

Environmental Impact Assessment Report (EIAR)

Volume 3 of 6: Environmental Assessment

(Chapter 18) Material Assets

Document no: 32105801/EIARC18

Version: Final

December 2025

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Acronyms and Abbreviations

Acronym	Meaning
BPT	Break Pressure Tank
BPS	Booster Pumping Station
CAT	Cable Avoidance Tool
DI	Ductile Iron
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
ESBN	Electricity Supply Board Networks
EU	European Union
FCV	Flow Control Valve
GDA WRZ	Greater Dublin Area Water Resource Zone
GWS	Group Water Schemes
HLPS	High Lift Pumping Station
HV	High voltage
kV	Kilovolt
LV	Low voltage
MI	Million litres
Mld	Million litres per day
MV	Medium voltage
RWI&PS	Raw Water Intake and Pumping Station
RWRM	Raw Water Rising Main
TPR	Termination Point Reservoir
uPVC	unplasticised polyvinyl chloride
WTP	Water Treatment Plant

18. Material Assets

18.1 Introduction

1. This chapter assesses the impacts of the Proposed Project on material assets, specifically utility infrastructure (gas and electricity transmission, communications infrastructure, surface and foul drainage, and communications infrastructure), transport infrastructure (roads, railways, and canals), and industrial land use. In accordance with the requirements of the Environmental Impact Assessment (EIA) Directive, it identifies, describes and assesses the likely significant effects on material assets resulting from the construction and operation of the Proposed Project.
2. This chapter sets out the methodology used, describes the baseline environment, examines the predicted effects of the Proposed Project upon material assets, describes mitigation measures and identifies residual effects. The assessment has been conducted in accordance with current relevant guidance.
3. 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 is described at the start of Section 18.4 and in Section 18.5.
4. Table 18.1 outlines the principal elements of the Proposed Project. A full description is provided in Chapter 4 (Proposed Project Description) of this Environmental Impact Assessment Report (EIAR).

Table 18.1: Summary of Principal 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 75ML 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 Lisgarriff (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.

5. Construction of the Proposed Project is anticipated to run from 2028 to 2032, with the first operational year anticipated to be 2033.
6. This chapter is supported by the following documents:
 - Appendix A18.1 (Schedule of Minor Crossings)
 - Appendix A18.2 (Glint and Glare Assessment).
7. Figures which are referenced in the text are provided in Volume 5 of this EIAR.
8. This assessment has been undertaken and reported by a team of competent experts. Refer to Chapter 2 (The Environmental Impact Assessment Process) for a description of the qualifications and expertise of the specialists that have inputted to this chapter.

18.2 Methodology

18.2.1 Scope of the Assessment

9. The scope of this assessment is determined by the definition of the term 'material assets'. The Environmental Protection Agency (EPA) Guidelines on the information to be contained in Environmental Impact Assessment Reports (hereafter referred to as the 'EPA Guidelines') (EPA 2022) define material assets as follows:

'In Directive 2011/92/EU this factor included architectural and archaeological heritage. Directive 2014/52/EU includes those heritage aspects as components of cultural heritage. Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes transport infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils.'

10. For the purpose of this assessment, therefore, material assets have been defined as utilities infrastructure, transport infrastructure, and industrial land use. Other features which may also be considered to be asset types, but not in the context of the EPA Guidelines, are addressed in their own respective chapters as follows:
 - Traffic – Chapter 7 (Traffic & Transport)
 - Waterways, rivers and streams and temporary reductions in existing abstractions during commissioning – Chapter 9 (Water)
 - Soils, geological heritage features and mining or quarrying operations – Chapter 10 (Soils, Geology & Hydrogeology)
 - Agricultural land – Chapter 11 (Agriculture)
 - Loss of renewable energy generation – Chapter 13 (Climate)
 - Businesses, social infrastructure such as educational and healthcare facilities, and other land-use assets – Chapter 14 (Population)
 - Cultural heritage assets – Chapter 17 (Cultural Heritage)
 - Waste management facilities – Chapter 19 (Resource & Waste Management).
11. The majority of the land use that would be affected along the route of the Proposed Project would be agricultural land and as a result the majority of the land use impacts are assessed in Chapter 11 (Agriculture).

12. Potential effects on residential properties and commercial property have been assessed in Chapter 14 (Population) and therefore have not been duplicated in this chapter. There would be no different or additional effects on them as an asset and therefore they are not considered further within the scope of the Material Assets assessment reported in this chapter. There would be the demolition of five buildings as part of the Proposed Project. They would consist of two sheds/out buildings and three buildings at a derelict petrol station. Although these assets would be permanently lost there would be no significant environmental effects from the removal of the structures and they are not considered further in this chapter.
13. There would be no direct impact on Ardnacrusha Power Station as a result of the Proposed Project. As part of an overall agreement with ESB, water will be diverted to the Proposed Project abstraction from the flow that would otherwise have been used for electricity generation on a continuous year round basis. At a practical level, this will mean that ESB, in keeping the water level within the Normal Operating Band on Lough Derg and within the upper and lower water level on Parteen Basin, will take account of, and respond to, the volume of water abstracted for the Proposed Project, alongside other relevant considerations such as, maintaining statutory compensation flow of 10m³/s down the Old Shannon channel, predicted rainfall, the demand for power and operating practices. ESB will maintain the water levels within the Normal Operating Band on Lough Derg and within the upper and lower water levels on Parteen Basin, as it does currently. Over longer periods there would be a generalised adjustment of the flow going to Ardnacrusha by ESB to respond to the volume of water used by the Proposed Project. Any such adjustment could potentially result a small reduction in the generation of renewable energy. This is assessed as a climate impact and reported in Chapter 13 (Climate). As there would be no impact on the power station as an asset, Ardnacrusha Power Station is not considered further within the scope of the Material Assets assessment reported in this chapter.
14. Power for the Proposed Project that is provided by connections to the existing network would be provided by ESBN. The availability of power and any consequences of such power being supplied to the Proposed Project is not part of the Proposed Project and not considered within the assessment reported in this chapter. It is assumed that ESBN will maintain the supplies required for all users.
15. The Fort Henry Embankment, which forms part of the Parteen Basin impoundment, is an engineered linear structure which is classified as a Category A dam. The potential geotechnical impacts on the embankment during the Construction Phase are assessed in Chapter 10 (Soils, Geology & Hydrogeology). The potential risk of embankment failure is addressed in Chapter 20 (Risk of Major Accidents and/or Disasters). There would be no direct impact on the embankment as an asset as the functioning embankment would be outside the Planning Application Boundary. Any indirect effect on the embankment as an asset is no different to the effect resulting from the risk of an embankment failure which is assessed and reported in Chapter 20 (Risk of Major Accidents and/or Disasters). Therefore, this is not duplicated in both chapters. There are no further foreseeable impacts that could occur at the Fort Henry Embankment as a consequence of the Proposed Project, and so on this basis this asset is not considered further in the assessment of material assets reported in this chapter.
16. Commercial peat extraction activities along the pipeline route have ceased. Therefore, peat is not considered to be a material asset in the context of this chapter. Its value as a natural asset is, however, recognised in Chapter 10 (Soils, Geology & Hydrogeology) and as a biodiversity receptor in Chapter 8 (Biodiversity).
17. Commercial forestry is a material asset and there would be a loss of up to approximately 14.5 hectares of commercial forestry temporarily during construction. Due to restrictions on the size of trees that can be planted over the pipeline once it has been installed, up to 6.6 hectares of this would be lost permanently. For a landowner who is prevented from either planting a commercial forestry or allowing an existing plantation to continue due to the presence of the Permanent Wayleave, or any part thereof, then Uisce Éireann shall pay compensation to the landowner subject to the provisions of the Deed of Easement.

Landowner compensation for the acquisition of land or a right over land will be assessed in accordance with the provisions in the Deed of Easement in consent cases by agreement with the landowner or in default of agreement by an independent arbitrator and in cases of an acquisition by Compulsory Purchase Order under the Statutory Rules of Compensation. Consequently, any loss is addressed through financial compensation and there would be no further environmental loss of a material asset to be assessed. The consequence of the loss of forestry as a biodiversity receptor or due to the impact on climate change is reported in the assessments on biodiversity and climate in Chapter 8 (Biodiversity) and Chapter 13 (Climate). Therefore, loss of commercial forestry including Coillte Lands (managed and owned) has been scoped out of the assessment reported in this chapter.

18. A Glint and Glare assessment has been undertaken for the solar panels proposed as part of the Infrastructure Sites along the route of the pipeline. This is contained in Appendix A18.2 (Glint and Glare Assessment). The conclusions of the Glint and Glare assessment confirmed that there would be no likely significant effects requiring mitigation on airport flight paths or air traffic control centres within 10km of the Infrastructure Sites.
19. The EIAR Scoping Methodology Report issued in November 2023 (Uisce Éireann 2023) identified the potential effects scoped into the assessment. These are summarised in Table 18.2. The matters scoped out of the assessment are summarised in Table 18.3. The scope has been slightly amended since the EIAR Scoping Methodology Report was produced and this is explained in Tables 18.2 and 18.3.
20. 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.

Table 18.2: Summary of Scope of the Assessment¹

Project Phase	Potential Impacts Scoped In
Construction	<ul style="list-style-type: none"> • Impacts on material assets including electricity transmission infrastructure, gas transmission infrastructure, communications infrastructure, foul drainage and water supplies infrastructure, industrial use lands and transport infrastructure (updated to reflect matters scoped out in Table 18.3)
Operation	<ul style="list-style-type: none"> • Consideration of potential impacts on material assets including electricity transmission lines, gas transmission pipelines, telecommunications, foul drainage and water supplies, industrial use land and transport infrastructure (updated to reflect matters scoped out in Table 18.3)

Table 18.3: Summary of Matters Scoped Out of the Assessment²

Project Phase	Potential Impacts Scoped Out
Construction	<ul style="list-style-type: none"> • Impacts on ecological habitats – these are addressed within the Biodiversity assessment • Impacts on geological heritage features, quarries and gravel pits – these are addressed within the Soils, Geology and Hydrogeology assessment • Agricultural lands – these are addressed within the Agriculture assessment • Impacts on land resource material assets including forestry and peatlands (updated to scope these out on the basis that commercial peat extraction has ceased and commercial forestry will be mitigated through financial compensation) • Impacts on residential properties and individual commercial buildings including the demolition of buildings (updated to clarify that these have been scoped out)*

¹ The scope has been updated since the EIAR Scoping Methodology Report in 2023 for the assessment reported in this chapter. This was necessary to take account of changes within the Proposed Project and to clarify the relationship between the matters assessed under the Material Assets assessment and those assessed under other topics within the EIAR.

² As above.

Project Phase	Potential Impacts Scoped Out
Commissioning	<ul style="list-style-type: none"> No anticipated impacts on material assets (updated to confirm there would be no effect on drainage infrastructure during discharge)
Operation	<ul style="list-style-type: none"> Impacts on ecological habitats – these are addressed within the Biodiversity assessment Impacts on geological heritage features, quarries and gravel pits – these are addressed within the Soils, Geology and Hydrogeology assessment Agricultural lands – these are addressed within the Agriculture assessment Impacts on land resource material assets including forestry and peatlands (updated to scope these out on the basis that commercial peat extraction has ceased and commercial forestry will be mitigated through compensation payments) Impacts on residential properties and individual commercial buildings (updated to clarify that these have been scoped out)*

* These receptors are assessed in Chapter 14 (Population)

18.2.2 Study Area

- The Proposed Project extends across the country from County Limerick to South Dublin County. The study area for the assessment is the Planning Application Boundary for the Proposed Project and the associated construction Haul Roads. The only effects on existing material assets would be a direct impact from the construction or operation of the Proposed Project as the scope of the assessment has not identified any potential indirect effects on material assets. Therefore, the study area is the Planning Application Boundary encompassing all areas where works would be required to construct the Proposed Project and the public road network used for construction access. This has been updated since the EIAR Scoping Methodology Report (Uisce Éireann 2023) to confirm that the construction Haul Roads are included within the scope of the assessment.
- For industrial land use, the study area has been extended to a 500m buffer around the Planning Application Boundary, a total corridor of 1km. Beyond 500m it is not expected that there would be likely significant effects on an industrial use from a project with the characteristics of the Proposed Project.

18.2.3 Relevant Guidelines, Policy and Legislation

- There is no set approach or guidance document that specifies how an assessment of material assets should be carried out. This assessment was prepared in accordance with relevant European Union and Irish legislation, including Schedule 6 of the Planning and Development Regulations 2001 (as amended) and the Planning and Development Act 2000 (as amended). The assessment has been undertaken with regard to relevant guidelines – including EPA (2022) and European Commission (2017) EIAR Guidelines and Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government 2018) – and professional judgement, which is considered appropriate for the Proposed Project.
- Any references to legislation in this chapter include any amendments thereto.

18.2.4 Data Collection Methods

- Two main forms of data collection were employed: desk study (including utility searches) and field surveys. These data collection approaches enabled the identification and ground truthing of a broad range of assets, not only the material assets described in this chapter. This additional information was used to support other EIAR topic areas such as Chapter 7 (Traffic & Transport), Chapter 14 (Population) and Chapter 20 (Risk of Major Accidents and/or Disasters).

18.2.4.1 Desk Study

26. The desk study examined aerial photography, topographical information and Geographical Information System datasets to identify relevant material assets within the study area. Existing utility information was requested and provided from utility companies and service providers including:

- ESB Networks
- Gas Networks Ireland
- Office of Public Works
- Uisce Éireann
- Coillte
- Telecoms service providers.

18.2.4.2 Field Surveys

27. Engineering walkover surveys were undertaken over a two-year period to March 2019 for previous iterations of the project. These visits comprised a visual inspection of the route of the proposed pipeline to support the desk study and to inform the design. This included the identification of material asset features to support the desk study. These surveys remain valid for the Proposed Project as the alignment remains the same in many instances. Subsequently, those surveys have been supplemented with the following for the Proposed Project:

- General walkover survey between 2017 – 2019
- Site visits for the Infrastructure Sites including - 2024 for the RWI&PS; October 2023 for the BPT, BPS, FCV; November 2025 for the TPR
- Review of the Haul Roads in 2021 and 2025
- High resolution overhead imagery specifically for the Proposed Project
- Ongoing engagement with landowners to identify relevant features/constraints.

28. The high-resolution imagery was used to check for any new above ground material assets and, for example, identified developments such as a new house which had not been present when the original 2019 surveys were undertaken.

18.2.5 Consultation

29. 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 the 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 Scoping Report³ (Irish Water 2016) relating to a previous iteration of the project.

30. The scoping consultation responses relevant to material assets received from stakeholders are provided in Table 18.4. 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.

³ As set out in Chapter 2 (The Environmental Impact Assessment 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 assessment where relevant to the Proposed Project.

Table 18.4: Issues Raised During Scoping Consultations

Consultee	Comment	Relevant Section of the EIAR
Commission for Railway Regulation	Project work (construction and operation) must be managed in order to be prevented from affecting the safe operation of any railway that the pipe will cross or come within close proximity to.	Construction of the Treated Water Pipeline crossings below the Galway Service railway (RYX005) and the Dublin – Newbridge railway line (RYX006) would be undertaken using trenchless construction techniques. Additional railway crossings for the provision of power connections would be undertaken using directional drilling. These are both described in Chapter 5 (Construction & Commissioning).
Inland Fisheries Ireland	Crossing of the Grand Canal should be undertaken by directional drilling.	Construction of the crossing of the Grand Canal would be undertaken using trenchless construction techniques, as described in Chapter 5 (Construction & Commissioning).
Railway Safety Commission	<p>Iarnród Éireann should be consulted to ensure that risks associated with railway trespass are not increased in the vicinity of the project.</p> <p>Construction work should not affect the safe operation of the railway network in the future.</p> <p>Observations/issues raised by Iarnród Éireann should be addressed.</p> <p>Iarnród Éireann should be consulted with regard to rail-road interfaces on access routes likely to have increased flow and abnormal loads during construction.</p>	<p>Construction of the pipeline crossings below the Galway Service railway (RYX005) and the Dublin – Newbridge railway line (RYX006) would be undertaken using trenchless construction techniques. Additional railway crossings for the provision of power connections would be undertaken using directional drilling. These are both described in Chapter 5 (Construction & Commissioning).</p> <p>The safety and security considerations associated with the construction of these rail crossings would be discussed in consultation with Iarnród Éireann in advance of any works.</p>
Iarnród Éireann	<p>Any microtunnelling works to be subject to legal licence agreements being in place.</p> <p>Depending on the nature of the works and the proximity of these to railway lines there may be some disruption to rail services. Accordingly, it will be necessary to consult with Iarnród Éireann well in advance in order to agree on the timing, scope and specification of the works. This will be particularly important in the case of the under-railway crossing on the Galway line. The design of this crossing and method of construction would need to be agreed in advance with Iarnród Éireann.</p>	Construction of the pipeline crossings below the Galway Service railway (RYX005) and the Dublin – Newbridge railway line (RYX006) would be undertaken using trenchless construction techniques. Additional railway crossings for the provision of power connections would be undertaken using directional drilling. These are described in Chapter 5 (Construction & Commissioning).
Tipperary County Council	Preferred route corridor has the potential to interact with nine Public Water Schemes within the County. More detailed consultation with Tipperary County Council to be undertaken prior to planning permission submission.	Section 18.3 of this chapter.
Kildare County Council	Provision should be made to maintain all existing wayleaves and to protect water mains during construction of the pipeline.	Section 18.3 of this chapter.

18.2.6 Appraisal Method for the Assessment of Impacts

31. The assessment of potential impacts of the Construction and Operational Phases on material assets was completed in accordance with the EPA Guidelines (EPA 2022). Table 2.2 in Chapter 2 (The Environmental Impact Assessment Process) outlines how the EPA Guidelines were applied to the evaluation of environmental effects on material assets, and Table 2.3 in the same chapter presents the significance of these effects. Significant effects in the context of the EPA Guidelines were deemed to be Significant effects or above.
32. For the Material Assets assessment, the consequential scenarios were based on whether potential impacts may affect end users, as well as the asset itself. For example, in the case of utility infrastructure, consideration was given to whether the potential for loss of power, gas, telecommunications or water would affect supplies to end users (homes and businesses), in addition to impacts on the assets themselves. Likewise, an impact on the rail or canal network was assessed not only in relation to the infrastructure itself but also to the transport network users.

18.2.7 Construction Flexibility

33. 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 18.5 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.
34. The construction works necessary to deliver the permanent design (including the construction flexibility defined in Table 18.5) 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.
35. 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 18.5 (i.e. the difference in effects would be imperceptible for the purpose of the assessment).

Table 18.5: 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).	The Material Assets assessment has identified the likely significant environmental effects from the horizontal alignment of the pipeline being within the 20m Pipeline Corridor. The construction flexibility for the horizontal alignment of the pipeline will be utilised, where reasonably practicable, to avoid impacting directly on existing infrastructure and reduce the potential effects on material assets.
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.	The Material Assets assessment has identified the likely significant environmental effects from the vertical alignment of the pipeline being within the defined upper and lower levels for the vertical alignment. The construction flexibility for the vertical alignment of the pipeline will be utilised, where reasonably practicable, to avoid impacting directly on existing infrastructure and, where this is not reasonably practicable, to reduce the potential effects on material assets.

Design Element	Construction Flexibility	How this has been Applied / Assessed in this Chapter
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).	The Material Assets assessment has identified the likely significant environmental effects from the valves being located within this defined construction flexibility.
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.	The Material Assets assessment has identified the likely significant environmental effects from the outfall connections being within the 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.	There would be no material assets affected by the outfall locations.

18.2.7.1 Variation in Construction Methods

36. In addition to the construction flexibility defined in Table 18.5 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.

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

38. In addition, as set out in Appendix A5.3 (Methods of Working in Peat), 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. The relevance to Material Assets assessment would only be if this technique was to be adopted where an existing asset was below the ground. In this instance the existing asset would act as a constraint and the techniques proposed under Method 3 or 4 would not be adopted for a short section if this would interfere with an existing asset. Therefore, 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).

18.2.8 Sensitivity of Receptors

39. Disruption of utilities at single point locations can often affect the functionality of the infrastructure over a large area. Therefore, all utilities are considered sensitive to change.
40. The disruption of rail lines at a single location can affect the functionality of the infrastructure over a large area. Therefore, all rail lines are also considered sensitive to change.
41. Similarly, the capacity of a canal waterway to accommodate change is limited and therefore considered sensitive to change.
42. The sensitivity of the existing material assets is determined having regard to criteria set out in Table 18.6.

Table 18.6: Summary of Material Assets with Potential to be Impacted by the Proposed Project

Material Asset	Element	Level of Importance	Sensitivity Rating
Utility infrastructure	Gas transmission/high pressure pipework (≥ 4 bar)	National	High
	Gas distribution pipework (≤ 4 bar)	Regional	Medium
	Potable (drinking) water trunk mains and trunk foul or combined sewers	Regional	Medium
	Water pipes (arterial) for drinking water, combined surface water sewers, foul sewers	Regional	Medium
	Surface water sewers of greater than or equal to 300mm diameter	Regional	Medium
	Surface water sewers of less than 300mm diameter	Local	Low
	Electricity (distribution) high voltage (HV) cables including underground cables and overhead lines above 38 kV	Regional 38 kV – 110 kV National 220 kV – 400 kV	Medium High
	Electricity (transmission) cables including underground cables and overhead lines of 38 kV and below	Local – Regional (depending on the voltage)	Low
	Telecommunications (including cables such as telephone and internet, cable television networks, signalling and traffic cables and other control cables (e.g. other private services))	Local – National (depending on the number of users/size of the supply)	Low – high
Transport infrastructure	Road network	Local – National (depending on the status of the road)	Low – high
	Rail network	Regional – National (depending on whether it is a regional or mainline rail link)	Medium – high
	Navigable canal waterways	Regional (as a canal does not provide a national level transport link)	Medium
Industrial land use	Power Station/Wind Farms/Solar Farm/ other generation identified)	Regional – National	Medium – high
	Power generation	Regional – National (depending on the level of generation)	Medium – high

18.2.9 Difficulties Encountered in Compiling Information

43. Obtaining accurate records of existing utilities is difficult. In particular, information regarding the age and material of existing services is in some cases insufficient or unreliable. Consultation has been undertaken with infrastructure and utility stakeholders to supplement records where required. A summary of this engagement is provided in Appendix A18.1 (Schedule of Minor Crossings). This assessment represents a prudent view of the baseline environment based on the information that was provided and otherwise obtained at this stage of the process. Any unidentified utilities would be managed through the same measures set out in this assessment and additional significant effects would not be likely. The information that has been used in 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 conclusions of the assessment.

18.2.10 Cumulative Effects Assessment

44. 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.

45. There are no environmental effects described within other topic chapters that require consideration for the intra-project cumulative effects assessment in the material assets topic chapter. However, there are features which may be considered to be material assets such as waste management facilities and agriculture land, which are addressed in topic specific chapters, rather than being reported in this Material Assets chapter, as set out in Section 18.2.1.

18.3 Baseline Environment

46. During the site selection process for the Proposed Project (including siting of the Infrastructure Sites and the pipeline routing), material assets were identified by desk study and engineering site visits and taken into consideration during the optioneering process (refer to Chapter 3: Consideration of Reasonable Alternatives) and the development of the design. As a result, the Proposed Project has embedded design principles which include:

- The avoidance of baseline material assets altogether through the careful routing or siting of the pipeline and permanent Infrastructure Sites away from sensitive locations
- The development of construction techniques at locations where the Proposed Project intersected with existing utility or transport infrastructure in such a way as to allow:
 - The assets to continue operating during construction; or
 - The avoidance of supply interruptions for end users of utility infrastructure while operation of the infrastructure is temporarily suspended to enable safe and efficient construction of the Proposed Project at each location (for example, overhead electricity transmission lines may need to be temporarily de-energised to enable safe construction operations in proximity to them).

47. The following section describes material assets within the study area, with referencing provided as appropriate to supporting figures provided in Volume 5 of this EIAR, specifically Figures 18.1 to 18.59.

18.3.1 Gas Transmission Infrastructure

48. Gas Networks Ireland own, operate, build and maintain the natural gas network in Ireland. The gas transmission infrastructure lines crossed by the Proposed Project are summarised in Tables 18.7 and 18.8 which differentiate between crossings needed for the Proposed 38 kV Uprate Works (and the associated power connection to the RWI&PS and WTP) and crossings by the water pipeline. All of the gas infrastructure that would be crossed are located along roads and therefore would be associated with specific road crossings, as listed.
49. The construction flexibility for the vertical and horizontal alignment of the pipeline will be utilised to avoid impacting directly on existing infrastructure.

Table 18.7: Gas Infrastructure Crossings – Proposed 38 kV Uprate Works and Power Connection to RWI&PS and WTP

Number	Crossing ID	Crossing Type	Material Details	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
1	PSN-GCN001 (PSN-RDX002)	Gas – Medium pressure	90mm diameter ((PE80) polyethylene material)	Ardnacrusha – Birdhill (northern line)	Proposed 38 kV Uprate Works	Figure 18.1	Overhead line
2	PSN-GCN002 (PSN-RDX003)	Gas – Medium pressure	180mm diameter ((PE80) polyethylene material)	Ardnacrusha – Birdhill (northern line)	Proposed 38 kV Uprate Works	Figure 18.1	Overhead line
3	GCN001 (RDX117)	Gas – Medium pressure	400mm diameter ((PE100) polyethylene material)	Birdhill Roundabout (R445)	The power supply from Birdhill Substation to the WTP would cross the gas main and run parallel to it, along the R445	Figure 18.5	Overhead line (to be removed) and buried cable for new power connection (directional drilling for crossings)
4	GCN002 (RDX119)	Gas – Medium pressure	250mm diameter ((PE80) polyethylene material)	Birdhill Roundabout (R494)	The power supply from Birdhill Substation to the RWI&PS would cross the gas main and run parallel to it, along the R494	Figure 18.5	Overhead line (to be removed) and buried cable for new power connection (directional drilling for crossings)
5	GCN003 (RDX118)	Gas – Medium pressure	250mm diameter ((PE100) polyethylene material)	Birdhill Roundabout	Crossing at R445/R494 Roundabout	Figure 18.5	Buried cable to replace overhead line removed (directional drilling for the crossing)
6	GCN004	Gas – Medium pressure	90mm diameter ((PE80) polyethylene material)	New power connection to the RWI&PS	The power supply from Birdhill Substation to the RWI&PS would run parallel to this gas main, along the R494	Figure 18.5	Underground line – open excavation
7	GCN005	Gas – Medium pressure	90mm diameter ((PE80) polyethylene material)	New power connection to the RWI&PS	The power supply from Birdhill Substation to the RWI&PS would run parallel to this gas main, along the R494	Figure 18.5	Underground line – open excavation

Number	Crossing ID	Crossing Type	Material Details	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
8	GCN006 (RDX121)	Gas – Medium pressure	400mm diameter ((PE80) polyethylene material)	R445	Crossing at entrance to the WTP	Figure 18.6	Underground line – Directional drilling
9	GCN012 (RDX120)	Gas – Medium pressure	250mm diameter ((PE80) polyethylene material)	R494	Crossing at the entrance to the RWI&PS	Figure 18.6	Underground line – Directional drilling

Table 18.8: Gas Infrastructure Crossings – Pipeline

Number	Crossing ID	Crossing Type	Material Details	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
1	GCN007 (RDX001)	Gas – Medium pressure	250mm diameter ((PE80) polyethylene material)	Pipeline crossing – R494 Regional Road, County Tipperary	RW – 700	Figure 18.6	Trenchless crossing
2	GCN008 (RDX003)	Gas – Medium pressure	400mm diameter ((PE100) polyethylene material)	Pipeline crossing – R445 Regional Road, County Tipperary	TW – 1900	Figure 18.7	Trenchless crossing
3	GCN009 (RDX013)	Gas – Medium pressure	400mm diameter ((PE100) polyethylene material)	Pipeline crossing – R445 Regional Road, County Tipperary	TW – 12700	Figure 18.10	Trenchless crossing
4	GCN010 (RDX107)	Gas – Medium pressure	180mm diameter ((PE80) polyethylene material)	Pipeline crossing – R403 Regional Road, County Kildare	TWE – 8500	Figure 18.56	Trenchless crossing
5	GCN011 N/A – TPR site	Gas – Medium pressure	125mm diameter ((PE80) polyethylene material)	N/A	TWE – 17500	Figure 18.59	N/A – the gas pipeline is within the Planning Application Boundary but not crossed by the Proposed Project pipeline

18.3.2 Electricity Transmission Infrastructure

50. ESNB, as part of the Electricity Supply Board Group, are responsible for the building, operation, maintenance and development of the electricity network in the Republic of Ireland.
51. The existing power transmission infrastructure identified in the study area consists of:
 - Low voltage (LV) and medium voltage (MV) distribution network (10 kV and 20 kV)
 - High voltage (HV) transmission network (38 kV, 110 kV, 220 kV and 440 kV).
52. The HV overhead power lines (38 kV and above) crossed by the Proposed Project are summarised in Table 18.9. The MV and LV crossings are listed in Appendix A18.1 (Schedule of Minor Crossings).

53. The construction flexibility for the vertical and horizontal alignment of the pipeline will be utilised to avoid impacting directly on existing infrastructure.

Table 18.9: Overhead Power Line Crossings – High Voltage: 38 kV and Higher Voltage

Number	Crossing Type	Crossing ID	Crossing Reference	Existing Line	Approximate Starting Chainage	Figure Reference	Crossing Method
1	Power	OHX023	Ardnacrusha – Birdhill – Nenagh Line (Southern Line)	Overhead	N/A	Figure 18.5	Underground cable connection point for line upgrade
2	Power	OHX001	220 kV Network	Overhead	TW – 7400	Figure 18.8	Trenchless/ open excavation
3	Power	OHX002	400 kV Network	Overhead	TW – 10500	Figure 18.9	Trenchless
4	Power	OHX003	220 kV Network	Overhead	TW – 24800	Figure 18.14	Trenchless/ open excavation
5	Power	OHX004	220 kV Network	Overhead	TW – 26200	Figure 18.14	Trenchless/ open excavation
6	Power	OHX005	38 kV Network	Overhead	TWA – 21700	Figure 18.24	Trenchless/ open excavation
7	Power	OHX006	110 kV Network	Overhead	TWB – 1700	Figure 18.26	Trenchless/ open excavation
8	Power	OHX007	110 kV Network	Overhead	TWB – 11700	Figure 18.32	Trenchless/ open excavation
9	Power	OHX008	38 kV Network	Overhead	TWB – 27800	Figure 18.37	Trenchless/ open excavation
10	Power	OHX024	110 kV Network	Overhead	TWC – 11800	Figure 18.40	Trenchless/ open excavation
11	Power	OHX009	38 kV Network	Overhead	TWD – 15500	Figure 18.48	Trenchless/ open excavation
12	Power	OHX010	38 kV Network	Overhead	TWD – 15700	Figure 18.49	Trenchless/ open excavation
13	Power	OHX011	110 kV Network	Overhead	TWD – 22300	Figure 18.50	Trenchless/ open excavation
14	Power	OHX012	110 kV Network	Overhead	TWD – 25800	Figure 18.52	Trenchless/ open excavation
15	Power	OHX013	110 kV Network	Overhead	TWD – 29500	Figure 18.53	Trenchless/ open excavation
16	Power	OHX014	110 kV Network	Overhead	TWE – 2800	Figure 18.55	Trenchless/ open excavation
17	Power	OHX015	220 kV Network	Overhead	TWE – 2800	Figure 18.55	Trenchless/ open excavation

Number	Crossing Type	Crossing ID	Crossing Reference	Existing Line	Approximate Starting Chainage	Figure Reference	Crossing Method
18	Power	OHX016	220 kV Network	Overhead	TWE – 5200	Figure 18.55	Trenchless/ open excavation
19	Power	OHX017	220 kV Network	Overhead	TWE – 6300	Figure 18.56	Trenchless/ open excavation
20	Power	OHX018	110 kV Network	Overhead	TWE – 9700	Figure 18.57	Trenchless
21	Power	OHX019	38 kV Network	Overhead	TWE – 10200	Figure 18.57	Trenchless/ open excavation
22	Power	OHX025	38 kV Network	Overhead	N/A – BPS power connection	Figure 18.29	Directional drilling

18.3.3 Communications Infrastructure

54. Communications infrastructure, including overhead lines and underground cables, are present throughout the area of the Proposed Project, primarily in the vicinity of the road crossings and connections to residential and commercial properties. This is considered to be normal infrastructure which would be encountered in any civil engineering works in rural and urban environments.
55. The only unique communications infrastructure that has currently been identified is the telecommunications mast to the north of the BPT.
56. The communications infrastructure along the route of the Proposed Project is summarised in Table 18.10. These are listed in full list in Appendix A18.1 (Schedule of Minor Crossings) and are shown on Figure 18.1 to Figure 18.59.
57. The construction flexibility for the vertical and horizontal alignment of the pipeline will be utilised to avoid impacting directly on existing infrastructure. Therefore, there would be no impact on these assets.

Table 18.10: Communications Crossings

Crossing Type	Crossing ID	Crossing Reference	No. of Crossings	Figure Reference	Crossing Method
Communications	PSN-CCA001 – PSN-CCA009	Eir	9	Figure 18.1 – 18.6	Proposed 38 kV Uprate Works – overhead line 7 overhead line 2 underground cable
Communications	CCA03 – CCA09	Eir	8	Figures 18.6 and 18.7	RWI&PS and WTP underground power connection
Communications	CCA035 – CCA043	Eir	9	Figures 18.26 – 18.29	BPS underground power connection
Communications	CCA001 – CCA002	Aurora	2	Figure 18.54 and Figure 18.58	Pipeline – open excavation (1 no.) and trenchless crossing (1 no.)

Crossing Type	Crossing ID	Crossing Reference	No. of Crossings	Figure Reference	Crossing Method
Communications	CCA003 – CCA076	Eir	57	Figure 18.5 – 18.59	Pipeline – 48 Open excavation 8 trenchless Crossing 1 overhead line

18.3.4 Surface Drainage and Foul Drainage Infrastructure

58. Surface drainage is present throughout the area of the Proposed Project and includes field drains and road network drainage. This is considered to be normal infrastructure which would be encountered in any civil engineering works in rural and urban environments.
59. Wastewater collection mains would be crossed at some locations by the Proposed Project. This is considered to be typical infrastructure which is frequently encountered in civil engineering infrastructure projects in both rural and urban environments. The wastewater collection infrastructure along the route of the Proposed Project is shown in Figure 18.1 to Figure 18.59. The sewer mains crossed by the proposed infrastructure are listed in Table 18.11.
60. The construction flexibility for the vertical alignment of the pipeline will be utilised to avoid impacting directly on existing infrastructure.

Table 18.11: Drainage Crossings

Number	Crossing Type	Crossing ID	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
1	Foul drainage	USC001 (RDX108)	Sewer Main	TWE – 9600	Figure 18.57	Open excavation
2	Foul drainage	USC002 (TPR)	Sewer Main	N/A	Figure 18.59	Diverted
3	Foul drainage	USC003 (TPR)	Sewer Main	N/A	Figure 18.59	Power connection crossing

18.3.5 Water Supply Infrastructure

61. The Proposed Project would cross water supply mains owned and operated by Uisce Éireann at several locations. This is considered to be typical infrastructure which is frequently encountered in civil engineering infrastructure projects in both rural and urban environments. Water supply mains in the study area are shown in Figure 18.1 to Figure 18.59.
62. During the EIA scoping consultation Tipperary County Council identified Group Water Schemes (GWS), which also include water supply infrastructure, that may interact with the Treated Water Pipeline. These GWS include:
- Dromin Carrigatogher GWS
 - Ballycuddymore GWS
 - Patrickswell GWS
 - Plunkett Street GWS
 - Gurteenakilla GWS

- Ballyhimkin GWS
- Ardcroney GWS
- Whitehall GWS.

63. Four GWS have been identified through engagement with the National Federation of Group Water Schemes for future engagement in preparation for construction. These are Ardcroney GWS, Ballingar GWS, Mount Lucas GWS, Killeigh GWS. Impacts on infrastructure as part of the GWS will be managed in accordance with mitigation set out in this chapter. The assessment of ground water impact reported in Chapter 10 (Soils, Geology & Hydrogeology) has considered the potential for impacts on the groundwater quality or flows within the relevant Public Water Schemes/GWS.
64. The construction flexibility for the vertical alignment of the pipeline will be utilised to avoid impacting directly on existing infrastructure.
65. The water distribution infrastructure along the route of the Proposed Project is shown in Figure 18.1 to Figure 18.59 and the trunk mains are listed in Table 18.12. Water distribution pipes crossed by the Proposed Project are listed in Appendix A18.1 (Schedule of Minor Crossings).

Table 18.12: Water Trunk Main Crossings

Number	Crossing Type	Crossing ID	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
1	Trunk Water Mains	PCN-UPC001	uPVC 400mm	Overhead line connection for 38kV Uprate Works	Figure 18.1	38 kV Uprate Works – overhead line
2	Trunk Water Mains	PCN-UPC003	DI 600mm	Overhead line connection for 38kV Uprate Works	Figure 18.1	38 kV Uprate Works – overhead line
3	Trunk Water Mains	UPC008 (RDX016)	uPVC 100mm	TW – 14100	Figure 18.10	Open excavation
4	Trunk Water Mains	UPC010 (RDX024)	DI 600mm and uPVC 150mm	TW – 22400	Figure 18.13	Open excavation
5	Trunk Water Mains	UPC022 (RDX069)	AC 406.4mm	TWB – 24700	Figure 18.36	Open excavation
6	Trunk Water Mains	UPC024 (RDX076)	uPVC 76.2mm	TWC – 7900	Figure 18.39	Open excavation
7	Trunk Water Mains	UPC040 (RDX090)	uPVC 254mm	TWD – 16200	Figure 18.49	Open excavation
8	Trunk Water Mains	UPC030 (RDX100)	Unknown 400mm	TWE – 100	Figure 18.54	Open excavation
9	Trunk Water Mains	UPC035 (RDX106)	uPVC 152.4mm	TWE – 7800	Figure 18.56	Open excavation
10	Trunk Water Mains	UPC036 (RDX107)	DI 300mm	TWE – 8500	Figure 18.56	Trenchless
11	Trunk Water Mains	UPC037	DI 900mm	TWE – 9000	Figure 18.57	Open excavation
12	Trunk Water Mains	UPC045	DI (Ductile Iron) 1200mm	TWE – 17100	Figure 18.59	Open excavation

Number	Crossing Type	Crossing ID	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
13	Trunk Water Mains	UPC050	DI (Ductile Iron) 1200mm	TWE – 17100	Figure 18.59	TPR access
14	Trunk Water Mains	UPC055	DI (Ductile Iron) 1200mm	TWE – 17500	Figure 18.59	TPR

18.3.6 Railways

66. The Proposed Project would cross rail infrastructure at eight locations. Two of these rail crossing locations are along disused rail lines, while the remaining rail crossings are along active rail lines, operated by Iarnród Éireann. The locations of these railway crossings are listed in Tables 18.13 and 18.14.

Table 18.13: Railway Crossings – Proposed 38 kV Uprate Works and Power Connection to RWI&PS and WTP

Number	Crossing Type	Crossing ID	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
1	Railway	PSN-RYX001	Limerick – Ballybrophy railway line	n/a – Proposed 38 kV Uprate Works	Figure 18.5	Overhead line
2	Railway	RYX003	Limerick via Nenagh railway line	New power connection to the RWI&PS	Figure 18.5	Directional drilling
3	Railway	RYX004	Limerick via Nenagh railway line	New power connection to the WTP	Figure 18.6	Direction drilling

Table 18.14: Railway Crossings – Pipeline

Number	Crossing Type	Crossing ID	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
1	Railway	RYX005	Railway – Galway railway line	TWC – 4800	Figure 18.38	Trenchless crossing
2	Railway	RYX006	Dublin – Newbridge railway line	TWE – 12400	Figure 18.58	Trenchless crossing

18.3.7 Roads

67. The Proposed Project would cross 144 roads, ranging in scale from small unnamed local roads, through regional and national primary roads to the M7 motorway. These are shown on Figures 18.1 to 18.59. The regional and national roads crossed by the Proposed Project pipeline are listed in Table 18.15. The regional and national roads crossed by the Proposed 38 kV Uprate Works are listed in Table 18.16. The local roads crossed by the Proposed Project are listed in Appendix A18.1 (Schedule of Minor Crossings). A summary of the total number of road crossings is provided in Table 18.17.

Table 18.15: Regional and National Road Crossings – Pipeline

Number	Crossing Type	Crossing ID	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
1	Road	RDX001	R494	RW – 700	Figure 18.6	Trenchless
2	Road	RDX003	R445 – Boher	TW – 1900	Figure 18.7	Trenchless
3	Road	RDX007	M7 – Kilnacranra	TW – 5500	Figure 18.8	Trenchless
4	Road	RDX008	R499	TW – 6000	Figure 18.8	Open excavation
5	Road	RDX013	R445	TW – 12700	Figure 18.10	Trenchless
6	Road	RDX015	M7 – Carrigatogher	TW – 13100	Figure 18.10	Trenchless
7	Road	RDX019	R494	TW – 16700	Figure 18.11	Open excavation
8	Road	RDX020	R495	TW – 18500	Figure 18.12	Open excavation
9	Road	RDX023	R493	TW – 21500	Figure 18.13	Open excavation
10	Road	RDX026	N52 – Ardcroney, County Tipperary	TW – 28900	Figure 18.15	Trenchless
11	Road	RDX031	R490	TW – 34700	Figure 18.17	Open excavation
12	Road	RDX035	R491	TWA – 2000	Figure 18.18	Open excavation
13	Road	RDX037	R491	TWA – 5000	Figure 18.19	Open excavation
14	Road	RDX043	R492/R491	TWA – 11500	Figure 18.20	Open excavation
15	Road	RDX044	N62	TWA – 14200	Figure 18.21	Trenchless
16	Road	RDX053	Camcor and R440	TWA – 27900	Figure 18.26	Trenchless
17	Road	RDX068	R421	TWB – 18700	Figure 18.34	Open excavation
18	Road	RDX071	N80	TWC – 100	Figure 18.37	Trenchless
19	Road	RDX076	R420	TWC – 7900	Figure 18.39	Open excavation
20	Road	RDX083	R402	TWC – 19200	Figure 18.42	Open excavation
21	Road	RDX084	R400	TWC – 19800	Figure 18.42	Open excavation
22	Road	RDX085	R441	TWC – 24700	Figure 18.44	Open Excavation
23	Road	RDX087	R401	TWD – 3600	Figure 18.45	Open excavation
24	Road	RDX090	R403	TWD – 16200	Figure 18.49	Open excavation
25	Road	RDX100	R407	TWE – 100	Figure 18.54	Open excavation
26	Road	RDX103	R408	TWE – 3900	Figure 18.55	Open excavation
27	Road	RDX106	R406	TWE – 7800	Figure 18.56	Open excavation
28	Road	RDX107	R403	TWE – 8500	Figure 18.56	Trenchless
29	Road	RDX112	R405	TWE – 14900	Figure 18.58	Open excavation

Table 18.16: Regional and National Road Crossings – Proposed 38 kV Uprate Works and RWI&PS, WTP, and BPS Power Connections

Number	Crossing Type	Crossing ID	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
1	Road	RDX117	Birdhill Roundabout (R445)	Power connection off the roundabout on the R445	Figure 18.5	Overhead line (to be removed) and buried cable for new power connection (directional drilling for crossings)

Number	Crossing Type	Crossing ID	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
2	Road	RDX118	Birdhill Roundabout	Power connection at roundabout	Figure 18.5	Directional drilling
3	Road	RDX119	Birdhill Roundabout (R494)	Power connection off the roundabout on the R494	Figure 18.5	Overhead line (to be removed) and buried cable for new power connection (directional drilling for crossings)
4	Road	RDX120	R494	Power connection at interface of R494 and access road to RWI&PS	Figure 18.6	Directional drilling
5	Road	RDX121	R445	Power connection at interface of R445 and access road to WTP	Figure 18.6	Directional drilling
6	Road	PSN-RDX003	R465	Overhead line connection for Proposed 38 kV Uprate Works	Figure 18.1	Overhead line
7	Road	PSN-RDX005	R471	Overhead line connection for Proposed 38 kV Uprate Works	Figure 18.2	Overhead line
8	Road	PSN-RDX007	R463	Overhead line connection for Proposed 38 kV Uprate Works	Figure 18.3	Overhead line
9	Road	PSN-RDX009	R525	Overhead line connection for Proposed 38 kV Uprate Works	Figure 18.3	Overhead line
10	Road	PSN-RDX010	R466	Overhead line connection for Proposed 38 kV Uprate Works	Figure 18.4	Overhead line
11	Road	RDX134	R440	BPS power connection	Figure 18.29	Directional Drilling

Table 18.17: Summary of Road Crossings

Proposed Infrastructure	Local Roads	Regional Roads	National Primary Roads	Motorways	Number of Crossings
Pipeline	94	24	3	2	123
Proposed 38 kV Uprate Works and power connection to RWI&PS and WTP	7	10	0	0	17
BPS power connection	3	1	0	0	4
Total	104	35	3	2	144

68. The existing road network crossed by the Proposed Project is shown in Figure 18.1 to Figure 18.59 inclusive. Haul Roads are part of the public road network which have been designated for the movement of construction materials, plant and labour as part of the construction of the Proposed Project. They include national, regional and local roads.

69. Those Haul Roads considered suitable for the construction vehicles have been determined in consultation with Transport Infrastructure Ireland and with the following relevant Local Authorities:

- Limerick County Council (Figure 5.25)
- Clare County Council (Figure 5.24)
- Tipperary County Council (Figure 5.22)
- Offaly County Council (Figure 5.21)
- Laois County Council (Figure 5.20)
- Kildare County Council (Figure 5.19)
- South Dublin County Council (Figure 5.18).

70. Details on the construction traffic movements and consultation with Local Authorities can be found in Chapter 7 (Traffic & Transport).

18.3.8 Canals

71. Canals are artificial linear bodies of water that were originally constructed for the purpose of navigation. The Proposed Project would cross a canal at three locations, as summarised in Table 18.18.

Table 18.18: Canal Crossings – Proposed 38 kV Uprate Works and Proposed Pipeline

Number	Crossing Type	Crossing ID	Crossing Reference	Approximate Starting Chainage	Figure Reference	Crossing Method
1	Watercourse	PSN – WCX015	Shannon Headrace Canal	Poleset 64B – 65B	Figure 18.3	Overhead line
2	Watercourse	WBX078	Grand Canal	TWD – 15000	Figure 18.48	Trenchless crossing
3	Watercourse	WBX088	Grand Canal	TWE – 14140	Figure 18.58	Trenchless crossing

18.3.9 Industrial Use Lands

72. The Treated Water Pipeline would be routed near existing infrastructure assets, as summarised in Table 18.19. Proposed and future windfarms have been considered within the cumulative assessment in Chapter 21 (Cumulative Effects & Interactions).

Table 18.19: Windfarms in the Vicinity of the Proposed Project

Industrial Use	Operator	Location	Chainage Nearest to Windfarm	Status of Windfarm Development
Mount Lucas Wind Farm	Bord na Móna	Daingean, County Offaly	TWC – 13300 to TWC – 17100	In operation
Clonreen Wind Farm	Bord na Móna	County Offaly	TWD – 2250 to TWD – 3000	In operation
Cushaling Wind Farm	Statkraft	Kilcumber, Cloncant & Cushaling, County Offaly and Ticknevin in County Kildare	TWD – 4250 to TWD – 5000	In operation
Edenderry Power Station	Bord na Móna	Ballykilleen, County Offaly	TWD – 3400	In operation

Industrial Use	Operator	Location	Chainage Nearest to Windfarm	Status of Windfarm Development
Drehid Waste Management Facility	Bord na Móna	County Kildare	TWD – 19000 to TWD – 21500	In operation

18.3.10 Summary of Material Assets

73. Table 18.20 provides a summary of the material assets with the potential to be directly affected by the Proposed Project.

Table 18.20: Summary of Material Assets with the Potential to be Impacted by the Proposed Project

Material Asset	Element	Number
Gas transmission infrastructure	Proposed 38 kV Uprate Works and power connection to RWI&PS and WTP	9
	Water pipeline (including the TPR)	5
	Total	14
Electricity transmission infrastructure	Water pipeline – 400 kV crossings	1
	Water pipeline – 220 kV crossings	6
	Water pipeline – 110 kV crossings	8
	Water pipeline – 38 kV crossings	7
	MV and LV crossings (below 38 kV)	195
	Total	217
Communications infrastructure	Proposed 38 kV Uprate Works and Power Connection to RWI&PS and WTP	17
	BPS power connection	9
	Water pipeline	59
	Total	85
Surface drainage and foul drainage	Sewer main	3
	Total	3
Water supply infrastructure	Trunk main	14
	Distribution Main	51
	Total	65
Rail network	Proposed 38 kV Uprate Works	3
	Water pipeline	2
	Total	5
Canal network	Proposed 38 kV Uprate Works	1
	Water pipeline	2
	Total	3

Material Asset	Element	Number
Road network	Proposed 38 kV Uprate Works and Power Connection – Local Road	7
	Proposed 38 kV Uprate Works and Power Connection – Regional Road	10
	BPS power connection – Local Road	3
	BPS power connection – Regional Road	1
	Water pipeline – National Road	5
	Water pipeline – Regional Road	24
	Water pipeline – Local Road	94
	Total	144
Industrial use lands	Mount Lucas Wind Farm Cloncreen Wind Farm Cushaling Wind Farm Edenderry Power Station Drehid Waste Management Facility	N/A

18.3.11 Future Baseline

74. There is potential for new material assets which have not been considered in this chapter to be commissioned and constructed at a future date. A schedule of reasonably foreseeable future developments has been compiled in Chapter 21 (Cumulative Effects & Interactions), based on detailed planning searches and local plan reviews. Any risks of the Proposed Project interacting with future material asset developments are considered in Chapter 21. This includes the potential future wind farms at TWC – 15000 and TWD – 10000 to TWD – 12500, and 220 kV electricity line upgrades at TWD – 21500.
75. The list of reasonably foreseeable developments does not include small developments such as, for example, planning applications for individual houses. These small scale developments would not fall within the scope of the assessment and would not result in likely significant effects on the environment.

18.4 Assessment of Effects

76. The following sections present an assessment of the effects on material assets associated with the Construction and Operational Phases of the Proposed Project. Although care has been taken to align the pipeline route and locate Infrastructure Sites away from material assets (i.e. through embedded mitigation), there are potential direct and indirect effects arising where the Proposed Project unavoidably intersects existing material assets.
77. During construction of the Proposed Project no existing utility infrastructure would be subject to major disruption in such a way as to interrupt end users of the material assets e.g. gas mains or electricity distribution network. The construction works would be planned in such a way as to ensure that even if a material asset outage was temporarily required, alternative provisions would be made to enable continuity of supply e.g. electricity or gas supplies provided through alternative distribution routes. Importantly, therefore, embedded mitigation is an integral component of constructing the Proposed Project below, through or over existing material assets. Embedded mitigation measures are described in Section 18.5, and the residual effects are reported in Section 18.6. Typically, a new connection can be provided without a loss of supply, but in the event this was not possible an alternative supply would be provided so that there would be no effect on end users. There would be no outages for major supplies e.g. high pressure gas main/high voltage cables.

78. Embedded mitigation relevant to this topic is as follows:

- The alignment of the pipeline was designed to avoid existing assets including, for example, houses and agricultural buildings as far as reasonably practicable
- The selection of sites for the Infrastructure Sites avoided/reduced the effect on existing assets (noting the utility connections would be required and therefore proximity to existing infrastructure was preferable)
- The use of trenchless crossings has been included in the Proposed Project to take the pipeline beneath existing assets such as the Grand Canal, railway crossings, major road crossings and power line crossings, as described in Chapter 5 (Construction & Commissioning) of the EIAR
- Select trenchless crossing techniques to reduce the risk of settlement including balancing the pressure between the cutting face and the surrounding ground, and using fast setting grout within the construction process
- Use appropriate back fill of open excavation to avoid settlement of ground under existing assets, specifically roads.

18.4.1 'Do Nothing' Scenario

79. Should the construction of the Proposed Project not occur, there would be no impact on any of the material assets discussed. Therefore, the environmental effect of the Do Nothing scenario is neutral.

80. However, without the Proposed Project there would be effects on existing water supply infrastructure. This is because additional strain would be put on this infrastructure as the demand for water increases in the future. This would be likely to result in more failures of that infrastructure and less resiliency in supply to customers.

18.4.2 Construction Phase

18.4.2.1 Risk of Settlement

81. In order to avoid potential impacts on assets, a number of crossings of existing infrastructure would be undertaken using trenchless technology. This type of crossing could result in settlement in the ground above the crossing with a potential risk to the asset above. An assessment has been undertaken of the likely level of settlement based on the depth of the crossings and this is summarised in Table 18.21. This is then relied on in the assessment of the effect on assets in Sections 18.4.2.2 to 18.4.2.8. The maximum expected level of settlement would be 30mm, however, Table 18.21 provides an indication of the general range of settlement. The size of the proposed pipeline combined with the fact that the crossings beneath an asset (such as a road, railway, canal or existing pipeline) would be very short, mean that the area of any settlement impact would be very small and can be effectively managed during construction of the works. Embedded mitigation has been incorporated into the Proposed Project to achieve this and will reduce the level of settlement from that reported in Table 18.21. This mitigation will include balancing the pressure between the trenchless crossing technique and the surrounding ground conditions and using fast setting grout within the construction process.

Table 18.21: Predicted levels of settlement

Crossing	Approximate Chainage	Asset	Maximum Level of Settlement
WBX078	TWD – 15010	Canal	18mm
WBX088	TWE – 14140	Canal	6mm
RYX004	TWC – 4800	Railway	5mm
RYX005	TWE – 12400	Railway	4mm
RDX007	TW – 5500	Road	11mm

Crossing	Approximate Chainage	Asset	Maximum Level of Settlement
RDX015	TW – 13100	Road	13mm

82. For open cutting crossings there would also be the risk of settlement and this will be managed through the backfilling of material and remedial measures.

18.4.2.2 Utility Infrastructure – Gas Transmission

83. The design of the Proposed Project has taken account of the requirement for the pipeline to cross gas transmission infrastructure without causing interference during the Construction Phase. This has been done by proposing trenchless construction technique at each of the crossing points. This is set out in Table 18.8 which confirms that four pipeline crossings of medium pressure gas mains would be via trenchless technique. This would avoid a direct impact on the infrastructure, and therefore there would be no direct effect.

84. Indicative levels of settlement have been provided in Table 18.21. The risk of settlement on gas pipelines will be managed through engagement with Gas Networks Ireland and embedded mitigation will be used to avoid an effect on the existing infrastructure. This will include a pre-construction assessment, design of the trenchless cutting face to balance ground pressure and using fast setting grout. As a result, there would not be an effect on the existing gas transmission network as a result of settlement and therefore, no effect on end users.

85. The fifth gas pipeline identified in Table 18.8 would not be crossed by the Proposed Project pipeline; rather, it runs along the edge of the Planning Application Boundary at the TPR site. There are no proposals to sever or realign any part of the existing gas infrastructure network; instead, the Proposed Project would work around the existing infrastructure. As a result there would not be an impact on the gas main and no effect on it as an asset.

86. The nine crossings of the gas transmission network by the Proposed 38 kV Uprate Works and power connection to the RWI&PS and WTP are set out in Table 18.7. These would involve a combination of overhead line crossings and buried underground cable crossings. The two overhead line crossings for the Proposed 38 kV Uprate Works would involve the re-stringing of the existing line and would not affect the existing gas transmission network. Five of the crossings would be for the power connection to the Infrastructure Sites and would be installed using directional drilling for the cable ducts. Neither of these types of crossing would have an effect on the gas transmission assets as the overhead lines would be above ground and the buried cables would be set at a depth to avoid an interface with the gas pipes. The final two crossings would be where the proposed works run in parallel to the existing gas network along the R494 and sufficient spatial separation would be allowed for to avoid any effect on the existing gas mains. As a result there would not be an impact on the existing gas mains as a result of the Proposed 38 kV Uprate Works and power connections to the RWI&PS and WTP.

87. Therefore, there would be no effect on gas transmission infrastructure as a result of the construction of the Proposed Project.

18.4.2.3 Utility Infrastructure – Electricity Transmission

18.4.2.3.1 *Upgrading of Existing Electricity Transmission Infrastructure*

88. The power supply required for the RWI&PS and the WTP requires the upgrading of an existing Ardnacrusha – Birdhill (northern line) 38 kV overhead line and some more localised works to the Ardnacrusha – Birdhill – Nenagh (southern line). This work is described in Chapter 4 (Proposed Project Description). In order to complete these works the line would be taken offline. However, based on the approach ESNB adopted to the recent upgrading of the southern line, the supply would be maintained from other lines and this has been confirmed with ESB Networks. On the basis of a brief negligible impact on a low sensitivity receptor (38 kV overhead line), the effect would be Not Significant.

18.4.2.3.2 *New Permanent Connections to the Existing Electricity Transmission Network*

89. For the Infrastructure Sites, there would be power connections made in order to provide permanent power to those sites. This would also act as the source of construction power (supplemented with the use of generators). Typically, a new connection can be provided without a loss of supply, but in the event this was not possible an alternative supply would be provided, whilst the connection was made, through agreement with ESNB. All of these alterations would be a brief negligible impact on a low sensitivity receptor (low voltage overhead lines), and therefore the effect would be Not Significant.

90. For each of the 51 Line Valves (including the one at the FCV) there would be a new power connection installed to an existing power line (noting that on the RWRMs it would be two Line Valves at one location and therefore a single new supply to two Line Valves.) These supplies would be necessary to provide the power to operate the valves. The connections would be via a combination of predominantly overhead connections and underground connections. Again, the intention would be that this can be delivered without an interruption to the supply. In the event that this could not be achieved, an alternative temporary supply would be provided through agreement with ESNB. Consequently, all of these alterations would be a brief negligible impact on a low sensitivity receptor (low voltage overhead lines), and therefore the effect would be Not Significant.

18.4.2.3.3 *Temporary Connections to the Existing Electricity Transmission Network*

91. At the Principal Construction Compounds and the Pipe Storage Depots a temporary power supply would be required. This would be achieved via a connection to an adjacent existing supply. For the reasons set out for the temporary connections, these would not affect existing users as typically a new connection can be provided without a loss of supply, through agreement with ESNB Networks and in the event this was not possible an alternative supply would be provided whilst the connection was made. All of these alterations would be a brief negligible impact on a low sensitivity receptor (low voltage overhead lines), and therefore the effect would be Not Significant.

18.4.2.3.4 *Crossings of the Existing Electricity Transmission Network*

92. As set out in Table 18.9, there would be one 400 kV high voltage line crossed by the route of the pipeline. A trenchless construction method has been proposed for the section of the pipeline crossing underneath this line, specifically to avoid an effect on the existing asset. As a result of this embedded mitigation, there would be no impact on the high voltage line and no effect on it as an asset. Therefore, there would be no effect on the 400 kV line as a result of the Proposed Project.

93. In addition, there would be a further 14 crossings of existing 220 kV and 110 kV lines along the route of the Proposed Project. For these crossings it is proposed that the construction technique could be either a trenchless crossing or an open excavation. An open excavation would only be adopted if the work could be done safely and without interrupting the existing supply. If a trenchless crossing technique was used

there would be no impact on supply. On this basis, there would not be an impact on the supply from these lines, regardless of the construction method selected, and no effect on them as assets. Therefore, there would be no effect on the 220 kV and 110 kV lines as a result of the Proposed Project.

94. There would also be seven crossings of existing 38 kV overhead lines. For five of these crossings it is proposed that the construction technique could be either a trenchless crossing or an open excavation. An open excavation would only be adopted if the work could be done safely and without interrupting the existing supply. On this basis, regardless of the construction method selected, there would not be an impact on these lines and no effect on them as assets. There would be one crossing (OHX023) which would be the connection point for the undergrounding of the existing line as part of the Proposed 38 kV Uprate Works. The new underground cable would be constructed in advance and then the line would be switched so that the overhead line can be decommissioned. This would generally avoid any loss of supply as a result of the works and therefore there would be no impact on the existing assets or the users of it. One further crossing of a 38 kV line would be required for the power connection to the BPS (OHX025). The new power connection would be a buried cable and the crossing would be via directional drilling and as a result there would be no impact on the existing overhead 38 kV line. Therefore, there would be no effect on the existing 38 kV lines crossed by the Proposed Project.
95. There would be a further 195 crossings of existing electricity lines of medium or low voltage (less than 38 kV). Ten of these existing electricity lines are underground cables. The remaining 185 are overhead lines. Seven of the existing underground cables would be crossed by the re-stringing of the existing overhead line as part of the Proposed 38 kV Uprate Works. These works would not affect an existing underground cable. One of the crossings would be for the power connection associated with the Proposed 38kV Uprate Works as a new underground cable would be installed along the R494 (ESB161). A separation distance will be maintained between the new electricity line and the existing one in order to avoid an effect on the existing asset. Similarly, for the remaining two crossings of the existing underground electricity cables, which would be by the pipeline (ESB084 and ESB124), a separation distance will also be maintained between the pipeline and the existing infrastructure. This will avoid any impact on these existing underground cables. Therefore, there would not be an effect on the 10 existing underground electricity lines, crossed by the Proposed Project, or on the users dependent on the supply they provide.
96. Of the 195 low voltage electricity line crossings, 11 would be associated with the Infrastructure Sites and permanent access. At the WTP, the BPS and the TPR, there are existing overhead lines that would need to be diverted around or within the boundaries of these sites (ESB165 at the WTP, ESB52 and ESB53 at the BPS, ESB168 and ESB169 at the TPR). In all five of these instances the diversion route would be constructed first so that the supply can be continued while the existing line is decommissioned. Supply would be maintained during the works so all of these alterations would be a brief negligible impact on a low sensitivity receptor (low voltage overhead lines), and therefore the effect would be Not Significant. The diverted lines would be to standards and so potentially an upgrade compared with the existing, albeit on a potentially slightly longer route.
97. At the BPT there would be a crossing of an existing line (ESB31) which would be diverted to provide power to the proposed site and to maintain power to the existing radio mast. The diversion route would be constructed first so that the supply can be continued while the existing line is decommissioned. The alterations would be a brief negligible impact on a low sensitivity receptor (low voltage overhead lines), and therefore the effect would be Not Significant.
98. In addition, there would be five crossings of the existing electricity network by proposed permanent access arrangements including:
- The permanent access road to the RWI&PS would cross three existing lines (ESB156, ESB157 and ESB158)
 - The BPT permanent access road would cross a further existing line (ESB167)

- The works for the passing bays on the L1064 (on the approach to the BPT) would require a further crossing of an existing low voltage line (ESB166).
99. Of these five, three would not require any works to the existing lines. However, for two of these, one at the RWI&PS and one at the BPT, constructing the permanent access roads at each site would require a minor realignment of an existing line because an existing poleset would need to be moved. The diversion route would be constructed first so that the supply can be continued while the existing line is decommissioned. As a result, the only impact would be a brief negligible impact on a low sensitivity receptor (low voltage overhead lines), and therefore the effect would be Not Significant.
100. The Proposed 38kV Uprate Works would include 28 crossings of the existing electricity network. Seven of these crossings would be of an existing underground cable as described earlier in this section. The remaining 21 crossings would be the re-stringing of an existing line crossing an existing electricity line and therefore, there would not be change compared with the current position and there would not be an impact on the existing assets. The re-stringing would be complete either without affecting the lines or with the provision of a temporary alternative supply, as agreed with ESN. As a result, the only impact would be a brief negligible impact on a low sensitivity receptor (low voltage overhead lines), and therefore the effect would be Not Significant.
101. The permanent new power connection to the RWI&PS and WTP would include six crossings along the length of the R445 and R494 to connect the Proposed 38 kV Uprate Works to these Infrastructure Sites (ESB159 – ESB164). One of these crossings, ESB161 would be a crossing of an existing underground cable as described earlier in this Section. At the point of the other crossings the new power supply for the Proposed Project would be buried and would not affect existing overhead lines. Therefore, there would be no effect on the existing medium and low voltage assets from these crossings.
102. The permanent new power connection from the Birr Substation to the BPS would include 28 crossings of the existing electricity network. The new connection would be a buried cable in the road and so would not have an impact on the existing overhead lines. As a result there would be no effect on the existing medium and low voltage cables crossed by the new power connection to the BPS required for the Proposed Project.
103. The Construction Compound sites would also require two diversions of an existing supply around the perimeter. This would be at the Killananny Construction Compound (ESB63) and Drummond Construction Compound (ESB94). These would both be low voltage lines, and in the case of the diversions the alternative line would be constructed in advance of the switch over so that there would be no loss of supply. In the event of a temporary impact in order to make these new connections, these alterations would be a brief negligible impact on a low sensitivity receptor (low voltage overhead lines), and therefore the effect would be Not Significant.
104. The remaining 120 of the 195 low or medium voltage line crossings would be along the route of the proposed pipeline. Three of these would be crossed by a trenchless crossing which are proposed for reasons other than the crossing of the medium and low voltage cables, but co-inside with a low voltage cable at those locations. Therefore, there would be no impact on these assets. The other 117 (out of the 120) medium or low voltage electricity cables would be crossed by open excavation (as set out in Table 2.1 in Appendix A18.1: Schedule of Minor Crossings), and in order to do this there could be an interruption in supply. However, through agreement with ESN an alternative supply will be provided so that there is no effect on end users. There would be a brief negligible magnitude impact on a low sensitivity receptor (low or medium voltage overhead lines), and therefore the adverse effect would be Not Significant.
105. For clarification, in addition to the 120 low and medium voltage crossings referred to, the two crossings of the electricity networks at the BPS, the crossing at the BPT and the two crossings at Drummond and

Killananny would also involve the pipeline crossing the same electricity lines as these features. There would be no additional effect from this compared with the assessment already reported in this section.

Table 18.22: Summary of Electricity Crossings

Line Type	Existing Line			Proposed Project							
	No.	Underground (No.)	Overhead Line (No.)	Diverted Around Infrastructure Site	Diverted Around Access Road	Unaffected by Access Road	Diverted – Construction Compound	Power Connection – Overhead	Power Connection Underground	Pipeline – Trenchless	Pipeline – Open Cutting
400 kV	1	0	1	0	0	0	0	0	0	1	0
220 kV	6	0	6	0	0	0	0	0	0	6 – either	
110 kV	8	0	8	0	0	0	0	0	1	7 – either	
38 kV	7	0	7	0	0	0	0	1	1	5 – either	
Less than 38 kV	195	10	185	6	2	3	2	28 (inc. 7 existing underground)	34 (28 for BPS and 6 for RWI&PS and WTP connection inc. 1 existing underground)	3	117 (inc. 2 existing underground)
Total	217	10	207	6	2	3	2	29	36	4 definite 18 potential	117

18.4.2.4 Utility Infrastructure – Communications

106. Communications infrastructure, including overhead lines and underground cables, are present throughout the area of the Proposed Project, primarily in the vicinity of the road crossings and connections to residential and commercial properties. There are 85 existing communication cables that have been identified as crossed by the Proposed Project through liaison with the operators. These are listed in Appendix A18.1 (Schedule of Minor Crossings). Seven of these would be crossed by the overhead electricity line for the Proposed 38 kV Uprate Works and there would be no effect on the existing infrastructure. In addition to these seven, a further 10 crossings would involve underground cables as part of the Proposed 38kV Uprate Works and the associated power connection to the RWI&PS and WTP. A separation distance would be put in place between the existing communication cable and the proposed electricity connection in order to avoid any impact on the existing asset. The new power connection would be installed without needing to disrupt the communications line. This would also be the case for a further nine crossings of communication cables by the proposed underground power connection to the BPS from the Birr Substation.
107. The remaining 59 crossings would be along the route of the pipeline. One of these would be for an overhead power line connection to a Line Valve and there would not be an impact on the existing asset. Nine of the pipeline crossings of existing communication lines would be via trenchless crossing because the communication line coincides with a trenchless crossing that is proposed for another reason. The remaining 49 would be via open excavation of the pipeline. A separation distance would be put in place between the existing communication cables and the proposed pipeline and there are no proposals to sever any communications infrastructure. It may be necessary to realign or divert some existing infrastructure, but this would be completed in consultation with the infrastructure owner, and alternative provisions to supply customers would be made if necessary to avoid service interruptions. All of these alterations would be a brief negligible magnitude impact on a low sensitivity receptor (communication lines), and therefore the adverse effect would be Not Significant.
108. The existing radio mast at the BPT would not be directly affected and measures have been incorporated into the design to maintain access. There could be the potential for a vibration effect from rock breaking and tunnelling as reported in Chapter 6 (Noise and Vibration). However, as also reported in that chapter mitigation measures would be adopted to reduce the effects below a level that would be predicted to result in structural / cosmetic effects and consequently, the residual vibration effect reported in the Noise and Vibration chapter on this receptor is Not Significant.

18.4.2.5 Utility Infrastructure – Water Supply, Foul Sewers and Waste Water Sewers

109. As part of the establishment works for the Construction Phase, water supply or wastewater infrastructure may require diverting during construction but there are no plans to sever these connections. The relevant water companies, the National Federation of Group Water Schemes and individual GWS would be consulted in advance to agree any diversions or outages and arrangements for alternative supplies.
110. As part of the construction works of the TPR, there is a proposed sewer diversion of the existing 225mm foul sewer. This sewer would be diverted approximately 470m along the eastern edge of the proposed reservoir. This is an Uisce Éireann owned asset and consequently any planned outages necessary during the diversion can be planned prior to construction. This would be a temporary negligible impact on a low sensitivity receptor (a foul sewer), and therefore the effect would be Not Significant.
111. There would be two further crossings of a foul sewer by the Proposed Project. One would be open excavation for the pipeline. The other would be a crossing by a diverted electricity power line at the TPR. There would be no impact for the electricity cable crossing. At the crossing by the pipeline, the intention would be to leave the existing infrastructure unaffected by going underneath it. Therefore, there would be no effect on the existing sewerage network.

112. There would be a total of 65 crossings of water mains. Fourteen of these would be crossings of trunk mains as set out in Table 18.12 and the remaining 51 would be crossing of distribution mains, as set out in Appendix A18.1 (Schedule of Minor Crossings). Of the 14 trunk main crossings, two would be crossed by overhead lines being re-strung as part of the 38 kV Uprate Works. There would be no effect from these works on the existing assets. The pipeline would cross trunk mains in 10 locations and one of these would be via a trenchless construction with all of the others being crossed by open excavation. The intention is that for trunk mains, the pipeline for the Proposed Project would be taken underneath the existing infrastructure to avoid any loss of supply. Therefore, there would be no effect on these water supply assets as a result of the Proposed Project.
113. The other two crossings of the trunk mains would be at the TPR. The construction of the TPR and the permanent access road would be undertaken without disturbing or affecting this existing infrastructure and there would be no effect on it.
114. For the 51 crossings of the water distribution mains, six of these would be overhead line crossings for the Proposed 38 kV Uprate Works and these would not affect the existing below ground assets. There would be a further four crossings needed for the proposed power connection to the RWI&PS and WTP. This would be an underground cable and would be installed using directional drilling where they would cross the water mains. This would also be the case for the power connection to the BPS (two crossings). These crossings could be installed above or below the existing infrastructure, with appropriate separation in place and as a result there would not be an effect on the existing infrastructure. There would be 39 crossing of water distribution mains by the pipeline. Six would be trenchless crossings because the water mains coincide with a trenchless crossing that is proposed for another reason. The remaining 33 crossings would be via open excavation. The approach to these crossings would be the same as for the trunk mains with the pipeline taken below the existing infrastructure to avoid a loss of supply. For smaller drainage/water distribution pipes there are no proposals to sever this infrastructure. However, it may be necessary to realign or divert some existing infrastructure, but this would be completed in consultation with the infrastructure owner and alternative provisions to supply customers would be made if necessary to avoid service interruptions. All of these alterations would be a brief negligible magnitude impact on a low sensitivity receptor, and the adverse effect would be Not Significant.

18.4.2.6 Transport Infrastructure – Road Crossings

115. As set out in Table 18.15 there would be five motorways/national roads crossed by the Proposed Project pipeline. A trenchless construction method is proposed for these crossings. As a result of this embedded mitigation there would not be an impact on these roads, and therefore no effect on them as an asset. Consequently, there would be no effect on the national road network as a result of the Proposed Project.
116. There would be a further 24 crossings of regional roads by the Proposed Project pipeline as summarised in Table 18.15. For five of these regional road crossings it is proposed that the construction technique would be a trenchless crossing, and therefore there would be no impact on these roads during construction. For the remain 19 crossings of a regional road by the pipeline, the construction technique would be open excavation. The intention is that this would be undertaken under a short closure (e.g. less than seven days). This would be a temporary medium magnitude impact on a medium sensitivity receptor (regional roads), and therefore the effect would be Slight adverse (Not Significant).
117. There would be a 10 crossings of regional roads by the Proposed 38 kV Uprate Works, the associated connection to the RWI&PS and WTP as summarised in Table 18.16. Five of these would be an overhead line crossing for the Proposed 38 kV Uprate Works and the re-stringing of this overhead line would have no effect on the road network. The other five crossing would be crossings of the R445 and R494 to connect power to the RWI&PS and WTP, from the Proposed 38kV Uprate Works and would be via directional drilling specifically to avoid potential effects. Therefore, there would not be a direct impact on these roads as an asset. However, this would be part of a larger piece of work to install the new power

connection along the verge of both roads (between the substation at Birdhill Roundabout and the RWI&PS along the R494 and from the same substation along the R445 to the WTP). This would require an extended closure of half of the road (at a time) and the ongoing use of traffic management such as temporary traffic lights and a single lane closure. The impact of the temporary traffic management measures on users of the roads has been assessed and is reported in Chapter 7 (Traffic & Transport).

118. As set out in Table 18.16, there would be one further crossing of a regional road by the power connection to the BPS. This would be via directional drilling to avoid potential effects. However, this would be part of a larger piece of work to install the new power connection along the verge of the road. This would require an extended closure of half of the road (at a time) and the ongoing use of traffic management such as temporary traffic lights and a single lane closure.
119. There would be 104 local roads crossed by the Proposed Project. Ten of these would be associated with power connections and 94 would be for the construction of the pipeline. These are set out in Appendix A18.1 (Schedule of Minor Crossings).
120. For the ten crossings by power connections, seven of these would be overhead line work for the Proposed 38 kV Uprate Works and the re-stringing of the overhead line would be completed without an effect on the existing road network. The other three crossings would be an underground cable for the power connection to the BPS. These would be an open excavation under a short term closure of half the road (at a time), e.g. a week. This would be a temporary medium magnitude impact on a low sensitivity receptor (local roads) and therefore the effect would be Not Significant. These crossings would be part of a larger piece of work to install the new power connection within the verge of the embankment between Birr Substation and the BPS. This would require an extended closure of the road and the ongoing use of traffic management such as temporary traffic lights and where reasonably practicable, a single lane closure. The impact of the temporary traffic management measures on users of the roads has been assessed and is reported in Chapter 7 (Traffic & Transport). There would be no impact on the road as an asset from the traffic management.
121. Out of the 94 crossings of the electricity network by the pipeline, five of these would be crossed by trenchless crossing.
122. The remaining 89 power line crossings would all be constructed by open excavation. Each of these would be completed in consultation with the relevant Local Authority with traffic management put in place (such as temporary road closure of half the road (at a time)) and any disruption would only be for a short period (e.g. less than a week). All of these alterations would be a temporary medium magnitude impact on a low sensitivity receptor (local roads) and therefore the effect would be Not Significant.
123. For the road crossings, whether trenchless or open cut, there could be a risk of a settlement. For the open cut crossings this risk would be managed through the use of suitable material to reinstate over the top of the pipeline and monitoring of post construction works. For the trenchless crossings indicative levels of settlement have been provided in Table 18.21. The risk of settlement on road crossings will be managed through engagement with TII and embedded mitigation will be used to avoid an effect on the existing infrastructure. This will include a pre-construction assessment, design of the trenchless cutting face to balance ground pressure and using fast setting grout. As a result, there would not be an effect on the existing the highway infrastructure as a result of settlement.

18.4.2.7 Transport Infrastructure – Railway Crossings

124. The location and construction methodology at each of the railway crossings identified previously is detailed in Tables 18.13 and 18.14.

125. Engagement has been undertaken with Iarnród Éireann and the proposed design intentionally includes trenchless construction techniques for both the crossing of the Galway railway line and the crossing of the Dublin – Newbridge railway line. Iarnród Éireann has indicated that the proposed rail crossing points and details are acceptable in principle. Furthermore, the trenchless crossings would be sufficiently deep to avoid a settlement risk that would affect the existing asset.
126. Indicative levels of settlement have been provided in Table 18.21. The risk of settlement on railway crossings will be managed through engagement with Iarnród Éireann and embedded mitigation will be used to avoid an effect on the existing infrastructure. This will include a pre-construction assessment, design of the trenchless cutting face to balance ground pressure and using fast setting grout. As a result, there would not be an effect on the existing railway infrastructure as a result of settlement.
127. Therefore, the design of the Proposed Project would mean that there would be no disruption to rail services on these lines, and as a result there would be no effect on this infrastructure as a result of the two pipeline crossings set out in Table 18.14.
128. The three crossings of the existing railway infrastructure by the Proposed 38 kV Uprate Works would involve one overhead line crossing of the Limerick – Ballybrophy railway line and two crossings of the Limerick via Nenagh railway line to be installed by directional drilling. The overhead line crossing would involve re-stringing to poleset 105B on the western side of the line. This could be done without disrupted services through agreement on the timing with Iarnród Éireann, but no such agreement has been reached at this stage of the Proposed Project. This has been assessed as a brief negligible impact on a high sensitivity receptor (train passengers on a mainline railway), and therefore the effect would be Not Significant.

18.4.2.8 Transport Infrastructure – Canal Crossings

129. As shown in Table 18.18, there would be two crossings of the Grand Canal by the pipeline. Both of these would be via a trenchless construction technique and therefore there would be no impact upon them. Furthermore, the trenchless crossings would be sufficiently deep to avoid a settlement risk that would affect the existing asset.
130. Indicative levels of settlement have been provided in Table 18.21. The risk of settlement on canal crossings will be managed through engagement with Waterways Ireland and embedded mitigation will be used to avoid an effect on the existing infrastructure. This will include a pre-construction assessment, design of the trenchless cutting face to balance ground pressure and using fast setting grout. As a result, there would not be an effect on the existing canal infrastructure as a result of settlement.
131. The stringing of conductors over the Shannon Headrace Canal would have potential to cause temporary disruption to navigation along the canal prior to tensioning. This could be done without disrupted services through agreement on the timing with Inland Waterways Ireland, but no such agreement has been reached at this stage of the Proposed Project. This has been assessed as a brief negligible impact on a high sensitivity receptor (canal users), and therefore the effect would be Not Significant.

18.4.2.9 Industrial Land Use

132. The proposed alignment of the pipeline at Mount Lucas and Cloncreen does not intersect with the existing wind farms and has been positioned to be outside of the radius of any fall area. Therefore, there would be no impact on these sites and no environmental effect.
133. The Cushaling Wind Farm would be closer to the alignment of the Proposed Project and there is ongoing liaison with the operator to avoid any effect on this asset.

134. There would be no interaction between the Proposed Project and the existing power generation site at Edenderry and the Drehid Waste Management Facility.

135. Therefore, there would no impact on industrial land use and consequently no environmental effects.

18.4.2.10 Summary of Construction Phase Effects

136. Table 18.23 provides a summary of the effects on material assets during construction. In the absence of mitigation measures, there are no likely significant effects identified in relation to material assets during construction.

Table 18.23: Summary of Construction Phase Effects

Material Asset	Element	With Embedded Mitigation But Before Consideration of Specific Mitigation Measures	
		Description of Impact	Significance of Environmental Effects
Utility infrastructure	Gas transmission	No direct or indirect material asset impacts associated with the Proposed Project and therefore, no environmental effect.	
	Ardnacrusha – Birdhill (northern line) 38 kV overhead line and minor works to the Ardnacrusha – Birdhill – Nenagh (southern line)	Existing lines would be taken offline in order to complete the upgrade. Supply would be maintained to end users via alternative lines.	The sensitivity of the receptor is low and the magnitude of the impact would be negligible, resulting in an effect which would be Not Significant.
	Power line connection to the BPS	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	
	Power line connections to Infrastructure Sites, Pipe Storage Depots and other Construction Compounds	The requirement for temporary works such as taking a supply offline to secure a connection would be a likely negligible adverse impact which is both temporary and reversible.	The sensitivity of the receptor is low and the magnitude of the impact would be negligible, resulting in an effect which would be Not Significant.
	Diversion of existing overhead lines for Infrastructure Sites and Pipe Storage Depots and other Construction Compounds	The diversions would be constructed in advance to reduce the impact on the infrastructure. The requirement for temporary works to take a supply offline to secure a switch over would be a likely negligible adverse impact which is both temporary and reversible.	The sensitivity of the receptor is low and the magnitude of the impact would be negligible, resulting in an effect which would be Not Significant.
	Power line connections to Line Valves	The requirement for temporary works such as taking a supply offline to secure a connection would be a likely negligible adverse impact which is both temporary and reversible.	The sensitivity of the receptor is low and the magnitude of the impact would be negligible, resulting in an effect which would be Not Significant.
	Crossing of 400 kV cable (1 no.)	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	
	Crossing of 38 kV, 110 kV and 220 kV cables (21 no.)	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	
	Crossings of medium and low voltage cables of below 38 kV (195 no.)	Crossing of medium and low voltages cables for construction of the Infrastructure Sites, access roads, 38 kV Uprate Works, and pipeline may require short term temporary outages. Through agreement with ESNB an alternative supply will be provided so that there is no effect on end users. This would be a likely negligible adverse impact which is both temporary and reversible.	The sensitivity of the receptor is low and the magnitude of the impact would be negligible, resulting in a Not Significant adverse effect.

Material Asset	Element	With Embedded Mitigation But Before Consideration of Specific Mitigation Measures	
		Description of Impact	Significance of Environmental Effects
	Communications	There may be a requirement to divert communication infrastructure. Alternative provisions to supply customers would be made if necessary to avoid service interruptions. This would be a likely negligible adverse impact which is both temporary and reversible.	The sensitivity of the receptor is low and the magnitude of the impact would be negligible, resulting in a Not Significant adverse effect.
	Surface water and wastewater infrastructure	The requirement for temporary works such as diverting smaller drainage/water distribution pipes represent a likely negligible adverse impact which is both temporary and reversible.	The sensitivity of the receptor is low and the magnitude of the impact would be negligible, resulting in Not Significant adverse effect.
	225mm sewer at TPR	The sewer would need to be diverted and there would be an outage in order to complete the switch over to the new alignment. This would be a likely negligible adverse impact which is both temporary and reversible.	This would be a brief temporary negligible magnitude impact on a low sensitivity receptor (a foul sewer) and therefore the effect would be Not Significant.
Transport infrastructure	Road network – national roads	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	
	Road network – regional roads	The roads crossed by open excavation would need to be closed for a short period of time. This would be a likely medium adverse impact which is both temporary and reversible.	The sensitivity of the receptor is medium and the magnitude of the impact would be medium, resulting in a Slight adverse effect (Not Significant).
	Road network – local roads	The roads crossed by open excavation would need to be closed for a short period of time. This would be a likely medium adverse impact which is both temporary and reversible.	The sensitivity of the receptor is low and the magnitude of the impact would be medium, resulting in an effect which would be Not Significant.
	Rail network – disused railway line	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	
	Rail network – Limerick via Neagh, Galway, and Dublin – Newbridge railway lines	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	
	Rail network – Limerick – Ballybrophy railway line	The stringing of conductors over the line would have no impact on the material asset itself, but may cause negligible adverse impact (temporary disruption) to train services in the absence of agreeing the timing of the works with Iarnród Éireann to avoid such an impact.	The sensitivity of the receptor is high and the magnitude of the impact would be negligible, resulting in an effect which would be Not Significant.
	Canal network – Shannon Headrace Canal	Potential adverse temporary impact on users of the canal but not on the Shannon Headrace itself.	The sensitivity of the receptor is high and the magnitude of the impact is negligible, resulting in an effect which would be Not Significant.
	Canal network – Grand Canal	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	
Industrial Land Use	Mount Lucas Wind Farm Cloncreen Wind Farm Cushaling Wind Farm Edenderry Power Station Drehid Waste Management Facility	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	

18.4.3 Operational Phase

137. The Operational Phase of the Proposed Project would deliver a long-term sustainable water source for the Eastern and Midlands Region, to meet the existing and future water demand from residential, commercial and industrial users. Principal Operational Phase activities would include:

- Abstraction of raw water from Parteen Basin, via the RWI&PS
- Treatment of the raw water at the WTP
- Transfer of water through the RWRMs, Treated Water Pipeline, BPT, BPS (if required) and FCV
- Delivery of water into the GDA WRZ network from the TPR
- Operation and maintenance of the ancillary pipeline infrastructure including the Line Valves, Washout Valves and Air Valves.

138. A pipeline conveying treated water would operate for many years with little more than routine maintenance of the various valves along the pipeline route, and plant, machinery and valves at the Infrastructure Sites. Appendix A4.1 (Operational Strategy) provides further details on the operation and maintenance activities for the Proposed Project.

18.4.3.1 Utility Infrastructure

139. The Proposed 38 kV Uprate Works are themselves an upgrade to an existing electricity asset. Therefore, there would be a beneficial effect on this asset as a result of the upgrade. This would be a beneficial, long term, negligible magnitude impact on a low sensitivity receptor (38 kV overhead line) and therefore a Not Significant beneficial effect.

140. Beyond this, during the Operational Phase of the Proposed Project, there would be no proposed activities that would adversely impact electricity or gas transmission infrastructure, or telecommunications infrastructure. Therefore, there would be no effect on these services during the Operational Phase.

141. In terms of surface water and wastewater infrastructure, the design of the pipeline includes Washout Valves to allow the pipeline to be drained infrequently during operation, typically once every 20 to 30 years. These are planned events and would be scheduled to suit landowner constraints and weather conditions such that the discharge of water would not impact land or drainage assets. Therefore, there would be no effect on surface water and wastewater infrastructure.

18.4.3.2 Transport Infrastructure

142. During the Operational Phase there would be no impact on transport infrastructure. There would therefore be no likely significant effects.

18.4.3.3 Industrial Land Use

143. During the Operational Phase there would be no impact on industrial land use. There would therefore be no likely significant effects.

18.4.3.4 Summary of Operational Phase Effects

144. Table 18.24 provides a summary of the effects on material assets during operation. In the absence of mitigation measures, there are no likely significant effects identified in relation to material assets during operation.

Table 18.24: Summary of Operational Phase Effects

Material Asset	Element	With Embedded Mitigation But Before Consideration of Specific Mitigation Measures	
		Description of Impact	Significance of Environmental Effects
Utility infrastructure	Proposed 38 kV Uprate Works	The Proposed 38 kV Uprate Works would involve the improvement of an existing asset. This would be a beneficial, long term, negligible impact.	This would be a negligible magnitude impact on a low sensitivity receptor (38 kV overhead line), resulting in an effect which would be Not Significant.
	Other electricity and gas transmission infrastructure, communications infrastructure, surface water and wastewater infrastructure	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	
Transport infrastructure	Rail network	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	
	Canal network	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	
	Road network	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	
Industrial land use	Existing infrastructure	No direct or indirect material asset impacts associated with the Proposed Project and therefore no environmental effect.	

18.5 Mitigation and Monitoring Measures

18.5.1 Introduction

145. 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) of the EIAR. Where avoidance has not been entirely possible, for example where the horizontal alignment of the Proposed Project interfaces with transport infrastructure assets, steps have been taken in the development of construction techniques which either avoid interrupting the operation of the assets or reduce the impact of temporary outages on end users. Embedded mitigation is considered in the assessment of pre-mitigation effects in Section 18.4.

146. Engagement will be undertaken with all asset owners and utility providers as part of the preparation for construction including, but not limited to Iarnród Éireann, Tii, Waterways Ireland, ESB Networks, Gas Networks Ireland. National Federation of Group Water Schemes and individual GWS. This consultation will agree any diversions, outages and arrangements for alternative supplies, as applicable.

18.5.2 Utility Infrastructure

147. Utility infrastructure was taken into consideration during the routing, site selection and planning stage design for the Proposed Project. This included consideration of trenchless crossing techniques to avoid the interruption of major services. As these are integral to the design they have been considered when identifying the potential effects of the Proposed Project in the pre-mitigation assessment.

148. There will be ongoing engagement with service providers to confirm the current locations of buried services. This information will be considered in the detailed design stage of the Proposed Project and the infrastructure will be avoided where reasonably practicable. Underground surveying techniques, such as a Cable Avoidance Tool (CAT) and a Signal Generator (genny) and/or surface radar scanning will also be used to help confirm the presence of utility services before commencement of any mechanical excavation in the vicinity of underground services. Method Statements will be developed by the appointed

Contractor(s) to ensure that all underground services are located manually, marked and carefully protected prior to any construction activities commencing. This will avoid the risk of service strike which would lead to a loss of services to end users (homes and businesses).

149. The contract-stage ground investigation will include mapping and electronic verification of the position of known services, and at the Construction Phase the position of these services will be exposed and marked before works commence near them. In addition, landowners will be consulted to help identify known services on their lands. The full Construction Working Width will be scanned using a CAT to confirm the positions of existing services and infrastructure which may affect the works. These services will be marked with hi-visibility plastic fencing, and warning signage and bog mat protection where required, as described in Chapter 5 (Construction & Commissioning).

18.5.3 Transport Infrastructure

150. The railway network was taken into consideration during the routing, site selection and planning stage design for the Proposed Project. This included consideration of trenchless crossing techniques to avoid impacts on railway lines. As these are integral to the design, they represent embedded mitigation solutions. Iarnród Éireann has indicated that the proposed rail crossing points and details are acceptable in principle. The appointed Contractor(s) will develop a method statement for the construction of rail crossings for agreement with Iarnród Éireann prior to construction commencing. This will avoid significant effects on these material assets.

151. The use of trenchless crossings has also been included in the Proposed Project to take the pipeline beneath major road crossings in order to avoid direct impacts upon them.

152. The stringing of conductors over the Shannon Headrace Canal will be undertaken by ESB and in consultation with Waterways Ireland. ESB has extensive experience in constructing these types of crossings and will apply the standard methods of working to safely undertake the works. The pipeline crossings of the Grand Canal will be crossed using trenchless technology which will mean that there will be no impact to navigation of the canal. This will avoid significant effects on these material assets.

18.5.4 Specific Mitigation and Monitoring Measures

153. There are no specific mitigation and monitoring measures required over and above the embedded mitigation and good practice measures previously described. The Construction Environmental Management Plan (Appendix A5.1) summarises the good practice measures referred to in this report in relation to utility and transport infrastructure. In addition, Uisce Éireann will also appoint a series of Landowner Liaison Officers to manage communication with the relevant landowners to facilitate the implementation of the good practice mitigation and monitoring works on their land.

18.6 Residual Effects

154. No likely significant effects have been identified in the pre-mitigation assessment, and therefore no specific mitigation measures are required to avoid or reduce effects. The material assets which have been identified are key types of infrastructure, and from the outset embedded mitigation techniques have been deployed to avoid end user disruption to utility assets and achieve reasonable minimum levels of disruption to users of transport infrastructure. Any adverse effects are temporary and reversible. In summary, therefore, there are no residual significant effects in relation to material assets.

18.7 References

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