

Environmental Impact Assessment Report (EIAR)

Volume 2 of 6: EIAR Main Report

(Chapter 4) Proposed Project Description

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Acronyms and Abbreviations

Acronyms and Abbreviations	Meaning
AAAC	All Aluminium Alloy Conductor
ACSR	Aluminium Conductor Steel Reinforced
BPT	Break Pressure Tank
BPS	Booster Pumping Station
CC	Construction Compound
CIRIA	Construction Industry Research and Information Association
CP	Cathodic Protection
CWST	Clear Water Storage Tank
EIAR	Environmental Impact Assessment Report
ESB	Electricity Supply Board
ESBN	Electricity Supply Board Networks
FCV	Flow Control Valve
GAC	Granular activated carbon
GDA WRZ	Greater Dublin Area Water Resource Zone
ha	Hectare
HLPS	High Lift Pumping Station
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light-emitting diode
MI	Megalitre
Mld	Megalitres per day
mAOD	Metres Above Ordnance Datum
NHA	Natural Heritage Area
OHX	Overhead Power Crossing
OSEC	On-site electrolytic chlorination
PLC	Programmable Logic Controller
pH	Potential of Hydrogen
pNHA	Proposed Natural Heritage Area
PSD	Pipe Storage Depot
PV	Photovoltaic
PWWC	Passive Wedge-Wire Cylinder
RDX	Road Crossing
RGF	Rapid Gravity Filtration
RW	Raw Water
RWBT	Raw Water Balancing Tank
RWI&PS	Raw Water Intake and Pumping Station

Environmental Impact Assessment Report (EIAR) Volume 2 of 6: EIAR Main Report
(Chapter 4) Proposed Project Description

Acronyms and Abbreviations	Meaning
RWRM	Raw Water Rising Main
RYX	Rail Crossing
SAC	Special Area of Conservation
SCADA	Supervisory Control and Data Acquisition
SPA	Special Protection Area
SPF	Set Point Flow
SuDS	Sustainable Drainage Systems
TII	Transport Infrastructure Ireland
TPR	Termination Point Reservoir
TW	Treated Water
TWL	Top Water Level
UV	Ultraviolet
WA	Washout Valve – Permanent Discharge Location with permanent outfall
WB	Washout Valve – with no Permanent outfall
WBP	Watercourse Crossing – ditch which has been noted as having some water during field survey
WBX	Watercourse Crossing – smaller watercourse or stream
WCW	Watercourse Washout Location – Permanent outfall locations
WCX	Watercourse Crossing – watercourse with Environmental Protection Agency segment code
WTP	Water Treatment Plant
WwTP	Wastewater Treatment Plant

4. Description of the Proposed Project

4.1 Introduction

1. This chapter provides a description of the Proposed Project which is assessed in this Environmental Impact Assessment Report (EIAR). The description sets out the proposed permanent infrastructure that is needed and how it is intended to operate and be maintained.
2. The Proposed Project is a water supply pipeline involving the abstraction and pumping of raw water from the Lower River Shannon at Parteen Basin; treatment of the water nearby at Birdhill, County Tipperary; and pumping of the treated water to a high point near Cloughjordan, County Tipperary and on through the Midlands to a termination point at Peamount, in County Dublin (within the administrative area of South Dublin County Council), where it would connect into the existing Greater Dublin Area Water Resource Zone (GDA WRZ) network.
3. In total the pipeline would be approximately 172km in length and would be supported by six permanent Infrastructure Sites, of varying sizes and purposes. The pipeline would traverse the administrative areas of Tipperary County Council, Offaly County Council, Kildare County Council and South Dublin County Council. In addition, the works needed to provide power to two of the Infrastructure Sites (referred to as the 38 kilovolt (kV) Uprate Works and described in Section 4.14) would cross Clare County Council, Limerick City and County Council, (as well as Tipperary). Therefore, six Local Authorities are partly within the Planning Application Boundary.
4. The Proposed Project would be constructed and operated within predominantly open countryside and has been designed to, generally, avoid towns and villages. Farming is the primary land use along the route and the Proposed Project would cross over 400 agricultural landholdings.
5. The Proposed Project has been developed to deliver a long-term, sustainable and resilient water supply for the Eastern and Midlands Region, to meet the water demand from residential, commercial and industrial development to the year 2050 and beyond. The Proposed Project infrastructure would have the capacity to deliver water to meet the projected peak deficit of 280 million litres per day (Mld) of treated water in 2050, as set out in the Regional Water Resources Plan – Eastern and Midlands (the Eastern and Midlands Plan) (Irish Water 2022). A raw water abstraction consent of 300Mld is being sought to cover the operational requirements of providing up to 280Mld of treated water in 2050, with a provision of a further 20Mld to allow for potential future sustainability reductions from existing supply volumes.
6. Under normal demand conditions the Proposed Project would provide a treated water supply of typically 154Mld in 2050 and up to 300Mld during peak demand periods. For the purpose of this EIAR, the peak abstraction and supply of 300Mld represents the potential worst case environmental effects and so forms the basis of the assessment.
7. An overview of the Proposed Project is shown in Image 4.1 (Overview of the Proposed Project), while Figure 4.2 to Figure 4.60 (Project Component Overview) present an overview of the principal elements forming the basis of assessment for the EIAR. These figures are provided in Volume 5 of this EIAR.

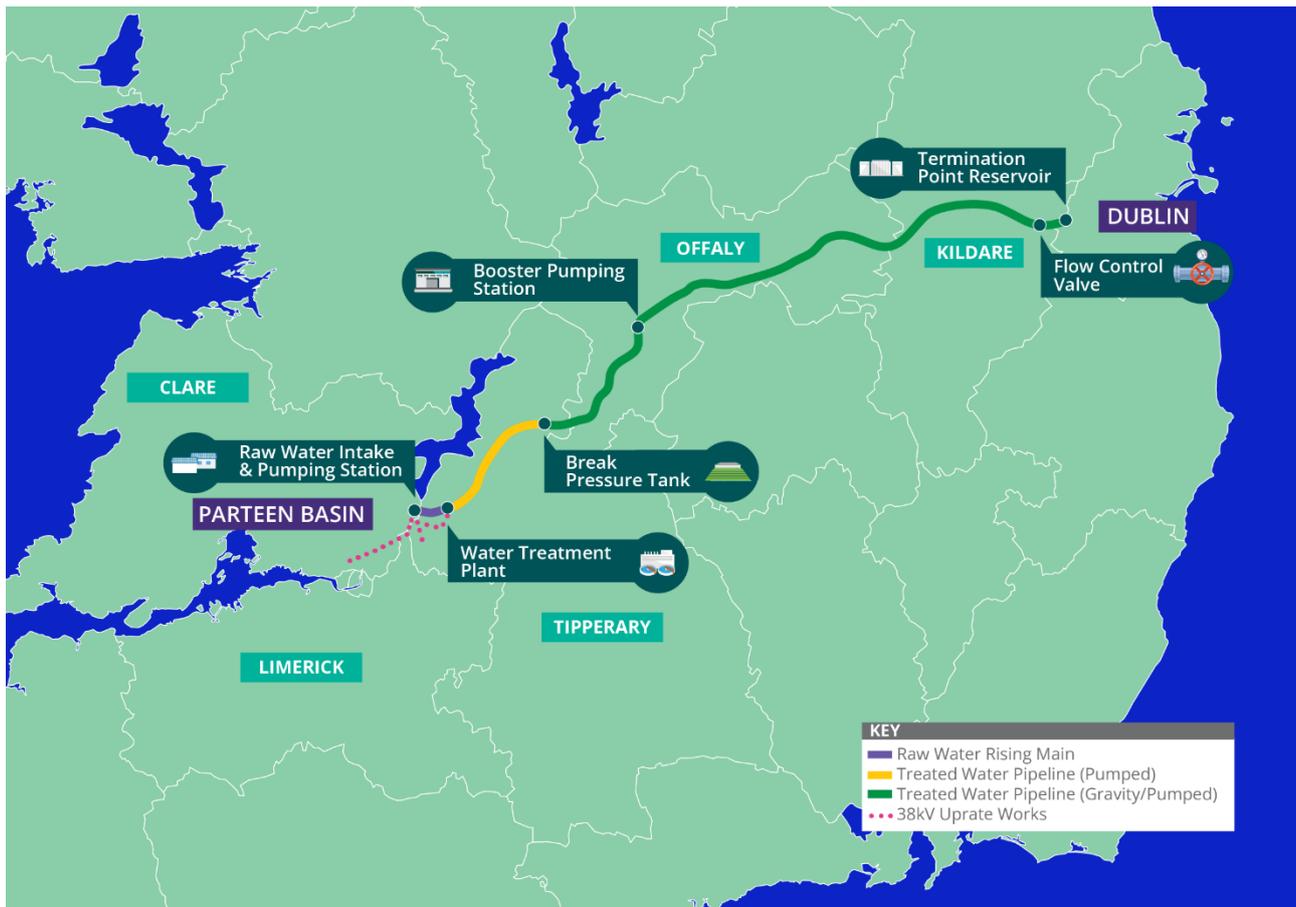


Image 4.1: Graphical Overview of the Proposed Water Supply Infrastructure

8. The Proposed Project would consist of the following main features:

- Abstraction of raw water from Parteen Basin on the Lower River Shannon downstream of Lough Derg and the towns of Ballina and Killaloe
- A Raw Water Intake and Pumping Station (RWI&PS) on the eastern shore of Parteen Basin would facilitate a maximum abstraction of up to 300Mld, during peak demand periods from the Lower River Shannon, downstream of Lough Derg
- Two steel pipelines, approximately 2km in length, and each 1,500mm in diameter, referred to as the Raw Water Rising Mains (RWRMs). These would transfer raw water from the RWI&PS to a Water Treatment Plant (WTP) near Birdhill, County Tipperary and each pipe would be capable of transferring raw water up to a maximum throughput of 300Mld
- The WTP would provide the infrastructure needed to clean the water to drinking standards and the capacity to pump the water through the Treated Water Pipeline
- Approximately 170km of 1,600mm diameter single steel pipeline, comprising:
 - A Treated Water Pipeline from the WTP to a Break Pressure Tank (BPT) near Cloughjordan, County Tipperary, approximately 37km long
 - A Treated Water Pipeline from the BPT to the Termination Point Reservoir (TPR) at Peamount, County Dublin, approximately 133km in length.¹

¹ A combination of pumping and gravity would be used to transfer water through the pipeline. Water would be pumped from the RWI&PS to the WTP and from the WTP to the BPT which is the high point along the pipeline. From the BPT, the water would usually flow by gravity along the remaining 133km to the TPR. However, at times when the volume of water needed is higher than approximately 165Mld, the water would be pumped through the whole length of the pipeline. The BPS provides the capacity to do this additional pumping when it is required.

- The TPR would have a capacity of 75 megalitres (MI) and would provide the location for the Proposed Project to connect into the existing drinking water network
 - Pipeline infrastructure including a BPT near Cloughjordan, County Tipperary; a Booster Pumping Station (BPS) east of Birr, County Offaly; and a Flow Control Valve (FCV) south of Newtown in County Kildare, approximately 5km west of the TPR
 - Operational ancillary infrastructure at frequent intervals along the length of the pipeline including Line Valves, Air Valves, water discharge points (referred to as ‘Washouts’), access points (referred to as Manways), parking Lay-Bys for maintenance access and power connections to the Line Valves
 - Power connections to the Infrastructure Sites², including upgrading of the existing Ardnacrusha – Birdhill 38 kV overhead line to deliver adequate electrical power to the RWI&PS and WTP and a new connection from a substation at Birr to the BPS.
9. In addition to this infrastructure, provision has been made for take-off points at strategic locations between the WTP and TPR. These would facilitate future potential connections to supply communities in the Midlands within the Water Supply Area³ without disruption to the operation of the pipeline. The location of these future potential connections align with the Eastern and Midlands Plan (Irish Water 2022). The connecting pipelines and associated infrastructure would be delivered by Uisce Éireann through separate projects, yet to be designed, and would be subject to their own separate consenting processes.
10. Water would be pumped through the RWRMs from the RWI&PS to the WTP using the pumping station at the RWI&PS. After treatment the water would be stored in the Clear Water Storage Tanks (CWSTs) at the WTP. It would then be pumped approximately 37km through the Treated Water Pipeline to the BPT using the high lift pumps at the WTP. The BPT would be the high point along the pipeline and from there the water would usually flow by gravity along approximately 133km of the Treated Water Pipeline from the BPT to the TPR. However, at times when the volume of water needed is higher than approximately 165Mld supplementary pumping would be needed to achieve the required supply. The BPS would provide this additional pumping capacity to increase the flow within the Treated Water Pipeline between the BPT and the TPR.
11. Image 4.2 provides a summary of the different elements of the Proposed Project. Table 4.1 provides a summary of the principal project infrastructure which is described in detail in this chapter.

² ‘Infrastructure Sites’ is the collective term that has been used for the RWI&PS, WTP, BPT, BPS, FCV and TPR.

³ The Water Supply Area is an area defined by the infrastructure and transfer pipeline, where the proximity of treated water supplies from the Proposed Project offers opportunities for potential future consolidation of existing smaller and more vulnerable public water supply schemes, in a resilient, well-supported configuration. Potential future connecting infrastructure would be subject to separate consenting processes.

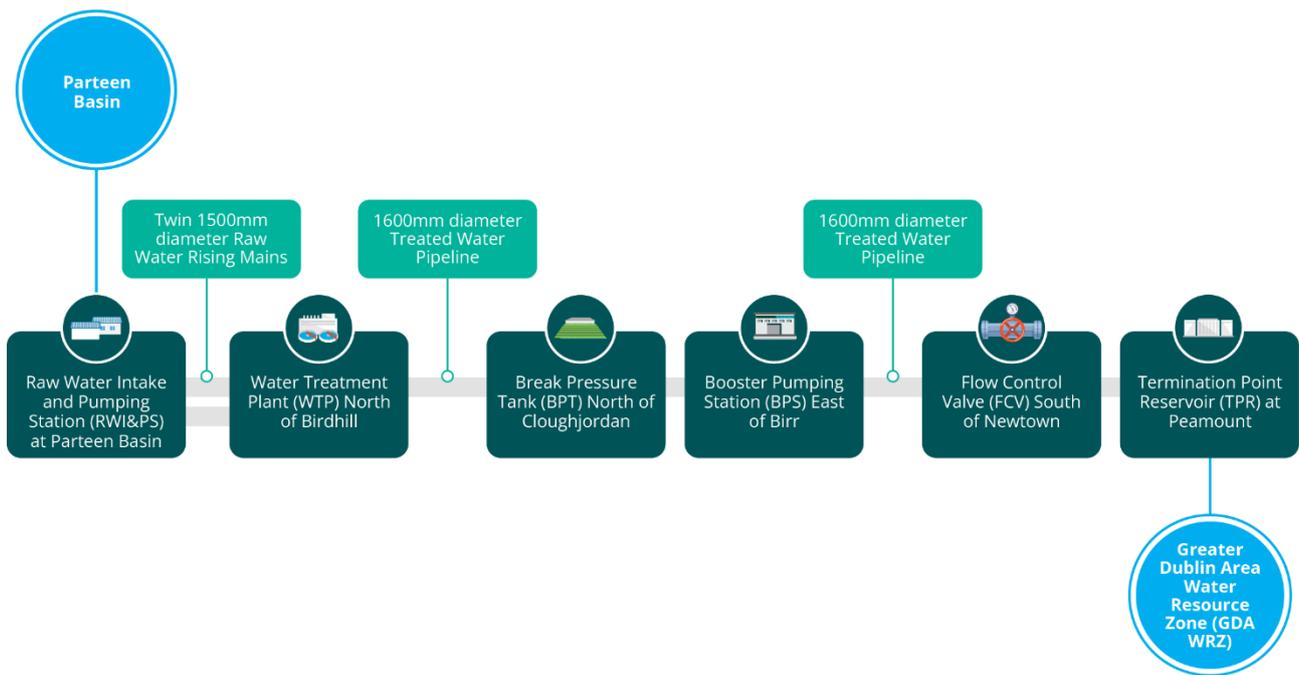


Image 4.2: Infographic Overview of the Principal Infrastructure and Pipeline Elements of the Proposed Project

12. The total area of land falling within the Planning Application Boundary is 1,233 hectares (ha). This includes both temporary and permanent use of land.
13. Permanent acquisition of land would be required for the RWI&PS, WTP, BPT, BPS, FCV and TPR, and for access roads to these locations, where required. In addition, land would be required permanently for Lay-Bys adjacent to Line Valve locations and also at four Line Valve locations where the ground level is being raised.
14. Along the pipeline Uisce Éireann will acquire a Permanent Wayleave, which gives it the right to construct, inspect, operate and maintain the RWRMs, Treated Water Pipeline and associated infrastructure. In addition, certain restrictions would apply within this wayleave in order to protect the pipeline. This would include for example, limiting future development and restricting planting of certain species of trees. Line Valves, Washout Valves and Air Valves locations would be situated within the Permanent Wayleave. The Permanent Wayleave associated with the RWRMs and Treated Water Pipeline would be 20m in width, normally centred on the pipeline. However, at Line Valves the Permanent Wayleave would be slightly widened to take account of additional permanent features including the kiosks and to provide operational access.
15. In addition, there would be two further wayleaves linked to ancillary pipeline infrastructure. Firstly, to discharge from some of the Washout Valves there would be a pipe connecting from the washout to a permanent outfall. There would be a Permanent Wayleave associated with this pipe. The wayleave would be 10m in width, normally centred above the connection pipe. At the outfall this wayleave would be widened to allow for the final position of the infrastructure as described in Section 4.3.2.
16. The second additional wayleave would be at each Line Valve and is needed for the permanent power supply from an existing mains power line to the valve. These connections would have a separate wayleave for the Electricity Supply Board (ESB).
17. The principal construction elements associated with the Proposed Project, including the construction techniques and equipment to be used, are presented in Chapter 5 (Construction & Commissioning).

18. The design has taken account of the Proposed Project's sustainability ambitions and incorporated measures to reduce environmental effects in response to the Environmental Impact Assessment (EIA) process. For the design of the permanent infrastructure these include:

- Selection of a solution which delivers a sustainable supply of water. The proposed drinking water abstraction is water that would otherwise be used in hydropower generation. A maximum of 2% of the long term annual average flow at Parteen Basin would be diverted for drinking water supply instead of being used for hydropower generation. This means that potential changes to the natural environment that could otherwise have occurred if overall abstraction rates were increased at Parteen Basin, or elsewhere, can be avoided by changing the use of the same volume of water which is already being abstracted from a lake. It also avoids the need to build a new impoundment and the environmental effects that would arise from doing so
- Optimising gravity pressure for transporting treated water through the pipeline to reduce energy demand and related emissions
- Choosing a route for the pipeline that avoids environmentally sensitive areas, as far as reasonably practicable, given its length
- Selecting Infrastructure Site locations that, as far as reasonably practicable, minimise environmental impacts, for example, visual effects, whilst considering technical and cost factors
- Optimising the operation of the pipeline taking into account the size of the steel pipe and the frequency with which pumping will be needed to supplement gravity fed supplies. This had to balance material use, embodied carbon and operational energy use
- Designing the intake at Parteen Basin to protect biodiversity, such as preventing fish from being trapped
- Designing the WTP to re-circulate waste washwater and avoid any discharge of waste water
- Using passive methods for lighting and ventilation of buildings
- Incorporating solar panels into the proposals at the Infrastructure Sites, including at the WTP, BPT, BPS, FCV and TPR to provide renewable energy where practicable
- Incorporating green roofs into the design of the WTP, BPT and TPR and providing for rain water harvesting at the RWI&PS and the WTP
- Including landscaping planting and habitat creation in the reinstatement proposals for the Infrastructure Sites.

19. Table 4.1 provides a summary of the principal Proposed Project infrastructure.

Table 4.1: 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 Garrynateel, 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.
Water Treatment Plant (WTP) (Infrastructure Site) County Tipperary	<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.

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
<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.
<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.

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
<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.
<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 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.

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
Construction Compounds Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council)	<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.
Pipe Storage Depots Counties Tipperary, Offaly and Kildare	<ul style="list-style-type: none"> • Nine Pipe Storage Depots would be temporarily required to supplement the Construction Compounds and would serve the installation of pipe between the WTP and the TPR. • Pipe Storage Depots would take direct delivery of the pipe for storage before onward journey to the required location along the Construction Working Width. • The Pipe Storage Depots would vary in size and require land temporarily during construction generally ranging between approximately 2ha and 7ha but with one site being larger at 11ha.

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

4.1.1 Structure of this Chapter

20. Table 4.2 sets out the structure of this chapter. This includes a description of each of the Infrastructure Sites and each section of the pipeline and then ancillary matters including the 38 kV Uprate Works and pipeline features.

Table 4.2: Structure of This Chapter

Topic	Sub-Topic	Section
Project Description Terminology	Identification Labels	Section 4.2.1
	Terminology	Section 4.2.2
Pipeline Corridor	The 20m Pipeline Corridor	Section 4.3.1
	Construction Flexibility	Section 4.3.2
Proposed Pipeline and Infrastructure Sites	Raw Water Intake and Pumping Station (RWI&PS)	Section 4.4
	Raw Water Rising Mains (RWRM)	Section 4.5
	Water Treatment Plant (WTP)	Section 4.6
	Treated Water Pipeline from the WTP to the BPT	Section 4.7
	Break Pressure Tank (BPT)	Section 4.8
	Treated Water Pipeline from the BPT to the TPR	Section 4.9
	Booster Pumping Station (BPS)	Section 4.10
	Flow Control Valve (FCV)	Section 4.11
	Termination Point Reservoir (TPR)	Section 4.12
Pipeline Features	Purpose of the Pipeline Features	Section 4.13.1
	Extent of the Pipeline Features	Section 4.13.2
	Line Valves	Section 4.13.3
	Chambers and Kiosks	Section 4.13.4
	Lay-Bys and Access	Section 4.13.5
	Cathodic Protection	Section 4.13.6
	Washout Valves	Section 4.13.7

Topic	Sub-Topic	Section
	Air Valves	Section 4.13.8
	Manways	Section 4.13.9
	Potential Future Connections	Section 4.13.10
	Operation and Maintenance of Pipeline Features	Section 4.13.11
38 kV Uprate Works	Purpose of the 38 kV Uprate Works	Section 4.14.1
	Location and Extent of Works	Section 4.14.2
	Design	Section 4.14.3
	Summary of the 38 kV Uprate Works	Section 4.14.4
	Operation and Maintenance	Section 4.14.5
Operation and Maintenance	Operational Management of Water Levels at Parteen Basin	Section 4.15.1
	Control Philosophy	Section 4.15.2
	System Control	Section 4.15.3
	Energy	Section 4.15.4
	Operational Staffing	Section 4.15.5
Construction (Including Commissioning)	-	Section 4.16
Decommissioning	-	Section 4.17
Environmental Design and Mitigation	-	Section 4.18

21. This chapter should be read in conjunction with the following chapters, and their appendices, which expand upon aspects of the Proposed Project:

- Chapter 3 (Consideration of Reasonable Alternatives)
- Chapter 5 (Construction & Commissioning).

22. Figures which are referenced in the text are provided in Volume 5 of this EIAR.

23. This chapter is also supported by the following appendices:

- Appendix A4.1 (Operational Strategy)
- Appendix A4.2 (Standard Specification for ESB 38 kV Networks)
- Appendix A4.3 (Pole Details and Works for the Proposed 38 kV Uprate Works).

4.2 Project Description Terminology

4.2.1 Identification Labels

24. A graphical overview of the water supply infrastructure is shown in Image 4.3. For ease of reference, the pipeline carrying treated water has been separated into six sections. The Treated Water Pipeline from the WTP to the BPT comprises one section, and the Treated Water Pipeline from the BPT to the TPR comprises the other five, which are labelled section A to section E. Sections 4.7 and 4.9 provide further details on these sections. Locations along the pipeline are identified by their Chainage. In Chainage references, 'RW' signifies 'Raw Water'; that is, locations along the RWRMs. 'TW' signifies 'Treated Water' – references to TW indicate a location on the Treated Water Pipeline from the WTP to the BPT, and 'TWA' to 'TWE' indicate a location on the Treated Water Pipeline from the BPT to the TPR.

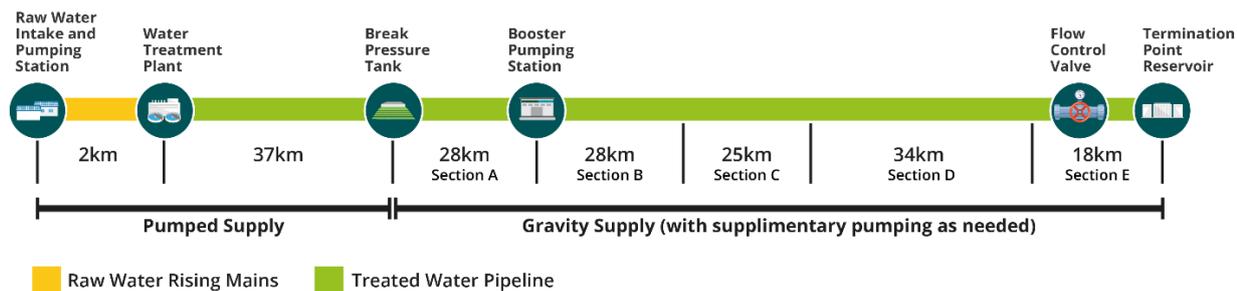


Image 4.3: Graphical Overview of the Water Supply Infrastructure

25. In addition, unique identification labels have been assigned to the following infrastructure and used throughout this EIAR:

- Construction Compounds (CC)
- Pipe Storage Depots (PSD)
- Watercourse Crossings – watercourses with Environmental Protection Agency segment codes (WCX)
- Watercourse Crossings – smaller watercourses and streams (WBX)
- Watercourse Crossings – ditches which have been noted as having some water during field surveys (WBP)
- Washout Valves – Permanent Discharge Locations with permanent outfall (WA)
- Watercourse Washout Location – Permanent outfall locations (WCW)
- Washout Valves – with no Permanent outfall – (WB)
- Road Crossings (RDX)
- Rail Crossings (RYX)
- Overhead Power Crossings (OHX)
- Gas Pipeline Crossings (GCN).

26. Each label has been assigned a unique number, for example RDX001, RDX002. Generally, the numbering has been applied beginning at the RWI&PS and then increasing in number as the reader travels along the Proposed Project towards the TPR. In some cases, features do not appear in numerical order or numbering has become redundant due to design development.

27. For the Proposed 38 kV Uprate Works (see Section 4.14), the following prefix has been applied to the ID labels:

- Features along the Proposed 38 kV Uprate Works Ardnacrusha – Birdhill Line (northern line) are noted with the prefix PSN.

4.2.2 Terminology

28. Table 4.3 provides a reference glossary to some of the terminology used in this chapter and throughout other chapters of the EIAR.

Table 4.3: Overview of Project Description Terminology

Term	Description
Ancillary Pipeline Features	These are the permanent features along the length of the pipeline such as valves, washouts and power supplies but excluding the Infrastructure Sites.
Barge	A flat-bottomed boat for transport of plant and material.
Battered excavation	To form the face or side or wall of an excavation at an angle to the horizontal in which earth slippage or slumping would not occur.
Bituminous macadam (Bitmac)	Crushed stone in a bitumen binder.
Bog mat	A ground protection solution, generally made from timber, used to create long-term temporary access roads on construction sites located on or near fragile ground.
Bowser	Mobile tanker containing water.
Bulldozer	A large and heavy tractor equipped with a substantial metal plate (termed a blade) used to push large quantities of excavated material during construction. Only for use on the Infrastructure Sites.
Bunding	A constructed barrier for the retention or containment of liquid material.
Caisson	A watertight retaining structure used in construction.
Casing end seals	A means of closing the space between the carrier (steel) pipe, and the larger surrounding pipe ('sleeve') which serves to contain it, preventing ingress of moisture and debris into the void between the pipes which could possibly corrode or damage the carrier pipe.
Casting	A manufacturing process which uses moulds to create a product in a controlled environment.
Cathodic Protection	Cathodic Protection is a technique used to control the electrochemical corrosion of a metal surface. It is described in Section 4.13.6.
Centrifugal force	The apparent force felt by an object moving in a curved path that acts outwards and away from the centre of rotation.
Cofferdam	An enclosure built within or across a body of water to allow the enclosed area to be pumped dry.
Commissioning	A systematic process of ensuring that the constructed works perform in accordance with the design intent, contract documents, and the owner's operational needs.
Concrete batching plant	Equipment that combines various ingredients, e.g. water, air, sand, stone aggregate, cement, to form concrete.
Concrete revetment mats	Flexible mat of meshed thin concrete segments used for stabilising sloping structures and erosion control.
Conductor	Metal cables for the transmission of electric power.
Construction Working Width	The works area required for the construction of the RWRMs and the Treated Water Pipeline would typically be 50m wide but would be wider than 50m for features such as trenchless crossings, access and egress points from the public road network, Construction Compounds and Pipe Storage Depots.
Construction flexibility	This refers to the ability to manage the delivery of the Proposed Project within normal construction practice to overcome unknown site constraints / obstacles.
Contractor	Any reference to the appointed Contractor means any of the Contractors Uisce Éireann may appoint for the Construction Phase of the Proposed Project. This includes sub-contractors to those Contractors.
Culvert	An enclosed structure that allows water to flow under an obstruction such as a road or railway.
Cut and fill operations	The process of earth moving where surplus excavated material from one part of a site is used to balance the soil material deficit in another part of the site.
Demand	Volume of water needed by domestic and commercial users that the Proposed Project needs to supply.
Dense bitumen macadam	20mm or 28mm aggregate in a bitumen binder.
Dry well	A dry underground structure associated with a pumping station, easily accessible, for housing pump pipework, including pumps, and ancillary infrastructure.
Dump truck	Plant for transporting construction materials with a back part that can be raised at one end so that its contents can be deposited.
Excavator	Plant with a boom/arm and bucket/shovels for excavating large volumes of construction materials.
Formation layer	The surface level at which the excavation ceases, and construction starts.
Formation level	The deepest point of an excavation; the starting level, usually expressed as a depth below ground level, for the construction of a structure.

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Term	Description
Gas Insulated Switchgear Modular Building	Prefabricated building for housing the Gas Insulated Switchgear.
Geogrid mattress	A synthetic material typically used to reinforce soils and subsoils below structures.
Graders	Plant with a long blade used for grading or defining the level of the material that is being graded.
Green roof	A 'living' roof on top of a building, where a soil layer of 15cm is laid down and then planted with seeds (which are suitable for the local environment).
Hardcore surface	A mass of solid materials used to create a firm and level working base or temporary road surface.
Haul Road	Part of the public road network for the movement of plant, labour and construction materials.
Horizontal directional drilling	A practice of drilling that uses steerable drilling rigs allowing horizontal alignment of straight or curved pipes and ducts without the need for open trenches.
Impact hammer	A piston or ram is dropped from a height onto an anvil block with a driving cap for driving sheet piles into hard soils. The impact hammer/pistol or ram/anvil block is supported within a heavy frame or chassis to maintain a vertical position during operation.
Jib	The horizontal part of a crane or other construction plant.
Launch pit	A temporary excavated area at the beginning of a trenchless construction operation used to assemble and deploy tunnelling equipment, such as a pipe jacking equipment. It is the entry point for excavation by trenchless construction.
Manifold	A piece of pipework containing multiple inlets/outlets.
Manway	A bolted, flanged, access hatch on top of the pipe.
Mobile Elevated Work Platform	A mobile machine used to move persons to working positions where they are carrying out work from the work platform.
Passive rock dowels	Reinforcing rods inserted into predrilled holes in the rock to provide structural stability.
Penstock	A hydraulic gate to control the flow of water within a channel or conduit.
Permeable geotextile membrane	Large sheets of fabric used for filtration.
Pile driver	A device used to drive piles into soil to provide foundation support for buildings or other structures.
Piling	The use of heavy stakes, posts or sheets installed to support foundations of a structure.
Pipeline Corridor	The Pipeline Corridor is a 20m width along the length of the pipeline (including both the RWRMs and the Treated Water Pipeline). It is described in Section 4.3.1.
Pipeline features	The pipeline features refer to the ancillary infrastructure that is needed along the length of the pipeline to support its operation. This would include Air Valves, Line Valves, Washouts, Manways, Kiosks and Lay-Bys. It also includes potential future connection points.
Poleset	A set of poles used to hold electricity lines.
Pontoon	A large flat-bottomed barge equipped with plant to carry out construction works from the lakeside.
Precast concrete	Concrete cast off site and delivered to site to be incorporated within the works.
Puddle clay	A watertight material based on clay and water mixed to be workable.
Pump sump	A pit serving as a receptacle for water and enabling the use of pumping equipment to remove it.
Reciprocating driving head mounted	A form of pumping mechanism incorporating repetitive up-and-down or back-and-forth linear motion.
Outfall	A permanent concrete structure on the banks of a watercourse that is at the end of a buried washout pipe to facilitate the occasional safe, controlled discharge from the Treated Water Pipeline during planned maintenance.
Reinforced concrete	Concrete in which steel is embedded in such a manner that the two materials act together in resisting forces. The reinforcing steel – rods, bars or mesh – absorbs the tensile, shear and sometimes the compressive stresses in a concrete structure.
Reprofiling	To change the profile of the existing ground from that which existed prior to construction.
Ripping claw	An attachment to an excavator with one or more sharp tooth-like tips for breaking up softer rock which is already fractured.
Road roller	A compactor-type plant used to compact soil, gravel/hardcore, or bituminous material in the construction of roads and foundations.
Rotary core drilling	A rotary coring system designed to drill deep boreholes.

Term	Description
Scarify	The process of breaking up soil by fracturing or tilling it.
Screening berm	A level space or raised barrier separating two areas.
Secant piles	Secant pile walls are formed by constructing intersecting reinforced concrete piles.
Sheet pile	A type of piling that has an interlocking section used to form a watertight retaining wall.
Stank	A material impervious to the passage of water.
Stay	Galvanised steel wire strands used for sustaining mechanical load. Generally made of several wires stranded around one wire and twisting together. Used to 'stay' polesets.
Steel fixing	Shaping and fitting steel rods, bars or mesh for incorporation within reinforced concrete.
Steel shuttering	Temporary moulds into which concrete is poured.
Structural steelwork	A category of steel capable of supporting high loading without excessive sagging or bending.
Subsoil	The layer of soil immediately under the surface soil.
Surge	Surge refers to temporary elevated or reduced pressure conditions, which may be caused in a pipeline by pump start-up or shut-down or by closing valves on the main.
Supernatant liquid	The clear liquid that lies above the solid residue.
Terram fabric	Permeable non-woven fabrics used in construction to separate, filter, reinforce, protect or drain a site.
Testing	The process of checking the materials, plant, equipment, and instrumentation used in the constructed/built works meet pre-determined standards for quality, safety, efficacy, and endurance.
Topsoil	The upper, outermost layer of soil with a typical depth of 150mm to 400mm.
Tracked vehicle	A self-propelled vehicle that moves on two tracks.
Tractor mounted flat lift rippers	Plant used for deep tillage, loosening, and breaking up of subsoil.
Tractor shovel	A tractor which has a bucket for digging, elevating and dumping its load at truck height.
Transient Pressure	Pressure changes within the water passing through the pipeline.
Treated Water Pipeline	This is the pipeline between the WTP and the TPR.
Vegetation clearance	Removal of hedgerows.
Vertical alignment	The vertical alignment of linear infrastructure such as a pipeline refers to the relative height or depth of the infrastructure when measured against a vertical axis with a fixed datum point. The heights and depths at different points along a pipeline may describe an ascending or descending straight line (i.e. a gradient), or vertical curves which are responding to, for example, low and high points in the local terrain. The vertical alignment of a pipeline influences the depth at which it is constructed below ground level. The reference point for vertical alignment on the Proposed Project is metres Above Ordnance Datum (mAOD).
Vibratory hammer	A tool used to drive piles into or out of the ground using spinning counter-weights to create vibration to the pile causing it to 'liquify' and slip in the ground.
Vibratory rollers	A compactor having a horizontal cylinder used to compact soil, asphalt or other materials through the application of combined static and dynamic forces (weight and vibrations) to increase the load-bearing capacity of the surface.
Wayleave	A wayleave is a right enjoyed over the lands of another. In the case of the Proposed Project, the right being acquired from a landowner is the right to lay a water pipeline and any other associated items such as valves, chambers and kiosks that are connected with the pipeline or that help Uisce Éireann to perform its duties. This includes a right of access to inspect and maintain the pipeline and any associated features such as the valves.
Wet infrastructure	The works relating to water abstraction, treatment, storage and water supply, including all structures, pipelines and fittings, tunnel installations, pumping plant, control and operating systems.

4.3 Pipeline Corridor

4.3.1 The 20m Pipeline Corridor

29. The Pipeline Corridor is a 20m wide area within which the final alignment of the pipeline would be located. This corridor has been defined by a 10m width in either direction from the current, proposed centreline of the pipeline, giving a total width of 20m. This is necessary to provide the construction flexibility described in Section 4.3.2. The Pipeline Corridor is shown in Figures 4.185 – 4.235.
30. This Pipeline Corridor provides a level of construction flexibility within normal construction practice.

4.3.2 Construction Flexibility

31. This chapter defines the Proposed Project and all of the elements within it. However, 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 (e.g. unknown archaeology, unknown services, new badger setts). Although a high level of ground investigation and survey work has been undertaken 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 constraints or obstacles during the later stages of the Proposed Project. The elements of the Proposed Project which are subject to construction flexibility are summarised in Sections 4.3.2.1 to 4.3.2.5.
32. Chapter 5 (Construction and Commissioning) provides further information on variations in the method of construction that have been assessed and reported in this EIAR. This section only addresses construction flexibility which affects the locations of the permanent infrastructure.
33. The assessment reported in this EIAR has taken account of this construction flexibility and assessed all the likely significant effects that could arise.

4.3.2.1 Construction Flexibility - Horizontal Pipeline Alignment

34. To allow for construction flexibility to overcome site constraints or obstacles, a 20m Pipeline Corridor has been defined for the pipeline (including both the RWRMs and the Treated Water Pipeline), within which the pipe would be located. As described in Section 4.3.1 this corridor has been defined by a 10m width either side of the centre of the pipeline alignment as currently proposed i.e. 20m in total. Therefore, for the purpose of the assessment reported in this EIAR, likely significant environmental effects have been identified and reported for the horizontal alignment of the pipeline being within the 20m Pipeline Corridor.
35. The 20m Pipeline Corridor defining the horizontal construction flexibility is shown indicatively in Image 4.4. The full length of the 20m Pipeline Corridor is shown in Figures 4.185 – 4.235.

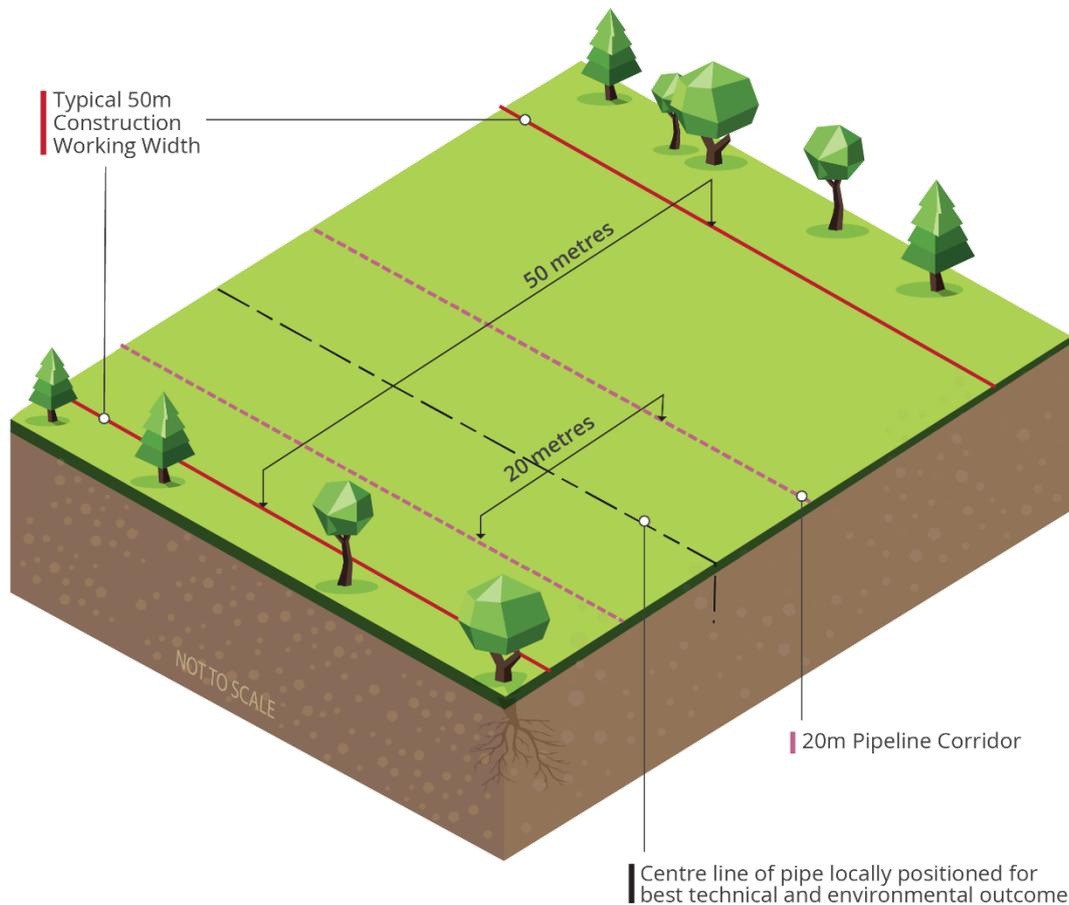


Image 4.4: Indicative representation of the 20m Pipeline Corridor within the wider Construction Working Width

4.3.2.2 Construction Flexibility - Vertical Pipeline Alignment

36. To allow construction flexibility to overcome site constraints or obstacles, the vertical alignment of the pipeline could vary between the following:
- The crown (or top) of the pipeline (excluding collars or other anti-floatation measure) being no shallower than 1.2m below current ground level
 - The crown (or top) of the pipeline would not be deeper than 4.4m below current ground level.
37. This construction flexibility is subject to some exceptions which constrain or alter the level of flexibility in certain locations or circumstances. These are:
- At trenchless crossings under major rivers, roads, railways and canals which would be deeper than 4.4m to the crown (or top) of the pipe. These would be no deeper than as set out in the Planning Application Drawings submitted as part of the Planning Application for the Proposed Project
 - At major watercourse crossings the crown of the pipe would be at least 1.6m below the bottom of the bed of the river
 - Similar minimum depth restrictions apply at rail, strategic roads and canal crossings

- Sections of the pipeline 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 Planning Application Drawings submitted as part of the Planning Application for the Proposed Project and consequently assessed for significant environmental effects as reported in this EIAR. These include, e.g. TWB – 27100 to TWB – 27700 and TWC – 2600 to TWC – 2750. In these instances, the parameters assessed have been the crown of the pipe not being deeper than that shown in the Planning Application Drawings submitted as part of the Planning Application for the Proposed Project, and not shallower than 1.2m.

38. Therefore, for the purpose of the assessment reported in this EIAR, likely significant environmental effects have been identified and reported for the vertical alignment of the pipeline being within this construction flexibility.

4.3.2.3 Construction Flexibility - Pipeline Features

39. In relation to the positioning of features associated with the pipeline such as Valves, Manways and Chambers, as described in Section 4.13 (but specifically excluding Lay-Bys and outfall locations), the design has identified suitable locations for these features. However, these features need to be above the pipeline. Therefore, to accommodate the vertical and horizontal construction flexibility set out in Sections 4.3.2.1 and 4.3.2.2, there also needs to be equivalent construction flexibility in the precise location of the Valves, Chambers or other pipeline features.

40. Consequently, for the purpose of the assessment reported in this EIAR, the likely significant environmental effects have been identified and reported from the pipeline features, specifically, Valves, Manways and Chambers, having the flexibility to move within the same 20m Pipeline Corridor as the horizontal alignment of the pipeline. However, this is subject to the following constraint:

- Those features must remain within the same parcel/folio of land in which they are currently proposed.

41. The location of the Lay-Bys would not vary because they are constrained by the Planning Application Boundary.

4.3.2.4 Construction Flexibility - Outfall Connections

42. Some of the Washout Valves along the length of the pipeline would have a permanent outfall to a watercourse. To get the water from the Washout to the outfall there would be a connecting pipe. To provide construction flexibility to overcome onsite obstacles or constraints a 10m wide corridor has been defined within which the pipe would be located. This corridor has been defined by a 5m width either side of the centre of the connecting pipe alignment as current proposed i.e. 10m in total.

43. Therefore, for the purpose of the assessment reported in this EIAR, likely significant environmental effects have been identified and reported for the alignment of the outfall connections pipe being within a 10m corridor.

4.3.2.5 Construction Flexibility - Outfall Headwalls and Discharge

44. For the Washouts with a permanent outfall, the outfall headwalls and discharge point would have to have the construction flexibility to move with the alignment of the outfall pipe. Therefore, the discharge point would have the flexibility to move within the same 10m corridor as the pipe, as defined in Section 4.3.2.4. The headwalls would need the flexibility to move further because they step out from the pipe. To allow for appropriate construction flexibility, the headwalls could move 10m either side of the current pipeline alignment. Therefore, a total construction flexibility width of 20m has been defined and the assessment reported in the EIAR has identified the likely significant environmental effects of the outfall headwalls being within this construction flexibility.

4.4 Raw Water Intake and Pumping Station (RWI&PS)

4.4.1 Purpose of the RWI&PS

45. The RWI&PS is needed to:

- Abstract raw water from Parteen Basin
- Pump raw water to the WTP.

46. As shown in Image 4.5, the raw water would enter the Intake Chamber and then pass through the Passive Wedge-Wire Cylinder (PWWC) Intake Screens into the Inlet Chambers before entering the pump hall. Water pumped from here can be passed through the microfiltration process as required before being delivered to the WTP at Incha Beg via the twin RWRMs.

47. The RWI&PS is designed to abstract a maximum of 300Mld of raw water from the River Shannon at Parteen Basin. The main components of the RWI&PS are illustrated in Image 4.5.

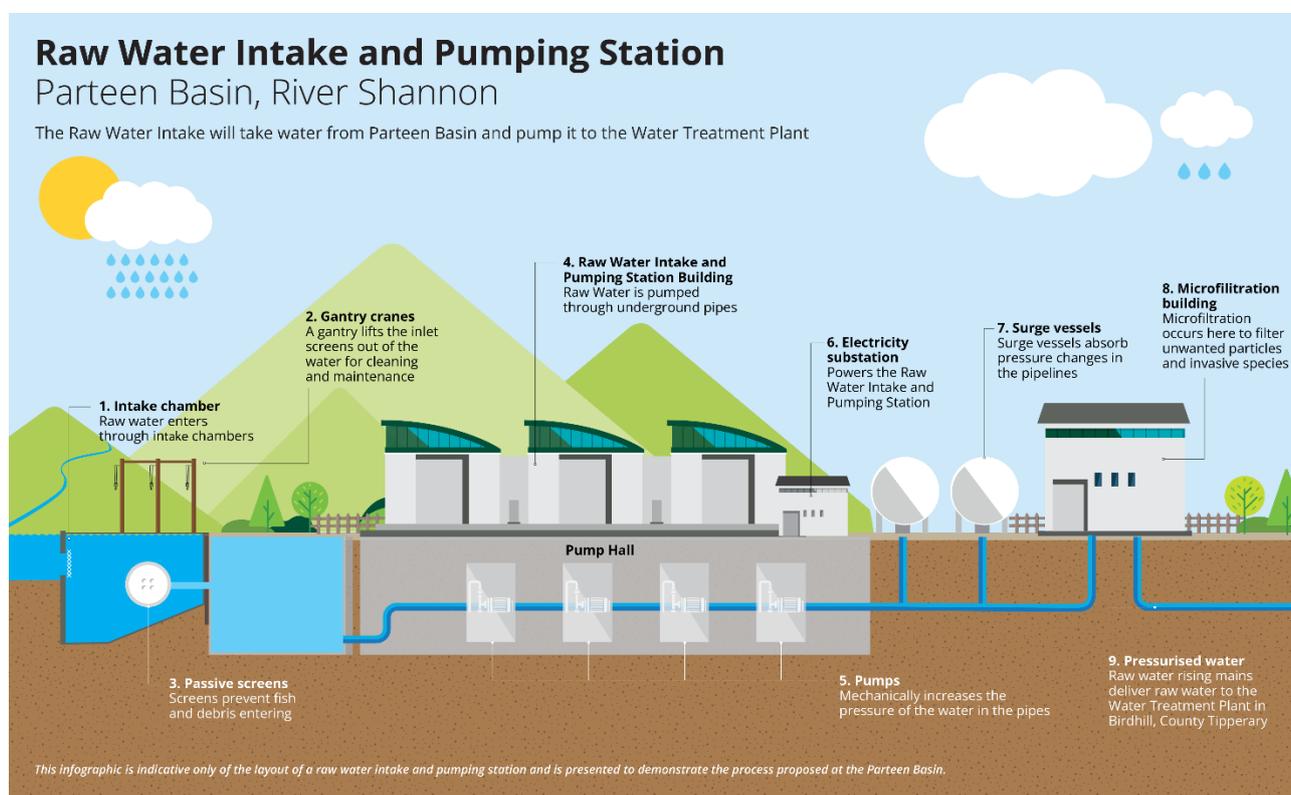


Image 4.5: Infographic Overview of the Raw Water Intake and Pumping Station

4.4.2 Location

48. The proposed site for the new RWI&PS is located on the eastern shore of the manmade Parteen Basin, downstream of Lough Derg in the townland of Garrynateeneel, immediately north of and adjacent to the linear reservoir embankment (Fort Henry Embankment – Category A dam) as shown in Figure 4.7. This is approximately 3.3km north-east of the Parteen Weir and the entrance to the Ardnacrusha Headrace, approximately 14.3km upstream of the Ardnacrusha Generating Station and approximately 2.9km downstream of the bridge at Ballina/Killaloe.

49. The RWI&PS site is located within the Lower River Shannon Special Area of Conservation (SAC) (Site Code 002165) and is currently non-commercial forestry.

50. The Parteen Basin forms part of the Lower River Shannon SAC and consequently the proposals for the design, construction, operation and maintenance of the proposed raw water intake have taken consideration of the qualifying interests in the SAC.

4.4.3 Extent of the Site

51. The RWI&PS site would be approximately 3.3ha (excluding the access road described in Section 4.4.4). This would comprise approximately 2.6ha of permanent land take and a further approximately 0.8ha of land only required temporarily during construction.⁴

4.4.4 Access

52. In order to provide permanent access to the site it is proposed to construct a new road from the R494 to the RWI&PS. The road would be 5m in width and would have a length of 670m. The permanent access would require 1.5ha of land. In addition, a further 0.3ha would be required temporarily during construction to build the access road.⁵ This would be in addition to the land defined in Section 4.4.3.
53. The permanent access road would be within an area of surface water flood risk and a Flood Risk Assessment has been undertaken and is reported in Appendix A9.4 (Flood Risk Assessment).
54. The access road junction would include a pull-in area before the security gates and appropriate signage when emerging onto the R494⁶, in accordance with Transport Infrastructure Ireland's (TII) Geometric Design of Junctions, DN-GEO-03060 (TII 2023). Sightlines at the access road entrance on the R494 have been facilitated by the recent Killaloe Bypass Shannon Bridge Crossing and R494 Improvement Scheme. These would also comply with DN-GEO-03060 (TII 2023). No further works or land would be required to provide these sight lines. The RWI&PS site and access road would also include lighting as described in Section 4.4.7.
55. Car park spaces would be provided on-site for sixteen vehicles, two of which would include a charging point for electric vehicles, in accordance with Table 6.6 in Appendix 6 of the Tipperary County Development Plan 2022-2028 (Tipperary County Council 2022).

4.4.5 Design

56. The proposed site would include the Raw Water Pumping Station Building, the Microfiltration Buildings, an Electricity Substation and ancillary works, such as surge vessels, metering and swabbing chambers, a Wastewater Holding Tank and site development works, as described in the following paragraphs.
57. The infrastructure elements of the RWI&PS are shown in Figure 4.61 and are detailed in Table 4.4.

⁴ These totals are affected by rounding to one decimal place.

⁵ These totals are affected by rounding to one decimal place.

⁶ Consultation has taken place with the Killaloe Bypass, Shannon Bridge Crossing and R494 Improvement Scheme Design Team related to the access road junction.

Table 4.4: Infrastructure Elements – Raw Water Intake and Pumping Station Site

Infrastructure Element	No.	Length	Width	Height Over Finished Ground Level	Plan Area	
					Each	Overall
Raw Water Intake Chamber (with Passive Wedge-Wire Screens)	1 No.	39.9m (average)	10.4m (average)	7.2m (depth)	416m ²	416m ²
Inlet Chambers	3 No.	5.0m	11.8m	13.0m (depth)	59m ²	176m ²
Inlet Revetment	1 No.	55.0m	27.0m	6.2m (depth)	1,040m ²	1,040m ²
Raw Water Pumping Station Building	1 No.	Superstructure 30.9m	Superstructure 37.5m	Superstructure 9.8m	1,159m ²	1,159m ²
		Substructure 45.4m	Substructure 37.5m	Substructure 13.0m (depth)	1,714m ²	1,714m ²
Microfiltration Buildings	2 No.	21.2m	16.2m	Superstructure 10.9m	345m ²	690m ²
				Substructure 10.4m (depth) ⁷	104m ²	104m ²
Surge Vessel	4 No.	7.5m	3.8m	5.0m	30m ²	120m ²
Concrete Revetment Mats	n/a	73.0m	20.0m	5.0m (depth)	n/a	1,460m ²
Raw Water Rising Mains Scour Tank	1 No.	44.7m	20m	Substructure 10.4m (depth) ⁸	4,109m ²	4,109m ²
20 kV Electricity Substation site	1 No.	40.2m	36.0m	4.7m for the Switchgear	1,447m ²	1,447m ²
Switchgear Building	1 No.	14.8m	9.3m	3.5m	138m ²	138m ²
Invasive Species Debris Retention Tank	1 No.	16.2m	13.8m	7.4m (depth)	224m ²	224m ²

4.4.5.1 Intake Chamber at the RWI&PS

58. An Intake Chamber is proposed on the bankside of the Parteen Basin. Existing ground levels on the bank at the proposed intake site at the Parteen Basin are approximately 31.0mAOD (Malin Head) (33.7m AOD Poolbeg).
59. The bankside structure would include the ‘wet infrastructure’, including the Intake Chamber with PWWC Intake Screens, located within a substructure, with a roof slab at finished ground level, and with lifting beams visible above ground. The lifting beams would allow the safe removal of the screens for periodic cleaning and maintenance.
60. At the Intake Chamber the ground would be excavated to a depth of 7.7m below the existing ground level, to 23.3mAOD (Malin Head) (26.0mAOD Poolbeg), and the intake chamber constructed with an invert level of 25.3mAOD (Malin Head) (28.0mAOD Poolbeg) in the central silt channel, as shown in Image 4.6. The cill wall would be constructed along the line of the existing shore. There would be seven separate inlet openings from Parteen Basin into the Intake Chamber, each measuring 1.7m high and 4.0m wide. These openings would be below the low water level in Parteen Basin. Penstocks at each opening could be closed to isolate the Intake Chamber from Parteen Basin, if necessary.
61. The wet chambers of the Intake Chamber would be able to accept inflow throughout the Normal Operating Water Band, and in flood conditions, on Parteen Basin.

⁷ The Microfiltration substructure would be 5.8m deep. The RWRM Scour Tanks would be below this, a further 4.6m deep. Therefore, the total depth of the Microfiltration Building and Scour Tank structure would be 10.4m.

⁸ The Microfiltration substructure would be 5.8m deep. The RWRM Scour Tanks would be below this, a further 4.6m deep. Therefore, the total depth of the Microfiltration Building and Scour Tank structure would be 10.4m.

62. A Bubble Curtain would be provided at the inlet openings to the Intake Chamber, between the Intake Chamber and the Parteen Basin. A Bubble Curtain is a system that produces fine bubbles of air across the entrance to the intake structure, which act as a barrier (a curtain) discouraging fish from entering the intake.
63. The Intake Chamber would be fitted with three PWWC Intake Screens (between the Intake Chamber and the Inlet Chamber) to avoid debris and/or fish or eels being taken up into the raw water pumps. Intake velocities through the screen slots would be limited to 0.15m/s, the velocity at which juvenile fish can swim away without being trapped/held by the screen. The screens would feed into three separate but interconnected Inlet Chambers, from which water would be drawn by the pumps, via a manifold suction pipe.
64. The PWWC Intake Screens would be 2.0m in diameter and would be set at an invert level (base interior level) of 27.0m AOD (Malin Head) (29.7m AOD Poolbeg) at the abstraction point. The level of the screens would ensure that there would always be a water depth of at least 1.0m above the crown (top) of the screens.

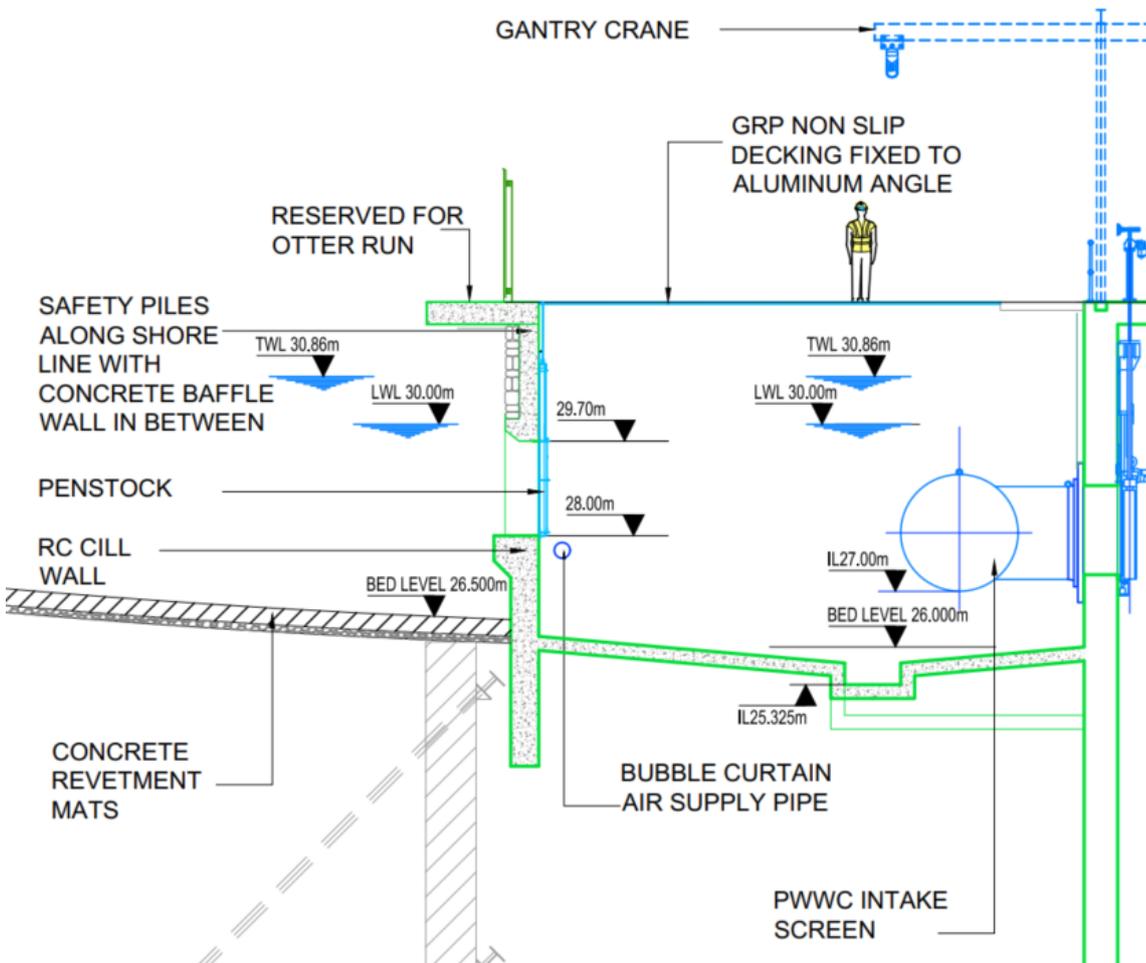


Image 4.6: Cross Section Through the Intake Chamber at the Raw Water Intake and Pumping Station

65. To prevent boats or floating debris from entering the Intake Chamber, a baffle wall would be constructed across the Intake Chamber, above the submerged cill wall. There would also be a line of protective buoys put in Parteen Basin outside the Intake Chamber, to mark the location of the underwater section and prevent boats from approaching the structure.

66. On the outside of the intake chamber the existing bed of Parteen Basin itself would be re-profiled to finished levels (along the wall of the intake chamber) of between 26.0mAOD and 25.5mAOD (Malin Head) (28.7mAOD to 28.2mAOD Poolbeg) and tapered over an area of 55m by 27m at the intake site. Flexible concrete revetment mats would be placed on that area and covered with gravel and native bed material. The depth of the re-profiled bed, which would be up to 5m would require a retaining wall on the bank of the Parteen Basin approximately 20m upstream and downstream of the Intake Chamber.
67. Space has been provided for an otter run between the site security fence and the edge of the Intake Chamber structure.

4.4.5.2 Raw Water Pumping Station Building

68. The Raw Water Pumping Station Building would include the following elements:
- Entrance foyer
 - Inlet chambers
 - Pump room
 - Control/data telemetry room
 - Office
 - Air burst and Raw Water Surge Vessel compressor room with provision for air receivers
 - Medium Voltage switchroom
 - Low Voltage switchroom
 - BioBullet⁹ storage and dosing room (for zebra mussel (*Dreissena polymorpha*) control)
 - Toilet and washing facilities with an associated Wastewater Holding Tank external to the Raw Water Pumping Station Building.
69. The superstructure of the Raw Water Pumping Station Building would have a ridge line 9.8m over finished ground level at its highest point, as illustrated in the photomontages presented as part of Chapter 16 (Landscape & Visual). This building has been designed to blend into the local landscape with the pumping station's housing located at the front of the Parteen Basin and intentionally incorporating three simple repeated regular forms emphasised by the curved roofline sections to create a 'boathouse' architectural form. This is intended to be in keeping with the setting of the building and reduce the visual impact of the structure. A visualisation of the buildings is provided in Image 4.7.

⁹ BioBullets are microscopic particles created by coating chemicals which are noxious to zebra mussels in a material that appears edible to the mussels. The noxious chemical is not detected and the filter feeder would continue to ingest the particles and not close down in self-defence, as they do when they detect, for example, heightened chlorine levels. BioBullets are approved by the UK Drinking Water Inspectorate for safe use in drinking water facilities. Uneaten BioBullets degrade to harmless concentrations within a few hours of entering the water, and do not bioaccumulate.



Image 4.7: RWI&PS Architectural Visualisation

70. The raw water pumps and pipework would be located in a 13.0m deep dry well installation, in the below ground, basement of the Raw Water Pumping Station Building. There would be two sets of four pumps. Each set of pumps would be capable of pumping the peak flow of 300Mld. The exact configuration of duty and assist pumps would evolve in response to the growth in demand. There would always be one pump on standby.
71. Communications links to the RWI&PS would be provided by a telemetry mast, the top of which would be 14m above finished ground level.

4.4.5.3 Surge Vessels

72. The site layout includes four Raw Water Surge Vessels for the RWRMs, two on each RWRM. The Raw Water Surge Vessels would be located external to the Raw Water Pumping Station Building superstructure and the top of each of the vessels would be 5.0m high.
73. Each vessel would have a capacity of 89m³ providing a total vessel volume of 178m³ on each RWRM.

4.4.5.4 Microfiltration Buildings and Raw Water Rising Mains Scour Tank

74. Two buildings, each housing five microfiltration units and associated pipework, would be constructed to the east of the main Raw Water Pumping Station Building. The buildings would each consist of a single room with a floor level 5.8m below finished ground level. (The RWRM Scour Tank would be below this floor level a further 4.6m deep and so the total depth of the combined structures would be 10.4m). The Microfiltration Buildings would be the tallest structures at this site with an approximate height of 10.9m over finished ground level. The microfiltration units would be part of the control of invasive species and are described in Section 4.4.5.5.
75. A Raw Water Rising Mains Scour Tank would be located at the RWI&PS below the Microfiltration Buildings. The Raw Water Rising Mains Scour Tank would be used to receive water from the RWRMs and its swabbing chambers when the pipes are being cleaned. The contents of the Raw Water Rising Mains Scour Tank would be pumped back to the pumping station Inlet Chambers, so that no water would be returned to Parteen Basin itself.

4.4.5.5 Design for Invasive Species Control

76. The RWI&PS has been designed to incorporate measures to reduce the risk of transfer of invasive species beyond Parteen Basin as a result of the Proposed Project.
77. Zebra mussel is a small freshwater mussel which is not native to Ireland, but which has been found in various watercourses including the River Shannon. In addition, quagga mussel (*Dreissena bugensis*) has also been found in Lough Derg in recent years. Similarly, the Asian clam (*Corbicula fluminea*), like the zebra mussel, is an invasive mollusc which has been found in Irish watercourses including the River Shannon.
78. The PWWC Intake Screens would be manufactured entirely of a copper-nickel alloy to inhibit attachment by zebra mussels, quagga mussels and Asian clams. There would be three screens, and this allows for any one screen to be lifted out for inspection and cleaned while the full abstraction volume flows through the other two screens. Each screen serves its own Inlet Chamber, which can also be isolated for cleaning from the other chambers while the full flow is passing through.
79. While the PWWC Intake Screens would be made of a copper-nickel alloy to minimise the risk of zebra mussel attachment, some pro-active anti-fouling measures would also be needed to protect the intake pipes from becoming clogged. The pipes would be internally coated with proprietary products to discourage zebra mussels from attaching to the pipe wall.
80. The Raw Water Pumping Station pump sets would deliver water into common manifolds which feed the twin RWRMs. Each RWRM can be taken out of service for maintenance, while delivering the full required flow through the other one. The pumping system is configured in such a way that not just the RWRM but each piece of pipework in the station can be accessed for maintenance without interruption of supply. In the event of invasive species infestation, either of the RWRMs could be taken out of service for days or weeks, as may be required for short-term 'pigging'¹⁰ or occasional longer standing chemical treatment, or for creating prolonged fully drained conditions which would inhibit the establishment of zebra mussels or other invasive species.
81. In order to protect from zebra mussel infestation, it would be possible to dose invasive species control chemicals directly into the raw water using control chemicals approved for use in water treatment of potable water. Provision has been made within the Raw Water Pumping Station Building for the storage and dosing of BioBullets or similar approved chemicals into the raw water.
82. The two microfiltration plants, one on each RWRM, housed in separate Microfiltration Buildings (as shown in Figure 4.61) would provide further protection against invasive species. Each microfiltration module would incorporate five filter units. The microfiltration size would typically be 40 microns, which is below the size at which the zebra mussel juveniles, called 'veligers', are usually observed to settle. The microfiltration modules would be equipped with protective non-return valves to prevent damage from surge backflows through the units.
83. The microfilters (Amiad Filters or equivalent) would sit on a manifold located on a loop off each RWRM. Raw water would pass through these units and dirt particles and juvenile mussels would be trapped in the unit, forming a 'filtration cake'. This cake would cause a pressure drop across the unit and a self-cleaning process would be triggered. The self-cleaning process would involve the units being flushed regularly to clean away any zebra mussels or other waste material trapped in the filters. A filter flush-out pipe would carry the washwater to an Invasive Species Debris Retention Tank, located to the east of the Microfiltration Buildings. This washwater volume would be approximately 1% of the maximum abstraction volume (i.e. up to 3,000m³/day) based on an output of 300Mld.

¹⁰ The practice of using devices known as 'pigs' to perform various maintenance operations.

84. This washwater would be subject to ultraviolet (UV) treatment to kill mussel juvenile forms (veligers) before being settled in the Invasive Species Debris Retention Tank. A floating-arm draw-off pipe would take supernatant liquid (the clear liquid that lies above the solid residue) from the tank and transfer it back to the raw water intake, via the Inlet Chamber, from where it would be pumped onwards for treatment at the WTP. Rejected solid material settled out in the Invasive Species Debris Retention Tank would be removed from site to an appropriately authorised facility in accordance with the requirements of the Waste Management Act 1996 (as amended) (see Chapter 19: Resource & Waste Management for further information).
85. Two Raw Water Balancing Tanks (RWBTs) are also proposed in the WTP, described further in Section 4.6.5, so that in the event of an invasive species breakthrough, one can be taken out of service for inspection, cleaning and maintenance, while the full flow is passing through the other tank.
86. The combination of measures at the RWI&PS and the water treatment process itself would reduce the risk of invasive species breakthrough to the Treated Water Pipeline. Invasive species design and likely environmental effects are assessed in further detail in Chapter 8 (Biodiversity).

4.4.6 Surface Water Management and Drainage

87. The RWI&PS access road, and other paved areas have been designed to incorporate Sustainable Drainage Systems (SuDS) principles as recommended in the SuDS Manual (Construction Industry Research and Information Association (CIRIA) 2015) in order to limit discharges from the site to the equivalent greenfield site flow rate.
88. As part of this strategy, rainwater runoff from the roofs of the Raw Water Pumping Station Building and the two Microfiltration Buildings would be harvested and taken into the Raw Water Intake Basin and the RWRMs Scour Tank respectively.
89. Rainfall runoff from roads and impermeable areas would be conveyed via a drainage system to a Stormwater Attenuation Tank, as shown in Figure 4.61. An oil/petrol interceptor would be located immediately upstream of the attenuation tank. The volume of the attenuation tank required to accommodate flows from a 1 in 100-year storm event, with an allowance for climate change, is 125m³. A flow control device on the outlet of the tank would limit discharge stormwater flow leaving the tank to a maximum of 17.35l/s, equivalent to the greenfield runoff from the entire RWI&PS site. Flow from the attenuation tank would be conveyed by a 200mm diameter drain along the RWI&PS access road to a local watercourse approximately 350m along the access road from the R494.
90. The site would not be permanently staffed and so foul wastewater generated by operational staff on the site would be less than 1m³/d and would be tankered from the Wastewater Holding Tank shown in Figure 4.61 to a licensed Wastewater Treatment Plant (WwTP).
91. The management of surface water arising from dewatering operations during construction is described in Chapter 5 (Construction & Commissioning).

4.4.7 External Lighting

92. At the RWI&PS site, light-emitting diode (LED) external lighting would be provided at the perimeter of the Raw Water Pumping Station Building and the two Microfiltration Buildings, on interconnecting footpaths, on traffic circulation areas around the site, in the car parking area and at the entrance to the site. In addition, exterior lighting would be provided to illuminate particular work areas to facilitate operational maintenance.

93. The design of external lighting at the RWI&PS site would be carried out with reference to the following Standards:
- Lighting Guide LG06: The Exterior Environment (Chartered Institution of Building Services Engineers 2016)
 - 2017 Guide on the Limitation of Effects of Obtrusive Lighting from Outdoor Lighting Installations 2nd Edition (Commission Internationale de l'Eclairage 2017)
 - Bats and Artificial Lighting at Night. Guidance Note 08/23 (Bat Conservation Trust 2023).
94. The lighting installation would provide a safe and secure environment for both pedestrians and drivers at the site and facilitate ongoing operational and maintenance works associated with the RWI&PS. To reduce impacts on areas adjacent to the RWI&PS site and light sensitivity species such as bats the following measures would be adopted:
- Luminaires (light fixtures), light standards (poles) and all other fixtures will be selected to complement the architecture of the buildings and will be sensitive to the surrounding environment
 - The required luminance levels will be achieved by selecting the most appropriate luminaires and lamp sources and carefully implementing the agreed control philosophy for operation of exterior lighting
 - External lighting would be designed to avoid night sky pollution/upward spill, and overspill into adjacent properties. This could include downward directional lighting and use of accessories such as hoods, cowls, louvres and shields to direct the light
 - Exterior lighting would be automatically controlled and would be turned off unless operational staff are present on-site
 - All luminaires used will lack UV/IR elements
 - LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability
 - A warm white spectrum (<2,700 kelvins (K) will be used to reduce the blue light component of the LED spectrum). This kelvin level is required to be reduced to 2,200K in lesser horseshoe bat zones
 - Luminaires will feature peak wavelengths higher than 550 nanometre (nm) (a nanometre is a length equal to one thousand-millionth of a metre). This is to avoid the component of light most disturbing to bats
 - Column heights will be carefully considered to minimise light spill. The shortest column height allowed will be used where possible
 - Only luminaires with an upward light ratio of 0% and with good optical control will be used
 - Luminaires will be mounted on the horizontal, i.e. no upward tilt
 - Any external security lighting will be set on motion-sensors and short (one minute) timers
 - The positioning of outdoor lighting will be directed away from any adjacent linear habitats (e.g. hedgerows, treelines, rivers, woodland edge) to ensure that there is no light spill onto such habitats.

4.4.8 Power Connection

95. The connected mechanical and electrical plant for the RWI&PS site would require 26,946kWh/d at an output of 154Mld, the annual average flow, and 52,401kWh/d at the peak demand of 300Mld.

96. The power supply to the RWI&PS would be provided by ESB Networks from the Birdhill 38 kV Substation, through two underground cable ducts laid in the R494 from Birdhill to the entrance of the RWI&PS access road. From there, the ducts would be routed along the access road into the electricity substation on the RWI&PS site (as shown in Figure 4.62). The cable ducts would consist of two 125mm ducts laid in one horizontal row with 75mm clear spacing from each other as per ESB Standard Specification for ESB 38 kV Networks Ducting/Cabling (Minimum Standards) (ESB Networks 2009); this is included as Appendix A4.2.
97. In order to provide the power required for the RWI&PS, ESB Networks would need to uprate the existing 38 kV overhead lines between Ardnacrusha and Birdhill. This is described in Section 4.14.
98. The RWI&PS site would contain a 20 kV electricity substation site, shown in Figure 4.61. This would consist of a fenced area within which there would be a Switchgear Building and two 20 kV to 6.6 kV transformers.
99. The Switchgear Building, located within the electricity substation site, would include a control room, a battery room and a switchgear room. The two transformers would be mounted externally on two 6.5m by 6.5m concrete plinths. Each transformer would have a height of 4.7m above the finished ground level.
100. In addition to the power supply to the site there are two existing overhead medium voltage lines which cross the access road to the RWI&PS. One of these would need a minor permanent diversion because there is a poleset that would be affected by the alignment of the permanent access road. The poleset would be relocated to the edge of the access road which would very slightly change the alignment of the overhead line. There would be no permanent works required for the second overhead line. A third line crosses underneath the access road and no permanent works would be required for this line either.

4.4.9 Potable Water Connection

101. A potable water supply for the welfare facilities at the RWI&PS would be required. The water would be brought to the RWI&PS site along the proposed access road from a connection to the 200mm diameter watermain, laid along the R494 as part of the Killaloe Bypass, Shannon Bridge Crossing and R494 Improvement Scheme.

4.4.10 Boundary Treatment/Landscaping

102. The RWI&PS site boundary would be fenced with a 1.2m post and rail stockproof fence with a second, 2.4m-high polyester powder-coated Paladin security fence set back 5m from the boundary fence. The overall expected length of the security fencing would be 689m. Paladin fencing was specified for this site following engagement with the Local Authority on the architectural treatment of the site.
103. There would also be two 2.4m-high polyester powder-coated security gates. One would be a set of 2.4m palisade gates at the entrance to the RWI&PS site. The second would be at the junction with the R494. This would be 2.4m high and integrated into the boundary wall which would consist of a 1.0m high block wall faced in local stone with a paladin security fence on top, to an overall height of 2.4m. There would also be a site entrance signage board incorporated into this boundary wall.
104. Along the boundary facing into Parteen Basin, the perimeter of the site would be a concrete wall and this would be faced in local stone with the paladin fence on top. Section 4.4.5.1 includes details on the boundary measures within Parteen Basin to protect the intake.
105. The permanent access road between the R494 and the RWI&PS site would have a post and rail fence only on its boundary.
106. CCTV cameras on 6m tall poles would provide security coverage of the access gates and buildings.

107. Site landscaping would seek generally to maintain existing ground levels across the site. However, the western area of the site adjacent to Parteen Basin would be raised from 31.5m AOD to a finished ground level of 32.3m AOD (Malin Head) (35.0m Poolbeg).
108. Woodland planting is proposed within the south-eastern area of the site and a mixed mosaic habitat proposed in the north-eastern part of the site (due to restrictions on planting as a result of below ground infrastructure including the RWRMs) as part of the ecological reinstatement of construction working areas and to help to further screen the buildings.
109. The landscaping plans for the site are shown in Figures 4.89 and 4.90. The landscape and visual effects are assessed in Chapter 16 (Landscape & Visual).

4.4.11 Operation and Maintenance

4.4.11.1 Operation

110. During operation, water would be abstracted from the Parteen Basin at the Intake Chamber. The volume of water to be abstracted would be determined using a predictive model that calculates how much water would be needed.
111. As shown in Image 4.5, raw water would enter the Inlet Chamber of the Raw Water Pumping Station from the intake chamber via the passive intake screens.
112. The volume of water taken into the Intake Chamber would all be automated and controlled by the rate of pumping in the pumping hall.
113. The number of pumps that are operating would vary depending on the volume of water required. A single set of pumps could deliver the required volume of water in 2050 under normal or average demand conditions. However, two sets of pumps would be needed to deliver the peak flow of 300Mld over a 24-hour period. The number of pumps, eight in total would allow for the plant to be rotated, providing downtime for the pumps and avoiding overheating. This would also allow for routine maintenance to take place with no impact on the operation of the Proposed Project. There would always be one pump available on stand-by. The pumps would operate with variable speed drives, allowing pumped flows to be regulated as required.
114. As described in Section 4.4.5.1 the velocity of the water entering the intake structure would be less than 0.15m/s.
115. The operational process for the initial treatment of raw water for invasive species at the RWI&PS is described in Section 4.4.5.5.
116. The site would not be permanently staffed, and operatives would only need to be on site intermittently for routine inspection and maintenance. The operation and maintenance of the RWI&PS is described in Appendix A4.1 (Operational Strategy).
117. The role of the RWI&PS in the operation and maintenance of the RWRMs is described in Section 4.5.4.

4.4.11.2 Surge Management

118. Surge management would be provided through the surge vessel described in Section 4.4.5.3.
119. The surge protection system is passive and would require no active intervention. It would run fully automatically with its own Programmable Logic Controller (PLC) and electrical power supply.

4.4.11.3 Residues

120. There would be periodic removal of any debris / materials taken out of the raw water to a licensed waste disposal facility; this could include removal of residues from the Invasive Species Debris Retention Tank and debris cleared from the PWWC screens.

4.4.11.4 Third Party Access

121. The ESB would have access to the RWI&PS site to maintain the Electricity Substation and Power Distribution Building on site. This would be via shared use of the permanent access road from the R494.

122. In addition, an access has been provided within the design for a landowner to be able to cross the permanent access road in order to access land on the southern side of it.

4.4.11.5 Recreational Safety

123. Swimmers and other recreational users of Parteen Basin would be alerted to the presence of the raw water intake through the positioning of a line of buoys set in an arc in the vicinity of the intake point.

4.4.11.6 Maintenance

124. All of the infrastructure has been designed to allow for routine maintenance and replacement. At the raw water intake this includes:

- Being able to isolate each opening within the Intake Chamber
- Allowing each set of pumps to draw water from any combination of Inlet Chambers, such that when one Inlet Chamber is out of service, there is no loss in pumping capacity.

125. The design also provides redundancy to allow individual screens or pumps to be taken out of service with no interruption of the operation of the RWI&PS.

126. The design of the RWI&PS includes the following for maintenance purposes:

- Gantry Cranes above the Passive Intake Screens, at raw water pumps and within the microfiltration units.

127. Routine maintenance and cleaning at this site would include:

- Cleaning of the microfiltration screens
- Automatic cleaning of the PWWC Intake Screens using an air blast (debris collected and removed from Intake Chamber).

4.4.11.7 Monitoring

128. The operation of the intake and the pumps will be continually monitored from the Control System and by operatives at the WTP. Routine monitoring on site will include:

- Inspection of the microfiltration screens
- Inspection of the bubble curtain
- Inspection of the PWWC screens
- Monitoring of groundwater
- Checking the speed of the pumps, the volume of water being moved and the pressure in the pipeline.

4.5 Raw Water Rising Mains (RWRMs)

4.5.1 Purpose of the RWRMs

129. The purpose of the RWRMs is to transfer up to 300Mld of raw water from the RWI&PS to the WTP.

4.5.2 Location and Extent

130. Abstracted raw water would be pumped from the proposed RWI&PS through twin 1,500mm nominal diameter steel pipes. These would be approximately 2km in length and would run in parallel with one another with a separation distance of 2-6m. They are shown in Figure 4.7.

131. The proposed RWRMs would extend in a generally east-south-easterly direction from the RWI&PS for approximately 850m through local forestry and open agricultural grassland, crossing a disused railway within the townland of Coolnadornory as far as the R494 (RDX001).

132. From the R494, the proposed RWRMs would continue in an east-north-easterly direction, through further agricultural grassland and forestry in the townlands of Kilmaglasderry and Knockadromin, before entering the WTP at Incha Beg (as shown in Figure 4.7). Table 4.5 outlines the locations where the proposed RWRMs cross Environmental Protection Agency watercourses, major roads or rail lines. A full schedule of crossings is provided in Appendix A5.4 (Schedule of Crossings).

Table 4.5: Raw Water Rising Mains Crossings

Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Road	RDX001	R494	RW – 800	Figure 4.7	
Gas	GCN-007	Gas – Medium pressure	RW – 800	Figure 4.7	

4.5.3 Design

133. The design for the RWRMs has been focused on ensuring a reliable supply, taking account of the fact that the RWRMs have to transport raw water.

134. The twin pipeline design allows for one RWRM to be taken out of service for cleaning and maintenance while still providing the uninterrupted raw water requirement through the other RWRM.

135. Each 1,500mm nominal diameter steel pipe has been designed to be able to withstand the pressure needed to pump the peak volume of water needed in 2050 (i.e. 300Mld).

136. The RWRMs would be laid generally at a minimum depth of cover of 1.2m above the crown of the pipe. Two sections of the RWRMs would be laid with deep cover. The first section would be adjacent to the RWI&PS and would form part of the deep excavation for the substructure. The second section, at a depth of up to 8.8m, lies east of the R494 crossing. This section, including the crossing of the R494, would be installed using trenchless construction. The construction methodology for the RWRMs is described in Chapter 5 (Construction & Commissioning).

137. Ancillary pipeline features for the RWRMs such as Line Valves and Lay-Bys are described in Section 4.13. The RWRMs would have one Line Valve on each pipe immediate west of the R494 crossing and two Air Valves on each pipe. The Line Valve would be in a permanent below ground chamber. A permanent Lay-By would be required at the Line Valve. This would be on the R494, adjacent to the Line Valve, and would be used to facilitate safe access off the road for inspection and maintenance purposes. Cathodic protection would be used on the RWRMs as described in Section 4.13.6.

4.5.4 Operation and Maintenance

4.5.4.1 Operation

138. The RWRMs would allow the transfer of up to 300Mld of raw water. Their operation and maintenance is described in Appendix A4.1 (Operational Strategy).
139. The twin pipeline design allows for one RWRM to be taken out of service for cleaning and maintenance while still providing the uninterrupted raw water requirement through the other RWRM. The RWRMs would be cross connected to allow flow to be diverted into one single rising main if the other is out of service for cleaning or maintenance.
140. The RWRMs would deliver raw water into the RWBTs via cascade chambers at the head of the WTP. The cascade chambers would aerate the water and would assist in precipitation of iron or manganese prior to entry into the treatment process.
141. The operational control of the water within the RWRMs would be at the Infrastructure Sites at either end, i.e. the RWI&PS and WTP.

4.5.4.2 Surge Management

142. Raw Water Surge Vessels have been included at the RWI&PS to control the normal transient pressures arising from start-up, shut-down and trip of the pumps. These are described in Section 4.4.5.3.

4.5.4.3 Maintenance

143. The RWRMs would require cleaning and maintenance as they would transfer raw water from Parteen Basin which would include silts and suspended solids. These would accumulate in the pipes over time and the pipes would need to be cleaned on a planned, intermittent basis. Experience in the operation of the RWRMs would dictate the frequency of cleaning but it is anticipated that this would occur once a year.
144. Provision has been made to allow each of the twin RWRMs to be emptied to a RWRMs Scour Tank. This tank would be located underneath the microfiltration buildings at the RWI&PS and would allow the RWRMs to be emptied for maintenance or in emergency without having to discharge any water back to Parteen Basin. The capacity of the RWRMs Scour Tank, at approximately 3,000m³, would allow for either RWRM to be emptied in sections.
145. The RWRMs would be laid at gradients that would allow approximately a 1,500m length of mains (from the RWI&PS to the Air Valve at Chainage RW – 1590) to be drained by gravity back to the RWRMs Scour Tank.
146. The section of RWRMs from the Air Valve (at RW – 1590) to the WTP would be drained by gravity to the Tank Draindown Management and Commissioning Lagoons in the WTP site.
147. Two RWRM Swab Chambers would be constructed on each RWRM: one at the RWI&PS site (Figure 4.61) and one within the boundary of the WTP site (see Figure 4.63). These chambers would allow pipe cleaning 'swab' devices, colloquially known as 'pigs', and shown in Image 4.8, to be inserted into the pipes from time to time to clean the internal walls of the pipes. The 'pigs' fit snugly within the pipe, dislodging deposits on the inner walls while being driven by water pressure from behind, and flushing water delivered through nozzles in the 'pig' serves to move dislodged deposits in a flushing flow ahead of the moving 'pig'.



Image 4.8: Pipe Cleaning Swab

148. When one of the RWRMs is being cleaned with swabs, these would be introduced into the mains at the WTP site and driven down towards the RWI&PS site. Any debris from the pipe would be drained, via the RWRM Swab Chambers at the RWI&PS site, to the RWRMs Scour Tank. From there it would be returned to the Inlet Chambers and recirculated.
149. Settled washwater would be pumped from the RWRMs Scour Tank, via a floating-arm draw-off, back to the Inlet Chambers from where it would be pumped onward to the WTP via the other, operational RWRM. Solids settled out in the RWRMs Scour Tank would be removed periodically from site to an appropriately authorised facility in accordance with the requirements of the Waste Management Act 1996 (as amended) (see Chapter 19: Resource & Waste Management for further information).
150. Other maintenance activities will be the same as set out for the Treated Water Pipeline in Section 4.9 and Pipeline Features in Section 4.13.

4.5.4.4 Monitoring

151. The main monitoring on the RWRMs would be to check for a breakout and build-up of invasive species. Otherwise, the only monitoring would be the system wide operational monitoring using the SCADA system.
152. The Cathodic Protection would provide advance warning on any deterioration in the integrity of the pipeline.

4.6 Water Treatment Plant (WTP)

4.6.1 Purpose of the WTP

153. The purpose of the WTP is to treat the raw water to a sufficiently high standard to be fit for drinking. This is a complex process involving multiple stages.

154. The proposed treatment process includes:

- pH correction
- Enhanced coagulant and polyelectrolyte dosing
- Flocculation and clarification
- First stage filtration (Rapid Gravity Filtration (RGF) – enhanced individual filtration)
- Second stage filtration through iron and manganese rapid gravity filters and Granular Activated Carbon (GAC) filters
- Disinfection with UV and dosing of low levels of chlorine into the final water, to prevent build-up of slime in the treated water pipe.

155. Image 4.9 provides an overview of the WTP. The number of buildings proposed at the WTP makes it difficult to identify specific buildings from a description. Therefore, to assist this chapter the buildings have been numbered in Figure 4.63 and references to those numbers are included in the description in the following sections.

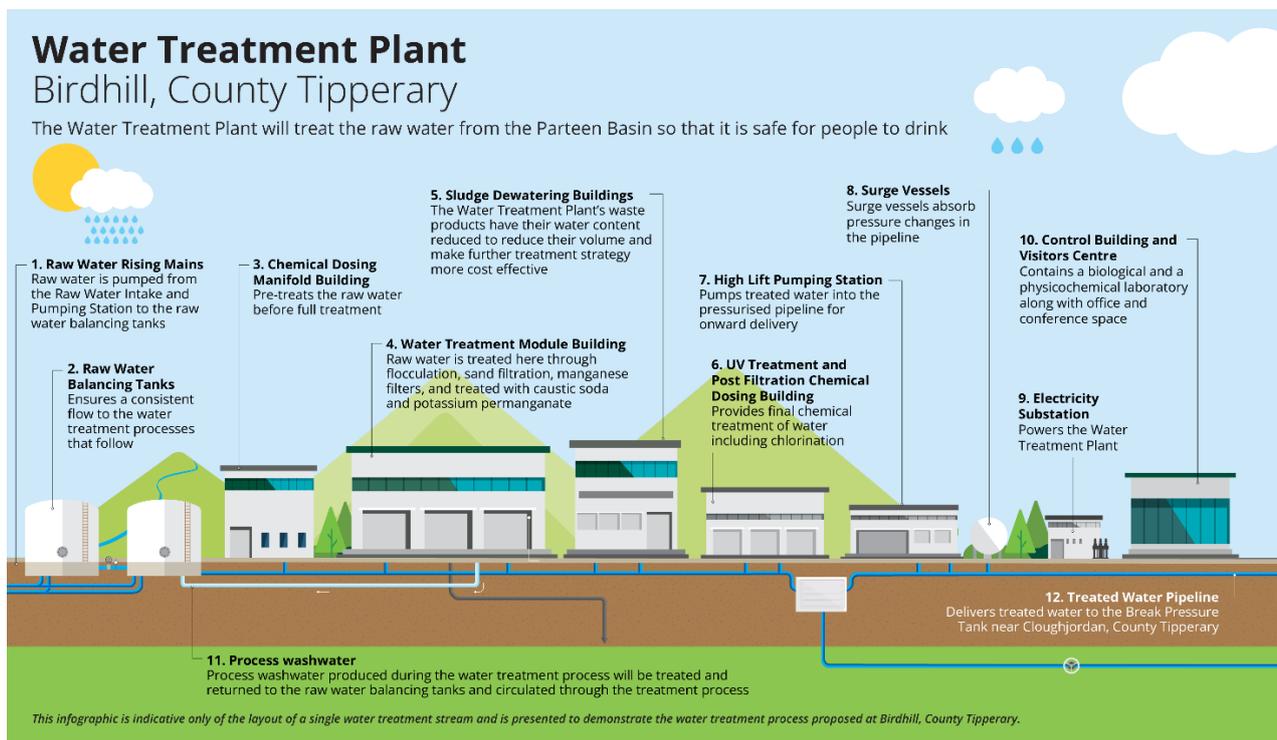


Image 4.9: Infographic Overview of the Water Treatment Plant

4.6.2 Location

156. The proposed WTP site would be located in the townland of Incha Beg in County Tipperary, approximately 2.6km north-east of the village of Birdhill, and approximately 2km east of the proposed RWI&PS. The WTP site is located within a sparsely populated rural area which is broadly bounded within a triangle formed by the R496, R445 and R494 regional roads.

4.6.3 Extent of the Site

157. The WTP site is located immediately north of dense woodland in open fields. The site would be approximately 30ha (excluding the access road described in Section 4.6.4). This would comprise of approximately 29.1ha of permanent land take and a further, approximately 0.9ha of land only required temporarily during construction.¹¹

4.6.4 Access

158. To provide permanent access to the WTP site it is proposed that a new permanent access road from the R445 would be constructed. The proposed access road would be 6m in width and 640m in length. The permanent access would require approximately 1.9ha of land. In addition, a further, approximately 1.6ha would be required temporarily during construction to build the access road.¹² This would be in addition to the land defined in Section 4.6.3.

159. The access road junction includes a pull-in area before the security gates, safe sight lines and appropriate signage when emerging onto the R445, in accordance with TII's Geometric Design of Junctions, DN-GEO-03060 (TII 2023). The sight lines would be partially provided by the existing curtilage of the road. The proposed access road would cross a tributary of the Kilmastulla River, immediately north of the R445, by way of a clear span bridge. A Flood Risk Assessment has been undertaken and is reported in Appendix A9.4 (Flood Risk Assessment). Based on the findings of the assessment the access road would include the installation of four box culverts along its length to accommodate passage of flood water within the floodplain of the Kilmastulla River, as shown in Figure 4.64.

160. Construction of the access road junction with the R445 public road would require the demolition of some disused and derelict buildings and old petrol pumps associated with a disused petrol station on the north-western side of the R445. This is further described in Chapter 10 (Soils, Geology & Hydrogeology) and Chapter 19 (Resource & Waste Management). It is important to note that only above ground structures need to be cleared from the petrol station site, to allow construction of the access road junction and provide the required safe sight distances. The proposed measures to protect the watercourse are further described in Chapter 5 (Construction & Commissioning).

161. There would be a total of 50 car parking spaces provided on the WTP site itself, ten of which would include charging points (fast charge) for electric vehicles in accordance with the Tipperary County Development Plan 2022-2028 (Tipperary County Council 2022).

4.6.5 Design

162. The proposed layout of the WTP is shown in Figure 4.63 and includes a unique number for each of the key buildings and locations discussed in this section. For each location discussed, the relevant ID number from Figure 4.63 is provided in brackets for ease of reference. Figure 4.65 indicates the process flows and links between the various units.

¹¹ These totals are affected by rounding to one decimal place.

¹² These totals are affected by rounding to one decimal place.

163. In addition to the Water Treatment Module Buildings (Buildings 05, 06 and 07 as shown in Figure 4.63), the main and substantial overground structures include the following, and these are discussed in further detail in Section 4.6.5:

- RWBTs (Buildings 02 and 03 as shown in Figure 4.63)
- Sludge Storage Buildings (Buildings 26 and 27)
- Sludge Dewatering Buildings (Buildings 17 and 18), with adjacent holding tanks and sludge silos
- HLPS and Surge Vessels (Building 14)
- Control Building (Building 22) integrated with Visitor/Interpretive Centre (Building 23).

164. The infrastructure elements of the WTP are detailed in Table 4.6.

Table 4.6: Infrastructure Elements – Water Treatment Plant

Infrastructure Element	No.	Length	Width	Height Over Finished Ground Level	Plan Area		Refer to Item on Figure 4.63
					Each	Overall	
RWRM Swab Chambers	2 No.	26.0m	21.0m	1.2m	n/a	n/a	01
Raw Water Balancing Tanks	2 No.	65m Φ^{13}	n/a	Roof Slab 4.8m	3,318m ²	6,636m ²	02, 03
				Cascade 8.5m			
Chemical Dosing Manifold Building	1 No.	Superstructure 76.8m	Superstructure 35.0m	11.2m	2,310m ²	2,310m ²	04
		Substructure 76.4m	Substructure 42.4m	5.5m (depth)	2,184m ²	2,184m ²	
Water Treatment Module Buildings	3 No.	141.3m	58.6m	15.6m	8,280m ²	24,841m ²	05, 06, 07
Used Washwater Equalisation and Settlement Tanks	8 No.	30.0m (internal)	20.0m (internal)	10.4m	600m ²	4,800m ²	08, 09
Post Filtration Chemical Dosing Building	1 No.	Superstructure 70.0m	Superstructure 39.3m	7.6m	2,749m ²	2,749m ²	10
		Substructure 28.0m	Substructure 38.0m	5.6m (depth)	1,064m ²	1,064m ²	
Backwash Water Tank and Pumping Station	1 No.	Superstructure 31.2m	Superstructure 14.8m	6.0m	462m ²	462m ²	11
		Substructure 43.4m	Substructure 30.9m	10.4m (depth)	1,341m ²	1,341m ²	
Clear Water Storage Tank	2 No. with 4 No. Cells	40m (internal)	65.6m (internal)	1.3m	2,624m ²	10,496m ²	12 and 13
High Lift Pumping Station	1 No.	Superstructure 43.8m	Superstructure 24.8m	6.2m	1,083m ²	1,083m ²	14
		Substructure 43.8m	Substructure 24.8m	12.5m (depth)			
High Lift Surge Vessels	5 No.	8.8m	3.8m Φ (external)	5.0m	33m ²	165m ²	Next to 14
Sludge Balancing Tanks	4 No.	n/a	10.0m Φ (internal)	0.2m	79m ²	314m ²	15

¹³ Φ symbolises diameter

Infrastructure Element	No.	Length	Width	Height Over Finished Ground Level	Plan Area		Refer to Item on Figure 4.63
					Each	Overall	
Sludge Thickeners	4 No.	n/a	12.0m Φ (internal)	3.0m	113m ²	452m ²	15
Sludge Forward Pumping Station	2 No.	12.2m	7.4m	2.5m	90.5m ²	181m ²	16
Sludge Storage Tanks	6 No.	8.8m (internal)	8.8m (internal)	5.7m	77.5m ²	465m ²	17, 18
Sludge Storage Silo	2 No.	n/a	4.0m Φ	13.9m	12.5m ²	25m ²	17, 18
Sludge Dewatering Buildings	2 No.	38.8m	28.1m	13.1m	1,093m ²	2,185m ²	17, 18
Washwater Settlement Building	1 No.	50.8m	29.7m	13.5m	1,511m ²	1,511m ²	19
Tank Draindown Lagoons	2 No.	77.6m	43m	7.0m (depth)	3,337m ²	6,674m ²	20
Lagoon Pumping Station	1 No.	12.0m (internal)	10.4m (internal)	0.2m	125m ²	125m ²	20
Control Building (2 storeys) (including Visitor Centre)	1 No (internally separated)	72.7m	30.0m	10.2m	2,181m ²	4,362m ² (Both parts)	22 and 23
38 kV electricity substation site	1 No.	40.2m	36.0m	4.7m for the Switchgear	1,447m ²	1,447m ²	24
Switchgear Building	1 No.	14.8m	9.3m	3.5m	138m ²	138m ²	24
Power Distribution Building	1 No.	43.5m	11.0m	6.3m	483m ²	483m ²	25
Sludge Storage Buildings	2 No.	72.9m	40.0m	8.1m	2,916m ²	5,832m ²	26, 27
Bat House	1 No.	3.3m	3.3m	3.8m	10.9m ²	10.9m ²	33

165. Visually the WTP would consist of a water treatment campus with three primary water treatment structures, each enclosing a completely integrated water treatment module, with the various tanks within the structure. 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 also be a telemetry mast, the top of which would be 14m above finished ground level.

166. The RWBTs (Buildings 02 and 03 as shown in Figure 4.63) would consist of two 65m diameter concrete tanks, with a water depth of 4.4m. The purpose of the RWBTs is to permit the WTP to operate at a steady continuous pace, even if the raw water pumps at the RWI&PS are switched off for a period of time. Each tank can be isolated, if required, and drained for maintenance to the tank draindown and commissioning lagoons, which would be located in the south-eastern area of the WTP site. The tanks would be capable of storing approximately 4.5 hours of water at an output of 154Mld.

167. The RWBTs would be located at the highest point of the flow system through the WTP, with a Top Water Level (TWL) of 59.9mAOD. The roof slab would be 4.8m over finished ground level, and a smaller Inlet Cascade Structure would sit above the inlet, with a height of 3.7m over the roof slab level. This inlet cascade structure would have louvred vents and would house the inlet pipe, and the cascade structure, to aerate and disperse the inflow and absorb the kinetic energy of the pumped inflow.

168. In the event of an invasive species breakthrough, one of the RWBTs can be taken out of service for inspection, cleaning and maintenance, while the full flow is passing through the other tank.

169. The Chemical Dosing Manifold Building (Building 04 as shown in Figure 4.63) would house the preliminary stages of treatment which would bring the water to an optimum pH for the later stages of treatment to operate most efficiently. Each of the treatment modules would have a 1,400mm nominal diameter inlet pipe, dosing point with sulphuric acid for pH adjustment, regulating flow meter and valve, and aluminium sulphate (also known as 'alum') dosing. This building would also house the reception area for, and storage of, chemicals with eight sulphuric acid storage tanks and eight liquid alum bulk storage tanks. It would include a raw water quality instrumentation room, a motor control centre and instrumentation panel.
170. Chemical storage tanks would typically hold approximately 40 days' supply. All chemicals stored on-site would be held in bunded areas, as close as possible to the final dosing points.
171. The Chemical Dosing Manifold Building is designed to house the main flow pipework in a central basement 5.5m below external finished ground level and would also include a gantry crane. Chemical storage tanks would be located on either side of the central basement and be bunded in an area below external finished ground level. The instrumentation and control room would be positioned above the central basement, with a roof ridge line in this area of 11.2m over finished ground level.
172. Each treatment module has its own Water Treatment Module Building (Buildings 05, 06, and 07 as shown in Figure 4.63). Each of the Water Treatment Module Buildings would house the main stages of treatment including flocculation, settlement, RGF, and manganese and GAC filtration. Each building would include six settlement tanks and eight filter units and solar panels on the south-facing roof sections. Circulation walkways and safety railings around all the tanks would also be included inside these buildings. Each building would be 141.3m long, 58.6m wide and up to 15.6m tall at the highest point.
173. Each Water Treatment Module Building would also house an inflow splitting chamber; a flocculation tank; polyelectrolyte, caustic soda, and brine/hypochlorite storage and dosing areas; a chemical reception area for these; space for air compressors and air blowers; a wet chemistry room; a main control and data room; and an instrumentation/inverter room for solar panel electricity management. All chemical storage areas within each of the buildings would be bunded.
174. At low level, waterworks sludge draw-off pipework from the settlement tanks would be provided in desludging galleries between the settlement tanks, and water at different stages of treatment would be decanted at high level and channelled to downstream stages of the process.
175. The UV Treatment and Post Filtration Chemical Dosing Building (Building 10 as shown in Figure 4.63) would sit downstream of the Water Treatment Module Buildings, and house equipment for UV disinfection of the treated water, as well as chlorination, fluoridation and pH adjustment of the treated water. In addition, the building would house an on-site electrolytic chlorination (OSEC) plant together with bunded brine storage tanks, and sodium hypochlorite storage tanks. The storage would provide 52 days of sodium hypochlorite at 154Mld and 30 days of brine storage at 154Mld.
176. The bunded sodium hypochlorite dosing system is required to maintain a minimum 'chlorine residual' of between 0.1mg/l and 0.2mg/l in the Treated Water Pipeline to prevent biofilm growth. The building would also house automatic monitoring and testing equipment to measure residual chlorine in the treated water from the WTP, and automatic dosing pipework.
177. The CWSTs (Buildings 12 and 13 as shown in Figure 4.63) and the HLPS (Building 14 as shown in Figure 4.63) would sit at the end of the treatment process. The two CWSTs would be arranged in four cells (two cells in each tank), arranged symmetrically around the HLPS. They would store approximately 3.7hours' production at peak output (300Mld) and would serve to permit continuous operation of the WTP, even at periods where the high lift pumps are not operating. Each cell can be individually isolated and would have individual overflow arrangements. Each cell would have a maximum water depth of approximately 4.4m and would be provided with chlorine dosing static mixers on the inlet side.

178. Treated washwater, supernatants, etc., cannot be returned to Parteen Basin due to its environmental designation. Therefore, the washwater would be returned to the head of the treatment works following suitable treatment consisting of settlement, to limit the turbidity of the return water, and UV disinfection. This would be achieved via the Backwash Water Tank and Pumping Station and Used Washwater Equalisation and Settlement Tanks.
179. The Backwash Water Tank and Pumping Station (Building 11 as shown in Figure 4.63) substructure would consist of two tanks to balance and store the washwater used for filter backwashing. Its plan area would be substantively below ground, with a superstructure housing a workshop and stores and a control and instrumentation panel room. The basement area would include eight washwater pumps, as well as service water pumps and pressure vessels. The superstructure roof ridge line would be 6m over finished ground level.
180. The site layout would include eight Used Washwater Equalisation and Settlement Tanks (Buildings 08 and 09 as shown in Figure 4.63) to balance the flush of backwash water from each filter. It would also contain two Filter 'Run to Waste' Equalisation and Settlement Tanks, which would permit the filters coming back into service to be run to waste for a period, as required until the filtration barrier has re-established itself, in order to bring the filtered water passing through up to required standards of protection against pathogenic organisms. The 'run to waste' would not result in a discharge as it would be re-circulated as described for the washwater.
181. Flows of settled treatment process waters from these tanks would be delivered forward to the Washwater Settlement Clarifiers Building (Building 19 as shown in Figure 4.63) for treatment and return to the RWBTs. Underflow sludges of settled material would be delivered to the Sludge Thickeners (Building 15 as shown in Figure 4.63).
182. Sludges would be thickened in four 12m diameter Sludge Thickeners (Building 15 as shown in Figure 4.63) and sludge volumes would be balanced in four 10m diameter Sludge Balancing Tanks (Building 15 as shown in Figure 4.63). There would be two Sludge Forward Pumping Stations (Building 16 as shown in Figure 4.63) which would deliver to six Sludge Storage Tanks and two Sludge Storage Silos attached to the Sludge Dewatering Buildings, which would allow sludge to be taken in liquid form, if necessary. Two Sludge Dewatering Buildings (Buildings 17 and 18 as shown in Figure 4.63) would be provided, where sludges at 1–3% dry solids would be dewatered to approximately 25% dry solids before transfer to the Sludge Storage Buildings.
183. The two Sludge Storage Buildings (Buildings 26 and 27 as shown in Figure 4.63) would be covered structures to hold sludge which has been dewatered to a sludge cake of approximately 25% dry solids. Each building would be partitioned into eight bays, accessible by a front-loader and each capable of holding a minimum 580m³ of sludge. Each building would be 72.9m long and 40m wide. In total they would provide up to six months' storage capacity. The buildings would be covered, primarily to prevent contaminated rainwater runoff from the stored sludge being generated but also to maintain the sludge at the approximately 25% dry solids content produced from the dewatering process. Supernatant from the sludge thickeners and expressate from the sludge dewatering process would be pumped, via the washwater treatment side stream, to the RWBTs at the head of the treatment process. The sludge would be periodically removed for beneficial reuse in line with Uisce Éireann's preferred management approach for WTP solid residuals, as outlined in Appendix K: Residuals of the National Water Resources Plan – Framework Plan (Irish Water 2021). This is further described in Chapter 19 (Resource & Waste Management).
184. The proposed works include for the treatment and recycling of process water streams, arising from settlement tank sludge bleeds, filter backwash water, filter 'run to waste' flows, and supernatants from the sludge thickening and dewatering processes. This includes a Process Water Balancing Sump and pumping station, a Washwater Settlement Clarifiers Building (Building 19 as shown in Figure 4.63) including lamella clarifier units, a static mixer and a UV unit.

185. Two Tank Draindown Management and Commissioning Lagoons (identified as number 20 on Figure 4.63), each with a capacity of 15,000m³, a total capacity of 30,000m³, would be provided for commissioning purposes, drawing down of an RWRM or other water tank, acceptance of surface water, or emergency storage of washwater. Each lagoon would have an associated pumping station to allow the contents to be recirculated to the RWBTs.
186. The HLPS (Building 14 as shown in Figure 4.63) would deliver treated water onwards from the WTP through the Treated Water Pipeline. It would have a substructure, with a basement depth of 12.5m below finished ground level, and a superstructure ridge line 6.2m over finished ground level. It would house a 2,000mm nominal diameter suction manifold or 'common' pipe, serving six high lift pumps, and deliver treated water to the 1,600mm nominal diameter Treated Water Pipeline from the WTP to the BPT at Cloughjordan. The basement would also include a crane to permit pumps, valves and motors to be installed and extracted as necessary. The superstructure would also house Medium and Low Voltage switchrooms for the pumping station.
187. The HLPS would have provision to draindown water from the Treated Water Pipeline, if required, towards the lagoons provided for drainage water on-site.
188. The High Lift Surge Vessels would balance the pressure in the pipeline. The required pressure vessel volume at the HLPS is 282m³ and it is proposed to construct five similar 94m³ units, each 3.8m diameter and 8.8m long, to provide the necessary volume. This would allow three duty units with two on standby at peak output which would then facilitate routine maintenance and inspections.
189. The WTP would include a Control Building (Building 22 as shown in Figure 4.63) incorporating laboratories, a workshop, storage and welfare facilities for operational staff.
190. This two-storey building would contain:
- Entrance foyer and lobby
 - Reception area
 - Toilets, changing rooms and welfare facilities
 - Canteen
 - Document storage room
 - Biological and physicochemical laboratories
 - SCADA room and control centre
 - Conference room and offices
 - Workshop and stores
 - Solar array control.
191. A Visitor/Interpretive Centre (Building 23 as shown in Figure 4.63) would be located at the southern end of the Control Building. They would be part of the same overall structure and the combined length of the building would be 72.7m. It would be 30.0m wide and 10.2m high. The building has been designed with high quality architectural form and finish to present as the public face of the WTP and the Proposed Project as a whole. While the Visitor/Interpretive Centre would be part of the same structure as the Control Building, for security reasons there would be no internal access from the Visitor/Interpretive Centre into the Control Building; the two would be entirely independent of one another. The Visitor/Interpretive Centre would contain a reception area and foyer, lecture theatre, display/exhibition area and offices. A visualisation of the Control Building and Visitor Centre is provided in Image 4.10.



Image 4.10: WTP Architectural Visualisation of the Control Building and Visitor Centre

192. There would also be a telemetry mast, the top of which would be 14m above finished ground level in order to provide communications network for the Control Room and the Electricity Sub-station.
193. The north-west corner of the site would also include a Materials Storage Compound (identified as number 28 on Figure 4.63), to store spare parts, spare pipe sections, and repair sections.
194. A Stormwater Attenuation Pond (identified as number 21 on Figure 4.63) would be provided to attenuate runoff from surfaces not subject to rainwater harvesting, described in Section 4.6.6.
195. As part of the WTP site a bat house has been included in the layout. This is required to mitigate for the bat impacts of the Proposed Project including the loss of a roost at the site. This would be a single storey building constructed from concrete block and timber frame structure. It would be 3.3m in length 3.3m wide and 3.8m high.
196. Two entrance points for the bats to get into the building would be put into the east facing and north facing wall. Additional roosting would be required on the bat house external walls. This would consist of four units of bat tubes positioned as high as possible.
197. Woodland planting has been specified around the bat house to provide screening, commuting and foraging.
198. The establishment of the bat house would be undertaken in consultation with a bat specialist to ensure the works are completed correctly and that the location of the bat roost is appropriate.

4.6.6 Surface Water Management and Drainage

199. The WTP access road, and other paved areas have been designed to incorporate SuDS principles as recommended in the SuDS Manual (CIRIA 2015) in order to limit discharges from the site to the equivalent greenfield site flow rate. As part of this drainage strategy the CWSTs would have a 'green roof' on top which would have a biodiversity benefit as well as reducing the rate of surface water runoff.

200. There would be two drainage systems in place at the WTP. Firstly, harvested runoff, from roofs of buildings and tanks, would drain to the commissioning lagoons. Secondly, general site runoff from internal roads would be taken to an attenuation pond in the south-eastern corner of the WTP site.
201. Building roofs and tank covers would account for approximately 55% of the impervious area of the WTP site. Rainfall runoff from these particular surfaces is considered to be of sufficiently consistent quality to be harvested as a source of raw water. Therefore, roof and tank cover runoff would be collected in a dedicated, separate pipe network which would outfall into the Tank Draindown Management and Commissioning Lagoons and would ultimately be pumped to the RWBTs. The lagoons and the associated return pumping system have been appropriately sized for the probability of extreme rainfall events (1 in 100-year return event with 30% allowance for climate change) occurring concurrently with commissioning or operational requirements.
202. It is expected that approximately 145,160m³ per year of runoff from roofs and tank covers would be harvested and treated to produce treated water. Harvesting rainwater in this manner would reduce stormwater runoff from the WTP site that would otherwise have to be managed, and would marginally reduce the volume of pumping required from the RWI&PS.
203. The general site surface water runoff from internal roads would be taken to an attenuation pond in the south-eastern corner of the WTP site. Runoff entering the attenuation pond would pass through an oil/petrol interceptor.
204. A flow control device on the outlet of the pond would limit discharge stormwater flow leaving the pond to a maximum of 239l/s, equivalent to the greenfield runoff from the WTP site as a whole. The flow would then be conveyed by a 600mm diameter stormwater drain running along the route of the WTP access road to discharge into the stream crossed by the proposed access road approximately 220m north of its junction with the R445.
205. Foul wastewater generated on the WTP site, which is estimated to be approximately 1m³/d in normal operation and 2.4m³/d with visitors to the site, would be tankered from a wastewater tank installed at the WTP to a licensed WwTP.

4.6.7 External Lighting

206. At the WTP site, LED external lighting would be provided at the perimeter of each of the buildings, on interconnecting footpaths, on traffic circulation routes around the site, in car parking areas and at the entrance to the site.
207. In addition, exterior lighting would be provided at loading bay doorways in buildings as applicable, and for task lighting to facilitate operational maintenance of the plant. The lighting installation would provide a safe and secure environment for both pedestrians and drivers at the site and also to facilitate ongoing operational and maintenance works associated with the WTP.
208. The design of the lighting at the WTP site will be carried out with reference to the standards and requirements listed for the RWI&PS in Section 4.4.7 including a reduction in the kelvin level (to 2,200K) within the 2km Core Sustainment Zone around the building to be demolished within the WTP site.
209. In addition, the following measures will be adopted:
- Exterior lighting to building exteriors, footpaths, circulation routes and car parks will be automatically controlled and will be subject to curfew with the exception of when work is required at discrete locations where illumination is required
 - Lighting at loading bays and for close work (task lighting) and internal light in all process buildings will normally be switched off and only used as dictated by operational requirements

- Certain areas of the Control Building will be lit at all times and, where necessary, the overspill of light coming from within the building will be mitigated through selection of appropriate window blinds.

4.6.8 Power Connection

210. The connected mechanical and electrical plant for the WTP site will require 132,975kWh/d at a normal year average output of 154Mld and 191,601kWh/d at the peak demand of 300Mld.
211. A 38 kV electricity substation site (Building 24 as shown in Figure 4.63) is proposed at a location adjacent to the HLPS. This substation would be similar to that proposed for the RWI&PS site, incorporating a fenced area of 40.2m by 36.0m within which a Switchgear Building and two external transformers would be located.
212. The Switchgear Building, located within the electricity substation site, would include a control room, a battery room and a switchgear room. The two transformers would be mounted externally on two 6.5m by 6.5m concrete plinths. Each transformer would have a height of 4.7m above the finished ground level.
213. The Power Distribution Building (Building 25 as shown in Figure 4.63) would be located adjacent to the 38 kV Substation and would contain the switchgear room (from 38 kV to 6.6 kV), a medium voltage transformer room and a low voltage power distribution room. The building would measure 11.0m by 43.5m and would have an overall height above finished ground level of 6.3m.
214. The power supply would be provided by ESB Networks from the Birdhill 38 kV Substation, through two bundles of underground cable ducts laid in the R445 from Birdhill to the entrance of the WTP access road, and from there the ducts would be routed along the access road into the electricity substation on the WTP site. The cable connection would consist of eight cable ducts laid in two bundles of 3 x 110mm ducts in trefoil arrangement plus two further single 110mm ducts as per Detail 1B in Appendix A4.2 ((Standard Specification for ESB 38 kV Networks).
215. Along a section of the WTP access road, the ducts would be laid in a single horizontal row, in accordance with Detail 5A in Appendix A4.2 (Standard Specification for ESB 38 kV Networks) and Standard Specification for ESB Medium Voltage/Low Voltage Networks Ducting (Minimum Standards). This would be required to accommodate the construction of this section of the access road over concrete box culverts.
216. In order to provide the power required for the Proposed Project WTP, ESB Networks would uprate the existing 38 kV overhead lines between Ardnacrusha and Birdhill. This is described in detail in Section 4.14.
217. In addition, to facilitate the construction of the WTP infrastructure there would be a permanent diversion of an existing 20 kV overhead powerline on the north-western side of the site.
218. It is proposed to place solar panels on the roofs of the Chemical Dosing Manifold Building, the Water Treatment Module Buildings, and Sludge Storage Buildings, and at a number of locations on the ground, including on top of the CWSTs, to supplement the main power supply. The total extent of the solar panels would be 40,357m² and would have a peak power output of 4,200kWp. These would help to power the operation of the buildings on site and to supplement the mains power supply. Consequently, this would reduce the energy required from mains supplies.

4.6.9 Potable Water Connection

219. A potable water connection would be made from the existing 100mm diameter watermain located on the R445 Regional Road. The connection would be constructed in conjunction with the new permanent access road to the WTP.

220. To allow for a potential future connection to the Proposed Project a 1050mm pipe would be included in the access track from the WTP to the R445. This would enable a connection to be made by a future project under a separate consenting process at the R445.

4.6.10 Boundary Treatment/Landscaping

221. The boundary of the site would be fenced with a 1.2m post and rail, stock proof fence, with a 2.4m-high polyester powder-coated palisade security fence set 5m within the boundary. The expected overall length of the security fence would be 2,224m. There would also be two 2.4m-high polyester powder-coated security gates. One would be a set of 2.4m palisade gates at the entrance to the WTP site. The second would be at the junction with the R445. This would be 2.4m high and integrated into the boundary wall which would consist of a 1.0m high block wall faced in local stone with a paladin security fence on top, to an overall height of 2.4m. There would also be a site entrance signage board incorporated into this boundary wall.

222. The permanent access road between the R445 and the WTP site would have a post and rail fence only.

223. CCTV cameras on 6m tall poles would provide security coverage of the access gates and buildings.

224. The site would be landscaped to reduce the visual effect of the WTP site as a whole. This would include retaining hedgerows along the perimeter and planting species rich semi-natural grassland and trees within the site boundary. Further, wet grassland and woodland would be planted in an area to the north-east of the site. Specific woodland and hedgerow planting would be installed to support commuting and foraging for bats using the bat house described in Section 4.6.5. This would include a planting to screen activity from the WTP itself.

225. The landscaping plans for the site are shown in Figures 4.91 and 4.92. See Chapter 16 (Landscape & Visual) for further details on visual effects.

4.6.11 Operation and Maintenance

4.6.11.1 Operation

226. The WTP would be configured as three separate treatment modules, each operating independently and in parallel. Each of the three treatment modules in the WTP would be able to deliver up to 100Mld with some units offline in each module for cleaning or maintenance.

227. Any one treatment module may be isolated for investigation, or taken out of service, and returned to service under proper ramping up and 'run to waste' protocols.

228. As shown in Image 4.9, raw water would enter the WTP at the RWBTs. The RWBTs would control the flow of the water coming into the WTP and would allow water to be stored temporarily. This would manage the rate of water flowing through the WTP and allow the WTP to operate at a steady continuous pace.

229. The water would then pass through chemical dosing, the water treatment process and the UV Treatment and Post Filtration Chemical Dosing Building.

230. The CWSTs and HLPS sit at the end of the treatment process. The CWSTs store clean water temporarily so that the onward flow of water through the pipeline can be controlled. The HLPS would pump the water through the Treated Water Pipeline from the WTP to the BPT.

231. The HLPS would be the interface between the CWSTs at the WTP and the Treated Water Pipeline from the WTP to the BPT. It would be fully automated with all alarms and signals being fed back via the SCADA system to the main control room.

232. The number of pumps running at any given time would be dependent on the flow rate. One backup/standby pump over those necessary to deliver the full flow has been included to provide resilience in the case of a pump fault requiring it to be offline. Variable speed pumps would be installed to allow controlled start and shut down of the system as well as the flow output of the HLPS to be matched more precisely to the output of the WTP.

233. Automatic duty rotation of the pumps and other plant would ensure reasonably consistent wear; although for large pump installations such as this, it is becoming normal practice to have asymmetric rotation so that not all planned plant replacement falls at the same time, thus improving resilience.

234. The WTP would be permanently staffed and would control the operation of the whole of the Proposed Project, on a day to day basis. Therefore, the tasks set out in Section 4.15 would be managed from the WTP. In particular, the WTP would control abstraction, RWI&PS and the WTP processes to provide the Set Point Flow¹⁴ into the CWSTs. Usual minor variations would be accommodated within the operating range of the CWSTs.

235. The operation and maintenance of the WTP is described in Appendix A4.1 (Operational Strategy).

4.6.11.2 Surge Management

236. The pressure in the Treated Water Pipeline from the WTP to the BPT, and the conditions which arise on pump start-up and shut-down, and which would create transient surge pressures, would be balanced by the High Lift Surge Vessels. These operate by gradually emptying and filling in order to dissipate the transient pressure wave on start-up and shut-down. These would be located beside the HLPS and arranged so that periodic inspection and maintenance could be performed without disrupting the operation of the pipeline. The surge vessels are described in Section 4.6.5.

4.6.11.3 Residues

237. Residues would be produced at the WTP from the following processes:

- Coagulation sludges produced by the coagulation and settling of natural turbidity
- Liquid and particulate waste produced from the cleaning of the sand filters
- GAC media would be taken off site periodically for replenishment
- Other chemical additions such as the addition of polyelectrolyte.

238. The water treatment process creates a residual waterworks sludge, as the coagulant chemical binds up the organic material into an insoluble form, which is then removed from the settlement tanks. The material backwashed from the various filtration stages also contributes to the volume of sludge from the water treatment process.

239. All residual solids would be thickened, after being balanced in a Sludge Balancing Tank. The sludge draw-off from the sludge blanket clarifiers would drain to Sludge Balancing Tanks before being pumped to sludge thickeners. Settled sludge would also be pumped to the Sludge Balancing Tanks before being pumped to picket fence thickeners.

240. Sludge from the sludge thickeners, at typically 1–3% dry solids, would be pumped to a sludge dewatering plant, which would include plate presses to bring the dry solids content of the sludge cake to approximately 25%. It is estimated that, operating under normal demand conditions (an output of 154Mld), the treatment plant would produce up to 9,280m³ of dewatered sludge cake over a six-month period.

¹⁴ Uisce Éireann would determine the required daily output from the Proposed Project up to a week in advance with only relatively minor adjustments 12 hours in advance. This required output is the Set Point Flow.

241. GAC filter media needs to be replenished periodically as it loses its effectiveness over time. Based on pilot trials undertaken at Clareville WTP, the media would require replenishment every 20 months at normal plant output. In practice the replacement of GAC media would not be a single operation taking place every 20 months but would be undertaken on rotation across a number of filters. The total mass of GAC filter media that would be replaced annually would be 420 tonnes. This material would be transported off site and brought to a specialist offsite facility where it would be regenerated by heating it to high temperatures. Following this process the GAC media would be transported back to the WTP for reuse.
242. Process waters from the treatment process would not be discharged back to the environmentally sensitive Lower River Shannon SAC. The process waters generated in the treatment process itself would be treated on-site and recirculated through the WTP. Process waters from the treatment process would be generated from the following sources:
- Backwash water from rapid gravity filters
 - Filter 'run to waste' water
 - Supernatant returned from sludge thickening
 - Expressate from the sludge dewatering process.
243. The volume of recirculated water would be variable; it would depend on filter backwash frequency, the length of the 'run to waste' cycle and the rate of sludge generation in the settlement tanks. The 'run to waste' would not result in a discharge as it would be within the re-circulation process. A full description of the management of these flows is provided in Appendix A4.1 (Operational Strategy).
244. It is proposed to tanker foul wastewater produced by Construction Phase staff and, later, Operational Phase staff to a licensed WwTP.

4.6.11.4 Third Party Access

245. The ESB would have access to the WTP site to maintain the 38 kV Electricity Substation. This would be achieved via shared use of the permanent access road from the R445 to the site.
246. A number of additional access points have been included within the design in order to maintain 3rd Party Landowner access to land / infrastructure. These are:
- A gate within the entrance from the R445 to the WTP to provide access to the land to the east of the permanent access road
 - A gate within the entrance from the R445 to the WTP to provide access to the land to the west of the permanent access road.
247. In addition, an agricultural crossing would be provided from one side of the permanent access road to the other in order to allow the landowner to access the land on either side of the embankment.

4.6.11.5 Maintenance

248. All of the infrastructure has been designed to allow for routine maintenance and replacement. At the WPT this includes the following:
- The Water Treatment Module Buildings would be self-contained parallel treatment streams, each of which can be isolated and taken out of service
 - Each stage of the treatment process within each treatment stream has been designed to deliver the peak supply of 300Mld whilst allowing for routine maintenance to be undertaken.
249. The design of the WTP includes the following for maintenance purposes:
- Gantry Cranes at all the main pumpsets and for GAC, RGF or manganese filter removal

- Pathways around the Main Treatment Module Buildings to facilitate solar PV panel cleaning using a cherry picker.

250. Routine maintenance and cleaning would include:

- Periodic (months to years), renewal or regeneration of the GAC; the frequency would be dependent on the input water quality and target output water quality
- All tanks in the WTP would need to be drawn down, taken out of service and cleaned at least once per year. The plant has been designed to allow for the planned maintenance and servicing of tanks, where tanks can be taken out of service without reducing the throughput of the plant. The water content of tanks on the WTP site would generally be drained to the Tank Draindown Management and Commissioning Lagoons in the south-east quadrant of the site, which have a combined volume of 30,000m³
- In the event of an invasive species breakthrough, one of the RWBTs can be taken out of service for inspection, cleaning and maintenance, while the full flow is passing through the other tank
- Maintenance tasks for the HLPS pumps would include weekly checks of all the main items of plant, but with no expected significant maintenance required for 10 years or more.

4.6.11.6 Monitoring

251. The monitoring of the WTP and the treatment processes would be automated; however, it would be backed up by routine audits and inspections including:

- Inspection of the sludge blanket at the coagulation plant
- Inspection of the rapid gravity filters
- Inspection of chemical dosing points
- Inspection of disinfection systems
- Monitoring water quality post treatment including residual pH level
- Checking the speed of the pumps, the volume of water being moved and the pressure in the pipeline.

4.6.12 Potential Future Connection

252. Provision has been made within the design of the WTP and its access road to include a watermain with a take-off to enable the provision of a strategic connection to the Limerick area at some point in the future. This is one of the Take-Offs described in Section 4.13.10 that allow for a potential connection to be made in the future to provide a supply into the Water Resource Zones in the Midlands Region in accordance with the Eastern and Midlands Plan (Irish Water 2022). This future connection would be a stand-alone project with a separate consenting process.

4.7 Treated Water Pipeline from the WTP to the BPT

4.7.1 Purpose of the Treated Water Pipeline from the WTP to the BPT

253. The purpose of the pipeline from the WTP to the BPT is to transfer up to 300Mld of treated water from the WTP at Incha Beg, near Birdhill to the BPT, located at a high point with an elevation of the roof of the BPT tank level 142.70mAOD, near Cloughjordan, County Tipperary. The water in this section of the pipe would always be pumped to the BPT by the HLPS at the WTP.

4.7.2 Location and Extent

254. This section of the proposed Treated Water Pipeline would be approximately 37km long and located wholly within County Tipperary. It would extend from the WTP in an east to north-east direction generally through open agricultural grassland. It would cross a number of local, regional and national roads and a number of watercourses including the Nenagh River (WCX016). Table 4.7 outlines the locations where this section of the Treated Water Pipeline would cross major roads, watercourses, railway or high voltage electricity lines. A full schedule of crossings is provided in Appendix A5.4 (Schedule of Crossings).

Table 4.7: Treated Water Pipeline from the WTP to the BPT – Crossings

Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Water	WCX003	Incha_Beg	TW – 700	Figure 4.8	
Water	WCX004	Knockadromin	TW – 1000	Figure 4.8	
Road	RDX003	R445	TW – 1900	Figure 4.8	
Gas	GCN-008	Gas – Medium pressure	TW – 1900	Figure 4.8	
Road	RDX007	M7	TW – 5500	Figure 4.9	
Road	RDX008	R499	TW – 6000	Figure 4.9	
Power	OHX001	220 kV Network	TW – 7400	Figure 4.9	
Water	WCX005	Burgesbeg	TW – 7500	Figure 4.9	
Water	WCX006	Gortmore 25	TW – 8500	Figure 4.10	
Water	WCX007	Carrigal	TW – 9000	Figure 4.10	
Water	WCX008	Mountsack	TW – 10200	Figure 4.10	
Power	OHX002	400 kV Network	TW – 10500	Figure 4.10	
Water	WCX009	Cloghleigh	TW – 10500	Figure 4.10	
Water	WCX010	Patrickswell 25	TW – 11400	Figure 4.11	
Road	RDX013	R445	TW – 12700	Figure 4.11	
Gas	GCN-009	Gas – Medium pressure	TW – 12700	Figure 4.11	
Road	RDX015	M7	TW – 13100	Figure 4.11	
Water	WCX011	Ardgregane Stream	TW – 13500	Figure 4.11	
Water	WCX012	Fatthen	TW – 15000	Figure 4.12	
Water	WCX013	Ardgregane Stream	TW – 16500	Figure 4.12	
Road	RDX019	R494	TW – 16700	Figure 4.12	
Water	WCX014	Monsea 25	TW – 17200	Figure 4.13	
Water	WCX015	Monsea 25	TW – 17900	Figure 4.13	

Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Road	RDX020	R495	TW – 18500	Figure 4.13	
Water	WCX016	Nenagh_070	TW – 19500	Figure 4.13	
Road	RDX023	R493	TW – 20700	Figure 4.13	
Water	WCX017	Upper Ballyanny	TW – 20700	Figure 4.13	
Power	OHX003	220 kV Network	TW – 24800	Figure 4.15	
Power	OHX004	220 kV Network	TW – 26200	Figure 4.15	
Water	WCX018	Ardcrony Stream	TW – 26500	Figure 4.15	
Road	RDX026	N52	TW – 28900	Figure 4.16	
Water	WCX019	Shesheraghmore	TW – 30800	Figure 4.16	
Road	RDX031	R490	TW – 34700	Figure 4.18	
Water	WCX020	Ballyfinboy	TW – 34800	Figure 4.18	
Water	WCX021	Ballyfinboy	TW – 35000	Figure 4.18	

255. Generally, the proposed Treated Water Pipeline from the WTP to the BPT would extend in a north-easterly direction through County Tipperary, north of, and parallel to, the Kilmastulla River and the Dublin – Limerick Railway, until the first of two crossings of the M7 Motorway (RDX007) in the townland of Kilnacranra (as shown in Figure 4.9). From the M7, it would then continue in a north-easterly direction, south of the M7 Motorway, and north of the Slievefelim to Silvermines Mountains Special Protection Area (SPA) (Site Code 004165) and Silvermines Mountains West SAC (Site Code 002258) (approximately 1.5km and 1.8km distant respectively), passing north of the tailings pond at Gortmore towards Carrigatogher Bog (as shown in Figure 4.10 and Figure 4.11).

256. The route of the proposed pipeline would then continue north of Carrigatogher Bog, crossing the M7 Motorway (RDX015) for a second time approximately 13.1km from the WTP (as shown in Figure 4.11). The route travels in a northerly direction, passing west of the town of Nenagh, and then turns in a north-easterly direction and crosses the Nenagh River (WCX016) (as shown in Figure 4.13).

257. The route continues in a north easterly direction, passing within 700m to the west of Lough Ourna Proposed Natural Heritage Area (pNHA) (Site Code 000650). The route turns east where it would cross a local road (RDX025) at Ballythomas, and then cross the N52 (RDX026), north-east of Ardcroney village (as shown in Figure 4.16), while extending in a more easterly direction.

258. From the crossing of the N52, the proposed pipeline would continue for a further 8km before connecting into the BPT at Knockanacree Hill, adjacent to Knockanacree Wood north of Cloughjordan, as shown in Figure 4.18.

4.7.3 Design

259. The Treated Water Pipeline would be a single 1,600mm nominal diameter buried pipe rising in elevation from a ground level of approximately 48mAOD at the WTP to 143mAOD at the BPT. This section of the pipeline would be approximately 37km in length and designed to a maximum pressure of 16 bar.

260. The pipeline would typically be laid at a minimum depth of cover of 1.2m above the crown of the pipe and generally would follow the existing ground profile to limit depths of excavation. Typically, the pipeline has been designed to be laid at gradients not less than 1:500 rising in the direction of flow and 1:300 falling from the direction of flow to encourage air removal. To allow for a reasonable tolerance during construction, a gradient of 1:250 has been adopted where feasible. However, occasional relaxation to 1:500 in the falling direction has been permitted in peat soils to avoid deeper digging.

261. Ancillary pipeline features such as Line Valves and Lay-Bys are described in Section 4.13 and the pipeline construction techniques are outlined in Chapter 5 (Construction & Commissioning).

4.7.4 Operation and Maintenance

4.7.4.1 Operation

262. The peak flow in the pipeline has been defined as 12,500m³/hr based on the maximum treated water demand of 300Mld and with pumping over 24 hours per day. The minimum velocity would be 52Mld in order to maintain an appropriate water age.

263. The target flow rate would be set by the operator and the WTP would endeavour to output this using the HLPS.

264. The pipeline would operate to transfer flows from the WTP to the BPT and at the end of this section would discharge flows to the base of each of the BPT cells.

265. For the most part the Treated Water Pipeline from the WTP to the BPT traverses open countryside, with high and low points along the profile, and incorporates several valves and associated ancillary structures. These valves are required for the operation and maintenance of the pipeline and are discussed in Section 4.13. They ensure that:

- Air in the system can be removed as efficiently as possible
- The shut-down and isolation of elements of the system can be conducted
- Water can be drained from the isolated sections in a controlled manner.

266. The Treated Water Pipeline would run full at all times and be kept pressurised by a combination of the water level in the BPT and the back pressure governed by the FCV located at the low point prior to the TPR.

4.7.4.2 Maintenance

267. A pipeline conveying treated water, such as the Proposed Project would operate for many years with little maintenance and there is not expected to be frequent maintenance required. Further, there is no requirement for regular cleaning as the pipeline would be transferring clean water. The operation and maintenance of the pipeline features is outlined in Section 4.15. A fuller description of the operation and maintenance of the Treated Water Pipeline is provided in the Appendix A4.1 (Operational Strategy).

268. If maintenance on the pipeline is required, then it is probable that at least partial draindown would be required. As this would be a planned event it would be scheduled to suit landowner constraints and appropriate weather conditions with adequate advance notice provided to the landowner.

269. The need to drain a section of the pipeline in operation would be a very rare event, at a typical frequency of perhaps once in every 20 to 30 years, but the design has carefully considered and provided for the circumstances where this could arise.

270. Prior to use of any Washout, all pipeline flows would be stopped and the Line Valves at either end of the section to be drained would be closed. If there are any intermediate connection points within this isolated section of pipe they would also be closed.
271. The pipeline section would then be emptied as far as possible through temporary pumps installed on the bypass of the Line Valve at the lower end of the pipeline section. The water would be pumped into the adjacent pipeline sections and not lost to waste.
272. When draining a pipeline section, air would be drawn into the pipeline through the Air Valves. A faint 'breathing' noise may be audible from the Air Valve chambers during this time.
273. Once the pumps at the Line Valve have drained as much as they are able, one or more of the several Washouts within the section may be used to drain the water now 'standing' in the pipe.
274. Which Washouts are used and the rate of discharge would depend largely on the prevailing conditions, such as:
- Which sub-sections of the isolated section are required to be drained
 - The environmental sensitivity of the watercourse and environs
 - The ease of access to the particular Washout
 - The proximity to a watercourse
 - The size of the watercourse and the existing water levels.
275. Due to the topography, some lengths of the pipeline would likely be below the discharge point, and there would likely be a small volume of 'standing' water remaining in the pipe that can only be removed using a temporary portable pump.
276. A discharge to a receiving watercourse would be restricted based on the following:
- Discharge volume limited to <20% Q_{med}
 - No discharge if watercourse is in flood (Flow > Q₃₀).

4.7.4.3 Monitoring

277. The monitoring would be the system wide operational monitoring using the SCADA system controlled and monitored from the WTP.
278. The Cathodic Protection would provide advance warning on any deterioration in the integrity of the pipeline. The Cathodic Protection would involve a very low continuous voltage (one or two volts) on to the pipeline which can be continuously monitored by the SCADA system. This alerts the operators of changes in system current which may indicate possible damage to the pipe coatings and that may, in the long run, cause localised corrosion. The system would work silently and continuously.

4.8 Break Pressure Tank (BPT)

4.8.1 Purpose of the Break Pressure Tank

279. The BPT provides a point where the pressure in the pipeline can be managed and would be used to transition to the use of gravity to maintain a flow of water in the pipeline under normal conditions. The water would be pumped from the WTP to the BPT but from the BPT the water would usually be moved through the pipe by gravity pressure. This avoids the need for the water to be pumped through the whole length of the pipeline all the time and consequently, would reduce the amount of energy needed for the operation of the Proposed Project.

280. In order to do this the BPT is intentionally located at the highest point on the route of the Proposed Project. This allows the BPT to provide hydraulic stability and mitigate transient pressures for both elements of the Treated Water Pipeline (from the WTP to the BPT and from the BPT to the TPR) and as such it is an essential part of the control system for the pipeline ensuring that it would remain full at all times.

281. The BPT has been sized to accommodate the pressure changes associated with the normal start up and shut down of the pumping stations as well as power failures and emergency stops, if any were to occur.

282. Image 4.11 provides an overview of the BPT.

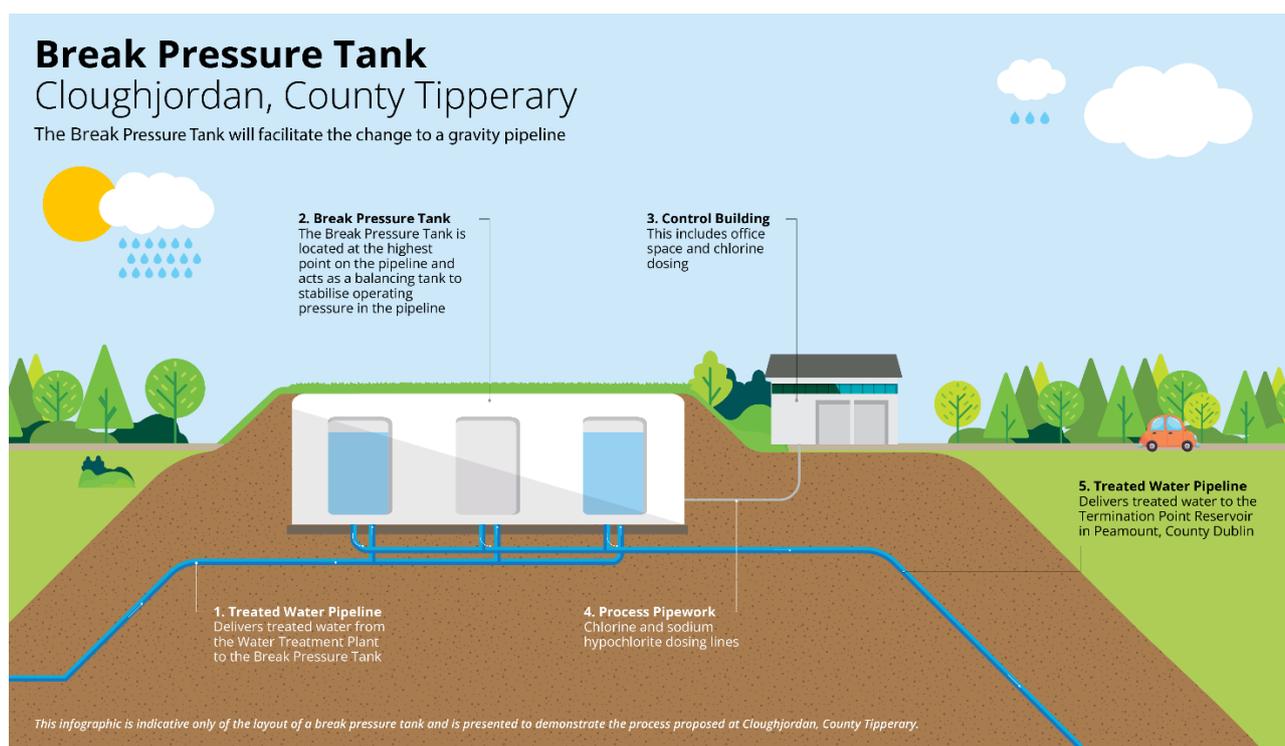


Image 4.11: Overview of the Break Pressure Tank

4.8.2 Location

283. The site for the proposed BPT (as shown in Figure 4.18) is located in the townland of Knockanacree in County Tipperary, approximately 1.8km north of the town centre of Cloughjordan and south of the Scohaboy (Sopwell) Bog SAC (Site Code 002206) and Scohaboy Bog Natural Heritage Area (NHA) (Site Code 000937) (1.8km and 700m respectively).

284. Currently, the site is mainly in agricultural use, as pasture land. To the south of and adjacent to the site is Knockanacree Woods which has three looped walks (Oak Walk, Ash Loop and Beech Trail). These would not be directly affected by the Proposed Project (see Chapter 14 (Population) for further detail); however, a circular walk would be provided within the planting on site at the BPT and this walk would connect into Knockanacree Wood. On the proposed site there is an access track for maintenance and inspection of the existing telecoms mast to the north-east of the BPT.

4.8.3 Extent of the Site

285. The BTP site is located immediately north of dense woodland in open fields. The site would be 5.5ha (excluding the access road described in Section 4.8.4). This would comprise 5.2ha of permanent land take and a further 0.3ha of land only required temporarily during construction.¹⁵

4.8.4 Access

286. To provide permanent access to the site a new access road would be constructed, from the L1064. This would be 5m in width and 794m in length. The permanent access would require 1.8ha of land. In addition, a further 0.5ha would be required temporarily during construction to build the access road.¹⁶ This would be in addition to the land defined in Section 4.8.3.

287. The access road junction includes for safe sight lines and appropriate signage when emerging onto the L1064, in accordance with TII's Geometric Design of Junctions, DN-GEO-03060 (TII 2023). The sightline on the western side of the entrance would be constrained by the existing properties and so will not reach the full length required.

288. There would be a total of ten car parking spaces provided at the BPT site with three including a charging point (fast charge) for electric vehicles in accordance with the Tipperary County Development Plan 2022-2028 (Tipperary County Council 2022).

289. Construction of the BPT would have the potential to affect existing access to the existing telecoms mast. However, provision has been made for a dedicated access track to the mast around the boundary of the BPT site for the telecoms provider to continue to be able to access their mast.

4.8.5 Design

290. The BPT site includes the BPT and a Control Building. These elements are shown in Figure 4.66 and detailed in Table 4.8.

Table 4.8: Infrastructure Elements – Break Pressure Tank

Infrastructure Element	No.	Length	Width	Operating Depth of Water	Height Over Finished Ground Level	Plan Area		Volumes	
						Each	Overall	Unit	Overall
Break Pressure Tank	1 No. (3 No. Cells)	23.0m each cell	41.7m each cell	4.15m	4.9m (depth)	959m ² (each cell)	2,877m ²	4,593m ³ (each cell)	13,776m ³
Control Building	1 No.	40m	20m	n/a	7.5m	800m ²	800m ²	n/a	n/a
Chlorine Dosing Kiosk	1 No.	4m	2.5m	n/a	3m	10m ²	10m ²	n/a	n/a

291. The BPT is a single structure containing three equal sized cells, each measuring 41.7m in length and 23.0m wide, with each cell providing an operational capacity of 4.6MI. Therefore, the total volume of the BPT would be 13.8MI although normally only two cells would be in operation and so the operational capacity in the remaining two tanks would be 9.2MI. The size of the cells is determined by the volume of water needed to balance levels in the pipeline and the capacity needed to store water in the event of a shut down.

¹⁵ These totals are affected by rounding to one decimal place.

¹⁶ These totals are affected by rounding to one decimal place.

292. The BPT would be rectangular and made of reinforced concrete and partially buried within an earthwork bank. Alongside this would be a Control Building, pipework, an access road, perimeter fencing and an infiltration basin where surface water would soak away.

293. The BPT would be partially buried and covered in earth. The ground level would, generally, be lowered at the site, as a result of the Proposed Project. However, finished ground levels would slope uphill in a northerly direction across the site. Consequently, the cell at the southern end would be above finished ground level and the northern cell would be close to finished ground level.

294. The Control Building would be the tallest structure with a height of 7.5m over finished ground level. It would be 40m long by 20m wide. An architectural visualisation of the BPT Control Building is provided in Image 4.12. The barrel-vaulted steel portal framed building is designed to invoke an agricultural building aesthetic, while the muted colour palette proposed is sensitive to the rural context. The façades would be overclad using robust thermally treated timber battens, fitted vertically, and spaced to give a three-dimensional effect and soften the visual appearance of the building. It would house:

- Water quality monitors
- Equipment for topping up the level of disinfection
- Chemical storage for chlorine dosing
- The OSEC system
- Power supply and uninterruptible power supply
- BPT level monitoring
- Security
- Telemetry
- Valve controls
- Solar array control.

295. The Control Building would include a water quality instrumentation room, a motor control centre and instrumentation panel, as well as toilet and welfare facilities. It would also be used for chemical storage and the OSEC system. This is described in Section 4.8.11.2.



Image 4.12: Architectural Visualisation of the BPT Control Building

296. Access to the Control Building would be through a personnel door and through roller shutter doors for equipment. Emergency fire exit doors would be provided to comply with Part B of the Second Schedule to the Building Regulations 1997 (as amended).
297. Communications links to the BPT would be provided by a telemetry mast, the top of which would be 14m above finished ground level.
298. A single storey walk-in kiosk would be needed within the BPT site to house the chlorine sample monitor, the duty standby dosing pumps and a wash station. The kiosk would be 4m long and 2.5m wide and would be within the side slope of the northernmost cell of the BPT. A separate 10m³ tank would need to be located close to the inlet mains along with a static mixer to allow the chlorine dosing to be undertaken. The tank would have a diameter of 2.4m and be 2.6m high. It would be within a bunded area.

4.8.6 Surface Water Management and Drainage

299. The BPT access road, and other paved areas have been designed to incorporate SuDS principles as recommended by the SuDS Manual (CIRIA 2015) in order to limit discharges of rainwater runoff from the BPT site to the equivalent greenfield site flow rate. As part of this drainage strategy the BPT would also have a 'green roof' on top which would have a biodiversity benefit as well as reducing the rate of surface water runoff.
300. Filter drains within the site boundary fence would collect surface water and direct it to an infiltration basin via small pumps in an underground chamber. Runoff from the roof of the Control Building would also be directed to the infiltration basin.
301. An oil/petrol interceptor located upstream of the infiltration basin would provide protection against spillages. The infiltration basin has been designed to hold a volume of 273m³ to accommodate flows from a 1 in 100-year storm, with a 30% uplift for climate change.
302. Filter drains with soakaways would provide drainage along the access road between the BPT and the L1064. These would collect surface water and direct it to one of four infiltration sumps located along the access road. These sumps have been sized to accommodate flows from a 1 in 100-year rainfall event with a 30% climate change uptake.
303. Foul wastewater generated on the site would be directed to a holding tank with a level sensor to alert when emptying is required. It would then be tankered away for disposal at a licensed WwTP. The site would not be permanently staffed and so foul wastewater generated by operational staff on the site would be less than 1m³/d.

4.8.7 External Lighting

304. At the BPT site, LED external lighting would be provided at the Control Building and chemical delivery area. It would also be required for traffic circulation areas around the BPT site in the parking area and at the entrance to the site. It is not proposed to put external lighting along the access road to the BPT site.
305. The design of the lighting at the BPT site will be carried out with reference to the standards and requirements listed for the RWI&PS in Section 4.4.7.

4.8.8 Power Connection

306. The BPT would have a kWh power demand per day of 1,496kWh/d at an annual average output of 154Mld of drinking water and 2,757kWh/d at the peak demand of 300Mld.

307. The power supply would be provided by ESB Networks from the existing medium voltage overhead power line which crosses the proposed BPT access road. A connection for the BPT would be made from this overhead line and routed via two underground cable ducts laid along the access road to the Control Building within the BPT site. The two underground cable ducts would be 125mm diameter 20 kV uPVC ducts and would be laid with a minimum cover of 750mm and a minimum spacing of 75mm between the ducts, in accordance with ESB standards.
308. In addition to the permanent power connection for the BPT a separate new connection is required for the radio mast on site because the existing supply would be severed by the Proposed Project. The replacement connection would be via an overhead line along the northern boundary of the site.
309. Along the access road to the BPT there would also be a permanent diversion of an existing overhead line required because the poles for the current line would be impacted by the access road.
310. Three stands of solar panels are proposed at the BPT site. These would include a stand of ground mounted solar cells to the south of the control building (596m² in extent), roof mounted cells on the south facing side of the control building roof (278m² in extent), and roof mounted cells on top of the three BPT cells (3,008m² in extent). These would provide a peak power output of 200kWp and would help to run the water quality monitoring, telemetry and SCADA systems for a portion of each day. A battery unit would be provided to store energy generated during daylight / sunshine so that it could be used at night / overcast periods. This would have a capacity of 200kWp. This would reduce the energy required from the mains supply.

4.8.9 Potable Water Connection

311. A potable water connection would be taken directly from the BPT and no additional connection into existing supplies would be required for the BPT.

4.8.10 Boundary Treatment/Landscaping

312. The BPT site would feature a double fence. There would be a 2.4m-high polyester powder-coated palisade security fence around the site. The expected overall length of the security fence would be 598m. This would be followed by a 1.2m high stock proof post and rail boundary fence on the outside of the proposed access track to the existing radio mast. The perimeter of the BPT would be marked by the existing woodland / hedgerow boundaries which would be retained.
313. There would be a post and rail fence, on the eastern side only of the boundary of the permanent access road from the L1064 to the site. On the western side of the access road the existing tree / hedgerow boundary would be retained.
314. There would also be a 2.4m high palisade security gate at the entrance to the BPT site and further, at the junction between the permanent access road and the L1064 there would be an agricultural gate matching the existing gates along the same road. Two further gates would be provided for third party access, One at the junction with the L1064 to provide landowner access and another at the entrance to the track to the radio mast.
315. CCTV cameras on 6m tall poles would provide security coverage of the access gates and buildings.
316. The tanks forming the BPT would be contained within an earthen embankment and the site would be landscaped to reduce the visual effect of the BPT site as a whole.
317. Land to the east of the BPT has been incorporated into the Proposed Project to allow for woodland habitat creation as part of the overall ecological reinstatement plans. This planting will avoid the historic monument within this part of the site. Additional woodland is proposed along the western boundary and

to the north of the site. There is existing woodland to the south of the site and so the planting proposals would connect the BPT site into this woodland. Further, a circular walk would be provided within the woodland planting on the south-eastern side of the BPT site and this walk would link into existing paths within Knockanacree Wood. The perimeter of the woodland planting area would not be fenced but would be demarked by existing hedgerows which would remain in situ.

318. Mixed mosaic habitat is proposed in the north-eastern and north-western parts of the site (due to restrictions on planting as a result of the below ground pipeline). The landscaping plans for the site are shown in Figures 4.93 and 4.94. The landscape and visual effects are discussed in further detail in Chapter 16 (Landscape & Visual).

4.8.11 Operation and Maintenance

4.8.11.1 Operation

319. The BPT has been sited at the proposed location in order to achieve a normal operating water level of 139.4mAOD. This would mean that the roof level of the BPT would be 142.7mAOD. At this elevation flows, from the BPT to the TPR, of up to approximately 165Mld would be achieved without supplementary pumping. Once the flows exceed 165Mld, additional pressure would be required to move the higher flows through the pipe. This would be provided by supplementary pumping from the BPS.

320. The Treated Water Pipeline from the WTP would enter the BPT site from the south-west and would connect to the inlet side of the BPT. The Treated Water Pipeline to the TPR would exit the BPT site to the north-east.

321. In normal operation the control system would keep the level in the BPT constant. Should this level vary outside the pre-set control band, the operators would be notified by alarms and a sequence of controlled shut downs would occur to prevent the levels rising further.

322. Typically, only the two outermost cells will be active. An overflow, if one occurs, would be to the middle cell within the BPT.

323. The controls at the BPT would ensure that the system would shut down should an overflow to the middle cell occur. Similarly, in the event that the signal to/from the BPT was lost then the system would shut down as a safety precaution.

324. In the event that the high lift pumps at the WTP trip, for whatever reason, the FCV near the TPR would signal to close. During this controlled shut-down, the BPT would play an integral part by ensuring that, in particular, the pipeline downstream of the BPT is always fully charged with water. This is important to avoid air entrainment, i.e. the creation of pockets of air in the Treated Water Pipeline, which would otherwise have to be bled and sterilised before they could be brought back into a full level of service.

325. Safety Integrity Level rated valves and instruments with appropriate standby would be installed on the inlet and outlet pipework to the BPT.

326. The BPT would not require a full-time presence during normal operation. Monitoring would be provided by telemetry systems, supported by standard monitoring and maintenance. Operatives would come to site when required as part of the standard monitoring and maintenance regime.

327. The operation and maintenance of the BPT is described in Appendix A4.1 (Operational Strategy).

4.8.11.2 Chlorine Dosing

328. The water arriving at the BPT would contain a trace level of chlorine and chemical dosing would be required in accordance with Uisce Éireann technical design standard TEC-900-05-02 (Disinfection: Secondary Chlorination) (Uisce Éireann 2023).

329. To ensure that the levels of chlorine residual are accurately controlled, water quality sampling would be automatically undertaken on the inlet and the outlet to the BPT and would determine the level of dose required at the BPT inlet pipework. A banded sodium hypochlorite dosing system would maintain a minimum 'chlorine residual' between 0.1mg/l and 0.2mg/l.

330. The Control Building would be used for chemical storage as well as to house the chemical dosing plant. The dosing system would use sodium hypochlorite produced on site by an OSEC system. Therefore, the site has been sized to include sodium hypochlorite storage (52 days at 154Mld) and storage of brine needed in the OSEC process (30 days at 154Mld).

4.8.11.3 Residues

331. The only residues during operation would be a small amount arising from the chlorine dosing process.

4.8.11.4 Third Party Access

332. A number of access points have been included within the design in order maintain access to land / infrastructure. These are:

- A replacement access (and power supply) to the existing radio mast at the northern end of the site. This would be via shared use of the permanent access road
- A landowner access point at the entrance from the L1064 to the BPT and an agricultural track to the east of the permanent access road from the L1064 to the BPT.

333. In addition it is proposed to provide public access to the planting area to the east of the site. This would involve a circular walk within the planting proposals and linking to the existing trail within Knockanacree Wood.

4.8.11.5 Maintenance

334. The maintenance strategy for the BPT is that while one of the outermost cells is being operated, the other can be isolated for cleaning or maintenance.

4.8.11.6 Monitoring

335. The on-going monitoring at the BPT would consist of checking:

- Water levels in the tanks
- Chlorine levels in the water
- Water pressure in the pipeline.

4.9 Treated Water Pipeline from the BPT to the TPR

4.9.1 Purpose of the Treated Water Pipeline from the BPT to the TPR

336. The purpose of the Treated Water Pipeline from the BPT to the TPR is to transfer up to 300Mld of treated water from the BPT at Knockanacree, near Cloughjordan, in County Tipperary to the proposed TPR adjacent to, and immediately west of, Peamount Hospital in County Dublin. Up to approximately 165Mld

can be transferred between the BPT and TPR without supplementary pumping, with the water moved via gravity pressure. Above this flow rate, additional pressure would be required to move the higher flows through the pipe. This would be provided by supplementary pumping from the BPS.

4.9.2 Location and Extent

337. The proposed Treated Water Pipeline from the BPT to the TPR is approximately 133km long and would extend in an east to north-east direction through northern County Tipperary and Counties Offaly and Kildare before terminating in County Dublin. This is shown in Figure 4.18 to Figure 4.60. The pipeline would be primarily routed through agricultural grassland, but there are extensive areas of peatland in County Offaly and eastern County Kildare through which the pipeline would be constructed.

338. For ease of reference, the Treated Water Pipeline from the BPT to the TPR has been separated into five sections: A to E. Table 4.9 outlines the chainages associated with each section.

Table 4.9: Sections of the Treated Water Pipeline from the BPT to the TPR

Pipeline Section	Approximate Start	Approximate End	Starting Chainage	Ending Chainage	Approximate Length
A	BPT	R440	TWA – 0	TWA – 28100	28.1km
B	R440	N80	TWB – 0	TWB – 28200	28.2km
C	N80	R402	TWC – 0	TWC – 24800	24.8km
D	R402	R407	TWD – 0	TWD – 34200	34.2km
E	R407	TPR	TWE – 0	TWE – 17600	17.6km

339. The approximate length of the Treated Water Pipeline from the BPT to the TPR within each county is presented in Table 4.10.

Table 4.10: Approximate Length of Treated Water Pipeline from the BPT to the TPR in Each County

County	Approximate Chainages	Approximate Length of Pipeline	Figures
County Tipperary	TWA – 0 to TWA – 4780	4.8km	Figure 4.18 to Figure 4.20
	TWA – 7960 to TWA – 9090	1.1km	Figure 4.21
	Combined length	5.9km	
	Note: Tipperary also has the RWRMs (2km) and the Treated Water Pipeline between the WTP and the BPT (36.8km) so overall length of the pipeline in Tipperary is 44.7km.		
County Offaly	TWA – 4780 to TWA – 7960	3.1km	Figure 4.20 to Figure 4.21
	TWA – 9090 to TWD – 10300	82.4km	Figure 4.21 to Figure 4.48
	Combined length	85.5km	
County Kildare	TWD – 10300 to TWE – 13930	37.8km	Figure 4.48 to Figure 4.59
County Dublin	TWE – 13930 to TWE – 17590	3.7km	Figure 4.59 to Figure 4.60

340. The following sections provide an overview of the location and environmental setting of the Treated Water Pipeline from the BPT to the TPR on a county-by-county basis. Table 4.11 to Table 4.14 outline the locations where the pipeline crosses existing major roads, watercourses, railways or high voltage electricity lines. A full schedule of crossings is provided in Appendix A5.4 (Schedule of Crossings).

4.9.2.1 County Tipperary

Chainage TWA – 0 to TWA – 4780 and Chainage TWA – 7960 to TWA – 9090

341. From the BPT, the Treated Water Pipeline extends in an easterly direction before crossing the minor road L5020 (RDX033) (which includes the Beara-Breifne Way and Ormond Way) and then the R491 (RDX035), approximately 2km from the BPT, near Garraun and Newtown. The pipeline then turns north-eastwards towards the County Tipperary/County Offaly border, in the townland of Behamore (Hawkshaw), where it diverts northwards, following the county boundary for a short distance before crossing into County Offaly in the townland of Derrinclare.
342. From the townland of Derrinclare, the pipeline crosses the R491 (RDX037) regional road for a second time and continues in a north-easterly direction for approximately 3km before again passing into County Tipperary in the townland of Quakerstown, approximately 90m north-west of Cangort Bog NHA (Site Code 000890). The pipeline extends for a further 1km prior to re-entering County Offaly in the townland of Ballaghboy, approximately 2km south of Sharavogue Bog SAC (Site Code 000585).

Table 4.11: County Tipperary – Treated Water Pipeline from the BPT to the TPR Crossings

Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Road	RDX035	R491	TWA – 2000	Figure 4.19	
Water	WCX022	Derrinclare	TWA – 4800	Figure 4.20	
Road	RDX037	R491	TWA – 5000	Figure 4.20	

4.9.2.2 County Offaly

Chainage TWA – 4780 to TWA – 7960 and Chainage TWA – 9090 to TWD – 10300

343. From the county boundary at Ballaghboy, the route of the Treated Water Pipeline from the BPT to the TPR generally follows a north-easterly to easterly route for approximately 82km through County Offaly.
344. From Ballaghboy, the route of the pipeline extends through the townland of Galbally, before crossing the R492 (RDX043), approximately 2.5km north of Shinrone, in the townland of Curralanty; the Little Brosna River (WCX026) in the townland of Tubbrid; and then the N62 (RDX044) national secondary road at Boveen. From the N62, the pipeline continues in a north-easterly direction, crossing over an unnamed local road in the townland of Ballyatty (shown in Figure 4.22). From here, the pipeline continues in a northerly and then a north-easterly direction, passing within 500m of the Lisduff Fen SAC (Site Code 002147), through Castletown which is approximately 5.5km south-east of Birr. The pipeline then proceeds to cross the Clareen Stream (WCX029) in the townland of Kilmaine, before also crossing and being routed parallel to the Breaghmore River in the townlands of Breaghmore and Killinure. The pipeline then crosses the Camcor River (WCX032) in the townland of Cloghanmore, which is approximately 9km due east of Birr (shown in Figure 4.27).
345. After reaching the BPS, located in the townland of Coagh Upper shown in Figure 4.27 the pipeline is then routed in a north-easterly direction, reaching the northern perimeter of Derrinboy Bog shown in Figure 4.32). It continues through open countryside crossing the Silver River (WCX036) in the townland of Ballynacarrig, shown in Figure 4.33, and taking a route that is approximately 1km south of the village of Mountbolus. From this position it veers eastwards, crossing the R421 (RDX068) regional road in the townland of Killananny, and continuing east to just south of Gorteen, shown in Figure 4.34, Figure 4.35 and Figure 4.36. At Gorteen, the pipeline crosses the Clodiagh River (WCX039) (Figure 4.37) before proceeding north-east through open agricultural land, between Monietta Bog (southside) and the L2002

(northside), before passing to the south of Killeigh village and crossing the N80 (RDX071) national secondary road and the nearby L5035 local road (RDX072). The latter two roads, which converge within Killeigh, are crossed on the south-eastern village limits, as shown in Figure 4.38.

346. The crossing of the Clodiagh River (WCX039) would be carried out using a trenchless construction technique, as would be required at other significant crossings, as detailed in Chapter 5 (Construction & Commissioning).
347. The pipeline continues north-eastwards for another 4.5km before meeting the first of two railway crossings (RYX005). This crossing of the Tullamore – Portarlington railway line would be carried out using trenchless construction as shown in Figure 4.39.
348. Progressing onwards toward Ballinagar, the pipeline crosses the R420 (RDX076) regional road in the townland of Curragh before a further trenchless crossing is required of the L1020 (RDX077) in Lugmore townland. The crossing of the L1020 is located 2.5km south of Ballinagar village and approximately 1km north of Geashill village, as shown in Figure 4.40.
349. There are three crossings of the L5034 local road (RDX078, RDX079 and RDX080) before the pipeline enters Clonad Bog (Figure 4.41). The pipeline is then routed through Mount Lucas Bog and crossing the R402 (RDX083) and R400 (RDX084) regional roads in the townland of Esker Beg, as shown in Figure 4.43.
350. The pipeline is then routed along the southern perimeter of Esker Bog before crossing the R441 (RDX085) again in Rathvilla townland, approximately 7.5km south-west of Edenderry, and continuing eastwards, passing through the north-east corner of Cloncreen Bog shown in Figure 4.45. Edenderry power station is 1km south of this location. The R401 (RDX087) regional road is crossed in the townland of Shean, at a point 6km south-west of Edenderry and 1km north-east of Edenderry power station. A further 0.5km east of the R401, the first of two trenchless crossings of the Figile River (WCX056) would be required; the second (WCX057) is 2.5km beyond the adjacent crossing of the R401 shown in Figure 4.47. From the first crossing of the Figile River (WCX056), and for the next 10km, the pipeline is routed through the extensive Ballydermot Bog, as shown in Figure 4.46 to Figure 4.48.
351. The Ballydermot Bog straddles the County Offaly/County Kildare border at Ticknevin townland.

Table 4.12: County Offaly – Treated Water Pipeline from the BPT to the TPR Crossings

Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Water	WCX023	Derrinclare	TWA – 5600	Figure 4.20	
Water	WCX024	Shinrone stream	TWA – 8000	Figure 4.21	
Water	WCX025	Quakerstown	TWA – 9400	Figure 4.21	
Road	RDX043	R492	TWA – 11500	Figure 4.21	
Water	WCX026	Little Brosna	TWA – 13000	Figure 4.22	
Road	RDX044	N62	TWA – 14200	Figure 4.22	
Water	WCX027	Rock [Birr]	TWA – 17500	Figure 4.23	
Power	OHX005	38 kV Network	TWA – 21700	Figure 4.25	
Water	WCX028	Kilmaine_25	TWA – 23800	Figure 4.25	
Water	WCX029	Clareen Stream	TWA – 24800	Figure 4.26	

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Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Water	WCX030	Breaghmore West	TWA – 25700	Figure 4.26	
Water	WCX031	Breaghmore	TWA – 26000	Figure 4.26	
Water	WCX032	Camcor	TWA – 27600	Figure 4.27	
Road	RDX053	R440	TWA – 27900	Figure 4.27	
Water	WCX033	Upper Coagh	TWB – 1400	Figure 4.27	
Power	OHX006	110 kV Network	TWB – 1700	Figure 4.27	
Water	WCX034	Kyleboher	TWB – 6600	Figure 4.32	
Water	WCX035	Kilgolan Lower	TWB – 7800	Figure 4.32	
Power	OHX007	110 kV Network	TWB – 11700	Figure 4.33	
Water	WCX036	Silver [Kilcormac]	TWB – 12600	Figure 4.33	
Water	WCX038	House Derries	TWB – 14800	Figure 4.34	
Road	RDX068	R421	TWB – 18700	Figure 4.35	
Water	WCX039	Clodiagh (Tullamore)	TWB – 24900	Figure 4.37	
Power	OHX008	38 kV Network	TWB – 27800	Figure 4.38	
Road	RDX071	N80	TWC – 100	Figure 4.38	
Water	WCX040	Killeigh Stream	TWC – 1000	Figure 4.38	
Water	WCX041	Finter	TWC – 3300	Figure 4.39	
Rail	RYX005	Railway – Galway Service	TWC – 4800	Figure 4.39	
Water	WCX042	Meelaghans	TWC – 5000	Figure 4.39	
Water	WCX043	Annaghharvey 25	TWC – 5600	Figure 4.39	
Road	RDX076	R420	TWC – 7900	Figure 4.40	
Water	WCX044	Tullamore 25	TWC – 8900	Figure 4.40	
Water	WCX045	Tullamore 25	TWC – 9700	Figure 4.41	
Power	OHX024	38 kV Network	TWC – 11800	Figure 4.41	
Water	WCX047	Esker_Beg	TWC – 17700	Figure 4.43	
Water	WCX048	Daingean	TWC – 18900	Figure 4.43	
Road	RDX083	R402	TWC – 19200	Figure 4.43	
Road	RDX084	R400	TWC – 19800	Figure 4.43	
Water	WCX049	Esker (Stream) [Offaly]	TWC – 20300	Figure 4.43	
Water	WCX050	Rathcobican	TWC – 20300	Figure 4.43	
Water	WCX051	Unnamed Tributary (ESKER STREAM_020)	TWC – 21100	Figure 4.44	

Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Water	WCX053	Unnamed Tributary (ESKER STREAM_020)	TWC – 21300	Figure 4.44	
Water	WCX054	Leitrim 14	TWC – 22800	Figure 4.44	
Road	RDX085	R441	TWC – 24700	Figure 4.45	
Water	WCX055	Ballykilleen	TWD – 3500	Figure 4.46	
Road	RDX087	R401	TWD – 3600	Figure 4.46	
Water	WCX056	Figile	TWD – 4100	Figure 4.46	
Water	WCX057	Figile	TWD – 6400	Figure 4.47	
Water	WCX058	Figile	TWD – 9000	Figure 4.47	

4.9.2.3 County Kildare

Chainage TWD – 10300 to TWE – 13930

352. The Treated Water Pipeline from the BPT to the TPR traverses County Kildare for approximately 37.8km, generally in a north-easterly to easterly direction.
353. The pipeline passes through Ballydermot Bog before exiting in the townland of Kilpatrick where the first of the two trenchless crossings of the Grand Canal (WBX078) are required, adjacent to Bord na Móna's Lullymore facility. A further short distance onwards, the route crosses the R403 (RDX090), shown in Figure 4.50, approximately 6km north-west of Allenwood.
354. The pipeline skirts the northern edge of Timahoe South Bog (which contains the Drehid Waste Management Facility) and Timahoe North Bog exiting at the L5013 local road, approximately 4km north-east of the waste management facility, shown in Figure 4.50 and Figure 4.51.
355. A further 2km eastwards, the route traverses the northernmost part of Gilltown Bog, the last of the large peat areas, shown in Figure 4.53.
356. The pipeline continues eastwards, crossing the Blackwater River in the townland of Newtownmoneenluggagh, routing north and eastwards of Ballagh Wood, before crossing the R407 (RDX100) regional road at a point 5km south-west of Kilcock, shown in Figure 4.53, Figure 4.54 and Figure 4.55. It then continues east and south-eastwards through the townlands of Baltracey (where it crosses the R408 (RDX103) regional road at a point 2km north-west of Rathcoffey village) and Raheen shown in Figure 4.56.
357. A short distance further east the R406 (RDX106) and R403 (RDX107) regional roads are crossed in the townland of Barberstown Upper and Lower, 0.5km north and east of the Barberstown roundabout respectively. The nearby River Liffey (WCX073), in the townland of Castledillon Upper, would be crossed using a trenchless construction technique as shown in Figure 4.58.
358. The pipeline continues eastwards on the southside of the River Liffey, before crossing the Celbridge to Ardclough road (L1016) and then the Dublin – Newbridge railway line (RYX006) in Kearneystown Upper townland. The pipeline enters County Dublin in the townland of Ringwood, near Hazelhatch, as shown in Figure 4.59.

Table 4.13: County Kildare – Treated Water Pipeline from the BPT to the TPR Crossings

Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Water	WCX059	Abbeylough	TWD – 14400	Figure 4.49	
Water	WBX078	Grand Canal	TWD – 15100	Figure 4.49	
Power	OHX009	38 kV Network	TWD – 15500	Figure 4.49	
Power	OHX010	38 kV Network	TWD – 15700	Figure 4.50	
Road	RDX090	R403	TWD – 16200	Figure 4.50	
Water	WCX060	Figile	TWD – 18100	Figure 4.50	
Power	OHX011	110 kV Network	TWD – 22300	Figure 4.51	
Water	WCX061	Mulgeeth	TWD – 24300	Figure 4.52	
Power	OHX012	110 kV Network	TWD – 25800	Figure 4.53	
Water	WCX062	Mulgeeth	TWD – 26400	Figure 4.53	
Water	WCX063	Derryvarroge	TWD – 28100	Figure 4.53	
Water	WCX064	Derrycrib	TWD – 28500	Figure 4.53	
Water	WCX065	Blackwater [Longwood]	TWD – 29200	Figure 4.54	
Power	OHX013	110 kV Network	TWD – 29500	Figure 4.54	
Water	WCX066	Aghafullim	TWD – 32800	Figure 4.55	
Road	RDX100	R407	TWE – 100	Figure 4.55	
Water	WCX067	Lyreen_010	TWE – 700	Figure 4.55	
Water	WCX068	Lyreen_010	TWE – 1800	Figure 4.56	
Water	WCX069	Clonshanbo 09	TWE – 2500	Figure 4.56	
Power	OHX014	110 kV Network	TWE – 2800	Figure 4.56	
Power	OHX015	220 kV Network	TWE – 2800	Figure 4.56	
Water	WCX070	Lyreen 09	TWE – 3600	Figure 4.56	
Road	RDX103	R408	TWE – 3900	Figure 4.56	
Power	OHX016	220 kV Network	TWE – 5200	Figure 4.57	
Power	OHX017	220 kV Network	TWE – 6300	Figure 4.57	
Road	RDX106	R406	TWE – 7800	Figure 4.57	
Road	RDX107	R403	TWE – 8500	Figure 4.57	
Gas	GCN-010	Gas – Medium pressure	TWE – 8500	Figure 4.57	
Water	WCX071	Posseckstown 09	TWE – 9000	Figure 4.58	
Water	WCX072	Ardress Lower	TWE – 9100	Figure 4.58	

Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Power	OHX018	110 kV Network	TWE – 9700	Figure 4.58	
Water	WCX073	Liffey	TWE – 9800	Figure 4.58	
Water	WCX075	Friarstown 09	TWE – 10100	Figure 4.58	
Power	OHX019	38 kV Network	TWE – 10200	Figure 4.58	
Water	WCX074	Reeves Stream	TWE – 11400	Figure 4.58	
Rail	RYX006	Dublin – Newbridge railway line	TWE – 12400	Figure 4.59	

4.9.2.4 County Dublin

Chainage TWE – 13930 to TWE – 17590

359. Immediately upon passing the Kildare–Dublin county boundary, the second of two crossings of the Grand Canal (WBX088) would be carried out, shown in Figure 4.59.

360. After this, the Treated Water Pipeline from the BPT to the TPR is routed parallel to the canal until the townland of Commons. From here it is routed north-east under the R405 (RDX112), travelling through primarily farmland, with two local road crossings (RDX113 and RDX114), until it approaches the R120. The pipeline route then travels parallel to the R120 until it reaches the existing Peamount Reservoir access road and then follows the route of the proposed permanent access road to the proposed TPR site at Peamount shown in Figure 4.60.

361. The length of the pipeline in County Dublin would be approximately 3.7km.

Table 4.14: County Dublin – Treated Water Pipeline from the BPT to the TPR Crossings

Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Water	WBX088	Grand Canal	TWE – 14200	Figure 4.59	
Road	RDX112	R405	TWE – 14900	Figure 4.59	

4.9.3 Design

362. The Treated Water Pipeline from the BPT (shown in Figure 4.18) to the TPR (shown in Figure 4.60) would be a single 1,600mm nominal diameter buried pipe designed to a maximum pressure of 16 bar. The BPT, near Cloughjordan has an elevation of approximately 142.70mAOD and a normal operating water level of 139.44mAOD. The TPR would be located adjacent to the existing Peamount Reservoir at a ground elevation of varying from approximately 79.00 - 81.00mAOD.

363. The pipeline would be laid at a minimum depth of cover of 1.2m above the crown of the pipe and generally would follow the existing ground profile to limit depths of excavation. Typically, the pipeline has been designed to be laid at gradients not less than 1:500 rising in the direction of flow and 1:300 falling from the direction of flow to encourage air removal. To allow for a reasonable tolerance during construction, a gradient of 1:250 has been adopted where feasible. However, an occasional relaxation to 1:500 in the falling direction has been permitted in peat.

364. Ancillary pipeline features such as Line Valves and Lay-Bys are described in Section 4.13 and the pipeline construction techniques are outlined in Chapter 5 (Construction & Commissioning).

4.9.4 Operation and Maintenance

4.9.4.1 Operation

365. The peak flow in the pipeline has been defined as 12,500m³/hr based on the maximum treated water demand of 300Mld and with pumping over 24 hours per day.

366. For the most part the Treated Water Pipeline from the WTP to the BPT would traverse open countryside, with high and low points along the profile, and incorporates several valves and associated ancillary structures. These valves are required for the operation and maintenance of the pipeline and are discussed in Section 4.13. They ensure that:

- Air in the system is removed as efficiently as possible
- The shut-down and isolation of elements of the system can be conducted
- Water can be drained from the isolated sections in a controlled manner.

367. The Treated Water Pipeline would run full at all times and be kept pressurised by a combination of the water level in the BPT and the back pressure governed by the FCV located at the low point prior to the TPR.

4.9.4.2 Maintenance

368. A pipeline conveying treated water, such as the Proposed Project would operate for many years with little maintenance and there is not expected to be frequent maintenance required. Further, there is no requirement for regular cleaning as the pipeline would be transferring clean water. The operation and maintenance of the pipeline features is outlined in Section 4.15. A fuller description of the operation and maintenance of the Treated Water Pipeline is provided in the Appendix A4.1 (Operational Strategy).

369. If maintenance on the pipeline is required, then it is probable that at least partial draindown would be required. As this would be a planned event it would be scheduled to suit landowner constraints and appropriate weather conditions with adequate advance notice provided to the landowner.

370. The need to drain a section of the pipeline in operation would be a very rare event, at a typical frequency of perhaps once in every 20 to 30 years, but the design has carefully considered and provided for the circumstances where this could arise.

371. Prior to use of any Washout, all pipeline flows would be stopped and the Line Valves at either end of the section to be drained would be closed. If there are any intermediate connection points within this isolated section of pipe they would also be closed.

372. The pipeline section would then be emptied as far as possible through temporary pumps installed on the bypass of the Line Valve at the lower end of the pipeline section. The water would be pumped into the adjacent pipeline sections and not lost to waste.

373. When draining a pipeline section, air would be drawn into the pipeline through the Air Valves. A faint 'breathing' noise may be audible from the Air Valve chambers during this time.

374. Once the pumps at the Line Valve have drained as much as they are able, one or more of the several Washouts within the section may be used to drain the water now 'standing' in the pipe.

375. Which Washouts are used and the rate of discharge would depend largely on the prevailing conditions, such as:

- Which sub-sections of the isolated section are required to be drained

- The environmental sensitivity of the watercourse and environs
- The ease of access to the particular Washout
- The proximity to a watercourse
- The size of the watercourse and the existing water levels.

376. Due to the topography, some lengths of the pipeline would likely be below the discharge point, and there would likely be a small volume of 'standing' water remaining in the pipe that can only be removed using a temporary portable pump.

377. A discharge to a receiving watercourse would be restricted based on the following:

- Discharge volume limited to <20% Q_{med}
- No discharge if watercourse is in flood (Flow > Q_{30}).

4.9.4.3 Monitoring

378. The monitoring would be the system wide operational monitoring using the SCADA system controlled and monitored from the WTP.

379. The Cathodic Protection would provide advance warning on any deterioration in the integrity of the pipeline.

4.10 Booster Pumping Station (BPS)

4.10.1 Purpose of the Booster Pumping Station

380. The purpose of the BPS is to facilitate the movement of the water along the Treated Water Pipeline from the BPT to the TPR at higher flow rates. Flows up to approximately 165Mld can flow without supplementary pumping. However, when the flow increases above 165Mld, pipeline frictional losses increase to the point where additional pressure would be required to overcome this. The BPS contains the pumps that provide the capacity to move flows up to 300Mld through the Treated Water Pipeline. Image 4.13 provides an overview of the BPS.

4.10.2 Location

381. The proposed BPS site is located to the east of Birr, in the townland of Coagh Upper, County Offaly, approximately 66km east of the proposed WTP. The BPS site is located within a rural area on agricultural land adjacent to the L3003, as shown in Figure 4.27.

4.10.3 Extent of the Site

382. The BPS site is located in open fields. The site would be 5.1ha (excluding the access road described in Section 4.10.4). This would comprise 2.2ha of permanent land take and a further 2.9ha of land only required temporarily during construction.¹⁷

¹⁷ These totals are affected by rounding to one decimal place.

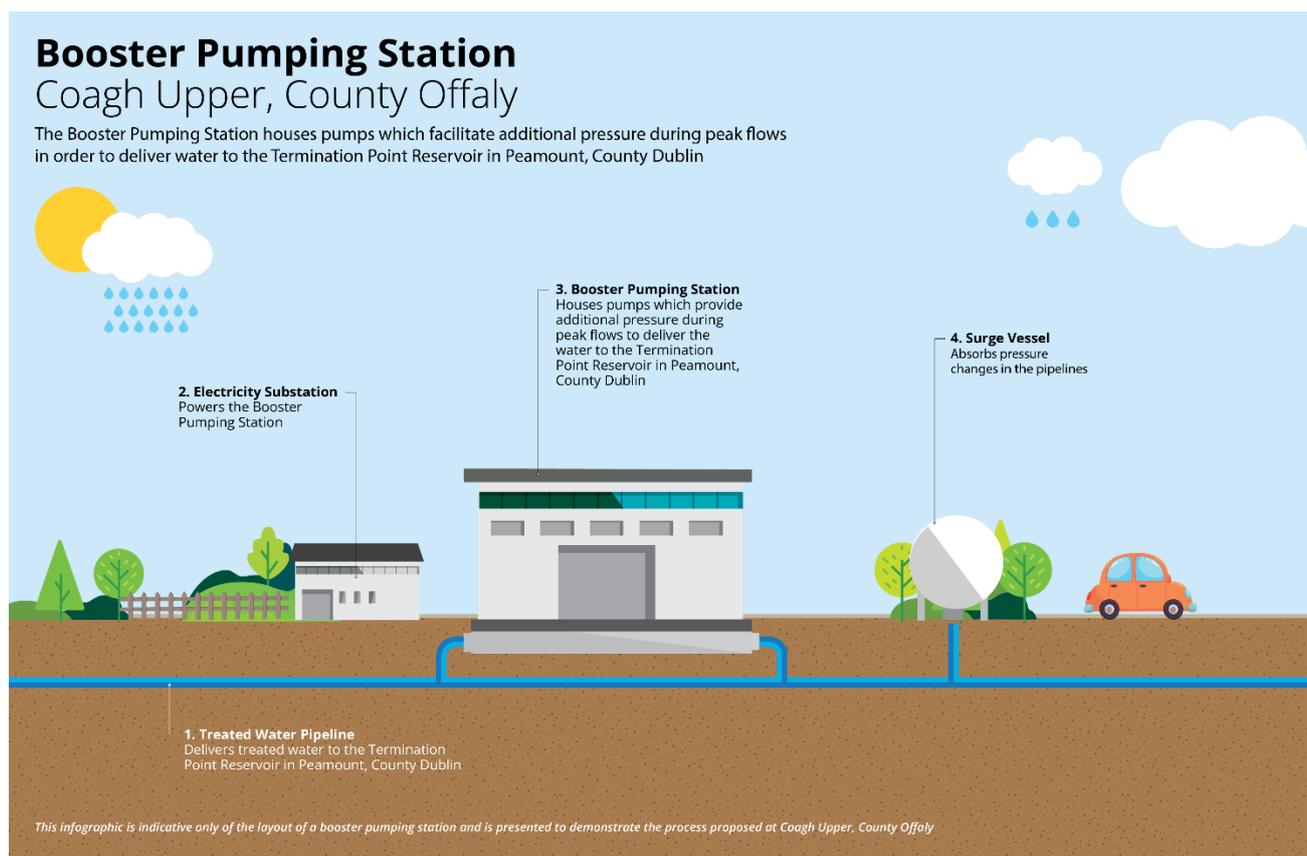


Image 4.13: Infographic Overview of the Booster Pumping Station

4.10.4 Access

383. Access to the BPS site would be directly off the L3003. There would be traffic circulation areas within the site including around the perimeter of the BPS. The access includes for safe sight lines and appropriate signage when emerging onto the L3003, in accordance with TII's Geometric Design of Junctions (DN-GEO-03060) (TII 2023). The sight lines would be partially provided by the existing curtilage of the road.

384. The permanent access would require 0.4ha of land. In addition, a further 0.1ha would be required temporarily during construction to build the access road.¹⁸ This would be in addition to the land defined in Section 4.10.3.

385. There would be four car parking spaces provided at the BPS site with one including a charging point (fast charge) for electric vehicles in accordance with the Offaly County Development Plan 2021 – 2027 (Offaly County Council 2021).

4.10.5 Design

386. The BPS site consists of a BPS Building, surge vessel, electricity substation building and two transformers. The infrastructure elements of the BPS are shown in Figure 4.68 and detailed in Table 4.15.

¹⁸ These totals are affected by rounding to one decimal place.

Table 4.15: Infrastructure Elements – Booster Pumping Station

Infrastructure Element	No.	Length	Width	Depth	Height Over Finished Ground Level	Plan Area Overall
Booster Pumping Station	1 No.	60m	36m	3.9m	7.6m	2,160m ²
38 kV Electricity Substation and Power Distribution Building	1 No.	14.8m	9.3m	n/a	3.5m for the building 4.2m for the Transformer	148m ²
Surge Vessel	1 No.	10m	3m Φ ¹⁹	n/a	4.5m	30m ²

387. The BPS Building is designed as a single-storey building with a basement below. It would be 60m long, 36m wide and 7.6m above finished ground level. The building above ground level would include:

- Welfare facilities
- Office facilities
- Electrical controls
- An overhead gantry crane to remove pumps, motors and pipework
- Space for an internal vehicle loading bay.

388. The basement of the BPS Building would contain the Pump Hall which would open to the ground floor of the building with walkways running on either side. It would contain:

- Six pumps (four duty and two standby)
- The incoming and outgoing Treated Water Pipeline
- The outgoing pump manifold to the Treated Water Pipeline.

389. As with the BPT Control Building, the Pumping Station at the BPS would be a barrel-vaulted steel portal framed building designed to invoke an agricultural building aesthetic. The lean-to roof at the side would harmonise with agricultural buildings in the area. A muted colour palette is proposed for this sensitive rural context. The façades would be overclad using robust thermally treated timber battens, fitted vertically, and spaced to give a three-dimensional effect and soften the visual appearance. An architectural visualisation of the BPS is provided in Image 4.14.



Image 4.14: BPS Architectural Visualisation

¹⁹ Φ symbolises diameter

390. Access to the building would be at ground level through a personnel door and through roller shutter doors for equipment. Emergency fire exit doors would be provided to comply with Part B of the Second Schedule to the Building Regulations 1997 (as amended). Removable acoustic louvres would be provided to facilitate the maintenance and replacement of plant.
391. Communications links to the BPS would be provided by a telemetry mast, the top of which would be 14m above finished ground level.
392. To the rear of the Control Building would be a surge vessel which would help manage changes in pressure within the water in the pipeline. This would be 10m long, 3m wide and 4.5m high providing a required capacity of 71m³.

4.10.6 Surface Water Management and Drainage

393. The BPS access road, and other paved areas have been designed to incorporate SuDS principles as recommended by the SuDS Manual (CIRIA 2015) in order to limit discharges of rainwater runoff from the BPS site to the equivalent greenfield site flow rate.
394. Surface water runoff would be conveyed via an oil/petrol interceptor and underground drainage system to an attenuation pond, located at the front of the site. The volume of the attenuation basin would be 600m³ to accommodate flows from a 1 in 100-year storm event and a 30% uplift in rainfall for climate change. Water from the attenuation basin would be discharged, at greenfield runoff rates, via a 200mm underground pipe to the unnamed tributary of the Camcor River, approximately 200m east of the BPS site.
395. Foul wastewater generated on the site would be directed to a holding tank with a level sensor to alert when emptying is required. It would then be tankered away for disposal at a licensed WwTP. The site would not be permanently staffed and so foul wastewater generated by operational staff on the site would be less than 1m³/d.

4.10.7 External Lighting

396. At the BPS site, LED external lighting would be provided for the BPS Building and on traffic circulation areas within the site, in the parking area and at the entrance to the BPS site.
397. The design of the lighting at the BPS site will be carried out with reference to the standards and requirements listed for the RWI&PS in Section 4.4.7.

4.10.8 Power Connection

398. The BPS would have a kWh power demand per day of 463kWh/d at an annual average output of 154Mld of water and 111,144kWh/d at the peak demand of 300Mld. This reflects the fact that at 154Mld the pumps would not be required to operate.
399. The power supply would be provided by ESB Networks from its 38 kV electricity substation at Birr along a 9km length of buried cables laid along the R440, L7004 and L3003 roads in Co. Offaly and terminating at a 38 kV Electricity Substation at the BPS site (shown in Figures 4.27 to Figure 4.30). The cable ducts would consist of two 38 kV circuits laid as per ESB Standard Specification for ESB 38 kV Networks Ducting/Cabling included in Appendix B
400. The 38 kV Electricity Substation would be located in a fenced area within the BPS site which would contain a Switchgear Building and two external transformers.

401. The Switchgear Building, located within the electricity substation, would include a control room, a battery room and a switchgear room.
402. Two transformers would be mounted externally on two 6.5m by 6.5m concrete plinths. Each transformer would have a height of 4.2m above the finished ground level.
403. The finishes of the electricity substation will be in accordance with the Standard Specification for ESB 38 kV Networks (this is set out in Appendix A4.2 (Standard Specification for ESB 38 kV Networks)).
404. Ground mounted solar panels are proposed on the southern side of the BPS site, as shown in Figure 4.68. These would cover an area of 278m² and provide a peak power output of 20kWp which would help to run the telemetry and SCADA systems for a portion of each day. A battery unit would be provided to store energy generated during daylight / sunshine so that it could be used at night / overcast periods. This would have a capacity of 40kWp. This would reduce the energy required from the mains supply.
405. In addition to the permanent power supply to the site there would be the permanent diversion of an existing LV overhead line which crosses the proposed site of the BPS and so would need to be moved. This would be diverted around the eastern side of the BPS.

4.10.9 Potable Water Connection

406. A potable water connection would be taken directly from the pipeline and no additional connection into existing supplies would be required for the BPS.

4.10.10 Boundary Treatment/Landscaping

407. The BPS site would feature a double fence on its boundary. There would be a stock proof 1.2m high post and rail boundary fence, with a 2.4m-high polyester powder-coated palisade security fence set within the boundary. The offset distance varies between approximately 5–12m. The expected overall length of the security fence would be 601m.
408. There would be 2 no. security gates provided at the BPS site. One would be provided at the site entrance and the other at the entrance to the 38 kV Substation. CCTV cameras on 6m tall poles would provide security coverage of the access gates and buildings.
409. The site would be landscaped to reduce the visual effect of the BPS site as a whole and the landscaping plan for the site is shown in Figure 4.95. The proposals include for species rich semi-natural grassland planting within the site and tree planting around the perimeter of the site. The landscape and visual effects are discussed in further detail in Chapter 16 (Landscape & Visual).

4.10.11 Operation and Maintenance

410. During the operation of the Proposed Project, the BPS would come into effect above flows of approximately 165Mld and provide supplementary pumping in order to push the water through the pipeline from the BPT to the TPR to deliver the required flow, up to 300Mld. To achieve this, the pumps in the BPS would link to pressure and flow monitors on the pipeline, both upstream and downstream of the site. They would initiate when the pressure in the pipeline started to drop below a set-point. When the pumps activate, they would mechanically increase the water pressure in the pipe.
411. Use of the BPS would be restricted, in any given year, to periods of routine testing and maintenance of the BPS or when demand for water increases above 165Mld. In this latter scenario, the BPS would operate for as long as necessary to meet the increased water demand.

412. At all other times during the operation of the pipeline, the BPS would be switched off and the Treated Water Pipeline from the BPT to the TPR would run in gravity mode on a bypass.

413. When required to run, two or three pumps would run in parallel to provide the required additional flow beyond the maximum gravity flow.

414. The pumps would be variable speed and provide coarse control of the flows in the pipeline.

415. The site is intended for remote operation and would be provided with actuated valves and flow meters to facilitate the transition from gravity to pumped modes of operation.

416. A SCADA system would communicate with and provide control from the WTP.

417. The site would not have staff permanently on site. Operatives would come to site when required as part of routine monitoring, maintenance and inspection.

418. The operation and maintenance of the BPS is described in Appendix A4.1 (Operational Strategy).

4.10.11.1 Surge Management

419. A surge vessel would be included at the BPS to prevent temporary elevation in pressure conditions. It would be located to the rear of the BPS Building (as shown in Figure 4.68).

420. The surge vessel is described in Section 4.10.5.

4.10.11.2 Waste and Residues

421. There are no specific waste / residue streams generated at the BPS during the operation of the Proposed Project.

4.10.11.3 Third Party Access

422. ESB would need access to the substation described in Section 4.10.5 and a separate entrance and access have been provided for this within the design.

423. A number of additional access points have been included within the design in order to maintain landowner access to land / infrastructure. These are:

- A gate within the entrance from the L3003 to the electricity substation to provide access to the land to the south of the BPS
- A gate within the entrance from the L3003 to the BPS to provide access to the land to the north of the BPS.

4.10.11.4 Maintenance

424. The BPS has been designed so that a pump can be taken out of service for maintenance and / repair and the remaining pumps can deliver the peak demand of 300Mld.

425. When not in service, the BPS would require approximately weekly maintenance runs for each of the pumps to avoid damage to bearings and drive systems. This can be achieved without the need for a full transition to pumped mode since individual pumps can be spun without impacting on the normal gravity flows.

426. The by-pass would also have to be tested at regular intervals.

427. Replacement of the pumps would be needed at the end of their life which would typically be 15–25 years.

428. The surge vessel would be maintained whilst not in operation, which will be when flows through the pipeline are below approximately 165Mld. Maintenance of the surge vessel would be carried out via a personnel access hatch. The vessel would be drained and taken off line prior to any works. The surge vessel will require an annual inspection by a qualified organisation to meet the Pressure Equipment Directive (2014/68/EU).

4.10.11.5 Monitoring

429. The on-going monitoring at the BPS would consist of:

- Checking the speed of the pumps, the volume of water being moved and the pressure in the pipeline.

4.11 Flow Control Valve (FCV)

4.11.1 Purpose of the Flow Control Valve

430. The FCV is a specific valve that would be used to control the flows in the pipeline, water level at the BPT and the volume of water arriving at the TPR.

4.11.2 Location

431. The FCV would be approximately 5km west of the TPR. It would be located next to the L1016 south of Newtown in County Kildare, shown in Figure 4.58.

4.11.3 Extent of the Site

432. The FCV site would be 0.9ha (excluding the access road described in Section 4.11.4). This would comprise 0.5ha of permanent land take and a further 0.4ha of land only required temporarily during construction.²⁰

4.11.4 Access

433. Access to the FCV site would be directly off the L1016 Commons Road Upper. There would be paved traffic circulation areas to all the elements of the FCV site. A Lay-By adjacent to the public road would allow for safe parking during access and egress. The access would include safe sight lines and appropriate signage when emerging onto the L1016, in accordance with TII's Geometric Design of Junctions, DN-GEO-03060, (TII 2023).

434. The permanent access would not require additional land beyond that allowed for the site, however, in order to build the access point from the L1016 there would be a further, 0.3ha of land required temporarily during construction in addition to that described in Section 4.11.3.²¹

435. There would be four car parking spaces provided at the FCV site.

4.11.5 Design

436. As shown in Figure 4.69, the FCV would consist of three 700mm diameter FCVs and three flow meters installed in parallel with the Line Valve, housed within an underground chamber. This is summarised in Table 4.16.

²⁰ These totals are affected by rounding to one decimal place.

²¹ These totals are affected by rounding to one decimal place.

437. The chamber would be 4.5m deep and 23.5m long by 13m wide and would contain the principal valve and associated powered actuator along with pressure instruments, flood detection and control equipment. The chamber allows this equipment to be protected and to be more easily accessed during the operation of the pipeline.

Table 4.16: Infrastructure Elements – Flow Control Valve

Infrastructure Element	No.	Length	Width	Depth	Height Over Finished Ground Level	Plan Area Overall
Flow Control Valves	3 no.	N/A	N/A	N/A	N/A	N/A
Chamber	1 no.	23.5m	13m	4.5m	N/A	306m ²

438. Above ground there would be a small compound, drainage pond, kiosks, solar panels and parking.

439. The compound would include one kiosk for the power supply to the FCV as set out in Section 4.11.8 and one other kiosk which would house the control PLC telemetry and SCADA system.

440. Communications links to the FCV would be provided by a telemetry mast, the top of which would be 14m above finished ground level.

4.11.6 Surface Water Management and Drainage

441. The FCV access road, and other paved areas have been designed to incorporate SuDS principles as recommended by the SuDS Manual (CIRIA 2015) in order to limit discharges of rainwater runoff from the FCV site to the equivalent greenfield site flow rate. This would include provision of filter drains to act as attenuation devices and disperse surface and stormwater in a controlled manner to the attenuation pond located to the north-west of the site. The volume of the attenuation basin would be 52m³ in order to accommodate flows from a 1 in 100-year storm event and a 30% uplift in rainfall for climate change.

442. An oil/petrol interceptor would be located upstream of the infiltration basin to provide protection against spillages. The discharge from the pond would be limited to greenfield runoff rates into the roadside drainage.

4.11.7 External Lighting

443. Lighting would be installed at the FCV in order to provide a safe and secure environment for both pedestrians and drivers at the site and to facilitate ongoing operational and maintenance works associated with the FCV.

444. This would be supplemented with task lighting in activities being undertaken during periods of darkness, e.g. during the winter. Task lighting inside the kiosks and chambers would be provided to facilitate operational maintenance. All task lighting would normally be switched off and only used when personnel are on-site. The design of the lighting at the FCV site will be carried out with reference to the standards and requirements listed for the RWI&PS in Section 4.4.7.

4.11.8 Power Connection

445. The FCV would have a kWh power demand per day of 188kWh/d at an annual average output of 154Mld of water and 365kWh/d at the peak demand of 300Mld.

446. Power supply to the FCV site would be provided by ESB Networks from their Low Voltage network via a combination of overhead lines and buried cables routed to a control kiosk on the site.

447. Ground mounted solar panels are proposed on the north-east side of the FCV as shown in Figure 4.69. These would cover an area of 556m² and provide a peak power output of 20kWp. This would be used to help run the telemetry and SCADA systems for a portion of each day. A battery unit would be provided to store energy generated during daylight / sunshine so that it could be used at night / overcast periods. This would have a storage capacity of 40kWp. This would reduce the energy required from the mains supply.

4.11.9 Potable Water Connection

448. There would be no potable water supply needed at the FCV.

4.11.10 Boundary Treatment / Landscaping

449. The FCV site would feature a double fence on its boundary. There would be a 1.2m high post and rail, stock proof boundary fence with a 2.4m-high polyester powder-coated palisade security fence set 5m within the boundary. The expected overall length of the security fence would be 216m.

450. A security gate would be provided at the site entrance. The gate would be 2.4m high to suitably match the perimeter palisade fence. CCTV cameras on 6m tall poles would provide security coverage of the access gates and the site.

451. The site would be landscaped to reduce the visual effect of the FCV site as a whole and the landscaping plan for the site is shown in Figure 4.96. The proposals include species rich semi-natural grassland and a thick hedgerow around the perimeter of the site. The landscape and visual effects are discussed in further detail in Chapter 16 (Landscape & Visual).

4.11.11 Operation and Maintenance

4.11.11.1 Operation

452. The FCV would operate 24 hours a day to control water flows through the pipeline. This would be done remotely and using an automated system. This would be controlled through the SCADA system.

453. The primary function of the FCV would be to match the pumped flow of water from the WTP with the flow in the Treated Water Pipeline as it leaves the BPT.

454. The site would not be permanently staffed; however, it would be visited by operatives for routine inspection and maintenance.

4.11.11.2 Waste and Residues

455. There would be no specific waste / residue streams generated at the FCV during the operation of the Proposed Project.

4.11.11.3 Third Party Access

456. Additional access points have been included within the design in order to maintain 3rd Party Landowner access to land / infrastructure. These are:

- A new entrance, gate and sightlines to provide access to land to the north of the FCV.

4.11.11.4 Maintenance

457. The valves would require regular inspection and replacement of perishable elements such as seals at prescribed intervals.

458. The FCV site would include an area of hardstanding to accommodate the installation of a temporary crane for maintenance works as and when required. The crane would be brought to and removed from the FCV site on completion of maintenance works.

4.11.11.5 Monitoring

459. The monitoring at the FCV would consist of checking the velocity and pressure of the water in the pipeline.

4.12 Termination Point Reservoir (TPR)

4.12.1 Purpose of the Termination Point Reservoir

460. The purpose of the TPR is to provide the link between the Treated Water Pipeline and the existing local distribution network in the GDA WRZ. There is an existing drinking water reservoir with a capacity of 40MI and an existing control building operated by Uisce Éireann at this site.

461. The TPR would temporarily store treated water supplied through the pipeline so that it is ready to be used by consumers.

462. There would be three separate connections from the TPR for integration with the existing arrangements at the adjacent Peamount Reservoir:

- Supply of the direct demand from the existing 40MI Peamount Reservoir Connection to Peamount Pumping Station for onward transfer to Saggart Reservoir and its supply area
- Connection to the pressure pipeline from Leixlip WTP which would provide the option to reverse the flow to Leixlip for onward supply to North Dublin.

463. In providing termination point storage capacity, the reservoir would allow the hourly variability in the water demand profile of the distribution network to be served by a stable incoming pressure and flow. The chlorine levels of the water would be adjustable at the TPR site to control water quality and facilitate its use for final consumption in the GDA WRZ.

464. The outline layout of the TPR is shown in Figure 4.70 and an overview is provided in Image 4.15.

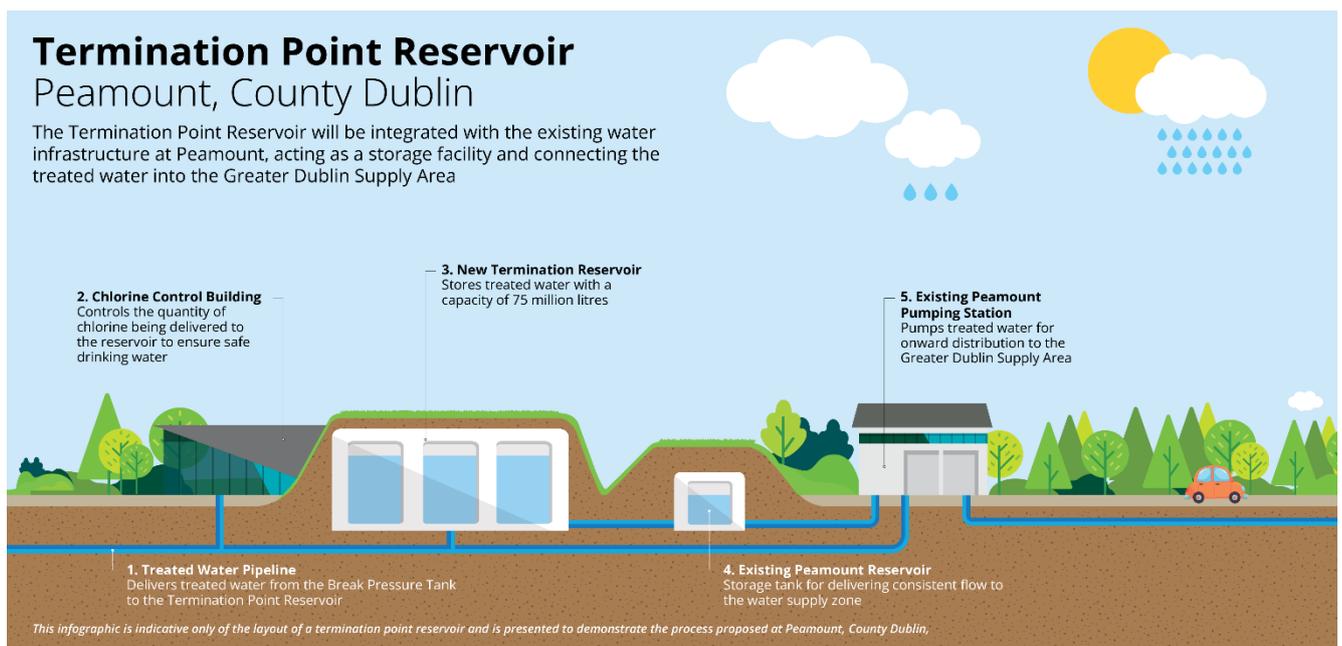


Image 4.15: Overview of the Termination Point Reservoir

4.12.2 Location

465. As shown in Figure 4.60, the proposed TPR would be located adjacent to the existing service reservoir site at Peamount in County Dublin. The TPR would occupy the northern portion of the site where ground levels are in the range of 79–80m AOD.

4.12.3 Extent of the Site

466. The proposed site area for the TPR is currently in agricultural use. The site would be 8.6ha²² (excluding the access road described in Section 4.12.4). This would comprise 7.5ha of permanent land take and a further 1.1ha of land only required temporarily during construction.²³

4.12.4 Access

467. A new access road, 5m in width and 342m in length, is proposed to be constructed off the R120 regional road, and adjacent to the western and northern perimeter of Peamount Hospital as shown in Figure 4.71. The new road is required due to the number of domestic properties along the existing access road which render it unsuitable for construction traffic.

468. The permanent access would require 0.9ha of land.²⁴ This would be in addition to the land defined in Section 4.12.3. There would be no additional land required temporarily to build the access.

469. The access road junction would include a pull-in area before the security gates, safe sight lines and appropriate signage when emerging onto the R120, in accordance with TII's Geometric Design of Junctions, DN-GEO-03060 (TII 2023). The sight lines would largely be provided by the existing curtilage of the road. Car parking would be available at the existing Uisce Éireann reservoir.

4.12.5 Design

470. The TPR site includes the above-ground TPR structure, associated underground pipework and Emergency Overflow Storage Tank and a Chlorine Dosing Control Building. The infrastructure elements of the TPR are shown in Figure 4.70 and detailed in Table 4.17.

Table 4.17: Infrastructure Elements – Termination Point Reservoir

Infrastructure Element	No.	Length	Width	Operating Depth	Free-board	Height Over Finished Ground Level	Plan Area		Volume	
							Each	Overall	Each	Overall
Termination Point Reservoir	3 No. Cells	90m (Each Cell))	40m (Each Cell))	7m	0.5m	11.2m	3,600m ²	10,800m ²	25,000m ³	75,000m ³
Emergency Overflow Storage Tank (underground)	1 No.	40m	40m	3.1m	0.3m	n/a	1,600m ²	1,600m ²	n/a	5,000m ³
Chlorine Dosing Control Building	1 No.	40m	40m	n/a	n/a	8.4m	1,600m ²	1,600m ²	n/a	n/a

²² This calculation does not include the existing site that is in Uisce Éireann ownership as it is not additional land required for the Proposed Project. The existing site has been included within the Proposed Project Boundary as there are connections into it from the Proposed Project and some habitat planting to be done within the boundary.

²³ These totals are affected by rounding to one decimal place.

²⁴ These totals are affected by rounding to one decimal place.

Infrastructure Element	No.	Length	Width	Operating Depth	Free-board	Height Over Finished Ground Level	Plan Area		Volume	
							Each	Overall	Each	Overall
Chlorine Dosing Kiosk	1 No.	4m	2.5m	n/a	n/a	3m	10m ²	10m ²	n/a	n/a

471. The TPR has been designed to have a capacity of 75Ml. It would be similar in shape and form to the existing 40Ml reservoir structures on the adjacent site, consisting of a rectangular tank of three cells constructed from reinforced concrete and surrounded by an earth embankment. The target water level in the TPR would be the same as in the existing reservoir. The top of the TPR would be 11.2m above finished ground level.

472. The proposed new reservoir site would be integrated with the existing reservoir layout so that it becomes one larger water storage facility, incorporating common means of access, site road layout and power supply, while meeting the same cover level as the existing reservoir structures. There is a Control Building within the existing 40Ml reservoir facility that would be used to accommodate some of the required instruments. This existing building incorporates toilet and welfare facilities and would serve the existing reservoir and the proposed TPR.

473. A Chlorine Dosing Control Building would be provided at the TPR to dose the treated water prior to the treated water entering the GDA WRZ. The building would be used for chemical storage and the OSEC system. As a result it would house automatic monitoring and testing equipment to measure residual chlorine in the treated water from the WTP, and automatic dosing pipework. It would also include:

- A water quality instrumentation room
- A motor control centre
- Instrumentation panel
- Solar panel controls
- Level monitoring
- Water quality monitoring.

474. The Chlorine Dosing Control Building would be 40m wide by 40m long and 8.4m high with a flat roof design to tie in with the reservoir.

475. The building has been designed with the proposed sheer concrete retaining wall of the TPR in mind and is intended to make the Chlorine Dosing Control Building homogeneous with the wall. The angle of the retaining wall's buttressing is inverted in the building by removing a 'wedge' underneath, and the concrete form extends, dramatically, at eaves level, past the curtain wall façade. This echoes the form of the proposed Visitor Centre at the WTP. The lower wedge is clad with curtain walling, glazed with ceramic-backed spandrel panels which gives the effect of glass (light versus the heaviness of the monolithic concrete) but is non-transparent. An architectural visualisation of the Chlorine Dosing Control Building is provided in Image 4.16.

476. Access to the Control Building would be through a personnel access door and through two roller shutter doors to bring equipment into the office and into the Chlorine Dosing Room. Emergency fire exit doors would be provided to comply with Part B of the Second Schedule to the Building Regulations 1997 (as amended).

477. Communications links to the TPR would be provided by a telemetry mast, the top of which would be 14m above finished ground level.

478. A single storey walk-in kiosk would be needed within the TPR site to house the chlorine sample monitor, the duty standby dosing pumps and a wash station. The kiosk would be 4m long and 2.5m wide and would be within the side slope of the south-west corner of the TPR site. A separate 10m³ tank would need to be located close to the inlet mains along with a static mixer to allow the chlorine dosing to be undertaken. The tank would have a diameter of 2.4m and be 2.6m high. It would be within a bunded area.



Image 4.16: Architectural Visualisation of the Chlorine Dosing Control Building

479. In addition, an Emergency Overflow Storage Tank would be provided at the TPR. This would be a 40m long underground storage tank, with capacity for 5MI, used during operation as described in Section 4.12.11.

4.12.6 Surface Water Management and Drainage

480. The TPR access road, and other paved areas have been designed to incorporate SuDS principles as recommended in the SuDS Manual (CIRIA 2015) in order to limit discharges from the TPR site to the equivalent greenfield site flow rate. As part of this approach the TPR would have a 'green roof' on top which would have a biodiversity benefit as well as reducing the rate of surface water runoff.

481. Filter drains would disperse surface water to attenuation basins. There would be two attenuation ponds at the TPR site. One of these would be on the northern side of the site and have a capacity of 1,229m³. The second attenuation pond would be located to the southern end of the site beside the entrance and have a capacity of 1,329m³. Both of these ponds have been sized to accommodate flows from a 1 in 100-year storm event with a 30% climate change uplift. Surface water from the attenuation basins would be discharged, at greenfield runoff rates, via a 200mm diameter underground pipe to the network of field drains and ditches located to the north and west of the site.

482. The existing foul sewer crossing the TPR site would be diverted as part of the Proposed Project.

483. There is no requirement for foul drainage as part of the proposed TPR. The existing facilities would be used by site operatives.

4.12.7 External Lighting

484. At the TPR site, LED external lighting would be provided on the buildings and on traffic circulation areas around the site, in the parking area and at the entrance to the TPR site. Task lighting would be provided to facilitate operational maintenance. It is not proposed to put external lighting along the access road to the TPR.

485. The design of the lighting at the TPR site will be carried out with reference to the standards and requirements listed for the RWI&PS in Section 4.4.7.

4.12.8 Power Connection

486. The TPR would have a kWh power demand per day of 1,232kWh/d at an annual average output of 154Mld of water and 2,757kWh/d at the peak demand of 300Mld.
487. The power supply for the TPR would be provided from the existing Uisce Éireann 40MI service reservoir facility, adjacent to the TPR. This facility includes an existing pumping station which is supplied by ESB Networks from an existing medium voltage overhead power line which traverses the TPR site. This power line would be re-routed underground around the southern and eastern perimeter of the site to the existing pumping station which houses the ESB control panel.
488. In addition to the permanent supply to the site, there is an existing overhead line which crosses the proposed TPR site and so this would be diverted around the site.
489. Solar panels have been proposed on top of the most northerly TPR tank roof as shown in Figure 4.70. These would cover an area of 2,152m² and provide a peak power output of 300kWp which would help to run the water quality monitoring, telemetry and SCADA systems for a portion of each day. A battery unit would be provided to store energy generated during daylight / sunshine so that it could be used at night / overcast periods. This would have a storage capacity of 300kWp. This would reduce the energy required from the mains supply.

4.12.9 Potable Water Connection

490. There is an existing potable water supply on the site, terminating at the existing pumping station building.

4.12.10 Boundary Treatment/Landscaping

491. The TPR site would feature a single fence on its boundary. This would be a 2.4m-high polyester powder-coated palisade security fence set 3m within the boundary. The expected overall length of the security fence would be 973m. This would tie into the security fencing for the existing site. There would be a security gate at the northern end of the permanent access road at the entrance to the site. CCTV cameras on 6m tall poles would provide security coverage of the access gates and the site.
492. On the boundary of the east of the site, the existing fence / boundary with the hospital would be retained. On the western side of the site the existing hedgerow would be retained along the boundary.
493. Alongside the access road connecting the site and the R120 there would be a post and rail fence installed on the western side and the existing wall and fence would be reinstated on a slightly amended alignment on the eastern side. At the road junction with the R120, there would be an agricultural gate matching the existing one on site. The TPR itself would be contained within an earthen embankment and the site would be landscaped to reduce the visual effect of the TPR site as a whole.
494. The area around and to the south of the new reservoir would be reinstated to create a species rich semi-natural grassland as part of the overall ecological reinstatement plans. Woodland planting is proposed within the site of the existing reservoir combined with mixed mosaic planting. In addition, mixed mosaic habitat is proposed where below ground infrastructure places restrictions on what can be planted at the surface. The landscaping plans for the site are shown in Figures 4.97 and 4.98. The landscape and visual effects are discussed in further detail in Chapter 16 (Landscape & Visual).

4.12.11 Operation and Maintenance

495. Treated water would arrive at the TPR through the pipeline and then be stored in the reservoir. In providing termination point storage capacity, the reservoir would allow the hourly variability in the water demand profile of the distribution network in the GDA WRZ to be served by a stable incoming pressure and flow.

496. If the TPR requires more or less water, then the operators of the system would instruct the WTP to adjust production, which in turn would:
- Alter the output flow from the HLPS to the BPT
 - Which would cause the BPT level to rise or fall
 - Which would cause the FCV to automatically adjust to maintain the BPT level
 - Which would adjust the flow into the TPR.
497. If one of the three cells of the TPR needs to be emptied, this would be done by drawing it down as part of the normal operational service. Each reservoir cell would have a scour valve at floor level to enable maintenance and reservoir cleaning of any fine particle deposits, and a high-level overflow pipe to control the maximum safe storage capacity.
498. The inlet pipe to each cell would be low level to allow recharge of the pipe during transient events and greater hydraulic stability.
499. The Emergency Overflow Storage Tank would provide a buffer for scour or overflow from the TPR cells for dechlorination prior to disposal from the site by tanker to a licensed waste facility.
500. Control of inflow and water levels within the TPR would be provided by telemetry systems, supported by visits by maintenance operatives. A standing maintenance presence would not be required on-site. Maintenance would be mostly planned with regular tank cleaning required, with due regard to the treated water being stored, to support effective operation.
501. The 5Ml underground Emergency Overflow Storage Tank has been provided within the design in case of an emergency overflow from the reservoir. Due to the 'depth of freeboard' within the TPR design itself and the high-water level alarms within the reservoir, an overflow event would be unlikely to occur. However, should an emergency overflow event occur, the retained volume in the Emergency Overflow Storage Tank would be tankered directly off site from the Emergency Overflow Storage Tank for disposal at a licensed facility.
502. Full details of the TPR operation can be found in Appendix A4.1 (Operational Strategy) including the overflow management approach at the site.

4.12.11.1 Chlorine Dosing

503. The water arriving at the TPR would contain a trace level of chlorine and chemical dosing would be required in accordance with Uisce Éireann technical design standard TEC-900-05-02 (Disinfection: Secondary Chlorination) (Uisce Éireann 2023).
504. To ensure that the levels of chlorine residual are accurately controlled, water quality sampling would be automatically undertaken on the inlet and the outlet to the TPR and would determine the level of dose required at the TPR inlet pipework. A banded sodium hypochlorite dosing system would maintain a minimum 'chlorine residual' between 0.1mg/l and 0.2mg/l.
505. The Chlorine Dosing Control Building would be used for chemical storage as well as to house the chemical dosing plant. The dosing system would use sodium hypochlorite produced on site by an OSEC system. Therefore, the site has been sized to include sodium hypochlorite storage (52 days at 154Mld) and storage of brine needed in the OSEC process (30 days at 154Mld).

4.12.11.2 Residues

506. The only residues during operation would be a small amount arising from the chlorine dosing process.

507. There are no specific waste / residue streams generated at the TPR during the operation of the Proposed Project.

4.12.11.3 Third Party Access

508. There is no additional third party access required at the TPR.

4.12.11.4 Maintenance

509. Consideration has been given to enabling maintenance of the TPR, without the requirement to temporarily take the entire TPR out of service.

510. The maintenance strategy for the TPR is that each cell can be drained down, whilst the others remain in operation in order to isolate it for cleaning or maintenance.

511. Cleaning of the reservoir, when required, would take place in a carefully controlled and well-planned environment. The cleaning regime would depend primarily on the quality of the water entering the tank, and the frequency of cleaning is expected to be low given the quality of treated water flows passing through it. Experience in the operation of the TPR would dictate the frequency of cleaning, but it is anticipated that this would occur every 10 to 15 years.

512. If one of the three cells of the TPR needs to be emptied, this would first be done by drawing it down in normal service. The actual cleaning process would involve the valving-off of a single reservoir cell, emptying, manual cleaning, disinfection and then refilling. Double isolation on both inlet and outlet for each cell for safety of those working in the cell has also been provided. Each reservoir cell would have a scour valve at floor level to enable maintenance and reservoir cleaning of any fine particle deposits, and a high-level overflow pipe to control the maximum safe storage capacity.

4.12.11.5 Monitoring

513. The Chlorine Dosing Control Building would house automatic monitoring and testing equipment to measure residual chlorine in the treated water from the WTP, and automatic dosing pipework.

514. In addition there would be monitoring of the water pressure within the pipeline.

4.13 Pipeline Features

4.13.1 Purpose of the Pipeline Features

515. The RWRMs and Treated Water Pipelines would incorporate several key pipeline features (shown in Image 4.17, and Figure 4.7 to Figure 4.60), namely:

- Line Valves to allow sections of the pipeline to be isolated for operation and maintenance purposes (Section 4.13.3)
- Chambers around the Line Valves to protect the valve and enable access for maintenance purposes (Section 4.13.4)
- Lay-Bys at Line Valves to allow safe access to the valves (Section 4.13.5)
- Cathodic Protection beds at the Line Valves to monitor the pipeline (Section 4.13.6)
- Washout Valves to allow sections of the pipeline to be drained down, if required (Section 4.13.7)
- Air Valves to facilitate removing air from the pipeline (Section 4.13.8)
- Manways to provide access to the pipe once operational (albeit it would be necessary to excavate down to them) (Section 4.13.9)

- Potential future connection points to the pipeline within the Water Supply Area (Section 4.13.10).

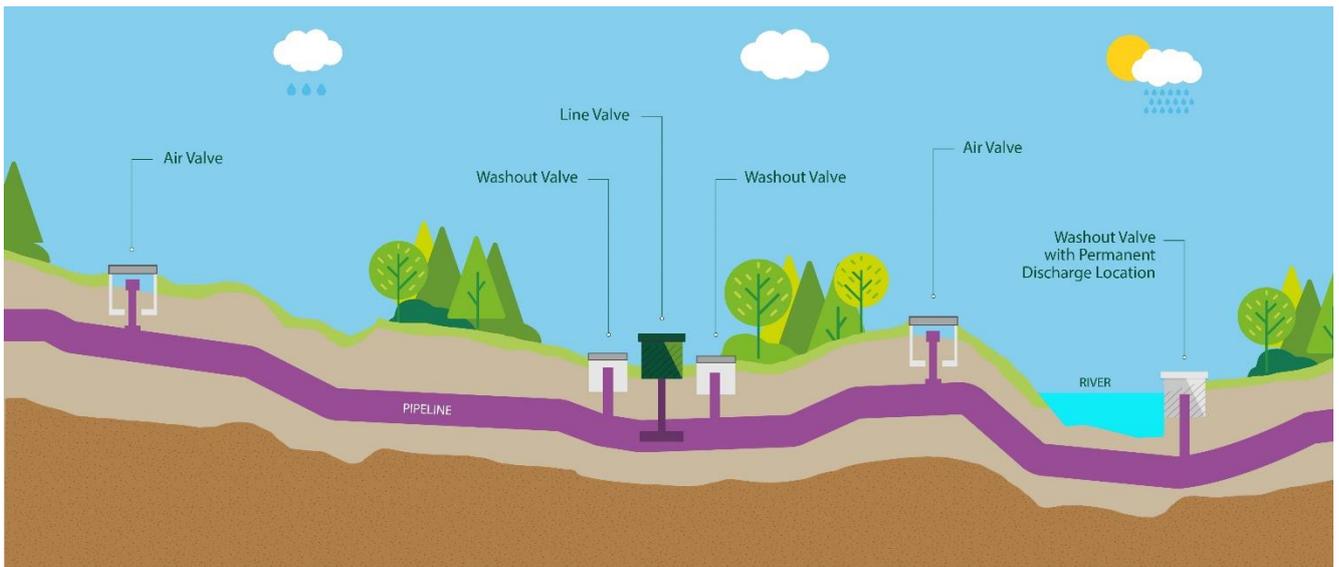


Image 4.17: Infographic Overview of a Pipeline Section Showing Pipeline Features

4.13.2 Extent of the Pipeline Features

516. The pipeline features would be required for the entire length of the pipeline and the number of valves is summarised in Table 4.18.

Table 4.18: Valve Types and Number

Valve Type	Treated Water Pipeline (WTP to TPR)	Raw Water Rising Mains	Total
Line Valves (including Washout, Air Valves and Manways)	49	2	51
Washout Valves:			
• Discharge to a watercourse with permanent outfall	39	-	39
• Discharge to a watercourse without a permanent outfall	57	-	57
• Localised discharge to ditch / land	91	-	91
• Incorporated within Line Valve installation (no discharge during operation).	49	-	49
Air Valves			
• Dedicated	287	2	289
• Incorporated within Line Valves installation.	30	2	32
Potential future connection points	3	1 (at the WTP)	4
Manways:			
• Dedicated	64	4	68
• Incorporated within Air Valves and Line Valves	389	-	389
• Co-incident with Washouts.	110	-	110

4.13.3 Line Valves

517. There would be 51 Line Valves located along the pipeline. (This does not include valves at the Infrastructure Sites which are not defined as Line Valves.) Line Valves would be installed within the RWRMs and Treated Water Pipelines to enable sections to be isolated, drained and recharged during the Commissioning Phase and for maintenance purposes during the Operational Phase.

518. The spacing of Line Valves is a function of the topography and the capacity and suitability of the nearby watercourses to receive water from Washouts. The Line Valves have been sited adjacent to public roads, where reasonably practicable, to facilitate operational inspection and maintenance. Access to the Line Valves would be facilitated, in most instances, by permanent Lay-Bys at the road edge.
519. The typical arrangement of each Line Valve location is shown in Figure 4.82 to Figure 4.85. Each Line Valve installation would incorporate a bypass pipework arrangement and Washout facility designed to maximise the potential to pump treated water around the Line Valves to sections not undergoing maintenance works. This would reduce the quantity of water to be discharged to the environment during draindown of any pipeline sub-section.
520. Generally, pipe sections would be drained partially around the Line Valve bypass pipework under gravity and then by the use of temporary, mobile pumps which would need to be brought to site. A permanent installation of the pump in each location would not be necessary given how infrequently it would be required. However, this means that sufficient space would be required at the Line Valves to allow safe placement and removal of the temporary pumps. This has been accounted for in the design of Lay-Bys and accommodated within the increased width of the Permanent Wayleave at each Line Valve.
521. Image 4.18 shows a typical Line Valve installation under construction prior to burial, which also incorporates a Washout Valve with two isolation valves on the left, a Line Valve with a bypass arrangement in the centre and an Air Valve rising from the Manway on the right. The capped end on the left is temporary and would be removed to connect to the continuation of the pipeline.
522. A power supply would be required for the Line Valves, and a mains power supply connection would be made to the existing network for each Line Valve.



Image 4.18: Photograph of a Typical Line Valve Installation

523. For four of the Line Valves, as listed in Table 4.19, it is proposed that the surrounding land would need to be raised slightly, using suitably graded embankments to match the ground levels of the adjacent road for future access during the Operational Phase. A fence would be required at the top of these embankments for safety.

Table 4.19: Line Valves Where the Surrounding Land Would Be Raised

Line Valve Reference	Approximate Chainage	Approximate Embankment Height (m)
LV-RDX044-01	TWA – 14105	1.5
LV-RDX077-01	TWC – 9020	1.5
LV-RDX088-01	TWD – 8110	1.5
LV-RDX100-01	TWE – 120	1

4.13.4 Chambers and Kiosks

524. Each of the Line Valves would be housed in a below ground concrete chamber. The chamber would contain the principal valve and associated powered actuator along with pressure instruments, flood detection and control equipment. The chamber would allow this equipment to be protected and to be more easily accessed during the operation of the pipeline.

525. The chamber would be 5.8m wide by 5.8m long. The depth of each of the chambers would vary depending on the pipe depth of the pipeline at the location of the Line Valve. The chambers are shown in Figure 4.82 to Figure 4.85.

526. In addition to the chamber a pair of kiosks (or a single co-joined kiosk with separate secure access, see Image 4.19) would be installed close by each Line Valve but offset at a sufficient distance to permit safe work on the pipeline if needed. One kiosk would house the ESB connection, isolator and meter. The other would house the PLC, telemetry and SCADA systems.



Image 4.19: Photograph of a Typical Kiosk Arrangement

4.13.5 Lay-Bys and Access

527. At Line Valve locations adjacent to roads, Lay-Bys would be constructed to facilitate safe working during planned periodic maintenance of the Line Valves and associated electricity supply kiosks. Lay-Bys would allow sufficient space for a delivery vehicle to park beside the installation and place/remove the temporary pumps required to facilitate the bypass required during a draindown. The kiosks would be located adjacent to and accessible from the Lay-Bys.

528. The locations of the Lay-Bys are noted on Figure 4.2 to Figure 4.60. In total there would be 43 Lay-bys. A visualisation of a Lay-By is provided in Image 4.20.

529. The majority of the Lay-Bys would be adjacent to public roads; however, four of the Lay-Bys would be accessed from a private road and a Right of Way is being acquired as part of the Proposed Project in order to allow Uisce Éireann to get to these locations.



Image 4.20: Visualisation of a Lay-By

4.13.6 Cathodic Protection

530. The impressed-current Cathodic Protection system would require grounded beds and rectifiers which would be located at Line Valve sites. The grounded beds would be installed in a vertical alignment below ground level and the rectifiers would share the same kiosks and share the same power and SCADA system.

531. Marker posts containing monitoring terminals connected directly to the pipeline would be located directly over the pipeline at Line Valve locations and at road crossings along the pipeline length. Periodic routine visits would be undertaken to check these marker/monitoring posts and that the impressed-current Cathodic Protection system is running as it should.

4.13.7 Washout Valves

532. Washout Valves would be located at every low point along the pipeline. These valves would be used, during testing and commissioning when sub-sections of the pipeline have completed hydrostatic testing to empty sections of the pipeline of test water which cannot be pumped to adjoining test sections.

533. During pipeline operation it would be very rare that these valves would be used, as sections would only infrequently need to be drained down. They would generally only be required for emptying sections of the pipeline where necessary for emergency repairs or possibly for cleaning programmes every 20 to 30 years. Even then, the Washout Valves would only be used to drain short sections of pipeline, which cannot otherwise be drained to either end of the pipeline section due to the topography.



Image 4.21: Typical Visible Above-Ground Portion of Washout Valve Prior to Reinstatement of Topsoil

534. The number of Washouts is a function of the topography and the capacity of the receiving streams to accept the discharge. This has been based on a commitment to restrict any single discharge to 20% of the associated stream's median annual flood flow rate (Qmed). This has been achieved through a combination of the strategic location of Line Valves to isolate sections of pipeline and by limiting the draindown in any given section.
535. Washout Valves would be buried below the surface and can be excavated in the very rare event of a problem that requires the valve to be replaced. The valves would incorporate extended telescopic spindles accessed via surface boxes at ground level as shown in Image 4.21.
536. Washout Valves do not require a power supply, as operation would be by a standard 'valve key and bar' which can be operated manually.
537. Discharges from the pipeline would require dechlorination prior to discharge to the environment. This would be achieved by using dechlorination tablets at the Washout locations. Tablets would be placed within a perforated basket allowing water to pass through. Dechlorination would be achieved almost immediately on contact with the tablets. This method provides the most flexible approach for the removal of low chlorine residual and is suited to the infrequent operation of the Washouts. The level of residual chlorine would be reduced to <math><0.005\text{mg/l}</math> as required by the Salmonid Regulations.
538. There would be 236 Washout Valves in total. Of these, 49 would be Washout Valves incorporated in the bypass pipework at each Line Valve installation (the two Line Valves on the RWRMs do not have Washouts). These would be used during operation to move the water from one section of the pipeline to the next as part of the draindown strategy. However, the 49 Washouts at Line Valves would not be used

to discharge water from the pipe during operation (some of them would be used to discharge water during commissioning and some would only be used to move water from one section of the pipe to another as described in Chapter 5 (Construction and Commissioning)).

539. Therefore, excluding the 49 Washout Valves incorporated in the bypass pipework at each Line Valve installation, there would be a further 187 Washout Valves along the length of the pipeline. These would be used during the Commissioning Phase (as described in Chapter 5 (Construction and Commissioning)) and could be used in the event of a drain down of the pipeline during its operation. The Washouts are divided into three types, 39 of which would have a permanent connection to an outfall discharging to a watercourse; 57 of which would require a temporary discharge to watercourses; and 91 of which would discharge locally. These are described in Section 4.13.7.1 to Section 4.13.7.3.

4.13.7.1 Washouts – Permanent Discharge Locations with Permanent Outfall

540. Where possible, the pipeline design has strategically located Washout Valves close to watercourses, so that water can be discharged into the watercourse at a controlled rate when the pipeline is drained. For the Permanent Discharge Locations with permanent outfalls, a buried pipeline would connect the water supply pipeline to a fixed permanent outfall structure on the bankside of the watercourse. The connecting pipeline diameter would be 600mm nominal diameter. The outfall structure would contain a stilling basin that would be used both for dechlorination and for decelerating the discharge velocity to avoid any scour in the watercourse.

541. Table 4.20 outlines the 39 locations of these Permanent Discharge Locations. Chapter 8 (Biodiversity) and Chapter 9 (Water) of this EIAR address the environmental implications of such infrequent controlled discharges.

Table 4.20: Summary of Permanent Washout Locations

Washout ID	Watercourse Reference	Washout Design Flow (l/s)	Approximate Chainage	Figure	Symbol
WCW001	Incha Beg	45*	TW-700	Figure 4.8	
WCW002	Roran		TW-1000	Figure 4.8	
WCW003	Kilmastulla	35	TW-2600	Figure 4.8	
WCW004	Kilmastulla	40	TW-3400	Figure 4.8	
WCW005	Burgess	30	TW-7500	Figure 4.10	
WCW007	Cloghleigh	35	TW-10600	Figure 4.10	
WCW008	Patrickswell	30	TW-11400	Figure 4.11	
WCW009	Ardgregane Stream	45	TW-13500	Figure 4.11	
WCW010	Ardgregane Stream	100	TW-15700	Figure 4.12	
WCW011	Ardgregane Stream	35	TW-16500	Figure 4.12	
WCW013	Nenagh	150	TW-19500	Figure 4.13	
WCW014	Ardcrony River	115	TW-26500	Figure 4.15	
WCW015	Shesheraghmore	60	TW-30800	Figure 4.16	
WCW017	Ballyfinboy	75	TW-35000	Figure 4.18	

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Washout ID	Watercourse Reference	Washout Design Flow (l/s)	Approximate Chainage	Figure	Symbol
WCW018	Derrinclare Stream	50	TWA-4800	Figure 4.20	
WCW019	Derrinclare Stream	40	TWA-5600	Figure 4.20	
WCW020	Shinrone	50	TWA-8000	Figure 4.21	
WCW021	Quakerstown	30	TWA-9400	Figure 4.21	
WCW022	Little Brosna	200	TWA-13000	Figure 4.22	
WCW023	Local drain	30	TWA-21300	Figure 4.25	
WCW024	Camcor	150	TWA-27600	Figure 4.27	
WCW025	Ditch	30	TWB-10100	Figure 4.33	
WCW026	Silver (Kilcormac)	30	TWB-12600	Figure 4.33	
WCW027	Clodiagh (Tullamore)	150	TWB-24900	Figure 4.37	
WCW028	Unnamed Meelaghans Tributary	30	TWC-5000	Figure 4.39	
WCW029	Philipstown River	30	TWC-18900	Figure 4.43	
WCW030	Esker Stream	50	TWC-20300	Figure 4.44	
WCW031	Figile	30	TWD-4200	Figure 4.46	
WCW032	Figile	150	TWD-8900	Figure 4.48	
WCW033	Figile Drain	50	TWD-18100	Figure 4.50	
WCW034	Unnamed Blackwater Tributary	60	TWD-26400	Figure 4.53	
WCW035	Aghafullim	100	TWD-32700	Figure 4.55	
WCW036	Clonshanbo	55	TWE-2400	Figure 4.56	
WCW037	Lyreen	30	TWE-3600	Figure 4.56	
WCW038	Ardross Lower	50	TWE-9100	Figure 4.58	
WCW039	Liffey	150	TWE-9800	Figure 4.58	
WCW040	Liffey	75	TWE-11300	Figure 4.58	
WCW041	Blackwater	150	TWD-28500	Figure 4.53	
WCW042	Unn	80	TWD-29100	Figure 4.54	

4.13.7.2 Washouts – Temporary Discharge Locations

542. Temporary Discharge Locations are Washouts where water can be discharged into a nearby watercourse at a controlled rate through temporary pipework such as a flexible hose. In most instances the Washout is close to the watercourse, typically within 100m. However, in some cases the temporary pipework would be laid across adjacent fields to the watercourse. Water from these Temporary Discharge Locations would be discharged responsibly at rates of up to 25l/s. There would be 57 Temporary Discharge Locations along the length of the pipeline. Appendix A4.1 (Operational Strategy) provides further details of the Washout design flow for each Washout.

4.13.7.3 Washouts – Local Discharges

543. Where no sufficiently sized watercourse would be available within 100m of the Washout, the water would be discharged to the adjacent land and would be allowed to soak away responsibly, taking into account local conditions at that time. There would be 91 Washout locations where no sufficiently sized watercourse is available within 100m of the Washout for a permanent discharge. For 51 of these locations, the discharge would be to small ditches and field drains which would ultimately discharge to larger watercourses. For the remaining 40 locations, the water would be discharged to the adjacent land and would be allowed to soak away responsibly, taking into account local conditions at that time, including use of a temporary bund/pond where necessary, at rates of up to 15l/s.

544. There would be no direct discharges to groundwater and water would only be discharged to land where it is appropriate to do so; see Chapter 10 (Soils, Geology & Hydrogeology) for further details. At 22 of these locations, the adjacent land is used for agriculture, while the 18 remaining locations are in peatland. Appendix A4.1 (Operational Strategy) provides further details of the Washout design flow for each Washout.

4.13.8 Air Valves

545. There would be a total of 321 Air Valves along the pipeline; 32 of these would be incorporated with a number of the Line Valve installations. There would be 289 stand-alone Air Valves.

546. The control of air in the pipeline is critical for initial filling and priming, for efficient operation, and for draindown and recharge. Air Valves of a 'double orifice' type would be provided for the following purposes:

- To permit air to be vented in or out of the pipeline when filling or emptying
- To release accumulated air during normal operation, which may be entrapped in the water from pumping or which comes out of solution from the water at lower pressures
- To prevent vacuum pressures from forming by admitting air into the pipeline, when emptying sections for maintenance.



Image 4.22: Typical Air Valve Above-Ground Infrastructure

547. The Air Valve locations are shown in Figure 4.7 to Figure 4.60. Where possible, within the constraints of topography and draindown times, Air Valves would be located in verges and near field boundaries to limit the effect on landowners and to permit easy access for maintenance.

548. Air Valve chambers would be elevated relative to pre-existing ground levels. This would reduce the potential for drainage into the chamber itself and also mitigate against contamination of the Treated Water Pipelines should it be necessary to drain the pipeline down. The Air Valve chamber would protrude 1m above the existing ground level.

549. A typical Air Valve chamber is shown in Figure 4.86 and typical Air Valve above-ground infrastructure shown in Image 4.22.

4.13.9 Manways

550. Manways would be used during commissioning to facilitate the disinfection of the pipeline during the initial filling. After this they are used only in very rare circumstances to facilitate access to the pipe.

551. The Manways consist of a tee piece inserted into the pipeline, closed with a blank flange and buried with the pipeline. To access the pipeline, it would be necessary to excavate down to the blank flange.

552. There would be 68 dedicated Manways but the majority of Manways would be combined with other pipeline features. 321 Manways would be provided as part of proposed Air Valves while a further 68 would be at the location of the Line Valves. In addition, there would also be 110 Manways proposed at Washout locations. As a result the Manways would provide access to the pipeline at intervals of no more than 550m spacings.

4.13.10 Potential Future Connections

553. 'Tee' pieces would be inserted on the Treated Water Pipeline from the BPT to the TPR at three potential future connection points to potentially supply areas of local demand in the Midlands in the future. There would also be future potential connection at the WTP from a pipe laid under the access road connecting to the R445. This would allow these locations to be connected to the Proposed Project at a later date with no disruption to the operation of the Proposed Project. The potential future connection points locations are summarised in Table 4.21.

Table 4.21: Location of Potential Future Connection Points

Chainage	Road Name/No.	Name	Townland	County	Figure
From WTP	WTP access road	1a Newport/Killaloe	Greenhills	Tipperary	Figure 4.7
TWA – 1990	R491	2a Newtown/North Tipperary	Newtown (Guest)	Tipperary	Figure 4.19
TWB – 17340	L6052	3a Tullamore/Mountbolus	Killananny	Offaly	Figure 4.35
TWC – 19770	R400	4a Mullingar Regional	Ballyhugh or Springfield	Offaly	Figure 4.43

554. The potential future connection points would each comprise an 800mm tee off the Treated Water Pipeline from the BPT to the TPR and initially would be terminated at twin isolation valves and a blank flange (shown in Figure 4.81). The valves would isolate the main line from the connecting branch and permit the blank flange (essentially a plate bolted to the free connection end) to be safely removed when making the new connection.

555. When, and if, demand requires the new connection at these locations, the blank flange can be removed and the local trunk main can be connected to the valves and brought into operation without affecting the operation of the Proposed Project.

556. The first potential future connection point listed in Table 4.21 would be directly from the WTP and has been included as part of the Proposed Project. A pipeline would be provided from the CWSTs and routed along the access road to the WTP, terminating with a blank flange at the junction of the access road and the R445 as shown in Figure 4.7.

557. The potential pipelines which would be required to connect to these potential future connection points to the local mains network would be the subject of a stand-alone project with its own development consent process and are not included in the scope of this EIAR.

4.13.11 Operation and Maintenance of Pipeline Features

558. The valves have been included in the design in order to facilitate the operation and maintenance of the pipeline.

559. The operation of the valves would vary based on their purpose. Although the Line Valves and Washouts would be critical to draining down the pipeline this would only be an exceptional circumstance. They would generally only be required for emptying sections of the pipeline where necessary for emergency repairs or possibly for cleaning programmes every 20 to 30 years. However, given the importance of the valves, if required to be used, and the infrequency of their use, regular inspections and exercising would be undertaken to ensure that the valves remain operational.

560. Similarly although a large number of Manways have been included in the design it would only be in very rare situations that these would be used.

561. In contrast the Air Valves would be used more regularly to manage air within the pipeline.

562. As a result all valves would be exercised regularly to check satisfactory operation. A permanent dedicated team would maintain the Treated Water Pipeline, checking all valves at least every six months.

563. The Cathodic Protection would operate continuously and this is described in Section 4.7.4.3.

4.14 38 kV Uprate Works

4.14.1 Purpose of the 38 kV Uprate Works

564. The purpose of the 38 kV Uprate Works is to provide the new power supply needed for the RWI&PS and WTP. Figure 4.72 shows an overview of the location of the Proposed 38 kV Uprate Works.

4.14.2 Location and Extent of Works

565. The works needed would entail uprating the existing Ardnacrusha – Birdhill (38 kV overhead) Line running from poleset 6B north of Ardnacrusha Substation, in County Clare, in a north-easterly direction and terminating at the Birdhill 38 kV Substation in County Tipperary. The works would also include the removal of polesets on the Ardnacrusha – Birdhill – Nenagh Line and replacement with a double-circuit underground cable and works at the Birdhill 38 kV Substation.

566. The existing single-circuit overhead line carries one set of three conductors, which comprises one complete distribution circuit. The Ardnacrusha – Birdhill Line (northern line) forms one part of a loop circuit between the substations of Ardnacrusha and Birdhill, with the second main element being the Ardnacrusha – Birdhill – Nenagh Line (southern line).

567. With the exception of the area around Ardnacrusha, the line largely travels through areas of agricultural farmland and avoids any major settlements. The Ardnacrusha – Birdhill Line leaves Ardnacrusha Substation in a northerly direction, travelling through a predominantly residential area before turning in a north-easterly direction. The line then travels in a general easterly direction through predominantly rural, agricultural land. The line crosses the Headrace and the Lower River Shannon to the west of O'Briensbridge. This part of the River Shannon forms part of the Lower River Shannon SAC. The line then continues in an easterly direction until it terminates at Birdhill 38 kV Substation.

568. The initial section of the Ardnacrusha – Birdhill Line is currently an overhead line carried on six structures from Ardnacrusha Substation to poleset 6B. However, this is due to be converted to an underground cable, as part of works planned by the ESB. This line runs alongside the initial part of the Ardnacrusha – Tulla Line as it leaves Ardnacrusha Substation and comprises a double-circuit 38 kV line. There are no works proposed on the Ardnacrusha – Tulla Line as part of the Proposed Project. The remainder of the line is an existing overhead line and it is this section that would be subject to upgrade works including line replacement and replacement of polesets as part of the Proposed Project.

569. The existing Ardnacrusha – Birdhill Line passes through three counties: Clare, Limerick and Tipperary.

570. The existing Ardnacrusha – Birdhill – Nenagh Line, which links Ardnacrusha Substation with Birdhill Substation and Nenagh Substation, consists of similar polesets and structures to the Ardnacrusha – Birdhill Line. As part of the Proposed Project, the section of this overhead line from the Birdhill Substation passing over the R445 and running proximal/adjacent to the east of the R494 would be removed and replaced with a 38 kV double-circuit underground cable. This work would be within Tipperary.

4.14.3 Design

571. The Ardnacrusha – Birdhill (northern line) 38 kV overhead line comprises 110 structures (polesets/steel towers) where works would be carried out, including replacement/uprating of 15 of the structures.

572. The existing lines have been in place for approximately 70 years and are primarily constructed on double wooden polesets with a number of portal towers and steel lattice towers where the lines terminate. Image 4.24 and Image 4.25 provide an overview of typical structures on both lines.

573. Wooden polesets are embedded in the soil at a depth of 2.3m, while lattice towers have concrete foundations under each leg extending to 2.5m x 2.5m x 2m. Polesets and towers range in height from 12m to 18m. Image 4.23 shows a typical section of the line. Currently, the span lengths on both 38 kV lines vary from 57m to 180m, with mid-span ground clearance ranging from 6.4m to 16.7m.

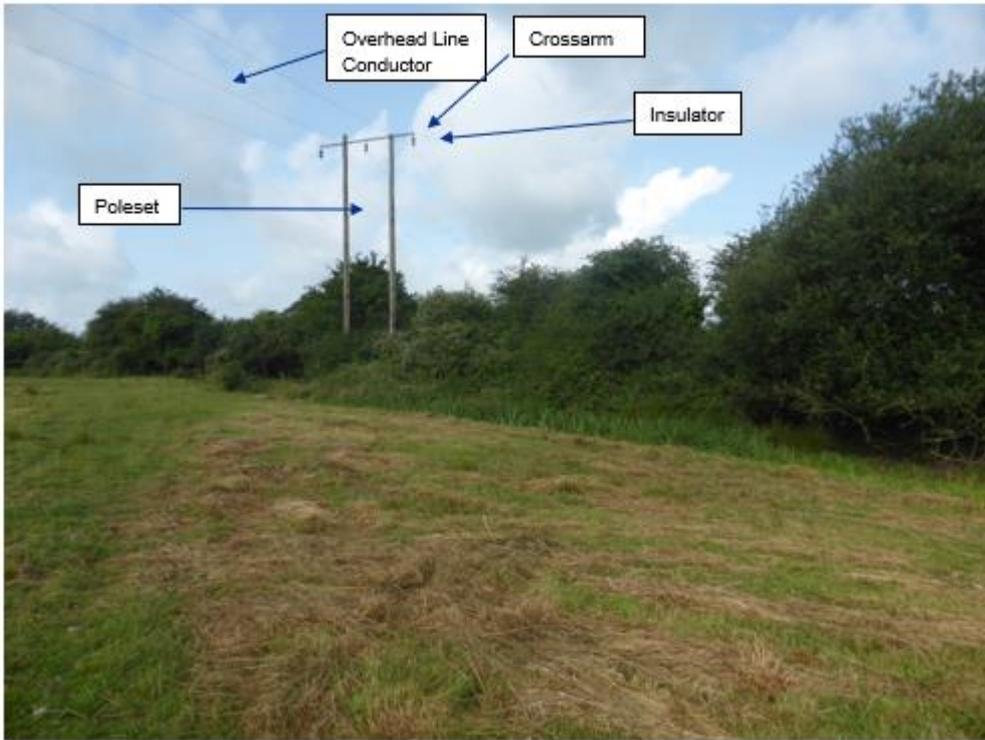


Image 4.23: Existing 38 kV Single-Circuit Overhead Line and Intermediate Wooden Poleset Structure

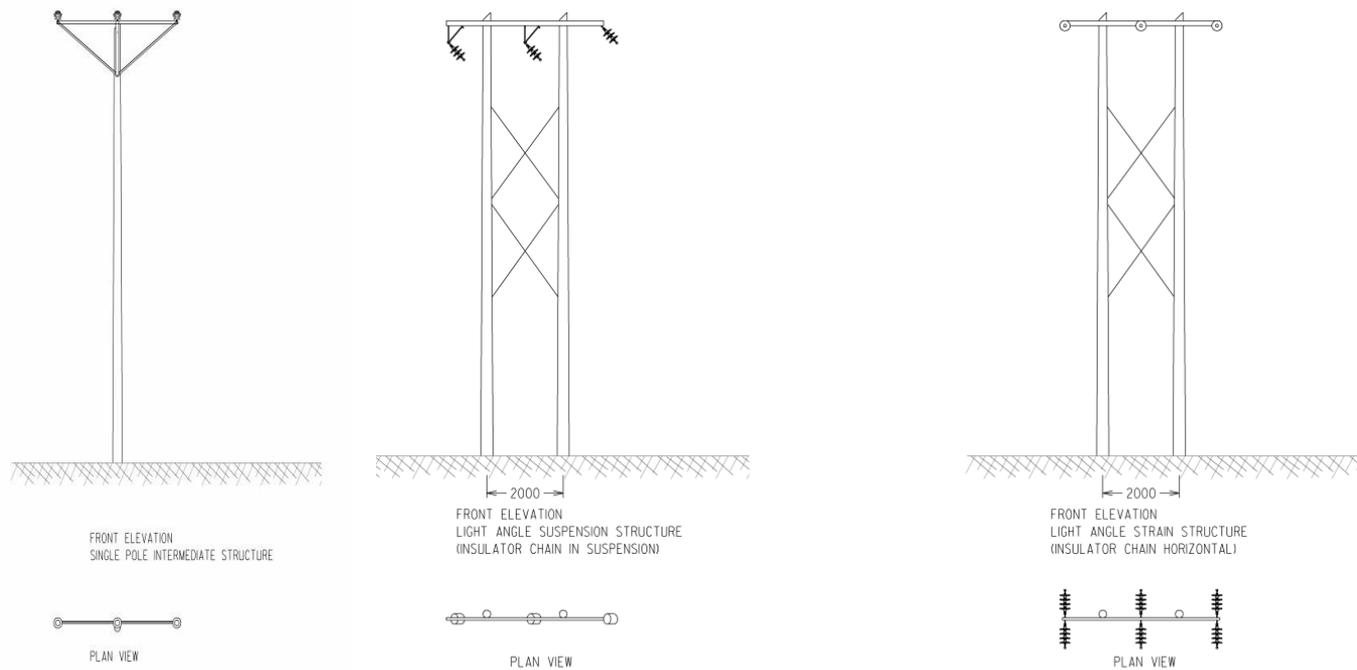


Image 4.24: Typical 38 kV Structures

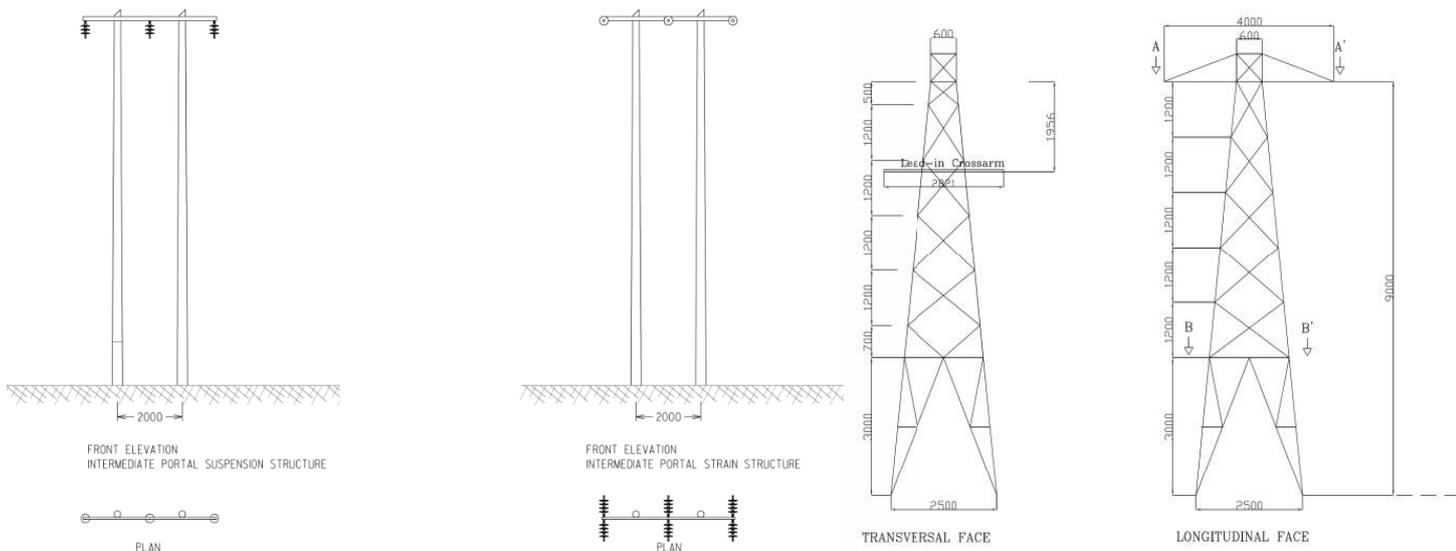


Image 4.25: Typical 38 kV Structures (contd.)

574. The current Ardnacrusha – Birdhill Line is strung with 50mm² copper conductor while the Ardnacrusha – Birdhill – Nenagh Line is strung with a 92mm² Aluminium Conductor Steel Reinforced (ACSR) conductor. It is proposed that both these overhead conductor types would be replaced by new 150mm² All Aluminium Alloy Conductors (AAAC). The equivalent AAAC have approximately the same ampacity and strength as their ACSR counterparts with a much-improved strength-to-weight ratio, and also exhibit substantially better electrical loss characteristics than their equivalent ACSR constructions. The thermal coefficient of expansion is also greater for AAAC than that of ACSR.

575. In order to meet the power requirements of the RWI&PS and WTP, certain structures, conductors and fittings need to be replaced, together with the installation of a double-circuit underground cable running from Birdhill Substation to the existing poleset 242.

4.14.3.1 Categorisation of the Proposed 38 kV Uprate Works

576. For the purpose of summarising the works to be carried out they have been separated into the works required at the existing 38 kV substation at Birdhill and then the works required on each of the lines. A description of the construction of the Proposed 38 kV Uprate Works is provided in Chapter 5 (Construction & Commissioning).

4.14.3.1.1 *Extension of Existing 38 kV Substation at Birdhill*

577. Works internal to the existing Birdhill 38 kV Substation would include the following:

- Site clearance and removal of existing poles and a portion of fencing
- One new 38 kV Gas Insulated Switchgear modular building, maximum 4.8m high and floor area of 28m²
- Provision of electrical plant and equipment, new poles and three 4m lighting poles
- All site works, including internal access road and new 2.6m high palisade fence
- Provision of all site services including drainage.

4.14.3.1.2 *Ardnacrusha – Birdhill 38 kV Line Uprate*

578. The Proposed 38 kV Uprate Works on the Ardnacrusha – Birdhill 38 kV Line would commence at existing poleset 6B and terminate at Birdhill Substation.

579. The works would involve the following:

- Fittings replacement – this would involve removing existing fittings and then installing new fittings. These include smaller-scale items such as brackets, insulators and clamps. This would generally be required at all polesets as the existing fittings are not suitable to carry the new 150mm² AAAC conductor
- Replace crossarm and fittings – this would involve removing crossarm and fittings and then installing new crossarm and fittings. This would generally be required at all polesets as the existing fittings are not suitable to carry the new 150mm² AAAC conductor
- Replace intermediate poleset structures – this would involve removing all associated fittings and stays, and cutting and removing the poles, then installing new poles, stays, crossarm and fittings. The replacement polesets would be located immediately adjacent to the existing polesets
- Replace angle structures – this would involve removing the structure and all associated fittings, then constructing the new structure and installing fittings. The replacement angle structures would be located immediately adjacent to the existing angle structures
- Replacing the conductor – this would involve re-stringing by pulling the conductor between the angle masts across the entire line
- Mid-span conductor joint installation at the stringing location.

580. Currently, there are a total of 110 structures on the Ardnacrusha – Birdhill Line. For this line, 14 replacement polesets would be required together with one new replacement tower. Replacement polesets would be located immediately adjacent to existing polesets. Once installed, the existing poleset would be removed. Figure 4.73 to Figure 4.80 provide an overview of all replacement structures and locations of all polesets where works such as crossarm and fitting replacements would take place.

581. Crossings for the 38 kV Uprate Works are shown in Table 4.22. This includes the crossings required by the associated power connections that link form the 38kV uprate Works to the RWI&PS and WTP. The details of the associated connections are described in Sections 4.4.8 and 4.6.8.

Table 4.22: 38kV Uprate Works and Associated Power Connection Crossings

Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Gas	PSN GCN 001	Ardnacrusa – Birdhill (northern line)	Proposed 38kV Uprate Works	Figure 4.2	
Gas	PSN GCN 002	Ardnacrusa – Birdhill (northern line)	Proposed 38kV Uprate Works	Figure 4.2	
Power	OHX023	Ardnacrusa – Birdhill – Nenagh Line (Southern Line)	Underground cable connection point for line upgrade	Figure 4.6	
Road	PSN RDX 003	R465	Proposed 38kV Uprate Works	Figure 4.2	
Road	PSN RDX 005	R471	Proposed 38kV Uprate Works	Figure 4.3	
Road	PSN RDX 007	R463	Proposed 38kV Uprate Works	Figure 4.4	
Road	PSN RDX 009	R525	Proposed 38kV Uprate Works	Figure 4.4	
Road	PSN RDX 010	R466	Proposed 38kV Uprate Works	Figure 4.5	
Road	RDX117	R445	Power connection at roundabout	Figure 4.6	
Road	RDX118	Birdhill roundabout	Birdhill roundabout	Figure 4.6	
Road	RDX119	Birdhill roundabout	Birdhill roundabout	Figure 4.6	
Road	RDX121	R445	Power connection at interface of R445 and WTP access road	Figure 4.7	
Road	RDX120	R494	RWI&PS power connection	Figure 4.7	
Gas	GCN 001	Birdhill roundabout	WTP power connection	Figure 4.6	
Gas	GCN 002	Birdhill roundabout	RWI&PS power connection	Figure 4.6	
Gas	GCN 003	Birdhill roundabout	WTP power connection	Figure 4.6	
Rail	PSN RYX001	Limerick – Ballybrophy railway line	Proposed 38kV Uprate Works	Figure 4.6	
Rail	RYX 003	Limerick via Nenagh railway line	RWI&PS power connection	Figure 4.6	
Rail	RYX004	Railway – Limerick via Nenagh Service	WTP power connection	Figure 4.7	
Water	WCX001	Kilmastulla	Power connection along R445	Figure 4.7	
Water	WCX 077	Kilmastulla	RWI&PS power connection	Figure 4.7	
Gas	GCN 004	New power connection	RWI&PS power connection	Figure 4.7	
Gas	GCN 005	New power connection	RWI&PS power connection	Figure 4.7	
Gas	GCN 006	R445	WTP power connection	Figure 4.7	

Crossing Type	Crossing ID	Crossing Reference	Approximate Chainage	Figure	Symbol
Gas	GCN 012	R494	RWI&PS power connection	Figure 4.7	

4.14.3.1.3 Ardnacrusha – Birdhill – Nenagh 38 kV Line Cabling Works

582. For the Ardnacrusha – Birdhill – Nenagh Line, a section of the line currently located on the eastern side of the R494 would be undergrounded. This would involve the retirement and removal of 10 existing polesets and one tower and the provision of a twin 38 kV underground cable running from Birdhill Substation to the existing poleset 242. Figure 4.80 shows the sections of line to be retired and where underground cabling is proposed.

583. This work would result in a minor reconfiguration of the current Ardnacrusha – Birdhill – Nenagh Line. Due to the retirement of the existing polesets along the R494 and the provision of a twin 38 kV underground cable, a second Ardnacrusha – Birdhill circuit would be created. The twin 38 kV underground cable would also form a new Birdhill – Nenagh circuit.

4.14.4 Summary of the 38 kV Uprate Works

584. Table 4.23 provides a summary of the Proposed 38 kV Uprate Works.

Table 4.23: Summary of Proposed 38 kV Uprate Works

Proposed Uprate Works	Number of Structures
Ardnacrusha – Birdhill Line (Northern Line)	
Polesets/structures to be replaced/uprated	15
Replacement of fittings and conductor	110
Polesets located in SAC (number to be replaced)	3(0)
Ardnacrusha – Birdhill – Nenagh Line (Southern Line)	
Structures to be removed and replaced with underground section	11

585. Appendix A4.3 provides details on the work that would be carried out at each poleset/tower, where new polesets would be required and where polesets/towers would be retired and replaced by underground cables.

4.14.5 Operation and Maintenance

586. The Proposed 38 kV Uprate Works are works to the existing electricity network and so would become part of the main network operated and maintained by ESB Networks in accordance with its standard operational practices.

587. There would be no permanent access routes constructed for the 38 kV Uprate Works. Future access will be under ESB Network’s existing wayleaves.

4.15 Operation and Maintenance

588. A pipeline conveying treated water would operate for many years with little more than routine maintenance of the various valves. All valves would be exercised regularly to check satisfactory operation. A permanent dedicated team would look after the Treated Water Pipeline from the WTP to the BPT and Treated Water Pipeline from the BPT to the TPR, checking all valves at least every six months.

589. Appendix A4.1 (Operational Strategy) provides further details of the operation and maintenance of the Treated Water Pipeline from the WTP to the BPT and Treated Water Pipeline from the BPT to the TPR.

4.15.1 Operational Management of Water Levels at Parteen Basin

590. ESB manages water levels on Lough Derg and controls the water levels on Parteen Basin by diverting water to Ardnacrusha power station for the production of zero carbon electricity, and by opening gates at Parteen Weir to release water down the old course of the River Shannon.
591. Parteen Basin is a small reservoir, built with earthen Embankment Dams along the south-western and south-eastern perimeter. It is fed from Lough Derg through the narrow river channel at Killaloe. ESB must ensure that the water levels at Parteen Basin do not exceed the maximum or minimum safety levels of those earthen Embankment Dams to avoid the risk of damage to the Dams.
592. ESB controls the water levels in Parteen Basin by closely matching the amount of water taken by Ardnacrusha and the Old River Shannon with the amount of water flowing into Parteen Basin each day.
593. The water levels on Lough Derg are managed within a Normal Operating Band 460mm (18 inches approximately) in depth, across a wide range of flows. It should be noted that 100mm of this operating band is usually reserved for emergency electricity generation and therefore, ESB seek to keep the water level within a 360mm range, above 30.50mAOD Malin Head (33.20mAOD Poolbeg).
594. At present, the normal water level on Lough Derg and on Parteen Basin is managed to be between the following limits:
- Parteen Basin: Upper level 30.86mOD Malin Head (33.56mAOD Poolbeg). Lower level: 30.00mAOD Malin Head (32.70mAOD Poolbeg)
 - Lough Derg: Upper level 30.86mAOD Malin Head (33.56mOD Poolbeg). Lower level: 30.40mAOD Malin Head (33.10mAOD Poolbeg).
595. Parteen Weir acts as the downstream control structure for water levels in the system. Water levels in Parteen Basin are maintained within the upper and lower levels at all times. During low flow conditions, the lower water level at Parteen Basin (30.0mAOD Malin), must be maintained for dam safety purposes and in doing this ESB ensures that water levels in Lough Derg are within the Normal Operating Band as the waterbodies broadly operate as a combined system, in these conditions.
596. ESB also continually discharges a statutory flow of 10m³/s down the Old River Shannon. By selecting how many turbines are in operation each day, ESB can set how much water is diverted from Parteen Basin to the station daily. To generate its full electrical output, each hydro turbine at Ardnacrusha takes approximately 100m³/s (100 cubic metres per second or tonnes of water per second). With its four turbines at full output, Ardnacrusha can take a flow of up to 400m³/s.
597. When the inflow from Lough Derg into Parteen Basin is higher than 400m³/s, ESB must ensure that the extra water is discharged down the Old River Shannon to prevent the water level in Parteen Basin exceeding 30.86mAOD Malin Head (33.56mAOD Poolbeg / 32.70mAOD Poolbeg). Gates at Parteen Weir are opened gradually to release the excess water to the old course of the River Shannon, to safely pass the excess inflow and return water levels to within the Normal Operating Band.
598. When the inflow from Lough Derg into Parteen Basin is less than 400m³/s, ESB keeps the water level within its Normal Operating Band by controlling how much water passes through the turbines. Using this control of water levels ESB's general practice is to maintain levels at the lower end of the Normal Operating Band in late autumn, in anticipation of higher inflow conditions across autumn and winter.
599. As winter comes to an end, ESB monitors the falling inflows along the length of the River Shannon before cutting back electricity generation in late spring with the general aim to retain water towards the upper end of the Normal Operating Band and to keep it in the upper end of the band through the summer. This is to enable sufficient water for the continual release, (if there is a dry summer), of the statutory flow of

10m³/s down the Old River Shannon alongside further electricity generation, if the inflows rise due to summer rainfall.

600. There are often periods of wet weather in the summer when inflows into Lough Derg will rise and increase the level at Lough Derg. As the inflows from Lough Derg arrives at Parteen Basin, ESB takes that additional water to increase generation at Ardnacrusha (up to 400m³/s). Once the flood flows in the river have passed and the more typical summer flows resume, ESB will normally return to managing water levels in Lough Derg towards the upper end of its Normal Operating Band.
601. In broad scale terms, approximately 90%–95% of the long-term average annual flow in the River Shannon at Parteen Weir (which is approximately 180m³/s), is directed through Ardnacrusha, with the minimum statutory compensation water flow of 10m³/s directed to the lower Shannon at Parteen Weir.
602. The proposed abstraction from the River Shannon would be located on the eastern shore of Parteen Basin, in the townland of Garrynatineel, approximately 3.3km north-east of the Parteen Weir. It is proposed to abstract up to a maximum of 3.47m³/s from Parteen Basin. This represents the projected peak deficit in a drought period, in 2050. Abstraction rates would vary during normal operation up to this maximum; however, more typical abstraction rates would be represented by the average deficit which is projected to be equivalent to 1.78m³/s in 2050.
603. At the maximum rate of abstraction the proposed abstraction of water would equate to a small fraction (approximately 2%) of the long term annual average flow through Parteen Basin.
604. The proposed abstraction of water is in essence, an abstraction from water normally used in the hydro-power plant, using the same existing water level controls, and therefore avoiding having to construct a new impoundment.
605. ESB will continue to maintain water levels as it does today, within its Normal Operating Band and therefore, ESB will facilitate the proposed abstraction of water by the Proposed Project within its current operating practices. 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. However, the operation of Lough Derg, post works, will feel and look very similar to the way it currently operates, and there will not be a visible day to day difference.
606. The minimum statutory compensation water of 10m³/s passed through Parteen Weir into the 'Old Shannon River' will remain unchanged and undiminished under this proposal. Navigation and beneficial uses focused on tourism will experience the same operating water level range as normal.

4.15.2 Control Philosophy

607. The Control Philosophy refers to how the flow of water through the pipeline would be controlled. This would effectively be done using a Set Point Flow (SPF) which determines the volume of water moving through the pipeline.

608. Uisce Éireann would predict the required daily output from the Proposed Project based on a forecast up to a week in advance. Relatively minor adjustments or refinements to the forecast would be made 12 hours in advance. The required output of water determines the SPF for a given day.
609. The Proposed Project output would then be controlled from the WTP; however, the level in the BPT would be the active control level for the entire pipeline. The control systems main task would be to keep this level constant.
610. Between the RWI&PS and the WTP, the WTP would control the rate of abstraction and pumping at the RWI&PS and the treatment process at the WTP in order to provide the required SPF into the CWSTs at the WTP.
611. The flow between the WTP to the BPT, and then further east would be controlled by the rate of pumping at the HLPS which would also operate at the given SPF (although independently from the WTP, i.e. not trying to match the WTP usual minor fluctuations minor which would be managed using the operating range of the CWSTs). Therefore, the HLPS would pump the SPF to the BPT.
612. From the BPT to the TPR the flow in the pipeline and the level in the BPT would still be influenced by the rate of pumping from the HLPS but would be controlled by very fine adjustments to the opening of the FCV.
613. The BPS, when required at higher SPF rates, merely acts as an input of energy to allow flows greater than the maximum gravity flow to be achieved. The BPS pumps would not be able to control flow as precisely as the FCV. Therefore, the BPS would simply be set at the most efficient rate of pumping for the SPF within a given flow control band.
614. There would be no level control on the TPR, (other than automatic shutdown of the flows from the BPT in the event of a high-high level alarm), it merely receives water at the SPF rate. It is expected that the TPR level would follow a typical diurnal pattern of dropping during the day and recovering at night.
615. The SPF can be altered at any time but the following needs to then happen:
- The WTP needs to adjust the abstraction, RWI&PS and WTP output to match the new set point
 - While this is happening the HLPS can be made to match the new SPF
 - The FCV would then notice the change in level in the BPT and adjust to match.
616. The time taken for the flow change to be seen from the HLPS to the TPR may be several minutes and the flow control loop would be set up accordingly to avoid pulsing and uncontrolled transients in the pipeline. The pressure transducers at every Line Valve would help in monitoring that stable conditions have been established.
617. In the event of a shutdown of the high lift pumps at the HLPS, then the flow to the TPR would have to be stopped to prevent the pipeline from draining. The communications to each of the valves to achieve this would be via the telemetry system.

4.15.3 System Control

618. The system control refers to how the system would be operated.
619. The overall pipeline system control would be from the central SCADA control. This would be located within the Control Building at the WTP (Building 22 shown in Figure 4.63) and monitored at Uisce Éireann's National Operations Management Centre.

620. The system control philosophy is to default to 'shut down' in the event of a high-water level or overflow at the BPT or TPR, or in the event of a comms failure between the Infrastructure Sites. Similarly, if the RWI&PS or WTP experience difficulties a signal would be sent to the BPT, TPR and BPS (as necessary) to shut down, to ensure the system remains primed. Further details of the system control are provided in Appendix A4.1 (Operational Strategy).
621. A controlled shut down of the pipeline from full gravity flow would take around 15 minutes after which the control system would prevent a restart attempt for up to 30 minutes to allow transient pressures to settle in the pipelines.
622. The shut down sequence from full pumped flow would take around 18.5 minutes after which the control system would prevent a restart attempt for up to 30 minutes to allow transient pressures to settle in the pipelines.
623. All critical systems would be provided with an uninterruptible power supply, with a battery back-up, to allow safe control, monitoring and shut-down in the event of power failure.
624. The SCADA system would monitor and/or control all critical system activities, including the following elements:
- RWI&PS – Parteen Basin levels, valve opening status, and pump voltages, currents, flow rates, suction and delivery pressures
 - HLPS – valve opening status, and pump voltages, currents, flow rates, suction and delivery pressures, surge system status
 - BPT – water levels and position status of inlet and outlet valves for each cell, and flow measurement
 - BPS – valve opening status, and pump voltages, currents, flow rates, suction and delivery pressures
 - FCV – valve opening status, flow rate and pressures
 - TPR – water levels, status of inlet and outlet valves for each cell, and flow measurement
 - Line Valves – valve position status
 - Pressure monitoring – in-line pressure monitoring at regular intervals along the Treated Water Pipeline from the WTP to the BPT and Treated Water Pipeline from the BPT to the TPR at Line Valve locations
 - Impressed-current Cathodic Protection system – voltage, current, status
 - Closed-circuit television cameras – security at critical locations, such as RWI&PS, WTP, BPT, BPS, FCV and TPR entrance gate and boundaries. These would be 6m high above finished ground level
 - Tamper alarms on all Line Valve kiosks – to alert the operators at the WTP of unauthorised access
 - Uninterruptible power supply status on all critical systems.
625. Communications between the various Infrastructure Sites and the Line Valve sites would be via a telemetry system designed in line with Uisce Éireann's Telemetry Communications Strategy (Irish Water 2019) and would be a combination of the following:
- Digital radio (point to multipoint) – This is the preferred method of communications selected for the Infrastructure Sites and the actuated Line Valves, where the location is within the reach of the nearest digital radio backhaul site
 - If digital radio is not suitable then 4G cellular would be used, provided that a signal strength of 'good' or better is available at the location with a 4G provider (suitable to Uisce Éireann)

- If digital radio is unavailable and there is not a suitable 4G signal strength, then a satellite connection would be provided.

4.15.4 Energy

626. Uisce Éireann is committed to designing, building and operating assets to ensure energy efficiency. The plant, equipment, building and systems associated with the Proposed Project would be designed, equipped, operated and maintained in such a manner as to ensure a high level of energy performance and that energy is used efficiently.

4.15.4.1 Energy Efficient Design

627. The need for pumping cannot be avoided due to the topography between the River Shannon and Dublin. However, by specifying high-efficiency pumps and motors, and the use of variable speed drives for both the HLPS and BPS, energy use would be optimised for the required water demand.

628. The proposed design of the treatment process is a conventional process of coagulation/flocculation followed by clarification, filtration and disinfection. Each element of the process has been sized in accordance with Uisce Éireann’s WTP design guidelines (IW-TEC-900 series).

629. The recirculation of process wastewaters to the RWBTs at the WTP would reduce the volumes of raw water that would otherwise need to be delivered to the WTP and consequently reduce the energy consumption of the RWI&PS, by approximately 5%.

4.15.4.2 Energy Demand

630. An energy demand assessment has been performed with consideration to the local ESB electricity distribution network in the areas relating to supply to the proposed RWI&PS, WTP, BPT, BPS, FCV and TPR.

631. The assessment has also been carried out with consideration to the wider electricity network and the ability of the system operator to ensure that supply meets demand. The baseline environment considered is based on the latest figures available in the All-Island Generation Capacity Statement 2023–2032 (EirGrid 2024).

4.15.4.2.1 Energy Demand Summary

632. The total annual average power consumption is summarised in Table 4.24.

Table 4.24: Annual Average Power Consumption in 2050 at a Typical Operational Flow of 154Mld

Site	Approximate Average Daily Consumption in 2050 (kWh/day)	Approximate Annual Average Consumption in 2050 (MWh/annum)
RWI&PS	26,946	9,835
WTP	132,975	48,536
BPT	1,496	546
BPS	463	169
TPR	1,232	450
FCV	188	69
Total	163,300	59,605

4.15.5 Operational Staffing

633. When fully developed and operational, it is expected that the following staffing would be required to operate and maintain the WTP and the RWI&PS as set out in Table 4.25. Staff numbers are presented as indicative full time equivalent personnel.

Table 4.25: Operational Staff Numbers to Operate the Water Treatment Plant and Raw Water Intake and Pumping Station (Based at the Water Treatment Plant)

Staff	No.
Plant Manager	1
Maintenance Manager	1
Control Room Operatives	6
Electrical Technicians	3
Mechanical Technicians	6
Control Room Technicians	6
General Operatives	9

634. Staffing for the operation of the Treated Water Pipeline would be small compared to the staffing levels required for the WTP and RWI&PS. It is however expected there would be a small team to look after the pipeline valves, BPT, BPS and FCV as set out in Table 4.26.

Table 4.26: Operational Staff Numbers to Maintain the Treated Water Pipelines, Break Pressure Tank, Booster Pumping Station and Flow Control Valve

Staff	No.
Pipeline Supervisor	1
Pipeline Operatives	4
Mechanical, Electrical, Instrumentation, Control and Automation Staff	1

635. The staff of the Treated Water Pipelines would likely be based at Uisce Éireann depots convenient to the pipeline route.

636. The pipeline route would be traversed and all valves, outfall structures and storages would be inspected at six-monthly intervals to check security, valve operation and to ensure no leaks are apparent. These would be planned activities and would be carried out with the prior knowledge of the landowner. The inspection would be carried out in a small van and on foot with access to land being co-ordinated with landowners.

637. There is an existing reservoir facility at Peamount, as referenced in Section 4.12, and it is envisaged that the staff currently managing that site would also be responsible for the proposed TPR, i.e. additional staff would not be required at this location.

4.16 Construction (Including Commissioning)

638. Chapter 5 (Construction & Commissioning) outlines the principal construction activities that are required to complete the Proposed Project, and includes details of the methods, enabling works, and activities required to undertake the construction, such as Construction Compounds, Pipe Storage Depot areas, Haul Roads, hours of working, material quantities, and numbers of personnel involved.

639. In addition to setting out the proposed construction works, Chapter 5 (Construction & Commissioning) includes details on commissioning works necessary for ensuring that systems and components meet the operational requirements for service.

4.17 Decommissioning

640. 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.

4.18 Environmental Design and Mitigation

641. The Proposed Project design has been an iterative process which has considered the likely significant effects on environmental receptors. The first option in mitigating any effect is to seek design measures that would enable the effect to be avoided or, if this is not possible, reduced. This is referred to as embedded mitigation and includes measures such as changing the pipeline horizontal and vertical alignment, reducing the temporary and permanent footprint of the Proposed Project, and altering construction methods.

642. Environmental considerations that have influenced the option development and selection process, and Proposed Project design, are set out in Chapter 3 (Consideration of Reasonable Alternatives).

643. Embedded mitigation designed as part of the Proposed Project has been described in this chapter, under the descriptions above and in Section 4.1.

644. Mitigation that is integral to the construction process, such as the siting of Construction Compounds, construction methods, and timing of activities (e.g. only reinstating land in suitable weather conditions), is included in Chapter 5 (Construction & Commissioning).

645. Further information on embedded mitigation, relevant to specific topic assessments, is provided in Chapters 6 to 20 of the EIAR.

646. It is not always possible to design out environmental effects. As such, it is necessary to develop additional, specific mitigation measures to reduce or offset effects, and to include land within the Proposed Project Planning Application Boundary to deliver these measures. An example of permanent environmental mitigation measures that have been developed for the Proposed Project is biodiversity habitat creation.

647. More details on specific mitigation for each environmental topic are provided in Chapters 6 to 20 of the EIAR.

648. An Environmental Masterplan has been produced which shows the Proposed Project design and areas within the Planning Application Boundary reserved for environmental mitigation, including habitat planting and reinstatement. This is included in Figure 4.106 to Figure 4.184 of the EIAR. The mitigation measures shown in the Environmental Masterplan have been factored into the assessment of likely significant effects presented in the EIAR topic chapters (Chapters 6 to 20).

4.19 References

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