Sure Partners Limited

ARKLOW BANK WIND PARK PHASE 2 ONSHORE GRID INFRASTRUCTURE

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

VOLUME II

Chapter 10 Water

ARUP

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Contents

			Page
10	**Water**		**1**
	10.1	Introduction	1
	10.2	Methodology	1
	10.3	Receiving Environment	4
	10.4	Characteristics of the Proposed Development	25
	10.5	Likely Significant Effects	26
	10.6	Mitigation Measures and Monitoring	37
	10.7	Cumulative Effects	41
	10.8	Residual Effects	46
	10.9	References	54

10 Water

10.1 Introduction

This chapter describes and assesses the likely significant effects of the proposed development in relation to surface water, water quality, the existing hydrological regime and flood risk during the construction, operation and decommissioning phases, where relevant. Mitigation measures are also detailed that minimise effects, where required.

Groundwater features of relevance and hydrogeology including groundwater quality have been considered separately in **Chapter 9** *Land and Soils*.

Chapter 5 *Description of Development* provides a full description of the proposed development whilst **Chapter 6** *Construction Strategy* describes the construction strategy.

The proposed development will provide:

- Landfall for two offshore export cable circuits from the High Water Mark (HWM) to two Transition Joint Bays (TJB) at Johnstown North, located approximately 4.5km northeast of Arklow Harbour;
- Connection by two underground 220kV high voltage alternating current cable circuits, and fibre optic cables over a distance of c. 6km, from the landfall to the new onshore 220kV substation;
- A new onshore 220kV substation, to be located at Shelton Abbey, north of the Avoca River, approximately 2.1km northwest of Arklow town consisting of two connected compounds:
    1. The transmission compound with the infrastructure to physically connect to the NETN, and
    2. The connection compound with the infrastructure to allow the connection of the windfarm in accordance with EirGrid grid code requirements;
- Flood defence improvement works to the existing Avoca River Business Park flood defences located c. 500m west of the substation site;
- A 220kV overhead line connection from the new 220kV substation at Shelton Abbey to the existing 220kV transmission network located c. 200m from the substation site.

10.2 Methodology

10.2.1 Guidance and Legislation

This assessment has been undertaken with due regard to the overarching EIAR guidance (described in **Chapter 3** *EIA Methodology*). Topic specific guidance in the following documents was also considered and applied:

- Transport Infrastructure Ireland (TII) (2009) *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*;
- Office of Public Works (OPW) and Department of Environment, Heritage and Local Government (2009) *The Planning System and Flood Risk Management; Guidelines for Planning Authorities*;
- Inland Fisheries Ireland (2016) *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*.

Water resource management in Ireland is dealt with in the following key pieces of legislation which were taken into consideration in this assessment:

- The European Union Water Framework Directive (WFD), 2000/60/EC;
- European Communities Environmental Objectives (Surface Water) (Amendment) Regulations 2015 (S.I. No.386 of 2015)[1];
- European Communities (Surface Water) (Amendment) Regulations 2019 (S.I. No. 77/2019);
- European Communities (Quality of Salmonid Waters) Regulations 1998 (S.I. No. 293 of 1998)[2];
- European Communities (Quality of Shellfish Waters) Regulations 2006 (S.I. 268 of 2006);
- European Communities (Quality of Shellfish Waters) (Amendment) Regulations 2009 (S.I. No. 55 of 2009);
- The Groundwater Directive, 2006/118/EC;
- European Communities Environmental Objectives (Groundwater) Regulations 2016 (S.I. No. 366 of 2016);
- European Communities (Drinking Water) Regulations 2014 (S.I. No. 122 of 2014);
- European Communities (Drinking Water) (Amendment) Regulations 2017 (S.I. No. 464/2017);
- The European Communities (Water Policy Regulations 2003 (S.I. 722 of 2003);
- The Habitats Directive (92/43/EEC);
- The European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011);
- Water Services Acts (2007 - 2014);

[1] European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI No 272 of 2009) as amended by the European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2012 (SI No. 327 of 2012); and the European Communities Environmental Objectives (Surface Water) (Amendment) Regulations 2015) (SI No 386 of 2015). And defined as "European Communities Environmental Objectives (Surface Waters) Regulations 2009 – 2015"

[2] "European Communities (Quality of Salmonid Waters) Regulations 1988 (SI No 293 of 1988)"

- The EU Floods Directive, 2007/60/EC;
- European Communities (Assessment and Management of Flood Risks) Regulations 2010 (S.I. No. 122/2010);
- Arterial Drainage Act, 1945 (as amended).

10.2.2 Impact Assessment Methodology

The existing environment of the site was analysed using data collected from a desk study, following the statutory guidance summarised above. The relevant site information has been derived from several different sources, including:

- Aerial photography and mapping from Bing Maps and Google Maps;
- LiDAR Survey;
- Topographic Surveys;
- Historical maps, OSI (map.geohive.ie);
- Water Features, Rivers and Streams, EPA (gis.epa.ie);
- Rainfall and Flood Estimation Applications, OPW (opw.hydronet.com);
- River Quality Surveys: Biological, EPA (epa.ie/QValue/webusers);
- Flood history of the site from the OPW National Flood Hazard Mapping website (floodinfo.ie/map/floodmaps/);
- Catchment Flood Risk Assessment and Management (CFRAM) Mapping produced by the OPW (floodinfo.ie/map/floodmaps/);
- Preliminary Flood Risk Assessment (PFRA) Mapping produced by the OPW (www.myplan.ie);
- Predicted extreme water levels and flood extent maps from the Irish Coastal Protection Strategy Study (ICPSS);
- Groundwater Mapping, Geological Survey Ireland (GSI) (dcenr.maps.arcgis.com);
- Site visit in January 2020.

Potential impacts on hydrology, flooding and water quality were then evaluated in the context of the baseline environment, having regard to the relevant EPA guidance for the preparation of EIARs.

The baseline environment is described in **Section 10.3**, followed by a description of the characteristics of the proposed development in **Section 10.4**. Potential environmental effects at each stage of the project are then identified in **Section 10.5**, followed by a description of the mitigation and monitoring measures that will be implemented as part of the development in **Section 10.6**. **Section 10.7** provides a description of the cumulative effects. The implementation of the mitigation measures and the residual effects of the proposed development are set out in **Section 10.8**.

The TII (2009) guidelines propose four steps to the impact assessment which include (i) baseline data collection, (ii) identify and categorise the impacts, (iii) rate the impacts and (iv) identify mitigation measures. The impacts are assessed based on the importance of the attribute and the magnitude of the impact as presented in **Table 10.1**.

Table 10.1: Rating of Significant Environmental Impacts at EIA Stage (TII 2009)

		Magnitude of Impact			
		Negligible	Small	Moderate	Large
Importance of Attribute	Extremely High	Imperceptible	Significant	Profound	Profound
	Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
	High	Imperceptible	Moderate / Slight	Significant / Moderate	Severe / Significant
	Medium	Imperceptible	Slight	Moderate	Significant
	Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

Note that a separate Flood Risk Assessment (FRA) report for the proposed development has been prepared and is included as **Appendix 10.1 of Volume 3** to this EIAR. The FRA has been prepared in accordance with the Guidelines for Planning Authorities on 'The Planning System and Flood Risk Management' published in November 2009, jointly by the Office of Public Works (OPW) and the then Department of Environment, Heritage and Local Government (DEHLG). The main findings from the FRA report are included in the text of this chapter.

10.3 Receiving Environment

10.3.1 Study Area

The proposed development site is described in **Chapter 5** *Description of Development* and summarised in **Section 10.4**. The study area for the hydrological assessment comprises the planning (red) line boundary of the proposed development together with the downstream surface water features which may be impacted by the proposed development, see **Figure 10.1**.

The proposed landfall location at Johnstown North comprises undulating pasture fields located behind sea cliffs which rise above a steeply sloping shingle beach.

The onshore cable route extends from the landfall at Johnstown North to the substation at Shelton Abbey.

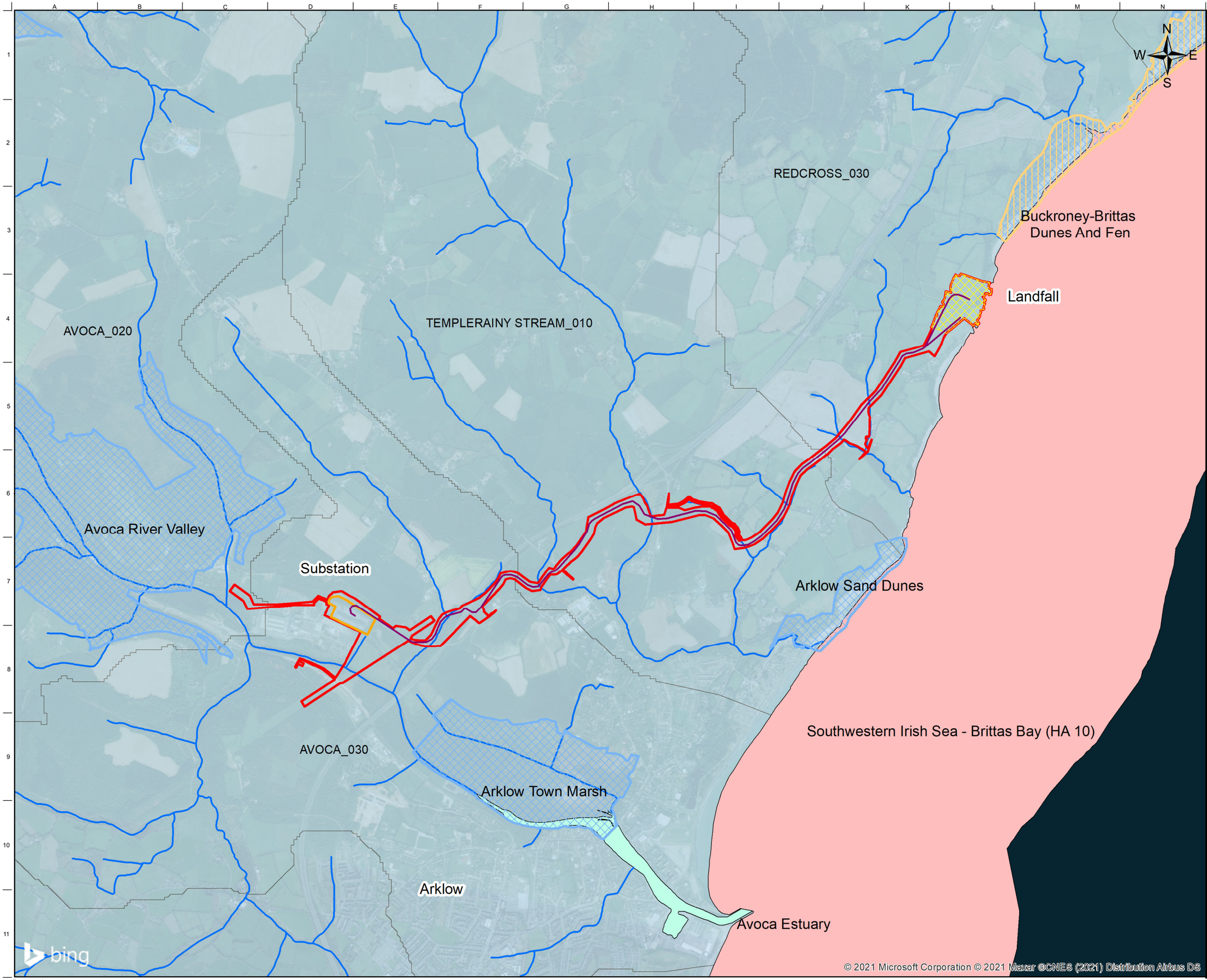
The approximately 6km onshore cable route extends mainly through agricultural land and crosses a number of streams and national, regional and local roads including the M11.

The proposed substation is located in the Avoca River Business Park. The brownfield site is part of a larger site that was formerly occupied by Irish Fertiliser Industries (IFI) until 2003. There is an old (EPA licensed) landfill to the east of the site, an embankment to the north of the site and a canal (Shelton Abbey Canal) to the south of the site. The Avoca River provides the southern boundary of the Avoca River Business Park. Ground investigations carried out by IDL (2020) and GII (2020) at the substation site reveal made ground with exceedances of hydrocarbons, PCBs and metals such as arsenic, copper, lead and zinc.

Groundwater quality samples were analysed as part of the project-specific GI carried out by IDL (2020). The results show exceedances of ammoniacal nitrogen, sulphate, arsenic, manganese, iron and some hydrocarbons. Further detail of the groundwater quality is provided in **Chapter 9** *Land and Soils*.

The connection to the NETN comprises overhead lines which extend from the substation site across the Avoca River to the southern bank of the river and northward toward the existing network.

Chapter 5 *Description of Development* provides a full description of the proposed development.



LEGEND:

- Arklow Bank Wind Park Onshore - Red Line Boundary
- Landfall
- Cable Route
- Substation Site
- Proposed Natural Heritage Area (pNHA)
- Candidate Special Area of Conservation (cSAC)
- River Waterbody
- Transitional Waterbodies
- Coastal Waterbodies
- River Sub-basin

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Drawing Title
Regional Hydrology

Scale at A3 1:24,000

Role EIAR

Suitability FOR INFORMATION

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Name Figure 10.1

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10.3.2 Hydrological Regime

10.3.2.1 Regional Hydrology

The Avoca River is the principal river waterbody in the region and is within the Avoca-Varty Hydrometric Area (HA). It is the longest river in County Wicklow and its catchment covers an area of approximately 650km² on the eastern flanks of the Wicklow Mountains. The Avoca River is formed by the confluence of three rivers: the Avonmore and Avonbeg Rivers, which meet at the Meeting of the Waters, and the Aughrim River, which joins at Woodenbridge. The Avoca River discharges to the sea at Arklow Harbour.

10.3.2.2 Local Hydrology

Landfall

The landfall is located adjacent to the Southwestern Irish Sea - Brittas Bay (HA 10) coastal waterbody (IE_EA_140_0000). This is a very large coastal waterbody which extends approximately 20km along the coast of Counties Wicklow and Wexford.

Cable Route

The onshore cable route crosses eight watercourses, namely the Johnstown North, Johnstown South, Ticknock, Coolboy, Templerainy, Kilbride, Kilbride Church and Sheepwalk watercourses and runs adjacent to the Seabank watercourse (approximately 300m) (**Figure 10.2**). Three of these have been identified as permanent flow watercourses: Johnstown North, Templerainy and Kilbride.

The Johnstown North watercourse (IE_EA_10R010600) has a catchment area of 1.9km^2 and discharges directly into the Irish Sea (Southwestern Irish Sea - Brittas Bay (HA 10)) approximately 3km north of Arklow Harbour.

The Templerainy Stream (IE_EA_10T040500) has a catchment area of 13.6km^2 and discharges into the Irish Sea south of Johnstown North watercourse.

The Kilbride Stream (IE_EA_10T040500) is a tributary of the Templerainy Stream.

Substation

The substation site is located on the natural floodplain of the northern bank of the Avoca River (IE_EA_10A031140) between the Raheen (IE_EA_10A031050) and Sheepwalk (IE_EA_10A031140) watercourses. The site is approximately 4km upstream of Arklow Estuary (IE_EA_150_0100) where the river discharges to the Irish Sea (Southwestern Irish Sea - Brittas Bay (HA 10)).

Land drainage at, and in the vicinity of, the substation site has been significantly modified by drainage channels and flood defence embankments. An unnamed watercourse runs along the northern and eastern boundaries of the substation site (AECOM 2018). A drainage canal which is part of the former Shelton Abbey

Canal runs along the southern boundary of the substation site from west to east. These channels combine to form the Shelton Abbey watercourse (IE_EA_10A031140) which flows south towards an attenuation pond. A gravity flap valve controls the water discharge into the Avoca River. When the river is in spate water is pumped from the attenuation pond over the embankment and into the Avoca River (see **Figure 10.3**).

The Shelton Abbey Canal, which was previously owned by IFI, extends from the south east of the substation site and flows east discharging into the Avoca River upstream of Arklow Bridge. The Sheepwalk stream flows south and, according to the EPA river flow maps, it crosses the canal (likely via a culvert) and discharges into the Avoca River. It is unclear from the desk study if there is hydraulic connection between the two watercourses. Historical maps indicate that the previously mentioned drainage canal located along the southern boundary of the substation site was part of the Shelton Abbey Canal. However, this section of the canal has subsequently been truncated by the road to the east of the substation site.

LEGEND:

- Substation Site
- Landfall
- Cable Route
- Arklow Bank Wind Park Onshore - Red Line Boundary
- River Waterbody
- River flow direction

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Onshore Grid Infrastructure

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Watercourses in the study area

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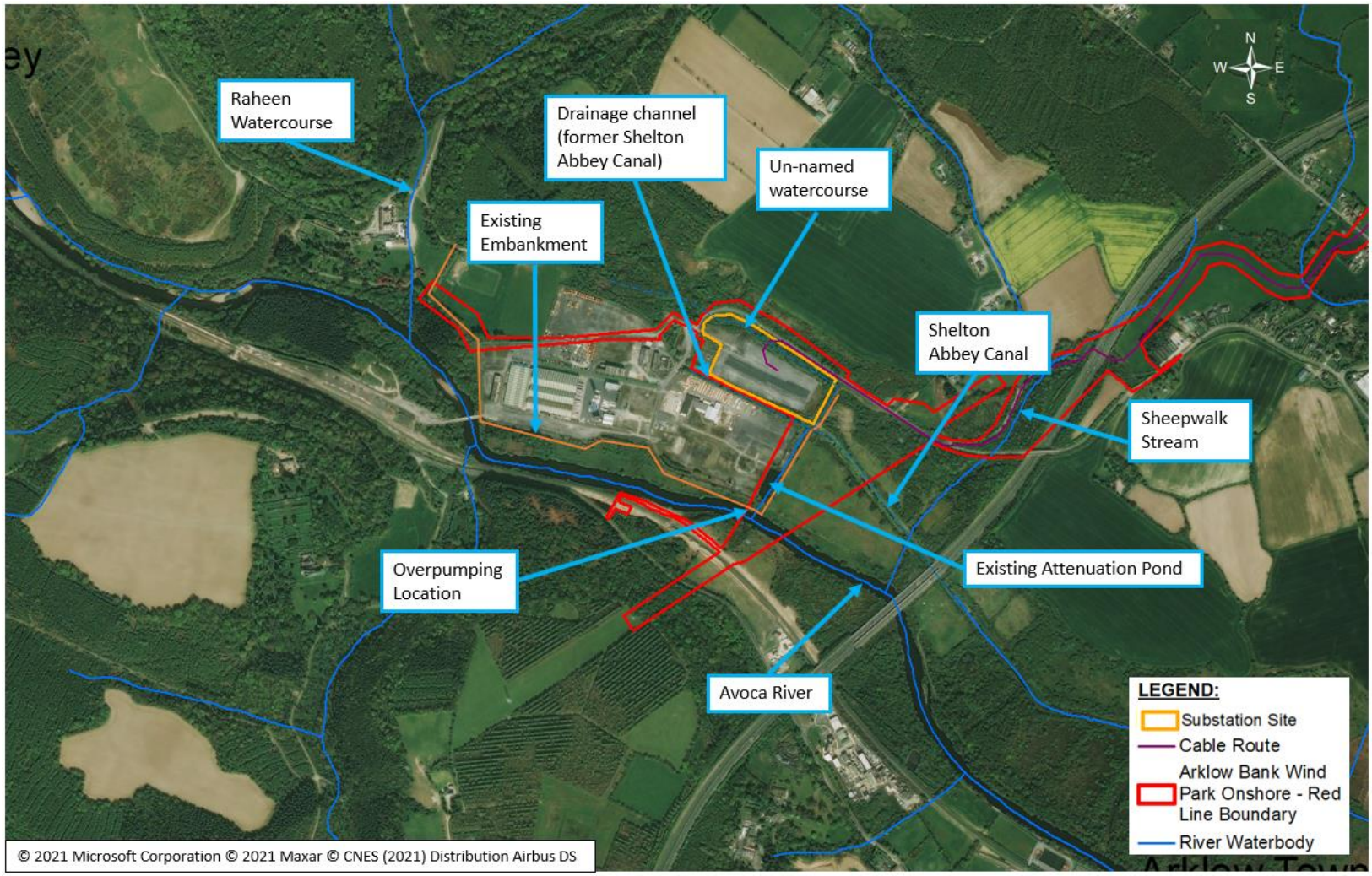


Figure 10.3 Watercourses at the Substation Site [Base map source: Bing Maps]

10.3.3 Water Quality

The Water Framework Directive (WFD) established a framework for the protection of all waters including rivers, lakes, estuaries, coastal waters, groundwater, and their dependent wildlife/habitats. One of the key aims of the WFD is achieving "good status" for all water bodies. The quality of surface waters in Ireland is examined regularly by the EPA to monitor performance against a number of biological and chemical thresholds. The EPA database provides information on the current WFD status of all waterbodies in Ireland. The water quality for the surface waterbodies of interest are discussed below.

Water quality information is not available for the Johnstown South, Ticknock, Coolboy, Kilbride Church and Sheepwalk watercourses. The Johnstown North and Johnstown South, Ticknock, Coolboy and Templerainy watercourses are salmonid with population of Brown trout and Templerainy also contains Sea trout. However, all these watercourses, with the exception of Templerainy are also noted to be of limited value for fish at the proposed cable route crossing points (see **Chapter 12** *Biodiversity* for further details).

Irish Sea - Brittas Bay (HA 10)

Hydrometric Area (HA) 10 refers to the Avoca-Vartry Hydrometric Area. The ecological status or potential of the Irish Sea – Brittas Bay (HA 10) is unassigned (**Figure 10.4**). The monitoring station (Station No. CW34001020AV1003) located approximately 2km offshore from the landfall does not have any available water quality data.

Johnstown North Watercourse

The Johnstown North watercourse status is unassigned in the EPA water quality database and does not have any associated water quality results (**Figure 10.4**). The EPA has noted that there are anthropogenic pressures on the Johnstown North watercourse.

The Johnstown North watercourse is a salmonid system and contains populations of brown trout. Further details are available in **Chapter 12** *Biodiversity*.

Templerainy Stream

The Templerainy Stream was at 'Good' water quality status according to the WFD status for the reporting period 2013-2018 (**Figure 10.4**). The EPA has noted that there are agricultural pressures on the Templerainy Stream.

There are two monitoring locations within the Templerainy Stream catchment: Porter's Bridge monitoring station, located approximately 500m from the mouth of the watercourse, and Templerainy Stream – Templerainy Bridge monitoring station located in the middle of the catchment, upstream of the point at which the Kilbride Watercourse joins the Templerainy Stream and upstream of the cable route.

The Q value[3] (i.e. biological quality rating) at the Templerainy Bridge monitoring station (Station No. RS10T040300) was '3' when last surveyed in 2003. A Q value of 3 indicates the watercourse was moderately polluted and of Poor status.

Q values have been regularly surveyed between 1990 and 2018 at Porter's Bridge monitoring station (Station No. RS10T040500). Since 2006 the Q value reported at Porter's Bridge has been consistently '4' indicating unpolluted conditions and Good status.

Fish stock assessments of the Templerainy Stream indicate the presence of species listed on Annex II of the Habitats Directive. The assessment of the Kilbride watercourse, a tributary of Templerainy Stream, shows it contains some habitats of potential value for fish stock including Brown Trout and Eel. Further details are provided in **Chapter 12** *Biodiversity*.

Avoca River

The section of the Avoca River which flows directly to the south of the proposed substation site (Avoca_030) is associated with historical pollution and industry pressures. This section of the Avoca River has not been assigned a WFD status for the reporting period 2013-2018 (**Figure 10.4**). In the reporting period 2010-2015 Avoca_030 was "failing to achieve good" chemical surface water status due to cadmium levels.

The Q value for the Avoca River was '1' in 1990 at the Arklow Bridge River Monitoring Station (Station No. RS10A031200), located downstream of the proposed development site. This Q value indicates Bad status and serious pollution of the river. There has not been any biological quality survey undertaken since 1990 at this monitoring station.

The river monitoring stations upstream of the proposed development site at Shelton Abbey (Station No RS10A031000) and at a footbridge 500m downstream of the Aughrim River (Station No RS10A030900) were last surveyed in 1986 and 1994 respectively. The respective monitoring stations were given Q values of '2' and '1' indicating Bad status and serious pollution of the Avoca River at these locations.

The only EPA monitoring station that has been regularly surveyed is at the Avoca Bridge (Station No RS10A030700) which is approximately 8km upstream of the Arklow Bridge and 2.6km downstream of the Avoca Mines upstream of the Proposed Development. A Q value of 2-3/0 was determined during the latest survey in 2019. This Q value indicates that at this location the Avoca River is of Poor status and moderately polluted. The suffix '0' indicates a toxic effect is apparent or suspected and is likely due to the historical contamination associated with the Avoca Mines.

[3] Q values are biotic indicators used to express biological water quality that are based on changes in the macroinvertebrate communities of riffle areas brought about by organic pollution. A seriously polluted river is indicated by Q1 while Q5 indicates unpolluted waters of high quality.

The surface water quality of the Avoca River was found to have a Q value of less than 4 which is classed as 'polluted' and determined as 'unsatisfactory' condition by the EPA.

The latest Biological River Quality Surveys Report (EPA 2020) indicates that the lack of pollution sensitive taxa and the presence of pollution tolerant species continues to indicate poor ecological conditions with toxic effects at Avoca Bridge in July 2019.

Surface water sampling was undertaken by Irish Fertilizer Industries between February 1995 and January 1996 as part of the site's EPA licence (Conestoga-Rovers & Associates 2003). The results indicate elevated levels of zinc and iron upstream of the substation site. Suspended solids, nitrogen and metal concentrations downstream of the substation site were noted to be similar to those upstream. Macroinvertebrate analysis indicated poor ecological status attributed to the historic mining contamination upstream.

Water quality sampling of the Avoca River was carried out as part of an environmental site assessment of the Avoca River Business Park. The study area included the footprint of the substation site for this proposed development as well as land to the west (upstream of the substation site). The results indicate elevated levels of ammonium and zinc and low levels of Polycyclic Aromatic Hydrocarbons (PAH) in the samples taken upstream of the site. The investigations also identified elevated levels of metals, ammonium, sulphates and sulphur in the groundwater which have the potential to migrate into surface water bodies including the Avoca River and Shelton Abbey Canal. The metals concentrations on site are below the existing concentrations in the Avoca River and the influence of the other parameters, such as ammonia, will be negligible as groundwater flow through the made ground is extremely small in comparison to the river flow. The assessment of groundwater migration is presented in **Chapter 9** *Land and Soils*.

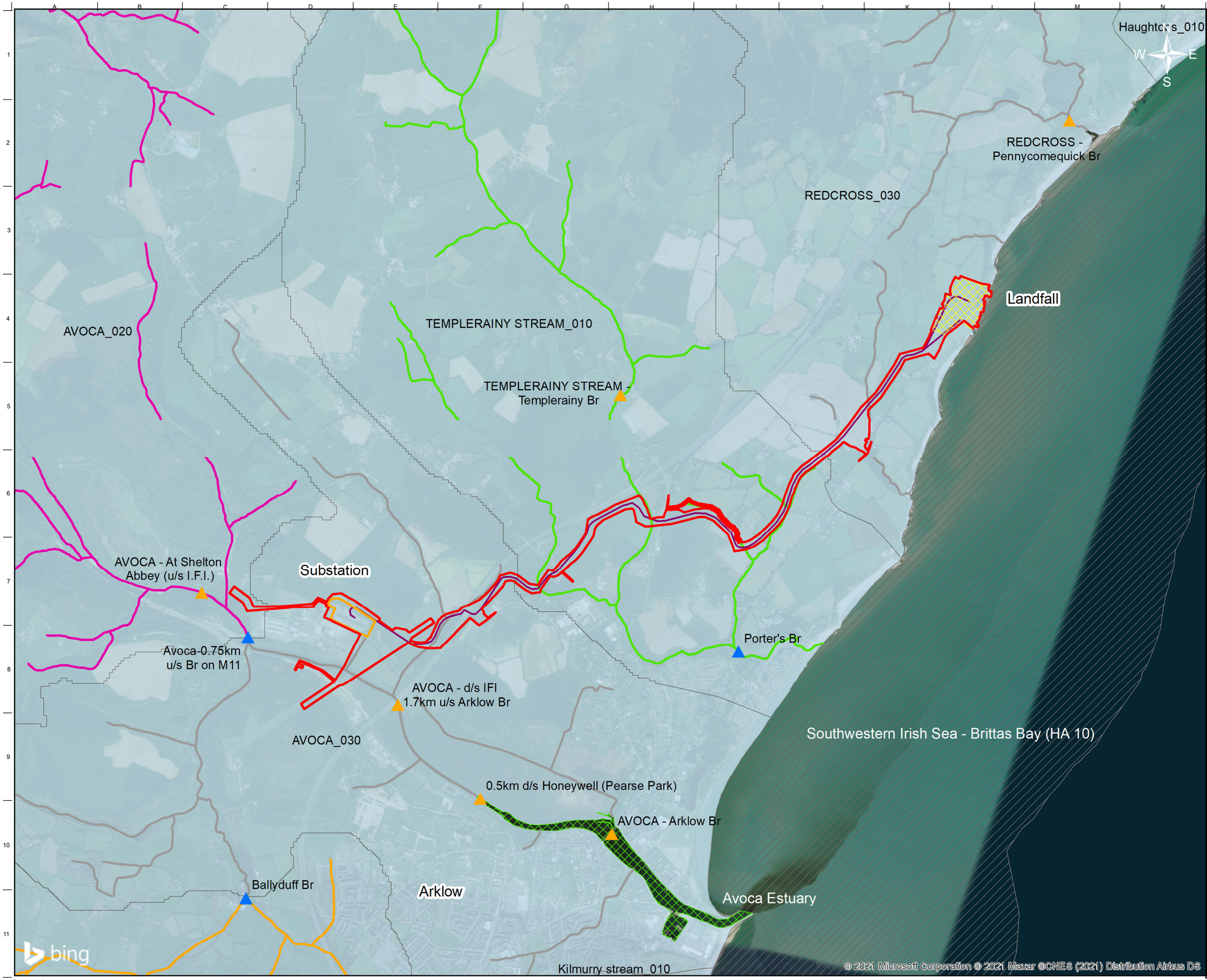
The Avoca River is a salmonid system and contains populations of Atlantic salmon, sea trout and brown trout. Further details are available in **Chapter 12** *Biodiversity*.

Avoca Estuary

The Avoca River flows into the Avoca Estuary (IE_EA_150_0100) in Arklow town. The banks of the estuary contain predominantly urban development, except for the area comprising Arklow Town Marsh located on the northern bank of the estuary upstream of the 19 Arches Bridge.

The Avoca Estuary has a Moderate ecological status according the EPA WFD reporting period 2013-2018 (**Figure 10.4**). However, the waterbody is "failing to achieve good" chemical surface water status due to cadmium, copper and zinc levels.

The Avoca Estuary contains populations of Atlantic salmon, brown trout European eel and River lamprey. Further details are available in **Chapter 12** *Biodiversity*.



LEGEND:

- Arklow Bank Wind Park Onshore - Red Line Boundary
- Substation Site
- Landfall
- Cable Route

River Waterbodies (Status)

- Good
- Poor
- Bad
- Unassigned

Transitional Waterbodies (Status)

- Good

Coastal Waterbodies (Status)

- Unassigned

EPA Monitoring stations

- Operational
- PreWfd
- River Sub-basin

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Project Title
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Role EIAR
Suitability FOR INFORMATION
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Name Figure 10.4

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10.3.4 Designated Sites

The Avoca River Valley (001748) is a proposed Natural Heritage Area (pNHA) and is a large mixed woodland which extends through the Avoca and Aughrim River valleys. The area is located approximately 200m upstream (as the crow flies) of the proposed development site (**Figure 10.5**), and as a result, will not be considered further as part of this assessment.

The Arklow Town Marsh (001931) is a pNHA located approximately 750m downstream of the proposed development substation site (**Figure 10.5**). The Avoca River forms the southern boundary of this large wetland area. The Arklow Town Marsh is likely to be in hydraulic connection with the Avoca River as the area is underlain by gravels.

The Arklow Sand Dunes (001746) is a pNHA located approximately 500m east of the cable route at its nearest point (**Figure 10.5**). The coastal site comprises sand dunes, grassland and wet woodland which is noted to be vulnerable to pressure from adjacent amenity sites. The Templerainy Stream flows along the southern boundary of the sand dunes.

The Buckroney-Brittas Dunes and Fen (000729) are a pNHA and cSAC located approximately 320m to the north of the landfall (**Figure 10.6**). This coastal site comprises sand dunes, salt marshes, and fens. The designated site is not within the same water catchment as the landfall or any part of the proposed development. Therefore this site is only considered downstream in terms of its interaction with the coastal waterbody (Irish Sea - Brittas Bay (HA 10)).

LEGEND:

- Arklow Bank Wind Park Onshore - Red Line Boundary
- Substation Site
- Cable Route
- Landfall
- Proposed Natural Heritage Area (pNHA)
- Candidate Special Area of Conservation (cSAC)
- River Waterbody

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Drawing Title
Designated Sites

Scale at A3 1:24,000
Role EIAR
Suitability FOR INFORMATION
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Name Figure 10.5

Do not scale

Figure 10.6 Watercourses at Landfall Site [Base map source: Bing Maps]

10.3.5 Amenity

The Avoca River, as the principal river waterbody in the region, and the Arklow harbour into which the Avoca River discharges, are considered locally important attributes for a wide range of leisure activities (i.e. used for riverside walks, fishing and boating etc.) and therefore, of high value as an amenity.

The Irish Sea and coastline including the Arklow Sand Dunes are also considered locally important attributes for a wide range of leisure activities (i.e. used for beach walks, fishing and boating etc.) and therefore of high value as an amenity.

Arklow South Beach is a sandy beach backed by boulders located in Arklow town. It is used for a wide range of recreational activities including swimming and therefore of high value as an amenity. Water quality at Arklow Beach South is considered to be excellent (EPA 2021).

The eight streams crossed by the cable route, namely the Johnstown North, Johnstown South, Ticknock, Coolboy, Templerainy, Kilbride, Kilbride Church and Sheepwalk watercourses (**Figure 10.2**), are minor waterbodies, only three of which are identified as perennial watercourses. All of these watercourses are locally important amenity sites for a small range of leisure activities (e.g. fishing) and therefore are considered attributes of low amenity value as per TII guidance.

10.3.6 Flood Risk

A desktop study was undertaken to establish the baseline information for the study area in relation to flood risk. The information with respect to flood risk considered various flood studies including the OPW PFRA (OPW 2012) and the Eastern Catchment Flood Risk Management Plan (OPW 2016) flood maps and reports. The Strategic Flood Risk Assessment Report produced as part of the Wicklow County Development Plan 2016–2022 (WCC 2016) was also reviewed with regard to existing and predicted flooding within the study area. In addition to the above, a Stage 3 detailed Flood Risk Assessment was carried out. The FRA has been included in **Appendix 10.1** of **Volume 3**.

10.3.6.1 Historic Flooding at the site

Reports and maps from the OPW flood hazard mapping website (www.floodinfo.ie) have been examined and there were no reported instances of historical flooding at the landfall, along the existing site of the proposed onshore cable route or at the Avoca River Business Park (location of the proposed substation).

10.3.6.2 Fluvial Flood Risk

Landfall

There are two watercourses in close proximity to the landfall. Stream ‘A’ to the north was identified at desktop study stage on the EPA RWB (River Water Body) mapping. Stream ‘B’ was noted during the site walkover.

Watercourse 'A' (IE_EA_10R010600) is located to the north of the site as shown in **Figure 10.6**. The watercourse was not identified as being a site for further flood risk assessment as part of the PFRA programme. This watercourse has not been modelled as part of the Eastern CFRAM study hence no predictive flood maps are available for the site. Due to the elevated topography of the proposed landfall above the existing watercourse the risk to the site from fluvial flooding from watercourse 'A' is considered to be low.

Stream B's location (identified in yellow) can be seen in **Figure 10.6**. This stream follows a channel to the east of the site. The stream flows along the western boundary hedge before being channelled eastwards along a hedge-line. The stream then crosses under the R750 road before outfalling to the coast. There were two ponds identified along the route of watercourse B. The topography of the site is such that the ground falls towards the stream. The risk at the landfall from fluvial flooding from Stream B is considered to be low due to the topography of the site.

Cable Route

The proposed cable route crosses eight watercourses. These are:

- Johnstown North watercourse;
- Johnstown South watercourse;
- Tiknock watercourse;
- Coolboy watercourse;
- Templerainy watercourse;
- Kilbride watercourse;
- Kilbride Church watercourse;
- Sheepwalk watercourse.

The above watercourses have not been modelled as part of the Eastern CFRAM study. PFRA mapping indicates that the following watercourses are at risk of fluvial flooding:

- Johnstown North;
- Templerainy watercourse;
- Kilbride watercourse;
- Sheepwalk watercourse.

The flooding identified on the PFRA mapping is minor out of bank flooding. The topography of the land around the above watercourses limits the extents of the out of bank flooding. This combined with the absence of any recorded flood events in close vicinity to any of the proposed watercourse crossings indicates that the risk along the cable route from fluvial flooding is low.

Substation

The main risk of fluvial flooding at the substation site is from the Avoca River to the south of the proposed substation site. PFRA mapping and CFRAM mapping indicate that the proposed site is at risk of fluvial flooding.

CFRAM mapping does not take the existing defences surrounding the site into account. In determining the CFRAM flood zones, the presence of flood protection structures is ignored as areas protected by flood defences may still carry a residual risk of flooding from overtopping or breach of defences as well as the fact that there is no guarantee that the defences will be maintained in perpetuity. This risk is addressed in the FRA in **Appendix 10.1** of **Volume 3**.

The existing flood defence embankment which surrounds the entire (former) IFI site protects the site to the 1 in 100-year event. The main fluvial risk to the existing site arises from failure of these existing flood defences.

Flood modelling carried out on the existing site identified a possible overland flow path to the north west of the site due to overtopping of the defence embankment by the Avoca River in the 1 in 1,000 year rainfall return period (0.1% Annual Exceedance Probability Event (AEP)).

Based on the existing site topography the substation site is not at risk of fluvial flooding from the Sheepwalk Stream to the east of the site or at risk of fluvial flooding from the Raheen stream to the west of the site.

NETN Connection

Based on the flood mapping completed as part of the PFRA and CFRAM programmes and the elevation of the existing tower 5 above the sea, the existing site for new tower 5A is outside the area of risk of fluvial flooding.

The new proposed towers 5B and 6A sit within the proposed substation site. The proposed towers 5B and 6A are not considered to be at risk of fluvial flooding due to the presence of the existing flood defence embankment surrounding the substation site.

Based on the flood mapping completed as part of the Stage 3 FRA, the proposed site for new tower 6B is outside the area of risk of fluvial flooding.

10.3.6.3 Tidal Flood Risk

Landfall

Based on the flood mapping completed as part of the Irish Coastal Protection Strategy Study (ICPSS) (RPS 2010) and the elevation of the landfall above the sea, there is no risk of tidal flooding at the landing site.

Cable Route

Based on the flood mapping completed as part of the ICPSS (RPS 2010) and the elevation of the existing cable route site above the sea, there is no risk of tidal flooding at the cable route site.

Substation

Tidal flooding was assessed by comparing existing ground levels across the site with the tidal levels outlined in the CFRAM reports.

The CFRAM 1 in 1,000 year tidal level is +1.75mOD, rising to +2.55mOD with climate change. This level is significantly lower than land to the immediate east of the site, which is generally above +5.0mOD. The low point in the embankment east of the site is also set at +4.2mOD, significantly higher than the 1 in 1,000 year + Climate Change tide level. Therefore, flooding as a result of high tide levels is not considered to be a risk at the substation site.

NETN Connection

Based on the flood mapping completed as part of the ICPSS (RPS 2010) and the elevation of the existing tower 5 above the sea, the existing site for new tower 5A is outside the area of risk of tidal flooding.

The new proposed towers 5B and 6A sit within the proposed substation site. The proposed towers 5B and 6A are not considered to be at risk of tidal flooding due to the presence of the existing flood defence embankment surrounding the substation site.

Based on the flood mapping completed as part of the Stage 3 FRA, the proposed site for new tower 6B is outside the area of risk of tidal flooding.

10.3.6.4 Pluvial Flood Risk

Pluvial flooding occurs when the capacity of the local drainage network is exceeded during periods of intense rainfall. At these times, water can collect at low points in the topography which could create a flood event independent of an overflowing waterbody.

Landfall

It was noted there were no low spots within the existing topography and the site generally drains towards the seashore via overland flow. As the subject site does not lie in a mapped flood extent and there is no record of flooding at the site, the risk at the site from pluvial flooding is considered to be low.

Cable Route

It was noted there were no low spots within the existing topography of the proposed cable route, with the fields along the temporary cable construction corridor generally draining towards existing watercourses via overland flow. There is no record of pluvial flooding at the site, and therefore the risk at the site from pluvial flooding is considered to be low.

Substation

Pluvial flooding from the catchment behind the existing flood embankment is likely to pose a flood risk at the substation site, which is low lying, cut off from natural drainage pathways by the embankments and reliant on a pump system for drainage in the existing scenario.

NETN Connection

The proposed tower 5A is sited at a location which drains towards the Shelton Abbey canal via overland flow. As the subject site does not lie in a mapped flood extent and there is no record of flooding at the site, the risk at the NETN site from pluvial flooding is considered to be low.

Pluvial flooding from the catchment behind the existing flood embankment is likely to pose a flood risk at the proposed substation site where towers 5B and 6A are sited. The substation site is low lying, cut off from natural drainage pathways by the embankment and reliant on a pump system for drainage in the existing scenario.

The proposed location for tower 6B is not at a topographical low point, so the risk at tower 6B from pluvial flooding is low.

10.3.6.5 Groundwater Flooding

Groundwater flooding can occur during lengthy periods of heavy rainfall, typically during late winter/early spring when the groundwater table is already high. If the groundwater level rises above ground level, it can pond at local low points and cause periods of flooding.

The Geological Survey of Ireland (GSI) provide groundwater flooding maps showing areas of historic groundwater flooding as well as groundwater flood probability maps (https://dcenr.maps.arcgis.com/apps/webappviewer/). There are no zones of either type mapped within the study area.

Landfall

Given the landfall site's sloping topography and the lack of historical flooding at the site it is expected that groundwater flooding risk will be low.

Cable Route

Due to the proposed cable route's sloping topography, the absence of bedrock outcrops along the proposed cable route and the lack of historical flooding, it is expected that groundwater flooding risk will be low.

Substation

The lowest point on the substation site currently sits at around 1.4mOD. The substation platform will be raised to a level of up to 3.8mOD as part of the proposed development.

The 1 in 2 year tidal levels are 1.05mOD and 1 in 2 year fluvial levels are approximately 3.0mOD. Therefore, any flooding that may occur can be described as fluvial/tidal in nature.

Elevated groundwater levels are likely to be caused by high water levels in the Avoca River either as a result of high tides or high fluvial events. Groundwater is not considered to be a significant source of flood risk in its own right, noting that the inspection, maintenance and repair programme for the overall Avoca River Business Park will undertake any required further investigation to confirm that

groundwater flood risk is not significant. This is discussed further in **Section 10.7.2.2**.

NETN Connection

The proposed tower 5A is sited at a location which drains towards the Shelton Abbey canal via overland flow. Given the tower 5A's proposed location in an area of sloping topography it is expected that groundwater flooding risk will be low.

Towers 5B and 6A sit within the proposed substation site. Groundwater is not considered to be a source of flooding at the substation site. Groundwater flooding is addressed in the FRA in **Appendix 10.1** of **Volume 3**. As detailed above, the inspection, maintenance and repair programme for the overall Avoca River Business Park will undertake any required further investigation to confirm that groundwater flood risk is not significant. This is discussed further in **Section 10.7.2.2**.

The new proposed tower 6B sits within an area of marshland noted to be at risk of flooding, but the proposed location for tower 6B is not at a topographical low point, and therefore, the risk from groundwater flooding at tower 6B is low.

The new proposed tower 6B is sited at a location which drains towards the Avoca River via overland flow. Given the tower 6B's proposed location in an area of sloping topography it is expected that groundwater flooding risk will be low. Any flooding that may occur at this location would be classified as fluvial/tidal in origin.

10.3.7 Summary of Features of Importance

The feature importance ranking based on the TII Guidelines established for the baseline conditions has been summarised in **Table 10.2.** The importance category considers the impact of changes in water level or water quality on the feature, for example SACs, NHAs and salmonid waters may be sensitive to such changes. The importance ranking does not consider the ecological importance of the feature.

Features with an importance ranking of low are not considered further as they will not result in a significant effect according to Box 5.4 of the NRA Guidelines. These are however included for completeness.

Table 10.2: Summary of Water Features within the Study Area

Category	Feature	Description	Importance	Justification for Importance rating
Watercourse	Avoca River	Salmonid waterbody Local amenity area for a wide range of leisure activities	High	Attribute has a high quality or value on a local scale

Category	Feature	Description	Importance	Justification for Importance rating
Watercourse	Johnstown North	Salmonid waterbody	High	Attribute has a high quality or value on a local scale
Watercourse	Johnstown South	Salmonid waterbody	High	Attribute has a high quality or value on a local scale
Watercourse	Ticknock	Salmonid waterbody	High	Attribute has a high quality or value on a local scale
Watercourse	Coolboy	Salmonid waterbody	High	Attribute has a high quality or value on a local scale
Watercourse	Templerainy	Salmonid waterbody	High	Attribute has a high quality or value on a local scale
Watercourse	Kilbride	Tributary to Templerainy which is a salmonid waterbody	Medium	Attribute has a medium quality or value on a local scale
Watercourse	Kilbride Church	Non-perennial watercourse, low amenity value	Low	Attribute has a low quality or value on a local scale
Watercourse	Sheepwalk	Non-perennial watercourse, low amenity value	Low	Attribute has a low quality or value on a local scale
Watercourse	Shelton Abbey	Low amenity value	Low	Attribute has a low quality or value on a local scale
Watercourse	Shelton Abbey Canal	Low amenity value	Low	Attribute has a low quality or value on a local scale

Category	Feature	Description	Importance	Justification for Importance rating
Transitional waterbody	Arklow Estuary	Moderate water quality status Salmonid waterbody	High	Attribute has a high quality or value on a local scale
Coastal waterbody	Irish Sea - Brittas Bay (HA 10)	Salmonid waterbody Local amenity area for a wide range of leisure activities	High	Attribute has a high quality or value on a local scale
Designated site	Avoca River Valley	pNHA - Located approximately 200m west of the red line boundary	Very high	River, wetland or surface water body with a high value on a regional or national scale
Designated site	Arklow Town Marsh	pNHA Located approximately 750m east of the cable route	Very high	River, wetland or surface water body with a high value on a regional or national scale
Designated site	Arklow Sand Dunes	pNHA – Located approximately 600m east of the red line boundary	Very high	River, wetland or surface water body with a high value on a regional or national scale
Designated site	Buckroney-Brittas Dunes and Fen	cSAC - located approximately 350m north of redline boundary	Extremely high	Attribute has a high quality or value on an international scale

10.4 Characteristics of the Proposed Development

A description of the proposed development is provided in **Chapter 5** *Description of Development* of this EIAR and construction activities are described in **Chapter 6** *Construction Strategy*.

The elements with particular relevance to the water environment include:

- Horizontal Directional Drilling (HDD) at the proposed landfall;

- Excavation of two trenches, typically 0.6 – 1.2m wide, along the onshore cable route (c. 6km long);
- Construction of haul route as part of the temporary cable construction corridor to allow for the passage of plant, equipment and material;
- Dry open cut trench crossing of all watercourses, except for the Templerainy Stream (which will be crossed using HDD), which may be done using one of two options:
    - Option 1 - Over pumping. Sandbags are used to create a seal and dam the channel flow. Pumps are set up to take the flow from upstream to downstream of the crossing point. The discharge hose(s) will be directed through a filtering medium to limit silt carry over or bed disturbance, before the pumped water is returned to the watercourse.
    - Option 2 - Temporary flumes. A suitably sized flume pipe will be installed over the point of the proposed crossing ensuring that it extends on each side of the trench-line crossing point for a suitable distance. The flume pipe will then be bedded and packed or surrounded with soil filled sandbags to create a seal or dam across the watercourse, so that the flume pipes take all the flow. Following the completion of the work the discharge hoses, flume pipe and packing or bags are removed once the bed materials and bank profile is reinstated.
- Construction and operation of the substation and related buildings;
- Substation flood defences - Whilst most of the existing flood defence embankment is above the required flood defence level, one section of approximately 75m in length to the west of the substation site, will be raised by up to 0.7m to provide the required protection against flooding. The embankment will be raised with an appropriate impermeable cohesive material or by sheet-piling; and
- An overhead line connection from the new proposed 220kV transmission compound to the existing 220kV National Electricity Transmission Network (NETN) will be required. This connection will include a northern tie-in to the transmission network of approximately 270m and a southern tie-in to the transmission network of approximately 350m in length. The two connections will involve the construction of four new towers and the decommissioning of two towers.

10.5 Likely Significant Effects

10.5.1 'Do-Nothing' Effects

The do-nothing scenario refers to what would happen if the proposed development was not implemented. The current baseline as described in **Section 10.4** would represent the 'Do Nothing Scenario'.

A conservative approach would be to assume no major changes to the baseline condition of the landfall and cable route.

No potential developments or environmental features have been identified which are likely to lead to further pressure on the baseline in these areas over time.

Should the proposed raising of the existing flood defence at the substation site not be carried out as part of this development then there is a possibility that the existing site may flood in the 1 in 1000 year pluvial event and in a MRFS (Mid-range future scenario) climate change event. Refer to **Appendix 10.1** of **Volume 3** for further detail on climate change modelling undertaken as part of the FRA.

Flooding on the substation site increases the potential for the mobilisation of contaminants in the subsurface made ground which then have the potential to be transported to surface water receptors including the Avoca River. Therefore, the effect of a 'do-nothing' scenario on the substation site is considered to be a **short term, slight negative** effect.

Should the proposed development not proceed at the substation site, the site would remain in its current state and this could lead to a negative impact on the environment eventually. The site is currently covered with asphalt which would become increasingly degraded due to cracking and vegetative intrusions over time. As a result, the percolation of rainfall on site will increase which in turn will lead to an increase in contaminant leaching from the made ground and a potential reduction in groundwater quality. This increases the potential for contaminants in the made ground to enter watercourses, however the impact of the increased leachate will be limited by the underlying low permeability silts and clays therefore, the effect of a 'do-nothing' scenario on the substation site is considered to be a **permanent, slight negative** effect.

10.5.2 Construction Phase

The potential water quality and flood risk impacts during the construction phase are presented in this section.

10.5.2.1 Hydrological Regime

The construction activities associated with the works are described in detail in **Chapter 6** *Construction Strategy*. These works could temporarily affect the hydrological and drainage characteristics of the study area.

Construction activities that have the potential to impact the hydrological regime include:

- Temporary stockpiling of material at working areas;
- Excavation of subsurface material;
- The erection of temporary hoarding around working areas may impede overland flow;
- Temporary diversion of field drains at the landfall, along the cable route and at the location of the overhead lines (OHL) new tower foundations;

- Temporary diversion of site drainage at the substation site, which will be directed into a site water treatment facility such as settlement ponds or silt interceptors before being discharged to the local drainage network;
- Temporary and localised diversion of stream flow at river crossing points where over pumping is applied as part of the open cut trenching; and
- Raising of the existing flood defence embankment.

The construction activities outlined above have the potential to alter the hydrological regime temporarily in the study area. The effects from the construction phase on each important water feature are summarised in **Table 10.3**.

10.5.2.2 Water Quality

There are numerous substances on construction sites that are potential pollutants to surface water if not managed correctly and which may result in short term significant negative effects. Potential pollutants include fuels, lubricants, cement, mortar, silt and soils. The introduction of excessive suspended solids in a water column may also result in interference with fish navigation and feeding, while also affecting populations of aquatic invertebrates, on which the fish diet is based. When excess amounts of silt are deposited it can affect bottom-dwelling aquatic invertebrates and damage nursery habitat for young fish.

The identified potential effects on surface water quality during the construction phase (based on previous relevant experience of similar projects in similar contexts) include the following:

- There is the potential for sediment-laden surface run-off during site preparation, site clearance, material storage and construction of site access roads. The potential for this sediment-laden surface run–off is likely to continue through the construction phase of the works, and until the ground has been completely consolidated or reinstated;
- The washing of construction vehicles and equipment as well as spillages of fuel and oil run-off from the use of vehicles and plant may pose a pollution risk to watercourses in the area if undertaken in inappropriate locations;
- Excavations at the landfall, trench excavation for the onshore cable, substation site and tower foundations may require temporary dewatering at some locations, which has the potential to generate runoff containing sediment;
- Excavation and removal of contaminated made ground at the substation site has the potential to release contaminants via runoff to surface water bodies. Refer to **Chapter 9** *Land and Soils*;
- The dry open cut trench crossings (see details in **Section 10.3**), have the potential to temporarily alter river morphology, release sediment into the watercourse and result in scour and increased velocities in streams;
- The proposed horizontal directional drilling at the landfall, Templerainy Stream and Sheepwalk watercourse has the potential to generate runoff containing sediment onto the adjoining land and/or into the sea.

Other potential sources of pollution associated with the HDD include lubricants and cooling fluids;

- Potential for pollutants associated with the HDD to enter the surface water environment as a result of a frack out; and
- Potential water contamination resulting from accidental spillages of effluent and sanitary waste from construction welfare facilities provided for the construction staff on site.

In the absence of mitigation measures, all of the above effects have the potential to alter the surface water quality temporarily in the study area. The potential effects from the construction phase on each important water feature is summarised in **Table 10.3.**

10.5.2.3 Flood Risk

Landfall

The proposed horizontal directional drilling at the landfall will not affect flood risk in the area, as the reception pit for the HDD activity is located outside areas which are subject to flooding. Similarly the construction site including the temporary construction compounds are located outside of areas deemed to be at flood risk.

Cable Route

The Templerainy watercourse crossing will be completed via HDD, therefore the existing conveyance capacity of the watercourse will not be altered. Consequently, the flood risk in this will not be affected as the launch and reception pits for the HDD activity are located outside areas which are subject to flooding.

The HDD crossing of the M11 will also cross the Sheepwalk Stream. The location of the reception pit directly beside the Sheepwalk Stream has the potential to locally increase flood risk, and associated risk to construction personnel. This would have a potential temporary slight negative effect.

The other watercourse crossings will be completed via open-cut trenches, except for Johnstown South which will be completed with a permanent culvert. The temporary open cut method will involve temporary damming and over-pumping or diversion via culvert and/or flumes pipes. This has the potential to locally increase flood risk to adjoining agricultural land, and associated risk to construction personnel. This would have a potential temporary slight negative effect.

Substation

The potential impact of construction at the proposed substation site on flood risk has been assessed. Due to the location of the site, i.e. the substation is within a defended site, the construction will have no material impact on floodplain storage and conveyance and thus will not increase flood risk elsewhere.

The potential impact of the localised raising of some lengths of existing flood defence embankment on flood risk has been assessed. Through the flood modelling completed as part of the FRA (See **Appendix 10.1** of **Volume 3**) flood depths were noted as having marginally increased around the industrial estate (outside of the embankment on the riverbanks) in only the most extreme event. In these extreme events, flood depths in the channel and on the floodplain were increased locally by a maximum of approximately 40mm to the west of the proposed site, with smaller increases downstream. As this work would improve the protection to the significant risk receptors within the defended area, and as there are no significant risk receptors immediately upstream or downstream, the proposed measures are considered to have a long term slight positive effect.

Exceptionally high intensity rainfall has the potential to cause localised flooding and associated damage during the construction stage. This would be considered a significant short-term negative effect.

NETN Connection

The potential impact of construction at the proposed tower location sites has been assessed.

- Tower 5A – The proposed construction of the tower 5A will not affect flood risk in the area, as the tower footprint is located outside areas which are subject to flooding;
- Towers 5B and 6A - Due to the location of the proposed towers, i.e. the towers are proposed within a defended site, the construction will have no impact on floodplain storage and conveyance. As construction works are limited to the site boundary, and there are no proposed works outside of that boundary, construction will not increase flood risk off site; and
- Tower 6B – While the footprint of the proposed Tower 6B is located within a floodplain, it is noted that the footprint of the proposed tower is small, any loss of flood plain storage capacity and conveyance will be offset by the removal of the existing tower 7. This would be considered a long term negligible effect.

10.5.2.4 Indirect Effects

During the construction phase there is the potential for indirect effects on water quality in waterbodies downstream of the proposed development. Contaminants released from site activities outlined in **Section 10.5.2.2** may migrate into waterbodies and be transported downstream.

If contaminants enter the Avoca River these contaminants may enter the Avoca Estuary and the Irish Sea. Significant dilution of contamination is expected to occur in these larger waterbodies.

The Templerainy Stream flows along the southern boundary of the Arklow Sand Dunes pNHA. If contamination enter the Templerainy Stream it has the potential to enter the Arklow Sand Dunes pNHA.

No significant indirect effects on flooding in relation to water have been identified for the proposed development, in the construction phase.

The potential effects from the construction phase on each important water feature is summarised in **Table 10.3**.

10.5.2.5 Summary of potential impact on features of importance during construction phase

The potential effects on the water features during the construction phase before any mitigation are summarised in **Table 10.3.** Though the magnitude of the potential effect may vary depending on the scale of activities and location of the activity relative to the effected important feature, only the maximum magnitude of the effect of the proposed development is considered.

Table 10.3: Summary of Predicted Construction Phase Effects

Feature	Description	Importance	Effect	Quality	Duration	Scale	Magnitude	Significance
Avoca River	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate
Avoca River	Salmonid waterbody	High	Impact on flood levels	Negative	Temporary	Local	Small Adverse	Slight
Johnstown North	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate
Johnstown South	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate
Ticknock	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate
Coolboy	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate
Templerainy	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate
Kilbride	Salmonid waterbody	Medium	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate
Arklow Estuary	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small Adverse	Slight
Irish Sea - Brittas Bay (HA 10)	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small Adverse	Slight

Feature	Description	Importance	Effect	Quality	Duration	Scale	Magnitude	Significance
Avoca River Valley	pNHA	Very high	Impact on water quality or hydrological regime	n/a – feature is upstream of development	n/a	n/a	n/a	n/a
Arklow Town Marsh	pNHA	Very high	Impact on water levels and flood protection provision	Neutral	Temporary	Local	Small adverse	Moderate
Arklow Sand Dunes	pNHA	Very high	Impact on water quality or hydrological regime	Negative	Temporary	Local	Small adverse	Moderate
Buckroney-Brittas Dunes and Fen	cSAC	Extremely high	Impact on water quality	Negative	Temporary	Local	Negligible	Imperceptible

10.5.3 Operation Phase

Land will be reinstated to its original use post construction at the proposed landfall, along the proposed cable route as well as along the temporary access routes and the construction areas around the towers and OHL stringing areas (for the connection to the NETN). Potential negative effects on hydrology from these elements of the development during the operational phase will be solely as a result of any ongoing maintenance or inspection of the proposed development, in the event of any spills and leaks from associated machinery.

The proposed substation will be operated remotely and will be generally unmanned. It will receive occasional visits for inspection and maintenance. Routine operational checks will be carried out 6 to 8 times per month at each compound. There will also be quarterly inspection visits and further visits at each compound for maintenance as and when required (typically once a year).

The substation site will be capped with hard standing and site buildings. A Geosynthetic Liner (GCL) will be installed across the site as part of the remedial strategy associated with contaminated made ground on site (see **Chapter 9** *Land and Soils*). This will prevent rainwater from infiltrating into the contaminated material located beneath the footprint of the site and therefore limit the mobilisation of any contamination from the substation site to adjacent surface waterbodies, namely the Avoca River and Shelton Abbey canal. As a result, the operational phase is considered to have a long term slight positive effect on water quality.

The main contaminant potentially arising from maintenance activities will be hydrocarbons as a result of accidental spillage from plant and equipment at the proposed development. Contamination of surface water systems by hydrocarbons may potentially occur due to inappropriate handling and storage. In the absence of mitigation measures, the effects as a result of these maintenance activities have the potential to alter the water quality temporarily in the study area.

It is recognised that once constructed, the proposed flood defence embankment (local raising as described herein) will reduce residual flood risk to the development during the operation of the proposed development and thus bring about further positive, cumulative effects on flood risk. It is noted that raising of the embankment will have a long term slight negative effect outside of the area protected by the flood defence embankment. There will be an overall reduction in the existing flood extent following construction of the proposed development which will be a long-term slight positive effect.

The worst-case scenario potential effects on the water features during the operation phase are summarised in **Table 10.4**. Though the magnitude of the potential effect may vary depending on the scale of activities and location of the activity relative to the effected important feature, only the maximum negative magnitude of the potential effect of the proposed development is considered.

Table 10.4: Summary of Predicted Operation Phase Effects

Feature	Description	Importance	Effect	Quality	Duration	Scale	Magnitude	Significance
Avoca River	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight
Avoca River	Salmonid waterbody	High	Increase flood protection	Positive	Permanent	Local	Moderate positive	Slight
Johnstown North	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight
Johnstown South	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight
Ticknock	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight
Coolboy	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight
Templerainy	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight
Kilbride	Salmonid waterbody	Medium	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight
Arklow Estuary	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Negligible	Imperceptible
Irish Sea - Brittas Bay (HA 10)	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Negligible	Imperceptible

Feature	Description	Importance	Effect	Quality	Duration	Scale	Magnitude	Significance
Avoca River Valley	pNHA	Very high	Impact on water quality or hydrological regime	n/a – feature is upstream of development	n/a	n/a	n/a	n/a
Arklow Sand Dunes	pNHA	Very high	Impact on water quality or hydrological regime	Negative	Temporary	Local	Negligible	Imperceptible
Arklow Town Marsh	pNHA	Very high	Impact on water levels and flood protection provision	Neutral	Temporary	Local	Negligible	Imperceptible
Arklow Sand Dunes	pNHA	Very high	Impact on water quality or hydrological regime	Negative	Temporary	Local	Negligible	Imperceptible
Buckroney-Brittas Dunes and Fen	cSAC	Extremely high	Impact on water quality	Negative	Temporary	Local	Negligible	Imperceptible

10.5.4 Decommissioning

As mentioned in **Chapter 5** *Description of Development*, the cables and associated ducts will most likely remain in-situ as there would be more environmental impact in removing these than can be justified by the recycle value of cable material and as is standard industry practice. All above ground infrastructure including the substation buildings will be removed.

The raised flood defence embankment will remain in situ following decommissioning of the proposed substation.

Following decommissioning there will be no activities related to the proposed development and therefore the effects on all the important water features will be imperceptible.

10.6 Mitigation Measures and Monitoring

10.6.1 Construction Phase

10.6.1.1 Mitigation measures

The employment of good construction management practices will minimise the risk of adverse impacts on the hydrological regime, water quality and flood risk. As part of the assessment of the required construction mitigation, good practice construction measures which will be implemented for the proposed development were considered.

A Construction Environmental Management Plan (CEMP) has been prepared and is provided in **Appendix 6.1** of **Volume 3.** It will be further developed by the Contractor prior to commencement of construction and maintained by the Contractor for the duration of the construction phase. The CEMP includes surface water management measures which will cover all potentially polluting activities to minimise the risk to waterbodies.

Specific environmental control measures to minimise the effect on the hydrological regime, water quality and flooding as outlined in the CEMP include:

General

- Good housekeeping (site clean-ups, use of disposal bins, etc.) will be implemented on the site;
- No materials will be stored in flood plains or in areas which would impede flood flow paths;
- Where possible, soil excavation will not be completed during periods of prolonged or heavy rain;
- Earthworks operations shall be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe run-off and prevent ponding and flooding;

- All construction compounds will be in areas that are at low risk of flooding (outside the 1 in 100-year flood zone);
- Secure oil and chemical storage in over-ground bunded areas, limited to the minimum volume required to serve immediate needs with specified delivery and refuelling areas;
- No refuelling or fuel storage within 50m of watercourse and only on a sealed surface;
- Emergency spill kits retained onsite at sensitive locations;
- Cessation of work and development of measures to contain and/or remove pollutant should an incident be identified;
- Silt traps will be employed and maintained in appropriate locations;
- Temporary interception bunds and drainage ditches will be constructed up slope of excavations to minimise surface runoff ingress and in advance of excavation activities;
- Weather warnings will be monitored during construction to ensure that there is no flood risk to construction workers installing the cable ducts. A risk assessment will be carried out in the case of a weather warning to determine what works can proceed, and what works need to be postponed; and
- The temporary foul drainage at the construction compounds will comprise self-contained sanitary facilities, with wastewater stored and tankered off-site to appropriately licensed treatment facilities.

Landfall

- If field drains at the landfall are temporarily diverted, facilities will be put in place to over pump the water into a settlement pond to limit silt discharge into the field drain downstream;

Cable Route

- Any groundwater or rainwater that collects in the HDD drilling pit or in a trench will be pumped away onto adjacent land, not directly into waterways;
- Any bentonite (or similar HDD drilling head lubrication material) will be handled and removed by the drilling contractor. Typically, bentonite is used, which comprises 95% water and 5% bentonite clay which is a non-toxic, natural substance. HDD will be a closed system, with drilling fluid recirculated, the drill cuttings recovered, and drilling fluid reused;
- In order to eliminate the migration of drilling fluids through the subsurface to waterbodies the following measures will be employed:
    - Drilling pressures will be closely monitored and not exceed those needed to penetrate the formation.
    - Exit and entry points for the HDD will be enclosed by silt barriers (e.g. straw or silt fence) to prevent any runoff into surface water bodies.
    - If pressure drops during drilling or if there is a lack of returns the drilling will stop immediately to allow an assessment of a potential leakage of drilling fluid into the surrounding formation. A leak stopping compound,

such as mica, may be used to prevent the leak from migrating further into the formation. If the leak stopping compound is not successful, the drilling direction may need to change to avoid the area where the leak occurred. Further details are provided in **Section 6.5.2.4** in **Chapter 6** *Construction Strategy;*

- If damming and over-pumping is adopted for the open cut watercourse crossings the water will be discharged through a filtering medium to limit silt carry over or bed disturbance downstream of the crossing point;
- There will be no tracking of machinery within watercourses other than the stream bed excavation for the temporary works associated with construction of the watercourse crossings for the cable route;
- Silt pollution caused by working in surface water will be minimised or prevented by keeping water out of the works area using appropriate isolation techniques, such as cofferdams, flume pipes and by-pass channels;
- Where short-term over pumping, culverts or flume pipes are required, equipment will be sized to accommodate surface water flow that might reasonably be expected over the period in question;
- Dewatering, where required, will incorporate the use of filter media; there will be no direct discharges into the watercourses
- During the construction of the crossing of the Kilbride watercourse Inland Fisheries Ireland (IFI) will be consulted in relation to protecting fish populations. Measures include only undertaking instream works during the period July to September in the Kilbride watercourse to avoid interference with the spawning migration and spawning process and to protect juvenile fish emerging from the gravels. Further details on mitigation measures for species protection are included in **Chapter 12** *Biodiversity*.

Substation

There are no specific mitigation measures associated with the substation. All the general mitigation measures apply.

NETN Connection

There are no specific mitigation measures associated with the NETN. All the general mitigation measures apply.

10.6.1.2 Monitoring

Visual monitoring will be undertaken as part of the regular site audits during the construction of the proposed development to ensure existing surface water drainage runoff and natural infiltration to ground is not affected by the proposed development.

A monitoring regime/programme for water quality will be put in place. Turbidity monitoring will be carried out downstream, within 20m of the crossing, while works are underway at the Templerainy, Kilbride River and Johnstown North

watercourse crossings to ensure that sediment levels are not significantly elevated above baseline levels.

The Contractor is required to monitor the weather forecasts to inform the programming of earthworks and stockpiling of materials.

Particular regard will be given to trench excavations and other works which may be vulnerable to the generation or conveyance of run-off, and for the protection of site personnel, plant and equipment in flood prone areas.

10.6.2 Operation Phase

10.6.2.1 Mitigation measures

The mitigation measures which will be implemented during the operational phase are outlined below:

- Appropriately sized hydrocarbon interceptors will be installed at strategic locations along the proposed surface water drainage network to prevent any hydrocarbons from leaving the site of the proposed substation.
- Emergency procedures detailing the measures to be undertaken should any accidental spill happen during operation will be developed as part of the operations manual.
- An automated remote monitoring system will be put in place on the proposed attenuation pumping system to monitor on-site infrastructure in an extreme rainfall event. Where this monitoring system notifies an issue, appropriate measures will be adopted, based on the circumstances.

10.6.2.2 Monitoring

Considering operational works are predominately related to the maintenance of the proposed substation, no monitoring measures are required during the operational phase, as there will be no potential for ongoing adverse impacts on water and hydrology.

The existing flood defences will be inspected annually for signs of disrepair, together with additional inspections after significant flood events (Events with a return period greater than a 1 in 2 year flood event). Maintenance of embankments includes removal of vegetation to allow for inspection of the embankment.

The maintenance programme for the drainage system will be set out in the Operation and Maintenance manual which will be prepared during the detailed design. Regular maintenance will consist of regular inspections, silt or oil removal if required more frequently than once per year, vegetation management, sweeping of surfaces, and litter and debris removal.

10.6.3 Decommissioning

The monitoring measures, described above for the construction phase, updated to reflect best practice at the time, will be implemented for the decommissioning phase.

10.7 Cumulative Effects

This section considers the potential for cumulative effects arising from the proposed development in association with other developments. Specifically, it considers a worst-case scenario, where both the proposed development and other developments for which construction timelines are not known are under construction and/or operation at the same time.

A two-tiered approach to the cumulative assessment has been undertaken, in which the proposed development is considered cumulatively with other projects as follows:

Tier 1 -

- ABWP Phase 2 Offshore Infrastructure;
- ABWP Phase 2 Operations and Maintenance Facility (OMF);
- EirGrid Grid Upgrade Works; and
- Irish Water Upgrade Works.

Tier 2 -

- Other relevant projects currently under construction;
- Other relevant projects with consent;
- Other relevant projects in the planning process; and
- Other existing projects that were not operational when baseline data were collected.

There are a number of other developments identified (not included in the list above) that are currently permitted or proposed in Arklow but were not assessed as the nature and scale of these developments are such that these projects in combination with the proposed development would not give rise to significant effects on water.

A summary of the cumulative effects is provided in **Chapter 21** *Summary of Cumulative Effects*.

10.7.1 Tier 1

10.7.1.1 Arklow Bank Wind Park Phase 2 Offshore Infrastructure and Operations and Maintenance Facility and Proposed Development

As outlined in the EIAR for the Arklow Bank Wind Park Phase 2 Offshore Infrastructure, the development is the subject of an existing Foreshore Lease, which does not overlap (in terms of area) with either the proposed development or the proposed Operations and Maintenance Facility. The Developer for each of these projects will be Sure Partners Limited ensuring co-ordination between the developments, for which the appropriate land acquisition and foreshore consent will be obtained in advance of the works.

Considering the EIAR for the Arklow Bank Wind Park Phase 2 Offshore Infrastructure considers that there will be imperceptible impact on water and the distance between each of these developments, it is not expected there will be any cumulative effect on water with the proposed development.

10.7.1.2 EirGrid Grid Upgrade Works and the Irish Water Connection and Proposed Development

It is expected that the EirGrid grid upgrade works and the Irish Water watermain upgrade works have the potential to impact water quality in surface waters as a result of surface water runoff washing contaminants and silt into surface water bodies. However, the CEMP for the proposed development includes surface water management measures, which outlines how surface water will be managed during construction and the measures to be taken to prevent any potentially polluting activities from occurring. As a result, no significant cumulative effects in relation to water and hydrology have been identified for the proposed development, in combination with the EirGrid upgrade works and Irish Water upgrade works. This will ensure there are no cumulative effects on water associated with Tier 1 projects during the construction phase.

As the effect of the proposed development on water and hydrology during the operation phase will not be significant, any potential cumulative effects arising, in combination with the EirGrid upgrade works and Irish Water upgrade works are not expected to be significant.

10.7.2 Tier 2

10.7.2.1 Developments in the vicinity of the Avoca River Business Park and the Proposed Development

There are a number of permitted and proposed developments in the vicinity of the Avoca River Business Park that have the potential to overlap during the construction phase. These developments include:

- the permitted Crag Digital Avoca Ltd data centre (Planning Reference 18940);

- the permitted Rappel Enterprises Ltd office development (Planning Reference 138823);
- the permitted Harmony Timber Solutions Ltd office and factory development (Planning Reference 1954);
- the proposed (not yet permitted) Crag Digital Avoca Ltd 110kV Substation (Planning Reference PL27.307256); and
- the proposed (not yet permitted) Crag Digital Avoca Ltd data centre amended application (Planning Reference 201285).

In respect of the two Crag Digital Avoca Ltd. data centre proposals, it should be noted that both the permitted and proposed data centre developments have one data hall, located on the proposed substation site, which will not be built if the proposed development proceeds.

No significant impacts are likely following the implementation of appropriate mitigation measures and adherence to the CEMP for the proposed development.

Thus, there are no likely significant direct or indirect cumulative impacts of the Tier 2 developments in combination with the proposed development in relation to water and hydrology during construction.

As the effect of the proposed development on water and hydrology during the operation phase will not be significant, any potential cumulative effects arising, in-combination with the developments in the vicinity, are not expected to be significant.

10.7.2.2 Flood Defence Embankment Works in the Avoca River Business Park

The entire Avoca River Business Park relies on an existing flood defence embankment for fluvial flood protection. As a result, these embankments need to be regularly and appropriately inspected, maintained and repaired, to ensure they remain capable of preventing inundation of flood waters from the nearby Avoca River. As detailed in the Flood Risk Assessment (**Appendix 10.1** of **Volume 3**) further investigations are to be undertaken to confirm the composition of the existing embankment, and its permeability and stability, so as to inform the future ongoing required inspection, maintenance and repair programme.

Should this investigation determine that works are required to maintain or reinforce the existing embankments, these works will be undertaken in advance of the substation construction, with ongoing maintenance and repair continuing thereafter, based on the findings of the regular inspection and monitoring regime, as is the case for the section of embankment reinforcement included within the proposed development, see **Section 10.6.2.2**.

While a range of approaches could be applied and a targeted approach is likely (where only certain areas of the embankment might require works), in a reasonable worst case scenario, the full length of the embankment may require to be further reinforced, similar to the works proposed as part of the proposed

development (localised reinforcement of the embankment), either using cohesive soils placed and suitably compacted in layers, and/or sheet piling.

As the construction of any required maintenance or reinforcement works will be completed ahead of the proposed development, and, as the proposed development is not expected to result in any significant effects on water quality, no significant cumulative effects are expected, during the construction phase.

In relation to flood risk, the cumulative effect of any additional maintenance and repair works to the overall Avoca Business Park flood defence embankment works in combination with the proposed development is that any residual flood risk, associated with a potential breach of the embankment or groundwater seepage will be minimised, in advance of the substation construction. There will also be an ongoing inspection, monitoring and maintenance programme for the Avoca River Business Park. This is considered a long term, positive cumulative effect in terms of flood risk.

10.7.2.3 Arklow Wastewater Treatment Plant

The Arklow Wastewater Treatment Plant (WwTP) Project and the proposed development will both maintain and implement a site-specific Construction Environmental Management Plan (CEMP) during the construction phase. The CEMPs outline how surface water will be managed during construction and the measures to be taken to prevent any potentially polluting activities from occurring. As a result, no significant cumulative effects in relation to water and hydrology have been identified for the proposed development, in combination with the Arklow WwTP project.

The proposed Arklow WwTP would significantly improve the Avoca River water quality during operation and is therefore considered to have a long term significant positive effect on surface water quality. The substation site of the proposed development will be capped with hard standing and site buildings and as part of the remedial strategy a Geosynthetic Clay Liner (GCL) will be installed across the site associated with contaminated made ground. This will prevent rainwater from infiltrating into the contaminated material located beneath the footprint of the site and therefore limit the mobilisation of any contamination from the substation site to adjacent surface waterbodies, namely the Avoca River and Shelton Abbey watercourse. As a result, the operational phase is considered to have a long term slight positive effect on water quality.

Therefore, the cumulative effects arising from the operation phases of the Arklow Wastewater Treatment Plant and the proposed development on water quality will be positive.

10.7.2.4 Arklow Flood Relief Scheme

It is possible that the construction of the proposed Arklow Flood Relief Scheme may take place in parallel with the construction of the proposed development (should the proposed Arklow Flood Relief Scheme be submitted, receive consent and commence construction in a timely manner). The concurrent construction of both developments may exacerbate effects on the hydrology and flooding.

Mitigation measures will be implemented to mitigate any significant flood risk during construction of works in and around the Avoca River. The construction works to the existing flood defence embankment and nearby construction of the proposed Arklow Flood Relief Scheme may generate the potential for direct and indirect short term significant negative effects on the hydrology of the Avoca River during construction for those reasons outlined above.

No significant effects are likely following the implementation of appropriate mitigation measures and adherence to the CEMP for the proposed development. Thus, there are no likely significant direct, indirect cumulative impacts of the proposed Arklow Flood Relief Scheme in combination with the proposed development in relation to water and hydrology.

As the effect of the proposed development on water and hydrology during the operation phase will not be significant, any potential cumulative effects arising, in combination with the Arklow Flood Relief Scheme, are not expected to be significant.

10.7.2.5 Solar farms

There are a number of permitted solar farms in the vicinity of the proposed development that have the potential to overlap during the construction phase. These developments include:

- BNRG Neon Holdings Limited Solar Farm Johnstown North;
- BNRG Neon Holdings Limited Solar Farm Ballymoney;
- Highfield Solar Limited Ballinclea Lower; and
- Highfield Solar Limited Templerainy East

The proposed development BNRG Neon Holdings Limited Solar Farm in Johnstown North borders the landfall site of the proposed development. The solar farm is located to the north west of the watercourse which flows through the landfall site. Therefore, it has been noted that the Solar farm at Johnstown North and the proposed development sites are hydrologically linked.

The proposed development BNRG Neon Holdings Limited Solar Farm in Ballymoney lies within 200m of the proposed cable route. It has been noted that the Solar farm in Ballymoney and the proposed development are hydrologically linked through their proximity to the Johnstown North watercourse.

The Highfield Solar Limited Ballinclea Lower development and the Highfield Solar Limited Templerainy East development and the proposed development are hydrologically linked by the Templerainy watercourse. The watercourse flows within the boundaries of both Highfield Solar Limited developments located upstream of the proposed cable route.

Considering the mitigation measures to be applied during the construction phase of the proposed development, no significant cumulative effects in relation to water and hydrology have been identified during the construction phases of any of the solar farms in combination with the proposed development.

As the effect of the proposed development on water and hydrology during the operation phase will not be significant, any potential cumulative effects arising, in-combination with any of the solar farms are not expected to be significant.

10.7.2.6 All Tier 2 Projects and the Proposed Development

Only the Tier 2 projects listed were considered to have the potential for a cumulative effect with the proposed development with regard to water.

It is not expected that there will be significant cumulative effects on water caused by the Tier 2 projects and the proposed development.

With regard to flood risk, a **long term, positive** cumulative effect is predicted with regard to the inspection, maintenance and repair programme for the Avoca River Business Park, in combination with the proposed development.

10.8 Residual Effects

10.8.1 Construction Phase

Following the implementation of the mitigation and monitoring measures outlined above, no significant residual effects on water quality, flooding and hydrology are envisaged during the construction phase. Temporary slight negative effects will exist for the open cut trench watercourse crossings. However, these effects are unlikely to lead to a deterioration in current WFD status or prevent unassigned water bodies from achieving good status in the future.

A summary of the pre-mitigation and post-mitigation effects is contained in **Table 10.5**.

Table 10.5: Summary of Predicted Construction Effects Following the Implementation of Mitigation and Monitoring Measures

Feature	Description	Importance	Effect	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation on Magnitude	Post-mitigation Significance
Avoca River	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate	Negligible	Imperceptible
Avoca River	Salmonid waterbody	High	Removal of flood protection	Negative	Temporary	Local	Small Adverse	Slight	Small Adverse	Slight
Johnstown North	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate	Small adverse	Slight
Johnstown South	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate	Small adverse	Slight
Ticknock	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate	Small adverse	Slight
Coolboy	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate	Small adverse	Slight
Templerainy	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate	Negligible	Imperceptible

Feature	Description	Importance	Effect	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation on Magnitude	Post-mitigation Significance
Kilbride	Salmonid waterbody	Medium	Impact on water quality	Negative	Temporary	Local	Moderate Adverse	Moderate	Small adverse	Slight
Arklow Estuary	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small Adverse	Slight	Negligible	Imperceptible
Irish Sea - Brittas Bay (HA 10)	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small Adverse	Slight	Negligible	Imperceptible
Avoca River Valley	pNHA	Very high	Impact on water quality or hydrological regime	n/a – feature is upstream of development	n/a	n/a	n/a	n/a	n/a	n/a
Arklow Town Marsh	pNHA	Very high	Impact on water levels and flood protection provision	Neutral	Temporary	Local	Small adverse	Moderate	Negligible	Imperceptible
Arklow Sand Dunes	pNHA	Very high	Impact on water quality or hydrological regime	Negative	Temporary	Local	Small adverse	Moderate	Negligible	Imperceptible

Feature	Description	Importance	Effect	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation on Magnitude	Post-mitigation Significance
Buckroney-Brittas Dunes and Fen	cSAC	Extremely high	Impact on water quality	Negative	Temporary	Local	Negligible	Imperceptible	Negligible	Imperceptible

10.8.2 Operation Phase

No significant residual effects on water quality, flooding and hydrology are envisaged during the operational phase. With regard to flood risk, a long term, positive cumulative effect is predicted with regard to the inspection, maintenance and repair programme for the Avoca River Business Park, in combination with the proposed development.

A summary of the pre-mitigation and post-mitigation effects is contained in **Table 10.6**.

Table 10.6: Summary of Predicted Operation Effects Following the Implementation of Mitigation and Monitoring Measures

Feature	Description	Importance	Effect	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation on Magnitude	Post-mitigation Significance
Avoca River	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight	Negligible	Imperceptible
Avoca River	Salmonid waterbody	High	Increase flood protection	Positive	Permanent	Local	Moderate positive	Medium	Moderate positive	Slight
Johnstown North	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight	Negligible	Imperceptible
Johnstown South	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight	Negligible	Imperceptible
Ticknock	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight	Negligible	Imperceptible
Coolboy	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight	Negligible	Imperceptible
Templerainy	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight	Negligible	Imperceptible

Feature	Description	Importance	Effect	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation on Magnitude	Post-mitigation Significance
Kilbride	Salmonid waterbody	Medium	Impact on water quality	Negative	Temporary	Local	Small adverse	Slight	Negligible	Imperceptible
Arklow Estuary	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Negligible	Imperceptible	Negligible	Imperceptible
Irish Sea - Brittas Bay (HA 10)	Salmonid waterbody	High	Impact on water quality	Negative	Temporary	Local	Negligible	Imperceptible	Negligible	Imperceptible
Avoca River Valley	pNHA	Very high	Impact on water quality or hydrological regime	n/a – feature is upstream of development	n/a	n/a	n/a	n/a	n/a	n/a
Arklow Sand Dunes	pNHA	Very high	Impact on water quality or hydrological regime	Negative	Temporary	Local	Negligible	Imperceptible	Negligible	Imperceptible
Arklow Town Marsh	pNHA	Very high	Impact on water levels and flood protection provision	Neutral	Temporary	Local	Negligible	Imperceptible	Negligible	Imperceptible

Feature	Description	Importance	Effect	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation on Magnitude	Post-mitigation Significance
Arklow Sand Dunes	pNHA	Very high	Impact on water quality or hydrological regime	Negative	Temporary	Local	Negligible	Imperceptible	Negligible	Imperceptible
Buckroney-Brittas Dunes and Fen	cSAC	Extremely high	Impact on water quality	Negative	Temporary	Local	Negligible	Imperceptible	Negligible	Imperceptible

10.8.3 Decommissioning

No significant residual effects on water quality, flooding and hydrology are envisaged during the decommissioning phase.

10.9 References

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