infrastructure sites and construction traffic on the haul routes. However, these would be daytime levels below or equal to the 65dB $L_{Aeq,T}$ threshold applied for construction noise. There is one road link through Celbridge along the R403 Dublin Road that would only be utilised by construction traffic during the night-time hours at the request of Kildare County Council. On all other Haul Roads, there will be no night-time construction traffic. Although construction traffic noise levels exceed the night-time significance thresholds, the duration would not exceed a week. Therefore, the threshold exceedances are below a duration where there is the potential for significant effects to occur according to the noise assessment in Chapter 6 (Noise & Vibration). From a human health perspective, the most likely effects would be temporary, negative impacts on mental wellbeing and sleep disturbance. These impacts would most likely be reversible on completion of the construction activities and would not reflect the Environmental Noise Guidelines for Europe (WHO Regional Office for Europe 2019) definition of 'annoyance', which refers to long term noise annoyance. The magnitude of health impact is assessed as negligible as the impacts would relate to a minor change in quality of life on a temporary basis. The significance to public health is assessed as negative, Not Significant, temporary for both highly sensitive and medium-sensitive population groups within the local study area and within 5m of Haul Road carriageways.

15.4.2.2.8 *Groundborne Noise and Vibration*

141. The groundborne noise assessment (Section 6.4 of Chapter 6 (Noise & Vibration)) identifies VSLs where there is potential for construction activities (piling, trenchless crossings and rock breaking) to result in vibration at 12 VSLs at levels between 1 millimetre per second (mm/s) peak particle velocity (PPV) and <10 mm/s PPV, in the absence of mitigation measures. This is a range considered relevant in terms of human response as it is where some individuals would be sufficiently annoyed or anxious that they would be likely to complain. However, with prior warning and explanation the levels can be tolerated (British Standards Institution, 2014). No VSLs have been identified where the levels of vibration are likely to be above 10 mm/s PPV (the threshold where people are likely to find the vibration intolerable if exposed for more than very brief periods (British Standards Institution, 2014)).

142. The groundborne noise assessment identifies the following numbers of VSLs as experiencing Moderate to Significant (significant effects in the noise assessment) human response effects (pre-mitigation):

- Three VSLs (two business properties, and one residential) due to piling activities
- Seven VSLs (three business properties, and four residential) due to vibration from rock breaking
- Two VSL (both residential property) due to vibration from trenchless crossings.

143. The most likely health effects arising from the above identified vibration impacts on people in the affected residential and business properties would be annoyance or concern for sensitive individuals. In the case of the trenchless crossings, there is also a risk of sleep disturbance due to the need to undertake work at night as well as day. These health effects are expected to be temporary and fully reversible on completion of the construction activities. Further, the noise chapter includes mitigation measures that would reduce the number of VSL that would experience significant residual effects (two VSL would have significant residual effects from rock breaking, and one VSL from trenchless crossing). The magnitude of population health effect is assessed as negligible as it would affect very few people, is temporary, reversible and relates to a minor change in quality of life. The significance of effect on population health is assessed as negative, Not Significant and temporary.

15.4.2.3 Water

144. Chapter 9 (Water) and Appendices A9.1 (Abstraction Assessment), A9.2 (Pipeline Assessment) and A9.3 (Non-Linear Principal Infrastructure and 38 kV Uprate Works Assessment) provide an assessment of effects on the water environment. The assessment identifies potential significant impacts on water quality resulting from several aspects of the construction activities in the absence of control and mitigation measures. These might include silt-laden water runoff into water bodies, spillages of pollutants (of a variety of types including pesticides, oil or vehicle fuel which can contain carcinogenic substances) or vehicle washing, oil dripping from plant and machinery and wastewater from welfare facilities. However, Lough Derg, which has locations protected for bathing water, is upstream of these impacts which limits the likelihood of human exposure to water quality impacts. Nevertheless, there is potential for people to come into contact with polluted water, such as boat users or anglers on the Shannon downstream of Parteen Basin and the Grand Canal. This could include dermal contact with polluted water or ingestion of contaminated fish. Silt-laden run-off is more likely to impact health in terms of a reduction of amenity of blue space, which is assessed in paragraph 153.
145. The significance of effect (pre-mitigation) during construction for surface water quality and hydrology associated with Non-Linear Principal Infrastructure is assessed to be Not Significant to Profound across the elements and construction activities of the Proposed Project. The magnitude of human exposure to reduced water quality in local water bodies is expected to be low pre-mitigation. This reflects that a relatively small minority of the population in both the local and regional study areas are likely to be exposed on an occasional basis to the potential water pollution pathways from construction sources and also that any potential pollution would be substantially diluted with increasing distance from source. This effect is predicted to be of negative, Slight, short term significance (effect is not significant) to public health. On the basis of the above analysis, it is likely that only a slight change in baseline health would be attributable to short term unmitigated pollution from the Construction Phase.
146. The significance of effect (pre-mitigation) associated with potential reductions in water quality due to oil spillages and/or increased silt laden runoff during the Construction Phase and changes to water quality in the receiving watercourse during the Commissioning Phase of washouts is assessed to be Slight to Very Significant (Appendix A9.2, Annex A). A relatively small minority of the population in both the local and regional study areas are likely to be exposed on an occasional basis to the potential water pollution pathways sources. Any potential pollution would also be substantially diluted with increasing distance from the source and therefore the impact of human exposure to these impacts is considered to be of low magnitude. Overall, the significance of this effect on public health is predicted to be of negative, Slight, short term duration (effect is not significant). On the basis of the above analysis, it is likely that only a slight change in baseline health would be attributable to short term unmitigated pollution from the Construction and Commissioning Phase of the washouts.
147. Chapter 9 (Water) also notes that some dewatering activities in dry weather during the Construction Phase could lead to decreased groundwater levels and reduced recharge to local rivers, causing a 'drought effect'. It is not anticipated that these temporary reductions in local river flows would affect quantity of water for drinking water or other pathways to health effects other than a potential reduction in amenity of blue space, which is assessed in paragraph 153.

15.4.2.4 Soil

148. The Proposed Project would require the temporary removal of topsoil from agricultural use. The topsoil would be temporarily stockpiled and reinstated over the completed pipe installation. There is also potential for dust deposition from earthworks and trackout to affect agricultural land which may limit the areas on which farmers can grow certain crops. A detailed assessment of agronomy impacts is reported in Chapter 11 (Agriculture). Prior to mitigation, the number of agricultural parcels within the Proposed Project (Pipeline Infrastructure) that are directly affected totals 420; 114 of these are predicted to have a Very Significant effect, 273 are predicted to have a Significant effect, seven are predicted to have a Moderate

effect and 26 are predicted to have a Slight effect. The number of agricultural parcels within the Proposed Project (Infrastructure Sites including associated Temporary Infrastructure) that are affected totals 16; two of these are predicted to have a Very Significant effect and 14 are predicted to have a Significant effect. Prior to mitigation, the number of equine enterprises related agricultural parcels within the Proposed Project (Pipeline Infrastructure) that are directly affected totals 15, with those indirectly affected totalling 10. Of the 15 directly affected equine enterprise related agricultural parcels, two would have a Profound effect, four would have a Very Significant effect, seven would have a Significant effect, and two would have a Moderate effect. Of the indirectly affected equine enterprises related agricultural parcels, six would have a Not Significant effect, and four would have a Slight effect.

149. In relation to food resources and safety as per the scope of the Human Health assessment (see Appendix A15.1: Scope of Health Determinants), the magnitude of impact is assessed as low. In the overall agricultural context of the area at national and county level, the impact of the Proposed Project would affect agricultural land at an Imperceptible scale (refer to Section 11.6.2 of Chapter 11: Agriculture) and is therefore assessed as a negative, Imperceptible, short term effect (effect is not significant) for population health. Potential health effects on the farming community as an economic group are set out in Section 15.4.2.7.

150. The potential for contaminated land has been assessed for the Proposed Project in Chapter 10 (Soils, Geology & Hydrogeology). However, no significant potential contamination risk was identified along the Construction Working Width. The potentially contaminated land sites identified outside of the Construction Working Width do not pose a significant risk of contamination or a constraint to the Proposed Project. Existing above ground structures at a disused petrol station located at the site of the WTP access road would be removed as part of the Proposed Project. In the case of the former petrol station, only above-ground structures will be removed. Elevated soil metals may be encountered near the banks of the Kilmastulla River, due to historical mining upgradient at Silvermines. Excavation of soils with high metals may mobilise metals in the soil and groundwater but is predicted to have a low and localised impact. During the Construction Phase, machinery on-site would include trucks, excavators and the use of mobile cranes. The potential effects to the underlying soils and geology from the Proposed Project could derive from minor accidental spillages of fuels, oils and solvents, which could impact the soil and groundwater quality, if allowed to infiltrate to ground during the Construction Phase. Chapter 10 (Soils, Geology & Hydrogeology) does not identify any significant groundwater quality effects.

151. From a population health perspective, the magnitude of impact is low due to the low likelihood of exposure to contaminated substances for a small minority of population on an occasional basis during the Construction Phase. This effect is predicted to be of negative, Slight, short term significance to public health (effect is not significant). On the basis of the above analysis, it is likely that only a slight change in baseline health would be attributable to potential exposure to contamination from the Construction Phase.

15.4.2.5 Open Space, Leisure and Play

152. As set out in Chapter 14 (Population), there would be minimal land-take from recreational assets, as the detailed route selection process avoided land-take from residential, commercial and community receptors that are in current everyday use. The Mount Lucas Windfarm (Walking Trails) and the Grand Canal (Walking Trail) are both located within the Planning Application Boundary and are directly impacted by the Proposed Project through impacts to accessibility and severance as discussed below.

153. Impacts on access to recreational and community assets would also be very limited due to the limited impacts on roads anticipated; therefore, there is expected to be no direct impact on the accessibility of amenity areas. Construction of the RWI&PS could affect amenity at Parteen Basin, but this is not likely to alter any existing use of blue space as the more popular recreational sites in Lough Derg would not be affected. Amenity impacts on Knockanacree Wood from construction of the BPT would be limited due to the screening effect of the woodland setting. There may be disruption of amenity on Newcastle Golf Centre, 110m east of the TPR Infrastructure Site, but again, the impact is not likely to dissuade use of the

golfing facility due to the distance and intervening buildings and vegetation which would help reduce the impacts. Temporary impacts on the walking trails at Mount Lucas Windfarm and the Grand Canal would be limited to very short sections and not be significant in terms of use and enjoyment of the overall routes. Leisure cyclists using the lane network have the potential to have their routes interrupted by construction traffic and impacts; however, this would only affect a small number of routes and cyclists would easily be able to find alternative, unaffected routes. While groups using recreational facilities will include those of high sensitivity, the magnitude of impact on the health determinant of open space, leisure and play is predicted to be low, due to the very low exposure to impacts in the population and temporary and occasional nature of impacts. The nature of impacts on recreational assets (temporary loss of amenity or a need to take diversions for brief or temporary road closures) is not likely to reduce use and is therefore not likely to reduce the health benefits of social interaction and physical activity. Therefore, no change in health status is likely and the significance of effect is assessed as negative, Not Significant, temporary.

15.4.2.6 Community Safety

15.4.2.6.1 Vermin

154. Consultation with the National Environmental Health Service has highlighted potential for construction activities to cause an increase in rodent activity. Any construction activity that involves groundworks can result in the mobilisation of existing vermin. However, any displaced vermin would rapidly move out of sight again. As identified in Section 15.3.8.2, the nearest premises where food is sold to the public are 145m from the Planning Application Boundary. This is relatively far from any areas likely to disturb vermin, making any food-related health risks extremely unlikely. There is no reason why there would be any change in the underlying vermin population as a result of the Proposed Project and, as such, the magnitude of impact is negligible and the significance of health effect is neutral, Imperceptible, temporary (effect is not significant).

15.4.2.6.2 Injury Risk (Including Drowning and Falls)

155. The main potential pathways to increase injury risk during the Construction Phase would be construction site risks and risks of collisions involving construction vehicles. The Safety, Health and Welfare at Work (Construction) Regulations 2013 clarify and strengthen the general duties of all parties as regards securing occupational safety, health and welfare in construction work. They place obligations on clients and designers to ensure that safety and health is taken into account before any construction work begins. Construction areas would be fenced off to protect the public. On the basis that health and safety legislation and associated obligations, for example, in respect of working in peat, working near water and working at height, would be followed, risks of injury to both construction workers and local communities would be well managed to be as low as reasonably practicable. As set out in Chapter 5 (Construction & Commissioning) the access/egress points would incorporate visibility splays based on sight lines appropriate to the speed limit of the road. They would be secured at all times and manned during working hours. This would reduce risks of collisions with other road users to be as low as reasonably practicable. Through consultation with Bord Na Móna methods for working in areas of peat (see Appendix A5.3: Methods of Working in Peat), based on the depths of peat that are expected to be encountered, have been developed to protect both the workers and the environment. The sensitivity of construction workers is medium on the basis that they are generally familiar and trained in construction risks yet may be isolated from families and support networks due to the relatively isolated nature of some of the work locations. The sensitivity of the public is also medium on the basis of the general health profile of the study area. The magnitude of health impact from injury risk is assessed as medium, as while very few people are likely to be affected by injury risk, the severity of injuries if they do occur can include mortality or severe injury outcomes, resulting in a potential slight change in the health of the baseline population. The significance of population health effect is negative, Moderate, short term (effect is not significant).

15.4.2.7 Employment and Income

15.4.2.7.1 Employment

156. Chapter 14 (Population) predicts that the number of new jobs likely to be created within the regional study area would be 454 in total (direct and indirect/induced jobs) and a further 1,518 direct and indirect/induced jobs outside the regional study area (i.e. in wider society) as a result of the Construction Phase of the Proposed Project. Chapter 14 (Population) assesses the effect on employment in the regional study area as positive, Significant and short term, while it is assessed as positive, Significant and short term on employment outside the regional study area. In terms of health outcomes, this has the potential to improve the health status of the group benefiting from the new employment, which may also include dependants of those with new employment. However, it is uncertain how many permanent jobs would be created in the regional study area. Furthermore, in terms of the overall population in the study area, the indirect health benefits from employment are likely to be relatively limited in scale. The regional study area population is assessed as medium sensitivity, while the magnitude of impact is low. The significance of population health effect is positive, Slight, short term (effect is not significant). This reflects that there is a suggestive relationship between employment created by the Construction Phase of the Proposed Project and changes to health outcomes. For wider society, the impact of employment on human health would be negligible and the significance of population health effect is neutral, Imperceptible, short term (effect is not significant).
157. Chapter 11 (Agriculture) provides a detailed assessment on the potential impacts of the Construction Phase on various aspects of farming including short term loss of land, impacts on services (water, power, fencing), disturbance to livestock and operations, nuisance dust, disruption of farm operations and effects on area-based payments, restrictions on use of land for sensitive crops or livestock, and biosecurity risks. There is potential for health impacts on the farming community to arise due to concerns over income or uncertainty over the impacts of construction on farming enterprises. As identified in Section 15.3.6, the farming community is considered to be a highly sensitive group. Chapter 11 (Agriculture) has assessed the overall construction effects on agricultural parcels within the Proposed Project (Infrastructure Sites) (pre-mitigation) to be Significant to Very Significant. Of these, 14 parcels are expected to experience a Significant effect, while the remaining two parcels are predicted to experience a Very Significant effect. No equine agricultural parcels were identified for the Proposed Project (Infrastructure Sites). Prior to mitigation, the agriculture assessment also identifies that the number of directly impacted agricultural parcels predicted to experience significant effects, associated with the Proposed Project (Pipeline Infrastructure), is 394 (114 Very Significant, 273 Significant and seven Moderate). In addition, prior to mitigation, the number of equine enterprises related agricultural parcels predicted to experience significant effects, associated with the Proposed Project (Pipeline Infrastructure), is 15 (two Profound, four Very Significant, seven Significant, and two Moderate). This is judged to be a high scale of exposure and the magnitude of health impact is assessed as medium on the basis that health implications are likely to relate to major changes in quality of life for farmers in the short term. This would be a negative, Significant, short term effect in terms of population health as there is potential for a small change in the health status of the farming community.

15.4.2.7.2 Procurement and Investment

158. Chapter 14 (Population) predicts the gross value added (GVA) per construction-related job. This provides a proxy for the economic benefits of procurement and investment. The Population assessment predicts a 1.03% increase in the construction sector's contribution to the national economy for every year that it is required to construct the Proposed Project. This is of relevance to the wider society study area applied to this health assessment. In terms of scale of health impact, it is considered that this would represent a low magnitude impact, benefiting a small minority of the population in wider society. The significance of population health effect is assessed as positive, Slight, short term (effect is not significant). This reflects that there is a suggestive relationship between economic improvement brought by the Construction Phase of the Proposed Project and changes to health outcomes, and that this is not significant for public health.

15.4.2.8 Construction Summary

159. Table 15.11 provides a summary of the effects on human health during construction. In the absence of mitigation measures.

Table 15.11: Summary of Construction Effects (Pre-Mitigation) for Human Health

Determinant	Health Impact	Population Groups At Risk	Significance of Effect on Human Health*
Air quality (dust)	Psychological reactions to dust	Farmers and other people in site-specific study area and people in local study area with underlying health conditions such as anxiety	Negative, Slight, Temporary (effect is not significant)
		General population in local study area within 250m of construction sites	Negative, Not Significant, Temporary
	Risk of invasive aspergillosis	People within 250m of construction sites who are severely immunocompromised including residents at Ashlawn House Nursing Home and Peamount Healthcare Nursing Home	Negative, Not Significant, Temporary
Air quality (vehicle emissions)	Health impacts from exposure to NO ₂ , PM ₁₀ and PM _{2.5}	People within air quality assessment study area	Negative, Not Significant, Temporary
Noise	Construction noise from TPR and access road	Residents, staff and visitors to Peamount Hospital complex, particularly the nursing home and two supported living residences	Negative, Significant, Short term
	Construction noise from pipeline	People at one NSL within 50m of pipeline construction	Negative, Not Significant, Temporary
	Night-time noise from trenchless crossings	People within 220m of the 15 trenchless crossing locations	Negative, Moderate, Temporary (effect is not significant)
	Night-time noise from directional drilling	People within 350m of the nine directional drilling locations	Negative, Moderate, Temporary (effect is not significant)
	Temporary Infrastructure Sites	People within 50m of the Construction Compounds and Pipe Storage Depots	Negative, Moderate, Temporary (effect is not significant)
	Proposed 38 kV Uprate Works and Power Connections	People within 40m of the works	Negative, Not Significant, Temporary
	Construction noise at other Infrastructure Sites and construction traffic noise	People within local study area and 5m of edge of road carriageway of Haul Roads	Negative, Not Significant, Temporary
	Groundborne noise and vibration from trenchless crossings and rock breaking	Three VSLs (two business properties, and one residential) due to piling activities Seven VSLs (three business properties, and four residential) due to vibration from rock breaking Two VSL (both residential property) due to vibration from trenchless crossings	Negative, Not Significant, Temporary
Water	Exposure to potential water pollution from unmitigated construction activities	Recreational users of affected water bodies such as boaters and anglers on River Shannon and Grand Canal and those reliant on groundwater resources for private water supplies	Negative, Slight, Short term (effect is not significant)
Soil	Effect on food resource due to impacts on agricultural land and soils	Wider society	Negative, Imperceptible, Short term (effect is not significant)
	Exposure to potential ground contamination during Construction Phase	People within site-specific study area including construction workers	Negative, Slight, Short term (effect is not significant)

Determinant	Health Impact	Population Groups At Risk	Significance of Effect on Human Health*
Open space, leisure and play	Impacts on wellbeing, social interaction and physical activity levels due to reduction of use of recreational assets and open space	Recreational users of recreational assets (including anglers, walkers, leisure cyclists, users of local sports pitches and golf courses within 500m of the Proposed Project)	Negative, Not Significant, Temporary
Community safety	Risk of vermin	People within local study area, particularly food premises	Neutral, Imperceptible, Temporary (effect is not significant)
	Injury risks from construction site activities	People within site-specific study area including construction workers	Negative, Moderate, Short term (effect is not significant)
Employment and income	Health benefits associated with new employment opportunities during construction	Job seekers in regional study area	Positive, Slight, Short term (effect is not significant)
		Job seekers in wider society	Neutral, Imperceptible, Short term (effect is not significant)
	Health and wellbeing effects from impacts on farm business	Farming community	Negative, Significant, Short term
	Health benefits of procurement and investment during construction, associated with economic contribution to the national economy	Wider society	Positive, Slight, Short term (effect is not significant)

*As explained in Section 15.2.1 the assessment relates to effects on population health and should not be used to infer effects on any specific individual.

15.4.3 Operational Phase

160. The scope of health assessment for the Operational Phase is summarised in Table 15.12. Reference should be made to Appendix A15.1 (Scope of Health Determinants) for details of issues scoped out of the assessment.

Table 15.12: Scope of Health Determinants for Operational Phase Assessment

Health Determinants in Construction Phase Scope	Summary of Scope
Biophysical environment	
Noise	Health and wellbeing effects arising from potential community exposure to operational noise from plant and associated traffic
Water	Health and wellbeing effects arising from drinking water quality
Wider societal benefits	
Water infrastructure	Health benefits of improved water supply infrastructure
Economic benefits	Health impacts relating to economic growth supported by water supply resilience
Climate change	Health benefits of resilient water supply in light of climate change

15.4.3.1 Noise and Vibration

161. As outlined in Chapter 6 (Noise & Vibration), the Treated Water Pipeline once constructed would not generate any significant noise in the Operational Phase. The potential for Operational Phase noise emissions is therefore limited to the Infrastructure Sites (i.e. RWI&PS, WTP, BPT, BPS, FCV and TPR) and presence of additional vehicular traffic on public roads.

162. The presence of additional vehicular traffic would result in a barely perceptible change in traffic noise levels. From a human health perspective, the magnitude of health impact is assessed as negligible as the impacts would relate to a minor change in quality of life. The significance to public health is assessed as negative, Not Significant, long term.
163. Each of the sites has the potential to generate noise in the Operational Phase, primarily due to new mechanical plant items that would be required. Noisy plant items located externally would potentially have the greatest impact on the receiving environment. The precise specifications of mechanical plant items are not available at this stage of the Proposed Project but are likely to include pumps, fans, air handling units, generators, condensers, and other Operational Phase mechanical plant items.
164. Noise from any operational plant items associated with the Proposed Project will be designed and/or controlled so as not to give rise to likely significant effects at the nearest NSLs. Furthermore, plant items would not emit significant tonal or impulsive characteristics that would be audible at any NSL. Contract documents will clearly specify that the appointed Contractor will be obliged to implement noise abatement measures where necessary.
165. The relationship between boundary noise levels and the levels at the nearest NSLs will ultimately depend on the location and sound power noise emissions of on-site plant. At the detailed design phase of the Proposed Project, mechanical plant items will be designed to ensure that the cumulative effect does not exceed the noise criteria outlined in Section 6.2.6 of Chapter 6 (Noise & Vibration). Embedded design measures to keep the building services plant emissions below the prescribed limits are outlined in Chapter 6 (Noise & Vibration). There would also be facilities for car parking and vehicular access to the Infrastructure Sites, both of which have the potential to generate additional noise emissions; however, the likely noise effect of car parking activities on the local environment is Not Significant.
166. The noise criteria outlined in Chapter 6 (Noise & Vibration) for the Operational Phase have been selected to ensure that appropriate internal noise levels are not exceeded within dwellings. The adherence to the proposed criteria is expected to result in, at worst, negative, Slight, long term effects, i.e. an effect which causes noticeable changes in the character of the environment without affecting its sensitivities. In terms of health, the severity of this level of noise impact would predominantly relate to a minor change in quality of life for those affected, rather than any impact on morbidity. The Infrastructure Sites are all located in rural locations away from substantial human settlements, meaning there would be negligible human exposure to any noticeable noise. The Peamount Hospital complex immediately adjacent to the proposed TPR site represents one of the closer locations and where a high sensitivity population is located. For the other Infrastructure Sites, the potential human exposure would be residents of a small numbers of isolated properties who may be particularly sensitive to new noise due to their baseline rural and tranquil settings. On the basis of the slight change in noise environment predicted and very few people affected, the magnitude of impact is negligible and the significance of effect on population health is negative, Not Significant, long term.

15.4.3.2 Water

167. Chapter 9 (Water) reports the assessment of the Operational Phase effects on water quality of water bodies surrounding the Infrastructure Sites. No Impact or a Negligible effect on water quality are predicted from the abstraction and for the Infrastructure Sites during operation. Chapter 9 (Water) anticipates that there would be no likely significant water quality impacts as a result of washouts during the Operational Phase as washouts would only be required for emptying sections of the pipeline for emergency repairs or for routine maintenance (typically every 20–30 years) and discharges would be a rare occurrence. Also, when these discharges are required, the water within the pipeline will have been treated to potable water standards, therefore, discharges will not release contaminants or pollutants. Any discharges will also require dechlorination prior to discharge to reduce chlorine concentrations to <0.005mg/l as required with Salmonid Regulations. Permanent washout valves will have a chamber to facilitate use of dechlorination tablets (i.e. embedded in the design), but temporary washouts (with no permanent washout infrastructure) will require dechlorination equipment to be brought to site prior to any discharge.
168. There are 40 washout locations where water would be discharged to the adjacent land and would be allowed to soakaway (see Appendix A4.1: Operational Strategy, Annex A: Schedule of Washouts, Table entitled ‘Summary of Washouts – Local Discharges Direct to Bunded area of Land (40nr)’). Local conditions at the time of any discharge would be taken into consideration and no discharge would occur during a flood event (flow rates >Q30). Discharged water would percolate back to ground or via overland flow to the existing drainage. Where discharge occurs to land, water would be dechlorinated prior to discharge and allowed to infiltrate into the ground. As noted above, these events would be very rare and thus, impacts would also be short term and temporary. The potential impacts on groundwater resources are assessed in Chapter 10 (Soils, Geology & Hydrogeology). With regards to the Operational Phase, no likely significant effects have been identified, therefore, application of the identified mitigation measures would mean that the residual effect on hydrogeology is further reduced and would still be Negligible. On this basis, any human exposure to changes in water quality (for example, recreational use of water bodies or use of private wells) is considered to be negligible in magnitude and the effect neutral, Imperceptible, long term (effect is not significant) in terms of significance to population health.
169. The abstraction of relatively large volumes of water during the Operational Phase could be perceived as having an impact. Highly sensitive groups are likely to be anglers and other people living close to or enjoying recreational benefits of the River Shannon (see Section 15.3.8.1). Chapter 9 (Water) assesses the magnitude of impact on the River Shannon as negligible. Health impacts are therefore only likely to relate to a minor change in quality of life for those concerned. The predicted effects on the River Shannon as set out in Chapter 9 (Water) are Not Significant. As a result, the magnitude of impact on health is predicted to be negligible once the Operational Phase is established. The significance of population health effect is neutral, Imperceptible, long term (effect is not significant).

15.4.3.3 Water Infrastructure, Economy and Climate Change

170. Wider societal benefits in relation to the improvement of water infrastructure have been included in the scope of Operational Phase assessment including consideration of health benefits relating to the economy and climate change resilience (Appendix A15.1: Scope of Health Determinants).
171. A reliable water supply is a necessity for both residential and economic development in a modern economy. New developments cannot be considered in areas where utilities are not sufficient to deal with human activity. In simple terms, new and better housing cannot be considered in areas where there is a potential shortage of water, one of the most fundamental requirements of human life and activity. A similar consideration is the development of factories, shops, offices and areas of entertainment or recreation. The Proposed Project has the potential to provide opportunities for health improvements by providing a secure, reliable, sustainable, long term water supply for residential and economic development.

172. Employment and income are among the most significant determinants of long term health, in addition to the quality of housing. Many epidemiological studies consistently show better health outcomes are associated with higher socio-economic status and better residential conditions. Consequently, poor economic circumstances and poor housing can influence health throughout life, where communities subject to socio-economic deprivation or poor housing are more likely to suffer from morbidity, injury, mental anxiety, depression and tend to suffer from higher rates of premature death. Some of the most reliable methods to improve health within a community are to raise its socio-economic status and improve the housing stock. Projects that have the potential to support regeneration, reduce unemployment and improve socio-economic circumstance, could contribute to improving the health and wellbeing of socio-economically disadvantaged communities.
173. In social health terms, economic development also brings the opportunity for reducing inequalities in society. Long term unemployment for example is detrimental to the individual, family and society. It has potential to transfer across generations so that families where the head of household is unemployed on a long term basis are themselves far more likely to become or stay unemployed. This has the potential to create and sustain social inequalities. The economic development opportunities provided by the Proposed Project have the potential to allow new and better-quality housing, to create more employment, reduce the risk of long term unemployment and to allow the development of commercial and amenity facilities as well as other human activities. This in turn can lead to greater opportunities for equity in society.
174. The Proposed Project would supply up to 300 megalitres per day of clean and potable water to the Greater Dublin Area (GDA) and the Proposed Project's wider Water Supply Area. The volume of water supply would meet the demand of the GDA Water Resource Zone (WRZ) to 2050. Furthermore, subject to future projects being brought forward through the planning process, it would enable the future supply to 17 other WRZs in the Eastern region via the redistribution of supply within the GDA WRZ and expansion of the GDA WRZ, and a further 18 WRZs in the Midlands region from potential future connection points along the pipeline (see Chapter 1: Introduction, and Chapter 4: Proposed Project Description for details). Furthermore, with climate change predictions of decreases in mean annual, spring and summer precipitation and extended dry periods, the Proposed Project will help secure a resilient water supply.
175. In summary, the Operational Phase of the Proposed Project has the potential for significant positive wider societal impacts on human health. It would result in a secure, sustainable, long term water supply and would allow for economic and social development which cannot occur without an adequate supply of water. The sensitivity of the population is high, due to the reliance on shared water resources. The magnitude of impact on health is high due to the large scale and long term duration of the water provision and the importance to health. The significance of effect on population health is positive, Very Significant, long term. This is significant for public health due to the health priorities around the provision of clean water.

15.4.3.4 Operational Phase Summary

176. Table 15.13 provides a summary of the effects on human health during operation. In the absence of mitigation measures, there would be no potential significant adverse effects on human health. Operation of the Proposed Project would have potential significant beneficial effects on health improvements from a clean and sustainable water supply.

Table 15.13: Summary of Operational Effects (Pre-Mitigation) for Human Health

Determinant	Health Impact	Population Groups At Risk	Significance of Effect on Human Health*
Noise (operational plant emissions and associated traffic)	Health impacts from exposure to operational noise	People within site-specific and local study area	Negative, Not Significant, Long term
Water	Health impacts from changes in water quality of impacted water bodies	Recreational users of affected water bodies such as boaters and anglers on River Shannon and those reliant on groundwater resources for private water supplies	Neutral, Imperceptible, Long term (effect is not significant)
	Health impacts from changes in water quantity of impacted water bodies	Recreational users of River Shannon such as anglers	Neutral, Imperceptible, Long term (effect is not significant)
Water infrastructure, economy and climate change	Health benefits from resilient water supply	Wider societal population in Eastern and Midlands region	Positive, Very Significant, Long term

*As explained in Section 15.2.1 the assessment relates to effects on population health and should not be used to infer effects on any specific individual.

15.5 Mitigation and Monitoring Measures

15.5.1 Embedded Mitigation

177. The environment team has worked in close collaboration with the infrastructure design team to avoid or reduce environmental impacts through the Proposed Project design. This is referred to as embedded (or design) mitigation. Embedded mitigation is inherent to the Proposed Project design, and forms part of the project description and construction methodology described in Chapter 4 (Proposed Project Description) and Chapter 5 (Construction & Commissioning). As such, embedded mitigation is considered in the assessment of pre-mitigation effects in Section 15.4. Chapter 3 (Consideration of Reasonable Alternatives) details the reasonable alternatives that have been considered throughout the design development of the Proposed Project, including the environmental factors which have influenced the decision making.

178. Embedded mitigation has been identified in other topic chapters to avoid or reduce environmental effects, including Chapter 6 (Noise & Vibration, Chapter 10 (Soils, Geology & Hydrogeology) and Chapter 12 (Air Quality). This includes, for example:

- Siting the Infrastructure Sites and routing the pipeline to avoid sensitive features and communities
- Selection of Haul Roads, through consultation with the Local Authorities, to reduce impacts on communities as far as reasonably practicable.

179. This embedded mitigation would also avoid or reduce potential effects on human health.

15.5.2 Specific Mitigation and Monitoring Measures

180. Specific mitigation measures are proposed to prevent or reduce significant adverse effects. Where appropriate, consideration has been given to the appropriateness of monitoring measures, the purpose of which is to check that the mitigation measures required to prevent or reduce significant adverse effects are delivered and perform as intended, in accordance with the requirements of the EIA Directive.

181. Two significant negative Construction Phase effects on human health were identified, the first related to the potential impacts of noise from construction of the TPR on the sensitive population at Peamount Hospital complex, and the second related to the effect on the farming community during the Construction Phase.

182. Regarding potential impacts of noise from construction of the TPR and access road construction on the sensitive population at Peamount Hospital complex, Section 6.5 of Chapter 6 (Noise & Vibration) sets out mitigation for noise. With those measures in place the noise assessment predicts that Moderate to Significant noise impacts for the TPR and access road construction would reduce to Slight to Moderate significance (effect is not significant). This represents a noise level below or equal to the construction noise threshold but above the baseline noise level. Reference should be made to Chapter 6 (Noise & Vibration) for specific details of the mitigation and residual effects on noise. This would partially mitigate the health effects predicted at Peamount Hospital complex, including the nursing home. There are no other significant human health effects predicted at Peamount Hospital complex, therefore, no further additional mitigation measures are recommended. The residual health effect is assessed as negative, Moderate, short term (effect is not significant).
183. For the significant effect on the farming community during the Construction Phase, Section 11.5 of Chapter 11 (Agriculture) sets out various mitigation measures including ongoing consultation and liaison with landowners to reduce disruption, discussions over potential compensation and pre-construction meetings to understand drainage systems and farm assets to be avoided during, or reinstated post, construction works. With the measures set out in Chapter 11 (Agriculture) it is expected that the potential impacts on the farming community's wellbeing and quality of life can be effectively reduced. The residual health effect is assessed as negative, Moderate, short term (effect is not significant). No other significant negative effects on health were predicted, therefore no further mitigation for human health is required. The extensive mitigation outlined in relevant topic chapters such as Chapter 6 (Noise & Vibration); Chapter 7 (Traffic & Transport); Chapter 9 (Water); Chapter 10 (Soils, Geology & Hydrogeology); and Chapter 12 (Air Quality) would reduce impacts on biophysical and social determinants of health. These measures would further reduce the predicted non-significant negative effects on human health.
184. Mitigation and monitoring measures for other topics are included in the Construction Environmental Management Plan which has been produced to support this EIAR (refer to Appendix A5.1) and are relevant to the Human Health assessment.

15.6 Residual Effects

185. Only impacts resulting in potential significant effects, as set out in the methodology in Section 15.2, are described below and summarised in Table 15.14. With noise mitigation in place for construction of the TPR, the residual health effect for residents, staff and visitors to Peamount Hospital and nursing home is assessed as negative, Moderate, short term (effect is not significant). With effective ongoing consultation, liaison and application of mitigation to reduce impacts on farmland and farming operations in place, the residual effect on the wellbeing of the farming community is assessed as negative, Moderate, short term (effect is not significant).
186. As described in Section 15.4.3.3, there are significant beneficial human health effects predicted from the Operational Phase of the Proposed Project including from the adequate supply of potable water for the protection of public health. This would allow for an adequate water supply to support socio-economic development which in turn would have a positive effect on human health. As these are positive effects, no mitigation is required and the residual effect would be as described in Section 15.4.3.3.
187. Table 15.14 provides a summary of the residual effects from the Human Health assessment.

Table 15.14: Summary of Likely Significant Effects for Human Health

Element/Receptor and Description of Impact	Significance of Effect (Pre-Mitigation)	Mitigation and Monitoring	Residual effect (Post-Mitigation)
Construction Phase			
Construction noise from TPR and access road construction affecting wellbeing of residents, staff and visitors to Peamount Hospital complex, particularly the nursing home and two supported living residences.	Negative, Significant, Short term	Noise mitigation measures as set out in Section 6.5 of Chapter 6 (Noise & Vibration)	Negative, Moderate, Short term (effect is not significant)
Impacts on farm business affecting wellbeing of farming community	Negative, Significant, Short term	Various mitigation measures and commitments to ongoing liaison and consultation with landowners as set out in Section 11.5 of Chapter 11 (Agriculture)	Negative, Moderate, Short term (effect is not significant)
Operational Phase			
Health improvements – Proposed Project would result in an adequate supply of clean potable water and would allow for various wider societal benefits such as economic and social development and climate change resilience which cannot occur without an adequate supply of water.	Positive, Very Significant, Long term	N/A	Positive, Very Significant, Long term

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