Tionscadal Soláthair Uisce
Water Supply Project

# Environmental Impact Assessment Report (EIAR)

## Volume 3 of 6: Environmental Assessment

### (Chapter 9) Water

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Irish Water

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TOBIN

# Contents

## Acronyms and Abbreviations

| Acronym | Meaning |
|---|---|
| AFA | Areas for Action |
| ASSAP | Agricultural Sustainability Support and Advisory Programme |
| BPS | Booster Pumping Station |
| BPT | Break Pressure Tank |
| CC | Construction Compound |
| CEMP | Construction Environmental Management Plan |
| CIRIA | Construction Industry Research and Information Association |
| CSWMP | Construction Surface Water Management Plan |
| CWT | Clear Water Tanks |
| DHLGH | Department of Housing, Local Government and Heritage |
| DMRB | Design Manual for Roads and Bridges |
| DWPA | Drinking Water Protected Area |
| EC | European Commission |
| EDEN | Environmental Data Exchange Network |
| Eflows | Environmental flows |
| EIA | Environmental Impact Assessment |
| EIAR | Environmental Impact Assessment Report |
| EIP | European Innovation Partnership |
| EIS | Environmental Impact Statement |
| EPA | Environmental Protection Agency |
| ESB | Electricity Supply Board |
| EU | European Union |
| FCV | Flow Control Valve |
| FRA | Flood Risk Assessment |
| GDA WRZ | Greater Dublin Area Water Resource Zone |
| HLPS | High Lift Pumping Station |
| HMWB | Heavily Modified Water Body |
| IFI | Inland Fisheries Ireland |
| IHO | International Hydrographic Organization |
| LAWPRO | Local Authorities Waters Programme |
| M&E | mechanical and electrical |
| mAOD | metres Above Ordnance Datum |
| Ml/d | Million litres per day |
| NAIP | National Agricultural Inspection Programme |
| NHA | Natural Heritage Area |
| NIS | Natura Impact Statement |
| NOB | Normal Operating Band |

| Acronym | Meaning |
|---|---|
| NPWS | National Parks and Wildlife Service |
| NRA | National Roads Authority |
| NWRP | National Water Resources Plan |
| OPW | Office of Public Works |
| ORS | Old River Shannon |
| PSD | Pipe Storage Depot |
| QMED | median flow |
| RBMP | River Basin Management Plan |
| RWI&PS | Raw Water Intake and Pumping Station |
| RWRMs | Raw Water Rising Mains |
| SAC | Special Area of Conservation |
| SC | sub-catchment |
| SPA | Special Protection Area |
| SuDS | Sustainable Drainage System |
| SWMP | Surface Water Management Plan |
| TII | Transport Infrastructure Ireland |
| TPR | Termination Point Reservoir |
| UV | Ultraviolet |
| UKTAG | UK Technical Advisory Group |
| WFD | Water Framework Directive |
| WTP | Water Treatment Plant |

# 9. Water

## 9.1 Introduction

1. This chapter assesses the likely significant effects of the Proposed Project on water bodies during the Construction and Operational Phases, in accordance with the requirements of the Environmental Impact Assessment (EIA) Directive.

2. For the purposes of this assessment, a water body is any Water Framework Directive (WFD) designated water body, or Other Waterbody (including ponds and lakes), affected by the Construction, Testing and Commissioning or Operational Phase of the Proposed Project, as defined by the study areas set out for each element of the Proposed Project.

3. The Proposed Project would deliver nationally important strategic infrastructure with individual elements designed with a lifespan of 80 to 100 years. The strategic importance of the Proposed Project for water supply in the Eastern and Midlands Region is such that there is no plan to decommission these structures and Uisce Éireann is committed to maintaining and repairing them into the future. On this basis it is not likely that the structures will be decommissioned and therefore, decommissioning of the Proposed Project has not been considered further in this assessment.

4. This chapter sets out the methodology used, describes the existing environment, examines the likely significant effects of the Proposed Project, proposes mitigation measures and identifies any residual effects post-mitigation. The assessment has been conducted in accordance with current relevant standards and guidance.

5. The assessment reported in this chapter has considered the mitigation that has been embedded into the design to avoid or reduce environmental effects. Embedded mitigation is an intrinsic part of the Proposed Project design and therefore the assessment of effects assumes all embedded design measures are in place. Embedded mitigation relevant to this topic is included in Section 9.4.

6. Table 9.1 outlines the principal Proposed Project elements. A full description is provided in Chapter 4 (Proposed Project Description) of this Environmental Impact Assessment Report (EIAR).

**Table 9.1: 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 | • The RWI&PS would be located on a permanent site of approximately 4ha on the eastern shore of Parteen Basin in the townland of Garrynatineel, County Tipperary. In addition, approximately 1ha of land would be required on a temporary basis during construction.<br>• 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.<br>• 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.<br>• Power for the RWI&PS would be supplied via an underground connection to the existing Birdhill 38 kV electricity substation.<br>• 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.<br>• 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. |

| Proposed Project Infrastructure | Outline Description of Proposed Project Infrastructure* |
|---|---|
| Raw Water Rising Mains (RWRMs)<br>(Pipeline)<br>County Tipperary | • 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.<br>• 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.<br>• The RWRMs would include Line Valves, a Lay-By, Air Valves and Cathodic Protection.<br>• A 20m wide Permanent Wayleave would provide Uisce Éireann with operational access to the RWRMs. |
| Water Treatment Plant (WTP)<br>(Infrastructure Site)<br>County Tipperary | • 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.<br>• 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.<br>• 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.<br>• There would also be a potential future water supply connection point at the junction between the permanent access road and the R445.<br>• 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.<br>• A new permanent access road from the R445 would be constructed and would be 6m in width and 640m in length.<br>• 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. |
| Treated Water Pipeline from the WTP to the BPT<br>(Pipeline)<br>County Tipperary | • 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.<br>• The Treated Water Pipeline would include Line Valves, Washout Valves, Air Valves, Manways, Cathodic Protection and Lay-Bys.<br>• 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. |

| Proposed Project Infrastructure | Outline Description of Proposed Project Infrastructure* |
|---|---|
| Break Pressure Tank (BPT)<br>(Infrastructure Site)<br>County Tipperary | • 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.<br>• 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.<br>• 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.<br>• 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.<br>• 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.<br>• 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. |
| Treated Water Pipeline from the BPT to the TPR<br>(Pipeline)<br>Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council) | • The Treated Water Pipeline from the BPT to the TPR would consist of a single 1,600mm underground steel pipeline, approximately 133km long.<br>• 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.<br>• The Treated Water Pipeline would include Line Valves, Washout Valves, Air Valves, Manways, Cathodic Protection, Lay-Bys and potential future connection points.<br>• 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. |
| Booster Pumping Station (BPS)<br>(Infrastructure Site)<br>County Offaly | • 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.<br>• The BPS would be required when the demand for water causes the flow through the pipeline to exceed approximately 165Mld.<br>• 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.<br>• 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.<br>• The site would be accessed directly from the L3003.<br>• 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* |
|---|---|
| Flow Control Valve (FCV)<br>(Infrastructure Site)<br>County Kildare | • 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.<br>• 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.<br>• Access to the FCV site would be directly off the L1016 Commons Road Upper.<br>• 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.<br>• 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.<br>• The site boundary would be fenced with a stock proof fence and a 2.4m high palisade security fence 5m inside the boundary. |
| Termination Point Reservoir (TPR)<br>(Infrastructure Site)<br>County Dublin (within the administrative area of South Dublin County Council) | • 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.<br>• 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).<br>• 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.<br>• 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.<br>• A new permanent access road from the R120 would be constructed and would be 5m wide and 342m in length.<br>• 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** | |
| Proposed 38 kV Uprate Works<br>Ardnacrusha – Birdhill<br>(Power Supply)<br>Counties Clare, Limerick and Tipperary | • The proposed 38 kV Uprate Works would be necessary to deliver adequate electrical power to the RWI&PS and WTP.<br>• 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.<br>• There would also be works at the existing Birdhill 38 kV electricity substation including the provision of a new 38 kV modular Gas Insulated Switchgear Modular Building, new electrical equipment and lighting, together with new fencing and associated works. |
| **Temporary Infrastructure – Required for Construction Phase Only** | |
| Construction Working Width<br>Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council) | • 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.<br>• 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<br>Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council) | • 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.<br>• The Principal Construction Compound at the WTP would require 30ha of land during construction.<br>• The other three Principal Construction Compounds would require land temporarily during construction ranging between approximately 12ha and 16ha.<br>• 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<br>Counties Tipperary, Offaly and Kildare | • 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.<br>• Pipe Storage Depots would take direct delivery of the pipe for storage before onward journey to the required location along the Construction Working Width.<br>• 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.

7. The assessment considers three attributes of each water body as listed in Appendix A9.5 (Baseline) – hydrology and surface water quality, hydromorphology, and surface water supply – to determine the significance of the effect on the receptor.

8. The assessment of the Proposed Project has been divided into three parts, the findings of which are presented in three technical appendices:

   - Appendix A9.1 (Abstraction Assessment) includes an assessment of the likely significant effects of the Operational Phase of the Proposed Project on water bodies with respect to the proposed abstraction of water from the Lower River Shannon catchment. There are no Construction Phase effects associated with this element of the Proposed Project
   - Appendix A9.2 (Pipeline Assessment) includes an assessment of the Treated Water Pipeline during the Construction and Operational Phases, including an assessment of watercourse crossings; dewatering during construction; Construction Compounds and Pipe Storage Depots; and draindown during the Operational Phase
   - Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment) includes an assessment of both the Construction and Operational Phases of each of the Infrastructure Sites and the Proposed 38 kV Uprate Works:
     - Proposed 38k V Uprate Works
     - Raw Water Intake and Pumping Station (RWI&PS)
     - Water Treatment Plant (WTP)
     - Break Pressure Tank (BPT)
     - Booster Pumping Station (BPS)
     - Flow Control Valve (FCV)
     - Termination Point Reservoir (TPR).

9. A summary of the key findings of these assessments is included in Section 9.4, proposed mitigation measures are included in Section 9.5 and residual effects are included in Section 9.6.

10. An assessment of the compliance of the Proposed Project with the objectives of the Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (the Water Framework Directive (WFD)) is provided in the accompanying Water Status Impact Assessment Report. This assessment incorporates the assessment and analysis from Appendices A9.1 to A9.3 of this chapter, Chapter 8 (Biodiversity), the Natura Impact Statement (NIS) and Chapter 10 (Soils, Geology & Hydrogeology).

11. Likely significant effects of flood risk and vulnerability of the Proposed Project to flood risk are provided in Appendix A9.4 (Flood Risk Assessment (FRA)).

12. The baseline conditions of all water bodies within the study area are presented in Appendix A9.5 (Baseline).

13. The laboratory results of samples taken to inform the baseline assessment of the study area are presented in Appendix A9.6 (Laboratory Analysis and In Situ Results).

14. The water quality monitoring information provided by the Environmental Protection Agency (EPA) is presented in Appendix A9.7 (EPA Monitoring Information).

15. This assessment has been undertaken and reported by a team of competent experts. Refer to Chapter 2 (The Environmental Impact Assessment Process) for a description of the qualifications and expertise of the specialists that have inputted to this chapter.

16. It should be noted that this chapter does not consider effects associated with groundwater. Chapter 10 (Soils, Geology and Hydrogeology) addresses these effects, including Groundwater flow, Groundwater quality and Groundwater Dependant Terrestrial Ecosystems. The transition between the two chapters is considered in context of groundwater-surface interactions. Dewatering of excavations is the Proposed Project activity that has the greater potential to affect such interactions.

## 9.2 Methodology

### 9.2.1 Study Area

17. The Proposed Project would abstract and pump raw water from the Derg HMWB (Heavily Modified Water Body), treat it at the WTP at nearby Birdhill and pump the treated water to the BPT at a high point near Cloughjordan. From there it would flow by gravity through the Midlands to the TPR at Peamount in South Dublin County, where it would connect into the existing Dublin water supply network. The BPS would be located in the townland of Coagh Upper, County Offaly, approximately 66km downstream from the BPT. The BPS is required when the demand for water causes the flow through the pipeline to exceed approximately 165Mld.

18. The study area for the Proposed Project encompasses all areas within the Planning Application Boundary with some extensions beyond, where appropriate. Each element of the Proposed Project has the potential for a different range of impacts on aspects of the surface water environment and so defined study areas have been considered for each.

19. The study areas have been defined in accordance with relevant guidance and professional judgement to identify potential source-pathway-receptor linkages and likely significant effects associated with the construction, testing and commissioning and operation of the Proposed Project.

20. These are detailed in the accompanying Appendix A9.1 (Abstraction Assessment), Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment) and are described in this section.

#### 9.2.1.1 Appendix A9.1 (Abstraction Assessment)

21. An overview of the River Shannon[1] to set the context for this study area is provided in A09.1 Figure 1 in Appendix A9.1. The upstream limit of the study area is Meelick Weir, which is located on the Shannon (Lower)_030 river water body, approximately 15km upstream of the Derg TN lake water body. It is operated by Waterways Ireland to maintain minimum navigation levels between Athlone and Meelick.

22. The Shannon (Lower)_030 river water body at Meelick is regulated by a long weir on the Main Channel. Navigation around this weir is managed via the Victoria Lock which is served by a side channel of Shannon (Lower)_030 river water body from the upstream side of Meelick Weir, returning to the main channel downstream where it converges with Incherky_010. Incherky_010 is crossed by a bridge at Corclough which also incorporates sluice gates at Clonahenoge. That channel is divided into smaller channels upstream which are fed by Shannon (Lower)_020. Examination of these points has shown that flow and water level at these locations are determined only by conditions upstream and not downstream.

23. There is free fall of water over Meelick Weir at medium and low flows, so changes to the water levels of Lough Derg (Derg TN) have no influence on water levels upstream of Meelick Weir. This therefore sets the upper limit of physical influence for water levels in Lough Derg (Derg TN) (i.e. it is not physically possible for water levels in Lough Derg (Derg TN), in low and medium flows, to influence water levels upstream of Meelick Weir). The 'downstream limit' of the study area is the confluence of the Shannon (Lower)_060 (Limerick Dock) and the Ardnacrusha Tailrace (North Ballycannan_010) at Limerick Dock. The diurnal tidal influence on water levels and flows at this point mean that any change in the Tailrace flow (the flow downstream of the Ardnacrusha Generating Station), resulting from a change in duration of flow through Ardnacrusha Generating Station, would be imperceptible in Limerick Dock at the confluence. Between the upstream and downstream limits, the study area includes a number of water bodies which are hydrologically connected to the Derg TN and the Derg HMWB lake water bodies (see A09.1 Figure 1 in Appendix A9.1). It should be noted that the Derg TN is hydrologically connected upstream of the Derg HMWB and they are effectively part of the same lake but are divided under the WFD.

#### 9.2.1.2 Appendix A9.2 (Pipeline Assessment)

24. Study areas have been defined for the following parameters for direct impacts using professional judgement:

    - Any water body crossed by the RWRMs and Treated Water Pipeline (see A09.2 Figure 1 to Figure 76 in Appendix A9.2)
    - Water bodies within 50m of the Construction Working Width
    - Any water body which would receive discharges from the proposed washouts unless already identified
    - Any water body within 50m of Construction Compounds and Pipe Storage Depots, unless already identified
    - Any water body within 50m of a road crossing for the RWRMs, Treated Water Pipelines, Construction Compounds, Pipe Storage Depots or associated access tracks.

25. The following study areas have been defined for indirect impacts:

    - Up to 5km downstream for hydrologically connected designated protected areas, e.g. Special Areas of Conservation (SACs)
    - Up to 5km downstream for connections to WFD designated water bodies where the receptor being directly impacted upon is an 'Other Waterbody'.

[1] The River Shannon includes Upper and Lower Shannon from Lough Allen to Limerick Dock. Shannon Upper becomes Shannon Lower just south of Shannonbridge, County Offaly.

#### 9.2.1.3 Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment)

26. The Proposed 38 kV Uprate Works are shown in A09.2 Figure 1 to Figure 5 in Appendix A9.2 and the Infrastructure Sites are shown on A09.3 Figure 5 to Figure 10 in Appendix A9.3. The Infrastructure Sites are geographically separate from each other.

27. The study area for the Proposed 38 kV Uprate Works is as follows:
    - Any water body crossed by the overhead lines
    - Water bodies within 50m of the Construction Working Width.

28. The study area for the Infrastructure Sites for direct impacts is defined as any water body within the 50m radius from the Planning Application Boundary.

### 9.2.2 Relevant Legislation, Policy and Guidance

29. The assessment has been undertaken in accordance with relevant legislation and with regard to best practice guidance (any references to legislation include any amendments thereto):

#### 9.2.2.1 Directives

- Directive (EU) 2020/2184 (formerly Directive 98/83/EC) on the quality of water intended for human consumption (recast) (the Drinking Water Directive)
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (the Water Framework Directive (WFD))
- Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU (The EIA Directive)
- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (The Birds Directive)
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive).

#### 9.2.2.2 Legislation

- Arterial Drainage Act 1945, as amended
- Arterial Drainage (Amendment) Act 1995, as amended
- The Local Government (Water Pollution) Act 1977, as amended
- The Local Government (Water Pollution) Regulations, 1978, as amended (S.I. No. 108/1978)
- Local Government (Water Pollution) Acts, 1977 and 1990 (Control of Edc, Tri, Per and Tcb Discharges) Regulations, 1994, as amended (S.I. No. 245/1994)
- European Union (Drinking Water) Regulations 2023, as amended (S.I. No 99/2023)
- European Communities (Water Policy) Regulations 2003, as amended (S.I. 722/2003)
- European Communities Environmental Objectives (Surface Water) Regulations 2009, as amended (S.I. No. 272/2009)
- European Communities (Arterial Drainage) Regulations 2009 (S.I. No 388/2009)
- European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended (S.I. No. 9/2010)
- European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293/1988)

- Urban Waste Water Treatment Regulations 2001, as amended (S.I. No. 254/2001)
- European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2023 (The WFD Regulations) (S.I. No. 410/2023)
- Safety, Health and Welfare at Work (Construction) Regulations 2013, as amended (S.I. No. 291/2013)
- European Communities (Assessment and Management of Flood Risks) (Amendment) Regulations 2015 (S.I. 495/2015)
- Regulation (EU) 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species (Invasive Alien Species Regulations)
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, as amended (S.I. No. 296/2018).

30. One of the main pieces of legislation for an assessment of the Proposed Project's impacts of water quality is the WFD. The WFD established a framework for the protection of both surface water bodies and groundwaters. It provides a vehicle for establishing a system to improve and/or maintain the quality of water bodies across the European Union. As set out above, compliance with the WFD is set out in the Water Status Impact Assessment Report accompanying this application.

31. There are a number of objectives under which the quality of water is protected, including the general protection of the aquatic ecology, specific protection of unique and valuable habitats, the protection of drinking water resources, and the protection of bathing water.

32. The WFD is transposed into Irish law by a number of pieces of legislation to regulate WFD characterisation, monitoring and status assessment programmes in terms of assigning responsibilities for the monitoring of different water categories, determining the quality elements and undertaking the characterisation and classification assessments.

33. In the absence of WFD compliance assessment guidance specific to Ireland, the assessment has been carried out in accordance with the UK Environment Agency's Clearing the Waters for All (updated 2023) (Environment Agency 2023) and the UK Planning Inspectorate's Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive (Planning Inspectorate 2024) for England and Wales as a basis for supporting appropriate assessment layout and methodology. The first one provides comprehensive guidance on scoping, protected areas and the fundamental parameters to assess, whereas the latter provides guidance on how to assess for a major infrastructure scheme. Other guidance for lakes is provided by UK Technical Advisory Group (UKTAG), which provides a steer on the metrics to assess. On this basis it is considered appropriate to use all as a basis for assessing the Proposed Project. This is supported by previous experience on similar schemes.

34. Consultation has been held with the EPA to determine the approach to the WFD for the Proposed Project.

#### 9.2.2.3 Guidance

35. This chapter has been completed in accordance with several guidance documents. These are listed below:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government 2018)
- Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532) (Construction Industry Research and Information Association (CIRIA) 2001)
- Control of Water Pollution from Linear Construction Projects: Technical Guidance (C648) (CIRIA 2006a)

- Control of Water Pollution from Linear Construction Projects: Site Guide (C649) (CIRIA 2006b)
- Environmental Good Practice on Site Guide (C811) (CIRIA 2023)
- Best Practice Guide BPGCS005 - Oil Storage Guidelines (Enterprise Ireland 2003)
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (National Roads Authority (NRA)[2] 2009)
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (NRA 2006)
- Guidelines for Planning Authorities 20: The Planning System and Flood Risk Management (Office of Public Works (OPW) and Department of Environment, Heritage and Local Government[3] 2009)
- Construction, Replacement or Alteration of Bridges and Culverts. A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945. Rev 201905-3 (OPW 2019)
- Drainage Systems for National Roads (DN-DNG-03022) (TII 2024)
- Road Drainage and the Water Environment (DN-DNG-03065) (TII 2015)
- Design Manual for Roads and Bridges (DMRB) LA 113 Road drainage and the water environment Revision 1 (Highways England *et al*. 2020)
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland (IFI) 2016)
- Stream Simulation: an ecological approach to providing passage for aquatic organisms at road-stream crossings (United States Forest Service 2008)
- Guidance. Water Framework Directive assessment: estuarine and coastal waters. Clearing the Waters for All (Environment Agency 2023)
- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Commission (EC) 2017)
- Guidelines on the Information to be contained in Environmental Impact Statement (EPA 2022a)
- Water Action Plan 2024: A River Basin Management Plan for Ireland (Department of Housing, Local Government and Heritage (DHLGH) 2024)
- Review of Ireland's Heavily Modified Water Body Designations for Third Cycle River Basin Management Plan (EPA 2022b).

### 9.2.3 Data Collection Methods

#### 9.2.3.1 Desktop Data Sources

36. A desk-based study has been carried out to collate the available information on the hydrology, surface water quality, surface water supply and hydromorphology of the study area. The following data sources were consulted during the assessment:

[2] Now Transport Infrastructure Ireland (TII)

[3] Now Department of Communications, Climate Action and Environment

**Table 9.2: Desktop Data Sources Consulted During the Assessment**

| Websites | Reports |
|---|---|
| • Aerial imagery<br>• EPA's Environmental Data Exchange Network (EDEN) Portal (EPA 2025)<br>• EPA Environmental Data Maps (EPA 2024a)<br>• EPA Water Environmental Data Maps (EPA 2024b)<br>• Ordnance Survey of Ireland - current and historic mapping (Ordnance Survey of Ireland 2024)<br>• National Parks and Wildlife Service (NPWS) - designated sites (NPWS 2024) | • Water Action Plan 2024: A River Basin Management Plan for Ireland (DHLGH 2024) |

#### 9.2.3.2 Field Survey Methods

##### *9.2.3.2.1 Walkover and Water Quality Sampling Surveys*

37. A number of walkover surveys were completed to gain an understanding of the hydrological environment of the Proposed Project (see Table 9.3) and inform the assessments in this chapter.

38. Surface water quality monitoring has been undertaken in accordance with the Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009). These guidelines were used in the absence of pipeline-specific guidance as roads are linear infrastructure. It is accepted industry standard to use this guidance for pipelines, as it provides guidance on how to undertake water quality sampling. Expert judgement has also been applied to the decision to apply this guidance. Surveys were undertaken for previous iterations of the project in October 2016, May 2017, June and November 2021, and November 2022; and for the Proposed Project in November 2024 and June 2025. Surveys for previous iterations of the project remain valid for the Proposed Project as the alignment remains the same in many instances. Samples taken in May and June represent the dry season and samples taken in October or November represent the wet season. On each occasion, several of the water bodies identified for sampling could not be sampled because they were either dry or there were restrictions to land access.

**Table 9.3: Description of Walkover and Sampling Surveys Completed**

| Survey (Date) | Description |
|---|---|
| June 2025 - Watercourse sampling | Collection of water quality samples at selected crossing and abstraction (for commissioning) locations. |
| November 2024 - Watercourse sampling | Collection of water quality samples at selected crossing and abstraction (for commissioning) locations. |
| October 2024 - Watercourse crossing and permanent washout locations visual inspection | Visual observation of site character for these locations, ground cover, substrate and watercourse morphology. |
| June 2023 - Watercourse sampling | Collection of water quality samples at selected crossing and abstraction (for commissioning) locations. |
| November 2022 - Watercourse sampling | Collection of water quality samples at selected crossing and abstraction (for commissioning) locations. |
| January 2022 - Site walkover Derg HMWB | Site walkover along the banks of the Derg HMWB to confirm the route of the Kilmastulla_050 which is diverted along the eastern side of the reservoir. |
| November 2021 - Watercourse sampling | Collection of water quality samples at selected crossing and abstraction (for commissioning) locations. |
| June 2021 - Watercourse crossing and permanent washout locations visual inspection and sampling | Visual inspections and collection of water quality samples at selected crossing and abstraction (for commissioning) locations. Additional visual inspections at sites identified to be potentially at risk or where new permanent infrastructure is proposed e.g. outfalls for washouts. |

| Survey (Date) | Description |
|---|---|
| May 2017 - Surface Water walkover and sampling | Visual inspection to determine baseline geomorphological characteristics, including data on the channel cross-section, bed material, morphological features and riparian corridor. |
| October 2016 - Surface Water walkover and sampling | Visual inspections of the RWI&PS along the bank of the Derg HMWB.<br>Visual inspections of water bodies crossed by the proposed Treated Water Pipelines which included data on channel morphology and the riparian corridor. |

#### *9.2.3.2.2 Derg TN (Lough Derg) Hydrographic Survey*

39. From April to September 2015, a hydrographic survey was undertaken, in accordance with the International Hydrographic Organization (IHO) 1A standards (or 1B standards where applicable). A summary of the survey and its findings can be found in Appendix A9.1 (Abstraction Assessment). Full details are provided in Annex E (Lough Derg Hydrographic Survey) of Appendix A9.1 (Abstraction Assessment).

#### *9.2.3.2.3 Surface Water Quality Monitoring: Derg TN and Derg HMWB*

40. Water quality monitoring commenced in May 2015 for the Derg TN lake water body and the Derg HMWB. Locations of the monitoring stations have been provided in A09.1 Figure 2 in Appendix A9.1.

41. A variety of methods was employed to monitor the surface water environment of the Derg TN lake water body and the Derg HMWB, as follows:

    - Continuous flow, water level, and currents
    - Continuous water quality monitoring: Physicochemical water quality sampling buoys sampling for water temperature, conductivity, dissolved oxygen, pH, nitrates, nitrites, ammonia and phosphates (at near-surface, mid depth and near bed of water column), with additional surface sampling of turbidity and chlorophyll-*a*
    - Continuous temperature monitoring: Temperature sensors measuring the water column at varying depths
    - Manual water quality spot sampling: Spot sampling from the surface of the river column at fortnightly intervals with laboratory analysis of biochemical oxygen demand, chlorophyll-*a*, nitrates, nitrites, ammonia, phosphates, suspended solids and alkalinity
    - Plankton surveys: monthly and fortnightly intervals for 112 months
    - Meteorological monitoring.

42. Further details, including the locations at which these methods were deployed, are provided in Appendix A9.1 (Abstraction Assessment).

### 9.2.4 Consultation

43. Consultation responses from key stakeholders, landowners and the public were reviewed and considered in compiling this chapter. Chapter 2 (The Environmental Impact Assessment Process) of the EIAR sets out the approach the Proposed Project has taken with regard to environmental scoping, in particular the EIAR Scoping Methodology Report (Uisce Éireann 2023) in respect of the Proposed Project and also the Environmental Impact Statement (EIS) Scoping Report[4] (Irish Water 2016) relating to a previous iteration of the project.

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

44. The scoping consultation responses relevant to water received from stakeholders are provided in Table 9.4. Further detail on the Proposed Project consultation is included in Chapter 2 (The Environmental Impact Assessment Process) and responses received are in the Water Supply Project: Eastern and Midlands Region – Consultation Report, which forms part of the Strategic Infrastructure Development planning application for the Proposed Project.

**Table 9.4: Relevant Scoping Consultation Responses**

| Consultee | Consultee Response | EIAR Response/Reference |
|---|---|---|
| **EIS Scoping Report (Irish Water 2016)** | | |
| Department of Arts, Heritage and the Gaeltacht[5] | The hydrodynamic and water quality model, which is under construction, will be needed to inform the Environmental Impact Statement (EIS) and Natura Impact Statement (NIS), and the identification of the Zone of Influence. This model should be included or referenced within the NIS, and used to inform the assessment and analysis of the implications of the project for the conservation objectives and integrity of relevant European sites. | The model reports have been provided in Appendix A9.1 (Abstraction Assessment). The outputs of the model have been used to inform the hydrological and water quality assessments for the Derg TN lake water body and the Derg HMWB (see Section 9.4.4.1). The conclusions of the Abstraction Assessment have informed the assessment in Chapter 8 (Biodiversity) of this EIAR and the NIS. |
| | Consideration should be given to whether there is potential for reduced flows over longer periods, or reduced flushing in the channel downstream of Parteen Basin, to occur and impact sedimentation rates and allow encroachment by trees, alluvial woodland and other wetland habitats to occur. | Section 9.4.4.1 of this chapter and Sections 6.2.4 and 6.2.5 of Appendix A9.1 (Abstraction Assessment) assess the potential for reduced flows and the impacts on sediment transfer, and the alteration of wetland habitats and alluvial woodland.<br>Further consideration of potential reduced flows as a result of abstraction impacts on wetland habitats presented in Chapter 8 (Biodiversity). |
| Laois County Council (Planning Authority) | This Chapter should include a surface water assessment of the impacts of disruption and disturbance of drainage systems and drainage patterns for both the Construction and Operational Phases and for the potential for the pipeline trench to form a pathway for contaminant transport. | This has been included in the assessment and is described in Section 9.4 of this chapter. Further details of potential impacts on drainage as a result of the Treated Water Pipelines are presented in Appendix A9.4 (FRA). Further details of potential impacts on water quality are presented in Appendix A9.2 (Pipeline Assessment). |
| Laois County Council | The potential for the pipeline route to act as a pathway to vulnerable groundwater bodies (and the wider water environment) should also be included in the assessment.<br>The impact of the Proposed Project on watercourses should have regard to the WFD catchment characterisations that are being completed by the EPA for the catchments within the water supply area, and the monitoring undertaken should be used to demonstrate how the Proposed Project will protect and enhance the water quality within the benefiting corridor.<br>This section should include an assessment of the impacts of disruption and disturbance of drainage systems and drainage patterns for both the Construction and Operational Phases | Potential impacts on groundwater bodies and groundwater sources of drinking water have been considered in Chapter 10 (Soils, Geology & Hydrogeology).<br>The impacts of the Proposed Project on WFD designated water bodies have been assessed in this chapter and accompanying appendices (Appendices A9.1, A9.2 and A9.3) as well as in the Water Status Impact Assessment Report.<br>An assessment of the impacts on disruption to drainage systems and patterns has been carried out as part of this chapter and Appendices (Appendices A9.1, A9.2 and A9.3). |
| Inland Fisheries Ireland (IFI) | The impact of the abstraction on assimilative capacity in the River Shannon downstream of Parteen Basin should be examined in the EIS.<br>The potential for river/stream collapse during trenchless tunnelling and loss of flow requires consideration.<br>Thorough impact assessment of potential water level change and implications for biological diversity is required and should include streams that discharge to the lake. | Potential impacts on the water levels of the Derg TN lake water body and the Derg HMWB and onward flows to Shannon (lower)_050 have been considered and are presented in Section 9.4.4.1 and Appendix A9.1 (Abstraction Assessment). Consideration of how these levels might affect water quality are considered in Annex B (Water Quality Modelling Report) of Appendix A9.1 (Abstraction Assessment).<br>Details of techniques proposed to be employed for watercourse crossings have been provided in Chapter 5 (Construction & Commissioning). Potential impacts on the structure and flow of the rivers, streams and ditches being crossed are considered in Appendix A9.2 (Pipeline Assessment) and in Appendix A9.4 (FRA). |

[5] Now Department of Culture, Heritage and the Gaeltacht

| Consultee | Consultee Response | EIAR Response/Reference |
|---|---|---|
| | | An impact assessment of how water level changes as a result of the proposed abstraction in Parteen Basin (Derg HMWB) and connected watercourses impact on biodiversity is presented in Chapter 8 (Biodiversity). |
| IFI | Impacts on water quality, quantity and hydromorphology should be assessed. | This has been included in the assessment and is described in Section 9.4 and Appendix A9.1 (Abstraction Assessment), Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment). |
| | All water crossing points must be agreed in advance with IFI. | All water crossings have been assessed and the findings are described in Section 9.4.2.4 of this chapter and Appendix A9.2 (Pipeline Assessment). Discussions with the IFI have been undertaken in relation to the Biodiversity assessment (Chapter 8: Biodiversity) and are described there. |
| | Total Residual Chlorine level in any discharges to fisheries waters shall not result in the receiving water level exceeding 0.005mg/l Hypochlorous Acid. | Details of the proposed approach have been provided in Section 9.4 and Appendix A9.2 (Pipeline Assessment). |
| | Impacts on water quality, quantity and hydromorphology should be assessed. | Potential impacts have been considered in Section 9.4 of this chapter, and in Appendix A9.1 (Abstraction Assessment), Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment). |
| | The potential for river/stream bed collapse during trenchless tunnelling is not specifically addressed but requires consideration. | Potential impacts have been considered in Section 9.4 of this chapter, and in Appendix A9.2 (Pipeline Assessment). |
| An Taisce | It is not clear from the EIS scoping report how the Proposed Project will impact on the water levels within the Upper and Lower River Shannon and the amount of water flowing through the Lower River Shannon. | These impacts have been described in Section 9.4.4.1 and Appendix A9.1 (Abstraction Assessment). |
| | EIS must outline how the Proposed Project will impact upon the operational water level range used by ESB. | These impacts have been described in Section 9.4.4.1 and Appendix A9.1 (Abstraction Assessment). |
| | An Taisce request that the management of the water levels within the Upper and Lower River Shannon by ESB from a flood mitigation perspective are also considered. | The Upper River Shannon is not within the study area; the upper limit of the study area is Meelick Weir which is located on the Shannon (Lower)_030 river water body (see Section 9.2.1.1). The impacts on water levels in the Derg TN lake water body have been described in Section 9.4.4.1 and Appendix A9.1 (Abstraction Assessment). Potential impacts on flooding are described in Section 4.2.1 of Appendix A9.4 (FRA). |
| | Please ensure that climate change predictions of drought are taken into account when modelling potential impacts of extraction on the Upper and Lower River Shannon. | These impacts have been taken into account in Section 9.4.4.1 and Appendix A9.1 (Abstraction Assessment). |
| | Any impacts which will prevent a water body from achieving its objectives under the WFD should be highlighted within the EIS. | These impacts have been described in Section 9.4 and in the Water Status Impact Assessment Report. |
| EPA | [Uisce Éireann] will need to consider the impact of providing this water to the ecological status of the water bodies to which this water will subsequently be discharged after use. | The treated water would be received at the TPR and mixed with water from existing sources. See Appendix A4.1 (Operational Strategy). There would be no impacts on the ecological status of the Dublin and Liffey basin as a result of the Proposed Project. This is set out in in Appendix A9.1 (Abstraction Assessment). |
| | The revised status for these water bodies up to the end of 2015 will become available by the end of June should you wish to update this information. | WFD status for 2019-2024 is now available and is used throughout this assessment. |

| Consultee | Consultee Response | EIAR Response/Reference |
|---|---|---|
| EPA | Assessments of these crossing points will be needed to determine if they will have an impact on the status of those water bodies temporarily or permanently. Should they have a permanent impact consideration of Article 4.7 of the WFD will be required. | These impacts have been described in Section 9.4 and in Appendix A9.2 (Pipeline Assessment) and the Water Status Impact Assessment Report. |
| | EPA may wish to have access to baseline monitoring data at Lough Derg. | Data will be provided to EPA on request. |
| | Planning for the Proposed Project will need to take account of second cycle of RBMPs. | The EIAR and Water Status Impact Assessment Report have considered the Water Action Plan 2024: A River Basin Management Plan for Ireland (DHLGH 2024). |
| | Should acknowledge the potential impacts of bringing different quality water (hardness etc.) to a different region; such things as impacts of limescale on pipework. | Water from the River Shannon system would be blended with the water in Dublin and produced to the same chemical standard as existing; there would be no discernible change. See Appendix A4.1 (Operational Strategy). There would be no impacts on the quality of water to the Dublin and Liffey basin as a result of the Proposed Project. |
| | No reference to outside River Basin water transfers, which is a formal WFD requirement for reporting in RBMPs. | Not relevant for this assessment and not included in Water Status Impact Assessment Report. |
| Clare County Council | The impacts of the abstraction on the Black, Ardcloony and Ballyteigue Rivers (in addition to the River Shannon itself) which flow into Lough Derg should be considered from an ecological and hydrological perspective.<br>No indication as to whether or not Flood Risk Assessments will be undertaken as part of the study. | These impacts are described in Section 9.4, Appendix A9.1 (Abstraction Assessment) and Chapter 8 (Biodiversity).<br>An FRA has been carried out and is provided in Appendix A9.4 (FRA). Ecological effects are described in Chapter 8 (Biodiversity). |
| Department of Agriculture, Food and the Marine Environment | The 2nd cycle WFD implementation will identify sub-catchments (100-200km) which will require additional cross-sectoral attention and some of these catchments are likely to be located within the River Shannon catchment/basin. | This chapter of the EIAR and the Water Status Impact Assessment Report have considered the Water Action Plan 2024: A River Basin Management Plan for Ireland (DHLGH 2024) |
| | During the construction of the pipeline, any land drainage systems (drainage pipes, stone drains, etc.) need to be kept intact across the working area. There will be very limited records for such drainage systems. | The approach to land drains during construction is described in Chapter 5 (Construction & Commissioning) and is assessed in Appendix A9.2 (Pipeline Assessment). Potential impacts are described in Section 9.4 of this chapter. |
| | Interruption of land drainage systems is potentially an issue post construction, if not properly mitigated during the Construction Phase. | Land drains would be identified during the Condition Survey (see Chapter 5: Construction & Commissioning) and reinstated. |
| Offaly County Council | Need measures to cope with escape of water through bursts/flushing in Operational Phase (flooding mitigation).<br>Identification and environmental implications of all existing watercourse crossings/bridges. | The potential implications on the surface water environment have been assessed at all crossing locations. See Section 9.4.2.4 and Appendix A9.2 (Pipeline Assessment).<br>Planned and unplanned discharges from the pipe are addressed in this chapter and Appendix A9.4 (FRA). |
| **EIA Scoping Methodology Report (Uisce Éireann 2023)** | | |
| Department of Housing, Local Government and Heritage (DHLGH) | Is the minimum flow rate of 10m$^3$/s compatible with the Qualifying Interests of the Lower River Shannon SAC (2165) achieving favourable conservation status? | The Proposed Project has no impact on the minimum flow rate to the Lower River Shannon. A statement with regard to this is included in the Water Status Impact Assessment Report. |
| | What are the worst-case impacts, for the habitats and species of conservation importance in the 'Old River Shannon' part of the Lower River Shannon SAC (2165), of water levels falling below 10m$^3$/s during a severe drought? | The Proposed Project has no impact on the minimum flow over Parteen Weir to the Old River Shannon. The hydrological modelling report to demonstrate this is provided in Appendix A9.1 (Abstraction Assessment). |

| Consultee | Consultee Response | EIAR Response/Reference |
|---|---|---|
| DHLGH | Parteen Weir likely acts as a large sediment trap. Will there be a need/requirement to clean this for the proposed abstraction? | Parteen Weir may act as a barrier to sediment transport. The rate and deposition of sediment are unknown. This has not been examined as part of this assessment. The requirement for the cleaning of the weir has therefore not been examined as it was deemed to be outside the scope of the Proposed Project. If this is deemed necessary for other works, this would be subject to a separate EIA and WFD assessment. |
| IFI | A Construction Surface Water Management Plan (CSWMP) should be developed and submitted as part of any planning application. Recommendations contained within the CSWMP should be discussed with IFI prior to the commencement of works involving the crossing of any stream or river. | A Surface Water Management Plan (SWMP) is included as Annex A of Appendix A5.1 (Construction Environmental Management Plan (CEMP)). |
| | Method statements should be developed and discussed in advance with IFI, prior to commencement of works to cross rivers or streams using either the open cut or trenchless methods. | Method Statements for watercourse crossings will be prepared and discussed with IFI. |
| | The 'GUIDELINES ON PROTECTION OF FISHERIES DURING CONSTRUCTION WORKS IN AND ADJACENT TO WATERS' and 'PLANNING FOR WATERCOURSES IN THE URBAN ENVIRONMENT' guidance documents should be considered. | These guidelines have been used in the assessment and measures adopted, e.g. complying with the 25mg/l suspended solids standard for discharges from construction works to fisheries waters. |
| | Instream works that are required to facilitate the Proposed Project can only be undertaken at a suitable time of the year, between 1st July and 30th September inclusive and should not commence without prior consultation and agreement with IFI. | The timing of in-stream works in watercourses will be discussed and agreed with IFI, with whom there is ongoing liaison in respect of the Proposed Project. |

### 9.2.5 Appraisal Method for the Assessment of Likely Significant Effects

45. The following method for the assessment of likely significant effects has been adapted as considered appropriate from the Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009), specifically Section 5.6 (Environmental Impact Assessment – Hydrology). The assessment has also been conducted in accordance with EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2022a).

#### 9.2.5.1 Sensitivity of the Receptor

46. The sensitivity of surface water ‘attributes’ to changes as a result of the Proposed Project are determined by a set of criteria including their relative importance or ‘value’ (e.g. whether features are of national, regional or local value). Table 9.5 outlines the criteria for estimating the sensitivity of receptors and their attributes. Professional expertise has been applied for identifying hydromorphological features required for the assessment of the hydromorphology attribute. In assigning sensitivity, whichever criterion affords the highest level of sensitivity is used first. For example, a SAC would be very high even if the WFD status is Moderate. A Good WFD status would result in high sensitivity even if there was no hydrological connection to a designated or protected area.

**Table 9.5: Criteria Used to Evaluate the Sensitivity of Water Bodies (NRA 2009, adapted to include WFD Guidance)**

| Sensitivity | Description | Criteria |
|---|---|---|
| Very high | Receptor (or receptor attribute) has a high quality or value on an international scale | **Surface Water Quality and Hydrology**<br>• Water body protected by EU legislation e.g. designated European sites (SACs and Special Protection Areas (SPA)) 'Salmonid Waters' or Nutrient Sensitive Areas.<br>• A WFD designated water body of High status (2019-2024).<br>• Water body is a within a designated Drinking Water Protected Area (DWPA).<br>• Other Waterbodies may be applicable if part of a Protected Site or river within a designated DWPA.<br>• An internationally important amenity site(s) for wide range of leisure activities. |
| | | **Hydromorphology**<br>• A water body that shows a natural planform and appears to be in natural equilibrium exhibiting a natural range of morphological features (such as pools, riffles, bars). There is a diverse range of fluvial processes present, free from any modification or anthropogenic influence. |
| | | **Surface Water Supply**<br>• Known surface water abstraction location within 50m from any proposed works.<br>• River or lake within a designated DWPA. |
| High | Receptor (or receptor attribute) has a high quality or value on a regional or national scale | **Surface Water Quality and Hydrology**<br>• A WFD designated water body which has a direct hydrological connection of <2km to European sites or protected ecosystems of international and/or national status (SAC/SPA or Salmonid Waters) including Nutrient Sensitive Areas, proposed and Natural Heritage Area (NHA) or DWPA.<br>• A WFD designated water body of Good status or below (2019-2024).<br>• Other Waterbody which has a direct hydrological connection of <2km to a Good or High status WFD designated water body and/or <2km to European sites or protected ecosystems of international status (SAC/SPA or Salmonid Waters) including Nutrient Sensitive Areas.<br>• Salmonid fishery or contains known populations of salmonids.<br>• A nationally important amenity site(s) for wide range of leisure activities. |
| | | **Hydromorphology**<br>• A water body that appears to show a mostly natural planform free from historical straightening or realignment. Water body appears to be in some natural equilibrium and exhibits morphological features (such as pools, riffles and bars). There is a diverse range of fluvial processes present, with very limited signs of modification or other anthropogenic influences. |
| | | **Surface Water Supply**<br>• Water body with direct hydrological connection (within 2km) to a downstream river or lake within a designated DWPA. |
| Medium | Receptor (or receptor attribute) has a high quality or value on a local scale | **Surface Water Quality and Hydrology**<br>• Other Waterbody with some economic and social uses <2km from a Moderate status or below WFD designated water body and/or >2km and <5km from a European or Nationally designated site.<br>• Contains coarse fish species.<br>• A regionally important amenity site(s) for wide range of leisure activities. |
| | | **Hydromorphology**<br>• A water body showing a low sinuosity planform and signs of historical modification or culverting but attempting to recover to a natural equilibrium. Water body may show a limited range of diverse hydromorphological features (small bars and riffles). The water body is one with a limited range of fluvial processes and is affected by modification or other anthropogenic influences.<br>• For standing water bodies: Exhibits modification to natural planform and fluctuating water levels during dry periods. |

| Sensitivity | Description | Criteria |
|---|---|---|
| Low | Receptor (or receptor attribute) has a medium quality or value on a local scale | **Surface Water Quality and Hydrology**<br>• Other Waterbody with minimal economic and social uses >2km and <5km from a Moderate status or below WFD designated water body and >5km from a European or Nationally designated site. A locally important amenity for a wide range of leisure activities. |
| | | **Hydromorphology**<br>• A highly straight and/or modified water body that has been changed by channel modification, culverting or other anthropogenic pressures. Only a limited range of fluvial processes. Evidence of historical channel change through artificial channel straightening and re-profiling.<br>• For standing water bodies: Do not appear to be naturally formed. Features with very limited or no recreational uses, No fish species or other ecological receptors present. May be intermittent during period of dry weather. |
| Negligible | Receptor (or receptor attribute) has a low quality or value on a local scale | **Surface Water Quality and Hydrology**<br>• Other Waterbody with >5km hydrological connection to a Moderate status or below WFD designated water body.<br>• Locally important amenity site for a limited range of leisure activities.<br>• Many existing pressures which are adversely affecting biodiversity. |
| | | **Hydromorphology**<br>• The watercourse exhibits no morphological diversity and has a uniform channel, showing no evidence of active fluvial processes and likely to be artificial or affected by extensive modification. Highly likely to be affected by anthropogenic factors and could dry up during summer months. |

#### 9.2.5.2 Magnitude of the Impact

47. The criteria used to evaluate the magnitude of impacts (Table 9.6) have been adapted from the criteria outlined in the Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009), however the typical examples have been developed further in accordance with other guidance from TII (DN-DNG-03065) (TII 2015) and DMRB LA 113 (Highways England *et al*. 2020), and professional judgement. The magnitude of impacts has been determined in accordance with the EPA Guidelines (EPA 2022a) and described in terms of the following:

- Scale, e.g. the size of the area, the number of sites, the proportion of a receptor – see Table 9.6
- Duration, as per EPA definitions, as set out in Table 2.2 in Chapter 2 (The Environmental Impact Assessment Process)
- Frequency (e.g. once, rarely, occasionally, frequently, constantly)
- Probability of occurrence of impact – negligible, low, medium and high – taking into account:
  - The proximity of the activity to a water body
  - The potential for a hydrological pathway from source to receptor.

**Table 9.6: Criteria for Determining Magnitude of Impact on Water Bodies (EPA 2022a; and Highways England *et al*. 2020)**

| Magnitude of Impact | Description | Scale and Nature of Impacts |
|---|---|---|
| High adverse | Results in loss of attribute and/or quality and integrity of the attribute | **Surface Water Quality and Hydrology**<br>• Construction works in-channel and/or extensive construction works adjacent to a watercourse which are therefore likely to risk a major, measurable shift from baseline water quality.<br>• For WFD classified water bodies, water quality impacts have the potential to impact the water body at the water body scale and cause deterioration in WFD status and/or prevent the water body from achieving its objectives under the WFD and River Basin Management Plan (RBMP).<br>• Loss or extensive change to a fishery and/or designated nature conservation site. |
| | | **Hydromorphology**<br>• Loss of, or extensive adverse changes to the watercourse bed, banks and vegetated riparian corridor resulting in changes to existing morphological features and/or channel planform and cross section and/or natural fluvial processes. Impacts would be at the water body scale.<br>• For WFD classified water bodies, impacts have the potential to cause deterioration on morphology status or prevent the achievement of 'Good' morphology status due to an increase in the extent of morphological pressures on the water body. |
| | | **Surface Water Supply**<br>• Loss of or change to regionally important public water supply.<br>• Extensive deterioration to designated DWPA or Group Scheme Source Protection Area. |
| Medium adverse | Results in effect on attribute and/or quality and integrity of the attribute | **Surface Water Quality and Hydrology**<br>• Construction works adjacent to a watercourse which are therefore likely to risk a moderate, measurable shift away from baseline water quality.<br>• Partial loss in productivity of a fishery.<br>• Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies.<br>• Contribution to reduction in water body WFD classification. |
| | | **Hydromorphology**<br>• Adverse changes to the water feature bed, banks and vegetated riparian corridor resulting in changes to existing morphological features and/or channel planform and cross section and/or natural fluvial processes. Impacts would be at the reach scale.<br>• For WFD classified water bodies, impacts may increase the extent of morphological pressures. May contribute to, but not cause, a deterioration of morphology status. |
| | | **Surface Water Supply**<br>• Temporary disruption or deterioration in a water supply or designated DWPA or Group Scheme Source Protection Area. |
| Low adverse | Results in some measurable change in attributes, quality or vulnerability | **Surface Water Quality and Hydrology**<br>• Construction works within the watercourse catchment that may result in a risk of a minor, measurable shift from baseline water quality but with no change in overall WFD classification.<br>• Measurable impact but with no change in overall WFD classification or the status of supporting quality elements. |
| | | **Hydromorphology**<br>• Slight adverse changes to/impacts on the water feature bed, banks and vegetated riparian corridor resulting in changes to existing morphological features and/or channel planform and cross section and/or natural fluvial processes. Impacts would be at the local scale and result in minor impact on integrity of receptor or loss of small part of receptor. |
| | | **Surface Water Supply**<br>• Minor impacts on water supplies and/or DWPAs and/or Group Source Protection Schemes. |

| Magnitude of Impact | Description | Scale and Nature of Impacts |
|---|---|---|
| Negligible | Results in effect on attribute, but of insufficient magnitude to affect the use or integrity | **Surface Water Quality and Hydrology**<br>• Construction works within the watercourse catchment that are not likely to result in a risk of a measurable change in water quality<br>• Minimal or no measurable change from baseline conditions in terms of water quality. |
| | | **Hydromorphology**<br>• Minimal or no measurable change from baseline conditions in terms of sediment transport, channel morphology and natural fluvial processes. Any impacts are likely to be highly localised. |
| Low beneficial | Results in some beneficial effect on attribute or a reduced risk of negative effect occurring | • Has some potential to result in minor improvement in WFD quality element(s). |
| Medium beneficial | Results in moderate improvement of attribute quality | • Contribution to improvement in water body WFD classification. |
| High beneficial | Results in major improvement of attribute quality | • Improvement in water body WFD classification. |

#### 9.2.5.3 Significance of the Effect

48. The significance of an effect is determined by combining the sensitivity of the receptor with the predicted magnitude of impact, as shown in Table 9.7. Descriptions of the significance categories are from the EPA Guidelines (EPA 2022a), as set out in Table 2.2 in Chapter 2 (The Environmental Impact Assessment Process). For the purpose of this assessment, significance of environmental effect of Moderate or greater is considered significant.

**Table 9.7: Significance of Environmental Effect (adapted from EPA Guidelines, EPA 2022a)**

| Magnitude of Impacts | Sensitivity of Receptor | | | | |
|---|---|---|---|---|---|
| | Negligible | Low | Medium | High | Very high |
| Negligible | Imperceptible | Not Significant | Not Significant | Not Significant | Not Significant |
| Low | Not Significant | Slight (not significant) | Slight (not significant) | Moderate (significant) | Significant |
| Medium | Not Significant | Slight (not significant) | Moderate (significant) | Significant | Very Significant |
| High | Not Significant | Moderate (significant) | Significant | Very Significant | Profound |

#### 9.2.5.4 Mitigation and Residual Effects

49. In general, a hierarchical approach to mitigation has been adopted for the Proposed Project, seeking to avoid adverse effects in the first instance through site selection and through an iterative approach to design. This is 'embedded mitigation' and is assumed to be in place for the assessment of effects. These measures are described in Section 9.5.

50. Where avoidance is not possible, and where potentially significant effects are identified from the assessment of effects, mitigation measures are proposed to prevent or reduce those effects.

51. As discussed in Section 9.5, there are two types of mitigation: generic mitigation and location-specific mitigation measures. Each potentially significant adverse effect requires mitigation, however, many effects can and will be addressed using generic mitigation including the application of best practice in the construction of the Proposed Project. These are set out in Annex A (Surface Water Management Plan (SWMP)) of Appendix A5.1 (Construction Environmental Management Plan (CEMP)).

52. Location-specific mitigation has been developed where generic mitigation is inappropriate, ineffective, or insufficient to avoid or reduce effects from a specific project element. These are described in Section 9.5, under the Construction, Commissioning and Operational Phase mitigation sub-sections.

#### 9.2.5.5 Modelling

53. Specifically in relation to the proposed abstraction, the complexity of the hydrological processes being assessed also requires the use of models to determine likely significant effects of the Proposed Project abstraction on the hydrology and water quality of the Derg TN lake water body, the Derg HMWB, their tributaries and downstream water bodies.

54. A hydrological model has been developed to assess the impact of the proposed abstraction on the water levels of the Derg TN lake water body and the Derg HMWB and the pass forward flows released to the Old River Shannon (ORS). Two constant rates of abstraction have been investigated:

    - 154Mld – taken to be representative of normal operation demand by the year 2050
    - 300Mld – projected peak need/demand at year 2050.

55. The model was run using data from the period 1 January 1972 to 31 October 2023, allowing the simulation of daily levels and daily flows across this 52-year period with and without the proposed abstraction in place.

56. The model was further developed to incorporate future climate change scenarios to also allow a simulation of the impact with the Proposed Project in place and including the effects of future climate change on flows on the River Shannon.

57. As a separate exercise, in order to test whether WFD mitigation measures and / objectives to restore the favourable conservation status of the qualifying interests of the Lower River Shannon SAC would be impeded by the Proposed Project, a sensitivity analysis was undertaken to apply an outline Eflows[6] approach proposed in a recent study (CDM Smith, 2025)[7] to the model and investigate the potential impacts of future changes in the compensation flow regime.

58. As WFD lake standards for the management of abstraction impacts are yet to be finalised by the EPA for Ireland, the UK WFD (UKTAG) lake level test was determined, through discussions with the EPA, to be an appropriate and useful test. The simulations have provided the information required to apply the UKTAG lake level test. The WFD lake level standards UK approach, as documented in the UKTAG (2013) River Basin Management (2015-21) report, is based on changes in the extent of the lake littoral zone due to the activity being assessed (in this case the Proposed Project abstraction).

[6] Environmental flows (Eflows) are considered within the context of the WFD as a hydrological flow regime consistent with the achievement of the environmental objectives of the WFD in natural surface water bodies.

[7] CDM Smith (2025). Roadmap for the Lower River Shannon Report 2021. Provision of Expert Advisory Services Regarding Fish Migration in the Lower River Shannon Catchment. Prepared by CDM Smith for the Department of Housing, Local Government and Heritage (CDM Smith (2025). Fish Pass Feasibility Study).

59. In order to better understand the impacts of changes in lake levels and flows on water quality in the Derg TN lake water body and the Derg HMWB, a water quality model was also developed. The study area for the model extends from Portumna Bridge at the north of the Derg TN lake water body to Parteen Weir/Ardnacrusha Headrace in the south. The boundaries of the model include the main inflow to the Derg TN lake water body from the Shannon (lower)_030 river water body and the tributaries which input to the Derg TN lake water body and the Derg HMWB. The outflow considers a combined outflow via Parteen Weir to Shannon (lower)_050 and to Ardnacrusha Headrace. The model also includes recorded meteorological conditions, and water quality data for the tributaries which feed into the lakes.

60. The water quality model was initially calibrated using data recorded in 2016 as it contained a complete data record of modelling inputs including, but not limited to, water levels at Portumna Bridge and Parteen Weir / Ardnacrusha Headrace and meteorological conditions. This data acted as a baseline and point of verification against the following parameters: biochemical oxygen demand (BOD), dissolved oxygen (DO), chlorophyll-a (CHL), nitrite ($NO_2$-N), ammonia ($NH_3$-N), nitrate ($NO_3$-N), and ortho-phosphate ($PO_4$-P) with modelling predictions compared against recorded datasets from the instruments deployed within Lough Derg (Derg TN) as part of the water quality monitoring and hydrographic survey campaign.

61. As the summer of 2018 has been identified as being the most extreme drought period experienced in Lough Derg (Derg TN) across the historical record (from 1972), the model was re-calibrated using 2018 data as a baseline year with a number of scenarios then run for the model:
    - Scenario 1: Baseline
    - Scenario 2: Proposed abstraction at constant 154Mld
    - Scenario 3: Proposed abstraction at constant 300Mld
    - Scenario 4: Proposed abstraction at constant 154Mld including climate change effects
    - Scenario 5: Proposed abstraction at constant 300Mld including climate change effects.

#### 9.2.5.6 Limitations of the Assessment

62. The information that has informed the assessment is sufficient to identify the likely significant effects having assumed the worst case scenario that occurred in 2018. The limitations described in this chapter are not considered to have a material impact on the assessment conclusions because, following the implementation of mitigation and control measures, potential significant effects identified in Section 9.4 would be reduced to Not Significant residual effects. See Section 9.6 for further details.

##### *9.2.5.6.1 Water Quality Monitoring*

63. For water bodies within the study area, water quality assessments have been undertaken using a combination of quality data supplied by the EPA and spot sampling carried out by Uisce Éireann on the rivers that would be crossed by the Proposed Project. There are limitations to spot sampling in particular. There can be large variations in the quality of water from one survey to the next depending on weather conditions and/or upstream activities. As such, the sample can only ever be a ‘moment in time’ and is not considered to represent a comprehensive baseline situation for the water bodies. However, if taken alongside the EPA data it provides supporting intelligence regarding the baseline environment. Samples were undertaken in dry and wet seasons to try to reduce the limitations, however, this meant that some of the water bodies that would be crossed by the Proposed Project were dry and could not be sampled. Additionally, there were restrictions to land access at some sampling locations. Notwithstanding these limitations, the samples provide a useful addition to the baseline environment identified for the Proposed Project.

64. For the Derg TN lake water body and the Derg HMWB, a comprehensive water quality monitoring programme was run for 24 months from May 2015 to May 2017. A more limited programme has been running from 2018 to 2023. It employed a combination of spot sampling and automatic monitoring station positions (Lough Derg Monitoring Programme; see Annex D of Appendix A9.1: Abstraction Assessment). It was difficult to discern trends in the parameters as many readings were recorded below detectable levels, however, obvious trends were seen in nitrate, phosphate, and chlorophyll-*a*. The limitations of spot sampling were reduced by repeating the sampling over a two-year period and using the automatic monitors for the lakes. Thus, the baseline for the water quality for the Derg TN and the Derg HMWB could be considered robust and was used in the water quality modelling carried out for the Derg TN lake water body and the Derg HMWB.

#### *9.2.5.6.2 Modelling*

65. As with all simulation models, the outputs of both the hydrological and water quality models have an element of uncertainty and assumption as they approximate the natural processes in the catchments using the best available data and methods. The models represent the most accurate method for simulating the response of catchments to changing inputs and outputs. Furthermore, hydrological and hydrometric uncertainties have been managed through the modelling of different sensitivity analyses.

66. The water quality model was calibrated using data from the Lough Derg Monitoring Programme. Limitations related to this, described in Section 9.2.5.6.1, are replicated in the water quality modelling report.

### 9.2.6 Construction Flexibility

67. At this stage of the development of the Proposed Project there are a number of points of detail which cannot be finalised. This is due to factors such as unknown site constraints or obstacles that may affect the construction of the permanent infrastructure. Although a high level of ground investigation has been obtained to inform the planning application for the Proposed Project, further site investigations will be undertaken following grant of planning permission. This will inform a confirmed design for construction. This is a standard delivery approach and as a result, for a linear project of this nature, scale and complexity, it is typical that a level of construction flexibility is required. This flexibility in construction is necessary to provide a mechanism to overcome these matters during the later stages of the Proposed Project. The elements which are subject to construction flexibility are summarised in Table 9.8 and this also explains how this flexibility has been accounted for within the assessment reported in this chapter. Chapter 4 (Proposed Project Description) and Chapter 5 (Construction and Commissioning) in Volume 2 of this EIAR provides further detail.

68. The construction works necessary to deliver the permanent design (including the construction flexibility defined in Table 9.8) would take place within the Construction Working Width which defines the extent of the Planning Application Boundary. For the assessment reported in this EIAR this means that the construction works could take place anywhere within the Construction Working Width.

69. The assessment reported in this chapter has taken account of this construction flexibility and assessed all the likely significant effects that could arise. For this assessment, the likely significant effects reported in this chapter would not change regardless of the alignment or location of infrastructure elements within the defined construction flexibility in Table 9.8 (i.e. the difference in effects would be imperceptible for the purpose of the assessment).

**Table 9.8: Definition of Construction Flexibility**

| Design Element | Construction Flexibility | How this has been Applied / Assessed in this Chapter |
|---|---|---|
| Pipeline | Treated Water Pipeline and RWRMs horizontal alignment – to allow for construction flexibility to overcome site constraints or obstacles the pipeline could be anywhere within a 20m Pipeline Corridor as defined in Chapter 4 (Proposed Project Description). | The assessment has identified the likely significant environmental effects from the horizontal alignment of the pipeline being within the 20m Pipeline Corridor. |
| Pipeline | Treated Water Pipeline vertical alignment – to allow construction flexibility to overcome site constraints or obstacles, the vertical alignment of the pipeline could vary between 1.2m and 4.4m to the crown of the pipe. Exceptions would be at proposed trenchless crossing locations (which due to the construction approach would be deeper than 4.4m to crown) and where it has been identified that for hydraulic purposes, the crown of the pipeline would need to be deeper than 4.4m. These have been included in the vertical alignment set out in the Planning Application for the Proposed Project and consequently have been assessed for significant environmental effects as reported in this EIAR. These include e.g. TWB 27100 - 27700 and TWC 2600 - 2750. In these instances, the construction flexibility would be the crown of the pipe not being deeper than that shown in the Planning Application Drawings and not shallower than 1.2m. The excavation needed for the pipeline is assumed to be the largest needed for the lowest vertical parameter set out. | The assessment has identified the likely significant environmental effects from the vertical alignment of the pipeline within the upper and lower parameter. |
| Valves | The location of valves, and associated pipeline features, that need to be above the pipeline could change if there is a change in the vertical or horizontal alignment of the pipeline, as a result of the construction flexibility defined in the two rows above. The construction flexibility would allow them to move within the 20m Pipeline Corridor. However, the location of these pipeline features would be limited to remaining within the land parcels as identified and assessed within the EIAR (but still remaining within the 20m Pipeline Corridor). | The assessment has identified the likely significant environmental effects from the valves being located within this construction flexibility. |
| Outfall connections | To construct the smaller connection pipes between washout valves and washout outfalls, a small amount of construction flexibility would be required to overcome onsite obstacles or constraints. To allow for this, the connecting pipe could be anywhere within a 10m corridor. | The assessment has identified the likely significant environmental effects from the outfall connections being within the10m corridor. |
| Outfall locations | The outfall headwalls and discharge point would have to move with the alignment of the outfall pipeline, as set out above, and so the discharge point could move within the same 10m construction flexibility. To allow for the headwalls to move 10m either side of the current pipeline alignment, a total construction flexibility width of 20m has been allowed for the headwalls. | The assessment has identified the likely significant environmental effects from the outfalls being located within the 20m construction flexibility. |

#### 9.2.6.1 Variation in Construction Methods

70. In addition to the construction flexibility defined in Table 9.8 there may also be the potential for variation in the method of construction to be used to build the Proposed Project. This variation would be necessary to deal with, for example, uncertainties in ground conditions or on-site constraints. Chapter 5 (Construction & Commissioning) includes further detail on these, including the reasoning why different techniques may be required. This could include:

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

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

72. In addition, as set out in Appendix A5.3 (Methods of Working in Peat), four slightly different methods for constructing the pipeline in areas of peat soils have been defined. To allow for variation in ground conditions it has been assumed for the purpose of the assessment reported in this EIAR that either Method 2, 3 or 4 could be used in areas where the depth of peat is greater than 1m. Where the depth of peat is less than 1m, Method 1 is proposed to be used and it is not expected that there would be any deviation from this methodology. The environmental effects from Methods 2, 3, and 4 would be similar. However, Methods 3 and 4 would result in additional permanent infrastructure in the form of stone pillars (Method 3) or piled supports (Method 4) below the pipeline. Consequently, Method 4 would require piling and as such, would have a slighter greater environmental impact. Therefore, the EIAR is based on the application of Method 4 where the depth of peat is greater than 1m. However, in areas where Methods 2, 3, or 4 could be used, the environmental assessment has considered whether these different methods would result in different likely significant effects and therefore the assessment reported in this chapter has identified the likely significant effects from any of the three techniques. The different methods are expected to have the same overall potential impacts including increasing fine-grained sediments, changing the pH, elevating the levels of ammonia/phosphorous and causing physical alteration to the drainage or river network. Therefore, for this assessment, the likely significant effects reported in this chapter would not change regardless of the working in peat method used (i.e. the difference between the methods would be imperceptible for the purpose of the assessment).

### 9.2.7 Cumulative Effects Assessment

73. As noted in Chapter 2 (The Environmental Impact Assessment Process), intra-project cumulative effects are described within respective topic chapters, while inter-project cumulative effects are described in Chapter 21 (Cumulative Effects & Interactions). The EIA Directive includes the consideration of existing projects within the cumulative effects assessment and this is addressed through a consideration of the incremental impact of the Proposed Project within the context of the existing baseline as described and, where applicable, the carrying capacity of the environment. See Section 9.3.5 (Future Baseline) and Section 9.4.1 (Do-Nothing Scenario) for additional explanation.

74. Detailed hydrodynamic and water quality modelling is described in this chapter and associated appendices which take account of the existing baseline conditions resulting from the historical operation of the Ardnacrusha Generating Station, and the additional impacts that could result from the Proposed Project abstraction.

75. The hydrological model was run using data from the period 1 January 1072 to 31 October 2023, allowing the simulation of daily levels and daily flows across this 52-year period with and without the proposed abstraction in place. The model was further developed to incorporate future climate change scenarios to also allow a simulation of the impact of the Proposed Project in place and including the effects of future climate change on flows on the River Shannon.

76. As a separate exercise, in order to test whether WFD mitigation measures and / objectives to restore the favourable conservation status of the qualifying interests of the Lower River Shannon SAC would be impeded by the Proposed Project, a sensitivity analysis was undertaken to apply an outline Eflows approach proposed in a recent study (CDM Smith, 2025) to the model and investigate the potential impacts of future changes in the compensation flow regime. Further details are provided in Section 9.4.4.3 and Appendix A9.1 (Abstraction Assessment).

77. The conclusions of the hydrodynamic and water quality modelling have informed the assessment in Chapter 8 (Biodiversity) of this EIAR and the Appropriate Assessment Screening Report and the NIS. Identified interactions with other topic chapters are assessed within the respective topic chapters and summarised in Chapter 21 (Cumulative Effects & Interactions).

### 9.2.8 Difficulties Encountered in Compiling Information

78. The only difficulty in compiling the information was land access issues for some water quality sampling and walkover surveys. Other than this, there were no difficulties encountered in compiling the information.

## 9.3 Baseline Environment

79. Appendix A9.5 (Baseline) provides a full description and analysis of the baseline environment relevant to each Proposed Project element and the determined study area. This section provides an overview of the baseline environment across the Proposed Project as a whole, highlighting particular areas for commentary where appropriate. All WFD designated water bodies within the study area are shown on A09.2 Figure 1 to Figure 76 in Appendix A9.2 and each catchment is described in this section. All water bodies crossed by the Proposed Project, along with the nomenclature for the crossings (i.e., WCX, WBX, WBP and PSN), are identified as follows:

- WFD designated Water Bodies – water bodies designated by the EPA as river water bodies under the WFD
  - Watercourse crossing ID WCX is applied for crossings of these water bodies by the pipeline
  - Watercourse crossing ID PSNWCX is applied for crossings of these water bodies by the Proposed 38 kV Uprate works
- Other Waterbodies - water bodies not designated by the EPA as river water bodies under the WFD
  - Watercourse crossing ID WBX is applied for crossings of larger rivers not designated by the EPA under the WFD by the pipeline. However, it should be noted that WBX water bodies can include water bodies identified by the EPA as artificial water bodies under the WFD (such as canals)
  - Watercourse crossing ID PSNWBX is applied for crossings of larger rivers not designated by the EPA under the WFD by the Proposed 38 kV Uprate works
  - Watercourse crossing ID WBP is applied for crossings of field drains or ditches not designated by the EPA under the WFD by the pipeline. These drains and ditches are likely to be intermittent (may not flow during dry conditions)
  - Watercourse crossing ID PSNWBP is applied for crossings of field drains or ditches not designated by the EPA under the WFD by the Proposed 38 kV Uprate works. These drains and ditches are likely to be intermittent (may not flow during dry conditions).

### 9.3.1 Overview of Water Bodies

80. There are 56 WFD designated water bodies identified as being at risk of impacts as a result of the Proposed Project. Appendix A9.5 (Baseline) outlines the water body ecological status (2019-2024) for these WFD designated water bodies. These have been organised by catchment for this chapter and are described in Section 9.3.2. There are also several unnamed watercourses which would be impacted, in particular as a result of being crossed by the Proposed 38 kV Uprate Works and Treated Water Pipelines. These include field ditches and drains listed in Appendix A9.5 (Baseline), that have a hydrological connection to a WFD designated water body listed in this chapter.

81. The information provided here is based on the third cycle status (2019-2024), EPA data available at Catchments.ie (EPA 2024c) and the Environmental Data Exchange Network (EDEN) (EPA 2025). All water bodies within the study areas for this assessment have been assigned a status by the EPA. This update was based on a number of factors including trends in inputting and receiving waters and professional judgement.

82. The Water Action Plan 2024 (DHLGH 2024) identifies 11 different significant pressure categories for surface water bodies. Over the 172km crossed by the Proposed Project, seven of these pressures are present. The seven significant pressures identified for the seven catchments crossed by the Proposed Project are:

- Agriculture
- Pressures affecting Hydromorphology
- Forestry
- Urban Wastewater
- Urban Runoff
- Domestic Wastewater
- Peat.

83. WFD designated water bodies within the study area are of Good, Moderate or Poor status with no High or Bad status water bodies – see Table 9.9 for the full breakdown.

**Table 9.9: River Water Body Ecological Status Throughout the Study Area**

| WFD Ecological Status (2019-2024) | Number of Water Bodies |
|---|---|
| High | 0 |
| Good | 13 |
| Moderate | 25 |
| Poor | 18 |
| Bad | 0 |

### 9.3.2 Catchments

84. The Proposed Project traverses seven catchments, including four Lower Shannon catchments; the northernmost part of the Barrow catchment; the south-east tip of the Boyne catchment; and the western edge of the Liffey and Dublin Bay catchment. Descriptions of the extent of these catchments have been drawn from Catchments.ie (EPA 2024c) and are provided in the following sections along with the key water bodies considered in the assessment. A full list of all water bodies is provided in Table 9.10.

#### 9.3.2.1 Lower Shannon Catchments

85. The Lower River Shannon catchments within the study area are the Lower Shannon 25A, 25B, 25C and 25D. These catchments cover an area of 5,091km² and comprise the Little Brosna River; the Derg TN lake water body and its tributaries; the Derg HMWB and its tributaries; and the lower reaches of the River Shannon to Limerick City and the catchment of the Mulkear River.

##### *9.3.2.1.1 Lower Shannon 25A*

86. The Cycle 3 HA 25A Lower Shannon Catchment Report (EPA 2024d) describes it as being characterised by relatively flat topography with extensive areas of peat in low-lying areas. The Lower Shannon 25A consists of the following sub-catchments (SCs) and their water bodies:

- **25A_11 Brosna_SC_070:** Kyleboher_010 rises in the Slieve Bloom Mountains, County Offaly and flows in a north-westerly direction until its confluence with the Silver (Kilcormac)_040 in County Offaly

- **25A_12 Silver[Kilcormac]_SC_010:** Silver (Kilcormac)_030 and_020 rises in the Slieve Bloom Mountains, County Offaly and flows in a north-westerly direction through the village of Kilcormac, County Offaly until its confluence with the Brosna_120, County Offaly which flows into the Shannon (Lower)_010 at Shannonbridge just upstream of Meelick Weir
- **25A_6 Clodiagh[Tullamore]_SC_010:** Clodiagh (Tullamore)_030 and 020 rises near the Slieve Bloom Mountains, County Laois south of Tullamore Town and flows in a northerly direction through the villages of Clonaslee, County Laois and Rahan, County Offaly until its confluence with the Brosna_100
- **25A_4 Tullamore_SC_010:** Tullamore_020 and _010 drain the lands to the east of Tullamore before flowing through Tullamore Town, County Offaly until its confluence with the Clodiagh (Tullamore)_050. Tullamore_020 is joined by other tributaries including the Mellaghans_010.

#### *9.3.2.1.2 Lower Shannon 25B*

87. The Cycle 3 HA 25B Lower Shannon Catchment Report (EPA 2024e) describes the Lower Shannon 25B as being characterised by a wide flat limestone plain with an upland region in the east comprising the western slopes of the Slieve Bloom mountains. The Lower Shannon 25B consists of the following sub-catchments (SCs) and their water bodies:

- **25B_1 Shannon [Lower]_SC_040:** Shannon (Lower)_020 runs from just outside Banagher town heading west as far as Incherky. This water body is shared with an adjacent sub-catchment (25B_4 as described below). Other water bodies in this catchment include the Rapemills_010 and _020
- **25B_4 Shannon[Lower]_SC_050:** Shannon (Lower)_010 commences at Shannonbridge and flows along the County Galway/County Offaly border south-east through Shannon (Lower)_020 and Shannon (Lower)_030 river water body along the County Galway/County Offaly border, forming a confluence with several tributaries (including Rapemills_020) before entering the northern end of the Derg TN lake water body at Portumna
- **25B_3 Camcor_SC_010:** Camcor_030 rises in the Slieve Bloom Mountains, County Offaly and flows in a north-westerly direction towards Birr, County Offaly, becoming the Camcor_040 and then the Camcor_050. At the confluence of Camcor_050 with the Little Brosna_050, it flows into the Shannon (Lower)_030 river water body at Friars Island. A number of water bodies flow into Camcor_050 including Clareen Stream/Faurawn_020
- **25B_6 LittleBrosna_SC_010**: Kilcomin Stream_010 rises in County Offaly, near the village of Dunkerrin and flows in a north-westerly direction towards the town of Shinrone, County Offaly until the confluence of Kilcomin Stream_030 with the Little Brosna_010. Little Brosna_010 is joined by a number of other tributaries including the Shinrone Stream_010
- **25B_7 LittleBrosna_SC_020:** Little Brosna_030 continues on from Little Brosna_020 at Liffey Mills in County Offaly, and flows in a north-westerly direction towards the town of Birr, County Offaly until its confluence with the Camcor_050. Little Brosna_030 is joined by a number of other tributaries such as the Rock (Birr)_010 and _020.

#### *9.3.2.1.3 Lower Shannon 25C*

88. The Cycle 3 HA 25C Lower Shannon (Lough Derg) Catchment Report (EPA 2024f) describes the Lower Shannon 25C as being characterised by flat limestone plains to the east of the Derg TN lake water body, and the uplands of the Devil's Bit Hills in the south-east, the Slieve Aughty Mountains in the west and the Slieve Bearnagh and Arra Mountains in the south, between which the River Shannon flows south from the Derg TN lake water body. The Water Action Plan 2024 (DHLGH 2024) divides the Lower Shannon 25C catchment into distinct regions:

- **Derg TN (Lough Derg)**: There are more than 1,600 lakes in the Lower River Shannon catchment, with the Derg TN lake water body being the largest covering an area of 120km². The WFD status of the Derg TN lake water body (2019 to 2024) is 'Moderate'; water bodies in the vicinity of the Derg TN lake water body (from Killaloe bridge to Parteen Weir) are heavily modified. The entirety of the Derg TN lake water body is classified under the WFD as a DWPA and a Nutrient Sensitive Area, with several salmonid water bodies of interest. However, none are designated under the Salmonid Regulations. The Derg TN has four bathing water areas including at Ballycuggeran, Mountshannon, Dromineer Beach and Portumna. In addition, the Derg TN lake water body falls within the Lough Derg (Shannon) SPA [004058]
- **Tributaries**: The Derg TN lake water body is fed by 70 water bodies of varying sizes, the largest of which is the Shannon (Lower)_030 river water body entering the lough at its most northerly point near the town of Portumna, at the County Galway and County Tipperary border. The Derg TN lake water body has a number of large settlements along its shores, most notably Portumna, Dromineer, Mount Shannon, Ballina and Killaloe. Much of the land use surrounding the Derg TN lake water body is agricultural, typically improved grassland. There are limited modifications to the shoreline of the Derg TN lake water body, predominantly consisting of narrow strips of woodland, however, the southernmost extent of the Derg TN lake water body is heavily managed particularly at Parteen Weir. The tributaries have been grouped by WFD designated water body catchments for ease of presentation, as follows:
- Western region tributaries:
  - **25C_12 Kilcrow_SC_010**: Kilcrow_070 rises in the north-west and is joined by the Cappagh (Galway)_020 before flowing into the Derg TN lake water body at Stoneyisland Bay
  - **25C_7 Bow_SC_010**: this catchment includes Woodford (Galway)_030 and Moannakeeba_010 which rise in the Slieve Aughty mountains before entering the Derg TN lake water body near Rossmore Pier. Various other tributaries which rise in the Cappaghabaun Mountains and flow into the Derg TN lake water body's eastern boundaries including Lower Village Trib_010, Coos_010 which rises in Loughatorick South Bog SAC, Derrainy_010 which flows through Alewnaghta Lake, and South Boleynagoagh_010, Kilrateera_Upper_010 and Bow_010 which flow into the south-west of the Derg TN lake water body
  - **25C_8 Graney [Shannon]_SC_010**: Graney (Shannon)_050: Scarriff Stream_010 and Graney (Shannon)_040 converge to Graney (Shannon)_050 and flows into the Derg TN lake water body at the head of Scariff Bay.
- Eastern region tributaries:
  - **25C_9 Ballyfinboy_SC_010**: Ballyfinboy_040 rises in County Offaly, near the village of Moneygall and flows in a north-westerly direction into the Derg TN lake water body at Drominagh, County Tipperary. Its tributary, Ardcrony Stream_010 joins with the Ballyfinboy_040 west of Borrisokane.
  - **25C_11 Nenagh_SC_020:** Nenagh_070 rises in the Silvermines Mountains, County Tipperary and flows in a north-easterly direction past Nenagh town eventually draining into the Derg TN lake water body, just north of Dromineer, County Tipperary. Nenagh_070 has a number of tributaries including the Nenagh Tributary_010. Clonmakilladuff_010 rises close to Coolbaun to the east of Borrisokane and drains into the Derg TN lake water body just north of the Nenagh_070
  - **25C_1 Youghal[Tipperary]_SC_010:** Youghal (Tipperary)_010 drains the flat land to the west of Nenagh and flows into the Derg TN lake water body south-west of the Nenagh in close proximity to the Newtown_010 and Ardgregane Stream_010 and _020 which drain the northern slopes of the Arra Mountains
  - **Lorrhastream_SC_010:** Lorrha Stream_010 flows into Lorrha Stream_020 which flows into the Derg TN lake water body from the north-east. Carrigahorig Stream_010 is joined by the Kilfadda Castle Stream_010, which similarly to Lorrha Stream_010 partially rises in Kilcarren-Firville Bog SAC. Terryglass_010 also flows into the Derg TN lake water body near Terryglass.

- **25C_10 Shannon[Lower]_SC_070:** Shannon (Lower)_040 is made up of various streams which flow into the Derg TN lake water body from the northern limits near Portumna Castle Harbour, along the eastern and western boundary to the southern limit at Ballina, north of Killaloe Bridge.

#### *9.3.2.1.4 Lower Shannon 25D*

89. As described in the Cycle 3 HA 25D Lower Shannon and Mulkear Catchment Report (EPA 2024g), the Derg TN lake water body (Lower Shannon 25C) narrows and flows into the Derg HMWB (Lower Shannon 25D) between Slieve Bearnagh and the Arra Mountains, dividing the towns of Ballina and Killaloe which are located to the east and west banks of the water bodies. At Parteen Weir, it divides into Shannon (Lower)_050 and Shannon (Lower)_060 (known as the Old River Shannon) and the Ardnacrusha Headrace Canal, which becomes the Ardnacrusha Tailrace (North Ballycannan_010) before converging at Limerick Dock transitional water body.

90. **Derg HMWB (Parteen Basin)**: Lies immediately downstream of the Derg TN lake water body and is also known locally as the 'Lower Lake'. It was constructed under the River Shannon Hydro-Electric Scheme in the late 1920s. It floods an area through which the River Shannon once flowed as a river, and the old channel is still recognisable in bathymetric/depth surveys of the bed of the flooded basin (see Appendix A9.1: Abstraction Assessment). The Derg HMWB and the Kilmastulla_050 form part of the Lower River Shannon SAC [002165].

    - Tributaries to the Derg HMWB:
        - **25D_6 Shannon[Lower]_SC_080:** Kilmastulla_050, _040, _030 and _020 rise in the Silvermines Mountains, County Tipperary. The Kilmastulla_050 flows towards the Derg HMWB before turning sharply southwards when it meets the Fort Henry embankment, and it enters the Shannon (Lower)_050 (Old River Shannon) just downstream of Parteen Weir
        - **25D_6 Shannon[Lower]_SC_080:** Ardcloony_010 rises in Slieve Bearnagh and flows into the Derg HMWB at Garranroe
    - Onward Flow from the Derg HMWB:
        - **25D_6 Shannon[Lower]_SC_080:** The Shannon (Lower)_050 flows from Parteen Weir south towards Castleconnell
        - **25D_3 Shannon[Lower]_SC_100:** A short distance upstream of Castleconnell it becomes the Shannon (Lower)_060 and flows into Limerick Dock transitional water body after converging with various tributaries including the Mulkear (Limerick)_050, the Blackwater (Clare)_020 and Groody_010
        - Limerick Dock transitional water body is a transitional water body where North Ballycannan_010 (Tailrace) and Shannon (Lower)_060 converge at Saint Thomas Island south of Parteen Bridge; Limerick Dock transitional water body then flows through Limerick and then into the Upper Shannon Estuary.

### 9.3.2.2 Barrow Catchment

91. Information on the Barrow catchment is drawn from Catchments.ie (EPA 2024c) and Cycle 3 HA 14 Barrow Catchment Report (EPA 2024h). The catchment includes the River Barrow and its tributaries to the tidal waters north of Waterford. The Proposed Project would cross water bodies only in the northernmost reaches of the Barrow catchment:

    - **14_3 Figile_SC_010**: Figile_010 rises near the village of Derrinturn and flows in an overall southerly direction towards the town of Monasterevin, County Kildare until its confluence of Figile_080 with the Barrow_090. Figile_030, _20 and _010 are joined by a number of other tributaries including the Abbeylough_010. The Grand Canal Main Line East (Barrow) is also crossed in the 14_3 Figile_SC_010

- **14_4 Figile_SC_020:** Daingean_030 and Esker Stream_010 both rise from the slopes north-west of Killaderry and flow south-east to the confluence of Esker Stream_020 and Figile_040 which continues south towards the town of Monasterevin, County Kildare until its confluence of Figile_080 with the Barrow_090. The Daingean_010 is also part of this catchment which eventually becomes the Esker Stream_040.

#### 9.3.2.3 Boyne Catchment

92. The Cycle 3 HA 07 Boyne Catchment Report (EPA 2024i) describes the catchment as being the area drained by the River Boyne and its tributaries to the estuary in Drogheda.

- **07_6 Blackwater[Longwood]_SC_010:** Blackwater (Longwood)_010 is the only tributary of the Boyne that would be crossed by the Proposed Project. It drains in a north-westerly direction to join the Boyne_060 approximately 4km north of Longwood town. The Blackwater (Longwood)_020 is also included in this catchment.

#### 9.3.2.4 Liffey and Dublin Bay Catchment

93. The Cycle 3 HA 09 Liffey and Dublin Bay Catchment Report (EPA 2024j) describes this catchment as including the area drained by the River Liffey and by all streams entering tidal water between Sea Mount and Sorrento Point, County Dublin, draining a total area of 1,616km$^2$. The largest urban centre in the catchment is Dublin City. The other main urban centres are Dun Laoghaire, Lucan, Clonee, Dunboyne, Leixlip, Maynooth, Kilcock, Celbridge, Newcastle, Rathcoole, Clane, Kill, Sallins, Johnstown, Naas, Newbridge, Athgarvan, Kilcullen and Blessington. The River Liffey catchment contains the largest population of any catchment in Ireland and is characterised by a sparsely populated, upland south-eastern area and a densely populated, flat, low-lying limestone area over the remainder of the catchment basin.

- **09_7 Liffey_SC_050:** Liffey_130 and _140 rises in the Wicklow Mountains, from where it flows west before being joined by the Brittas River, Ballylow Brook and Goldenhill Rivers and flowing into the northern end of the Poulaphuca Reservoir, created by ESB in the 1930s. The Liffey flows out of the reservoir via the Poulaphuca generating station and into the lower reservoir and second generating station at Golden Falls, upstream of Ballymore Eustace. The river then flows through Newbridge, around Naas and Celbridge after joining with Kilmurry_010, Morell_030 and Morell_040. Liffey_140 then flows on towards Leixlip Reservoir and generating station. From here it enters a steep-sided valley and flows past Islandbridge at which point it becomes tidal. It is then joined by the outflow from the Royal and Grand Canals; the Dodder from the south and Tolka from the north, and flows past Dublin Port into Dublin Bay
- **09_14 Liffey_SC_070**: Reeves_010 rises south of Ardclough and flows north toward its confluence with the Liffey_140. The Grand Canal Main Line (Liffey and Dublin Bay) is also crossed by the 09_14 Liffey_SC_070
- **09_9 Lyreen_SC_010:** Lyreen_010 and_020 is the only significant tributary of the Liffey to be crossed by the Proposed Project and is joined by the Clonshanbo_010 and 020 which is crossed by the pipeline. This river rises in the westernmost part of the catchment and forms the watershed with the Boyne catchment. It flows north-east to Maynooth, where it joins the Rye Water_040, shortly upstream of the Rye Water Valley/Carton SAC. The Rye Water_040 joins the Liffey_150 downstream of the Leixlip Reservoir
- **09_15 Liffey_SC_090:** There are a total of 10 river water bodies in this sub-catchment. It includes the Castletown (Dublin-Kildare)_010 tributary, which feeds the Liffey_150 water body, which in turn proceeds downstream to Liffey_160 and _170.

### 9.3.3 Water Bodies Baseline Details

94. Full details on each of the water bodies potentially affected by the Proposed Project are provided in Appendix A9.5 (Baseline). A summary of details is provided in Table 9.10 for ease of reference.

**Table 9.10: WFD Designated Water Bodies within the Study Area**

| Catchment (WFD Catchment Code) | Sub-Catchment | WFD Designated Water Bodies | WFD Ecological Status (2019-2024) | Sub-Catchment Pressure Category |
|---|---|---|---|---|
| Boyne (07) | 07_6 Blackwater[Longwood]_SC_010 | Blackwater (Longwood)_010 | Poor | Extractive Industry<br>Anthropogenic Pressures |
| | | Blackwater (Longwood)_020 | Moderate | |
| Liffey and Dublin Bay (09) | 09_7 Liffey_SC_050 | Liffey_130 | Good | Agriculture<br>Forestry<br>Industry<br>Extractive Industry<br>Hydromorphology<br>Anthropogenic Pressures |
| | | Liffey_140 | Good | |
| | 09_14 Liffey_SC_070 | Grand Canal Main Line (Liffey and Dublin Bay) | Good | Agriculture<br>Forestry<br>Industry<br>Extractive Industry<br>Hydromorphology<br>Anthropogenic Pressures |
| | | Reeves_010 | Good | |
| | 09_15 Liffey_SC_090 | Castletown (Dublin-Kildare)_010 | Poor | Agriculture<br>Urban Waste Water<br>Urban runoff<br>Waste<br>Industry<br>Extractive Industry<br>Hydromorphology<br>Anthropogenic Pressures |
| | | Liffey_170 | Poor | |
| | 09_9 Lyreen_SC_010 | Clonshanbo_010 | Poor | Agriculture<br>Urban Runoff<br>Domestic Waste Water<br>Hydromorphology<br>Anthropogenic Pressures |
| | | Clonshanbo_020 | Poor | |
| | | Lyreen_010 | Poor | |
| | | Lyreen_020 | Poor | |
| Barrow (14) | 14_3 Figile_SC_010 | Abbeylough_010 | Moderate | Agriculture<br>Urban Waste Water<br>Domestic Waste Water<br>Extractive Industry<br>Hydromorphology<br>Anthropogenic Pressures |
| | | Figile_010 | Poor | |
| | | Figile_020 | Moderate | |
| | | Figile_030 | Moderate | |
| | | Grand Canal Main Line East (Barrow) | Good | |
| | 14_4 Figile_SC_020 | Daingean_010 | Poor | Agriculture<br>Extractive Industry<br>Hydromorphology<br>Anthropogenic Pressures |
| | | Daingean_030 | Poor | |
| | | Esker Stream_010 | Moderate | |
| | | Esker Stream_020 | Moderate | |
| | | Figile_040 | Poor | |

| Catchment (WFD Catchment Code) | Sub-Catchment | WFD Designated Water Bodies | WFD Ecological Status (2019-2024) | Sub-Catchment Pressure Category |
|---|---|---|---|---|
| Lower Shannon (25A) | 25A_11 Brosna_SC_070 | Kyleboher_010 | Moderate | Anthropogenic Pressures |
| | 25A_12 Silver [Kilcormac]_SC_010 | Silver (Kilcormac)_020 | Good | Agriculture<br>Urban waste water<br>Hydromorphology |
| | | Silver (Kilcormac)_030 | Moderate | |
| | 25A_4 Tullamore_SC_010 | Meelaghans_010 | Moderate | Agriculture<br>Industry<br>Extractive Industry |
| | | Tullamore_010 | Poor | |
| | | Tullamore_020 | Poor | |
| | 25A_6 Clodiagh [Tullamore]_SC_010 | Clodiagh (Tullamore)_020 | Good | Abstraction<br>Hydromorphology |
| | | Clodiagh (Tullamore)_030 | Moderate | |
| Lower Shannon (25B) | 25B_3 Camcor_SC_010 | Clareen Stream/Fuarawn_020 | Moderate | Agriculture<br>Forestry<br>Extractive Industry<br>Hydromorphology<br>Anthropogenic Pressures |
| | | Camcor_030 | Good | |
| | | Camcor_040 | Good | |
| | | Camcor_050 | Good | |
| | 25B_6 LittleBrosna_SC_010 | Kilcomin Stream_030 | Moderate | Agriculture<br>Forestry<br>Hydromorphology<br>Anthropogenic Pressures |
| | | Shinrone Stream_010 | Poor | |
| | 25B_7 LittleBrosna_SC_020 | Little Brosna_030 | Good | Agriculture<br>Urban Waste Water<br>Urban Runoff<br>Industry<br>Extractive Industry<br>Hydromorphology |
| | | Rock (Birr)_010 | Poor | |
| | | Rock (Birr)_020 | Moderate | |
| Lower Shannon (25C) | 25C_1 Youghal[Tipperary]_SC_010 | Ardgregane Stream_010 | Poor | Agriculture<br>Urban Runoff<br>Hydromorphology |
| | | Ardgregane Stream_020 | Moderate | |
| Lower Shannon (25B) | 25B_1 Shannon[Lower]_SC_040 | Rapemills_010 | Moderate | Agriculture |
| Lower Shannon (25C) | 25C_10 Shannon[Lower]_SC_070 | Derg TN | Moderate | Agriculture<br>Hydromorphology<br>Invasive Species |
| Lower Shannon (25C) | 25C_11 Nenagh_SC_020 | | Moderate | Agriculture<br>Hydromorphology<br>Invasive Species |
| Lower Shannon (25D) | 25D_6 Shannon[Lower]_SC_080 | Derg HMWB | Good | Agriculture<br>Urban Waste Water<br>Extractive Industry<br>Hydromorphology<br>Invasive Species<br>Anthropogenic Pressures |
| | | Kilmastulla_020 | Moderate | |
| | | Kilmastulla_030 | Poor | |
| | | Kilmastulla_040 | Moderate | |
| | | Kilmastulla_050 | Moderate | |
| | | Shannon (Lower)_050 | Poor | |
| | 25D_3 Shannon[Lower]_SC_100 | North Ballycannan_010 | Good | Agriculture<br>Domestic Waste Water<br>Forestry<br>Hydromorphology |
| | | Blackwater (Clare)_020 | Good | |
| | | Shannon (Lower)_060 | Moderate | |

| Catchment (WFD Catchment Code) | Sub-Catchment | WFD Designated Water Bodies | WFD Ecological Status (2019-2024) | Sub-Catchment Pressure Category |
|---|---|---|---|---|
| Lower Shannon (25C) | 25C_11 Nenagh_SC_020 | Nenagh Tributary_010 | Moderate | Agriculture<br>Hydromorphology |
| | | Nenagh_070 | Moderate | |
| | 25C_9 Ballyfinboy_SC_010 | Ardcrony Stream_010 | Moderate | Agriculture<br>Urban Runoff<br>Extractive Industry<br>Hydromorphology |
| | | Ballyfinboy_040 | Moderate | |

### 9.3.4 Amenity Areas

#### 9.3.4.1 River Shannon

95. The River Shannon is the longest river in Ireland. It is navigable for over 200km, from Lough Allen in the north to Limerick in the south, passing through Lough Ree, the Derg TN lake water body and the Derg HMWB. The marked navigation channel in the Derg HMWB is approximately 280m from the RWI&PS. The navigation channel continues through a series of locks from the Derg HMWB into the Headrace and into the Shannon (Lower)_050 and _060 following the confluence with the Tailrace (North_Ballycannon_010).

#### 9.3.4.2 Derg TN

96. The Derg TN lake water body has 179km of shoreline, stretching over 40km from Portumna, County Galway in the north to Killaloe, County Clare and Ballina, County Tipperary in the south. Water-related recreational activities on the Derg TN lake water body include boating, canoeing, water skiing, kayaking, surfing and sub-aqua diving. There are four designated Bathing Water Areas on Lough Derg (Derg TN): Ballycuggeran, Mountshannon, Dromineer Beach and Portumna. There are also walking trails associated with the Lough, such as the East Clare Way and the Lough Derg Way. There are a number of historic sites surrounding the Derg TN lake water body. The lake is also an important fishing location, and is especially famous for brown trout, roach, salmon and bream.

#### 9.3.4.3 Grand Canal

97. The Grand Canal connects Dublin in the east to the River Shannon at Shannon (Lower)_010 near Banagher in the west, through the midland towns of Tullamore, Edenderry and Naas. It is an important amenity used by both tourists and visitors for walking, fishing, boating (barges) and bird watching in areas close to public transport links. The Treated Water Pipeline from the BPT to the TPR would cross beneath the Grand Canal, using trenchless construction techniques, north-west of Allenwood in County Kildare, approximately 700m west of the Bord na Móna Bridge, Kilpatrick (WBX078). It would also cross beneath the Grand Canal a second time, approximately 700m south-west of Straleek, in South Dublin County (WBX088).

### 9.3.5 Future Baseline

98. The future baseline of the water environment without the Proposed Project is considered in Section 9.4.1 (Do-Nothing Scenario).

99. In general, long-term projected conditions for all water bodies (including minor watercourses and drainage channels) may be influenced by changes in river flows and rainfall intensity as a result of climate change, as well as changing populations, increased urbanisation and changes in land use.

100. Climate change effects are considered in that sensitivity to climate change is a certainty rather than a possibility. A precautionary approach to the consideration of climate change has been applied in the Proposed Project hydrological modelling, and a 'reasonable worst case' climate change scenario has been used based on the 2080s epoch. Broadly, future climate change impacts will mean winters are likely to become wetter and summers becoming drier. Annex A (Hydrological Modelling Report) of Appendix A9.1 (Abstraction Assessment) provides full details on how climate change has been considered, the projected percentage changes to the Lough Derg (Derg TN)/Parteen Basin (Derg HMWB) system hydrology (catchment runoff flows, direct lake precipitation and direct lake evaporation), and the simulated changes to lake levels when applying the climate change allowances across the 52-year hydrological model simulation (1972-2023), with and without including the Proposed Project abstraction.

## 9.4 Assessment of Likely Significant Effects

101. The following sections present an assessment of the likely significant effects on the water environment associated with the Construction, Commissioning and Operational Phases of the Proposed Project with respect to the appraisal methods that have been presented in Section 9.2.

102. There are a number of likely significant effects on water bodies which could occur as a result of the Construction and Operational Phase of the Proposed Project. Appendix A9.1 (Abstraction Assessment), Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment) describe the nature of the impacts and overall significance of the effects relating to elements of the Proposed Project. The key findings of these assessments are summarised in this chapter. Likely effects of Moderate (significant) or higher significance are summarised. For Slight (not significant), Not Significant or Imperceptible effects, the reader is directed to the relevant appendices.

103. This section presents an assessment in the absence of mitigation measures, with the exception of embedded mitigation that has been incorporated into the design (e.g. avoiding sensitive features through the siting of the Proposed Project during the optioneering stages). Mitigation measures have been proposed in Section 9.5 to prevent or reduce the likely significant effects, and the residual effects after the application of mitigation measures are reported in Section 9.6.

### 9.4.1 Do-Nothing Scenario

104. Schedule 6 of S.I. No. 296 of 2018 requires that EIARs include:

'*(c) a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge*'

105. In this EIAR, the 'evolution of the baseline without the development' is described as the 'Do-Nothing' scenario.

106. The baseline (see Section 9.3) describes the water bodies within the study area and the existing pressures, identified and categorised under the Water Action Plan 2024 (DHLGH 2024). It is assumed that the more short-term trends would be seen in water quality, with hydrological and geomorphological changes being subject to more long-term trends. This section sets out the key pressures and policy responses in Ireland.

107. Within the seven catchments of the study area, Agriculture is the top significant pressure to water bodies which are 'At Risk' of failing to achieve WFD objectives within the study area, as reported in the Cycle 3 Catchment Reports (EPA 2024d; EPA 2024e; EPA 2024f; EPA 2024g; EPA 2024h; EPA 2024i; EPA 2024j).

108. The DHLGH outline in their Water Action Plan 2024 that "*Agriculture is the most common significant pressure impacting 1,023 water bodies*" (DHLGH, 2024). There has been an increase in agricultural pressures on water quality from the 2nd to 3rd cycle RBMP, which is expected to continue into the future. The EPA has established that the projected increases in dairy production, in part due to the end of EU milk quotas and expanding markets in third country markets (Department of Agriculture, Food and the Marine, 2020), will pose a 'significant threat' to water quality (EPA 2010).

109. Under the Water Action Plan 2024 (DHLGH 2024), the key policy response is in relation to the strengthened Nitrates Action Programme continuing to be enforced by local authorities and Department of Agriculture, Food and the Marine. Up to 5,000 farmers will receive support from Teagasc through the new collaborative Agricultural Sustainability Support and Advisory Programme (ASSAP) targeted within the 190 Areas for Action (AFAs) with 30 Sustainability Advisors in place. As well as this, the Farming for Water European Innovation Partnership (EIP) provides €60 million in funding for farmers to implement the actions in the AFAs. In addition, 18,000 dairy farmers will receive advice on sustainable farming practices under the Dairy Sustainability Initiative. Local Authorities will strengthen the inspection and enforcement relating to agricultural pollution from diffuse sources. This includes the allocation of 57 new inspectors for the National Agricultural Inspection Programme (NAIP) and four additional staff allocated to Local Authorities Waters Programme (LAWPRO) to help with coordination and efficiency. There are also a range of measures outlined under Ireland's CAP Strategic Plan (Department of Agriculture Food and the Marine, 2025) including, but not limited to, eco-scheme measures to promote the protection of water quality and the focus on reducing losses of sediment, nitrogen, phosphorous and pesticides to water from agricultural lands.

110. Pressures on Hydromorphology is the second most significant pressure in six of the seven catchments in the study area. Only the Liffey and Dublin Bay Catchment differs, where Urban Runoff is the second most significant pressure. The pressures relate to physical modifications to the flow, form or function of natural surface water bodies, or changes to the habitat conditions.

111. The Water Action Plan 2024 (DHLGH, 2024) also details numerous actions to improve the knowledge and understanding of hydromorphological characteristics of water bodies in Ireland. The Department for Housing, Planning and Local Government has established a Hydromorphology Expert Group to support the new National Hydromorphology Programme, the ultimate goal of which is to have a statutory control regime in place to manage activities impacting on the physical condition of the water environment, as well as a prioritised programme of restoration for impacted waters. The Group will implement interim measures during the 3rd RBMP cycle. The Department envisages that the control regime will be risk-based and proportionate, consisting of a tiered approach that includes general binding rules, registration and licensing. Substantial technical work is planned by the EPA and IFI, with the support of other authorities, to further develop systems for the assessment of hydromorphological condition and its relationship with ecology.

### 9.4.2 Construction Phase

#### 9.4.2.1 Introduction

112. Chapter 5 (Construction & Commissioning) outlines the principal Construction Phase activities required to complete the Proposed Project, and includes details of these activities, such as Construction Compounds, Pipe Storage Depots, temporary roads, hours of working, and numbers of personnel involved. In addition, it includes details on the commissioning works necessary for assuring that systems and components meet the operational requirements for service.

113. The duration of the Construction Phase is estimated to be approximately 5 years. The Construction Compounds would be in place for the full duration of the Construction Phase. The Pipe Storage Depots would be removed following completion of the extent of pipeline works they support.

114. In the absence of control measures or mitigation, there are a number of impacts which could occur during the Construction Phase which would be common to most major construction sites and are applicable across the whole of the Proposed Project. These are described in this section.

115. The prediction of specific impacts during the Construction Phase for each element of the Proposed Project is provided in Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment). Note, Appendix A9.1 (Abstraction Assessment) focuses solely on the operational impacts of the abstraction regime and includes no Construction Phase impacts.

116. A summary of the findings from Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment) is presented in this section and likely effects that would have a significant effect (Moderate (significant) or above) are presented in Table 9.11 and Table 9.12.

117. The assessment considers the likely significant effects of the Proposed Project prior to mitigation or control measures being implemented. Measures required to prevent effects on water bodies are provided in Section 9.5 of this chapter, summarised in Table 9.14 and Annex A (SWMP) of Appendix A5.1 (CEMP). Residual effects following mitigation are provided in Section 9.6.

#### 9.4.2.2 Generic Impacts During Construction

118. There are a number of likely impacts which could occur as a result of the Proposed Project, and common to most major construction projects. These include:

- Likely impacts on hydrology during construction would be largely related to the potential for activities to disrupt surface water flows, across land and in water bodies
- Secondary impacts of disruption to flow include sediment mobilisation and changes to hydromorphology would occur because of additional fine sediment input arising from bare earth surfaces and working within a channel. These are addressed in the sections relating to those attributes
- There are several likely surface water quality impacts associated with the construction of the pipeline, which would be common to most construction sites in the absence of control measures or mitigation. These relate to the potential for the mobilisation of polluting substances, as follows:
  - Silt-laden water runoff, leading to increased sediment loading in nearby water bodies from activities such as the diversion or overpumping of water bodies, stripping of topsoil during site preparation, the dewatering of excavations and the storage of excavated material. In addition, there is potential for the open trenches to act as ‘conduits’ for the flow of silty water to water bodies, creating pathways to water bodies that would not otherwise be present. This type of impact is most likely to occur where the RWRMs and Treated Water Pipelines cross a body of water
  - Spillages of miscible (capable of being mixed in water in this case) substances (e.g. pesticides), and immiscible substances (e.g. oil, vehicle fuel), and concrete and other cements. In the absence of mitigation, these have the potential to impact water quality even in small quantities
  - Others: there are several other likely impacts common to most construction works, associated with Construction Compounds and Pipe Storage Depots. The Construction Compounds would house welfare cabins, store materials (including oil and construction materials) and provide car parking and vehicle washing. In the absence of mitigation, in addition to the impacts already listed, there are likely impacts on water quality from vehicle washing, oil dripping from plant and machinery and wastewater from welfare facilities

- Construction activities, including excavation in and around a channel, storage of excavated materials, vegetation clearance and topsoil stripping, all have the potential to create bare earth surfaces providing a source of fine sediment
- With changes in overland flow pathways and in-channel working, the potential for fine sediment to enter a river/water body would be increased. This additional sediment would lead to localised changes in the flow and geomorphic processes within the channel, potentially leading to smothering of bed substrate and changes to existing morphological features. This would have a greater impact on the medium and high sensitivity water bodies.

#### 9.4.2.3 Abstraction

119. There would be no construction impacts related to the abstraction itself; likely impacts as a result of the abstraction would occur during operation only. The infrastructure required to facilitate the abstraction would have impacts during construction; these are described in Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment) and are summarised in Section 9.4.2.5.

#### 9.4.2.4 Raw Water Rising Mains, Treated Water Pipeline (Appendix A9.2: Pipeline Assessment)

120. A detailed assessment of the likely significant effects of the RWRMs and Treated Water Pipelines is provided in Appendix A9.2 (Pipeline Assessment). This section presents a summary as follows:
    - An overview of the likely significant effects from the construction of the pipeline (in relation to hydrology, surface water quality and hydromorphology)
    - A summary of the findings of the assessments of major activities with the potential to affect water bodies:
        - Pipeline trenching
        - Water body crossings
        - Road crossings
        - Construction Compounds and Pipe Storage Depots
        - Washout valves.

##### *9.4.2.4.1 Pipeline Trench (Drainage, Dewatering and Surface Water Runoff)*

121. General pipe drainage and dewatering would be required along the pipeline where excavation works are undertaken, or on trenchless sections of the pipeline where there is ingress of water into shafts.
    - Drainage measures for groundwater management may be required in some locations to prevent deterioration of the working areas and to prevent excess water collecting in the trench during construction. Existing drainage lines may be re-routed using a drainage trenching machine so that they continue to function during the Construction Phase. These would be installed in accordance with the individual landowner agreements
    - Dewatering: before trenching commences, dewatering of groundwater may be required to ensure safe working conditions.

122. The drainage and dewatering of the pipeline trench have the potential to impact water bodies through:
    - Changing local runoff patterns and rates associated with flow interception leading to changes in stream flow and velocity or inflows to adjacent pond or wetland habitats
    - Localised lowering of the water table, loss of river flows or reduction in level in adjacent pond or wetland habitats
    - Pollutant (silt, oil or chemical) entry to water bodies from runoff, dewatering and spillages

- Creating a large, exposed area which could provide a substantial new source of fine sediment into receiving watercourses, particularly if a large rainfall event occurs
- Input of fine sediment from local runoff or dewatering discharges to water bodies, leading to changes in sediment regime and riverbed substrate locally
- Changes to flow regime, which could impact river processes, in-channel sediment movement, channel morphology and stability locally and downstream
- A change in runoff entry points, which could cause localised scour of banks.

123. Impacts associated with the trench as a result of filter drainage would occur where there is a pathway to water bodies; this would be the case where there are open cut crossings in particular. Impacts associated with crossings are detailed in Section 9.4.2.4.2 (Water Body Crossings) and Section 9.4.2.4.3 (Road Crossings).

124. Dewatering of trenches would involve pumping and discharge of water, via attenuation ponds to either land or nearby water bodies. It is likely there would be a large number of local settlement lagoons along the proposed Treated Water Pipelines and a detailed assessment of the requirement for temporary water storage for settlement has been calculated, taking into account local topography and rainfall patterns. The exact location of these settlement ponds would be identified during detailed design; however a hierarchy is proposed whereby water management in these ponds would be in the following order of preference:
    - Soakaway '*in situ*' – there would be no discharge point from the lagoon or pond; the water would naturally soak away into the ground (see Chapter 10: Soils, Geology & Hydrogeology)
    - Discharge to land – where land conditions permit, settled water would be discharged onto land within the Construction Working Width and allowed to soak away naturally across grassed areas (see Chapter 10: Soils, Geology & Hydrogeology)
    - Discharge to water bodies – where it is not feasible to discharge to land, discharges to local water bodies would be made following settlement as outlined below.

125. It should be noted that Nature-Based Solutions will be used where practicable and green engineering solutions will be used in favour of grey based solutions. The use of these measures will depend on local site characteristics and the types of infrastructure or construction being proposed.

126. Attenuation ponds will be located in natural low points along the pipeline route. Full details are provided in Appendix A9.2 Section 7.4.2.2. All of the attenuation ponds would be designed, constructed and operated to ensure discharges do not exceed 25mg/l suspended solids from construction works to fisheries waters or 35mg/l suspended solids from construction works to water bodies in peatland. Rates of discharge would also be controlled to ensure there is no scour of the bed and banks of the receiving water bodies.

127. Therefore, in normal operating conditions, pre-mitigation impacts as a result of discharges from the attenuation ponds would be short-term, adverse and of negligible magnitude. There is a range of sensitivities for the receiving water bodies, from medium to very high. This would result in a Not Significant effect.

128. In conditions of increased rainfall, where increased volumes of water would need to be managed, there is potential for the attenuation ponds to become inundated and unable to operate in their correct manner, for example with reduced settling time, which could result in increased levels of suspended solids in discharges. In this situation, the magnitude of impacts could increase to medium; it is unlikely to be higher than this as it is likely the receiving water would also have received additional rainfall and be able to provide an increased level of dilution to the discharge. In these conditions, the significance of effects would range from Not Significant to Very Significant depending on the sensitivity of the receiving water body and/or the proximity to WFD designated water bodies or feeding tributaries.

129. There would be the potential for the pipeline trench to become a conduit and pollution pathway for contaminants to reach water bodies.

130. The stripping of soil across the entire working width presents risks of silty water runoff to nearby water bodies. In many locations, this would be addressed through filter drains or dewatering, however there are some locations where there are water bodies adjacent to the proposed Treated Water Pipelines corridor rather than directly crossed by it, where silty water could runoff to them instead of towards the trench, depending on the topography. Where water bodies are smaller or in close proximity to attenuation ponds, dilution effects and interception of sediment would be less. The proximity of the working area in these locations could mean there is a high likelihood that silty water could reach the water body. Without a vegetated buffer between the pond and the water body, there is potential for overland flows during inundation. For further information on this please refer to the Water Status Impact Assessment Report and Appendix A9.2 Section 7.4.2.1.

#### *9.4.2.4.2 Water Body Crossings*

131. There would be 512 crossings of water bodies by the RWRMs and Treated Water Pipelines; 71 of those crossings would be on water bodies identified by the EPA (WCX reference; and WBX for WFD classified canals), some of which are crossed more than once. The remainder are field drains and ditches (WBX and WBP reference) which are Other Waterbodies not identified or named by the EPA under the WFD. A detailed assessment of the crossings is provided in Annex A (Water Body Crossings and Washout Valves - Detailed Assessment) of Appendix A9.2 (Pipeline Assessment).

132. The watercourses would be crossed using ‘trenchless’ or ‘open cut’ techniques. There are 481 open cut crossings and 31 trenchless crossings proposed.

- Trenchless: Trenchless construction would involve tunnelling under major crossings such as roadways, railways, canals, large or sensitive watercourses and high voltage overhead power lines. This would mean that the Proposed Project would not inhibit the function of key infrastructure and reduce the likelihood of impacts to ecologically sensitive habitats. Typically, for the Proposed Project this would be carried out using pipe jacking or auger boring. Horizontal directional drilling would also be used for power connections
- Open cut: There are two open cut techniques:
  - ‘Damming and Fluming’: The crossing of the watercourse would be facilitated by channelling the water body through a conduit, or ‘fluming’. The flume is used to carry the water over the excavated trench; a dam of sandbags and suitable clay material across the riverbed would ensure all flow is diverted through the conduit(s)
  - ‘Damming and Pumping’: Again, a dam (sandbags and suitable clay material) would be created across the riverbed, however in this scenario, suitably sized temporary pumps would be used to convey the water downstream of the open excavation crossing point.

133. There are 31 water body crossings which would be crossed using trenchless technology because of their size, nature or sensitivity, including the following crossings on 9 WFD designated water bodies:

- WCX016 - Nenagh_070
- WCX026 - Little Brosna_030
- WCX031 - Camcor_030
- WCX032 - Camcor_030
- WCX036 - Silver (Kilcormac)_020
- WCX039 - Clodiagh (Tullamore)_020
- WCX056 - Figile_030

- WCX057 - Figile_030
- WBX078 - Grand Canal Main Line East (Barrow)
- WCX073 - Liffey_140
- WCX076 - Liffey_140
- WBX088 - Grand Canal Main Line (Liffey and Dublin Bay).

134. Trenchless crossings would be non-intrusive to the water bodies as they involve no in-stream works. However, there is still some potential for water quality and hydromorphology impacts. The trenchless crossings require shafts to be excavated on either side of the crossing, and this has potential to result in runoff of sediment to nearby receptors impacting water quality and hydromorphology. These impacts, pre-mitigation, would likely be of medium adverse magnitude.

135. There is also potential for accidental leakage of oil and/or chemicals from machinery impacting water quality and channel morphology (including bed and bank composition), followed by pollution of the water column as oil degrades. These impacts have a low likelihood of occurrence.

136. Since trenchless techniques do not require in-channel working, it is unlikely that there would be any direct impact on riverine water levels/flow rates, although there could be some medium adverse magnitude impacts as a result of slight changes to water levels due to dewatering of shaft excavations.

137. The greatest risk from trenchless crossings is the potential for a 'breakout' of bentonite drilling fluid. Where a slurry system is used to extract spoil during micro-tunnelling, a mix of bentonite and water is used to suspend the excavated spoil which is then pumped out of the excavation to a solids separation system on the surface where the spoil is filtered and separated from the slurry. The liquid sludge remaining in the tanks is placed under a soil separator and dewatered with a centrifuge or filter press.

138. In the absence of control measures, breakouts could occur spilling bentonite slurry onto the ground and/or into local water bodies. If these were to occur, there could be impacts to water quality as a result of the release of fine sediments to the receptor, including change to pH, as bentonite grout is alkaline. Although unlikely, should such a breakout occur, the magnitude of impact would be medium adverse, resulting in effects ranging from Slight (not significant) to Very Significant in the water bodies at the 31 water body crossings, as detailed in Section 7.5.2 in Appendix A9.2 (Pipeline Assessment).

139. Of the remaining 481 water body crossings, which would be crossed using open cut crossing techniques, 59 would be on WFD designated water bodies, with the remainder being water bodies such as drains and ditches. Open cut crossing techniques require in-channel works, as described above.

140. Types of impacts are as follows:

- Hydrology: Disruption to flow and water levels as a result of over-pumping or diversions; dewatering leading to a change in groundwater and subsequent recharge levels
- Water quality:
  - Accidental releases of hydrocarbons
  - Silty water runoff
  - Silty water in dewatering
  - The potential for the trench to be a pathway for pollutants to reach water bodies
  - Build-up of silt behind dam structures which, on removal, could lead to a release of sediments to the water body
- Hydromorphology: Channelisation, impacts on the riparian zone, and increased in-channel sediment-loading, potentially smothering substrate.

141. In considering the potential magnitude of impacts for the watercourse crossings as a result of crossing via open cut techniques, since the nature, duration and scale is likely to be similar at each crossing point, a similar magnitude of impact is likely. There are 59 WCX crossings of 33 different WFD designated water bodies which range from low to very high sensitivity. Given the high adverse magnitude of impacts, pre-mitigation, the significance of effects is Very Significant for all WCX open cut crossings.

142. Open cut crossings in peat soils bring additional risks to water quality and hydromorphology. Water quality issues associated with peat include elevated levels of suspended solids, ammonia, phosphorus and dissolved organic carbon. There are 21 open cut crossings directly in peat areas which have the potential to impact 12 high sensitivity WFD designated water bodies. It is likely the magnitude of the impact will be high adverse, resulting in Very Significant effects.

143. There are 422 open cut crossings of Other Waterbodies. Impacts discussed in relation to WFD designated water bodies are similar for these Other Waterbodies and therefore the magnitude of impacts are expected to be high adverse. Similarly, differentiation of impacts comes from the sensitivity of each Other Waterbody to change and so significance of effect would range from Moderate (significant) to Very Significant.

144. Location-specific additional mitigation for both trenchless and open cut water body crossings is identified in Section 7.5.4 of Appendix A9.2 (Pipeline Assessment) and Annex A (SWMP) of Appendix A5.1 (CEMP). Effects post-mitigation are identified in Section 9.6.

#### *9.4.2.4.3 Road Crossings*

145. There are 127 crossings of roads by the RWRMs and Treated Water Pipelines (see A09.2 Figure 1 to Figure 59 in Appendix A9.2): 107 open cut and 20 trenchless (see A09.2 Figure 60 to Figure 76 in Appendix A9.2). Section 3 of Appendix A5.4 (Schedule of Crossings) includes a list of all proposed road crossings, with full details of their locations. These road crossings coincide with open cut and trenchless water body crossings. The impacts associated with these water body crossings are covered in Section 9.4.2.4.2.

146. In addition to water body crossings at the road crossings at risk of likely significant effects, there are 13 water bodies within 50m of the road crossings and the temporary construction road. The impacts associated with these nearby water bodies are covered in Section 7.6 of Appendix A9.2 (Pipeline Assessment) and in Section 9.4.2.4.1 above.

#### *9.4.2.4.4 Construction Compounds and Pipe Storage Depots*

147. Given the extent of the Proposed Project, a number of Construction Compounds are required to facilitate the works, and are directly related to the number of contractors to be employed. Eight Construction Compounds are identified in Chapter 5 (Construction & Commissioning) of the EIAR. Five of these are located within the boundaries of the Infrastructure Sites (RWI&PS, WTP, BPT, BPS and TPR). The impacts from these sites are considered in Section 9.4.2.5 and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment). This section considers the other three Construction Compounds (CCs) along the pipeline route (CC2, CC5 and CC6) and outside the Infrastructure Sites.

148. Pipe Storage Depots (PSDs) would take direct delivery of the pipe sections. Within these areas the pipe sections would be prepared and stored for onward journey to the required install location. Given the volume of pipe material to be delivered, it is not considered feasible or practical for pipe material to be delivered directly to the point of installation. Nine Pipe Storage Depots have been identified as being suitable along the pipeline (PSD1-6 and PSD8-10).

149. Establishment of Construction Compounds and Pipe Storage Depots during enabling and construction works has the potential to expose bare ground and create sources and pathways for fine sediment pollution from plant machinery to water body receptors.

150. In the absence of control or mitigation measures, there would be a potential for the spillage of oil and chemicals to ground and the production of a large amount of silt-laden water as a result of dewatering or surface water runoff from stripped land.

151. For the welfare facilities at the Construction Compounds and Pipe Storage Depots, a service connection would be made to the potable water supply in public roads where possible; if this is not possible, water would be brought to the compounds via bowser.

152. There are 24 water bodies either within the footprint of the Construction Compound or Pipe Storage Depot, directly crossed by the pipeline and within the footprint, adjacent to or within 50m of the footprint extent. These are detailed in Table 7.9 in Section 7.7 of Appendix A9.2 (Pipeline Assessment). In line with Chapter 5 (Construction & Commissioning), where water bodies are within the compound or depot footprint, but not crossed by the pipeline, they are to be recorded and temporarily culverted during the Construction Phase. For water bodies within the compound or depot footprint and crossed by the pipeline, it is unclear at this stage if the water body would be temporarily culverted under the compound during construction or crossed using open cut techniques for the pipeline; therefore these water bodies have been assessed for both at this stage.

153. Temporary culverting would likely be carried out by temporarily damming the water body and over-pumping or fluming flow, to create a dry area in which work can be carried out. Working in-stream in this manner has the potential for the following impacts on the hydromorphology of the water bodies:

- Release of silty runoff
- Damage and modifications to the bed and banks
- Changes to flow regime as a result of over-pumping/fluming.

154. Installation of the culverts would require some excavation of the channel bed and banks. This would cause a release of fine sediments that could cause smothering of downstream bed substrate and hydromorphological features. There would also be a loss of hydromorphological features (if present) over the footprint of the excavation location.

155. The impacts as a result of changes to the flow regime of the water body would include the potential for a build-up of sediment at the dam, leading to localised changes in the bed and localised scouring at the point at which the pump discharges into the water body. Such impacts would be temporary, limited to the Construction Phase and localised to the works footprint and for a small distance upstream and downstream, although impact could propagate upstream and/or downstream.

156. Temporary culverts have the potential to impact the hydromorphology of the water bodies during the Construction Phase through the following:

- Increased flow velocities through the culvert leading to increased erosion downstream
- Removal of morphological features and natural bed and bank material below the culvert footprint
- Loss of lateral and longitudinal connectivity with subsequent impact on sediment and ecological continuity.

157. As such, the magnitude of impact, pre-mitigation, for water bodies with temporary culverts is assessed as medium to high adverse. The significance of effects of site compound and pipe storage areas would vary based on the sensitivity of the receptor, and range from Moderate (significant) to Very Significant.

158. For water bodies within proximity to the Construction Compounds and Pipe Storage Depots, the construction works would not require works within the channels. Therefore, impacts would be limited to indirect impacts which could arise as a consequence of topsoil stripping or any earthworks required to set up compounds which may result in the diversion or 'cut-off' of land drains and ditches.

159. Where these sites are located further than 50m from the nearest water body, impacts are likely to be negligible as they would have no measurable impact on integrity of the attribute. Where there is a water body in close proximity (<50m) to the construction activities at a site then, in the absence of control measures or mitigation, there is a reasonably high likelihood of a pollution pathway being established. As a result, a medium adverse magnitude of impact (pre-mitigation) is predicted. The significance of effect would vary depending upon the sensitivity of the water body and range from Not Significant to Significant.

160. Full details of the assessment of these water bodies are presented in Annex A of Appendix A9.2 (Pipeline Assessment) and Section 7.7 in Appendix A9.2.

#### *9.4.2.4.5 Construction in Peat*

161. Construction of the pipeline will occur within areas of peat along the pipeline route. There are four methods for working in peat proposed for the Proposed Project, full details of which can be found in Appendix A5.3 (Methods of Working in Peat). Appendix A5.3 also outlines the appropriateness of the four methods. Appendix A5.1 Annex A (SWMP) details a variety of mitigation measures to minimise likely significant effects of construction in peat areas.

162. The Treated Water Pipeline will cross 10 peatland sites managed by Bord na Móna. Additionally, private peat operations and individual peat harvesting operations are located along the Treated Water Pipeline in County Offaly. The pipeline will also cross directly within areas of peat identified by Teagasc (Agriculture and Food Development Authority).

163. Crossings within peat areas have been given a specific focus in this assessment because surface water drains in peat extraction areas have the potential to have elevated concentrations of suspended solids and ammonia. Mitigation measures have been developed to monitor and manage drainage from peat working areas to reduce potential impacts from pollutant runoff (see Table 9.14 in Section 9.5). Peat sites within the construction footprint and crossed by the pipeline have been included in the assessment for likely significant effects.

164. There are a total of 216 water body crossings along the pipeline route (24 WCX, 46 WBX and 146 WBP) directly within areas of peatland identified by Teagasc. Of these, 50 water body crossings are directly within sites managed by Bord na Móna. Further details of these crossings can be found in Appendix A9.2 (Pipeline Assessment).

#### *9.4.2.4.6 Washout Valves*

165. There are 187 Washout Valves. The majority of these would be temporary Washout Valves, however in 39 locations, Washouts would have permanent infrastructure and discharge water to a water body. This would consist of a suitable length of pipeline, valving to control discharge of drain water, a washout chamber and outfall structure.

166. Construction of the outfall structure has the potential to impact on the water body. There is potential for changes in flow and/or water levels due to dewatering of excavations or changes in drainage. There is also the potential for silt-laden runoff during excavation of the outfall structure and potential for accidental spillage of oils/chemicals from machinery during the construction process; all potentially reducing baseline water quality.

167. The majority of watercourses which would have permanent Washout Valves installed are at the location of open cut crossings for construction of the pipeline. Therefore the Washout Valves would be constructed in a dry area and there would be limited additional potential for silt-laden runoff, runoff containing pollutants within peat, or any additional impacts in relation to drainage. There is potential for some additional impacts in relation to hydromorphology as an additional area of river bank (particularly where composed of peat, and peat subsoils) would need to be excavated. The impacts to the water bodies at these locations associated with the open cut crossings are presented in Section 9.4.2.4.2.

168. Due to the existing dry working area for the open cut crossings, impacts are likely to be temporary and at a local scale; therefore, it is likely that all Washout Valves constructed at open cut crossings would have a low magnitude of impact. Therefore, the significance of effect would only vary as a result of the sensitivity of the water bodies, and range from Slight (not significant) to Moderate (significant).

169. For washouts constructed at water bodies which are crossed by trenchless techniques or where there is no crossing of the discharge water body for the pipeline, additional activities would involve isolating and drying the area to construct the Washout Valve outfall. As a result of the additional requirement to make a dry working area, and the potential for adverse impacts to bed and bank and a moderate shift in baseline water quality, it is likely that all Washout Valves constructed in water bodies crossed using trenchless techniques would have a medium magnitude of impact. Therefore, the significance of effect would only vary as a result of the sensitivity of the water bodies, and range from Significant to Very Significant.

170. All permanent outfalls are located on relatively large water bodies, large enough to install the outfall structure, which would be sized in proportion to the water body banks. All washouts (WA) and WCW (Watercourse Washout Location ID) outfalls are on WFD designated water bodies with the exception of WA-023 (WCW023) and WA-025 (WCW025) which are on drains discharging to Rock (Birr)_020 and Silver (Kilcormac)_020 respectively.

#### 9.4.2.5 Infrastructure Sites (Appendix A9.3: Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment)

171. A detailed assessment of the likely significant effects of the Infrastructure Sites is provided in Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment). This section presents a summary as follows:

- An overview of the likely significant effects from the construction of the Infrastructure Sites (hydrology, surface water quality and hydromorphology)
- A summary of the findings of the assessments of major activities at each site with the potential to affect water bodies.

172. The proposed locations for the Infrastructure Sites have been carefully selected carrying out multi-criteria analysis of the likely significant effects on the surface water environment. Sites were selected which have the least environmental impact (see Chapter 3: Consideration of Reasonable Alternatives) and are also technically and financially viable. The locations have been selected with the aim of reducing proximity to sensitive water bodies. As a result, except for the RWI&PS and the WTP access road, none of the Infrastructure Sites contains, or is near, a water body of a medium, high or very high sensitivity and the impacts on water bodies during the Construction Phase are minimised.

173. There are a number of low value receptors in the vicinity of the Infrastructure Sites, such as field drains and ditches. In the absence of control measures and mitigation, generic impacts as outlined in Section 9.4.2.2 would occur as a result of interrupted surface water flows on land, silty water runoff, spillages of miscible and immiscible substances from plant and wastewater discharges from welfare facilities on-site.

#### *9.4.2.5.1 RWI&PS*

174. The RWI&PS is a particularly sensitive site given its proximity to the Derg HMWB and the need for 'in-channel' or in this case 'in-lake' working. It is unlikely that there would be an impact on hydrology during construction: the need to abstract water from within the secant pile walls constructed along the shoreline of the Derg HMWB would not result in any significant effects. There would also be a requirement to abstract water from the Derg HMWB to commission the Proposed Project; this is addressed in Section 9.4.3. Given the above, the magnitude of impact is assessed as negligible, resulting in a Not Significant effect.

175. In terms of surface water quality, given the proximity of the Derg HMWB, generic impacts are at a higher risk of occurrence due to a number of pollutant pathways; in the absence of control measures or mitigation, these impacts, on a receptor of very high sensitivity, would potentially have a Significant to Profound (significant) effect. These effects are outlined in Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment).

176. There is potential for accidental releases of wastewater during the transfer from containment to tanker. Wastewater tankers are designed with cut-off valves to reduce this risk and it is considered that this has a low probability of occurring. The magnitude of this impact on the Derg HMWB would be negligible, resulting in a Not Significant effect.

177. There is potential for hydromorphological change to the Derg HMWB from removal of a section of the lough bed, and further bed and shoreline/bank at the Derg HMWB where concrete revetment mats and gabion mattresses would extend out from the intake to prevent bed scour. A number of trees and shrubs would also be permanently removed and there is potential for localised changes in flow and/or sediment processes and the dispersal of silt fine sediment into the Derg HMWB. These impacts would be temporary and limited to the Construction Phase. Additionally, Derg HMWB is large in area and would likely have sufficient dilution capacity to reduce impacts of silty runoff. Therefore, without mitigation the magnitude of impact is assessed as medium adverse resulting in a Slight (not significant) effect.

178. Downstream impacts on receptors beyond the Derg HMWB have been assessed for the Construction Phase. There are no significant downstream impacts likely in relation to hydrology and hydromorphology for any water body. However, there is potential for Very Significant effects on Shannon (Lower)_050, and Other Waterbodies WBX002, WBP062 and WBP396 as a result of accidental release of oils and/or increase in silty runoff during the Construction Phase.

#### *9.4.2.5.2 WTP*

179. The installation of the clear span bridge over the Roran watercourse (a tributary of the Kilmastulla River and part of the Kilmastulla_050 WFD designated water body) to facilitate the access road to the WTP site is not likely to have any impacts to speed of flow and/or volume as these would be maintained through the structure. The bridge is designed to be set above the 0.1% Annual Exceedance Probability flood event water level (including allowance for climate change) with 300mm of freeboard so would not impact upon the hydrology of the Roran watercourse and therefore the Kilmastulla_050. Therefore, the magnitude of impact is assessed as negligible. This results in a Not Significant effect.

180. There is a requirement to provide additional floodplain continuity next to the proposed clear span bridge structure. This would involve constructing the flood relief box culverts within the Kilmastulla_050 floodplain. These would be constructed offline from the Kilmastulla_050 channel in normal flow conditions and would not require the provision of a dry working area. The magnitude of impact is assessed as negligible resulting in a Not Significant effect.

181. An assessment of impacts on flood risk is presented in Appendix A9.4 (FRA). The bridge would be constructed as a single span structure using pre-cast concrete or steel sections. The bridge abutments would be set at least 5m back from each bank of the water body.

182. The construction of the clear span bridge on the Roran watercourse (part of the Kilmastulla_050 WFD designated water body) would be within the vicinity of a disused petrol station where there is increased risk of encountering contaminated land. Pollutants in the soil could be mobilised during the construction process and a pathway to the water body created. A high magnitude impact is predicted. The water body is of high sensitivity. This would result in an adverse, Very Significant effect.

183. Construction adjacent to and on the banks of the Kilmastulla_050 could increase silty runoff as a result of excavations and plant and machinery working adjacent to and on the bank tops. This has the potential to enter the water body and reduce baseline water quality. This would be a temporary impact localised to the works footprint. Additionally, the Kilmastulla_050 is a relatively large water body in this location and runoff would potentially be easily diluted. However, given the proximity of the works to the Kilmastulla_050, the magnitude of impact is assessed as medium adverse, resulting in a Significant effect.

184. Surface water on the WTP site and in the Construction Compound area would be discharged indirectly to the Kilmastulla_050 via field drains close to the site and the installation of what would eventually be a permanent outfall. There is potential for silty water from construction works and contamination from concrete batching and/or accidental releases of oil or chemicals to enter the water body. The water body is approximately 650m from the WTP site boundary at its closest point which would allow settlement of suspended solids and attenuation of accidental spills prior to discharge to the Kilmastulla_050. Given the above, the magnitude of impact is assessed as low adverse. This results in a Moderate (significant) effect.

185. Stormwater runoff would be conveyed via a drain running along the route of the WTP access road to discharge into the Roran watercourse (part of the Kilmastulla_050 WFD designated water body). Working on and adjacent to the banks to construct the outfall has the potential to increase silty runoff and potentially contaminating materials (such as fuel and oils from plant and machinery and concrete batching materials) entering the channel, leading to a reduction in baseline water quality. Impacts would be temporary over the Construction Phase and localised (not at the water body scale), resulting in a minor impact on integrity of a small part of, or temporary loss of a small part of, the receptor. The magnitude of impact is assessed as low adverse, resulting in a Moderate (significant) effect.

186. Works to construct the bridge, flood relief culverts and outfall have the potential to also generate silty runoff which could enter the channel with similar impacts to those described above for other activities. Additionally, modifications to the channel banks, including removal of riparian vegetation, could increase bank erosion where vegetation is contributing to bank stability. Such impacts would be localised to the works footprint, but given the need to work adjacent to and on the banks of the channel, the magnitude of impact is assessed as low adverse, resulting in a Moderate (significant) effect.

187. For Other Waterbodies there would be no direct impacts on hydrology during construction. Potential indirect impacts could arise because of the dewatering of excavation sites, or the diversion or ‘cut-off’ of land drains and ditches. During dry weather these activities could result in decreased groundwater levels, reducing recharge to local rivers and streams, leading to a ‘drought effect’. However, these impacts would be at a local scale and temporary over the Construction Phase. Therefore, the magnitude of impact is assessed as negligible, resulting in a Not Significant effect.

188. The installation of a culvert on WBX004 and WBP221 for the construction of the access road to the WTP site is not likely to have any impacts in the volume or speed of flows as these would be maintained through over-pumping or fluming around the site. This would avoid disruption of flows downstream of the dry working area, and so would not affect water body hydrology. Therefore, the magnitude of impact is assessed as negligible. This results in a significance of effect of Not Significant.

189. Working in-stream for the installation of culverts on WBX004, WBP221, WBP063 and WBX090 would have the potential to create significant levels of silty water which would need to be pumped from the 'dry' area. In addition, following completion of the installation, there is potential for sediment built up over time to be released following removal of the dam. This would be a temporary and localised impact during and immediately after construction until the water body re-establishes. The magnitude of impact is assessed as medium adverse, resulting in a Significant effect for WBX004, WBP221, WBP063 and WBX090.

190. Impacts on hydromorphology resulting from changes in flow within the water body would include the potential build-up of sediment at the temporary dam, leading to localised changes in channel bed morphology, including scour. These impacts would be temporary, limited to the Construction Phase and localised to the works footprint. As such, the magnitude of impact is assessed as high adverse. This results in a Moderate (significant) effect for WBX004 and WBX090 and would be Not Significant for WBP221 and WBP063.

#### *9.4.2.5.3 BPT*

191. There would be no direct impacts on hydrology during construction. Indirect impacts could arise as a consequence of the dewatering of excavation sites, or the diversion or 'cut-off' of land drains and ditches. During dry weather, these activities could result in decreased water levels. Such impacts would be temporary over the Construction Phase and localised to the works footprint. An impact of negligible magnitude is predicted, resulting in a Not Significant effect.

192. In the absence of control or mitigation measures, there is potential for spillage of oil, chemicals, concrete/cement and other pollutants to ground and the production of a large amount of silt-laden water as a result of dewatering or surface water runoff from stripped land.

193. However, there are no receptors on the site itself and the closest field drains and ditches are likely to be more than 50m from the site. As a result, an impact of negligible magnitude is predicted. This would result in a Not Significant effect.

194. There would be no direct impacts on the hydromorphology of any local field drains or ditches. Therefore, the magnitude of impact is assessed as negligible. This would result in a Not Significant effect.

#### *9.4.2.5.4 BPS*

195. There would be one direct discharge of treated construction drainage to the Camcor_030 via attenuation basins. Discharges would be restricted to greenfield runoff rates; therefore, the magnitude of impact is assessed as negligible, resulting in a Not Significant effect.

196. In the absence of control or mitigation measures, there is potential for spillage of oil and chemicals within the Construction Compound and from mobile plant and machinery. There is also the potential for silty runoff water to be produced as a result of excavation to construct the BPS, dewatering of such excavations, and surface water runoff from stripped and stockpiled land. From the concrete batching plant on site, there may be a release of cement/concrete which is highly alkaline. Additionally, discharge from the proposed outfall location could also provide a source of silty water. Further impacts may be caused by working on the channel banks to construct the outfall.

197. Working on the banks of and adjacent to the Camcor_030, and in the absence of control measures or mitigation, there is a reasonable likelihood of a pollution pathway being established. This would be temporary during the Construction Phase, and would be attenuated and treated via Sustainable Drainage System (SuDS) principles. As a result, a low adverse magnitude of impact is assessed. This would result in a Moderate (significant) effect.

198. Natural bank material would need to be removed to facilitate the outfall construction on the banks of the Camcor_030. Additionally, there is potential for indirect impacts as a result of increased sedimentation through the activities outlined above for surface water quality. These would be short-term impacts over the Construction Phase and localised to the discharge point and immediately downstream. Additionally, discharges of construction drainage would be treated through settlement in the attenuation pond prior to discharge. As a result, an impact of low adverse magnitude is assessed, resulting in a Slight (not significant) effect.

#### *9.4.2.5.5 FCV*

199. There would be no direct impacts on hydrology during construction. Potential indirect impacts could arise as a consequence of the dewatering of excavation sites, or the diversion or 'cut-off' of land drains and ditches. During dry weather, these activities could result in decreased water levels. Such impacts would be temporary over the Construction Phase and localised to the works footprint.

200. An impact of negligible magnitude is predicted, resulting in a Not Significant effect.

201. In the absence of control or mitigation measures, there is potential for spillage of oil and chemicals to ground and the production of silt-laden water as a result of dewatering or surface water runoff from stripped land. There is also the potential for the accidental release of potentially polluting cement/concrete from any in-situ concrete works required. Concrete and cement are highly alkaline.

202. While there are no receptors on the site itself, the closest field drains and ditches are located within 50m of the proposed FCV site. A negligible magnitude of impact is predicted. This would result in a Not Significant effect.

#### *9.4.2.5.6 TPR*

203. There would be no direct impacts on hydrology during construction. Potential indirect impacts could arise as a consequence of the dewatering of excavation sites, or the diversion or 'cut-off' of land drains and ditches. During dry weather, these activities could result in a drawdown of groundwater levels, reducing recharge to local rivers and streams, leading to a 'drought effect'.

204. The TPR would be located within an area of agricultural land with no water bodies within 50m of the site or access road. The change in the land use under the footprint of the TPR could lead to changes in overland flow pathways through some field ditches and drains connecting to the Liffey_170 which is almost 600m from the site boundary. However, these impacts would be temporary over the Construction Phase and localised to the working footprint. Therefore, the magnitude of impact is assessed as negligible, resulting in a Not Significant effect.

205. In the absence of control or mitigation measures, there would be potential for spillage of oil and chemicals to ground and production of some silt-laden water as a result of dewatering or surface water runoff from stripped land. There is also the potential for the release of potentially polluting cement/concrete from any in-situ concrete construction required. Concrete and cement are highly alkaline. There are no WFD designated water bodies within 50m of the site, but numerous ditches and drains which flow into the Liffey_170 could potentially be affected.

206. Given the distance from the site and the potential for suspended solids to settle out, the magnitude of impact is assessed as negligible, resulting in a Not Significant effect.

207. The TPR would be located in an area of agricultural land with no water bodies identified within the proposed construction footprint or access road. The change in the land use under the footprint of the TPR could lead to changes in overland flow pathways through some field ditches and drains connecting to the Liffey_170. However, it is considered that these impacts would be of negligible magnitude, resulting in a Not Significant effect.

208. For Other Waterbodies, there would be some limited direct impacts on hydrology at the TPR site during construction as a result of the interruption to surface water runoff pathways over the footprint of the works. Potential indirect impacts could also arise as a consequence of the dewatering of excavation sites, or the diversion or 'cut-off' of land drains and ditches. These impacts would be at a local scale and temporary over the Construction Phase. Therefore, the magnitude of impact is assessed as negligible, resulting in a Not Significant effect.

209. In the absence of control or mitigation measures, there is potential for spillage of oil and chemicals to ground at the Construction Compound and from mobile plant and machinery. There is also the potential for the release of potentially polluting cement/concrete from any in-situ concrete construction required. Concrete and cement are highly alkaline. There may also be the production of silt-laden water as a result of dewatering or surface water runoff from stripped land.

210. Unnamed field drains and ditches are located downstream, directly adjacent to the north-western corner of construction activities. In the absence of control measures or mitigation, there is a reasonably high likelihood of a pollution pathway being established to it. As a result, an impact of medium adverse magnitude is predicted. This would result in a Moderate (significant) effect.

211. There is potential for increased sediment in local field drains and ditches as a result of construction works. Given that under baseline conditions these Other Waterbodies have no morphological features and processes, the magnitude of impact is assessed as low adverse. This results in a Not Significant effect.

#### *9.4.2.5.7 Proposed 38 kV Uprate Works*

212. The Proposed 38 kV Uprate Works would be undertaken on existing infrastructure. The likely impacts on surface water relate solely to the construction works required to install the replacement lines. The works at Birdhill substation are not in close proximity to a water body and are therefore not considered further. All Construction Compounds are to be located at existing ESB site depots or compounds. As a result, this activity is scoped out of the assessment.

213. The potential for impacts from the Proposed 38 kV Uprate Works is therefore a result of direct crossing of water bodies by plant and machinery. The temporary crossing locations are not known at this stage and would be subject to ESBN approval. However, for the purpose of this assessment it is assumed that temporary crossing locations would be located at the point in which the overhead line crosses the water body should no obvious existing road crossing be apparent from mapping. The temporary access tracks would cross WFD designated water bodies and open land drains via existing bridges or proposed temporary clear span bridges as illustrated in Chapter 5 (Construction & Commissioning).

214. The proposed construction activities may result in localised changes to surface water drainage patterns, flow pathways, subsequent flow volumes and restrictions to infiltration of rainfall in soils. Given the largely rural locations of the Proposed Project, existing drainage networks are available, and any disturbance would be localised and temporary in duration. Surface water contributions would remain unchanged and would likely discharge to the same catchment.

215. Impacts to surface water quality through the potential for contaminated surface water runoff and the release of sediment to nearby water bodies (silty water) could alter baseline water quality. Temporary access tracks used to facilitate construction may affect surface runoff patterns creating alternative flow paths and may promote erosion of previously unaffected areas. An accidental release of potentially polluting substances, such as cement, oils, fuels and lubricants (hydrocarbons), may result in a deterioration to water quality including a reduction in dissolved oxygen. Therefore, the pre-mitigation magnitude of impact to the receptor is assessed as medium adverse. The exception is where any runoff generated from the works would likely be captured by the existing road drainage network and could be diluted before discharging to the water body. In these locations, the pre-mitigation magnitude of impact is assessed as low adverse. Therefore, the significance of effect ranges from Moderate (significant) to Very Significant.

216. Hydromorphological impacts could result from vegetation removal, tracking of plant and machinery within floodplains and increased sediment inputs to watercourses. Works along banks and any resulting damage to the bank top/face also has the potential to lead to increases in the rate of bank erosion, altering the cross section of the water body.

217. For WFD designated water bodies, these impacts would be short-term, and would likely not cause a deterioration in water quality or compromise the ability of WFD designated water bodies to meet their objectives. Therefore, the pre-mitigation magnitude of impact is assessed as medium adverse. The exception is where any runoff generated from the works would likely be captured by the existing road drainage network and could be diluted before discharging to the water body. In these locations, the pre-mitigation magnitude of impact is assessed as low adverse.

218. For smaller water bodies which are modified and straightened and have limited distinct fluvial features and processes, the pre-mitigation magnitude of impact is assessed as low adverse. Therefore, the significance of effect for impacts on hydromorphology ranges from Not Significant to Moderate (significant).

#### 9.4.2.6 Summary

219. Tables 9.11 and 9.12 provide a summary assessment of the likely significant effects, i.e. Moderate (significant) or above, in the absence of additional mitigation, during the Construction Phase of the Proposed Project from the impacts described in the above Sections 9.4.2.1 to 9.4.2.5. Full details of likely significant effects with Slight (not significant) or Not Significant effects are detailed in Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment).

**Table 9.11: Construction Phase Pre-Mitigation Likely Significant Effects from Drainage and Dewatering, Crossings, Washouts and Construction Compounds/Pipe Storage Depots**

| Receptor Location ID | WFD Designated Water Body (or Nearest if Receptor is Not WFD) | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|
| Construction Activity: Drainage and Dewatering (nearby water bodies) | | | | |
| N/A - approximate chainage RW – 0 | Derg HMWB | Very high | Medium adverse | Very Significant |
| N/A - approximate chainage TW – 2300 to TW – 3700, TW – 6100 to TW – 6500 | Kilmastulla_040 | High | | Significant |
| N/A - approximate chainage TWC – 13800 | Daingean_010 | | | |
| N/A - approximate chainage TWE – 7100 | Liffey_130 | | | |
| **Watercourse Crossings** | | | | |
| Construction Activity: Trenchless Crossings | | | | |
| WCX016 | Nenagh_070 | Very high | Medium adverse | Very Significant |
| WCX026 | Little Brosna_030 | High | | Moderate (significant) |
| WCX031 | Camcor_030 | | | |
| WCX032 | Camcor_030 | | | |
| WCX036 | Silver (Kilcormac)_020 | | | |
| WCX039 | Clodiagh (Tullamore)_020 | | | |
| WCX056 | Figile_030 | | | |
| WCX057 | Figile_030 | | | |
| WBX078 | Grand Canal Main Line East (Barrow) | Very high | | Very Significant |
| WCX076 | Liffey_140 | | | |
| WCX073 | Liffey_140 | | | |
| WBX088 | Grand Canal Main Line (Liffey and Dublin Bay) | | | |
| WBX003 | Derg HMWB | High | | Significant |
| WBX008 | Kilmastulla_040 | Medium | | Moderate (significant) |
| WBX009 | | | | |
| WBX036 | | | | |
| WBX035 | Camcor_030 | High | | Significant |
| WBX096 | Clodiagh (Tullamore)_030 | Medium | | Moderate (significant) |

| Receptor Location ID | WFD Designated Water Body (or Nearest if Receptor is Not WFD) | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|
| WBP227 | Kilmastulla_040 | Medium | Medium adverse | Moderate (significant) |
| WBP126 | Kilmastulla_020 | | | |
| WBP234 | | | | |
| WBP257 | Camcor_030 | High | | Significant |
| WBP210 | | | | |
| WBP258 | | | | |
| WBP259 | | | | |
| WBP147 | Meelaghans_010 | Medium | | Moderate (significant) |
| WBP094 | Abbeylough_010 | | | |
| WBP095 | | | | |
| WBP212 | Castletown (Dublin-Kildare)_010 | Very high | | Very Significant |
| Construction Activity: Open Cut Crossings | | | | |
| WCX003, WCX004 | Kilmastulla_050 | High | High adverse | Very Significant |
| WCX005 | Kilmastulla_030 | | | |
| WCX006, WCX007, WCX008, WCX009, WCX010 | Kilmastulla_020 | | | |
| WCX011 | Ardgregane Stream_010 | | | |
| WCX012, WCX013, WCX014 | Ardgregane Stream_020 | | | |
| WCX015 | Nenagh_070 | | | |
| WCX017 | Nenagh Tributary_010 | | | |
| WCX018, WCX019 | Ardcrony Stream_010 | | | |
| WCX020, WCX021 | Ballyfinboy_040 | | | |
| WCX022, WCX023 | Kilcomin Stream_030 | | | |
| WCX024, WCX025 | Shinrone Stream_010 | | | |
| WCX027 | Rock (Birr)_010 | | | |
| WCX028, WCX029 | Clareen Stream/Fuarawn_020 | | | |
| WCX033 | Camcor_030 | | | |
| WCX034 | Kyleboher_010 | | | |

| Receptor Location ID | WFD Designated Water Body (or Nearest if Receptor is Not WFD) | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|
| WCX035 | Silver (Kilcormac)_030 | High | High adverse | Very Significant |
| WCX038 | Silver (Kilcormac)_020 | | | |
| WBP309 | Clodiagh (Tullamore)_030 | | | |
| WCX041, WCX042 | Meelaghans_010 | | | |
| WCX043 | Tullamore_020 | | | |
| WCX045 | Tullamore_010 | | | |
| WCX047, WCX048 | Daingean_030 | | | |
| WCX049 | Esker Stream_010 | | | |
| WCX050, WCX051, WCX053, WCX054 | Esker Stream_020 | | | |
| WCX055 | Figile_030 | | | |
| WCX058 | Figile_020 | | | |
| WCX059 | Abbeylough_010 | | | |
| WCX060 | Figile_010 | | | |
| WCX061, WCX062, WCX063, WCX064, WCX065 | Blackwater (Longwood)_010 | | | |
| WCX066 | Clonshanbo_010 | | | |
| WCX067, WCX068, WCX070 | Lyreen_010 | | | |
| WCX069 | Clonshanbo_020 | | | |
| WCX071, WCX072, WCX075 | Liffey_140 | | | |
| WCX074 | Reeves_010 | | | |
| WBX001 | Derg HMWB | | | |
| WBX090, WBX091 | Kilmastulla_050 | | | |
| WBX005, WBX006, WBX007, WBX010, WBX011, WBX012, WBX108 | Kilmastulla_040 | Medium | | Significant |
| WBX013, WBX014 | Kilmastulla_020 | | | |
| WBX015, WBX016 | Ardgregane Stream_020 | | | |
| WBX017 | Nenagh_070 | High | | Very Significant |
| WBX018 | Nenagh Tributary_010 | | | |

| Receptor Location ID | WFD Designated Water Body (or Nearest if Receptor is Not WFD) | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|
| WBX019 | Ardcrony Stream_010 | Medium | High adverse | Significant |
| WBX020 | Ballyfinboy_040 | | | |
| WBX021, WBX022 | Kilcomin Stream_030 | | | |
| WBX023, WBX024 | Shinrone Stream_010 | High | | Very Significant |
| WBX025, WBX026 | Little Brosna_030 | | | |
| WBX027 | | Medium | | Significant |
| WBX028, WBX029 | Rock (Birr)_020 | High | | Very Significant |
| WBX030, WBX031 | | Medium | | Significant |
| WBX032, WBX033 | Camcor_050 | | | |
| WCX030 | Camcor_040 | High | | Very Significant |
| WBX034, WBX037 | Camcor_030 | | | |
| WBX038, WBX039, WBX107 | Rapemills_010 | Medium | | Significant |
| WBX108 | Kilmastulla_040 | | | |
| WBX040, WBX041, WBX042, WBX043, WBX092, WBX093 | Silver (Kilcormac)_020 | High | | Very Significant |
| WBX045, WBX046, WBX047, WBX048, WBX049, WBX050, WBX051, WBX052, WBX094, WBX095 | Clodiagh (Tullamore)_020 | | | |
| WCX040 | Clodiagh (Tullamore)_030 | | | |
| WBX053 | Clodiagh (Tullamore)_030 | Medium | | Significant |
| WBX054, WBX055, WBX056 | Meelaghans_010 | Medium | | Significant |
| WBX057 | Tullamore_020 | | | |
| WCX044, WBX058, WBX059, WBX060, WBX061, WBX062, WBX097 | Tullamore_010 | | | |
| WBX063 | Daingean_010 | | | |
| WBX098, WBX064, WBX066 | Daingean_030 | | | |
| WBX067, WBX068, WBX069, WBX071, WBX072, WBX073 | Esker Stream_020 | | | |
| WBX074 | | Low | | Moderate (significant) |
| WBX075, WBX076 | Figile_030 | | | |
| WBX077, WBX099, WBX100, WBX103 | | Medium | | Significant |

| Receptor Location ID | WFD Designated Water Body (or Nearest if Receptor is Not WFD) | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|
| WBX104 | Figile_020 | Medium | High adverse | Significant |
| WBX079, WBX105 | Abbeylough_010 | | | |
| WBX106 | Blackwater (Longwood)_010 | Low | | Moderate (significant) |
| WBX080, WBX081 | | Medium | | Significant |
| WBX082, WBX083 | Clonshanbo_010 | | | |
| WBX084 | Lyreen_020 | Low | | Moderate (significant) |
| WBX085, WBX086 | Liffey_130 | High | | Very Significant |
| WBX087 | Liffey_140 | | | |
| WBP001, WBP062, WBP063, WBP220, WBP320, WBP175, WBP321, WBP322 | Kilmastulla_050 | | | |
| WBP222 | | | | |
| WBP003, WBP058, WBP066, WBP068, WBP223, WBP224, WBP226, WBP264, WBP265, WBP282, WBP312 | Kilmastulla_040 | Medium | | Significant |
| WBP004, WBP228 | Kilmastulla_030 | | | |
| WBP005, WBP059, WBP069, WBP070, WBP071, WBP072, WBP073, WBP107, WBP229, WBP230, WBP231, WBP232 WBP233, WBP287, WBP288, WBP289, WBP290, WBP291, WBP318, WBP328, WBP390 | Kilmastulla_020 | | | |
| WBP235, WBP236, WBP239, WBP240, WBP272, WBP274, WBP401 | Ardgregane Stream_010 | | | |
| WBP074, WBP075, WBP108, WBP241, WBP323, WBP324, WBP325 | Ardgregane Stream_020 | | | |
| WBP076, WBP242, WBP243 | Nenagh_070 | | | |
| WBP077, WBP078, WBP079, WBP273, WBP329 | | High | | Very Significant |
| WBP330, WBP331 | Nenagh Tributary_010 | | | |
| WBP332, WBP333, WBP397 | Ballyfinboy_040 | Medium | | Significant |
| WBP206 | Ardcrony Stream_010 | | | |
| WBP006, WBP334, WBP335 | Kilcomin Stream_030 | | | |
| WBP336 | Shinrone Stream_010 | High | | Very Significant |
| WBP009 | Little Brosna_030 | | | |

| Receptor Location ID | WFD Designated Water Body (or Nearest if Receptor is Not WFD) | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|
| WBP010, WBP011 | | Low | High adverse | Moderate (significant) |
| WBP080, WBP109 | Rock (Birr)_010 | Medium | | Significant |
| WBP110, WBP284, WBP286 | Rock (Birr)_020 | High | | Very Significant |
| WBP012, WBP225, WBP267, WBP319, WBP399, WBP400 | | Medium | | Significant |
| WBP251 | Camcor_050 | | | |
| WBP013, WBP278, WBP281, WBP283 | Clareen Stream/Fuarawn_020 | | | |
| WBP014, WBP081, WBP082, WBP083, WBP256, WBP260, WBP266, WBP269 | Camcor_030 | High | | Very Significant |
| WBP016, WBP017, WBP018, WBP019, WBP020, WBP021, WBP111, WBP261, WBP262, WBP275, WBP276, WBP277, WBP337 | Kyleboher_010 | Medium | | Significant |
| WBP084 | Rapemills_010 | | | |
| WBP106, WBP112, WBP113, WBP263 | Silver[Kilcormac]__030 | | | |
| WBP022, WBP061, WBP085, WBP087, WBP123, WBP124, WBP125, WBP128, WBP129, WBP130, WBP131, WBP132, WBP133, WBP134, WBP136, WBP137, WBP338 | Silver[Kilcormac]__020 | High | | Very Significant |
| WBP115, WBP139, WBP140, WBP142, WBP143, WBP145, WBP298, WBP339, WBP340, WBP406 | Clodiagh (Tullamore)_020 | | | |
| WBP089, WBP146, WBP314 | Clodiagh (Tullamore)_030 | Medium | | Significant |
| WBP023, WBP148 | Meelaghans_010 | Medium | | Significant |
| WBP024, WBP025, WBP341 | Tullamore_020 | Low | | Moderate (significant) |
| WBP150, WBP151, WBP152, WBP153, WBP154, WBP155 | Tullamore_010 | Medium | | Significant |
| WBP026, WBP156, WBP157, WBP158, WBP159, WBP160, WBP342 | Daingean_010 | | | |
| WBP299, WBP300, WBP301 | Figile_040 | Low | | Moderate (significant) |
| WBP027, WBP116, WBP161, WBP162, WBP163, WBP164, WBP326, WBP327, WBP343, WBP344, WBP345 | Daingean_030 | Medium | | Significant |
| WBP028, WBP090 | Esker Stream_010 | | | |
| WBP029, WBP091, WBP117, WBP165, WBP166, WBP167, WBP168, WBP169, WBP170, WBP172, WBP173, WBP174, WBP294, WBP346, WBP347, WBP348, WBP349, WBP391 | Esker Stream_020 | | | |

| Receptor Location ID | WFD Designated Water Body (or Nearest if Receptor is Not WFD) | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|
| WBP030, WBP031, WBP032, WBP092, WBP176, WBP177, WBP178, WBP179, WBP180, WBP302, WBP303, WBP305, WBP350, WBP351, WBP352, WBP353, WBP354, WBP365 | Figile_030 | Medium | High adverse | Significant |
| WBP033, WBP034, WBP035, WBP036, WBP093, WBP304, WBP306, WBP355, WBP356 | Figile_020 | | | |
| WBP096, WBP253, WBP316, WBP357 | Abbeylough_010 | | | |
| WBP118, WBP252 | Figile_010 | High | | Very Significant |
| WBP038, WBP097, WBP098, WBP099, WBP100, WBP249, WBP359 | | Medium | | Significant |
| WBP039, WBP248, WBP292, WBP296, WBP297, WBP360 | Blackwater (Longwood)_020 | | | |
| WBP040, WBP041, WBP042, WBP043, WBP044, WBP045, WBP121, WBP182, WBP183, WBP184, WBP244, WBP245, WBP246, WBP247, WBP280, WBP285, WBP293, WBP317, WBP361, WBP362, WBP392 | Blackwater (Longwood)_010 | | | |
| WBP185, WBP271 | Clonshanbo_010 | Low | | Moderate (significant) |
| WBP046, WBP047, WBP048, WBP102, WBP186, WBP187, WBP188, WBP189, WBP190, WBP191, WBP279 | | Medium | | Significant |
| WBP050, WBP051, WBP192, WBP193, WBP194, WBP195, WBP196, WBP197, WBP363, WBP364, WBP405 | Lyreen_010 | | | |
| WBP052, WBP103, WBP122, WBP198, WBP199, WBP200, WBP201, WBP202, WBP203, WBP310, WBP311, WBP366 | Liffey_130 | High | | Very Significant |
| WBP057, WBP119, WBP205, WBP207, WBP209, WBP268 | Liffey_140 | | | |
| WBP055, WBP056, WBP104, WBP208 | Reeves_010 | | | |
| WBP120, WBP211, WBP213, WBP214, WBP215, WBP367, WBP368 | Castletown (Dublin-Kildare)_010 | | | |
| WBP217, WBP218, WBP307 | Liffey_170 | Low | | Moderate (significant) |
| WBP219, WBP255 | | Medium | | Significant |
| **Construction Compounds and Pipe Storage Depots** | | | | |
| Construction Activity: Trenchless Crossings and Temporary Culverting | | | | |
| PSD1 - WBP126 | Kilmstulla_020 | Medium | Medium adverse | Moderate (significant) |
| PSD1 - WBP234 | | | | |

| Receptor Location ID | WFD Designated Water Body (or Nearest if Receptor is Not WFD) | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|
| Construction Activity: Trenchless Crossings and Temporary Culverting | | | | |
| PSD1 - WBP274 | Ardgregane Stream_010 | Medium | High adverse | Significant |
| PSD1 - WBP232 | Kilmastulla_020 | | | |
| PSD1 - WBP233 | | | | |
| CC5 - WBP139 | Clodiagh (Tullamore)_020 | High | | Very Significant |
| CC5 - WBP140 | | | | |
| CC5 - WBP115 | | | | |
| CC5 - WBX094 | | | | |
| CC6 - WBP097 | Figile_010 | Medium | | Significant |
| CC6 - WBP098 | | | | |
| CC6 - WBP099 | | | | |
| PSD10 - WBX086 | Liffey_130 | High | | Very Significant |
| PSD10 - WBP203 | | | | |
| PSD9 - WBP193 | Lyreen_010 | Medium | | Significant |
| Construction Activity: Construction of site (nearby water bodies) | | | | |
| PSD1 - N/A | Adjacent to Kilmastulla_020 | High | Medium adverse | Significant |
| | Adjacent to Ardgregane Stream_010 | | | |
| PSD4 - WBP281 | Adjacent to Field Drain to Clareen Stream/Faurawn_020 | Medium | | Moderate (significant) |
| PSD5 - WBP262 | Adjacent to Field Drain to Kyleboher_010 | | | |
| CC5 - WBX046 | Adjacent to Field Drain to Clodiagh (Tullamore)_020 | High | | Significant |
| PSD8 - WBX073 | 40m from Field Drain to Esker Stream_020 | Medium | | |
| CC6 - WBP100 | Adjacent to Field Drain to Figile_010 | | | |
| PSD10 - WBP205 | 10m from Field Drain to Liffey_140 | High | | Significant |
| Construction Activity: Washout Valves | | | | |
| WCW001 - WCX003 | Kilmastulla_050 | High | Low adverse | Moderate (significant) |
| WCW002 - WCX004 | | | | |

| Receptor Location ID | WFD Designated Water Body (or Nearest if Receptor is Not WFD) | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|
| WCW003 - N/A | Kilmastulla_040 | High | Medium adverse | Significant |
| WCW004 - N/A | | | Low adverse | Moderate (significant) |
| WCW005 - WCX005 | Kilmastulla_030 | | | |
| WCW007 - WCX009 | Kilmastulla_020 | | | |
| WCW008 - WCX010 | | | | |
| WCW009 - WCX011 | Ardgregane Stream_010 | | | |
| WCW010 - N/A | Ardgregane Stream_020 | | Medium adverse | Significant |
| WCW011 - WCX013 | | | Low adverse | Moderate (significant) |
| WCW013 - WCX016 | Nenagh_070 | Very high | Medium adverse | Very Significant |
| WCW014 - WCX018 | Ardcrony Stream_010 | High | Low adverse | Moderate (significant) |
| WCW015 - WCX019 | | | | |
| WCW017 - WCX021 | Ballyfinboy_040 | | | |
| WCW018 - WCX022 | Kilcomin Stream_030 | | Medium adverse | Significant |
| WCW020 - WCX024 | Shinrone Stream_010 | | | |
| WCW021 - WCX025 | | | Low adverse | Moderate (significant) |
| WCW022 - WCX026 | Little Brosna_030 | | Medium adverse | Significant |
| WCW024 - WCX032 | Camcor_030 | | | |
| WCW025 - WBP061 | Ditch | | Low adverse | Moderate (significant) |
| WCW026 - WCX036 | Silver (Kilcormac)_020 | | Medium adverse | Significant |
| WCW027 - WCX039 | Clodiagh (Tullamore)_020 | | | |
| WCW028 - WCX042 | Meelaghans_010 | | Low adverse | Moderate (significant) |
| WCW029 - WCX048 | Daingean_030 | | | |
| WCW030 - WCX049 | Esker Stream_010 | | | |

| Receptor Location ID | WFD Designated Water Body (or Nearest if Receptor is Not WFD) | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|
| WCW031 - WCX056 | Figile_030 | High | Medium adverse | Significant |
| WCW032 - WCX058 | Figile_020 | | Low adverse | Moderate (significant) |
| WCW033 - WCX060 | Figile_010 | | | |
| WCW034 - WCX062 | Blackwater (Longwood)_010 | | | |
| WCW041 - WCX064 | | | | |
| WCW042 - WCX065 | | | | |
| WCW035 - WCX066 | Clonshanbo_010 | | | |
| WCW036 - WCX069 | Clonshanbo_020 | | | |
| WCW037 - WCX070 | Lyreen_010 | | | |
| WCW038 - WCX072 | Liffey_140 | | | |
| WCW039 - WCX073 | | Very high | Medium adverse | Significant |
| WCW040 - WCX074 | Reeves_010 | High | Low adverse | Moderate (significant) |

**Table 9.12: Construction Phase Pre-Mitigation Likely Significant Effects from Non-Linear Infrastructure and 38 kV Uprate Works**

| Proposed Project Element and Construction Activities | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| **RWI&PS** | | | | | | |
| Intake structure and dewatering of secant pile walls | Derg HMWB | Release of potentially polluting materials | Surface Water Quality and Hydrology | Very high | High adverse | Profound (significant) |
| | | Increases in silty runoff | | Very high | Low adverse | Significant |
| | Shannon (Lower)_050 | Oil/pollutant spill | Surface Water Quality and Hydrology | Very high | Medium adverse | Very Significant |
| Intake structure, dewatering of secant pile walls, construction of RWI&PS, and access road | WBX002 | Release of potentially polluting materials | Surface Water Quality and Hydrology | High | Medium adverse | Very Significant |
| | | Increases in silty runoff | | High | Medium adverse | Significant |
| | WBP062 | Release of potentially polluting materials | | High | Medium adverse | Significant |
| | | Increases in silty runoff | | High | Medium adverse | Significant |
| | WBP396 | Release of potentially polluting materials | Surface Water Quality and Hydrology | High | Medium adverse | Significant |
| | | Increases in silty runoff | | High | Medium adverse | Significant |

| Proposed Project Element and Construction Activities | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| **WTP** | | | | | | |
| Installation of clear span bridge and flood relief culverts | Kilmastulla_050 (WCX002) | Increases in silty runoff | Surface Water Quality and Hydrology | High | Medium adverse | Significant |
| | | Increases in silty runoff, modifications of sections of bank and associated riparian vegetation | Hydromorphology | High | Low adverse | Moderate (significant) |
| Construction Compound and drainage | | Discharge of construction drainage, including silty runoff | Surface Water Quality and Hydrology | High | Low adverse | Moderate (significant) |
| Removal of disused petrol station | | Mobilisation of contaminants | | High | High adverse | Very Significant |
| Construction of new outfall | | Discharge of construction drainage, including silty runoff | Surface Water Quality and Hydrology | High | Low adverse | Moderate (significant) |
| | | Increases in silty runoff, modifications of sections of bank and associated riparian vegetation | Hydromorphology | High | Low adverse | Moderate (significant) |
| Culverting/realignment and temporary construction discharge | WBX090 | Release of silty runoff and potential polluting materials | Surface Water Quality and Hydrology | High | Medium adverse | Significant |
| | | Release of silty runoff, damage and modifications to the bed and banks, changes to flow regime as a result of over-pumping/fluming | Hydromorphology | Low | High adverse | Moderate (significant) |
| | WBP063 | Release of silty runoff and potential polluting materials | Surface Water Quality and Hydrology | High | Medium adverse | Significant |

| Proposed Project Element and Construction Activities | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| Culverting of water body | WBX004 | Release of silty runoff and potential polluting materials | Surface Water Quality and Hydrology | High | Medium adverse | Significant |
| | | Release of silty runoff, damage and modifications to the bed and banks, changes to flow regime as a result of over-pumping/fluming | Hydromorphology | Low | High adverse | Moderate (significant) |
| | WBP221 | Release of silty runoff and potential polluting materials | Surface Water Quality and Hydrology | High | Medium adverse | Significant |
| **BPS** | | | | | | |
| Construction of the BPS including discharge of construction drainage | Camcor_030 | Increases in silty runoff from construction works and discharge of construction drainage | Surface Water Quality and Hydrology | High | Low adverse | Moderate (significant) |
| **TPR** | | | | | | |
| Construction of the TPR including discharge of construction drainage | Unnamed field drains and ditches with potential hydrological connection to the Liffey_170 | Increases in silty runoff | Surface Water Quality and Hydrology | Medium | Medium adverse | Moderate (significant) |
| **Proposed 38 kV Uprate Works** | | | | | | |
| Three crossings of separate tributaries of the Blackwater Clare_020<br>Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossings. | Black Water Clare_020<br>PSNWCX001 to PSNWCX003 | Release of silty water, increased erosion of exposed surfaces, and accidental release of polluting materials | Surface Water Quality and Hydrology | High | Medium adverse | Significant |
| | | Removal of riparian vegetation, Release of silty water, and temporary bridge crossings | Hydromorphology | Medium | Medium adverse | Moderate (significant) |

| Proposed Project Element and Construction Activities | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| One crossing of the main Shannon (Lower)_050 channel<br>Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | Shannon Lower_050 (Main Channel)<br>PSNWCX004 | Release of silty water, increased erosion of exposed surfaces, and accidental release of polluting materials | Surface Water Quality and Hydrology | Very high | Medium adverse | Very Significant |
| | | Removal of riparian vegetation, release of silty water, and temporary bridge crossings | Hydromorphology | Medium | Medium adverse | Moderate (significant) |
| Two crossings of separate tributaries of the Shannon (Lower)_050<br>Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | Shannon Lower_050 (Tributaries)<br>PSNWCX005 & PSNWCX006 | Release of silty water, increased erosion of exposed surfaces, and accidental release of polluting materials | Surface Water Quality and Hydrology | High | Medium adverse | Significant |
| | | Removal of riparian vegetation, release of silty water, and temporary bridge crossings | Hydromorphology | Medium | Medium adverse | Moderate (significant) |
| Undergrounding of the proposed power supply line to Birdhill Station<br>Working adjacent to the water body with plant and machinery<br>Excavations within the existing road adjacent to and over the water body. | Kilmastulla_050<br>WCX077 | Release of silty water, increased erosion of exposed surfaces, and accidental release of polluting materials | Surface Water Quality and Hydrology | Very high | Low adverse | Significant |
| | | Removal of riparian vegetation, release of silty water, and temporary bridge crossings | Hydromorphology | High | Low adverse | Moderate (significant) |

| Proposed Project Element and Construction Activities | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| One crossing on each of the listed water bodies<br>Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | PSNWBX004<br>PSNWBX006 to PSNWBX010 | Release of silty water, increased erosion of exposed surfaces, and accidental release of polluting materials | Surface Water Quality and Hydrology | High | Medium adverse | Significant |
| | PSNWBX001 & PSNWBX002 | | | High | Medium adverse | Significant |
| | PSNWBX003 | | | Medium | Medium adverse | Moderate (significant) |
| | PSNWBP030 | | | Very high | Medium adverse | Very Significant |
| | PSNWBP008 to PSNWBP020<br>PSNWBP028 and PSNWBP029<br>PSNWBP031 to PSNWBP046 | | | High | Medium adverse | Significant |
| Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | PSNWBP001 to PSNWBP004<br>PSNWBP023 | | | High | Medium adverse | Significant |
| Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | PSNWBP049<br>PSNWBP050 | | | High | Medium adverse | Significant |

| Proposed Project Element and Construction Activities | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | PSNWBP005 to PSNWBP007<br>PSNWBP024 to PSNWBP027<br>PSNWBP051<br>PSNWBP052<br>PSNWBP060 | Release of silty water, increased erosion of exposed surfaces, and accidental release of polluting materials | Surface Water Quality and Hydrology | Medium | Medium adverse | Moderate (significant) |
| Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | PSNWBP047<br>PSNWBP056<br>PSNWBP057 | | | High | Medium adverse | Significant |
| Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | PSNWBP048 | | | High | Medium adverse | Significant |
| Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | PSNWBP053<br>PSNWBP054 | | | High | Medium adverse | Significant |

| Proposed Project Element and Construction Activities | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | PSNWBP055 | Release of silty water, increased erosion of exposed surfaces, and accidental release of polluting materials | Surface Water Quality and Hydrology | Medium | Medium adverse | Moderate (significant) |
| Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | PSNWBP058<br>PSNWBP059<br>PSNWBP062 | | | High | Medium adverse | Significant |
| Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | PSNWBP060<br>PSNWBP065 to PSNWBP070 | | | High | Medium adverse | Significant |
| Working adjacent to the water body with plant and machinery<br>Excavations adjacent to the water body to replace pole sets<br>Construction (and use of) temporary clear span bridge crossing. | PSNWBP064 | | | High | Medium adverse | Significant |

| Proposed Project Element and Construction Activities | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| Undergrounding of the proposed power supply line to Birdhill Station – it is assumed that these works would be carried out within the existing road infrastructure<br>Working adjacent to the water body with plant and machinery<br>Excavations within the road adjacent to and over the water body. | WBP002, WBP065, and WBP064 | Release of silty water, increased erosion of exposed surfaces, and accidental release of polluting materials | Surface Water Quality and Hydrology | High | Low adverse | Moderate (significant) |

### 9.4.3 Testing & Commissioning Phase

#### 9.4.3.1 Introduction

220. During the construction of the Proposed Project, testing would be carried out on individual elements of the works at suitable stages of progression. Final commissioning of the whole works would be undertaken to confirm that the system responds in accordance with its specified requirements.

221. Chapter 5 (Construction & Commissioning) outlines typical approaches to testing the individual elements of the works, and final commissioning of RWI&PS at the Derg HMWB, treatment and supply of treated water delivery to the termination point in South Dublin County.

#### 9.4.3.2 Raw Water Rising Mains and Treated Water Pipeline

##### *9.4.3.2.1 Activities*

222. Hydrostatic pressure testing would be carried out on the Treated Water Pipelines. It is proposed to abstract water from eight water bodies along the route and use the abstracted 'test water' to pressure test the pipeline. This water would then be discharged through the use of washouts to land or to water bodies, or tankered away where required. The water bodies chosen for the abstractions are those considered to have sufficient annual average flows that, with careful design in terms of abstraction rates and other measures, no significant effects are likely.

223. Appendix A5.2 (Commissioning Strategy) details the methodology and principles for the abstractions for pipeline commissioning in order to reduce and, where possible, avoid environmental impacts. In the absence of Irish guidelines or standards, the strategy is designed in accordance with the UKTAG UK Environmental Standards and Conditions (UKTAG 2008) to ensure no impact on hydrological flows or deterioration in WFD status.

224. These standards set out restrictions on abstractions for different seasons and for different WFD designated water bodies. Despite some of the abstractions being from Moderate status water bodies and temporary in nature, the Commissioning Strategy uses the principles for Good status water bodies as a precautionary approach so as not to prevent any water body from achieving Good status in the short- or longer-term future. It should be noted that none of these water bodies have High status objectives.

225. The water bodies along the length of the pipeline were evaluated and smaller water bodies with Q95 flow of less than 100l/s were discounted. The eight water bodies were selected and are set out in Annex B of Appendix A5.2 (Commissioning Strategy).

226. The proposed abstraction locations are:

- Kilmastulla_040
- Nenagh_070
- Little Brosna_030
- Camcor_030
- Silver (Kilcormac)_020
- Clodiagh (Tullamore)_020
- Figile_030
- Liffey_140.

227. In addition to the principles governing the site selection for the abstractions, additional design measures are set out in Annex C of Appendix A5.2 (Commissioning Strategy), governing the operation of the abstraction process. These measures are provided to avoid biological or chemical cross-contamination between water bodies. They are also designed to protect the integrity of the new pipeline.

228. Annex C of Appendix A5.2 (Commissioning Strategy) provides details of the generic management measures proposed, depending upon prevailing conditions. These are summarised below.

229. The source of abstracted water would be monitored for physical, biological and chemical parameters for a period leading up to the Commissioning Phase. Where required, mobile treatment facilities would be employed to remove any contaminants prior to the filling of the pipeline. Depending on the findings, this would include:

- Mobile water treatment plant
- Filtration pumps (abstraction velocities would be kept below 0.15m/s through a fine mesh not greater than 3mm aperture)
- Disinfection (ultraviolet (UV) or chlorination).

230. Annex A of Appendix A5.1 (SWMP) identifies specific risks associated with, and outlines mitigation measures for, the proposed abstraction from Kilmastulla_040 and the Liffey_140 which have particular water quality sensitivities identified including heavy metals at Kilmastulla_040 and pressures associated with Bord na Móna land at Liffey_140.

231. Abstraction rates would be controlled as follows:

- <Qn95 take nothing (this is stricter than the WFD standard)
- >Qn95 <Qn80 take 10% (of Qn95) up to a maximum of 2,000m$^3$/day (25l/s)
- >Qn80 (unless identified as a sensitive water body in terms of hydrology)
  - >Qn80 <Qn70, this remains as take no more than 10% (of Q95) or 150l/s, whichever is the smaller
  - >Qn70 and <Qn60, the appointed Contractor can take more, in accordance with the numbers below – with a maximum of 25% of Qn95 during April to October or 150l/s, whichever is the smaller
  - >Qn50 – the Q60 limits apply
- >Qn80 (sensitive water bodies for hydrology e.g. Liffey) – the maximum remains at 10% Qn95 or 2,000m$^3$/day (25l/s), whichever is the smaller.

232. There is potential for cumulative effects on water flows and levels within the Camcor_030. This is due to the Birr WTP, which currently abstracts from the water body and is in the process of upgrading its abstraction from 2,273m$^3$/d to 4,500m$^3$/d. To avoid these impacts, an in-principle agreement is in place with the Operational Management Team at Birr WTP that abstraction would be reduced by the amount being abstracted by the Proposed Project, for the short time required to test the pipeline (approximately 10 days).

233. Uisce Éireann's abstraction at Leixlip Reservoir is located a short distance downstream of the proposed temporary abstraction on the Liffey_140. This may lead to impacts on flows within the Liffey_140 and therefore operations at Leixlip Reservoir due to over-abstraction. The Regional Water Resources Plan - Eastern and Midlands Study Area 9 Technical Report (Irish Water 2022) identifies the potential for existing abstractions on the Liffey being reduced to allow for greater compensation flows downstream, in order to meet WFD objectives. Therefore, to avoid impacts of over-abstraction and any impacts on WFD objectives, an agreement, in-principle, is in place with the Operational Management Team at Leixlip

Reservoir to reduce their abstraction by the amount to be abstracted by the Proposed Project, for the short time required to test the pipeline (approximately 36 days).

234. Further discussion on the timing and duration of the abstractions will be agreed with the Uisce Éireann Operational teams at Birr WTP and Leixlip WTP in advance of testing to ensure there is no significant effect on river flows and no risk to the water supplies at these locations.

235. The water from these eight different water bodies would then be discharged across the study area via each Washout Valve along the pipeline; a total of 187 Washout Valves discharging into 34 different WFD designated water bodies. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of Appendix A9.2 (Pipeline Assessment).

236. In addition, there are a total of 51 Line Valves along the pipeline route. Two of these are located on the RWRMs and the other 49 are located along the Treated Water Pipeline. The two Line Valves on the RWRMs would not have washouts. Forty nine Line Valves along the Treated Water Pipeline would have washouts, of which 20 would discharge water. Washouts at Line Valves would only be used to discharge the sweetening flows during final filling in the Commissioning Phase and the washout design flow would vary between 1l/s and 4l/s. The water used to test the pipeline would be released via one of these 20 Line Valve Washouts. These are detailed in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of Appendix A9.2 (Pipeline Assessment).

237. Following this hydrostatic testing, the pipeline would be cleaned using a swab pig. The water used for cleaning would be disposed of by tankers (to a designated Wastewater Treatment Plant), or to an adjacent water body or allowed to soak away onto the land following treatment.

#### *9.4.3.2.2 Assessment of Effects*

238. Impacts as a result of the proposed abstractions from the water bodies during the testing process have been accounted for in the process design and as a result, they are likely to be of negligible magnitude, resulting in effects which are Not Significant.

239. From a water quality perspective, as a result of the measures outlined, the water in the pipeline would be treated river water and would not include any potential contaminants from the water body from which it was abstracted. In addition, sampling of pipeline water would be undertaken to ensure that no environmental impacts would be caused. Treatment will include de-chlorination (using recommended products during discharge into settlement ponds), pH adjustment (within the settlement ponds) and oxygenation (on discharge from the settlement ponds). There is, however, potential for a reduction in water quality from its time in the pipeline. In particular, as the pipeline would not have been cleaned up to this point, it may contain residues of fine suspended solids. Also, the time spent in the pipeline may result in the water becoming deoxygenated; however, a sweetening flow (minimum base flow) would be used to avoid this. It should be noted that the sweetening flow applies to the final pipeline commissioning. Hydrostatic test water is only required for a short period of time to test the integrity of the pipeline. If water were to be discharged to a water body, potential impacts would include an increase in sediment loading of the receiving water.

240. There is also the potential for scouring of the beds and banks of the water bodies to occur if discharge rates are too high and/or set in the wrong location, including bank destabilisation and sediment mobilisation influencing water quality and downstream hydromorphology. This would not be the case where discharges are occurring at permanent outfall locations; these are already designed to avoid such impacts.

241. The receiving water bodies for the 39 permanent washouts (WA) and 148 temporary washouts to water bodies (WB) range from low to very high sensitivity. All impacts at Testing & Commissioning Phase described above are likely to be low adverse. Therefore, the differentiation in effects comes from the sensitivity of each water body to change and ranges from Slight (not significant) to Significant.

242. The receiving water bodies for the 20 Washouts at Line Valves range from Medium to High sensitivity. All impacts at Testing & Commissioning Phase described above are likely to be low adverse. Therefore, the differentiation in effects comes from the sensitivity of each water body to change and ranges from Slight (not significant) to Moderate (significant).

#### 9.4.3.3 Infrastructure Sites

##### *9.4.3.3.1 RWI&PS*

Activities

243. The RWI&PS would be one of the first elements of the Proposed Project to be tested and commissioned, as the water required for the testing and commissioning of the WTP and HLPS would need to come from Parteen Basin (Derg HMWB).

244. Following dry inspection of the Intake Chamber, the Passive Wedge-wire Cylinder Intake Screens, the penstocks, chambers and wet wells would be flooded. The reprofiled area of Parteen Basin (Derg HMWB) bed, at the Raw Water Intake Basin, would be inspected by divers for integrity of the concrete revetment mats. The Intake Chamber would remain flooded, as far as closed penstocks on the Inlet Chambers, until the wet wells are flooded immediately prior to commissioning.

245. The microfiltration units and the UV units on the microfilter washwater return pipes would be wet commissioned first so that water pumped forward is free of invasive species. Water would be delivered to the microfiltration units from the RWI&PS pump hall by a temporary pump, appropriately sized. This would then run waste into the Raw Water Rising Main Scour Tanks, located beneath the Microfiltration Buildings. This water would be returned to the raw water Inlet Chambers and recycled through the microfiltration units until commissioning of those units is complete.

246. Having informed ESBN of a time profile of test/commissioning loads, pumps would then be commissioned individually and in parallel.

Assessment of Effects

247. There are likely significant effects associated with the flooding of the river intake construction area and removal of the secant pile walls, in so far as this would allow sediment mobilisation into the Derg HMWB. Given the sequential approach to the excavation and backfilling of the construction areas, the concentrations of sediments at this stage of the process would be very low, the duration of the impact very short and the dilution effect from the Derg HMWB large. As a result, the magnitude of impact would be negligible; combined with the very high sensitivity of the Derg HMWB, the effect would be Not Significant.

##### *9.4.3.3.2 WTP*

Activities

248. Commissioning and test water for the WTP would be provided from Parteen Basin (Derg HMWB) via the RWI&PS and the RWRMs.

249. Following cleaning and dry inspection of all tanks, penstocks and chambers, the Raw Water Balancing Tanks would be filled by forward pumping from the RWI&PS.

250. Initial testing and commissioning of the WTP would be carried out incrementally and using only a fraction of the ultimate flow. Commissioning would be possible, in the initial first stage, at a low rate (approximately 10Mld) and initially it would recirculate that water. This would be done by discharging the treated water to one cell of the Clear Water Tanks (CWTs), and rather than pumping it forward to the BPT, it would be drained back to the Tank Draindown Management and Commissioning Lagoons on-site and recirculated to the Raw Water Balancing Tanks at the head of the works.

251. When the water quality has reached a sufficient standard, it would be used initially as test water for tanks throughout the WTP site, and finally the through flow would be allowed to discharge forward to the CWTs, available for testing and commissioning of the HLPS. For the rest of the process commissioning, flows would gradually be increased (by activating further treatment sub-streams) until two full streams are operational.

252. The second stage involves gradually increasing flows from 10Mld to 20Mld and flows at this level would be monitored and increased as required so that the flow from one full treatment module would be available for the commissioning of the Treated Water Pipeline from the WTP to the BPT and the HLPS.

253. The same procedure would be followed with a second and third treatment module.

254. The Treated Water Pipeline from the WTP to the BPT would be swabbed, tested, chlorinated and commissioned, and the high lift pumps would be then commissioned individually and in parallel. The WTP site lagoons have adequate capacity to store the water volume in the Treated Water Pipeline to the first local high point downstream of the WTP.

Assessment of Effects

255. Impacts on water levels and flows in the Derg HMWB are similar to those described in the Operational Phase impact assessment (see Section 9.4.4.1), but with a negligible magnitude. The effect would be Not Significant.

256. The WTP process has been designed as a closed system, with no discharges from the process to water bodies. This principle applies to the testing and commissioning stage also; there would be no discharges during testing and commissioning. If water quality tests fail, the water would be recirculated back through the treatment process until it meets the appropriate standard for onward flow.

#### *9.4.3.3.3 BPS*

257. The BPS would need to pass the Factory Acceptance Test (FAT) and once installed, Site Acceptance Testing (SAT). These would be undertaken in the “dry” and would include all comms links to other infrastructure sites.

258. Full “wet” commissioning of the BPS can only take place once the pipeline from the BPT to the TPR is operational and water available from the WTP. A pre-requisite of this would be the full commissioning of the RWI&PS, WTP, pipelines, BPT, FCV and TPR.

259. Following disinfection of pipework, the next step would be commissioning the surge protection system. The BPS pumps would then be commissioned individually. Finally, acceptance testing would include an endurance test whereby the pumps are required to successfully run for an extended period.

260. Predicted impacts would be similar to those described for the Commissioning of the pipeline. There would be no significant effects.

#### *9.4.3.3.4 BPT, FCV and TPR*

261. The BPT, TPR and FCV would be commissioned together and alongside the High Lift Pumping Station (HLPS) at the WTP and the Treated Water Pipelines. Similarly to the other Infrastructures Sites, these sites would undergo water retention tests followed by water quality tests.

262. Any water which cannot be passed forward, or fails the water quality test, would be disposed of via the nearest Washout Valve on the pipeline. Any discharged water would be treated as described for the Commissioning of the pipeline.

263. Predicted impacts would be similar to those described for the Commissioning of the pipeline. There would be no significant effects.

### 9.4.3.4 Summary

264. The greatest likelihood for impacts on surface waters during commissioning arises from the requirement, in a worst-case scenario, to dispose of large volumes of water from either testing or failed water quality tests. With the design and treatment measures in place, this has the potential to impact on water quality of receptors. Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of Appendix A9.2 (Pipeline Assessment) details the assessment of these impacts from Washout Valves in the Commissioning Phase which are likely to be low adverse. Therefore, the significance of effect would only vary as a result of the sensitivity of the water bodies, and range from Slight (not significant) to Significant, in the absence of additional mitigation measures.

## 9.4.4 Operational Phase

265. The impact assessment considered the likely significant effects the Proposed Project could have on the surface water environment during the Operational Phase, specifically hydrology, surface water quality, and hydromorphology.

266. For an assessment of the likely significant effects during operation it is appropriate to include design features that avoid or reduce otherwise significant adverse effects (i.e. embedded mitigation). For clarity, the assessments of the various elements of the Proposed Project identify impacts that are likely to occur, then describe the design features that have avoided or reduced these impacts as well as those that it has not been possible to ‘design out’.

### 9.4.4.1 Abstraction

267. Appendix A9.1 (Abstraction Assessment) describes the likely significant effects of the abstraction on water bodies, including the Derg TN lake water body, the Derg HMWB, the Shannon (lower)_050, the Shannon (lower)_060, Limerick Dock and the various tributaries. The assessment shows that the abstraction is not considered likely to result in a significant effect on any of the water bodies, including during a drought and/or climate change scenario and no additional measures are required.

268. As there are no significant impacts from abstraction on water levels, there will be no measurable reduction in flows downstream of the Derg HMWB. This means that there will be no reduction in flushing in the channel and will not have any knock-on impacts on sediment transport and will not cause alterations to wetland habitats or alluvial woodland.

269. Due to the Not Significant impacts on both the lake levels and water quality within the Derg TN and the Derg HMWB, it is anticipated that effects on the Lough Derg on the River Shannon NSA will also be Not Significant. Sections 5 and 5.4 of the Water Status Impact Assessment Report also provide an assessment of the impacts of the proposed abstraction on NSAs. This assessment concluded that the operation of the RWI&PS would have no impact on NSAs during operation.

270. Additionally, water quality modelling has shown that there will be a neutral effect on the water quality of Lough Derg (Derg TN) both spatially and temporally for biochemical oxygen demand, dissolved oxygen, chlorophyll-a, nitrate, orthophosphate and ammonia.

#### 9.4.4.2 Modelling

271. A hydrological model was developed to assess the impact of the proposed abstraction on the water levels of the Derg TN (Lough Derg) lake water body and the Derg HMWB (Parteen Basin) and the pass forward flows released to the ORS. Full details of the approach to modelling are provided in Appendix A9.1 Annex A (Hydrological Modelling Report). A summary is provided here for ease of reference.

272. Two constant rates of abstraction have been investigated: i) 154Ml/d, taken to be representative of normal operation demand by the year 2050; and ii) 300Mld, projected peak need/demand at year 2050.

273. The model was run using data from the period 1 January 1972 to 31 October 2023, allowing the simulation of daily levels and daily flows across this 52-year period with and without the proposed abstraction in place. Model runs on earlier periods have not been undertaken as the water resources management practices differed then, precluding the derivation of representative hydrological inflows. The model was further developed to incorporated future climate change scenarios to also allow a simulation of the impact with the Proposed Project in place and including the effects of future climate change on flows on the River Shannon.

274. As a separate exercise, in order to test whether WFD mitigation measures and / objectives to restore the favourable conservation status of the qualifying interests of the Lower River Shannon SAC would be impeded by the Proposed Project, a sensitivity analysis was undertaken to apply an outline Eflows approach proposed in a recent study (CDM Smith, 2025) to the model and investigate the potential impacts of future changes in the compensation flow regime.

275. ESB monitors the daily levels in metres Above Ordnance Datum (mAOD) (Poolbeg) at Portumna Bridge (top of Derg TN), Pier Head at Killaloe (bottom of Derg TN), and on the upstream side of Parteen Weir (bottom of Derg HMWB). ESB work to the Poolbeg datum, whilst the Proposed Project hydrological model has been set up to work to the Malin Head datum. Therefore, recorded ESB lake water levels have been converted from Poolbeg to Malin Head by subtracting 2.70m.

276. ESB also keeps daily records in cubic metres per second ($m^3/s$) for flows going through the Ardnacrusha Generating Station and the total amount of water leaving the Derg HMWB (i.e. the total combined flow going downstream to both the ORS channel and Ardnacrusha Headrace).

277. The Proposed Project impact assessment needs to be representative of the hydrological conditions going forward. Whilst ESB level and flow records extend back to 1932, prior to 1972 the management of the River Shannon was significantly different to that of today. Active management of upstream storages Lough Ree and Allen occurred to supplement flows to Lough Derg (Derg TN). After 1971 this ceased and the upstream Shannon management regime (which follows prescribed actions to meet navigation and flood management requirements) has since been, it is understood, applied in a consistent manner. The derived inflows to Lough Derg (Derg TN) prior to 1972 are therefore judged to be unrepresentative of the post 1971 hydrological conditions and for this reason are not included in the analysis. These levels and flows were provided by ESB for use in this assessment.

278. The hydrological model simulations provide impact understanding on levels and forward flows and the information required to apply the UKTAG WFD lake level test pending the development of an Irish WFD lake level test. Appendix A9.1 describes the application of this test on both the Derg TN lake water body and the Derg HMWB.

279. Initial modelling of water levels of the Lough Derg (Derg TN) and Parteen Basin (Derg HMWB) system was based upon reproducing the baseline historical observed level and simulating the effect of introducing the Proposed Project abstraction. This model is referred to as the "Historical Model". The Historical Model uses the historical recorded Ardnacrusha flows controlled by ESB in response to the historical inflows entering Lough Derg (Derg TN) and Parteen Basin (Derg HMWB) at the time. Therefore, these historical Ardnacrusha flows may not be appropriate for future scenarios when projected climate change impacts will alter the lake inflow regime, i.e. in future wetter periods when Ardnacrusha is likely to use more water and in future drier periods when ESB may need to reduce the flows going to the power station.

280. To model the future impact of the Proposed Project therefore requires a rules-based modelling approach to determine how much water would flow to Ardnacrusha based upon the changed inflow hydrology whilst still meeting the required compensation and fish pass flows and keeping the lake levels within ESB's Normal Operating Band (NOB) for Lough Derg (Derg TN) and within the upper and lower water levels that ESB applies to Parteen Basin (Derg HMWB). ESB operational principles used in the final WSP hydrological model build[8] are based on discussions with ESB to understand how ESB typically aim to manage both the Lough Derg (Derg TN) and Parteen Basin (Derg HMWB) system levels and pass forward flows to the Ardnacrusha Generating Station and ORS. The operational guiding principles received from ESB were codified into the model for a rules-based modelling approach.

281. The WSP hydrological model was run including the Proposed Project constant abstraction rates of 154Ml/d (normal) and 300Ml/d (peak). It was also run with consideration for climate change impacts (using a reasonable worst case in terms of potential climate change scenarios) and for proposed Eflow releases at Parteen Weir, to take account of the proposed RBMP measures for the Shannon (lower)_050 and Shannon (lower)_060 candidate HMWBs.

282. In determining the potential impacts as a result of any changes due to the Proposed Project, a WFD Lake Test was undertaken incorporating:

- The National Water Resources Plan (NWRP) screening test
- The WFD lake level standard.

283. Details of the application of these tests is provided in Appendix A9.1 Annex A (Hydrological Modelling Report).

284. In addition, water quality modelling was undertaken using the outputs of the hydrological model to determine the potential for impacts on the water quality of the Derg TN lake water body and the Derg HMWB. Details of the model and its outputs are provided in Annex B and Annex C of Appendix A9.1.

285. Using 2018 as a baseline year, a number of scenarios were run for the model:

- Scenario 1: Baseline
- Scenario 2: Proposed abstraction at constant 154Mld
- Scenario 3: Proposed abstraction at constant 300Mld
- Scenario 4: Proposed abstraction at constant 154Mld including climate change effects
- Scenario 5: Proposed abstraction at constant 300Mld including climate change effects.

[8] This final version of the WSP hydrological model build has previously been referred to as the "Operational Principles Model" to differentiate it to the initial "Historical Model" build.

#### 9.4.4.3 Potential Impacts

286. The assessment of impacts has been carried out in two 'steps': Step 1, the assessment of the impacts of the abstraction on water levels and flows; and Step 2, the assessment of impacts that those changes might have on other attributes, specifically water quality and hydromorphology.

##### *9.4.4.3.1 Step 1 Water Levels and Forward Flows*

287. The impacts to lake levels and forward flows to the ORS due to the modelled inclusion of the Proposed Project abstraction (as a constant flow of either 154Mld or 300Mld) were found to be barely distinguishable from the baseline case when viewed on level/flow duration curves (a standard hydrological method for comparing long-term data series).

288. The level regimes of both the Lough Derg (Derg TN) and Parteen Basin (Derg HMWB) lake water bodies are only simulated to be notably affected by the inclusion of the Proposed Project during extreme drought periods and in the days immediately after the drought (up to a week) when lake inflow is needed to replenish any deficit in storage caused by the Proposed Project abstraction. From the 52-year model simulation period (1972-2023), the simulated lake levels are only found to be notably affected by the inclusion of the Proposed Project during the 1995 and 2018 drought events. Therefore, for approximately 99% of the 52-year model simulation period, there are no perceptible impacts to simulated lake levels as a result of the Proposed Project.

289. The model demonstrates that the required ORS compensation and fish pass flows downstream can always be met, either with or without the simulated Proposed Project abstraction in place within the modelling undertaken.

290. 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 NOB 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 10$m^3$/s down the old Shannon channel, predicted rainfall, the demand for power and operating practices. ESB will maintain the water levels within the NOB 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.

291. During flood flows, when the water level is no longer below the top of the Lough Derg NOB, ESB can operate Ardnacrusha at full capacity and allow the excess flow down the ORS as they have done in the past, and the Proposed Project abstraction would be provided from a minor depletion in the simulated lake storage.

292. The simulated forward flows to the ORS remain unchanged by the inclusion of the Proposed Project abstraction. The proportion of days (to the nearest whole percent) when the ORS is receiving the minimum required compensation and fish pass flows is simulated to be unchanged by the inclusion of the Proposed Project abstraction, as does the timing of the spill flows down ORS when Ardnacrusha is at full capacity.

293. From the 52-year model simulation (1972-2023), the 2018 drought event shows the most notable impact to simulated lake levels from the inclusion of the Proposed Project abstraction (at a constant 154Ml/d or 300Ml/d). However, even during the modelling of the worst drought event (2018), the size and rate of the simulated lake level changes fit within the range of ESB normal observed lake level fluctuations seen within the 52-year period of historical recorded levels. Furthermore, the simulated lake levels with the inclusion of the Proposed Project abstraction are still within the Lough Derg NOB and within the upper and lower water levels that ESB applies on Parteen Basin without a change to the ORS compensation and fish pass flows, which would always be met.

294. Climate change simulations for a 'reasonable worst case' scenario for the 2080s epoch with the inclusion of the Proposed Project indicate that simulated lake levels would draw down closer to the bottom of the Lough Derg NOB during the 2018 worst drought event. However, the additional simulated lake level drawdown is still fitting within the range of ESB normal observed lake level fluctuations, resulting in lake levels still remaining within the Lough Derg NOB, and within the upper and lower water levels that ESB applies to Parteen Basin, with no change to the ORS compensation and fish pass flows, which would always be met.

295. The Water Action Plan 2024 (DHLGH, 2024) sets out a roadmap of actions aimed to improve fish migration in the Lower River Shannon (Shannon (lower)_050 and Shannon (lower)_060) around Parteen Weir and the Ardnacrusha Generating Station. An outline Eflow approach has been developed by a CDM Smith (2025) study to provide proposed variable compensation flows to be released down the ORS from Parteen Weir. As part of the Proposed Project hydrological modelling scope, a sensitivity analysis has been undertaken to test how the inclusion of this proposed Eflow regime would be likely to impact the viability of the Proposed Project abstraction.

296. The WSP hydrological model has been codified to represent the proposed Eflow regime rules from the CDM Smith (2025) study. The application of the proposed Eflow regime involved replacing the existing ORS 10$m^3$/s compensation and fish pass flow with a variable baseflow compensation flow and the inclusion of seasonal freshets to assist migratory fish up the ORS and into Parteen Basin (Derg HMWB). The sensitivity analysis found that similar water level differences were simulated during the droughts when the proposed abstractions were included in the Eflow scenario as were simulated for the case for a constant compensation flow. This relies on the assumption that freshets would not be released during droughts.

297. The model found that the released flows to the ORS during periods of spill are virtually the same for the Proposed Project abstraction rate of 300Mld with either a compensation flow of 10$m^3$/s or the Eflows. The Proposed Project would therefore have a negligible impact on the operation of either the existing compensation flow or the proposed Eflow regimes and would not prevent the use of this mitigation measure to help achieve overall objectives of Good status. Effects would be Not Significant.

298. As WFD lake standards for the management of abstraction impacts are yet to be finalised by the EPA for Ireland, two different kinds of lake standards tests have been applied for the purpose of assessing the Proposed Project:

    i) A screening test based upon the abstraction of a proportion of the inflow to a lake has been previously used by Uisce Éireann in consultation with the EPA in the development of the NWRP (Irish Water 2021)[9]

    ii) The WFD lake level standards UK approach, as documented in the UKTAG (2013) River Basin Management (2015-21) report, based on changes in the extent of the lake littoral zone due to the activity being assessed (in this case the Proposed Project abstraction).

[9] Irish Water (2021). National Water Resources Plan – Appendix C.

299. The Proposed Project passes the (i) NWRP screening test as the proposed peak 300Ml/d abstraction is comfortably within the 10% of the lake inflow Q50 threshold. After discussing the matter with the EPA, it was decided to adopt the (ii) UKTAG WFD lake level test approach as it was considered the more complex and sophisticated target used in the UK, therefore the most appropriate for the Proposed Project. Full details of the application of both tests are provided in Appendix A9.1 Annex A (Hydrological Modelling Report).

300. Based on the UKTAG WFD lake level test, the following standards are met for the two proposed abstraction rates:

- A constant abstraction of 154Ml/d results in both the Lough Derg (Derg TN) and Parteen Basin (Derg HMWB) water bodies meeting the lake level requirements for the WFD Good (Potential) status standard
- A constant abstraction of 300Ml/d results in both the Lough Derg (Derg TN) and Parteen Basin (Derg HMWB) water bodies meeting the lake level requirements for the WFD Good (Potential) status standard
- Inclusion of the future “reasonable worst case” 2080s climate change impacts and/or proposed ORS Eflows regime sensitivity analyses results in both the water bodies still meeting the lake level requirements for the WFD Good (Potential) status standard for a constant WSP abstraction of 154Ml/d or 300Ml/d.

301. Based upon these findings, effects on the Derg TN lake water body and the Derg HMWB would be Not Significant.

#### *9.4.4.3.2 Step 2 Indirect Impacts on Water Quality and Hydromorphology*

302. Based upon the outputs of the water quality modelling for the Derg TN lake water body and the Derg HMWB, as set out in Appendix A9.1, impacts of a negligible magnitude are predicted as a result of the Proposed Project. The water quality model was calibrated for the following parameters: biochemical oxygen demand (BOD), dissolved oxygen (DO), chlorophyll-a (CHL), ammonia (NH3-N), nitrate (NO3-N) and orthophosphate (PO4-P) with model predictions compared against samples recorded throughout Lough Derg. The modelling shows a neutral effect on the water quality of Lough Derg (Derg TN), both temporally and spatially, for all scenarios, including that for a reasonable worst-case drought period incorporating climate change effects for the 2080s epoch. The model predicts decreases of approximately ≤5% against average drought baseline PO4-P, BOD and NO3-N concentrations and miniscule variations of about ±2% against average drought baseline DO, CHL and NH3-N concentrations. Therefore, effects on water quality in both the Derg TN lake water body and the Derg HMWB would be Not Significant.

303. Based upon the negligible impacts on lake levels, effects on the hydromorphology of the lakes are also considered to be negligible and therefore Not Significant.

304. There are over 20 water bodies feeding into the two lakes. The negligible impacts predicted for the Derg TN lake water body and the Derg HMWB in terms of levels, water quality and hydromorphology mean that any impacts on inputting water bodies would also be negligible at most and therefore Not Significant.

305. No significant effects on flow as a result of the proposed abstraction mean that there would be no indirect significant effects on water quality or hydromorphology for downstream water bodies; this includes Shannon (lower)_050, Shannon (lower)_060 and Limerick Dock transitional water body.

#### 9.4.4.4 Raw Water Rising Mains and Treated Water Pipeline

306. Appendix A9.2 (Pipeline Assessment) describes the likely significant effects of the Operational Phase of the RWRMs and Treated Water Pipelines on water bodies. There are limited opportunities for the Treated Water Pipelines to result in impacts on water bodies during operation. The activity most likely to result in an impact is the operation of the Washout Valves, either as part of planned maintenance or in an emergency situation. It is very rare for these valves to be used; approximately once every 20–30 years. Nevertheless, the likely effects could be significant given the volume of water that would be discharged in these events.

307. The Washouts are divided into four types:

- Washouts at permanent discharge locations with permanent outfall (39 valves)
- Washouts at temporary discharge locations where water can be discharged into a nearby water body at a controlled rate through temporary pipework (flexible hose) (57 valves)
- Washouts at temporary local discharge locations where water can be discharged into a nearby water body (including field drains or small ditches within 250m) (51 valves)
- Washouts with local discharge to adjacent land, where there are no field drains or small ditches within 250m of the Washout Valve (40 valves). In this rare instance a local temporary soakaway would need to be formed using sandbags or equivalent. Any localised flood risk concerns at these locations would be considered.

308. Impacts relate to:

- Chlorine in the water: the water in the Treated Water Pipelines is treated drinking water and is required to contain a certain amount of chlorine to maintain quality along its length. The level has been reduced to approximately 0.1mg/l chlorine, however discharge of even this level into a water body, at the flow rates and volumes likely, could cause a potentially significant effect
- The discharge of large flows and volumes of water into local water bodies: this could cause scour of the channel bed and at the discharge point, potentially altering morphological processes leading to erosion of channel morphology.

309. As a result of these impacts, a number of controls and features (see Image 9.1) have been designed into the washout system as follows:

- Discharges would be made using flexible hoses where flow rates permit
- The Draindown Strategy is predicated on the following parameters:
  - Discharge rates to land drain washouts would be limited to a maximum of 15l/s
  - Discharge rates to minor water bodies would be limited to a maximum of 25l/s
  - Discharge to significant water bodies would be limited to a maximum of 20% of the stream's median annual flow (Qmed) and also an overarching maximum value of 150l/s
- The water would be dechlorinated as necessary. Residual chlorine would be reduced to <0.005mg/l as required by the Salmonid Regulations. For permanent washouts, tablets are placed within a perforated basket in the stilling basin allowing water to pass through. Dechlorination is achieved almost immediately on contact with the tablets. This method provides the most flexible approach for the removal of low chlorine residue and is suited to the infrequent operation of the washouts. Washouts where there is no permanent outfall will require dechlorination equipment to be brought to site as part of the operational procedure
- Washout Valves with a permanent outfall have been designed to reduce the impact of the discharge by having a suitable orientation and appropriate engineering design to dissipate the energy from the discharge (as shown in Image 9.1).

310. It should be noted that during the Operational Phase, these events would be very rare and thus, impacts would be short-term and temporary. Discharges would not take place immediately following the spreading of silage by farmers in order to reduce potential pollution to nearby water bodies. As a result of the embedded design measures, it is likely there would be no impacts at the permanent washouts (WA) from the discharge of water, and at the temporary washouts (WB) the impacts from the discharge of water would be low adverse. Therefore, the differentiation in impacts for temporary washouts comes from the sensitivity of each water body to change and ranges from Slight (not significant) to Moderate (significant) in the absence of mitigation measures. A detailed assessment of all Washout Valves is provided in Annex A (Water Body Crossings and Washout Valves – Detailed Assessment) of Appendix A9.2 (Pipeline Assessment).

311. The 40 temporary washouts with local discharge to land may have impacts associated with increased local flood risk depending on local topography and ground conditions. Impacts in relation to agricultural land as a result of the discharges of washouts to land are assessed in Chapter 11 (Agriculture).

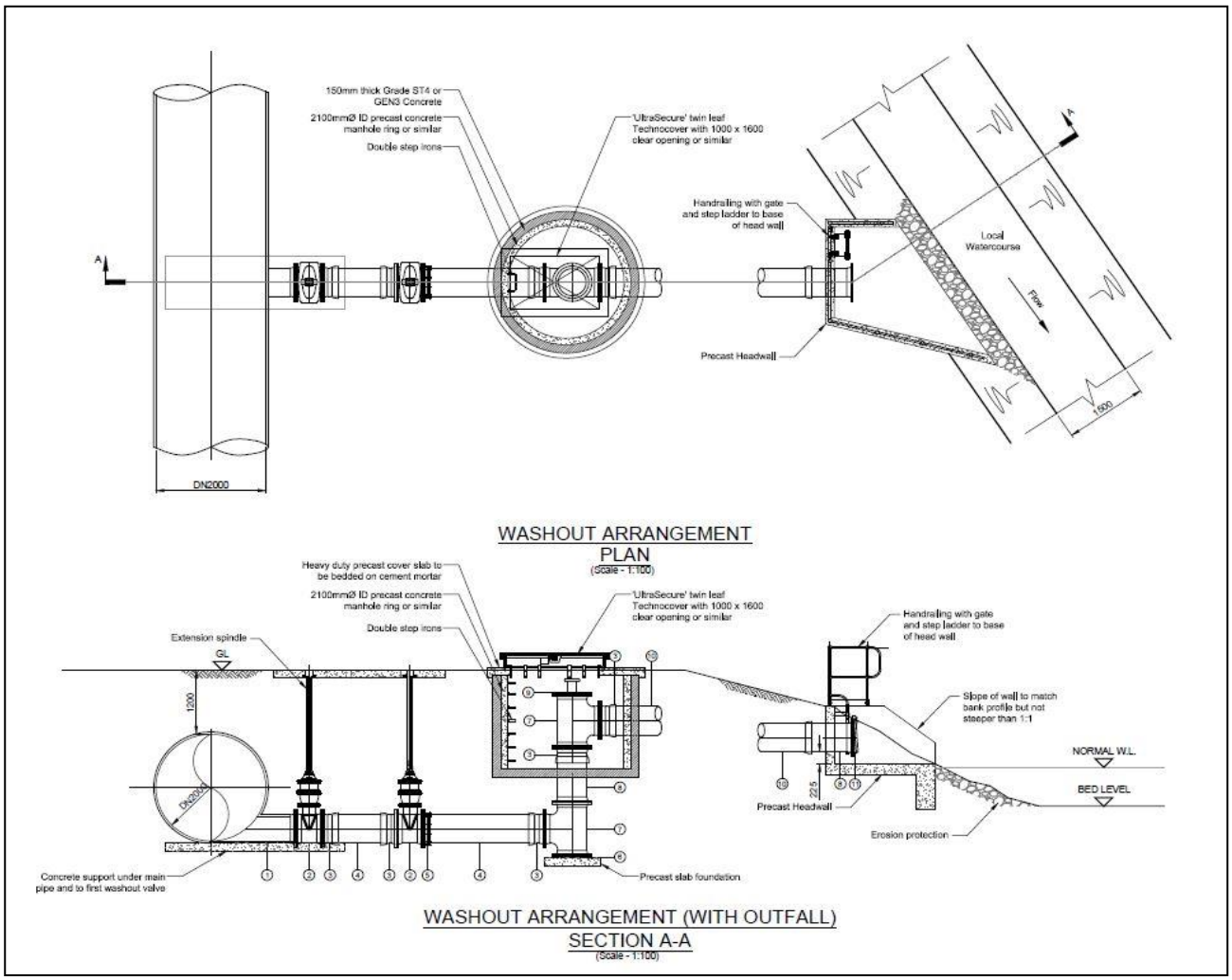


**Image 9.1: Typical Washout Valve Arrangement - with Outfall**

#### 9.4.4.5 Non-Linear Infrastructure Sites

312. Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment) describes the likely significant effects of the Infrastructure Sites on water bodies during the Operational Phase.

313. All Infrastructure Sites have been designed to avoid or reduce impacts on the surface water environment, including ensuring that, as far as possible, they are located in areas in which there are no water bodies that would be affected.

#### *9.4.4.5.1 RWI&PS*

314. The RWI&PS would be located on the banks of the Derg HMWB. The abstraction has been discussed above. In terms of the day-to-day running of the site, no significant effects are likely for the Derg HMWB. The RWI&PS is a ‘closed loop system’ meaning there are no process discharges from the site. During operation, there are limited likely sources of water quality contamination from the operation of the RWI&PS infrastructure pre-mitigation. Rainfall runoff from roofs, roads and impermeable areas would be conveyed to a drainage system comprising SuDS. Drainage from the new access road between the R494 and the RWI&PS site would be 'over the edge' to a hardcore longitudinal soakaway along both edges of the road.

315. On the RWI&PS site itself, rainwater from the roofs of the Raw Water Pumping Station Building and the two Microfiltration Buildings would be harvested and taken into the Intake Chamber and the Raw Water Rising Mains Scour Tank respectively. Other impermeable circulation areas would be drained to infiltration basins formed where the Construction Phase dewatering settlement lagoons are proposed to be located. This would then be discharged to the settlement lagoons via oil interceptors and then recirculated through the Raw Water Pumping Station Building into the treatment process.

316. Foul water from welfare facilities would be contained and disposed of to a licensed Wastewater Treatment Plant. Overall, there would be a negligible magnitude of impact on the water quality of the Derg HMWB from contaminated surface water. Despite the sensitivity of the Derg HMWB being very high, the significance of effect would be Not Significant.

317. There would be an impact on hydromorphology from the alteration of the Derg HMWB. Concrete revetment mats and gabion mattresses would alter lough substrate along the shoreline. This would permanently change the hydromorphology of a localised area. However, the lough bed would re-establish itself over time because the concrete revetement mat would be colonised by species. Therefore, the magnitude of impact is assessed as low adverse resulting in a Slight (not significant) effect.

318. The operation of permanent culverts on WBX002 WBP062 and WBP396 have the potential to cause changes to flow types, and sediment transport regime whilst reducing lateral and longitudinal connectivity, which can change channel planform and sediment continuity. These impacts would start locally to the culvert but have the potential to propagate upstream and downstream. Therefore, the magnitude of impact is assessed as medium adverse, resulting in a Slight (not significant) effect for WBX002 and WBP396 and a Not Significant effect for WBP062.

#### *9.4.4.5.2 WTP*

319. As with the RWI&PS, there would be no significant effects from the day-to-day running of the WTP. The WTP has been designed to avoid or reduce impacts, including the treatment of its process water, sludge, surface water and foul water (from welfare facilities).

320. As with the RWI&PS, the WTP process would be operated as a ‘closed system’ with washwater being recirculated back through the system.

321. Surface water is proposed to be addressed in two distinct networks:

- Building roofs and tank covers 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. It would be collected in a dedicated, separate pipe network which would outfall into the commissioning lagoons and would ultimately be pumped to the Raw Water Balancing Tanks

- A stormwater attenuation pond would be provided to attenuate runoff from surfaces not subject to rainwater harvesting. Runoff would be pre-treated in a Class 2 By-Pass Hydrocarbon Interceptor. This allows for any build-up of pollutants on an internal roadway or working surface that would be washed off in the early part of a storm, to be treated. The outfall from the attenuation pond would be fitted with a penstock which can be used to isolate the attenuation pond and so contain pollutants in the event of an accidental spillage.

322. The attenuation pond has been designed such that it would discharge to the outfall on a proposed stormwater drain and eventually to a field drain. This will provide a direct pathway to the WFD designated Kilmastulla_050 at the south-east corner of the site at greenfield runoff rates. As a result of these design features, it is likely that any impacts on surface water from the operation of the WTP would be Not Significant.

323. For Other Waterbodies, no significant effects on hydrology or surface water quality are likely from the operation of the WTP.

324. The culverting and incorporation of WBX090 and WBP063 into the surface water drainage system of the WTP would result in a permanent loss of these Other Waterbodies. These Other Waterbodies are ditches that are currently actively managed and display limited to no morphological features and/or process. Given the existing baseline, the magnitude of impact is assessed as negligible, resulting in a Not Significant effect for WBX090 and WBP063.

325. WBX004 and WBP221 would have permanent culverts below the proposed WTP access road. Culverts have the potential to impact the hydromorphology of the water bodies through the following:

- Increased flow velocities through the culvert leading to increased erosion downstream
- Permanent removal of natural bed and bank material below the culvert footprint
- Loss of lateral and longitudinal connectivity with subsequent impact on sediment and ecological continuity.

326. The culvert lengths on WBX004 and WBP221 would at minimum be as long as the proposed access road width (approximately 6m). However, unsuitable culvert design could lead to the impacts outlined above. Therefore, the magnitude of impact is assessed as medium adverse, resulting in a Slight (not significant) effect for WBX004 and a Not Significant effect for WBP221 (given the lack of morphological features under baseline conditions).

#### *9.4.4.5.3 WTP Access Road*

327. The WTP access road would be allowed to drain via filter drains running on either side of the road. Pea-gravel is a permeable material and would allow storage of excess rainwater before it infiltrates into the subsoil. This process replicates the existing greenfield drainage regime on the site.

328. The access road bridge has been designed to ensure there is no impediment to flows in the Kilmastulla_050. There would be no additional drainage to the water body from the access road. As a result, no impacts are likely on the hydrology of the water body from this activity in operation.

329. There are no discharges proposed in relation to the access road or the bridge and as a result, no potential for effects on surface water quality from such a source.

330. The access road to the WTP would require construction of a clear span bridge on the Kimastula_050. It would not interact with the channel bed and bank during operation, nor alter pass-forward flow. Therefore, the magnitude of impact on hydromorphology is assessed as negligible, resulting in a Not Significant effect.

#### *9.4.4.5.4 BPT*

331. There would be no impacts on hydrology during the operation of the BPT. There would be no process discharges from the BPT to the surface water environment during the Operational Phase and no wastewater discharges from welfare facilities. Foul wastewater generated on the BPT site would be passed through a holding tank with a level sensor which would generate an alarm when emptying is required.

332. The BPT is located within an area of agricultural land with no water body crossings. There are some field drains and ditches in the vicinity of the site and the change in the land use under the footprint of the BPT could lead to changes in overland flow pathways. However, it is considered that there would not be a significant impact on water bodies within the surrounding area. Overall, it is considered that there would be a negligible magnitude of impact as a result of the BPT on hydromorphology receptors, leading to a Not Significant effect.

#### *9.4.4.5.5 BPS*

333. There would be no impacts on hydrology during the operation of the BPS. Operational discharge from the BPS site would be restricted to greenfield runoff rates. Therefore, the magnitude of impact is assessed as negligible, resulting in a Not Significant effect.

334. There would be no process discharges from the BPS to the surface water environment during the Operational Phase and no wastewater discharges from welfare facilities. Foul wastewater generated on the BPS site would be passed through a holding tank similar to the BPT. This would be tankered to an appropriately licensed waste facility. Surface water runoff would be treated via SuDS to acceptable levels prior to discharge via the new outfall. Therefore, the magnitude of impact is assessed as negligible, resulting in a significance of effect of Not Significant.

335. Operational surface water discharges would occur to the Camcor_030 WFD designated water body via the proposed outfall from the BPS. Discharges have the potential to alter flow regimes within the receiving water body local to and downstream of the outfall location. New discharges from the BPS could result in increases in bed and bank erosion and changes to flow pathways and morphology if they significantly alter the existing flow regime.

336. Outfall discharges would be restricted to greenfield runoff rates. Therefore, the magnitude of impact is assessed as low adverse, resulting a Slight (not significant) effect.

#### *9.4.4.5.6 FCV*

337. There would be no impacts on hydrology during the operation of the FCV. There would be no process discharges from the FCV to the surface water environment during the Operational Phase.

338. The FCV would be located within an area of agricultural land with no water body crossings. There are no proposed discharges or outfalls from the site. There are some field drains and ditches in the vicinity of the site and the change in the land use under the footprint of the FCV could lead to minor changes in overland flow pathways. However, it is considered that there would not be a significant impact on water bodies within the surrounding area. Overall, it is considered that there would be a negligible magnitude of impact as a result of the FCV on hydromorphology receptors, leading to a Not Significant effect.

#### *9.4.4.5.7 TPR*

339. There would be no impacts on hydrology during the operation of the TPR. Operational discharge from the TPR site would be restricted to greenfield runoff rates. Therefore, the magnitude of impact is assessed as negligible, resulting in a Not Significant effect.

340. There would be no process discharges from the TPR to the surface water environment during operation. Surface water discharges would be to filter drains for attenuation and discharged to the local drainage network which has a pathway downstream to the Liffey_170 approximately 600m away. Additionally, the water would be treated and hydrocarbon interceptors would be installed. Therefore, the magnitude of impact is assessed as negligible, resulting in a Not Significant effect.

341. It is not likely that there would be any operational impacts on hydromorphology as a result of the TPR. Surface water runoff would be attenuated to greenfield runoff rates and discharged to drainage ditches 600m upstream of the Liffey_170. There are no proposed new outfalls from the TPR to the Liffey_170. Therefore, the magnitude of impact is assessed as negligible, resulting in Not Significant effect.

#### *9.4.4.5.8 Proposed 38 kV Uprate Works*

342. While it is possible for impacts during operation, power supply upgrades would operate overhead and above ground. Therefore, it is unlikely that the Proposed 38 kV Uprate Works would interact with water bodies. Therefore, the magnitude of impact for all water bodies crossed is assessed as negligible. This results in Not Significant effects during the Operational Phase.

### 9.4.4.6 Summary

343. Table 9.13 provides a summary assessment of the potential significant effects, i.e. Moderate (significant) or above in the absence of additional mitigation, during the Operational Phase of the Proposed Project from the impacts described in the above Sections 9.4.4.1 to 9.4.4.5. Full details of effects with Slight (not significant) or below significance of effect are detailed in Appendix A9.1 (Abstraction Assessment), Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment).

**Table 9.13: Operational Phase Pre-Mitigation Likely Significant Effects**

| Proposed Project Element and Operational Activity | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| **Abstraction** | | | | | | |
| No significant effects likely during the Operational Phase. | | | | | | |
| **RWRMs, Treated Water Pipeline** | | | | | | |
| Washout Valves | Kilmastulla_040 - WB-001 | Impacts would be temporary over the operational use of the valve and localised (not at the water body scale), resulting in a measurable impact for a short period of time and no overall change in the ability of WFD designated water bodies to meet their objectives. Minor impact on a small part of the receptor. | Hydromorphology | High | Low adverse | Moderate (significant) |
| | Kilmastulla_040 - WB-002 | | | | | |
| | WCX006 - WB-007 | | | | | |
| | WCX007 - WB-007a | | | | | |
| | WCX008 - WB-008 | | | | | |
| | Ardgregane Stream_010 - WB-009 | | | | | |
| | WCX014 - WB-012 | | | | | |
| | WCX015 - WB-012a | | | | | |
| | WBX017 - WB-013 | | | | | |
| | WBX018 - WB-14 | | | | | |
| | WCX020 - WB-018a | | | | | |
| | WBX024 - WB-022 | | | | | |
| | WBX025 - WB-022a | | | | | |
| | WCX027 - WB-027 | | | | | |
| | WBX028 - WB-028 | | | | | |
| | WCX028 - WB-031 | | | | | |
| | WCX029 - WB-032 | | | | | |
| | WCX030 - WB-033 | | | | | |

| Proposed Project Element and Operational Activity | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| Washout Valves | WCX031 - WB-034 | Impacts would be temporary over the operational use of the valve and localised (not at the water body scale), resulting in a measurable impact for a short period of time and no overall change in the ability of WFD designated water bodies to meet their objectives. Minor impact on a small part of the receptor. | Hydromorphology | High | Low adverse | Moderate (significant) |
| | WBX034 - WB-035 | | | | | |
| | WBX037 - WB-036 | | | | | |
| | WCX033 - WB-037 | | | | | |
| | WCX035 - WB-041 | | | | | |
| | WBX040 - WB-042 | | | | | |
| | WBX043 - WB-043 | | | | | |
| | WBP022 - WB-044 | | | | | |
| | WCX038 - WB-045 | | | | | |
| | WBX045 - WB-049 | | | | | |
| | WBP142 - WB-050 | | | | | |
| | WBX049 - WB-051 | | | | | |
| | WBX050 - WB-052 | | | | | |
| | WBP145 - WB-053 | | | | | |
| | WBX052 - WB-054 | | | | | |
| | WCX040 - WB-057 | | | | | |
| | WCX041 - WB-059 | | | | | |
| | WCX043 - WB-062 | | | | | |
| | WCX045 - WB-065 | | | | | |
| | Daingean_010 – WB-070 | | | | | |
| | WCX050 - WB-078 | | | | | |
| | WCX051 - WB-079 | | | | | |
| | WCX053 - WB-080 | | | | | |

| Proposed Project Element and Operational Activity | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| Washout Valves | WCX053 - WB-081 | Impacts would be temporary over the operational use of the valve and localised (not at the water body scale), resulting in a measurable impact for a short period of time and no overall change in the ability of WFD designated water bodies to meet their objectives. Minor impact on a small part of the receptor. | Hydromorphology | High | Low adverse | Moderate (significant) |
| | WCX054 - WB-082 | | | | | |
| | WCX055 - WB-091 | | | | | |
| | Figile_030 - WB-092 | | | | | |
| | Figile_030 - WB-093 | | | | | |
| | Figile_030 - WB-094 | | | | | |
| | Figile_030 - WB-095 | | | | | |
| | Figile_030 - WB-096 | | | | | |
| | Figile_030 - WB-097 | | | | | |
| | Figile_030 - WB-098 | | | | | |
| | WCX059 - WB-107 | | | | | |
| | WBP118 - WB-109 | | | | | |
| | WCX061 - WB-122 | | | | | |
| | WCX067 - WB-131 | | | | | |
| | WCX068 - WB-132 | | | | | |
| | WBP310 - WB-134 | | | | | |
| | WBP119 - WB-136 | | | | | |
| | WCX075 - WB-137 | | | | | |
| | WBP120 - WB-139 | | | | | |
| | WBP211 - WB-140 | | | | | |

| Proposed Project Element and Operational Activity | Water Body | Impacts | Receptor Attribute | Sensitivity | Magnitude of Impact | Significance of Effect (Pre-Mitigation) |
|---|---|---|---|---|---|---|
| **Infrastructure Sites** | | | | | | |
| **RWI&PS** | | | | | | |
| No significant effects likely during Operational Phase. | | | | | | |
| **WTP** | | | | | | |
| No significant effects likely during Operational Phase. | | | | | | |
| **BPT** | | | | | | |
| No significant effects likely during Operational Phase. | | | | | | |
| **BPS** | | | | | | |
| No significant effects likely during Operational Phase. | | | | | | |
| **FCV** | | | | | | |
| No significant effects likely during Operational Phase. | | | | | | |
| **TPR** | | | | | | |
| No significant effects likely during Operational Phase. | | | | | | |
| **Proposed 38 kV Uprate Works** | | | | | | |
| No significant effects likely during Operational Phase. | | | | | | |

## 9.5 Mitigation and Monitoring Measures

344. The environment team has worked in close collaboration with the infrastructure design team to avoid or reduce environmental impacts through the Proposed Project design. This is referred to as embedded (or design) mitigation. Embedded mitigation is inherent to the Proposed Project design, and forms part of the project description and construction methodology described in Chapter 4 (Proposed Project Description) and Chapter 5 (Construction & Commissioning) of the EIAR. As such, embedded mitigation is considered in the assessment of pre-mitigation effects in Section 9.4. Chapter 3 (Consideration of Reasonable Alternatives) of the EIAR details the reasonable alternatives that have been considered throughout the design development of the Proposed Project, including the environmental factors which have influenced the decision making.

345. Embedded design measures are described, where relevant, in Section 9.4, and include measures such as siting the Infrastructure Sites to avoid sensitive water features where practicable, drainage design, and controls designed into the washout system.

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

347. Mitigation measures have been developed with reference to the Water Action Plan 2024's Programme of Measures to 2027. These measures have been envisaged to return all water bodies in Ireland to 'Good' Ecological Status (or Good Ecological Potential) with the strategic aim to reduce phosphorous and nitrogen pollution to waterways, restore natural functioning of rivers and targeting specific and diffuse pressures. For further information on the Programme of Measures, please refer to the Water Status Impact Assessment Report.

### 9.5.1 Construction Phase Mitigation Measures

348. Construction Phase impacts will be avoided or mitigated through the implementation of measures set out in this section. These measures have been informed by this assessment and the methods outlined in Chapter 5 (Construction & Commissioning).

349. There are many potentially significant effects on water bodies which are common to most major construction works and are possible across the various elements of this Proposed Project. This includes those associated with Construction Compounds and Pipe Storage Depots.

350. Consequently, two types of mitigation measures have been identified:

- Generic mitigation measures which will be applied across the Proposed Project to avoid or reduce likely significant effects. Generic measures are in line with best practice construction guidance. These are detailed in Appendix A5.1 Annex A (SWMP) and referenced in Appendix A9.1 (Abstraction Assessment), Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment)
- Location-specific mitigation measures specific to the various Proposed Project elements. These are detailed in the SWMP and referenced in the relevant assessments in Appendix A9.1 (Abstraction Assessment), Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment) and summarised in this chapter. These measures will be adopted where it is considered that the generic measures in place across the site will not be sufficient to avoid or reduce significant effects.

#### 9.5.1.1 Generic Measures

351. Generic control measures are described, to avoid or reduce the impacts for the Proposed Project. These mitigation measures are detailed in the SWMP.

352. The generic measures which will be implemented include:

- Control of silt-laden water runoff and dewatering of silt water
- Appropriate stockpiling of material
- Appropriate storage of materials away from water bodies
- Containment of fuel tanks, drums, mobile bowsers and bunds
- Appropriate usage of vehicles and plant including when driving and refuelling
- Control measures when working in or near watercourses
- Avoiding use of concrete in design where possible; and using self-contained batching plant on-site with adequate cleaning process defined.

353. These generic mitigation measures follow industry best practice, and will be implemented in accordance with the contractors' overall CEMP for the works. This control methodology has been proven to work on other similar projects and is utilised across the construction industry. Measures have been selected to ensure suitability for the Proposed Project and the types of construction methods that would be employed. These measures will be adopted in accordance with the following guidelines:

- Control of Water Pollution from Linear Construction Projects: Technical Guidance (C648) (CIRIA 2006a)
- Control of Water Pollution from Linear Construction Projects: Site Guide (C649) (CIRIA 2006b)
- Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532) (CIRIA 2001)
- Environmental Good Practice on Site Guide (C811) (CIRIA 2023)
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI 2016)
- Stream Simulation: an ecological approach to providing passage for aquatic organisms at road-stream crossings (United States Forest Service 2008)
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA 2006)
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009)
- Water Action Plan 2024: A River Basin Management Plan for Ireland – Appendix 1: Programme of Measures (DHLGH 2024).

#### 9.5.1.2 Location Site-Specific Measures

354. Mitigation measures for site-specific impacts are also identified for each of the key construction activities throughout the Proposed Project. Full details of these mitigation items are detailed in the SWMP and are summarised in Table 9.14.

**Table 9.14: Construction Phase Activity/Site-Specific Mitigation Measures**

| Proposed Project Activities | Activity/Site-Specific Mitigation Measures |
|---|---|
| Pipeline trench (drainage, dewatering and surface water runoff) | • **W-SC1 - Toe Drains:** During construction of the pipeline, shallow toe-drains will be installed along the edges of the Construction Working Width to intercept overland flows from adjoining lands; they will also catch runoff from the stockpiles of topsoil and subsoils resulting from the excavation of the trenches.<br>• **W-SC2 - Attenuation Lagoons:** Attenuation/settlement lagoons will be located at low points along the Construction Working Width, making use of the natural topography. The attenuation lagoons represent locations which, through their topography, have the potential to retain large areas of runoff from the surrounding land, or from along the Construction Working Width.<br>• Where the attenuation ponds are located on a slope or for those located within a Wet Grassland or floodplain, additional silt fencing or sandbags may be required. |
| Watercourse crossings | • **W-SC3 - Trenchless Crossings:** The layout of the trenchless crossing area is designed to avoid impacting on riverbanks and contamination of the river with either dewatering fluid, silty water runoff or bentonite slurry. In particular, the reception and launch pits for the trenchless excavation will be located as per the requirements of the detailed design to be completed by the appointed Contractor, but will be contained within the Proposed Project and will be chosen or engineered such that the fall is away from the water body and beyond the riparian habitat Soil stockpiles and fuel storage tanks will be a minimum of 10m from the river (CIRIA 2006a).<br>• **W-SC4 – Open Cut Crossings**: In-stream working will be carried out in accordance with guidelines issued by IFI (IFI 2016). This will apply to the watercourse crossings; pipeline trench works near to watercourses; and the construction of permanent outfalls for the washouts. Prior to construction, the appointed Contractors will discuss the specific requirements for any discharges with the relevant authorities. The approach to managing surface water during the construction of the Treated Water Pipelines in all peat areas will follow the standards set by the EPA for Bord na Móna.<br>• **W-SC5 - Over Pumping:** For open cut crossings, where over-pumping is required, the watercourse will be diverted around the works by 'over-pumping'. The potential issues relating to a build-up of silt or silt-laden dewatering fluids will be addressed through the use of settlement tanks at each crossing. Under the supervision of an aquatic ecologist, spawning gravels encountered (if any) will be removed at the stream crossing points prior to construction works taking place, subject to the prior agreement at all stages in consultation with IFI. There will be seasonal constraints on working through, and adjacent to, watercourses which are of a particular ecological interest. Works will be in accordance with IFI Guidelines (IFI, 2016) or as otherwise agreed with IFI during the Construction Phase.<br>• **W-SC6 - Fluming:** For open cut crossings, where fluming is required, the watercourse will be diverted around the works by gravity, most likely in an enclosed pipe. Potential issues relating to a build-up of silt, or silty dewatering fluids will be addressed through the use of settlement tanks at each crossing. Whilst the purpose of the flume is to create a dry stream/river bed for the open excavation, it may be necessary to employ a temporary sump pump to remove any additional water. Pumped discharge will be via a settlement tank to remove any solids from the dewatering.<br>• **W-SC7 – Open Cut Crossings in Areas of Peat:** Specific measures for working in areas of peat are identified in W-SC9 to W-SC15 and are also detailed in Appendix A5.3 (Methods of Working in Peat). In areas where there is a significant volume of marl, which is a very fine clay-type soil, it may be more difficult to settle suspended solids within the silt ponds. For slower settling solids additional silt ponds, in series, or addition of a coagulant, and possibly flocculant, may be required to ensure successful settlement, and these will be put in place where required.<br>Coagulants and flocculants are usually metal or polymer-based chemicals and these have been shown to be harmful to aquatic organisms. More recently however, non-toxic bio-coagulants and bio-flocculants have been developed. Therefore, if additional treatment is required to treat the marl, only biological-based treatment approaches will be used. Weekly sampling of the silt ponds effluent will be undertaken to ensure compliance with any emission limits set.<br>• **W-SC8 - Reinstatement (Watercourses, Trenches and Drains):** The detailed design of works within the watercourses, particularly the reinstatement of watercourses following open cut crossings, will be undertaken with input/guidance from a geomorphologist and ecologist.<br>Where reinstatement of the pipeline trench occurs near a watercourse, a silt fence will be placed along the riverbank to prevent solids that are washed off the works area during heavy rainfall from entering the stream while the surface adequately revegetates. This measure will be particularly important at sites that slope to the edge of a watercourse. Typically, a silt fence will incorporate a geotextile filter fabric stretched between a series of wooden or metal fence stakes and will be installed in such a way to create pooling of runoff and thereby allowing sedimentation to take place.<br>The reconnection of land drains temporarily altered during construction will be carried out as part of the backfill operation. After the installation of the pipeline, the backfill will be compacted in layers up to the underside of the severed drains which are to be permanently reinstated. The replacement drain will extend into the undisturbed ground on each side of the trench for a suitable distance to ensure a properly supported reconnection can be made (typically 1m or more). The undisturbed ground will be excavated by hand and a good connection formed to the existing drain. The pipeline trench backfill will then be compacted up to the subsoil surface level. |

| Proposed Project Activities | Activity/Site-Specific Mitigation Measures |
|---|---|
| Construction in peat | To reduce the impacts on water bodies during construction of the pipeline in peat areas, the following specific measures will be implemented:<br>• **W-SC9** – **Monitoring of Water Quality**: Water quality will be monitored for seven parameters – PH, total suspended solids, total phosphorous, ammonia, colour, and chemical oxygen demand (COD) – at key working locations:<br>- Before and after crossing water bodies in peat areas; and<br>- Settlement ponds storing surface water runoff from construction works.<br>This programme will comprise 12-months of pre-construction, baseline monitoring to capture seasonal variability and 3-months of post-construction restoration monitoring. Monitoring locations will be assigned in agreement with Bord na Móna.<br>While standards set by the EPA for Bord na Móna's Integrated Pollution Control (IPC) licence require quarterly monitoring, the nature of the Proposed Project warrants an increased monitoring frequency. Therefore, during active work phases in these pear areas, monthly monitoring will be conducted – except in the following cases:<br>- Where a work site is near a protected water body; or<br>- Where a work site crosses through a sensitive area.<br>- In these cases, weekly monitoring is proposed.<br>• **W-SC10** - Daily visual inspection of the waterbody downstream of the crossing will be undertaken to monitor colour and turbidity; pH readings will also be taken to give an indication of excessive ammonia in the water. The Environmental manager can take handheld readings if they observe a change in waterbody colour.<br>• **W-SC11** - Where reasonably practicable, works will be carried out in dry conditions to reduce the potential for peat laden runoff to impact the downstream waterbody. Provision will be made to halt work during heavy rainfall / storm events. The extent of exposed peat areas and duration of exposure will be limited due to the temporary nature of the works.<br>• **W-SC12** - These new temporary proposed settlement ponds and their silt fences will be managed and maintained regularly in line with a pollution prevention plan. Water from the settlement ponds will flow onwards to the appropriate active Bord na Móna silt pond at a rate that follows the standards set by the EPA for Bord na Móna to meet its Integrated Pollution Control license requirements.<br>• **W-SC13** - **Appropriate Handling of Excavated Material:** Temporary storage of excavated peat will be accommodated parallel to the trench and within the Construction Working Width but out with the buffer extents surrounding drains and watercourses. Buffers will be maximised where possible and designed to consider site topography. Note that excavated peat will be re-wet whilst stored in order avoid it drying out. and as the settlement lagoons are temporary in nature, they will be decommissioned once active works have ceased in their vicinity and the land made good.<br>• **W-SC14** - **Appropriate Peat Storage:** Elevated ground close to the construction working width will be kept free from excessive loose peat to reduce the likelihood of runoff to the downstream waterbody. Furthermore, no materials will be stored in areas of deep peat.<br>• **W-SC15** - **Managing Surface Water Through Peat Areas:**: The approach to managing surface water during the construction of the Treated Water Pipeline in all peat areas will follow the standards set by the EPA for Bord na Móna to meet its Integrated Pollution Control licence requirements with a focus on good construction management practices and techniques. The licence requirements stipulate flows and water quality as follows:<br>Maximum flow velocity: <10cm/s<br>Silt pond design capacity: minimum 50$m^3$ per net ha of bog serviced<br>- Emission Limits Values for water (monitored quarterly):<br>- Total Suspended solids(TSS): 35mg/l<br>Trigger level values for water:<br>- Total Ammonia: 3mg/l<br>- Chemical oxygen demand (COD): 100mg/l<br>Sampling of Total Suspended Solids, Total Ammonia and COD (among other standards) is carried out quarterly by Bord na Móna with each outlet being sampled at least once every 2-3 years. A number of the peatland sites / bogs which the Treated Water Pipeline will cross are sampled more frequently (in order to support the Peatlands Climate Action Scheme). It should be noted that the PCAS monthly sampling will cease in August 2026 with these areas returning to standard sampling at least once every two to three years per Bord na Móna license conditions. Statistical analysis of this sampling data can be found in Appendix A9.2.<br>Monitoring will be undertaken to determine any potential exceedances of the Emissions Limit Values (ELV) in discharge water. |

| Proposed Project Activities | Activity/Site-Specific Mitigation Measures |
|---|---|
| | The risk of exceeding the Trigger level values for ammonia and COD is considered low with the implementation of the mitigation measures listed above. Note that for Trigger level values (Ammonia and COD), any exceedance is not reportable as an incident, but it must be included in an update to the EPA at the end of each quarter. This data can be used to support Bord na Móna in meeting its Integrated Pollution Control licence requirements.<br>Should the Project be at risk of exceeding the ELV for TSS or Trigger level values for Ammonia and COD, the Project Environmental Manager will implement suitable adaptive management measures to mitigate the likelihood of potential exceedances in discharge water. This will include adjustments to the programme of excavations; methods of stockpiling and control of discharges from settlement ponds. Any exceedances of ELV for TSS or Trigger level values for Ammonia / COD would be investigated by the Project Environmental Manager. Prior to construction, the appointed contractors will discuss the specific requirements for any discharges with the relevant authorities. As a result, in addition to the sampling proposed under ID W-SC9, weekly sampling of the effluent from silt ponds will be undertaken to ensure compliance with any emission limits set.<br>Ditches on Bord na Móna lands, currently used by that organisation to manage its their own discharges, will not be used for the settlement of solids. Silty water and runoff from any excavations will be settled in the temporary settlement lagoons and treated before any being discharged to Bord na Móna ditches. All water will be discharged at a controlled rate to ensure there is no resuspension of settled solids arising from the Proposed Project in Bord na Móna ditches and will be done in collaboration and agreement with Bord Na Móna. |
| Washout Valves | **W-SC16 - Structures (New Outfalls):** the following measures will be implemented in the construction of new washouts:<br>• Works will be conducted during forecast low flow periods to allow the outfall to be constructed into the bank and on a dry section of the riverbed<br>• A silt boom will be placed around the new outfall during the construction works to prevent the runoff of silty water into the water body<br>• In-stream works will not be carried out in water bodies frequented by salmon or trout during the Annual Close Season and will be undertaken outside of the lamprey spawning season. River and brook lamprey spawn during the period March to April, while sea lamprey spawn during the period May to August. In-stream works may be carried out between October and March if juvenile lamprey are translocated; however, the salmonid spawning season will still need to be considered. The duration of the season for salmonids varies regionally. The timing of works will always be considered on a site-specific basis and in agreement with IFI, as some rivers have late spawning salmonids<br>• The area of disturbance of the watercourse bed and bank will be the absolute minimum required for the installation of the outfall<br>• Outfalls will be at a 45-degree angle and in line and at a level with the watercourse bed<br>• The headwall will be set back into the channel banks so it is flush<br>• The headwall adjacent to the riverbank will be kept free of vegetation and debris and the riverbank will be checked for scour damage and erosion regularly, and defects remedied early<br>• If clean water from any Infrastructure Site or the RWRMs or Treated Water Pipelines is required to be discharged into a watercourse, a baffle will be fitted to the discharge point to prevent disturbance of the watercourse bed. |
| Construction Compounds and Pipe Storage Depots | **W-SC17 - Culverts:** Specific measures in relation to culverting of water bodies under the footprint of Construction Compounds and Pipe Storage Depots:<br>• Appropriate design of culvert structures and water body modifications (e.g. realignments) with respect to hydromorphology, and both riparian and aquatic ecology<br>• Allowance for the appropriate conveyance of water and sediment for a range of flows (including at low flow conditions). This will include formation of a low-flow channel within the culvert where applicable<br>• Where culvert gradient requires, baffles will be included in culvert designs for bed material retention and/or to provide resting pools for fish<br>• Limitation of culvert lengths through design<br>• Close alignment of the culvert with the existing water feature in terms of gradients<br>• Roughening of culvert inverts and interiors to help reduce water velocities<br>• Where culverts are greater than 25m in length, planting should be used at the inlets and outlets to smooth the light transition at these locations. |

| Proposed Project Activities | Activity/Site-Specific Mitigation Measures |
|---|---|
| RWI&PS | • **W-SC21 - Construction Sequencing:** The RWI&PS will be constructed in the sequence outlined in Table 5.1 in the SWMP. The site will be prepared so as to reduce the ingress of groundwater and surface water to the site.<br>• **W-SC22 - Managing Silty Water:** The Derg Heavily Modified Water Body (HMWB) will be protected and a dry area created through the use of a cofferdam which will be installed using a barge. It is expected that active dewatering of the construction site behind the cofferdam will be carried out to ensure dry working conditions. Water pumped from the cofferdam will be settled in the Dewatering Settlement Basins on-site before being returned to the Derg HMWB (Parteen Basin).<br>• **W-SC23 - Construction Compounds:** The Construction Compound at the RWI&PS will accommodate the construction site offices and will be covered in geotextile membrane and overlain with stone following topsoil stripping. This will reduce the amount of bare earth which could otherwise be mobilised during rainfall. The Satellite Construction Compound (CC0) for the RWI&PS will also require the construction of lined Dewatering Settlement Basins, initially for the purposes of groundwater management and site runoff but subsequently to act as permanent infiltration basins. Wastewater from the compound welfare facilities will be contained and will be tankered off site each day and disposed of at a nearby Wastewater Treatment Plant.<br>• **W-SC24 - Secant Piles:** At the RWI&PS site, secant pile walls will be required to allow work on the intake structure and below-ground sections of the Raw Water Pumping Station to proceed in dry conditions, below the prevailing water level outside in Parteen Basin (Derg HMWB). Secant piles along Parteen Basin shoreline will be constructed from a temporary piling platform which will be constructed within Parteen Basin. This platform could be retained using temporary piling or may be free standing. Silt generated from construction works in Parteen Basin, such as dredging for the gabion mats and construction of the secant piles, will be contained by means of two rows of heavy duty Type 3 silt curtains installed in Parteen Basin around the work areas. Silt generated during construction works will be allowed sufficient settlement time within the water contained within the silt curtains.<br>• **W-SC25 - Concrete Revetment Mat:** A concrete revetment mat (a flexible mat of meshed thin concrete segments with voids) will be installed on the profiled bed of Parteen Basin and used for erosion control in the area immediately outside the intake. The mat will be provided with a small cover layer of granular or other native bed material to provide a surface which can be recolonised by native fauna. This will be installed from the water using a crane and lifting bracket on board a flat-bottomed barge. No refuelling of plant and machinery, or storage of fuel tanks, will take place on the barge (if used) used for transporting excavated material off-site. No refuelling of the barge or the equipment contained on it will be undertaken on the water; all refuelling will take place in port in designated areas (for the barge) and on land for the equipment on the barge. Oil, bilge water and sewage will be contained within the barge itself and disposed of at appropriately licensed sites. With respect to the provision of welfare facilities at the construction site, the wastewater generated from sinks, toilets, washrooms, and showers will be contained in holding tanks on the site and periodically tankered off site and disposed of to a Wastewater Treatment Plant. |
| WTP | • **W-SC26 - Construction Sequencing:** In order to reduce silty water runoff, the works will be phased such that a greenfield rate of runoff can be maintained across the whole site. Various methods will be employed including contour draining of the WTP site, partitioning the upper undisturbed soil areas into units to be built later, and directing the drainage to the Tank Draindown Management and Commissioning Lagoons. The WTP will be constructed in the sequence outlined in Table 5.2 in the SWMP.<br>• **W-SC27 - WTP Access Road:** The access road to the WTP site would cross a tributary of the Kilmastulla River, immediately north of the junction of the access road with the R445 Regional Road. The bridge would be constructed as a single span structure using precast concrete or steel sections such that there would not be any in-stream works required. The bridge abutments would be constructed at least 5m back from each bank of the stream. No construction will take place in the location of the existing disused petrol station near to the access road. Local superstructures will be removed; the tank will be emptied of any groundwater ingress (if any) using a tanker, and disposed of to a licensed facility. The tank will then be filled with either sand and cement or foam concrete and left *in situ*.<br>• **W-SC28 - Managing Silty Water:** The Tank Draindown Management and Commissioning Lagoons in the south-eastern area of the site, will be one of the first structures constructed at the WTP site. These lagoons will be lined with a permeable liner, working as attenuation lagoons for surface water drainage from exposed excavations and for dewatering flows. The appointed Contractor will be required to partition the sequence of works at the WTP site to optimise the drainage of the site, as the Tank Draindown Management and Commissioning Lagoons will be relied upon to act initially as efficient construction site drainage/settlement lagoons. This will allow the WTP site drainage to be managed during construction, resulting in the least possible earthworks and bare soil face being exposed at a given time. This will be consistent with the necessary sequence of construction of the various units.<br>• **W-SC29 - Construction Compounds:** The Construction Compound at the WTP will accommodate the Construction Compound offices and will be covered in geotextile membrane and overlain with stone following topsoil stripping. This will reduce the amount of bare earth which could otherwise be mobilised during rainfall. It will require the early construction of its Tank Draindown Management and Commissioning Lagoons to act as temporary Construction Phase lagoons for surface water drainage from exposed excavations for ground dewatering flows. |

| Proposed Project Activities | Activity/Site-Specific Mitigation Measures |
|---|---|
| BPT | • **W-SC30 - Construction Sequencing:** The BPT will be constructed in the sequence outlined in Table 5.3 in the SWMP.<br>• **W-SC31 - Managing Silty Water:** The appointed Contractor will construct temporary drainage measures to reduce risk of pollution during earthworks construction and other elements of work. This will include the construction of soakaway chambers and filter drains to disperse surface water in a controlled manner. In addition, the proposed site layout will include an infiltration basin at the southern extremity of the site, which will be used for control of any surface water runoff. The latter will be lined with a permeable geotextile membrane/filter material. This infiltration basin will also be used for the control of sediment from the excavation and will be retained for the Operational Phase of the BPT. It has been designed with a volume of 190m$^3$, to accommodate flows from a 1 in 100-year storm, with a 10% uplift for climate change. |
| BPS | • **W-SC32 - Construction Sequencing:** The BPS will be constructed in the sequence outlined in Table 5.4 in the SWMP.<br>• **W-SC33 - Managing Silty Water:** Topsoil stripping will not be carried out within 5m of the adjacent water body (Camcor_30). Bunding or silt fences will be installed along the entire length of the water body as it bounds the site; this will be set back from the water body at least 5m to allow ecosystems alongside the water body to continue to function. Where topography does not allow the free flowing of surface water towards the attenuation basin, the appointed Contractor will construct temporary drainage measures to reduce risk of pollution during earthworks construction and other elements of work. This will include the construction of soakaway chambers and filter drains to disperse surface water in a controlled manner. Monitoring of the quality of the water in the Camcor_030 will take place daily, through visual inspections at the upstream and downstream extents within the site boundary. Daily visual inspections will also be carried out for the settlement lagoons and their discharge points. Weekly sampling of the outfalls from the settlement lagoons will be caried out. |
| FCV | • **W-SC34 - Construction Sequencing:** The main construction activity would be excavating and installing the below ground valves. Other construction activities would include landscaping, an access road and internal circulation roads, car parks and walkways, security fencing, mechanical and electrical (M&E) plant, instrumentation and control systems, and building services. In addition, a new mains supply would be provided off the electrical grid, to power the plant and equipment.<br>• **W-SC35 - Managing Silty Water:** The appointed Contractor will construct temporary drainage measures to minimise risk of pollution during earthworks construction and other elements of work. This will include the construction of soakaway chambers and filter drains to disperse surface water in a controlled manner. The proposed site layout will include a soakaway at the north-west of the site, which has been sized with a capacity of 52m$^3$. |
| TPR | • **W-SC36 - Construction Sequencing:** The TPR will be constructed in the sequence outlined in Table 5.5 in the SWMP.<br>• **W-SC37 - Managing Silty Water:** At the outset, the appointed Contractor will stone-out future permeable surfaces on a permeable geotextile membrane to provide a working platform. This will reduce surface water runoff during construction. Surface water runoff from a catchment covering the north of the TPR site will be conveyed to an attenuation basin in the north-west corner of the site. Surface water runoff from a catchment covering the south of the TPR site and the access road will be conveyed to an attenuation basin in the south-west corner of the site. The volume of the attenuation basins has been designed to accommodate flows from a 1 in 100-year storm event plus a 10% uplift for climate change. These volumes have been calculated as 675m$^3$ for the detention basin located to the south-west of the site and 795m$^3$ for the detention basin located to the north-west of the site. |
| Proposed 38 kV Uprate Works | **W-SC38 - Construction:** Specific measures in relation to the construction of the Proposed 38 kV Uprate Works include:<br>• The Proposed 38 kV Uprate Works will be completed by ESBN on behalf of Uisce Éireann. During the Construction Phase, ESBN will be obliged to comply with all the commitments set out in the EIAR and the NIS. In addition, ESBN will be required to comply with any conditions that may be attached by An Coimisiún Pleanála to any planning approval that may be granted for the Proposed Project.<br>• In most instances, the Proposed 38 kV Uprate Works do not involve extensive soil stripping. In addition, access will be across fields and in any peat area or wetland using wide-tracked, low ground pressure vehicles to reduce damage to the surrounding ground. No stone access roads are required, and where necessary 'bog mats' will be used to cross softer land.<br>• Clear span bridging will be used to provide access for construction machinery across watercourses where there is no existing crossing structure. This crossing method will be used unless an alternative crossing method is agreed with IFI. There are seven such crossings required for the Proposed 38 kV Uprate Works.<br>• Clear span bridging utilises multiple layers of bog mats, wooden sleepers or lightweight metal structures. The nature of the bridging to be used will be agreed with the project ecologist on-site prior to installation. IFI has been and will continue to be consulted with respect to watercourse crossings and relevant guidance will be adhered to.<br>• Bridging will incorporate silt control fencing to prevent loose material deposition from construction vehicles gaining access to the watercourse being crossed. Clear span bridging will be installed using a tracked excavator, tracked dumper and tracked quad bikes importing materials via the agreed access tracks to the crossing point. |

| Proposed Project Activities | Activity/Site-Specific Mitigation Measures |
|---|---|
| | • There is no requirement to provide temporary crossing infrastructure for the River Shannon or the Headrace. Existing public road crossings of both these significant watercourses will be utilised throughout the works. |

### 9.5.2 Commissioning Phase Mitigation Measures

355. The key impacts during the Commissioning Phase have been reduced through design. However, there are likely significant effects as a result of the discharge of commissioning water. Annex C (Table C.2) and Annex D of Appendix A5.2 (Commissioning Strategy) include generic and location-specific mitigation measures to avoid or reduce the likely effects as a result of the discharge of commissioning water. Key measures are outlined in detail in the SWMP and summarised in Table 9.15.

**Table 9.15: Commissioning Phase Activity/Site-Specific Mitigation Measures**

| Proposed Project Activities | Activity/Site-Specific Mitigation Measures |
|---|---|
| Abstractions | **W-SC18 - Commissioning:** Specific measures in relation to the commissioning of the abstraction on eight WFD designated water bodies:<br>• River flows in the months preceding the abstraction will be monitored using a combination of OPW data (where available) and the hand-measurement of water levels. It is most likely this will be done from a boat. The rate of abstraction from any watercourse will be appropriate to the size of the watercourse and the prevailing conditions at the time<br>• Abstraction rates will be no greater than 10% of Q95 at flows between Q80 and Q95; below Q95 no abstraction will occur. This more than meets the environmental standards for abstraction for rivers of Good status set by the UK WFD Technical Advisory Group (TAG) (UKTAG 2008).<br>• A temporary small-scale intake design of up to circa 2,000m$^3$/day (25l/s) will be developed, probably in the form of a suspended cage lowered into the mid-stream but not close to the river bed to avoid drawing in aquatic species that prefer the margins. Abstraction velocities will be kept below 0.15m/s through a fine mesh not greater than 3mm aperture<br>• A number of potential sources of contamination, both in terms of background concentrations and discrete incidents, have been identified including diffuse pollution from agricultural land, discharges from wastewater treatment works, sedimentation from the extractive industries and, specifically for the Kilmastulla, heavy metals from historic mining operations. Discrete incidents include discharges from stormwater and emergency overflows from the local sewer networks and the potential for accidental releases in the form of oil or chemical spills<br>• Given the potential for such contamination, and the importance of not passing on such contaminants to the receiving water body, as well as avoiding contaminating the pipe itself, the source of abstracted water will be monitored for biological and chemical parameters for a period leading up to the Commissioning Phase and the required water treatment determined based on:<br>– Suspended solids<br>– Invasive species (e.g. zebra mussels, crayfish plague)<br>– Water chemistry - pH, hardness, conductivity, organics, metals, nutrients, pesticides.<br>• Abstracted water will be treated using mobile treatment plants until testing and commissioning is completed.<br>**W-SC19 - Abstractions from the Camcor and Liffey:**<br>• Two of the water bodies noted above are considered to be more sensitive to change with respect to abstractions because they have existing abstractions for WTPs located downstream. These are the Camcor_30 (Birr WTP 6.9km downstream) and the Liffey_140 (Leixlip WTP 8.4km downstream). Temporary abstractions for testing and commissioning would have the potential for significant effects during the summer, when the rivers are more susceptible to drought, due to in-combination effects with the existing water treatment works abstractions<br>• In principle, agreements have been reached with the respective Uisce Éireann operations teams that the existing water treatment works would reduce their abstractions for the short periods required for the testing and commissioning abstractions (approximately 10 days for the Camcor and approximately 36 days for the Liffey). Further discussion on the timing and duration of the abstractions will be agreed in advance of testing and commissioning to ensure there is no significant effect on river flows and no risk to the water supplies at these locations. |

| Proposed Project Activities | Activity/Site-Specific Mitigation Measures |
|---|---|
| Discharges via Washout Valves | **W-SC20 - Washout Discharges:**<br>• Once the pipeline has been appropriately tested the water will need to be drained out. Due to the vertical profile of the pipeline this will require the use of every washout along the length of the pipeline. The number of Washout Valves totals 187, of which 39 are confirmed to have permanent outfall infrastructure for discharges to a water body/surface water receptor; 108 will require temporary outfall infrastructure for discharges to water bodies (via flexible hose) and small ditches and field drains; and the remaining 40 will discharge locally to land where possible. There are also 20 Washouts at Line Valves, 18 of which will require temporary outfall infrastructure for discharges to water bodies (via flexible hose) and small ditches and field drains; and the remaining two will discharge locally to land where possible.<br>• The following discharge rates will be employed:<br>– Field washouts will be limited to a maximum of 15l/s<br>– Minor watercourses will be limited to a maximum of 25l/s<br>– Significant water bodies will be limited to a maximum of 20% of QMED, (the median flow) and also to an overarching maximum value of 150l/s (this limit will be applied to both the hydrostatic test water and sweetening flow during testing and commissioning)<br>– Discharges will occur during periods when river flows are lower than the mean flow (typically July to September)<br>– Discharges will only occur to receiving water bodies that have sufficient capacity to receive flows from the pipeline without increasing flood risk<br>– Discharges will be controlled in accordance with EPA, IFI and OPW requirements.<br>• The water to be discharged will require further treatment to remove potential contaminants including silt (from inside the pipe which will not have been cleaned at this stage) and chlorine (used to sterilise the abstracted water to prevent contamination from microorganisms including bacteria). In addition, the pH in the discharged water needs to be the same as that in the receiving water and oxygen levels in the discharge are likely to be low; adjustments to pH and reoxygenation are therefore likely to be required. Temperature impacts are not expected due to discharged water being similar in temperature to receiving water bodies and therefore no mitigation is required.<br>• Any discharges from the pipeline will be dechlorinated prior to discharge. This will be achieved by using sodium sulphite dechlorination tablets inserted into perforated wire mesh baskets at the washout chamber or permanent outfall structure. Dechlorination is 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. Residual chlorine would be reduced to <0.005mg/l as required by the Salmonid Regulations.<br>• It is not likely that site-specific measures will be required as the discharge will be treated such that it can enter any receiving water, at the appropriate discharge rate. |

### 9.5.3 Operational Phase Mitigation Measures

356. For the proposed abstraction, there would be no significant effects as a result of the Operational Phase of the RWI&PS. Therefore, no mitigation measures are required.

357. Mitigation measures for site-specific impacts have been outlined in detail in the SWMP and summarised in Table 9.16.

**Table 9.16: Operational Phase Activity/Site-Specific Mitigation Measures**

| Proposed Project Activities | Activity/Site-Specific Mitigation Measures |
|---|---|
| Washouts | • **W-SO1 - Operation of Washouts:** The discharges proposed to water bodies will need to be agreed with the relevant regulatory authorities and carried out in accordance with any conditions imposed in regulatory authorisations. As with the potential discharges during the Construction Phase, it is likely that the levels of contaminants (suspended solids and chlorine) in any discharge will be within set limits; and flows will be controlled to levels appropriate to the receiving water. The discharge limitations for the Construction Phase will also apply to the Operational Phase. |

| Proposed Project Activities | Activity/Site-Specific Mitigation Measures |
|---|---|
| BPS | **W-SO2 - Control of Silt Laden Water at the BPS:**<br>• During operation, surface water runoff from impermeable areas will be directed via a petrol interceptor to an attenuation basin at the south of the BPS site<br>• The volume of the attenuation basin has been designed to accommodate flows from a 1 in 100-year storm event plus a 10% uplift for climate change using the Institute of Hydrology Report 124 Flood estimation for small catchments (Institute of Hydrology 1994). This volume has been calculated as 400m$^3$<br>• A flow control device on the outlet of the tank will limit discharge to an equivalent green field runoff from the entire BPS site. This flow will be conveyed along an outfall pipe to a stream to the south-east of the site. The basin and outfall pipe will be installed during the Construction Phase and retained for the Operational Phase of the BPS. |
| Operational culverts | **W-SO3 - Culverting of Water bodies**: For any culverts which continue in operation following the Construction Phase, the following design measures will apply:<br>• Appropriate design of culvert structures and water body modifications (e.g. realignments) with respect to hydromorphology, and both riparian and aquatic ecology<br>• Allowance for the appropriate conveyance of water and sediment for a range of flows (including at low flow conditions) this will include formation of a low-flow channel within the culvert where applicable<br>• Where culvert gradient requires, baffles will be included in culvert designs for bed material retention and/or provide resting pools for fish<br>• Limitation of culvert lengths through design<br>• Close alignment of the culvert with the existing water feature in terms of proposed gradients<br>• Roughening of culvert inverts and interiors to help reduce water velocities. Where culverts are greater than 25m in length, planting should be utilised at the inlets and outlets to smooth the light transition at these locations<br>• To monitor the efficacy of the above measures, there will be post project appraisal to identify if there are issues that can be investigated and addressed at an early stage. |
| New outfalls | **W-SO4 - New Outfall Discharges:** Post project inspections of outfall locations will be undertaken to monitor the efficacy of the design measures:<br>• Directing each outfall downstream to reduce impacts to flow patterns<br>• Provision of appropriate scour protection at the base of the outfall headwall where required<br>• Directing outfalls away from the banks of a river to reduce any potential risk of erosion (particularly on the opposite bank)<br>• Minimising the size/extent of the outfall headwall where possible to reduce the impact on the banks. |

### 9.5.4 Monitoring and Inspections

358. Prior to construction, water quality monitoring will take place weekly for a period of up to three months to establish a baseline and for up to 12 months afterward to ensure that design and mitigation measures have been successful in avoiding significant effects. The appointed Contractor and the Employer will need to set up a monitoring strategy. Pre-construction and during construction monitoring will be the responsibility of the appointed Contractor; post-construction monitoring will be the combined responsibility of the Employer and the appointed Contractor during the contract 'close-out period', the length of which is to be agreed as part of the contract.

359. The Environmental Manager will carry out a visual inspection of surface water treatment measures (ponds, tanks, silt fences, sandbags, etc.) on a daily basis during the Construction Phase. In addition to daily inspections, the Environmental Manager will, each week, monitor the discharge from any surface water treatment measures, through sampling, for levels of total suspended solids. The Environmental Manager will also carry out site measurements of temperature, pH and dissolved oxygen (DO) and, once a month (unless a visual inspection suggests an issue), take samples for hydrocarbon analysis (ethylene, benzene, toluene). Samples will be taken of discharges and at the same locations up and downstream of watercourses in close proximity to the works, or at crossing points.

360. The Construction Phase monitoring results will be compared to those results established in pre-construction monitoring. In the event of an elevation above pre-construction levels, an investigation will be undertaken by the Environmental Manager and remediation measures will be put in place as appropriate.

361. Particular emphasis will be paid to the monitoring of discharges from peat working areas, as described in Section 9.5.1 above (Mitigation ID numbers W-SC9, W-SC10 and W-SC15).

362. The monitoring results will be stored and made available for inspection/audit by Uisce Éireann, the appointed Contractor and regulatory bodies such as the EPA, IFI, NPWS and the OPW, as relevant.

363. Section 7 of Appendix A5.1 Annex A (SWMP) provides further details of proposed monitoring and inspections.

## 9.6 Residual Effects

364. Following implementation of mitigation and control measures, potential significant effects identified in Section 9.4 would be reduced to Not Significant residual effects. A record of all residual effects for the water environment assessment is included in Appendix A9.1 (Abstraction Assessment), Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment).

365. As described in Section 9.4.2, there would be potential pre-mitigation significant effects during construction of the pipeline trench from drainage and dewatering, the attenuation lagoons, watercourse crossings (both open cut and trenchless), Construction Compounds and Pipe Storage Depots, Washout Valves and Infrastructure Sites (including the RWI&PS, WTP, Proposed 38 kV Uprate Works, BPS and TPR) ranging from Moderate (significant) to Very Significant.

366. As described in Section 9.4.3, there would be potential pre-mitigation significant effects during commissioning from the Washout Valves ranging from Moderate (significant) to Significant. There would also be potential pre-mitigation significant effects during commissioning from Washouts at Line Valves ranging from Slight (not significant) to Moderate (significant).

367. As described in Section 9.4.4, there would be potential pre-mitigation significant effects during operation from Washout Valves and the WTP, ranging from Moderate (significant) to Significant.

368. Mitigation has therefore been identified to reduce or avoid these effects as detailed in Section 9.5 and in the SWMP. Further details of the location-specific mitigation measures applied to each impact are detailed in Appendix A9.1 (Abstraction Assessment), Appendix A9.2 (Pipeline Assessment) and Appendix A9.3 (Non-linear Principal Infrastructure and 38 kV Uprate Works Assessment). In all cases, proposed mitigation has been deemed adequate to reduce or avoid the significant effect and as a consequence there are no significant residual effects as a result of the construction or operation of the Proposed Project.

369. In addition to the noted conclusion above of no likely significant effects under applicable EIA legislation, it should also be noted that, the WFD Compliance Assessment, as reported in the separate Water Status Impact Assessment Report, has concluded that the Proposed Project would not compromise WFD objectives or cause a deterioration in the status of any surface water or groundwater WFD designated water body and/or jeopardise the attainment of good surface water (or good ecological potential) or groundwater status.

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