9.0 HYDROLOGY & HYDROGEOLOGY

9.1 INTRODUCTION

This chapter describes the existing hydrological, hydrogeological and water quality characteristics at the site of the proposed project. The potential effects on the water environment arising from the development of the substation and associated infrastructure, including the grid connection, are assessed. The drainage of the project is considered which includes proposed mitigation measures to reduce any potential negative effects associated with the construction, operation and decommissioning of the proposed development. Any residual effects are also assessed.

Planning Permission is being sought for the installation of a substation and all associated infrastructure, which are described in detail in Chapter 3 of this EIAR (Description of the Development).

The proposed development will comprise of:

- EirGrid/ ESBN Control Room building
- Associated Internal 15kV and 110kV Underground Cabling
- Installation of a 15/110kV Transformer (TRAFO) with associated equipment including:
    - Cable Sealing End
    - Surge Arrestor
    - Earth Disconnect
    - Current /Voltage Transformer
    - Circuit Breaker
- 110kV underground cable to Barnakyle 110kV substation 3 No Power Ducts and 2 No Telecoms Ducts.
- Diesel Generator
- Security Fencing, Security Cameras and Poles
- Lights/Lamp Poles
- Lightning Masts
- Temporary Construction Compound
- And all other associated site development plant and equipment and other works including surface water and foul wastewater drainage, within an overall redline boundary measuring approximately 2.6 hectares.

Information on the design is provided in Chapter 3 'Description of Development'.

9.1.1 Statement of Authority

TOBIN Consulting Engineers (TOBIN) have completed this chapter. This chapter has been completed by John Dillon, TOBIN hydrogeologists with over 18-years' experience respectively, specialising in environmental site assessments and EIAs. Mistaya Langridge, TOBIN water resources engineer, has been responsible for carrying out the site-specific hydraulic modelling Flood Risk Assessment.

9.1.2 Scope of Assessment

The scope of the assessment undertaken is set out as follows:

1. Characterise the hydrological and hydrogeological baseline conditions of the existing environment based on a desktop study and site investigation;
2. Identify the possible impacts of the proposed development during construction, operation and decommissioning of the project on the receiving hydrological and hydrogeological environment;
3. Develop mitigation measures to reduce or eliminate the identified potential negative impacts; and
4. Identify any residual impacts after mitigation measures are implemented.

9.1.3 Legislative / Guidance Review

This EIAR has been prepared in accordance with the requirements of the codified Directive 2011/92/EU as amended by Directive 2014/52/EU (hereafter referred to as the 'amended Directive').

This EIAR has been prepared with reference to the requirements of the following legislation (where relevant):

- S.I. No. 293 of 1988: European Communities (Quality of Salmonid Waters) Regulations;
- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009, as amended;
- S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended;
- S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011;
- Consolidated EIA Directive 2011/92/EU as amended by Directive 2014/52/EU;
- European Communities (Water Policy) Regulations 2003 [S.I. No. 722/2003];
- Waste Management Act 1996, as amended;
- Water Framework Directive (2000/60/EEC); and
- Groundwater Directives (80/68/EEC) and (2006/118/EC).

The hydrology and hydrogeology section of the EIAR is carried out in accordance with guidance contained in the following:

- "Guidelines on the Information to be contained in Environmental Impact Statements" (EPA, 2002);
- "Guidelines on the Information to be contained in Environmental Impact Assessment Reports" (EPA, 2022);
- The guidelines and recommendations of the Institute of Geologists of Ireland (IGI) publication 'Geology in Environmental Impact Statements – A Guide' (2002);
- Inland Fisheries Ireland (2016) "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites";
- IGI Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (2013);
- Good Practice During Proposed Development Construction (Scottish Natural Heritage, 2010);
- PPG2 – Above ground oil storage tanks;
- PPG5 – Works or Maintenance in or near water;
- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006);

- CIRIA C697 SuDS Manual; and
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.

9.1.4 Study Methodology

An examination of the existing hydrological/hydrogeological regime was carried out through a combination of consultation with relevant authorities (i.e., South Dublin County Council), a desktop review of the hydrological/hydrogeological resources, and site-specific fieldwork. These elements are described further below.

The assessment of the water environment consisted of the following:

- A desk study of available information, including a review of site investigations relating to surface water and groundwater, undertaken within or adjacent to the site;
- A walkover of the site and surrounding area;
- Drainage distribution and catchment mapping;
- Interpretation of all data to establish the baseline environment; and
- Assessment of flood risk.

Information retained by the Geological Survey of Ireland (GSI), the Office of Public Works (OPW) and EPA was accessed to provide the hydrological and hydrogeological setting of the site. Relevant documents and datasets used to provide the setting of the site included EPA Water Quality Data, topography maps, and GSI Hydrogeological Data.

The relevant sections of the South Dublin County Development Plan 2022 - 2028 were also consulted in the preparation of this report.

The following sources of information were utilised to establish the baseline environment:

- The Geological Survey of Ireland (GSI) groundwater records for the area were inspected with reference to hydrology and hydrogeology;
- Office of Public Works (OPW) flood mapping;
- Catchment Flood Risk Assessment and Management (CFRAM) and Preliminary Flood Risk Assessment (PFRA) map data;
- EPA water quality monitoring data for watercourses in the area;
- EPA Water Framework Directive Monitoring Programme;
- Information from the 2nd Cycle River Basin Management Plan, 2018-2021; and
- Site visit of the study area.

TOBIN Consulting Engineers carried out an investigation in February 2023, in order to assess the water environment in the vicinity of the proposed development.

In this chapter, the potential impacts on the water environment resulting from the proposed development are evaluated and mitigation measures are proposed to reduce any significant impacts. Based on the mitigation measures proposed, the significance of the residual impact on the water environment is determined.

The significance of effects of the proposed development has been assessed in accordance with the EPA guidance document *Guidelines on the Information to be contained in Environmental*

Impact Assessment Reports (2022)[1]. Table 2-2 (available in Chapter 2) is taken from the EPA document. It outlines guidance for describing the quality and significance of effects.

The magnitude of any effects considers the likely scale of the predicted change to the baseline conditions, resulting from the predicted effect and takes into account the duration of the effect, i.e., temporary or permanent.

Potential effects may have negative, neutral or positive qualities where:

- Positive effect – A change which improves the quality of the environment;
- Neutral effect – A change which does not affect the quality of the environment; and
- Negative effect – A change which reduces the quality of the environment.

The diagram below shows how comparison of the character of the predicted effect to the sensitivity of the receiving environment can determine the significance of the impact.

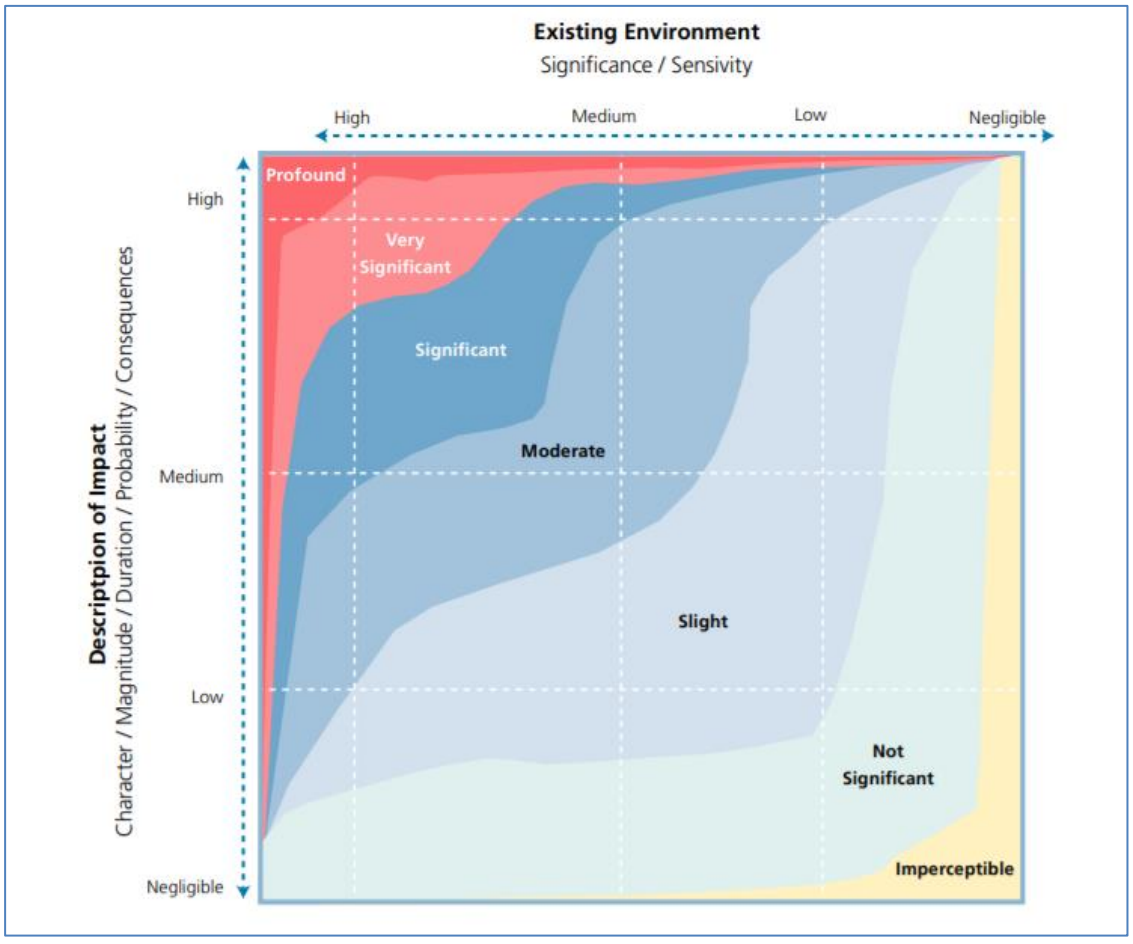


Diagram 1 EIAR significance of effects matrix (EPA, 2022)

In order for a potential effect to be realised, three factors must be present. There must be a source of a potential effect, a receptor which can be adversely affected and a pathway or connection which allows the source to effect the receptor. Only when all three factors are present can an effect be realised.

[1] https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

9.1.4.1 Consultation

Consultation took place with a number of organisations including the following relevant bodies:

- An Bord Pleanála;
- South Dublin County Council;
- Inland Fisheries Ireland;
- Geological Survey of Ireland;
- Department of Arts, Heritage and the Gaeltacht;
- Waterways Ireland;
- EPA; and
- The Office of Public Works.

9.2 EXISTING ENVIRONMENT

9.2.1.1 Site Walkover and Investigations

Field work involved:

- A walkover survey of the site to identify hydrological features on site, wet ground, drainage patterns and distribution, exposures, drains, etc.

Following the field survey, the results were reviewed in ArcGIS software in conjunction with publicly available hydrological and hydrogeological data from the GSI, EPA and OPW. Various maps were produced, representing a graphical interpretation of the field results.

On a regional scale, the site at Profile Park and its environs is located within the Liffey and Dublin Bay Hydrometric Area and Catchment. The delineation of the sub-catchments and general area of confluence is shown in Figure 9-1 'Regional Catchment Delineation Overview'.

The proposed development site is located within the National River Basin District of the 2nd cycle river basin management plan, formerly the Eastern River Basin District (ERBD) within the 1st cycle river basin management plan. At a local scale, the Baldonnell Stream (EPA Code: 09B09) flows through the site from in a north-south direction. The Baldonnell stream continues to flow northwards, discharging into the Griffeen River which then discharges into the River Liffey at Lucan.

9.2.2 Topography

The topography of the proposed development site is mostly flat with elevations from c.73 mAOD to 76 mAOD. Surface water flows generally in a northward's direction towards the River Liffey.

9.2.3 Surface Water Hydrology

The purpose of this section is to describe the surface water environment including the following:

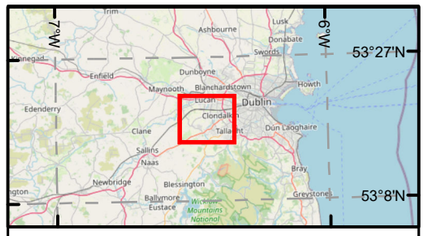
- Catchments;
- Site surface water features and drainage;
- Flood risk assessment;
- Assessment of hydrometric data;
- Surface water abstractions within the catchment of the site; and
- Surface water quality.

9.2.3.1 Catchments

A catchment, also referred to as a drainage basin and watershed, is a topographic area that collects and discharges surface streamflow through one outlet or mouth (Mays, 2012[2]). The catchment boundary is the line dividing land where surface drainage flows toward a given stream from land where it drains into a separate stream.

The regional natural surface water drainage pattern, in the environs of the Profile Park proposed development site is shown on Figure 9-1 'Regional Catchment Delineation Overview'. The proposed development site is located within the River Liffey and Dublin Bay catchment, located within the National River Basin District. The proposed development is not located within a catchment which has identified ecological habitats such as Natural Heritage Areas, Special Areas Conservations and Special Protection Areas.

2 Ground and Surface Water Hydrology. Mays K.W. (2012)



Legend

- Planning Application Boundary
- WFD - River Water bodies
- WFD - Subcatchments

0 500 1,000 1,500 2,000
Meters

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
A	23/05/2023	Final issue	S.P	C.N

Client: Greener Ideas

Project:
Profile Park power plant - Substation Application

Title:
Figure 9-1:
Surface water feature and local catchments

Scale @ A3: 1:40,000

Prepared by:	Checked by:	Date:
S.Pezzetta	C.Naughton	May 2023

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Map Ref: 11069-008-RI-CAs-TOB-A

Draft: A

The proposed development lies within the Liffey sub catchment, identified in Table 9-1 below.

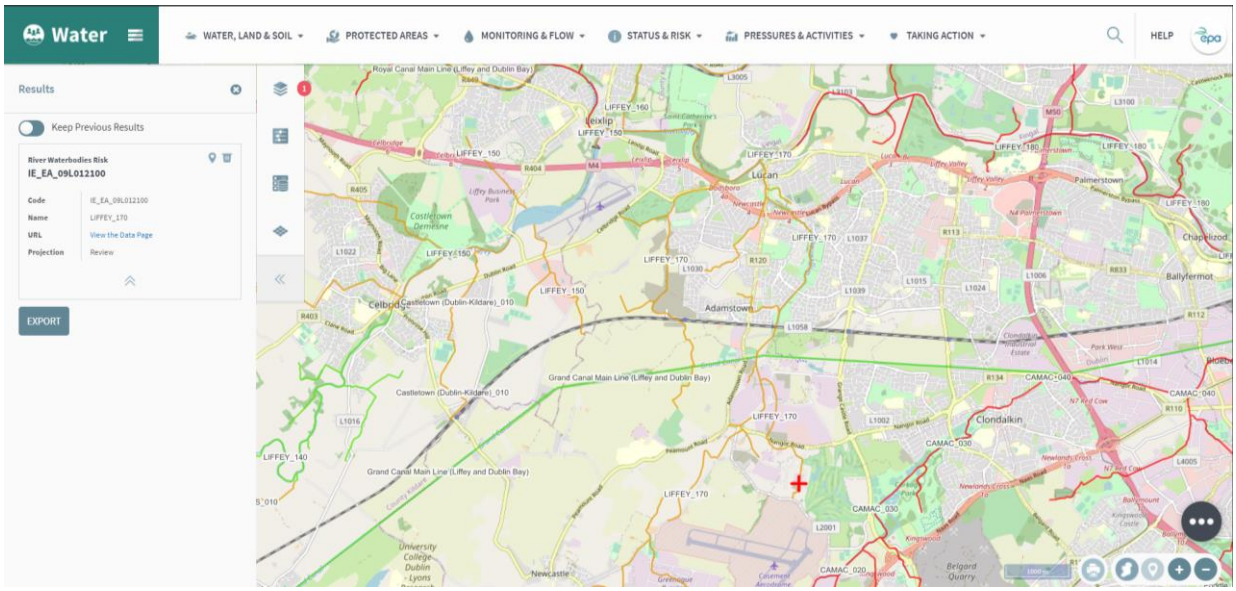

Table 9-1: Waterbodies (within 2km radius) and the Proposed Development Site

Catchment (Catchment ID)	WFD Sub-catchment (Sub catchment ID)	River Network EPA Name (Eden Code)	River Waterbody WFD Status 2013 – 2018 (River Name & Code)	River Waterbody WFD Risk (3rd Cycle) 2020-2027
Liffey and Dublin Bay (9)	Liffey_SC_090 (09_15)	Baldonnell Stream (09B09)	Good Liffey_170 (IE_EA_09L012100)	Under Review
		Camac (09C02)	Poor Camac_030 (IE_EA_09C020310)	At Risk

The EIAR study area comprises of approximately 2 ha and has a few surface water features in the region of the site. The study area includes the grid connection. The main regional surface water features include the following:

- Griffeen River (located approximately 1km northwest of the development); and
- Liffey River (located approximately 4.5km north of the development).

This catchment includes the area drained by the River Liffey and by all streams entering tidal water between Sea Mount and Sorrento Point, Co. Dublin, draining a total area of 1,616km^2. The largest urban centre in the catchment is Dublin City. The other main urban centres are Dun Laoghaire, Lucan, Clonee, Dunboyne, Leixlip, Maynooth, Kilcock, Celbridge, Newcastle, Rathcoole, Clane, Kill, Sallins, Johnstown, Naas, Newbridge, Athgarvan, Kilcullen and Blessington. The total population of the catchment is approximately 1,255,000.

The River Liffey rises on the western slopes of Tonduff in the Wicklow Mountains, from where it flows west, before being joined by the Brittas River from the north and then flowing into the northern end of Pollaphuca Reservoir (created by the ESB in the 1930s). The Liffey flows out of the reservoir through the Pollaphuca generating station and into the lower reservoir and generating station at Golden Falls. The Liffey then flows west though Kilcullen before flowing through Newbridge, then past Sallins and Clane, after which it is joined by the Morell from the south.

The Liffey continues through Celbridge to Leixlip, before which it flows into Leixlip reservoir and generating station. The Liffey then enters a steep-sided valley, through which it flows past Islandbridge, where the river becomes tidal, and through the centre of Dublin City.

9.2.3.2 Surface Water Features & Drainage within the Site Boundary

The proposed development consists primarily of commercial land, mostly comprised of artificial surfaces made up of industrial, commercial and transport units.

The Baldonnell Stream (IE_EA_09L012100) is located within the site boundary. The EPA maps show the stream to run through the central portion of the proposed development in a north-south orientation. The Baldonnell Stream joins the Griffeen River (IE_EA_09L012100) approximately 1.3km downstream from the proposed development. The Griffeen River then joins the Liffey River (IE_EA_09L012350) at Lucan, located 4.8km north of and downstream from the proposed development.

The neighbouring data centre site has diverted the upstream section of Baldonnell Stream where it has been culverted under their site before it enters a 'V-Shaped' channel within the proposed development. The diverted stream enters the proposed development at the south-eastern corner, where it continues to flow northwards along the 'V-shaped' channel which has steep grassy banks up to 3m in height. The Baldonnell Stream follows the development site's eastern boundary before it is culverted beneath the existing road through a concrete circular culvert measuring approximately 1m in diameter. The Baldonnell Stream is 0.3 to 0.6m in width, with water depths averaging at 0.2m in the winter period, the stream flow was mostly gentle, and the substrate varied from clayey cobbles to silt.

Minor surface water ponding occurs on the site. The surface water ponding is considered to be seasonal and mainly associated with periods of heavy, prolonged and intense rainfall. The

ponding forms as a result of acceptance of drainage from the adjacent site and of natural attenuation of rain. The ponding has minor connectivity with the Baldonnell Stream (Liffey_170, IE_EA_09L012100) through the small drainage pipe located at the south-eastern corner of the proposed site.

9.2.3.3 Flood Risk Assessment

TOBIN Consulting Engineers were appointed by Greener Ideas Limited to undertake a Flood Risk Assessment (FRA) for the construction of a new 110kV substation at Profile Park, West Dublin. The Flood Risk Assessment is provided in Appendix 9-1.

The Planning System and Flood Risk Management (PSFRM) Guidelines (OPW/DoEHLG, 2009) classify substations as essential infrastructure, and "highly vulnerable" in terms of their sensitivity to flooding. The proposed development was assessed for suitability through the PSFRM Justification Test.

Pluvial Flooding:

Pluvial flood risk has not been noted by existing flood mapping.

Groundwater Flooding:

There is no evidence to suggest groundwater as a potential source of flood risk to the proposed development site.

Coastal/Tidal Flooding:

The site is not at risk of coastal flooding due to its elevation and distance inland.

Fluvial Flooding:

The Baldonnell Stream, a tributary of the Griffeen River, is located east of the proposed substation and adjacent to the approved power plant. Previous flood studies in the area (CFRAM and PFRA) modelled the Griffeen and Camac Rivers, however the Baldonnell Stream was not explicitly modelled. CFRAM modelling of the area shows the site as liable to fluvial flooding, without accounting for the conveyance capacity of the Baldonnell Stream.

To quantify the risk of fluvial flooding from the Baldonnell Stream, a site-specific hydraulic model was prepared. Based on the results of this model, it is estimated that the Baldonnell Stream will not burst its banks under existing flow conditions; however, the subject site may be impacted due to climate change (0.1% AEP High End Future Scenario).

Proposed site regrading (proposed elevations ≥74.80mOD) provide more than 0.80m freeboard above the predicted 0.1% AEP HEFS flood level, removing the proposed development from the future floodplain.

The adjacent power plant, granted planning permission, also proposed raising ground levels to 74.80mOD or higher, which in turn, will sever the flow path of flood waters from the Baldonnell Stream to the site of the proposed substation. In this scenario, the need for compensation storage is eliminated as flood waters from the Baldonnell Stream will be unable to encroach the subject site.

Based on the result of site-specific modelling, and a detailed assessment of existing flood mapping, it is predicted that the development will have an imperceptible impact on flood risk upstream/downstream of the subject site, and that the risk of fluvial flooding associated with the development will be minimal. The development satisfies the criteria of the PSFRM's Justification Test.

9.2.3.4 Assessment of Hydrometric Data

The natural surface water drainage pattern in the environs of the proposed development site is shown in Figure 9-1.

It was noted that there were no hydrometric stations located in the immediate environs of the proposed development site. Although hydrometric stations do exist on watercourses downstream of the development, they include flows coming from a number of different tributaries. As such, they are not representative of the actual flows occurring at the site.

9.2.3.5 Surface Water Pressures within the Site

There are currently no known surface water abstractions from the streams adjacent to the site and the EPA has identified no river abstraction pressures upstream or downstream of the site.

The EPA (www.catchment.ie accessed in April 2023) has identified the Baldonnell Stream (Liffey_170, IE_EA_09L012100) to be under significant pressures at risk of not meeting their water quality objectives under the Water Framework Directive, namely from urban run-off and urban wastewater.

9.2.3.5.1 Cable Route

The electrical generator associated with each gas engine will connect to a main transformer where the voltage will be increased to 110 kV. Electrical power will then be exported via an underground cable from the plant's main transformer to an offsite electrical substation.

The proposed grid connection will consist of underground cabling (UGC).

The underground cable route exits the proposed Baldonnell 110kV Substation from the northside fence and heads in a westerly direction. The route follows the private road (Falcon Avenue) west for approximately 250m until it reaches the entrance to Barnakyle 110kV Substation. The cable then turns south to enter the Barnakyle substation through existing ducts. This section of the route is almost entirely within the road except for the crossover into the substation.

A site layout of the proposed Baldonnell 110kV substation and associated grid connection is provided under Figure 3-1 of Chapter 3 of this EIAR.

The UGC works will consist of the installation of 6 No. ducts in an excavated trench to accommodate 3 No. power cables, 2 No. fibre communications cable to allow communications between the Baldonnell and ESB Barnakyle 110kV Substation and one earth continuity conductor (ECC).

There are no drainage/ stream crossings identified from aerial and GSI mapping. Further details of the cable crossings, and the proposed methodologies, are provided in Chapter 3 of this EIAR (Description of Development). No instream works are proposed for the cable works.

The specification for cables and cable installation will be in accordance with EirGrid requirements and within the parameters assessed in this EIAR.

9.2.3.6 Surface Water Quality

Environmental Protection Agency Records:

The Environmental Protection Agency (EPA) regularly monitors water bodies in Ireland as part of their remit under the Water Framework Directive (WFD) (2000/60/EC), which requires that rivers are maintained or restored to good/ favourable status. The quality of watercourses is assessed in terms of 4 No. quality classes; 'unpolluted' (Class A), 'slightly polluted' (Class B), 'moderately polluted' (Class C) and 'seriously polluted' (Class D). These water quality classes, and the water quality monitoring programme are described in the EPA publication 'Water Quality in Ireland, 2003'. The water quality assessments are largely based on biological surveys. Biological Quality Ratings or Biotic Indices (Q values) ranging from Q1 to Q5 are defined as part of the biological river quality classification system. The relationship of these indices to the water quality classes defined above, are set out in Table 9-2 below.

Table 9-2: Relationship between Biotic Indices and Water Quality Classes

Biotic Index	Quality Status	Quality Class
Q5, 4-5, 4	Unpolluted	Class A
Q3-4	Slightly Polluted	Class B
Q3, 2-3	Moderately Polluted	Class C
Q2, 1-2, 1	Seriously Polluted	Class D

No monitoring locations were recorded on the Baldonnell Stream within or upgradient of the site due to the limited stream size. However, samples were recorded downgradient of the site boundary c. 3.9 km and c. 4.8km on the Griffeen River (RS09G010500 and RS09G010600 respectively) which feeds into the River Liffey (RS09L012100) at Lucan. The locations of the biological quality stations are included in Table 9-3 and Figure 9-2 below.

Table 9-3: Relationship between Biotic Indices and Water Quality Classes (Sourced from EPA Maps/ Water, accessed in February 2021)

Location	Griffeen – First Bridge E. of Milltown	Griffeen – Esker Br	Griffeen - In Lucan Village (Gauging Station)	Lucan Br
Distance from site boundary	1.2 km	3.9 km	4.8 km	5.1 km
Up or down gradient	Upgradient	Downgradient	Downgradient	Downgradient
River Waterbody Name	Liffey_170	Liffey_170	Liffey_170	Liffey_170
River Waterbody Code	IE_EA_09L012100	IE_EA_09L012100	IE_EA_09L012100	IE_EA_09L012100
Segment Code	09_1079	09_1120	09_242	09_916
Station Code	RS09G010200	RS09G010500	RS09G010600	RS09L012100
2019	-	-	Q3, Poor (Operational)	Q3-4, Moderate (Operational)
1991	Q3, Poor (PreWFD)	Q3, Poor (PreWFD)	-	-

The majority of EPA monitoring points indicate that the overall water quality in this area is moderately polluted. The overall status of surface water/rivers in the vicinity of the proposed site is deemed poor. This classification is based on a medium macroinvertebrate value (Q-Value) according to www.wfdireland.ie.

The EPA has assigned WFD River Waterbody Approved Risks to a number of waterbodies. The WFD Status (2013-2018) of Liffey_0170 is good. The Baldonnell Stream within the site, feeding into the River Liffey (_170) is currently 'under review' within the WFD Risk 3rd cycle. River Liffey (_170) was 'at risk' according to (2010-2015) 2nd WFD assessment cycle, with significant pressures including urban wastewater and runoff.

9.2.4 Hydrogeology/Groundwater

The information provided herein relates to the hydrogeology or groundwater environment. It is provided to give context to the groundwater characteristics and flow patterns within and adjacent to the proposed project site.

9.2.4.1 Existing Groundwater Quality

The study area lies within the following groundwater waterbody (GWB), Dublin (IE_EA_G_008). The Water Framework Directive (www.wfdireland.ie) for the period 2013-2018 describes the groundwater quality status as 'Good' for Dublin GWB. These classifications are based on an assessment of the point and diffuse sources in the area that may affect the groundwater quality.

9.2.4.2 Aquifer Potential and Characteristics

Reference to the National Aquifer Map prepared by the GSI (www.GSI.ie) indicates that there is one type of Bedrock Aquifer underlying the proposed site. The bedrock aquifer is a Locally Important aquifer which is moderately productive in local zones (Ll).

The subsoil deposits overlying the bedrock are not considered to be of sufficient lateral extent, depth or permeability to represent an aquifer body and are mainly comprised of low permeability limestone till. Summarised below in Table 9-4 are the aquifer characteristics of the underlying aquifer.

Table 9-4: Bedrock Aquifer Classification and Characteristics

Aquifer Classification	Permeability/Flow Mechanism	Bedrock	Karst Features
Locally Important (Ll)	Productive only in Local Zones	Dark limestone and shale underlying the entire site	No

No significant dissolution features (i.e., karst) were observed from visual appraisal of the proposed site and no karst features are recorded within the GSI Karst Database of Ireland within a 2km radius of the proposed development site.

9.2.4.3 Groundwater Vulnerability

Groundwater vulnerability represents the intrinsic geological and hydrogeological characteristics that determine how easily groundwater may be contaminated by activities at the surface. Vulnerability depends on the quantity of contaminants that can reach the groundwater, the time taken by water to infiltrate to the water table, and the attenuating capacity of the geological deposits through which the water travels.

These factors are controlled by the types of subsoils that overlie the groundwater, the way in which the contaminants recharge the geological deposits (whether point or diffuse), and the unsaturated thickness of geological deposits from the point of contaminant discharge. The groundwater vulnerability throughout the proposed site is at H (High).

9.2.4.4 Groundwater Usage

According to South Dublin County Council and Irish Water, no public water scheme (PWS) is present within a 2km radius of the site. No groundwater abstractions were identified within 5km from the site (as shown in Figure 9-1 'Regional Surface Water Features/Catchment Delineation').

According to the GSI database, there are no recorded wells within the proposed development study area. According to the GSI well data, there are no known water supply wells within1 km of the proposed development.

9.2.4.5 Groundwater Flow

On a regional scale, the groundwater flow direction is generally a subdued reflection of surface water drainage. Therefore, on a regional scale, the groundwater flow direction is considered to be toward the surrounding tributaries, which feed into the River Liffey to north of the proposed development. Local and regional groundwater flow is generally northwards with local groundwater flow discharging to the local streams i.e., Baldonnell Stream feeds into the River Liffey.

9.3 POTENTIAL EFFECTS

9.3.1 Introduction

This section addresses the potential effects on the hydrological and hydrogeological environment as a result of the development of the proposed development site. The potential effects may comprise direct and indirect effects on the quality of surface waters and groundwater. Thus, the hydrological and hydrogeological assessment identified water sensitive receptors located within the proposed site area and downstream from the proposed infrastructure works.

Annex III of the amended EIA Directive uses the following criteria to consider such effects:

- the magnitude and spatial extent of the effect (for example geographical area and size of the population likely to be affected);
- the nature of the effect;
- the transboundary nature of the effect;
- the intensity and complexity of the effect;
- the probability of the effect;
- the expected onset, duration, frequency, and reversibility of the effect;
- the cumulation of the effect with the effect of other existing and/or approved projects; and
- the possibility of effectively reducing the effect.

The current proposals for all construction activities and operational infrastructure were reviewed to identify activities likely to effect upon identified water bodies including relevant water courses within and remote from the site. Following the identification of sensitive water receptors and potential effects to the water environment at the development stage, the extent and severity of potential construction, operational, decommissioning and cumulative effects were evaluated, taking into account all proposed control measures included in the project design.

9.3.1.1 Sensitivity of Receptors

The sensitivity of an environmental receptor is based on its ability to absorb an effect without perceptible change. The hydrological environment is considered to be of low sensitivity for

receptors draining to the Liffey River via hydrological links. The EPA has found the water quality in the receiving waters to be poor (Q3).

9.3.2 Do Nothing Scenario

If the development does not proceed, the proposed development site and surrounding areas would remain as they currently are (i.e., artificial surfaces made up of industrial, commercial and transport units). The site would fall under the industrial management at Profile Park. This would result in no effect to the existing hydrological and hydrogeological conditions in the area.

9.3.3 Worst Case Scenario

Localised and short-term contamination of surface water streams could occur during the construction and operational phases, which in turn could affect the ecology and quality of the downstream water bodies of the Liffey River. Also, there is the potential for localised groundwater contamination to occur. However, good environmental practice will be observed on-site and mitigation measures, as outlined in Section 9.6, will be put in place to prevent this from happening.

9.3.4 Construction Phase

9.3.4.1 Construction Activities

The construction phase of the development will involve the following key activities that could have potential impacts on surface water and groundwater conditions:

- Earthworks related to:
    - Construction of temporary and permanent infrastructure on site, including foundations, hardstands, fuel/oil bunds, site access, substation, construction compounds, and all associated onsite infrastructure;
    - Laying of underground electrical cabling, both within the proposed development site, and as part of the route to the off-site electrical substation; and
    - Stockpiling material.
- Handling and storage of hydrocarbons, concrete, urea, and other potential water pollutants.

A CEMP (Appendix 3-2 of the EIAR) was developed for the project to ensure adequate protection of the water environment. The construction of the temporary site compounds, site access, substation infrastructure foundations, bunds, hardstands, laying of underground electrical cabling and drainage channels will involve the removal of vegetation, the excavation of mineral subsoil and rock. Exposed and disturbed ground may increase the risk of erosion and subsequent sediment laden surface water runoff. The release of suspended solids is primarily a consequence of the physical disturbance of the ground during the construction phase, if not correctly compacted.

Incorrect site management of earthworks and excavations could, therefore, lead to loss of suspended solids to surface waters as a consequence of the following activities:

- Soil stripping, to construct the site access/ entrance, site compounds, substation infrastructure foundations, hardstands, fuel bunds within site, laying of underground cabling and substation;

- Run-off and erosion from soil stockpiles (prior to reinstatement/profiling/side casting).

9.3.4.2 Hydrology and Hydrogeological Impacts

Based on the construction phase activities outlined above, the potential hydrological and hydrogeological impacts can be summarised as follows:

- Surface water quality impacts;
- Surface water flow alterations; and
- Groundwater flow and quality impacts.

Hardstand areas and additional sealed surfaces could potentially reduce the infiltration capacity of the soils in areas where earthworks are undertaken and increase the rate and volume of direct surface runoff. Surface water control measures are incorporated into the design of the proposed development. The potential for an increase in runoff to streams is limited as surface water runoff will be controlled as part of the project design. Further detail is provided under Section 9.4 of this chapter.

Pre-mitigation, the potential construction impact will be an imperceptible neutral effect.

9.3.4.2.1 Pluvial Flooding

The Strategic Flood Risk Assessment (SFRA) does not indicate any pluvial flooding within the bounds of the proposed substation.

Surface water arising at developed areas of the site will be managed by a dedicated stormwater drainage system designed in accordance with Sustainable Drainage Systems (SuDS) principles, limiting discharge from the site to greenfield runoff rates.

It is estimated that the natural landscaping and topography of the site will provide safe exceedance flow paths and prevent surface water ponding, therefore minimising residual risks associated with an extreme flood event or a scenario where the stormwater drainage system becomes blocked.

On this basis, the proposed development is not at risk of pluvial flooding and there will be no cumulative effects on flood risk elsewhere, based on the Flood Risk Assessment. The proposed development will not significantly alter the drainage regime of the site. Therefore, no cumulative impacts on other projects are anticipated.

9.3.4.2.2 Fluvial Flooding

Based on the indicative flood mapping produced as part of the National PFRA Study, it is estimated that the proposed development is not at risk of fluvial flooding from watercourses in the area.

The landscaping and topography of the site also provides a natural overland flow path to convey water away from the essential infrastructure.

It is calculated that the stormwater management system proposed as part of the development will limit runoff from the site to greenfield runoff rates, therefore mitigating against an increase in flood risk elsewhere.

9.3.4.2.3 Groundwater Flooding

There is no evidence from Geological Survey Ireland mapping to suggest that groundwater is a potential source of flood risk to the proposed development site.

9.3.4.2.4 Coastal Flooding

Given the elevated nature of the proposed development site (72 mOD), there is no risk of coastal flooding.

Based on the results of the Flood Risk Assessment, it is estimated that the risk of flooding to the proposed development will be minimal, and that the development will not increase the risk of flooding elsewhere.

9.3.4.3 Earthworks (Removal of Vegetation Cover, Excavations and Stock Piling)

Construction phase activities of the proposed development will require earthworks resulting in the removal of vegetation cover and excavation of mineral subsoil and are detailed in the Description of the Proposed Development (Chapter 2). Potential sources of sediment laden water include:

- Drainage and seepage water resulting from infrastructure excavation;
- Stockpiled excavated material providing a point source of exposed sediment;
- Construction of the grid connection cable trench to substation resulting in entrainment of sediment from the excavations during construction; and
- Erosion of sediment from emplaced site drainage channels.

These activities can result in the release of suspended solids to surface watercourses, i.e., Baldonnell Stream, and could result in an increase in the suspended sediment load, leading to increased turbidity, which in turn could affect the water quality and fish stocks of downstream water bodies. Potential impacts are significant if not mitigated against. The pathways identified for construction earthworks are drainage and surface water discharge routes. The main receptors are downgradient rivers (Liffey) and associated dependent ecosystems.

The pre-mitigation impact is indirect, negative, significant, temporary and of a medium probability impact.

The main drainage channel will be diverted around the boundary of the site. Drainage width, side slopes and substrate will be replicated in the proposed drainage channels. Where existing drains need to be rerouted/reprofiled, the original bed material will be reused. The sizing of any new internal drainage crossings will maintain existing depth of flow and channel characteristics. Where required, culverts will be buried at an appropriate depth below the channel bed.

9.3.4.4 Cable Route

The excavations for cable route trenches may have a direct permanent impact on the exposed soils and rock in the form of increased erosion and sediment release that, without mitigation, could also have additional impacts on water quality (due to sedimentation of water courses).

Any excavations for the cable route will expose bare soil for a temporary period over a short section of the trench.

The trench will be backfilled immediately following the installation of each section of cabling. While the trench is open, there will be a potential impact to the adjacent watercourse of an increase in the concentration of suspended solids.

There are no significant watercourse crossings on the proposed grid connection route. The pre-mitigation impact of the Grid Route is considered as slight, brief and unlikely to impact due to the immediate backfilling following cable installation.

9.3.5 Operational Phase

Surface water arising at the site will be managed by a dedicated stormwater drainage system designed in accordance with SuDS, limiting discharge from the site to greenfield runoff rates. On this basis, it is predicted that the development of the site will not increase the risk of flooding elsewhere in the catchment.

The landscaping and topography of the site will provide safe exceedance flow paths and prevent surface water ponding to minimise residual risks associated with extreme flooding or blockage of the stormwater drainage system.

It is therefore estimated that the risk of pluvial flooding associated with the proposed development is minimal.

Groundwater Flooding:

There is no evidence to suggest groundwater as a potential source of flood risk to the proposed development site.

Coastal/Tidal Flooding:

The site is not at risk of coastal flooding due to its elevation and distance inland.

To quantify the risk of fluvial flooding from the Baldonnell Stream, a site-specific hydraulic model was prepared. Based on the results of this model, it is estimated that the Baldonnell Stream will not burst its banks under existing flow conditions; however, the subject site may be impacted due to climate change (0.1% AEP High End Future Scenario).

Proposed site regrading (proposed elevations ≥74.80mOD) provide more than 0.80m freeboard above the predicted 0.1% AEP HEFS flood level, removing the proposed development from the future floodplain.

The adjacent power plant, granted planning permission, also proposed raising ground levels to 74.80mOD or higher, which in turn, will sever the flow path of flood waters from the Baldonnell Stream to the site of the proposed substation. In this scenario, the need for compensation

storage is eliminated as flood waters from the Baldonnell Stream will be unable to encroach the subject site.

Using current ground elevations at both the approved power plant and proposed substation, the 0.1% AEP HEFS event from the Baldonnell Stream is expected to inundate a small portion of the subject site. Using the modelled design level of 73.85mOD, approximately 42.3m^3 of water will be displaced by the development. Using the CFRAM 0.1% AEP HEFS extents and by analysing the local topography, a more conservative design level of 74.00mOD was achieved and would displace approximately 117.20m^3. With an additional 231m^3 of floodplain storage available at the approved power plant, and severance of a flow path from the Baldonnell Stream, no additional compensatory measures need to be implemented.

Based on the result of site-specific modelling, and a detailed assessment of existing flood mapping, it is predicted that the development will have an imperceptible impact on flood risk upstream/downstream of the subject site, and that the risk of fluvial flooding associated with the development will be minimal.

The development satisfies the criteria of the PSFRM's Justification Test.

The greenfield runoff rate has been calculated based on the SuDS Manual C753 (CIRIA, 2015), South Dublin County Council's Development Plan, 2022-2028 and the non-statutory standards for SuDS (Defra, 2015). Details in relation to drainage and SuDS measures are included in the Engineering Services Report. With regard to water quality impacts, the main discharges occur as a result of surface water runoff (storm water) to the surface water environment during the operational phase. Surface water runoff will be generated from all surfaces within the facility that are exposed to rainwater or to which water is applied in order to clean. This includes all hardstanding surfaces, roofs, and other impermeable surfaces. Operational access will be required to the site for testing, maintenance and deliveries. There will be vehicles daily on the site at any given time. This may lead to occasional accidental emissions, in the form of oil, petrol or diesel leaks, which could cause localised contamination of site drainage/ surface water features, i.e., Baldonnell Stream. Due to the infrequent nature of visits, the risk of surface water pollution during operation is considered to be unlikely, not significant and short term.

The presence of site workers at the proposed development will lead to the generation of foul sewage from toilets and washing facilities. This foul sewage will be collected and discharged to the foul sewer network.

Due to the operational nature of the proposed site, the handling, containment, use and disposal of chemicals on site will be required at any given time leading to occasional accidental emissions of potentially polluting substances. This could cause localised contamination of site drainage/ surface water features, i.e., Baldonnell Stream.

Firefighting systems will be used during the operational phase of the proposed development. Mobile foam units will be used for immediate action against small local fires and the engine hall will be equipped with a number of powder and CO_2 extinguishers. Firefighting pump connected to the fire main will be operated on diesel. The risk to surface water pollution is considered to be likely and permanent.

The pre-mitigation impact is considered as significant, permanent and likely to impact on surface waters.

9.3.6 Decommissioning Phase

The proposed Baldonnell 110kV substation is expected to be operational in accordance with the adjacent gas fired power plant. The power plant is expected to be operational for at least 25 years. On cessation of activities, the plant will either be redeveloped as a power related facility, or the site will be redeveloped in an alternative form.

In the event that the substation is decommissioned, the following programme will be implemented:

- All plant equipment and machinery will be emptied, dismantled, and stored under appropriate conditions until it can be sold. If a buyer cannot be found, the material will be recycled or disposed of through licensed waste contractors and hauliers. If plant and machinery is required to be cleaned on site prior to removal, all necessary measures will be implemented to prevent the release of contaminants;
- All waste will be removed from the facility;
- The site and all associated buildings will be secured; and
- Waste will be recycled, wherever possible. Licensed waste contractors will control all waste movement, recycling, and disposal operations.

Decommissioning of the proposed development will involve the disassembly and removal of the development equipment and machinery. These impacts have been assessed similar to that of the Construction Phase and, therefore, the mitigation measures for the Construction Phase will also be implemented during decommissioning.

The pre-mitigation impact is considered as significant, long-term and likely to impact on surface waters.

9.3.6.1 Pre-mitigation Magnitude and Significance of Impact

The magnitude of an impact includes the timing, scale, size and duration of the potential impact. The magnitude criteria for hydrology/hydrogeology are defined as set out in Table 9-6 to 9-8 below.

Table 9-5: Pre-mitigation Magnitude and Significance of Hydrological/Hydrogeological Criteria – Construction

Criteria	Description	Duration and Frequency of Effects	Significance of Potential Effect
Runoff Regime	Potential localised increase in surface water runoff may be caused by impermeable areas on site. Impermeable areas may give rise to a slight increase in surface water flow locally but will not have a significant impact on the volumetric flow rate of downstream rivers. Diversion of existing channel.	Short term and rarely	Slight negative
Surface Water Quality	Sedimentation of drainage ditches and streams.	Temporary and occasional	Slight/moderate negative
Groundwater Levels	No change in groundwater is expected. No ZOCs or wells within 2km of proposed development.	Not applicable	Not significant
Groundwater Quality	Minor leaks or spills during the construction phase.	Short term and occasional	Not significant

Table 9-6: Pre-mitigation Magnitude and Significance of Hydrological/Hydrogeological Criteria – Operational

Criteria	Description	Duration and Frequency of Effects	Significance of Potential Effect
Runoff Regime	Increased surface runoff caused by impermeable areas on site may increase surface water flow locally but will not have a significant potential effect on the volumetric flow rate of downstream rivers. Site to be maintained at greenfield runoff rates.	Long term and rarely	Not significant
Surface Water Quality	Significant loss in water quality is expected in the form potentially polluting substances.	Short term and unlikely	Not significant
Groundwater Levels	No significant change in groundwater is expected.	Not applicable	Not significant
Groundwater Quality	Minor leaks or spills during the construction phase has the potential to affect groundwater quality	Long term and unlikely	Not significant

Table 9-7: Pre-mitigation Magnitude and Significance of Hydrological/Hydrogeological Criteria – Decommissioning

Criteria	Description	Duration and Frequency of Effects	Significance of Potential Effect
Runoff Regime	Potential localised increase in surface water runoff may be caused decommissioning activities on site. Impermeable areas may give rise to a slight increase in surface water flow locally but will not have a significant impact on the volumetric flow rate of downstream rivers.	Short term and rarely	Slight negative
Surface Water Quality	Sedimentation of drainage ditches and streams. Receptors include the onsite Baldonnell Stream.	Temporary and occasional	Slight/moderate negative
Groundwater Levels	No change in groundwater is expected. No ZOCs or wells within 2km of proposed development.	Not applicable	Not significant
Groundwater Quality	Minor leaks or spills during the decommissioning phase.	Short term and occasional	Not significant

9.4 MITIGATION MEASURES

As outlined in Chapter 3, Description of Development, the design of the proposed development has considered a range of best practice construction measures which will ensure avoidance and reduction of impacts throughout the construction, operational and decommissioning phases. Additional measures have been developed to mitigate the impacts identified in the preceding section.

9.4.1 Mitigation by Avoidance

In identifying and avoiding sensitive surface waters, the proposed development has implemented 'avoidance of impact' measures. Mitigation by avoidance is viewed as part of the 'Consideration of Alternatives' outlined in Chapter 5. Examples include moving the grid connection route away from Baldonnell Stream and locating fuel storage and construction compounds >50m from surface water streams.

9.4.2 Mitigation by Prevention and Reduction

Mitigation measures are outlined below and are considered as in-built to the design of the project. These mitigation measures are a combination of measures to comply with legislation and best practice construction methods to be implemented in order to prevent water (surface water and groundwater) pollution. Examples of these measures are the storage of potentially polluting materials in fully bunded tanks and controlling / reducing runoff from hardstand areas. Bund testing will be undertaken on a regular basis during the operation phase in accordance with BAT guidance.

9.4.3 Mitigation Measures – Construction Phase

In order to mitigate potential impacts during the construction phase, best practice construction methods will be implemented in order to prevent water (surface water and groundwater) pollution. A CEMP (Appendix 3-2 of the EIAR) was developed for the project to ensure adequate protection of the water environment. All personnel working on the project will be responsible for the environmental control of their work and will perform their duties in accordance with the requirements and procedures of the CEMP.

During the construction phase, all works associated with the construction of the development and associate grid connection to the substation will be undertaken in accordance with the guidance contained within CIRIA Document C741 'Environmental Good Practice on Site' (CIRIA, 2015). Any groundwater encountered will be managed and treated in accordance with CIRIA C750, 'Groundwater control: design and practice' (CIRIA, 2016).

All mitigation and management measures outlined hereunder will be incorporated into the CEMP (Appendix 3-2 of the EIAR). Mitigation measures are incorporated into the CEMP and will be incorporated into the specification for the Civil Engineering Works contract. The implementation of the Surface Water Management Plan will be overseen by a suitably qualified ecologist/engineer and will be regularly audited throughout the construction phase. The assigned ecologist/engineer will be required to stop works on site if he/she is of the opinion that a mitigation measure or corrective action is not being appropriately or effectively implemented.

Monitoring

It is recommended that local surface water features in the immediate vicinity of the site boundary are monitored pre-construction and during construction to take account of any variations in the quality of the local surface water and groundwater environment as a result of activities related to the proposed development. Monitoring of Baldonnell Stream (for water quality and turbidity) subject to Profile Park consent, will be undertaken pre-construction and during the construction period. A programme of inspection and maintenance will be designed, and dedicated construction personnel assigned to manage this programme. A checklist of the inspection and maintenance control measures will be developed, with records kept.

During the construction phase, field testing and laboratory analysis of a range of parameters will be undertaken at adjacent watercourses, specifically following heavy rainfall events (i.e., weekly, monthly and event based as appropriate).

9.4.3.1 Hardstanding

To minimise any impact on the underlying subsurface strata from material spillages, all oils and solvents used during construction will be stored within specially constructed dedicated bunded areas. Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area of the site, away from surface water gullies or drains. Spill kits and hydrocarbon absorbent packs will be stored in this area and operators will be fully trained in the use of this equipment. For certain vehicles which are less mobile, refuelling may need to occur elsewhere on site. A spill kit will be stored with the bowser and the person

operating the bowser will be trained in their use. When not in use this will be stored in the designated area of the construction compounds.

All construction waste will be sorted and stored in on-site skips, prior to removal by a licensed waste management contractor.

9.4.3.2 Concrete

Concrete is required for the construction of the development infrastructure foundations. After concrete is poured at a construction site, the chutes of ready mixed concrete trucks must be washed out to remove the remaining concrete before it hardens. Wash out of the main concrete bottle will not be permitted on site; wash out is restricted only to chute wash out of trucks, mixers and concrete pumps. Wash down and washout of the concrete transporting vehicles will take place at an appropriate facility offsite.

The best management practice objectives for concrete chute washout are to collect and retain all the concrete washout water and solids in leak proof containers or impermeable lined wash out pits, so that the wash material does not reach the soil surface and then migrate to surface waters or into the groundwater. The collected concrete washout water and solids will be emptied on a regular basis. Washout will be undertaken at the construction compounds.

9.4.3.3 Fuels and Chemicals

With regards to on-site storage and handling of potentially pollutant materials:

- Fuels and chemicals will be stored within bunded areas as appropriate to guard against potential accidental spills or leakages. The bund area will have a volume of at least 110 % of the volume of such materials stored;
- All on-site refuelling will be carried out by a trained competent operative;
- Mobile measures such as drip trays and fuel absorbent mats kept with all plant and bowsers and will be used as required during all refuelling operations;
- A spill kit will be stored with the bowser and the person operating the bowser will be trained in their use;
- All equipment and machinery will have regular checking for leakages and quality of performance, and will carry spill kits;
- Any servicing of vehicles will be confined to designated and suitably protected areas such as construction compounds; and
- Additional drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.

9.4.3.4 Erosion and Sediment Control

Runoff will be maintained at Greenfield (pre-development) runoff rates. The layout of the development has been designed to collect surface water runoff from hardstanding areas within the development and discharge to associated surface water attenuation adjacent to the proposed infrastructure. It will then be managed by gravity flow at Greenfield runoff rates.

Silt fences will be installed along the eastern boundary of the proposed development to ensure there is no runoff into Baldonnell Stream. Silt fences will be constructed using a permeable filter fabric (Hy-Tex Terrastop Premium silt fence or similar), which will be installed as per the

manufacturer's guidelines and will be maintained until vegetation on the disturbed ground has been re-established. Once installed, the silt fence will be inspected regularly (daily) during construction and more frequently (hourly) during heavy rainfall (i.e., if there is a yellow weather warning in place or if the rainfall is greater than 5mm in a 1-hour period).

Suspended solid (silt) removal features will be implemented in accordance with CIRIA C697 SuDS Manual, and CIRIA C648 Control of water pollution from linear construction projects.

9.4.3.4.1 Interceptor Drains

Interceptor drains/diversion ditches will be installed ahead of the main earthworks activities to minimise the effects of collected water on the stripped/exposed soils once earthworks commence. This drainage will integrate into the existing site drainage. These drainage ditches will be installed on the upgradient boundary of the areas affected by the foundation edge earthworks operations and installed ahead of the main foundation construction operations commencing. They will generally follow the natural flow of the ground. The interceptor drains will intercept any storm water surface run-off and collect it to the existing low points in the ground, allowing the clean water flows to be transferred independently through the works without mixing with the construction drainage.

9.4.3.4.2 Swales

Infrastructure drainage/swales are required to control run-off from the running surface to lower water levels in the subgrade, to control surface water and to carry this flow to outlet points. Swales will be installed in advance of the main construction phase and will provide additional storage of storm water where located along gradient.

Swales will be re-vegetated by hydro-seeding with indigenous seed mix as soon as is practicable following excavation. This will reduce the flow velocity, treat potential pollutants, increase filtration and silt retention.

All stockpiled material will be side cast, battered back and profiled to reduce rainfall erosion potential. The stockpiling of materials will be carefully supervised as per the mitigation measures listed in Section 8.5.1 within Chapter 8, Land, Soils and Geology.

A number of ephemeral drainage features (drains) are also present on site. These appear dry except during dry weather. Culverting of these will only take place during dry weather periods. Culverts will be designed to be of a size adequate to carry expected peak flows. Culverts will be installed to conform, wherever possible, to the natural slope and alignment of the drainage line. Where required, culverts will be buried at an appropriate depth below the channel bed and the original bed material placed at the bottom of the culvert. The sizing of any new internal drainage crossings will maintain existing depth of flow and channel characteristics.

9.4.3.5 Grid Connection Route

Excavated material will not be stockpiled or side-cast within 10m of a watercourse. Appropriate steps will be taken to prevent soil/dirt generated during the grid connection route works from being transported on the public road. Road sweeping vehicles will be used to ensure that the public road network remains free of soil/dirt from the location of the grid connection when required. This will reduce the potential for sedimentation of surface watercourses locally.

Further mitigation measures will be incorporated in the CEMP in Appendix 3-2 of the EIAR.

There will be no natural watercourse crossings along the grid connection route.

9.4.3.6 Major Accidents/Disasters

As part of the requirements of the new EIA Directive, the applicant is requested to consider the "Expected Significant Adverse Effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned." As such, this section describes the expected significant effects on the environment arising from the vulnerability of the proposed development to risks of major accidents and/or natural disasters which are relevant to the project.

Due to the limited quantities of fuel on site, and 110% bunded fuel storage and appropriate chemical storage, the potential for a significant spillage of hydrocarbons is negligible and does not give risk to a major accident or disaster. Notwithstanding the negligible risk of serious spillage, additional spillage protection measures are included in the mitigation measures for the proposed development. In the unlikely event of a minor spill, the spill will be collected at the dedicated refuelling hardstand area, with collection only to be completed by trained operatives, and with spill kits to be made readily available. Additional measures in relation to hydrocarbon or oil spills are further discussed in Section 9.6.4. and mitigation measures in relation to potential contaminants are outlined in Section 9.5.

Due to the nature of Profile Park being an urban environment, in the unlikely event of a fire, there is no significant additional fire risk due to the separation distances from any fuel sources such as hydrocarbons and chemicals. In the event of substation infrastructure fire, there is minimal potential for fire spread due to the proposed design (i.e., hardstand areas) and to the firefighting protection system in place, which is based on the National Fire Protection Association (NFPA) standards.

The volumes of hydrocarbons and chemical storage will be kept to a minimum (as required), subject to a COSHH (Control of Substances Hazardous to Health) assessment and in compliance with the requirements of REACH, i.e., European Communities Regulation 1907/2006 for the Regulation, Evaluation, Authorisation and Restriction of Chemicals. Operators will receive specific training on the handling, containment, use, and disposal of all hazardous substances on site.

Baldonnell Stream is located within the site boundary. There are no streams in close proximity to the substation location. There is, therefore, no risk of significant impact on the surface water from substation fire.

It can be concluded that the risk of major accidents associated with this development and hydrological/hydrogeological factors is very low and would not cause unusual, significant or adverse effects on the hydrological or hydrogeological environment during the construction, operational and decommissioning phases.

9.4.4 Mitigation Measures – Operational Phase

The following mitigation measures will be implemented during the operational stage.

9.4.4.1 Hardstanding

The operational team will carry out maintenance works such as servicing of the infrastructure, upkeep of access, any hardstand and sealed areas (i.e., foundations for development buildings,

car park, bunded structures), ensuring drainage system remains functional throughout the operation of the development.

Mitigation for the operational maintenance works include regular scheduled maintenance works, regular inspections of all project elements with any unscheduled repairs or maintenance arising to be undertaken.

The potential impact of hydrocarbon or oil spills during the operational phase of the development are limited by the size of the fuel tank of vehicles used on the site. Mitigation measures for the potential release of hydrocarbons or oil spills include:

- The plant and vehicles to attend site should be regularly inspected or at least prior to the scheduled site visit to be free from leaks and fit for purpose;
- Fuels stored on site will be minimised, any storage areas will be bunded appropriately for the fuel storage volume for the time period of the operation;
- Operational team to be competent and trained in an emergency plan for the operation phase to deal with accidental spillages; and
- Spill kits will be available to deal with accidental spillages.

9.4.4.2 Hydrocarbon Fuel/ Oils

All fuel will be stored in bunded areas. The bund capacity will be sufficient to accommodate 110% of the largest tank's maximum. The exception to this being double walled tanks equipped with leak detection, which do not require additional retention.

It is proposed to discharge all the surface water to the soakaway but when the flow of water within the pipe exceeds the infiltration rate, excess water will be directed to the existing surface water infrastructure on the power plant site. Further treatment will be provided through the detention basin under the car parking and a petrol interceptor before discharging to the stream.. Regular bund testing will be undertaken in accordance with BAT guidance.

In order to comply with CRU requirements, low sulphur diesel oil will be stored as a backup fuel. The tanks will be bunded in accordance with the requirements set out in the EPA publication, 'Storage and Transfer of Materials for Scheduled Activities' (2004), which states bunds are to contain 110% of the volume of the tank in the event of a tank rupture.

9.4.4.3 Drainage

9.4.4.3.1 Surface Water Drainage

Surface water runoff will be generated from all surfaces within the facility that are exposed to rainwater or to which water is applied in order to clean. This includes all hardstanding surfaces, roofs, and other impermeable surfaces. All surface water will be discharged to the ground.

The drainage design is indicated on Planning Application Drawings 11069-2210. Surface water drainage calculations informing the drainage design are provided.

9.4.4.3.2 Foul Wastewater Drainage

Domestic type wastewater effluent will be generated on site. An approximate volume of $1m^3$/day of domestic type wastewater was identified as the maximum domestic wastewater flow which may be generated on site. Wastewater will be pumped to an existing holding tank which will be maintained, monitored and emptied to a licensed facility.

The drainage design is indicated on Planning Application Drawings 11069-2210 and 11069-2240. Foul Wastewater drainage calculations informing the drainage design are provided.

9.4.4.3.3 Process Wastewaters

There will be no process wastewater generated from the development.

9.4.4.4 Chemical Storage

Operators will receive specific training on the handling, containment, use, and disposal requirements for all potentially polluting products on site. All chemicals stored on site will be subject to a COSHH (Control of Substances Hazardous to Health) assessment and in compliance with the requirements of REACH, i.e., European Communities Regulation 1907/2006 for the Regulation, Evaluation, Authorisation and Restriction of Chemicals. Chemicals will be managed in accordance with European Chemicals Agency's Guidance for Downstream Users (2014). Final selection of bulk chemicals will be subject to an assessment of trace elements to ensure that they are within acceptable limits. In addition to this:

- All potentially polluting substances, including waste, will be stored in designated areas, in appropriate UN approved containers within bunds, drip trays, or spill pallets, as deemed necessary;
- All containers and bunds will be inspected regularly to ensure they have not become damaged or degraded;
- Hazardous compressor cleaning products will be segregated in a locked cabinet with limited access to prevent misuse. This cabinet will be made of suitably fire rated material;
- All areas on site with potentially polluting substances will be hardstanding with drainage networks directing run-off to contained areas;
- Accidental spillages will be contained and cleaned immediately by suitably trained personnel;
- Spill equipment stocks will be stored at strategic locations around the site. Stocks will be subject to regular inventory checks. Incidents, accidents, and near-misses will be recorded on site and notified to the appropriate authorities in accordance with licence requirements; and
- An Emergency Incident Response Plan will be developed and implemented in consultation with the local emergency services. This plan will include emergency response contact details for site personnel and emergency services, maps and plans of the facility, emergency procedures, chemical inventories, and equipment lists.

9.4.4.5 Firefighting Systems and Controls

A dedicated private fire ring main and hydrants, will be installed as part of the adjacent power station, that will serve the proposed substation. They will comply with IS 391:2020 Fire mains for buildings - Installation, commissioning, maintenance, and testing. A minimum of seven hydrants are being provided on the site, three of which are within close proximity of the proposed substation and on a route accessible by fire appliances. The hydrants will comply with the requirements of BS 750:2012 Specification for underground fire hydrants and surface box frames and covers. All hydrants will be conspicuously marked in accordance with BS 3251:1976 Specification of indicator plates for fire hydrants and emergency water supplies. The hydrants will be located such that they are not less than 6m or more than 46m from a building, and the distance from a hydrant to a vehicle access roadway or hard standing for fire appliances is not more than 30m.

A water storage tank will be provided on the power station site to ensure the security of the water supply for operational and firefighting needs. The tank shall serve both the ring main and hydrants. The latest calculations as provided to Irish Water, indicate that the water tank shall have a dedicated firefighting water storage capacity of circa 545m3, which will provide water at a rate of 75L/minute for 90 minutes.

9.4.5 Decommissioning Phase

In the event that the facility is decommissioned, the following programme will be implemented:

- All plant equipment and machinery will be emptied, dismantled, and stored under appropriate conditions until it can be sold. If a buyer cannot be found, the material will be recycled or disposed of through licensed waste contractors and hauliers. If plant and machinery is required to be cleaned on site prior to removal, all necessary measures will be implemented to prevent the release of contaminants;
- All waste will be removed from the facility;
- The site and all associated buildings will be secured; and
- Waste will be recycled wherever possible. Licensed waste contractors will control all waste movement, recycling, and disposal operations.

Details of provisions to decommission and render safe or remove all materials, waste, ground, plant, or equipment contained on or in the site that may result in environmental pollution will be agreed with the Environmental Protection Agency as part of the Industrial Emissions Licensing process.

Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures in Section 9.4.3.

These impacts have therefore been assessed as similar to the construction phase. Mitigation measures for the construction phase will therefore also be implemented during decommissioning.

9.5 RESIDUAL EFFECTS

The potential residual impacts on the surrounding water quality, hydrology and existing drainage regime at the site are considered to be slight and temporary/short term in nature.

The construction timescale of activities within the site will be short-term in duration and, thereafter, the only activities occurring within the site will be associated with maintenance, such as maintaining the hardstanding and existing drains, ongoing maintenance, replacement of infrastructure and onsite infrastructure and monitoring during the operational phase. There are no significant long-term impacts.

The design of the proposed development has taken account of the potential impacts of the development and the risks to the surface water and groundwater environment. Measures have been developed to mitigate the potential effects on the water environment. These measures seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation. Residual impacts are outlined in Table 0-9 to Table 9-11 below.

Table 9-8: Magnitude and Significance of Hydrological Criteria – construction (residual impacts)

Criteria	Duration and Frequency of Effects	Significance of Potential Effect
Runoff Regime	Short term and rarely	Not significant
Surface Water Quality	Temporary and occasional	Not significant
Groundwater Levels	Short term and rarely	Not significant
Groundwater Quality	Short term and occasional	Not significant

Potential residual impacts from the construction phase of the proposed development on the hydrological and hydrogeological environment are considered to be negative, short term and not significant.

Table 9-9: Magnitude and Significance of Hydrological Criteria – operational (residual impacts)

Criteria	Duration and Frequency of Effects	Significance of Potential Effect
Runoff Regime	Long term and rarely	Not significant
Surface Water Quality	Long term and rarely	Not significant
Groundwater Levels	Long term and rarely	Not significant
Groundwater Quality	Long term and rarely	Not significant

Potential residual impacts from the operational phase of the proposed development on the hydrological and hydrogeological environment are considered to be negative, of an unlikely probability, long term and not significant.

Table 9-10: Magnitude and Significance of Hydrological Criteria – Decommissioning (residual impacts)

Criteria	Duration and Frequency of Effects	Significance of Potential Effect
Runoff Regime	Short term and rarely	Not significant
Surface Water Quality	Temporary and occasional	Not significant
Groundwater Levels	Short term and rarely	Imperceptible
Groundwater Quality	Short term and occasional	Imperceptible

The decommissioning phase would have an unlikely and imperceptible impact for the high sensitivity watercourses.

9.6 CUMULATIVE IMPACTS

In terms of the potential impacts of developments on downstream surface water bodies, the biggest risk is during the construction phase of the development as this is the phase when earthworks and excavations will be undertaken at the sites.

Potential hydrological cumulative impacts arising from the proposed development and proposed grid connection are also not expected to be significant, due to the planned placement of the cables either within the one trench along existing roads or under the fence to the adjacent site, thereby reducing overall excavation requirements. Also, no in-stream works are required along the grid connection route.

A review of chapter 6 of this EIAR and relevant planning applications in terms of the 1.8 km zone of influence radius surrounding the proposed development site. Due to the small scale of development and a review of other projects and plan, there are no significant cumulative impacts.

The approved power plant project has potential hydrological and hydrogeological connectivity between the downstream sites and the site of the proposed development, and therefore there can be potential cumulative effects or interaction with both the construction, operation, and decommissioning phases of the development.

SD20A/0121 Ancillary site development works will include attenuation ponds, the installation and connection to the underground foul and storm water drainage network, and the installation of utility ducts and cables, which will include the drilling and laying of ducts and cables under Baldonnell stream. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, service road, entrance gate, sprinkler tank house (72sq.m), security hut (30sq.m), 150 no. car parking spaces, and 78 no. sheltered bicycle parking spaces. The development will be enclosed with landscaping to all frontages, including a wetland to the west.

SD16A/0087 Site enabling works will include the demolition of an existing vacant house and outbuildings (total floor area c.241sq.m), the diversion of Baldonnell stream, and the provision of below ground attenuation and associated landscape works on a site of c.9.4ha, located north of the Nangor Road and west of Kilcarberry Business Park.

Implementation of the proposed drainage mitigation will ensure there will be no cumulative significant adverse impacts on the water environment from the proposed development in combination with other data centre developments and non-data centre farm developments within a 10km radius in the Liffey and Dublin Bay catchment.

9.7 CONCLUSIONS

The residual impacts on the surrounding water quality, hydrology, hydrogeology and existing drainage regime at the site are considered to be not significant and mainly short term in nature.

Detailed mitigation measures have been provided with regard to the design, construction, maintenance and decommissioning of the proposed development. The surface water drainage plan will be the principal means of significantly reducing sediment runoff arising from construction activities, and to control runoff rates. The key surface water control measure is that there will be no direct discharge of proposed development runoff into local watercourses.

In summary, the available information indicates that the proposed development presents no significant long-term impact on water quality, hydrology and hydrogeology, provided that the works are designed, constructed, maintained and decommissioned in accordance with the mitigation measures outlined in this chapter.

No significant cumulative impacts on any of the regional surface water catchments or groundwater bodies are anticipated from the proposed development and associated grid connection.

9.8 GLOSSARY

Aquifer A subsurface layer of layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater [Water Framework Directive (2000/60/EC)].

Hydraulic conductivity [m/d] is an expression of the rate of flow of a given fluid through unit area and thickness of the medium, under unit differential pressure at a given temperature. In subsoils, intergranular permeability dominates, whilst in rock, fissure permeability (via fractures and bedding discontinuities) dominates in limestone bedrock in Ireland.