HERBATA DATA CENTRE, NAAS

EIAR
VOLUME I MAIN TEXT – CHAPTER 7 WATER AND HYDROLOGY

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7 WATER AND HYDROLOGY

7.1 Introduction

This chapter of the EIAR assesses the potential impact of the Project on receiving water quality environment and Water Framework Directive (WFD) compliance. Existing water quality in the vicinity of the Project is established based on available water quality information and WFD monitoring programmes. The likely significant effects on water quality of the implementation of the Project are assessed and measures to reduce, avoid and prevent these likely significant effects are proposed, where they are necessary.

This assessment is based on the Project Description detailed in Chapter 4 and has been prepared at to identify potential water quality issues that may arise from the development and presents mitigation measures that will be implemented to address the potential impacts.

7.2 Methodology

Baseline water quality within the receiving environment has been established through review of national monitoring data used to establish water quality status in the context of the EU Water Framework Directive (WFD) and supporting environmental standards.

An assessment has then been made of the components of the development that have the potential to have a significant impact on water quality using criteria for rating significance and magnitude set out in the National Roads Authority (NRA) publication “Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes” (NRA, 2008).

The significance of impact on surface water quality likely to occur during the construction and operation phases of the development are determined using a predominantly qualitative methodology. The assessment is a consideration of a combination of receptor sensitivity (

Table **7.1**) and the potential magnitude of the impact on the water environment (Table 7.2), in order to determine significance (Table 7.3). The approach to assessing the significance of impacts comprises assigning each impact to one of the four categories of magnitude as outlined in Table 7.2 enables different components to be assessed based upon the same scale.

The significance determination and assessment of the potential likely environmental effects of each component of the Project has been made based on the matrix presented in Table 7.3 and in Table 7.4. To conclude the assessment, mitigation measures are proposed to reduce, avoid and prevent these likely significant effects, where appropriate. This enables a “with mitigation” assessment to be made of any residual impact as a result of the construction and operational phases of the Project and/or in combination with other existing or approved projects in the vicinity of the development.

Table 7.1: Criteria for Rating Receptor Sensitivity (NRA, 2008)

Value (Sensitivity)	Typical Descriptors
Extremely High	***Attribute has a high quality or value on an international scale.*** Examples: Examples: River, Wetland or surface water body ecosystem protected by EU legislation. I.e. designated under the Habitats, Birds, Shellfish, Bathing Water or Freshwater Fish, Drinking Water or Nitrate Directives.
Very High	***Attribute has a high quality or value on a regional or national scale.*** Examples: River, Wetland or surface water body ecosystem protected by national legislation (NHA status), Regional important potable water source supplying >2500 homes, nationally important amenity site for wide range of leisure activities, Quality Class A (Biotic Index Q4, Q5), Flood plain protecting more

	than 50 residential or commercial properties from flooding.
High	***Attribute has a high quality or value on a local scale.*** Examples: Salmon fishery, locally important potable water source supplying >1000 homes, Quality Class B (Biotic Index Q3-4), Flood plain protecting 5 to 50 residential or commercial properties from flooding, Locally important amenity site for wide range of leisure activities.
Medium	***Attribute has a medium quality or value on a local scale.*** Examples: Coarse fishery, Local potable water source supplying >50 homes, Quality Class C (Biotic Index Q3, Q2-3), Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	***Attribute has a low quality or value on a local scale.*** Examples: Locally important amenity site for small range of leisure activities, Local potable water source supplying <50 homes, Quality Class D (Biotic Index Q2, Q1), Flood plain protecting 1 residential or commercial property from flooding. Amenity site used by small numbers of local people.

Table 7.2: Criteria for Rating the Magnitude of Impact (NRA, 2008)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	Loss or extensive change to a water body or water dependent habitat.
		Increase in predicted peak flood level >100mm.
		Extensive loss of fishery
		Extensive reduction in amenity value
		Potential high risk of pollution to water body from routine run-off
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm
		Partial loss of fishery
		Potential medium risk of pollution to water body from routine run-off
		Partial reduction in amenity value
Minor Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm
		Minor loss of fishery
		Potential low risk of pollution to water body from routine run-off
		Slight reduction in amenity value
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level. Negligible loss of amenity value. Negligible loss of fishery

Table 7.3: Criteria for Rating the Significance of Environmental Impacts (NRA 2008)

Importance of Attribute	Magnitude of Impact			
	Negligible	Minor	Moderate	Large
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

Table 7.4: Defining Impact Significance (NRA, 2008)

	Attribute Importance				
	Extremely High	**Very High**	**High**	**Medium**	**Low**
Profound	Any permanent impact on attribute	Permanent impact on significant proportion of attribute			
Significant	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute		
Moderate	Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute	
Slight		Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute
Imperceptible			Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute

7.3 Characteristics of the Project

The characteristics of the Project are described in detail in Section 4.2. This chapter will consider these characteristics further in terms of the water environment.

7.4 Baseline

A desk-based assessment of surface water quality in the vicinity of the Project application area was conducted. The sources of the water quality information include:

- Water Framework Directive water body status information arising from the Water Framework Directive monitoring programme. Water Quality in Ireland Report 2013-2018 (2019) supported by water quality information available on the EPAs online Water Framework Directive Application (www.catchments.ie);
- Protected areas datasets including:

  - information on Nutrient Sensitive Areas as outlined in the EPA's most recent Urban Waste Water Treatment Report (2021); and
  - the existing Register of Protected Areas (under Article 6 of the Water Framework Directive) for water dependent habitats and species in the SAC and SPA networks held by the EPA.
- Water Quality in Ireland – An Indicators Report (2020);

For the purposes of monitoring and assessing the quality of surface waters, all rivers, lakes, coastal inter-basins, estuaries, and coastal waters (within 1 nautical mile of the shoreline) have been divided into management units called "water bodies". Under the Water Framework Directive (WFD) condition of each water body must be reported to the European Commission in the form of ecological status and chemical status. Ground water bodies are similarly delineated with status identified.

Surface water bodies are grouped into sub-catchments for the purposes of water management, of which there are 583 nationally, which are further grouped into catchment management units of which there are 46 based on the hydrometric areas used by public authorities.

7.4.1 Site Context

As illustrated in Figure 7.1, the Project is located within Liffey_SC_060 sub catchment. The Liffey_100 (IE_EA_09L011200) river water body runs parallel to the Project. The Bluebell Stream which runs along the southern boundary of the Project is part of the Liffey_100 river water body. The WFD status assigned to this river water body is representative of the Bluebell Stream, therefore the assessment of the potential impacts on the Bluebell Stream is based on the WFD Status assigned to this water body and the potential implication for the achievement of the environmental objectives of the Liffey_100 river water body. The Liffey_110 (IE_EA_09L011300) river water body is downstream of the Project.

Figure 7.2 shows the Project in the context of the wider surface water body environment. These river water bodies ultimately discharge into the Liffey Estuary Upper (IE_EA_090_0400).

The Project lies within the 'Naas' and the 'Curragh Gravels East' groundwater bodies (EA-G-027 and EA_G_017). These water bodies have remained at 'good' status since 2007 and achieved 'good' status during the most recent 2013-2018 WFD monitoring cycle for groundwater. All the waterbodies are grouped into the Liffey_SC_050 (09_7) and the Liffey_SC_060 (09_6) sub-catchments, are within the Liffey and Dublin Bay Catchment (Hydrometric Area 09) in the Irish River Basin District.

7.4.2 Baseline Environment

Directive 2000/60/EC establishing a framework for community action in the field of water policy (the Water Framework Directive), and its transposing regulations, establishes a legal framework for the protection, improvement and sustainable management of rivers, lakes, transitional waters (estuaries), coastal waters (to a distance of one nautical mile) and groundwater.

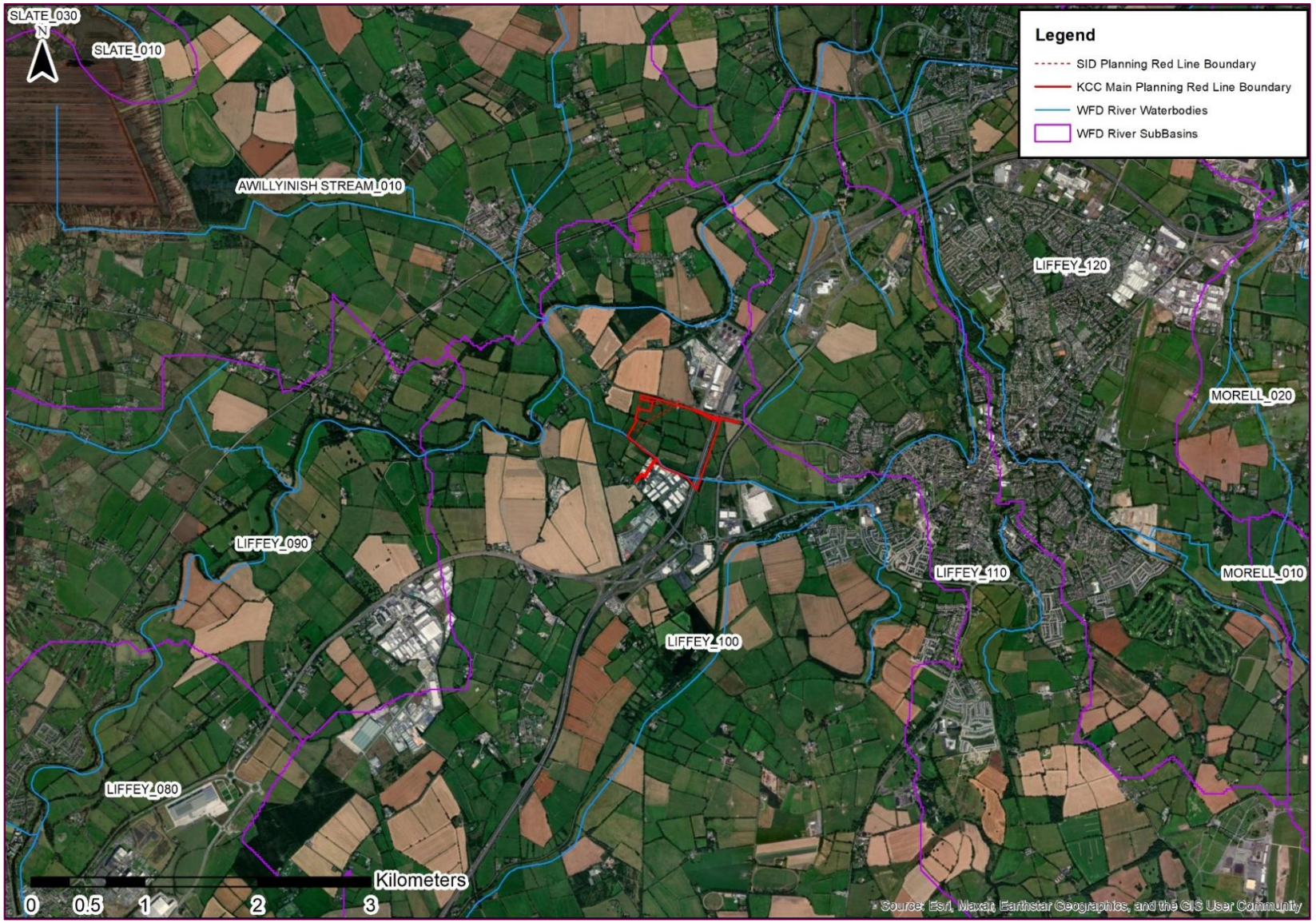


Figure 7.1: Site Location in the Context of the Water Framework Directive River Sub Basins

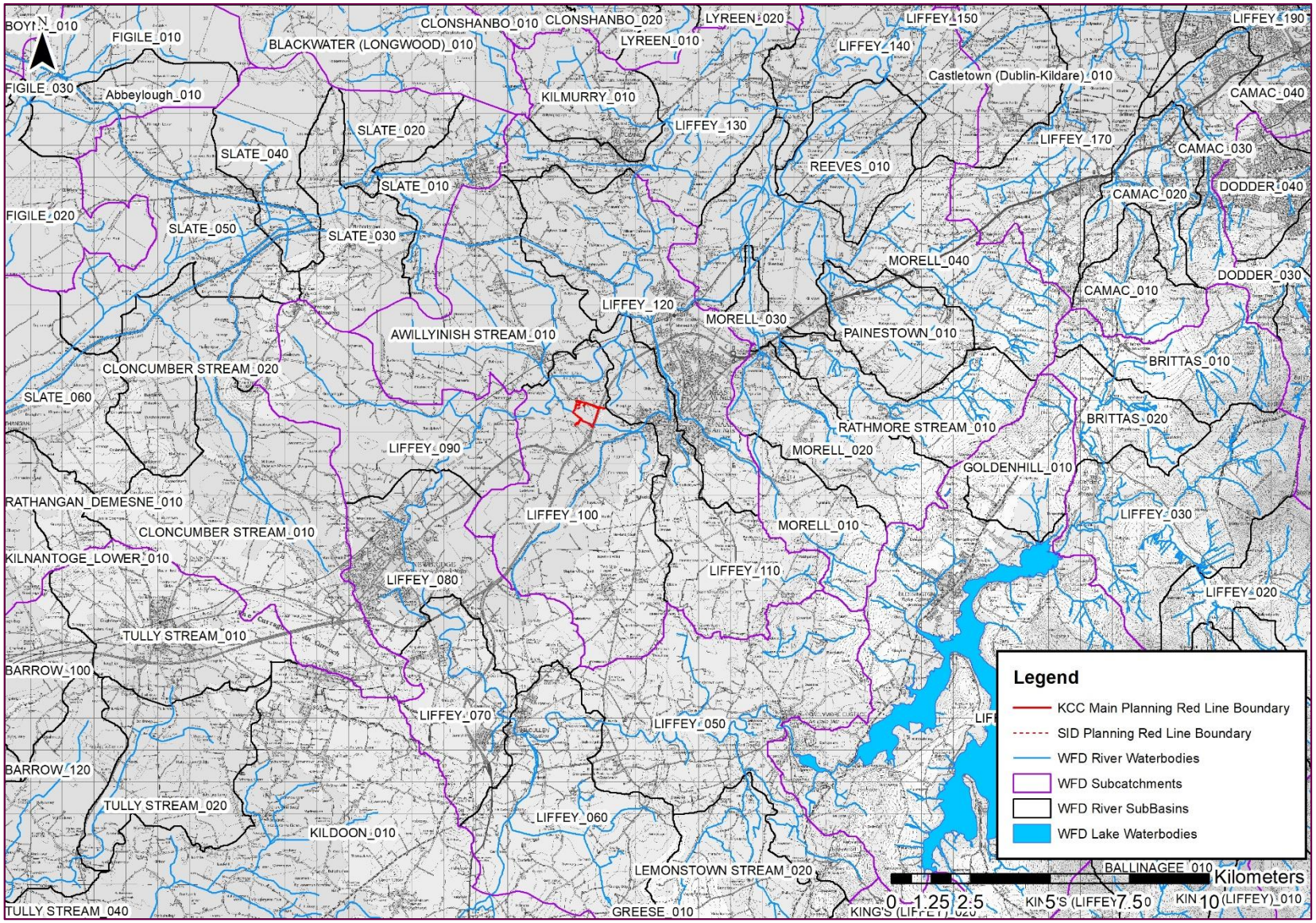


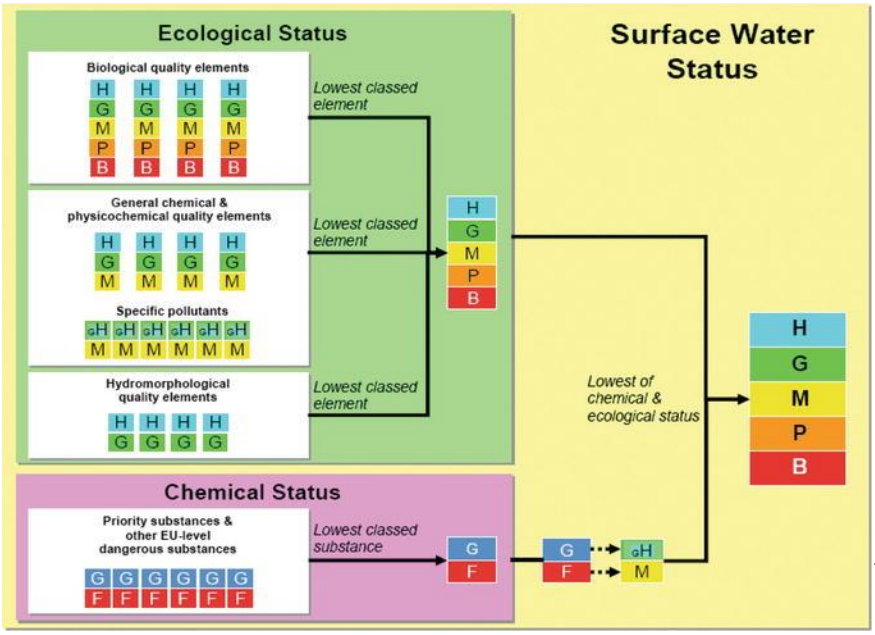
Figure 7.2: Site Location in the Context of the Wider Surface Water Environment

The fundamental objectives of the WFD are to maintain “high status” of surface waters where it exists, prevent deterioration in the existing status of waters, and achieve at least “good status” in relation to all waters by the end of the current river basin management cycle unless a water body is subject to an extended deadline under Article 4(7) of the Directive. A water body must achieve both good ‘ecological status’ and good ‘chemical status’ before it can be considered to be at good overall status.

An assessment of the risks to the achievement of these objectives for water bodies has been undertaken by the EPA through the extensive characterisation of water bodies and the key pressures acting upon them. This characterisation process allows the development of a programme of measures to aid the achievement of the WFD objectives.

A Programme of Measures (POMs) outlines the steps that will be taken to meet WFD objectives as applicable to each water body. This Programme is contained within an overarching River Basin Management Plan (RBMP). These measures will require implementation at strategic level but also at regional and local level through the establishment of Regional Integrated Catchment Management Programmes. Whilst none of the water bodies within the Project area have been included amongst those 527 prioritised areas for action in the current Draft River Basin Management Plan for Ireland 2022 - 2027 (DHPLG, 2022), it is noted that measures required to ensure compliance with existing legislation will be implemented during this river basin management cycle.

Environmental Quality Standards (EQSs) for classifying surface water status are established in the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (SI No. 272 of 2009), as amended. These regulations set standards for biological quality elements, physico-chemical conditions supporting biological elements (including general conditions and specific pollutants), priority substances and priority hazardous substances.



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As shown in Figure **7.3** the ‘ecological status’ of a water body is established according to compliance with the EQSs for biological quality elements, physico-chemical conditions supporting biological elements and relevant pollutants and hydromorphological quality elements. The ‘chemical status’ of a water body is established according to compliance with the EQSs for priority substances and priority hazardous substances.

In addition to achieving good ecological and chemical status, a water body must achieve compliance with standards and objectives specified for protected areas, which include areas designated by the Bathing Water Directive; the Urban Waste Water Treatment Directive; the Shellfish Waters Directive; the Habitats Directive and the Birds Directive. Waters bodies that are compliant with WFD standards, but that contain protected areas that are non-compliant with protected area standards are downgraded to ‘less than good’ status.

Based on monitoring information and data from 2016 to 2021, the current WFD status classification of river water bodies potentially affected by the Project is illustrated in .

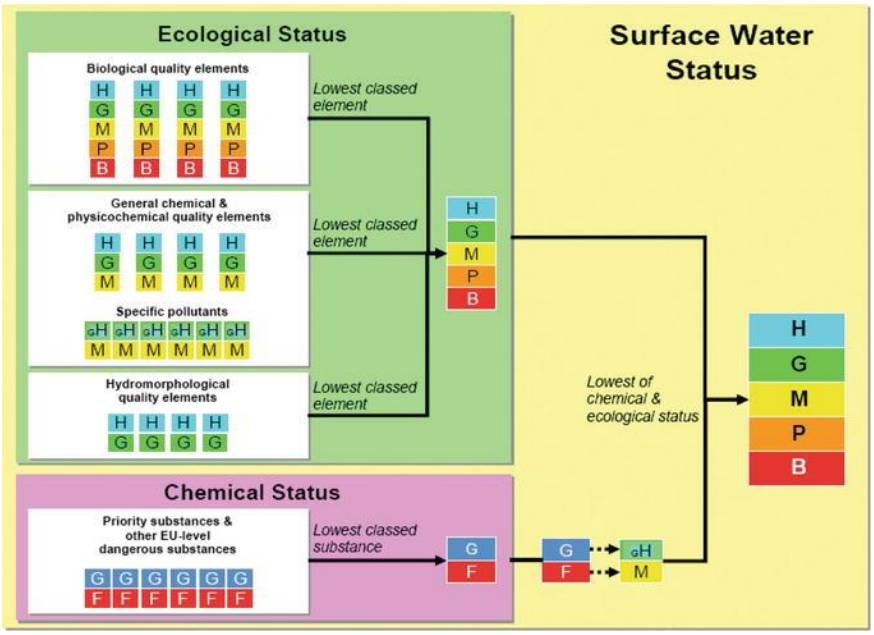

Figure 7.3: Elements of the Water Framework Directive Status

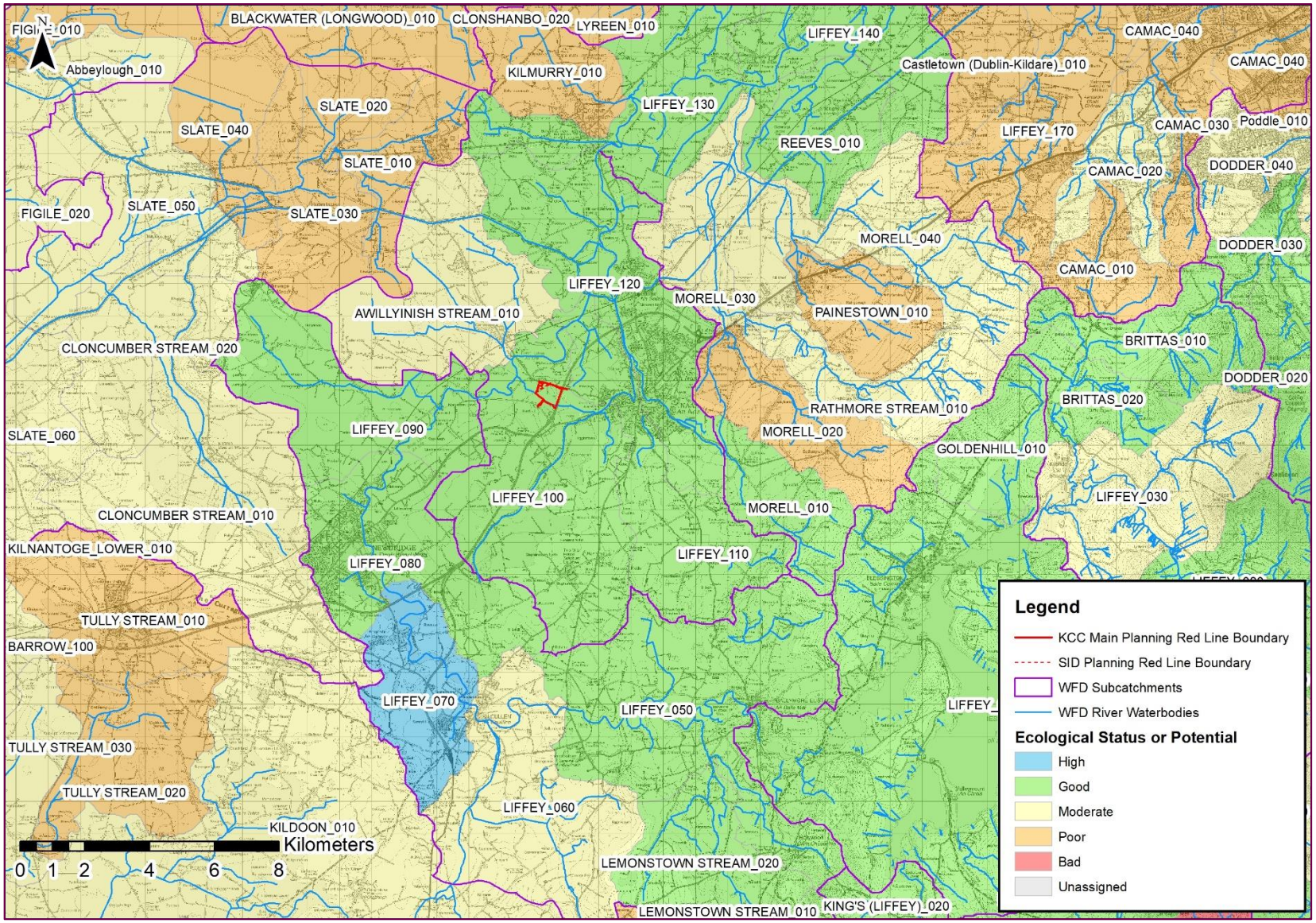

Figure 7.4: Water Framework Directive Water Body Status

The WFD status classification between 2007 and 2021 is shown in Table 7.5 for each of these water bodies. In summary, the Liffey_090 upstream was classified as “good” since 2007, while the Liffey_100, included the Bluebell Stream reach, and the downstream Liffey_110 have been reported as “moderate” status previously until the most recent classification of “good” status in 2016-2021.

Table 7.5: WFD Status (2007-2018)

WFD Status 2007-2021	***Liffey_090***	***Liffey_100***	***Liffey_110***
	09L011050	***09L011200***	***09L011300***
Overall WFD Water Quality Status (2007-2009)	Good	Moderate	Unassigned
Overall WFD Water Quality Status (2010-2012 - Interim)	Good	Moderate	Unassigned
Overall WFD Water Quality Status (2010-2015)	Good	Moderate	Unassigned
Overall WFD Water Quality Status (2013-2018)	Good	Moderate	Moderate
Overall WFD Water Quality Status (2016-2021)	Good	Good	Good

A further breakdown of the ecological and chemical elements for the 2016-2021 WFD cycles is shown in Table 7.6. The water body in the vicinity of the Project, the Liffey_100 which the Bluebell Stream is part of, has been classified at “moderate” Ecological Status since the 2007 monitoring period until most recently improving to “good” status. There was an improvement in both nitrogen and phosphorus conditions during the previous WFD cycles 2010-2015 to 2013-2018, while they remained unchanged in 2016-2021. Nitrogen conditions improved from “moderate” to “good” and phosphorus conditions from “good” to “high” during the 2010-2015 to 2013-2018 cycles. The Liffey_100 and the downstream Liffey_110 have been assigned “good” status after being previous assigned “moderate” during past monitoring periods.

This assessment of likely significant effects on water quality has been undertaken having regard to the necessity to comply with the WFD and in doing so ensuring that the Project does not prevent the achievement of the WFD objectives for these water bodies in subsequent RBMP cycles. The water quality assessment must therefore demonstrate that the development will not cause deterioration in the status of the affected water body or prevent the improvement in status, where necessary, under the environmental objectives of the WFD.

Table 7.6: WFD Status Breakdown (2016-2021)

WFD Status 2013-2018			***Liffey_090***	***Liffey_100***	***Liffey_110***
			09L011050	***09L011200***	***09L011300***
Ecological Status	*Biological Status*	*Phytoplankton Status*	*Not Available*	*Not Available*	*Not Available*
		Angiosperm Status	*Not Available*	*Not Available*	*Not Available*
		Invertebrate Status	*Good*	*Good*	*Not Available*
		Fish Status	*Not Available*	*Not Available*	*Not Available*
	Supporting Chemistry Conditions	*Oxygenation Conditions*	*Not Available*	*Pass*	*Pass*
		Nutrients Condition	*Not Available*	*Pass*	*Pass*
		Phosphorus conditions	*Not Available*	*High*	*High*
		Nitrogen conditions	*Not Available*	*Good*	*Good*
		Relevant Pollutants	*Not Available*	*Not Available*	*Not Available*
	Hydromorphological Quality Element	*Hydrology, Morphology, Continuity*	*Not Available*	*Not Available*	*Not Available*
	Ecological Status (2013 – 2018)		**Good**	**Good**	**Good**
Chemical Status	*Priority substances and other EU-level dangerous substances*		*Not Available*	*Not Available*	*Not Available*
	Chemical Status (2013 – 2018)		*Not Available*	*Not Available*	*Not Available*
Overall WFD Quality Status 2013 - 2018			***Good***	***Good***	***Good***

7.4.3 Protected Areas

A significant proportion of the area of the Liffey and Dublin Bay catchment is protected under existing EU legislation requiring special protection due to the sensitivity to pollution or particular environmental importance. All of the areas requiring special protection in the Irish River Basin District have been identified by EPA, mapped and listed in a national register of protected areas (required under Article 6 of the WFD Directive). The register of protected areas includes:

- Areas designated for the abstraction of water for human consumption (Drinking Water Protected Areas);
- Areas designated for the protection of economically significant aquatic species, i.e. Freshwater Fish and Shellfish;
- Bodies of water designated as recreational waters, including areas designated as bathing waters;
- Nutrient-sensitive areas, including areas identified as Nitrate Vulnerable Zones under the Nitrates Directive or areas designated as sensitive under Urban Waste Water Treatment Directive; as well as

- Areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection including relevant Natura 2000 sites (Special Protection Areas (SPAs); and candidate Special Areas of Conservation (cSACs).

These protected areas have their own monitoring and assessment requirements to determine their condition. They are often assessed for additional pollutants or requirements relevant to their designation.

7.4.3.1 Nutrient Sensitive Waters

The Urban Waste Water Treatment Regulations 2001, as amended (which transpose the Urban Wastewater Treatment Directive (91/271/EEC) into Irish law and update the Environmental Protection Agency Act, 1992 (Urban Waste Water Treatment) Regulations 1994, as amended) list nutrient sensitive waters in the Third Schedule. There are no nutrient sensitive areas in the sub catchment.

7.4.3.2 Natura 2000 Protected Areas

Natura 2000 is a European network of important ecological sites. The EU Habitats Directive (92/43/EEC) places an obligation on Member States of the EU to establish the Natura 2000 network. The network is made up of Special Protection Areas (SPAs), established under the EU Birds Directive (79/409/EEC), and cSACs, established under the Habitats Directive itself.

As illustrated in Figure 7.5 the Project activities within the development area will not be within any Natura 2000 site (i.e. SPA or cSAC). The development will therefore not have a direct impact on any Natura 2000 sites. However, there is the potential for water dependent protected areas downstream of the Project to be indirectly affected in the event of water pollution, in the absence of mitigation.

One of the main purposes of the water quality assessment is to ascertain whether the development will cause significant effects on the ecological status of the water bodies affected having regard to the environmental objectives for the water bodies, including conservation objectives for qualifying features of the downstream Natura 2000 network. It should also be noted that potential effects on Natura 2000 or “European” sites will be considered extensively in the appropriate assessment process which will be undertaken during the development consenting stage of the development.

7.4.3.3 Bathing Waters

The Bathing Water Directive (2006/7/EC) came into force in March 2006, and was transposed into Irish law by the Bathing Water Quality Regulations, 2008, as amended. The previous 1976 Directive was repealed with effect from 31 December 2014. Since 2014, the annual water quality classification (rating) of a beach or lake has been based on water quality results covering a four-year period rather than a single previous season’s data. Water quality at beaches and lakes is classified as Excellent; Good, Sufficient or Poor. There are no designated bathing waters in the catchment.

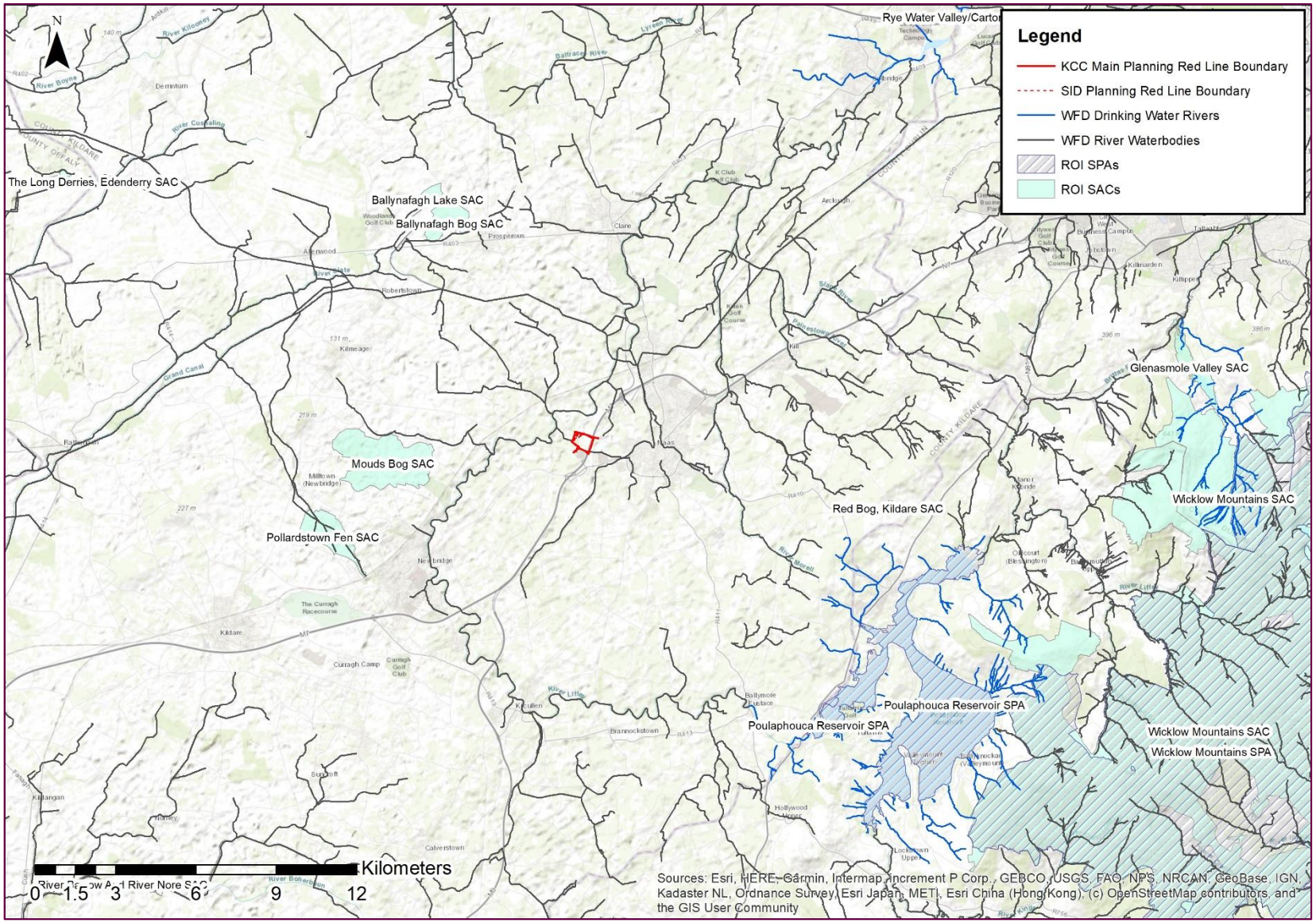

Figure 7.5: Natura 2000 Designated Sites

7.4.4 EPA Water Quality in 2020: An indicators Report

In 2021 the EPA published the Water Quality in 2020, An Indicators Report. The intention of the report is to keep decision makers and the public informed by providing timely, scientifically sound information on water quality using a series of water quality indicators. Of the ten indicators four relate to the river water bodies located in close proximity to the Project;

- River biological quality
- Nitrate in rivers,
- Phosphate in rivers,
- Oxygen demand in rivers.

In this water quality assessment consideration has been given to potential effects of the development on these environmental indicators.

7.4.4.1 River Quality

The assessment of macroinvertebrates is used to assess the general heath of rivers and general water quality. The health of macroinvertebrate communities is assessed using the Quality Rating System (Q-value). Rivers can then be classed (high/good/moderate/poor/bad ecological status based on these biological elements and supporting physico chemical and hydromorphological conditions) in respect to macroinvertebrate abundance and diversity. The quality is defined by the lowest class recorded. Table 7.6 above details the class recorded for the Liffey River segments.

7.4.4.2 Nitrate in Rivers

Nitrate concentration in rivers is a potential human health concern for drinking water and an indication of nutrient enrichment when present in rivers.

The assessment uses the three year average of the concentrations from each site and subsequently classes these amongst six different categories in respect to the outcome. Although there are no environmental quality standards set, average concentrations of less than 4mg/l NO3 (0.9mg/l N) and 8mg/l NO3 (1.8mg/l N) are indicative of high and good quality by the EPA respectively. Table 7.7 below displays the levels recorded within the Liffey River sections during 2019-2021.

The indicator evaluated by the Indicator's Report shows that 47% of surveyed river sites, nationally, had unsatisfactory concentrations from 2018-2020. It was stated that the 38% of sites recorded increasing trends and only 3% recorded decreasing trends during 2013-2021.

The development will produce foul water, a potential source of additional N loading to the downstream receiving water bodies, however the foul water will be treated in the Osberstown Waste Water Treatment Station which has adequate capacity to ensure that the existing emission limit values from the WWTP will not be exceeded and therefore should not result in an impact to the nitrate levels in rivers.

Table 7.7: Summary of Total Oxidised Nitrogen (as N) mg/l concentrations at the Liffey River sections during 2019-2021

Total Oxidised Nitrogen (as N) mg/l	Liffey_100	Liffey_110
Min	1.1	1.1
Max	2.4	2.4
Mean	1.79	1.79
5%ile	1.31	1.268
95%ile	2.26	2.33

7.4.4.3 Phosphate in Rivers

Phosphate is essential for plant growth but excessive levels can be detrimental to river ecological health and lead to eutrophication. The primary sources of phosphate in freshwater systems are sewage/industrial discharges and both diffuse or point sources from agricultural land.

The assessment is undertaken by categorising each site into six different quality classes in respect to concentrations recorded over a three year average. Environmental quality standards for phosphate levels in Ireland in accordance with the objectives of the WFD have been established. Average concentrations less than 0.025mg/l P and 0.035mg/l P are considered of high and good quality respectively. Mean concentrations above a concentration of 0.035mg/l, which is required to meet good ecological status, are likely to result in nutrient enrichment. The Liffey sections are achieving the EQS for phosphate based on the mean annual concentrations (Table 7.8).

Long-term trends nationally from the 2013-2021 average concentrations suggest 24% of sites had increasing concentrations, while only 7% had decreasing concentrations.

The development will produce foul water, a potential source of additional phosphorus loading to the downstream water bodies, however the foul water will be treated in the Osberstown WWTP which has adequate capacity to ensure that the existing emission limit values from the WWTP will not be exceeded.

Table 7.8: Summary of Ortho-Phosphate (as P) mg/l concentrations at the Liffey River sections during 2019-2021

Ortho-Phosphate (as P) mg/l	Liffey_100	Liffey_110
Min	0.005	0.005
Max	0.06	0.06
Mean	0.022	0.023
5%ile	0.01	0.005
95%ile	0.05	0.05

7.4.4.4 Oxygen Demand in Rivers

Excessive biodegradable organic matter will result in excessive microorganism growth, a depletion in dissolved oxygen in the water and thus negative effects on the macroinvertebrate communities or possible fish kills. Wastewater treatment plants and agricultural land are a potential source of organic matter to waterbodies. The amount of oxygen used by the microorganisms during the break down of the organic matter is called the Biochemical Oxygen Demand (BOD). High levels of BOD values give an indication of organic pollution within a waterbody.

Nationally from the 2018-2021 average concentrations suggest 89% of sites monitored have satisfactory (high and good) BOD levels.

The assessment is undertaken by categorising each site into six different quality classes in respect to concentrations recorded over a three year average. Environmental quality standards for BOD levels in Ireland in accordance with the objectives of the WFD have been established. Average concentrations less than 1.3 mg O_2/l and 1.5mg O_2 /l P are considered of high and good quality respectively. Mean concentrations above a concentration of 1.5 mg O2/l, which is required to meet good ecological status, are likely to result in organic enrichment. The Liffey sections are achieving the EQS for BOD based on the mean annual concentrations (Table 7.9).

Table 7.9: Summary of BOD (as O_2) mg/l concentrations at the Liffey River sections during 2019-2021

BOD (as O_2) mg/l	Liffey_100	Liffey_110
Min	0.5	0.5
Max	15	3
Mean	1.40	1.04
5%ile	0.5	0.5
95%ile	3	2

7.4.5 Site Characterisation

The Pollutant Impact Potential (PIP) mapping produced by the EPA ranks areas within water bodies from 1 (highest) to 7 (lowest) in respect to the potential impact from pollutants. In terms of PIP, the site was rated a PIP category of 5 for nitrate pollution to groundwater and surface waters. However, the PIP for phosphate to surface waters the site is ranked 6 with a small section of rank 4 (fourth highest).

7.4.6 Summary of Existing Water Quality

A review of available national monitoring information for the water bodies in the immediate vicinity of the application boundary has concluded:

- The overall WFD Surface Water Quality status between 2016-2021 is:
  - Liffey_090 – Good Status;
  - Liffey_100 – Good Status;
  - Liffey_110 – Good Status;
  - Naas groundwater body – Good Status;
  - Curragh Gravels East groundwater body – Good Status.
- Downstream of the development area, there are a number of protected areas under Article 6 of the WFD Directive, i.e., Natura 2000 sites and bathing water although the nearest bathing water and Natura 2000 site is over 40 km downstream from the site;
- The receiving water bodies are currently achieving their environmental objective under the WFD and therefore the key focus of the impact assessment must be to demonstrate that the Project will not result in a deterioration in the current water body status, i.e. the status of the water bodies must be protected.

7.5 Impact Assessment

The likelihood of environmental impacts arising due to the development is assessed in relation to the construction and operational phases. The elements of construction and operation and the potential impacts on water quality have been identified for assessment.

The development has the potential to directly impact upon the Liffey_100 water body given the location of the works. The potential to indirectly impact upon the Liffey_110 water body and sensitive areas further downstream has also been considered.

The significance of any environmental effect is rated based on the magnitude of the impact and the importance of the attribute. Based on this criteria the receiving environment is considered to be of very high importance due to the fact that the water bodies are a high quality (Q4). The waterbodies are within the Liffey and Dublin Bay catchment and provide a hydrological link to the important downstream protected areas, particularly the Natura 2000 sites.

In summary and for the purposes of this impact assessment the following components of works have been considered:

- Surface Water Drainage
- Foul Water Drainage for the entire development
- Demolition of three dwellings and agricultural sheds
- Construction of the Data Centre buildings, associated plant compounds, security hut, 210 car parking spaces and all associated site development and landscaping works.

7.5.1 Do Nothing Scenario

If the Project, its associated works and infrastructure does not proceed, it is assumed that the character of the landscape and its uses will remain much as they are today i.e. agricultural land, until future development under the Naas Local Area Plan by Kildare County Council where is currently zoned for "Data Centre development and their associated infrastructure only". If the Project does not proceed, the opportunity for the creation of a new facility and employment as established in the Local Area Plan will not occur and the pressures on water quality associated with eh current land use, i.e. diffuse agriculture will continue.

7.5.2 Likely Significant Environmental Effects

7.5.2.1 Construction Phase

Based on the nature of the components of works proposed for the development, temporary impacts on water quality have the potential to occur during the construction phase of the works. The following have been considered in this assessment:

Increased suspended sediment levels due to the accidental release of sediment to the water column during:

- Construction of buildings & structures (including instream structures);
- Cut and fill operations;
- Suspended sediment, including all soils, sands and rubble is the single main pollutant to the aquatic environment generated at construction sites and largely arises from the erosion of exposed soils and sediments by surface water runoff. Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. Suspended sediment due to run off from stripped construction areas, stockpiled earth and the dewatering of excavations can have a severe negative impact on water quality. Once suspended sediment load enters a river it can result in long-term changes that cause chronic harm. Sediment can cause river hydromorphological changes, which in turn change the dynamics of the river in the future and can negatively impact on the supporting hydromorphological conditions and ecological status resulting in an increased risk to the environmental objectives of a water body.
- Accidental release of highly alkaline contaminants from concrete and cement during the construction of hardstand areas, etc. The construction works associated with the development will involve the use of cement and concrete for some of the hard standing areas and construction of buildings. During the construction phases, there is the potential for impact on the water quality and a toxic effect on the biological elements resulting in a possible further deterioration in the ecological status or compromise the improvement in ecological status through the implementation of the programme of measures included in the River Basin Management Plan; and
- General water quality impacts associated with works machinery, infrastructure and on-land operations including the temporary storage of construction materials, oils, fuels and chemicals.

7.5.2.2 Operational Phase

The operational phase impacts associated with the Project represent general water quality issues associated with surface and foul water drainage. General water quality impacts associated with runoff from parking areas and other hard standing areas will be collected and discharged via a mixture of traditional and Sustainable

Urban Drainage Systems (SuDS) via attenuation tanks with restricted flow to ensure greenfield run-off rates are achieved. The SuDS features include wetland habitats, soft landscaping and retention ponds.

It is proposed to collect all surface water as far as practically possible at surface level with ponds and swales. Surface water will therefore be utilised at peak times, as well as hydrant and sprinkle back supply. The excess water will be discharged back into Bluebell river a tributary of the Liffey_100 river water body.

All storm water collected on site will be discharged into the current water course following treatment via SuDS measures which include green/blue roofs, permeable surfaces, grass lined bioswales, bioretention areas/ponds, bioretention tree pits and oil interceptors.

It is therefore imperative to ensure that mitigation proposed during the operational phase of the development in relation to drainage and flood relief are adhered to. There will be limited direct impact to the Liffey_100 water body itself that would result in significant changes to the hydromorphological regime of the river and provided the SuDS measures have adequate capacity there will be a beneficial impact associated with the operational phase through the attenuation of contaminants and therefore water quality.

7.5.2.2.1 Storm water Run-off Contamination:

The operational phase of the development will involve the use of vehicles to the Data Centres and service vehicles to the substation. During the operational phase, there is potential for fuel or oil spillages and contaminants from vehicle engines, transformers and switchgear. Run-off from these areas and roadways may be impacted with residual hydrocarbon contaminants from fuel emission and tyres, sediment and trace contaminants like metals and organics and therefore represent a potential source of contamination that could have a pathway to surface waters through the storm water drainage system. The nature of these contaminants could have a toxic effect on the biology of the receiving waters affecting the ecological status and chemical status of the water body and thereby potentially impacting on the ability of the water body to achieve it environmental objectives and downstream conservation objectives for the Natura 2000 sites.

7.5.2.2.2 Foul Sewerage:

Inadequate or inappropriate urban wastewater infrastructure can result in significant pressures to surface water bodies particularly where misconnections (piping of sewerage directly to a storm water network or surface water body) can result in significant impacts to the biology and chemistry of the aquatic environment. It is also important to ensure the existing sewer network within an agglomeration has capacity to accept the additional hydraulic and pollutant loading from the development and that adequate treatment is provided at the wastewater treatment system so as not to impact the receiving environment and downstream sensitive areas.

7.5.3 Impact Matrix (Absence of Mitigation)

The potential impacts outlined in Sections 7.5.4.1 and 7.5.5 above are rated based on the impact level criteria in Section 7.5.4 to indicate their potential severity (profound, significant, moderate, slight and imperceptible) in the absence of any mitigation. The assessment reflects the activities and pollutants listed above and the different considerations for construction and operational phases of the Project.

Table 7.10: Potential Impact Rating Matrix (in the absence of mitigation)

	Significance of Environmental Impact
Construction Phase	
Suspended sediments / sedimentation	Significant
Concrete and cement pollution	Significant
Impacts associated with general construction works	Significant
Demolition works	Significant

Operational Phase

Storm Water Run-off	Significant
Foul Water	Significant
Hydromorphology	Slight

7.5.4 Description of likely significant impacts

7.5.4.1 Construction Phase Impacts

7.5.4.1.1 Sediment Loading

The works associated with the development involves extensive earth works throughout with the construction of SuDS, road ways, trench excavations for undergrounding overhead lines and the foul water and surface water drainage system, landscaping and parking areas. Instream works for the surface water drainage outfalls and proposed culverts of the Bluebell Stream (Liffey_100 river water body) at the M7 Business Park access to the southeast of the site will also represent a risk of increased sediment loading.

Suspended sediment, including all soils, sands and rubble is the single main pollutant to the aquatic environment generated at construction sites and largely arises from the erosion of exposed soils and sediments by surface water runoff and direct impacts on water courses and riparia areas causing bank and channel disturbance. Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. Suspended sediment due to run off from stripped construction areas, stockpiled earth and the dewatering of excavations can have a severe negative impact on water quality. This is particularly true in sloping areas with underlying clay following topsoil stripping. In areas of moderate to high rainfall, the potential problems are clearly exacerbated. If allowed to enter surface watercourses this run off can give rise to high suspended solids and detrimental impacts, in particular to fisheries and aquatic invertebrates which can impact the ecological status of a water body. Suspended solids may have an effect on:

- Sediment movement through rivers and its settlement onto the river bed causing formerly clean gravels to become clogged with fine sediment.
- The survival of fish eggs in gravel beds or spawning grounds as a result of deoxygenation caused by silt deposition;
- The survival of plants and algae by smothering;
- The survival of young fish and aquatic invertebrates such as mayfly larvae (Calopteryz sp.) through gill damage from sediment particles and;
- Amenity value through impaired visual appearance.

Once suspended sediment load enters a river it can result in long-term changes that cause chronic harm. Sediment can cause river hydromorphological changes, which in turn change the dynamics of the river in the future and can negatively impact on the supporting hydromorphological conditions of the water bodies ecological status resulting in an increased risk of deterioration in status.

Both bed and suspended materials, and subsequent changes in channel form associated with changes in sediment supply, may affect benthic invertebrates in many ways at various stages in their life cycle. The direct kill is only the first stage in the damage that silt causes to a benthic invertebrate population. Sediment that infiltrates the river bed decreases oxygen supply in interstitial areas, and destroys habitat for juvenile stages of the many benthic invertebrate life cycles. This can impact on the ecological status of a water body by changing the nature of the invertebrate community to more tolerant species that would not be indicative of the reference conditions expected for an Irish water body typology.

The sediment subsequently provides a medium for macrophyte growth. Macrophytes can smother the river substrate and habitat further, and can trap more sediment which exacerbates the problem in the long term. Silt infiltration of river bed gravels can also have a negative effect on fish species which can further impact on the

biological elements of the WFD ecological status classification and could prevent the achievement of the environmental objectives for the water body.

As outlined in the Site Specific Flood Risk Assessment the Project is located wholly within Flood Zone C where the probability of flooding from the Bluebell stream is less than 0.1% (1 in 1000 years). This means that there will be no risk of the site being subjected to flooding during the construction of the development and the risk of impacts of suspended solids and other pollutants from site run-off will be from overland flow generated from rainfall falling on the site and not from flood waters from the Bluebell Stream (Liffey_100 river water body).

Given the scale and nature of the works, the magnitude of the impact associated with sediment loading is considered to be **moderate** adverse. The significance of the environmental effect is therefore **significant** in the absence of mitigation based on the very high sensitivity of the receiving environment.

7.5.4.2 Concrete and Cement Pollution

The construction works associated with the development will include concrete crushing and reinforced construction of foundations and the placement of the precast concrete culverts with concrete binding in the Bluebell Stream (Liffey_100 river water body). During the construction phase, there is the potential for accidental spillage of cement materials or during the setting of concrete which could have a significant adverse impact on water quality and a toxic effect on the biological elements resulting in a possible further deterioration in the ecological status or compromise the improvement in ecological status through the implementation of the programme of measures included in the River Basin Management Plan.

Given the scale and nature of the works, the magnitude of the impact associated with concrete and cement pollution is considered to be **moderate** adverse. The significance of the environmental effect is therefore **significant** in the absence of mitigation based on the very high sensitivity of the receiving environment.

7.5.4.3 General Construction Works

The construction works will involve the use of plant and machinery, as well as the associated temporary storage of construction materials, oils, fuels and chemicals. During the construction phase, there is the potential for accidental spillage or release of construction materials (e.g. diesel, oil, chemicals) which could have a significant adverse impact on water quality and a toxic effect on the biological elements resulting in a possible further deterioration in the ecological status or compromise the improvement in ecological status through the implementation of the programme of measures included in the River Basin Management Plan.

Given the scale and nature of the works, the magnitude of the impact associated with general construction is considered to be **moderate** adverse. The significance of the environmental effect is therefore **significant** in the absence of mitigation based on the very high sensitivity of the receiving environment.

7.5.4.4 Demolition Works

During the construction phase, there is potential for various pollutants from buildings and dust to be airborne and scattered throughout the site during demolition works. Three dwellings and agricultural sheds shall be demolished. Therefore, the demolition works have the potential to contaminate water bodies and to stress sensitive species within the water environment.

Given the scale and nature of the works, the magnitude of the impact associated with the demolition works is considered to be **moderate** adverse. The significance of the environmental effect is therefore **significant** in the absence of mitigation based on the very high sensitivity of the receiving environment.

7.5.5 Operational Phase Impacts

Although the Project has been designed to incorporate water retention/detention into its design, potential water quality impacts associated with the operational phase of the Project can be exacerbated due to poor design and implementation of these measures. It is therefore imperative to ensure that mitigation proposed during the operational phase of the developments in relation to drainage are adhered to. There should be limited direct impact to the Liffey_100 water body itself that would result in significant changes to the hydromorphological regime of the river particularly as extensive SuDS measures are incorporated into the design and will ensure that the discharge will achieve greenfield run-off rates. Furthermore, the SuDs measures and oil interceptors will have a beneficial impact associated with the operational phase through the further attenuation of contaminants.

7.5.5.1 Storm water Run-off Contamination

The operational phase of the development will involve the use of vehicles to the Data Centres and service vehicles to the substation. During the operational phase, there is potential for fuel or oil spillages and contaminants from vehicle engines, transformers and switchgear. Run-off from the these areas and roadways may be impacted with residual hydrocarbon contaminants from fuel emission and tyres, sediment and trace contaminants like metals and organics and therefore represent a potential source of contamination that could have a pathway to surface waters through the storm water drainage system. The nature of these contaminants could have a toxic effect on the biology of the receiving waters affecting the ecological status and chemical status of the water body and thereby potentially impacting on the ability of the water body to achieve it environmental objectives and downstream conservation objectives for the Natura 2000 sites.

Given the scale and nature of the work across the development, the magnitude of the impact associated with surface run-off contamination is considered to be **moderate** adverse. The significance of the environmental effect is therefore **significant** in the absence of mitigation based on the very high sensitivity of the receiving environment.

7.5.5.2 Foul Sewerage

Inadequate or inappropriate urban wastewater infrastructure can result in significant pressures to surface water bodies particularly where misconnections (piping of sewerage directly to a storm water network or surface water body) can result in significant impacts to the biology and chemistry of the aquatic environment. It is also important to ensure the existing sewer network within an agglomeration has capacity to accept the additional hydraulic and pollutant loading from the development and that adequate treatment is provided at the wastewater treatment system so as not to impact the receiving environment and downstream sensitive areas.

Given the scale and nature of the work, the magnitude of the impact associated with inadequate or inappropriate foul water collection and treatment is considered to be **moderate** adverse. The significance of the environmental effect is therefore **significant** in the absence of mitigation based on the very high sensitivity of the receiving environment.

7.5.5.3 Hydromorphological changes

The presence of physical alterations within a waterbody, i.e. the installation of the culverts on the Bluebell Stream (Liffey_100 river water body), has the potential to impact on the hydromorphology of the waterbody. Therefore, should the inclusion of the structures within the water bodies impact negatively the hydromorphology, the water bodies may potential be at risk of deterioration and unable to achieve their WFD objectives. Structures may lead to increases or decreases in sediment deposition, currents and/or water flow patterns within the waterbodies.

The works are extremely limited and small-scale in nature and will be undertaken over an extremely limited time period and in line with best practice measures. Given the extent of the works and the magnitude of the impact is considered to be minor

This watercourse is fairly narrow (less than 2m wide) and supports slow flowing conditions with a fairly uniform U-shaped channel and is well vegetated at the margins. For much of its length, within the survey area, the watercourse was assessed as having characteristics of a well-fed field drain. The watercourse is culverted under the M7 to the east of the site boundary. Significant lengths of the watercourse are entirely covered by vegetation including common reed *Phragmites australis*, reed canary-grass *Phalaris arundinacea*, lesser water parsnip *Berula erecta* and floating sweet-grass. The sensitivity of the water course is therefore medium at best and therefore the significance of effect is considered to be slight.

7.5.6 Mitigation

In the absence of mitigation, the construction of some elements of the Project has the potential to have significant effects on the water quality and aquatic environment.

Similarly, with no mitigation the Project has the potential to have significant adverse effects on water quality and the aquatic environment during the operation stage.

With these considerations in mind, detailed mitigation has been incorporated into the engineering design of the Project to minimise its potential impact on the water environment. The risk to water quality posed by this Project during construction and operation will be dependent on the quality of drainage and treatment of site run-off before discharge to the river. Therefore, it is pertinent to ensure that procedures are put in place for the

control and minimisation of surface water and suspended solids movement, it is also important that measures are taken to ensure existing drainage pathways are kept free from construction sediment and pollutants through the use of effective barriers to pollutant export and best practice techniques to control these pressures at source. Section 7.5.8 and Section 7.5.9 details the mitigation measure that will be employed on site during the Project construction and operational phases.

7.5.7 Mitigation Incorporated into the Drainage Design

7.5.7.1 Wastewater

Wastewater generated on-site particularly during the operational phase of the development will be piped and discharged to the existing Irish Water foul sewer which flows along the L2030 Newhall Road to the Newhall Wastewater Pumping Station located (west of the site) and is ultimately pumped to Osberstown WWTP (north of the site). Irish Water has provided agreement in principle for the connection of the development associated with the development to their assets and have confirmed that the connection is feasible without the need to upgrade Irish Water infrastructure. The Project will include a private rising mains from the site to the existing 300mm wastewater gravity network along Newbridge Road. Provided the sewer network is installed using industry standard best practice, including the installation of the sewer under the Bluebell Stream by trenchless techniques, and routinely checked there is likely to be no impact from wastewater from the development and therefore no further mitigation required. Drainage pipelines will be inspected by CCTV at completion of the construction project and any damage will be repaired.

7.5.7.2 Surface Water

There is no existing surface water infrastructure on the site, drainage runoff is collected via overland flows to agricultural ditches connected to Bluebell Stream. Consultation has taken place with Inland Fisheries Ireland (IFI) and the IFI document “Planning for Watercourses in the Urban Environment” has been incorporated into the design. The development has incorporated a variety of Sustainable Drainage Systems (SuDS) techniques to counteract the potential increased runoff as a result of increased hardstanding. It is proposed to collect all surface water as far as practically possible at surface level with ponds and swales. Surface water will therefore be utilised at peak times, as well as hydrant and sprinkle back supply. The excess water will be discharged back into Bluebell Stream. While all storm water collected on site will be discharged into the current water course following treatment via SuDS measures which include permeable surfaces, grass lined swales, bioretention ponds and oil interceptors at critical locations within the drainage network, e.g. on the surface water drainage form the GIS substation. The SuDS processes decrease the impact of the development on the receiving environment by providing amenity and biodiversity in many cases.

Adequately specified oil interceptors will be incorporated into the proposed drainage network for the substation, parking areas and access roads.

7.5.8 Construction Phase Mitigation Measures

7.5.8.1 Construction Phase Best Practice Measures

Mitigation measures will be implemented by the contractors who will construct the development in accordance with the requirements listed within the Construction Environmental Management Plan which will be submitted as part of the planning applications for the development. Furthermore, once appointed, the contractors will submit a detailed Construction Management Plan based on the requirements of these submitted planning documents for approval by the Planning Authority. The mitigation measures implemented by the contractor will refer to the construction management procedures for best practice regarding the following recognised international guidelines:

- Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA, 2001);
- Control of Water Pollution from construction sites, Guidance for consultants and contractors (C532);
- Environmental Good Practice on Site (3rd edition) (C692); and
- Guidelines on Protection of Fisheries During Construction Works and Adjacent to Waters (2016).

7.5.8.2 Suspended Sediment and Sedimentation

Preventing run-off is an effective method of preventing sediment pollution in the water environment. Therefore, adoption of appropriate erosion and sediment controls to manage run-off during construction is essential to prevent sediment pollution.

Mitigation measures to address the potential impact from suspended solids will be carried out in accordance with a site specific CEMP. The measures will be employed prior to the commencement and during construction and will include such measures as:

- Drainage and measures to control run-off will be employed to manage sediments prior to any works to be undertaken at the site, i.e., arrangements for the treatment of dirty groundwater ingress from any excavations will be in place in advance of the dewatering to ensure it can be adequately managed on site;
- If possible, earthworks operations should be limited to the summer months.
- The site shall be surveyed to identify all existing drainage features and waterbodies.
- It is proposed that this work on the culverts to facilitate the secondary access through the M7 Business Park will be undertaken in dry conditions and will utilising an open-cut methodology with temporary damming and fluming of the relevant lengths of watercourse.
- Works within the channel of a watercourse with sensitive fish present (i.e. salmon, lamprey, trout and eels) requires appropriate timing of the works. Therefore, IFI's document entitled 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016) will be consulted for additional information on timing of works. In salmonid rivers such as the Liffey_100, downstream of the Project, the guidelines require that all in-stream works should be carried out during the period July to September; any requirement for works to be conducted earlier will seek approval from IFI.
- In order to ensure that the biological elements of the ecological status are not impacted the risk of the potential loss or crushing of sensitive fish in the vicinity of the culvert crossings should be mitigated before in-channel works commence by their capture and translocation distantly away from the works area. Authorisation via Section 14 of the Fisheries Act will be required from IFI and should be conducted using a competent fisheries expert, with the application made at least 12 weeks prior to works commencement.
- A minimum Buffer of 10 metres is proposed from the proposed works to the Bluebell Stream to protect the aquatic environment.
- Silt fencing will be installed at strategic locations around the perimeter of the site. The indicative location of the silt fencing has been determined in the Construction Phase Surface Water Management Plan within the in the construction stage CEMP (EIAR Volume II, Appendices, Appendix 4.5) and will be subject to confirmation for phase to be developed. The purpose of the silt fencing is to prevent silt laden water leaving the site and entering neighbouring land with the potential to impact nearby watercourses.
- Filter drains be cut to intercept surface water where there is a risk of significant water flow into excavations or on to adjoining lands. There will also be a requirement to periodically pump water from excavations. All collected and pumped water will have to be treated prior to discharge. The run-off will be directed through appropriately sized propriety settlement tanks, with a proprietary silt bag to intercept bulk silt volumes, to remove suspended solids. Details are provided in the Surface Water Management Plan included in the construction phase CEMP (EIAR Volume II, Appendices, Appendix 4.5);
- The use of filter drains and temporary settlement ponds shall further treat any potential contaminated/ polluted runoff prior to discharge to a Silt Bag arrangement which will provide maximum treatment of surface water runoff entering the Bluebell stream.
- During the construction phase of the development, all silt/ pollution removal strategy structures shall be constructed/ installed outside the extent of the riparian buffer which has been determined as 10m from the Bluebell Stream bank
- Retention and utilisation of subsoil and topsoil for the creation of landscape mounding, up to 6.5m high, to the site boundary with the M7 and for reinstatement of disturbed landscape areas

- Emergency contact numbers for the Local Authority Environmental Section, Inland Fisheries Ireland, the Environmental Protection Agency and the National Parks and Wildlife Service will be displayed in a prominent position within the site compound. These agencies will be notified immediately in the event of a pollution incident;
- Site personnel will be trained in the importance of preventing pollution and the mitigation measures described here to ensure same;
- The site manager will be responsible for the implementation of these measures. They will be inspected on at least a daily basis for the duration of the works, and a record of these inspections will be maintained;
- Any temporary storage of soil, hardcore, crushed concrete or similar material will be stored as far as possible from any surface water drains. There can be no direct pumping of silty water from the works directly to any watercourse. All water from excavations must be treated by infiltration over lands or via settlement areas, silt busters etc;
- Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures:
    - Vehicles delivering material with potential for dust emissions to an off-site location shall be enclosed or covered at all times to restrict the escape of dust;
    - Any hard surface site roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only;
    - A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate;
    - Road sweepers will be employed to clean the site access route as required.

The incorporation of these mitigation measures during the construction phase means the potential impact to receiving water environment will be reduced to negligible thus reducing the significance of the environmental effect to **imperceptible**, based on the very high sensitivity of the receiving environment.

7.5.8.3 Concrete and Cement Pollution

The impacts in relation to cement and concrete for the development are, for the most part (but not limited to) the installation of the concrete areas (to be poured in-situ) and construction works of buildings. The principal risks are:

The use of concrete in close proximity to water bodies requires a great deal of care. Fresh concrete and cement are very alkaline and corrosive and can cause serious pollution in water bodies. It is essential to ensure that the use of wet concrete and cement in or close to any water course is carefully controlled so as to minimise the risk of any material entering the water, particularly from shuttered structures or the washing of equipment. The following measures will be undertaken to mitigate against possible pollution:

- A concrete washdown area will be provided on site for trucks to use after delivery of concrete or on return to the batching plant. This area will be adequately bunded to mitigate the risk of contaminated runoff discharge to the Liffey_100 water body. Concrete trucks are to be washed down within the concrete truck washdown area after delivery of concrete, prior to exiting the site. Washdown runoff will be appropriately treated prior to discharge;
- Wash-out areas on site will be properly designed with an impermeable line to contain all cement laden water. No wash-out of ready-mix concrete vehicles shall be located within 10 metres of any temporary or permanent drainage features. Signage shall be erected to clearly identify the wash-out areas. Sufficient wash-out areas shall be provided to cater for all vehicles at peak delivery times;
- The installation of the box and pipe culverts, including the concrete required for the binding will be undertaken in dry conditions through the damming and fluming of the minor water course, to prevent wet concrete from entering the aquatic environment.

In circumstances where the mitigation measures are employed during construction operations, the potential impact to receiving water environment will be reduced to negligible thus reducing the significance of environmental effect to **imperceptible**.

7.5.8.4 General Construction Works

The risk of water quality impacts associated with works machinery, infrastructure and on-land operations (for example leakages/spillages of fuels, oils, other chemicals and waste water) will be controlled through good site management and the adherence to codes and practices which limit the risk to within acceptable levels. The following measures will be implemented during construction:

- A works specific Construction Environmental Management Plan has been prepared as part of the planning submission and will be developed and implemented by the contractor and will include detail in respect of every aspect of the works in order to minimise potential impacts and maximise potential benefits associated with the works;
- Management and auditing procedures, including tool box talks to personnel, will be put in place to ensure that any works which have the potential to impact on the aquatic environment are being carried out in accordance with the contactors environmental controls, which will be consistent with an approved CEMP and any planning conditions;
- Existing and proposed surface water drainage and discharge points will be mapped on the Drainage layout. These will be noted on construction site plans and protected accordingly to ensure water bodies are not impacted from sediment and other pollutants using measures to intercept the pathway for such pollutants;
- Welfare facilities (canteens, toilets etc.) will be available within the construction compound and this will remain in place for the construction of the Project. The offices and site amenities will initially need to have their own foul water collection until connections are made to the mains networks.

The use of oils and chemicals on-site requires significant care and attention. The following procedures will be followed to reduce the potential risk from oils and chemicals:

- New metal gerry cans with proper pouring nozzles will be used to move fuel around the site for the purposes of refuelling items of small plant on site. Metal gerry cans and any other items of fuel containers will be stored in certified metal bunded cabinets.
- Drip trays will be used under items of small plant at all times. Any waste oils etc. contained in the drip trays or the bunded area will be emptied into a waste oil drum, which will be stored within the bund.
- Any gas bottles will be stored in a caged area at a secure location on the site. All will be properly secured at point of work.
- No bulk chemicals will be stored within the active construction areas. Temporary oil and fuel storage tanks may be kept in the material storage area in suitable containers and will be stored on appropriately bunded spill pallets as required. Any fuel and oil stored onsite shall be stored on bunded spill pallets approved under BS EN 1992-3:2006). All bunds will be impermeable and capable of retaining a volume of equal to or greater than 1.1 times (>10%) capacity of the containers stored on them. In the event of a filling spillage excess oil or fuel will be collected in the bund;
- Refuelling of vehicles and the addition of hydraulic oils or lubricants to vehicles will be undertaken offsite where possible. Where this is not possible, filling and maintenance will take place in a designated material storage compound, which is located at least 10 metres from any temporary or permanent drainage features. Spill protection equipment such as absorbent mats, socks and sand will be available to be used in the event of an accidental release. Training will be given to appropriate site workers in how to manage a spill event. A certified double skinned metal fuel tank will be situated in this secure bunded area on the construction site if applicable. This tank will be certified for lifting when full.
- Spill protection equipment such as absorbent mats, socks and sand will be available to be used in the event of an accidental release during refuelling. Training will be given to appropriate site workers in how to manage a spill event. A hazardous bin will also be available to contain any spent sand or soak pads.
- Contingency Planning: A project specific Pollution Incident Response Plan will be prepared by the contractor and will refer to PPG 21 Pollution Incident Response Planning. The contractor's Environmental Manager will be notified in a timely manner of all incidents where there has been a breach in agreed environmental management procedures. Suitable training will be provided by the

contractor to relevant personnel detailed within the Pollution Incident Response Plan to ensure that appropriate and timely actions is taken.

The following mitigation measures will be taken at the construction site in order to prevent any spillages to ground of fuels during machinery activities and prevent any resulting soil and/or groundwater quality impacts:

- Refuelling will be undertaken off site where possible;
- Where mobile fuel bowsers are used the following measures will be taken:
    - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
    - The pump or valve will be fitted with a lock and will be secured when not in use;
    - All bowsers to carry a spill kit and operatives must have spill response training; and
    - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

Provided these mitigation measures are employed during construction operations, the potential impact to receiving water environment will be reduced to **negligible** thus reducing the significance of environmental effect will be reduced to **imperceptible**.

7.5.8.5 Demolition Works

The risk to water quality impacts associated with demolition works during the construction phase will be controlled through good site management conforming to health and safety, while adhering to codes and practices which limit the risk of demolition related contamination. PPG 6: Working at construction and demolition sites, shall be adhered to particularly in relation to safe and secure on site storage and minimising storage time, wheel washing, placing of concrete and dealing with silty water for the construction and demolition industry (Environmental Agency, 2012).

A Method Statement for the demolition of the building shall be prepared showing the sequence of demolition and the method of demolition to be employed. A health and safety plan showing all the measures for the protection of the public including hoardings shall also be prepared.

In circumstances where the above mitigation measures are employed during the construction phase operations, the potential magnitude of the impact on the receiving waters will be reduced to **negligible** thus reducing the significance of the environmental effect to **imperceptible** during demolition works.

7.5.9 Operational Phase Mitigation Measures

7.5.9.1 Foul Water

Foul wastewater generated on-site particularly during the operational phase of the development will be piped and discharged to the existing Irish Water foul sewer. Agreement in principal to discharge to the existing foul network and Osberstown WWTP will be secured with Irish Water and will ensure the wastewater discharge authorisation for the existing agglomeration will not be adversely affected (see EIAR Volume II, Appendices, Appendix 4.12, Planning Engineering Report, Appendix E).

Furthermore, each Data Centre building is serviced by its own local foul drainage network which conveys flows to one of two onsite pumping stations, located west and east of the site. Each pumping station will have sufficient capacity to accommodate wastewater generated by a sprinkler discharge event by a Data Centre (max 440m^3). This is sufficient to accommodate 24 hour storage for domestic and process wastewater generation.

Both the surface water and foul system are to be entirely separate developments.

Where the mitigation measures listed above are employed, the potential impact to receiving water environment will be reduced to negligible thus reducing the significance of environmental effect will be reduced to Imperceptible.

7.5.9.2 Storm Water Run-off

The development has incorporated a variety of Sustainable Drainage Systems (SuDS) techniques to counteract the potential increased need for supply. SuDS, supplemented by bypass separators on the piped storm water network, will include green roofs, permeable paving, rain gardens, attenuation tanks, bioretention pods, as well as, grassed and open space landscape portions of the site.

To reduce the water demand on the Local Authority water supplies and to reduce the requirement of the facility to use mains connection, water conservation measures will be incorporated throughout the development. Surface waters will be collected as far as practically possible at surface level via ponds and swales, to be used for peak hours and hydrant and sprinkler back up supply. Rainwater will be collected for use in the cooling operations of the plant to decrease reliance on public supply.

During the operational phase, there is potential for storm water run-off to be impacted by pollutants arising within the car parking areas and roadways. This runoff has the potential to provide pathways for a wide range of contaminants arising from general operations to the aquatic environment. The main potential pollutants from surface water drainage or direct run-off are sediment, hydrocarbons, and trace contaminants including metals and organics.

The attenuation tanks and pervious pavements have proposed dual purpose and whilst they are flow attenuation features they also mitigate against potential water quality issues associated with storm water run-off.

All surface water run-off from roof areas and hardstanding areas are designed to be collected by a gravity pipe network. The collected stormwater will be diverted through a petrol interceptor prior to an underground attenuation storage tank.

Provided the best-practice techniques illustrated in CIRIA's guidance document (C768 – Guidance on the Construction of SuDS) are followed, no further mitigation is required. Where the measures listed above are employed, the potential impact to receiving water environment will be reduced to **negligible** thus reducing the significance of environmental effect will be reduced to **imperceptible**.

7.5.9.3 Hydromorphology

In terms of the culvert installation the condition of the Bluebell Stream the existing stream bed shall be excavated to the design formation levels as set by the engineer. If suitable, all existing bed material will be stockpiled on site for re-use along the culverted stream channel. Where the measures listed above are employed, the potential impact to receiving water environment will be reduced to negligible thus reducing the significance of environmental effect will be reduced to imperceptible.

7.5.10 Monitoring

7.5.1 Construction Phase

The CEMP includes emergency response procedures to mitigate against contamination to water systems, in particular in relation to oil spillage, uncontrolled silt discharge and sewage spill. The CEMP will also have procedures for monitoring the performance and effectiveness of mitigation measures employed during construction to ensure they are operating as intended and are providing the necessary protection to the receiving environment.

Weekly checks will be carried out to ensure surface water drains are not blocked by silt, or other items, and that all storage is located at least 10m from surface water receptors. A regular log of inspections will be maintained, and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not reoccur.

7.5.2 Operational Phase

A number of elements of the development require frequent inspection and cleaning as a maintenance requirement. Visual inspections and cleaning of drainage elements are required at different times for each element, these will be monitored and maintained as necessary.

7.5.3 Residual Impacts

Where the appropriate mitigation measures are fully implemented during the construction and operational phases of the development as outlined in the previous section, the impact of the Project on the water quality in the area will be imperceptible as indicated in Table 7.11.

Accordingly, the development will not have a significant effect on the water quality of the receiving waters.

It can therefore be concluded that the proposed works are compliant with the requirements and environmental objectives of the EU Water Framework Directive and the other relevant water quality objectives for these water bodies.

Table 7.11: Residual Impacts (with mitigation)

Significance of Environmental Impact	
Construction Phase	
Suspended sediments / Sedimentation	Imperceptible
Concrete and cement pollution	Imperceptible
Impacts associated with general construction works	Imperceptible
Demolition works	Imperceptible
Operational Phase	
Storm Water Run-off	Imperceptible
Foul Water	Imperceptible
Hydromorphology	Imperceptible

7.6 Interactions

The water environment and impact on water quality has the potential to impact on water dependent habitats and species in the water bodies affected and therefore there is a strong interaction with biodiversity. The protection of the water environment will help to ensure that biodiversity is not significantly impacted by the implementation of the Project.

Geology and soils also have a strong interaction with water quality. The interaction of surface and sub surface water means it is important in the generation of run-off and the mitigation of same. Chapter 6 Lands and Soils notes that no significant pollutant linkages are considered to be present within the study area and that impact to groundwater is considered to be Neutral.

7.7 Cumulative Effects

7.7.1 Other Projects

As identified in Chapter 1 of the EIAR (Section 1.4), there are a number of other projects which have been identified for consideration in terms of their potential for cumulative effects.

Table 7.12 provides an assessment of the potential cumulative effects of these developments with the Project by establishing their location, hydrologically connective to the Project site and the assessments undertaken for each individual application. Based on the assessment in Table 7.12 it can be concluded that there is no potential for cumulative effects with the Project and these developments.

Table 7.12 Assessment of Cumulative Effects

Planning Reference	Address	Description	Status	Cumulative Assessment
201418	Kerdiffstown and Monread North, Naas, Co. Kildare	A proposed solar farm on an area of approximately 10.8 hectares	Granted	The location of this proposed development is downstream of the Project in the Liffey_120 river water body. The supporting documents had identified that the development would not have a significant impact on the feeder stream feeding the Grand Canal and the surface water management measures would ensure that there would be no impact on water quality. The Project is upstream of this development but with the implementation of the mitigation measures proposed as part of the Project there is no potential for any cumulative effects and the water quality in the Liffey_120 will not be affected by the Project.
PL09.305953	Townlands of Drehid, Mulgeeth, Ballynamullagh, Mucklon, Kilmurray (Carbury By), Killyon and Timahoe East, Co. Kildare	Renewable energy development for 2 areas of solar photovoltaic arrays	Granted	This development is in the Boyne catchment and therefore is not hydrologically connected to the Project site and there is no potential for cumulative effects.
181328 & PL09.303577	Townlands of Guidenstown South and Rahilla Glebe, Co. Kildare	The development consist / consists of a ground mounted solar photovoltaic (PV) farm	Refused	This project was refused planning permission and is located int eh River Barrow Catchment and is therefore not hydrologically connected to the Project.
18969	Brownstown and Carnalaway, Kilcullen, Co. Kildare	A solar farm to be installed over restored landfill	Granted	This development is upstream of the Project site location in the Liffey_060 river water body which is current at moderate ecological status with the significant pressure noted as Agriculture by the EPA. The solar farm is proposed on a restored landfill but all works are undertaken above ground so as not to compromise the integrity of the capping system that has been installed on the site of the old landfill. It was concluded that this proposed development would not impact on surface water and groundwater quality or result in preferential pathways for leachate export. A Construction Environmental Management Plan will ensure best practice. Given the nature of the works and the application of best practice in the CEMP there is no significant effects predicted. The Project site is downstream of this development but hydrologically connected, however water quality will not be affected by this development therefore there is no potential for cumulative effects in the River Liffey, particularly given the significant pressure on the Liffey_060 water body is due to nutrient pressures from agriculture.
18250	Killeenlea, Ardrass Lower & Killadoon, Celbridge, Co. Kildare	A solar farm comprising: the installation of photovoltaic panels on ground mounted frames	Granted	This development is downstream of the Project site location, located in the Liffey_140 river water body which is currently at good ecological status. An AA screening undertaken by Kildare County Council determined that there would be no impact on freshwater habitats or species from the development. Given the distance downstream from the

				Project site, the conclusion of the impact assessment for the Project and the fact that there is no potential from significant effects from this development there is no risk to the existing good ecological status from cumulative effects.
12577	Bord na Mona, Main Street, Newbridge, Co. Kildare.	Construction of a new I.T. data centre building, concrete slab to facilitate a 550 Kva back-up generator and a concrete fuel storage bund to hold a 3000L fuel tank	Granted	This development is located in the main street in Newbridge within the Liffey_050 river water body which is currently at good ecological status. The development is upstream of the Project site and has already been constructed. The current baseline in the Liffey_050 is achieving its objective so there is no potential for cumulative effects.
18247	Porterstown and Kilteel Lower, Kill, Co. Kildare	Transmission System Operator (TSO) compound including substations and containerised battery storage modules (Battery Storage Facility)	Granted	This development is located in the Painestown_010 river water body which is currently at poor ecological status due to agricultural and hydromorphological (channelisation) pressures. This development is downstream of the Project site. An EIA Screening was undertaken for this development and concluded that there would not be any significant impacts and only clean uncontaminated surface water would be discharged from the site.
20745	Porterstown, Kill, Co. Kildare.	The development of a new electrical substation and additional equipment in the existing ESB Kilteel 110kV Substation to facilitate the connection of the Porterstown Battery Storage Facility infrastructure.	Granted	This application is associated with the TSO compound above and the AA screening concluded that there was no potential for impacts on freshwater habitats or species. Therefore there is no potential for cumulative effects with the Project.
PL09.310841	Dunnstown, Co. Kildare	An enclosed battery energy storage system compound on c. 4.089 ha with 76 no. battery storage units.	Granted with Conditions after Appeal	This development is located in the Liffey_050 river water body which is currently at good ecological status. The development is upstream of the Project site. A review of the An Bord Pleanala inspectors report established that the site is remote from any surface water or groundwater connectivity to the Liffey_050 and the inspector concluded that there was no potential to impact on the Water Framework Directive Objectives of the Liffey_050 river water body. There is therefore no potential for cumulative effects with the Project.

7.7.2 Gas Connection

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

The GNI Infrastructure Upgrade Outline Report notes that the proposed works will likely include the construction of a new circa 300mm dia. high pressure gas pipeline which is likely to follow the existing pipeline route from the Glebe West AGI to the Naas Town AGI. From there it will most likely closely follow the existing low-pressure distribution network around the Southern Link Road to the junction with the R445 Newbridge Road, cross the Grand canal and follow the existing public foul sewer network wayleave across agricultural lands in a north-westerly direction towards the Project site.

An GNI Infrastructure Upgrade Outline Report has been used to assess the potential for cumulative effects with the Project.

7.7.2.1 Potential Route in Context of the Water Environment

The likely route for the gas pipeline commences at the existing Above Ground Installation (AGI) at Glebe West which is within the Liffey_050 river water body, which is currently at good ecological status. On leaving the AGI the gas pipeline will likely travel in a north westerly direction into the Liffey_110 river water body, which is also at good ecological status. Within this water body there is a minor water course crossing just north of the L6409 at Bawnoge after which the likely route will continue on a north-westerly direction crossing another water course within the Liffey_110 water body to the west of Punchestown race course, the Naas River. From here the likely route for the gas pipeline will continue in a west north-westerly direction along the R411, Ballymore Eustace Road, crossing another water course in the Liffey_110 water body at Oak Park, Naas. The likely route then continues west along the Naas Southern Link Road and crosses into the Liffey_100 river water body where it crosses the Bluebell Stream. The likely route continues northwards in the Liffey_100 water body where it then crosses a tributary of the Bluebell Stream and the Grand Canal, it is likely that a single crossing will be used to traverse these water courses. After crossing the Grand Canal the likely route of the gas pipeline will continue to traverse the Liffey_100 catchment in a north-westerly direction along agricultural lands on the approximate alignment of the existing wayleave for the foul drainage network after which it will likely deviate west to cross the Naas Road and the M7 motorway onto the R409 to the Project site.

7.7.2.2 Potential Cumulative Effects

The likely route of the new pipeline will require crossing a number of watercourses within the Liffey_050, Liffey_100 and Liffey_110 river water bodies, including the Grand Canal, Naas River, Bluebell Stream and numerous land drainage ditches. The method of constructing this crossing (and other watercourses along the likely route) will typically consist of either open excavation (from smaller watercourses and ditches) or directional drilling / pipe jacking as appropriate. GNI will determine the best crossing method for all watercourses as part of their environmental assessment. The final design will be subject to consultations with Waterways Ireland / Inland Fisheries Ireland and Kildare Co. Council Water Services and Environment departments.

GNI will use the standard construction corridor for pipelines on agricultural lands which will usually require a working width that will be fenced off and stripped of topsoil to allow the installation of the pipeline in a trench. The excavated subsoil will be stored separately from the topsoil in the working width to ensure there is no cross contamination.

There is the potential for elevated suspended solids in the surface water run-off from the working areas, however pre-construction drainage and a dedicated haul route will ensure that the run off generated will be reduced to a minimum by ensuring on rainfall incident on the working area will have the potential to generate run-off. In addition the best practice measures for pipeline construction as outlined in the CIRIA guidance document C648, Control of water pollution from linear construction projects will be followed by the GNI contractors who will be contractually required to ensure pollution form the working area and the water course crossings do not impact on the water bodies and water courses traversed by the pipeline.

On the basis of the likely route of the pipeline and the minor nature of the water courses traversed, including the selection of the most appropriate crossing technique in consultation with the relevant statutory authorities

and the application on best practice it is reasonable to assume that the cumulative effects of the main Project with the GNI gas transmission line connection will not be significant and will not compromise the environmental objectives of the water bodies affected.