

## 8 Water

### 8.1 Introduction

This chapter considers and assesses the existing surface water environment and the potential significant impacts associated with both the construction, operation and decommissioning of the proposed development. It is noted that the proposed development comprises four distinct elements as outlined in **Chapter 4** namely:

- the continued operation of the existing WOP Station and ADF;
- the phased transition of the WOP Station to firing exclusively on renewable biomass;
- the development of fuel management and handling facilities; and
- the development of additional landfill capacity at the existing ADF.

As the existing development is subject to the condition that all existing activity ceases in December 2020 the potential impacts of the continued operation of WOP Station and the ADF will also be assessed.

The potential impacts on various surface water aspects such as water quality and flooding from the proposed development, have been identified and assessed in relation to:

- Water quality impacts on receiving rivers and streams from construction runoff (suspended solids and from accidental spillages (e.g. oil / chemical spillages);
- Increased flood risk as a result of increasing runoff rates and volume;
- The continuation of operational discharges (post 2020) from the West Offaly Power (WOP) Station and the Ash Disposal Facility (ADF); and
- Indirect impacts associated with the peat and biomass supplies to the WOP Station.

The Chapter also provides a high level assessment of the compliance of the proposed development with the Water Framework Directive (WFD).

#### 8.1.1 Legislative Context

The EU WFD (2000/60/EC) established a framework for the protection of both surface and groundwater. Transposing Irish legislation with regard to surface waters, namely S.I. 272 of 2009, European Communities Environmental Objective (Surface Water) Regulations 2009 (as amended), outlines the water protection and water management measures required in Ireland to maintain high status of surface waters where it exists, prevent any deterioration in existing water status and achieve at least good status for all waters i.e. requirement to implement the WFD.

A number of River Basin Management Plans (RBMPs) were developed to address the requirements of the WFD. The first cycle RBMP of relevance to this assessment (the Shannon International RBMP 2009-2015) was adopted in 2009 and this included a programme of measures required to facilitate the achievement of the WFD objectives. This programme of measures included full implementation of existing legislation including the Water Pollution Acts, Water Services Act, Bathing Water Quality Regulations, Integrated

Pollution Prevention and Control (IPPC) Regulations, Urban Wastewater Treatment Regulations, the Foreshore Acts and the Birds and Habitats Directives (particularly the Appropriate Assessment (AA) process).

The second cycle of the river basin management planning is currently underway (this was delayed due to significant reform in the water sector in recent years) and the second consolidated RBMP which was published in April 2018 has merged the Eastern, South Eastern, South Western, Western and Shannon River Basin Districts to form one national River Basin District. As outlined in the RBMP this “Irish River Basin District” is “broken down into 46 catchment management units. These units are, in the main, based on the hydrometric areas– with, for example, the River Shannon being sub-divided on the basis of the catchments of its major tributaries. The 46 catchment management units (CMU) have been broken down further into 583 sub-catchments”.

The WOP Station and ADF location in relation to hydrological catchments is shown on **Figure 8.1**.

Individual catchment assessments for each of the 46 CMUs are currently being developed by the EPA’s Catchment Science and Management Unit however, to date these have not been published.

Other relevant EU and national legislation pertaining to the hydrological environment and the proposed development include:

- The EU Floods Directive 2007/60/EC;
- S.I. 122 of 2010, European Communities (Assessment and Management of Flood Risks) Regulations;
- S.I. 722 of 2003, European Communities (Water Policy) Regulations, as amended;
- S.I. 350 of 2014, European Union (Water Policy) Regulations 2014;
- The Industrial Emissions Directive 2010/75/EU; and
- Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations 2013.

## 8.2 Methodology

This assessment was carried out in accordance with and with regard to the following guidance and tailored accordingly based on professional judgement:

- EPA Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2002) (and revised draft guidelines 2017);
- EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003) (and revised draft advice notes 2015);
- National Road Authority (NRA) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009);

- Office of Public Works (OPW) Guidelines for Planning Authorities (GPA) 20: The Planning System and Flood Risk Management (OPW and Department of Environment, Heritage and Local Government 2009); and
- Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Union, 1999).

### 8.2.1 Relevant Characteristics of the Proposed Development

The WOP Station including the ADF currently operates under the Environmental Protection Agency (EPA) Industrial Emissions (IE) licence P0611-02.

The potential impacts likely to be caused by the proposed development on the various hydrological attributes such as water quality and flood risk have been identified as a result of:

- The continued operation of the WOP Station and the ADF and the associated Point Source Surface Water (PS-SW) discharges, these are:
  - PS-SW1<sup>1</sup>- Cooling Water;
  - PS-SW2 - Screen Wash Water;
  - PS-SW3 - Treated Sewage Effluent;
  - PS-SW4 - Boiler Blowdown;
  - PS-SW5 - Water Treatments Effluent;
  - PS-SW6 & PS-SW7 - Surface water drainage from the station; and
  - Ash Landfill (AL)-SW1- ADF - surface runoff and leachate.
- Water quality impacts on receiving rivers and streams from construction works generating silt laden runoff and /or from accidental spillages (e.g. oil/chemical spillages, bulk liquid cement);
- Construction work in proximity to waterbodies or hydrological links (i.e. the surface water drainage system) to waterbodies; and
- Increased flood risk as a result of reducing the volume of flood storage available on the floodplain and/or increasing runoff rates and volume.

Water is abstracted from the River Shannon for the power plant processes including the provision of cooling water. It is this returned cooling water that acts as the principal aqueous discharge from the existing WOP Station (PS-SW1). The WOP Station discharges approximately 186MWth to the river Shannon when on full load. This consists of a flow through the condenser of 5.5 m<sup>3</sup>/s with a temperature rise of approximately 8.5°C. All existing surface water discharges from the station and ADF are shown on **Figure 8.2** and **Figure 8.3** respectively.

Condition 5.5 of the Industrial Emissions (IE) Licence for the station specifically concerns the thermal discharge from the station and states that:

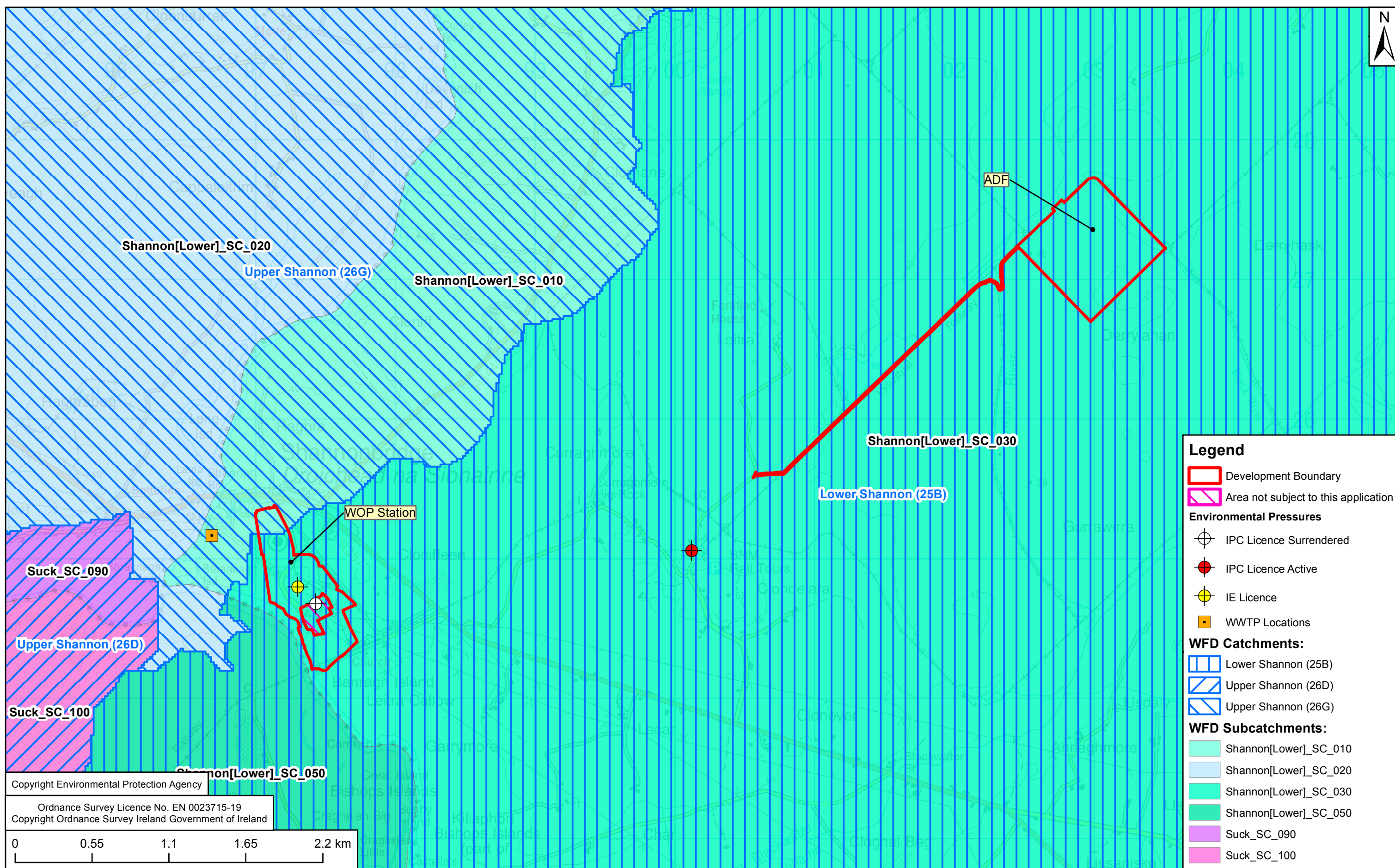
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<sup>1</sup> These are the EPA IE licence Emission Point Reference number as it appears on the WOP IE licence P0611-02

## West Offaly Power Transition to Biomass

*Discharges from the installation shall not artificially increase the ambient temperature of the receiving water by more than 1.5 °C outside the mixing zone. In relation to temperature, the mixing zone shall not exceed 25% of the cross sectional area of the river at any point.*





**Legend**

- Development Boundary
- Area not subject to this application

**Environmental Pressures**

- IPC Licence Surrendered
- IPC Licence Active
- IE Licence
- WWTTP Locations

**WFD Catchments:**

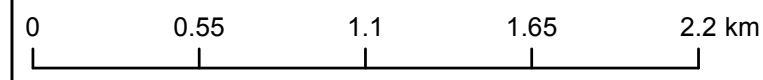
- Lower Shannon (25B)
- Upper Shannon (26D)
- Upper Shannon (26G)

**WFD Subcatchments:**

- Shannon[Lower]\_SC\_010
- Shannon[Lower]\_SC\_020
- Shannon[Lower]\_SC\_030
- Shannon[Lower]\_SC\_050
- Suck\_SC\_090
- Suck\_SC\_100

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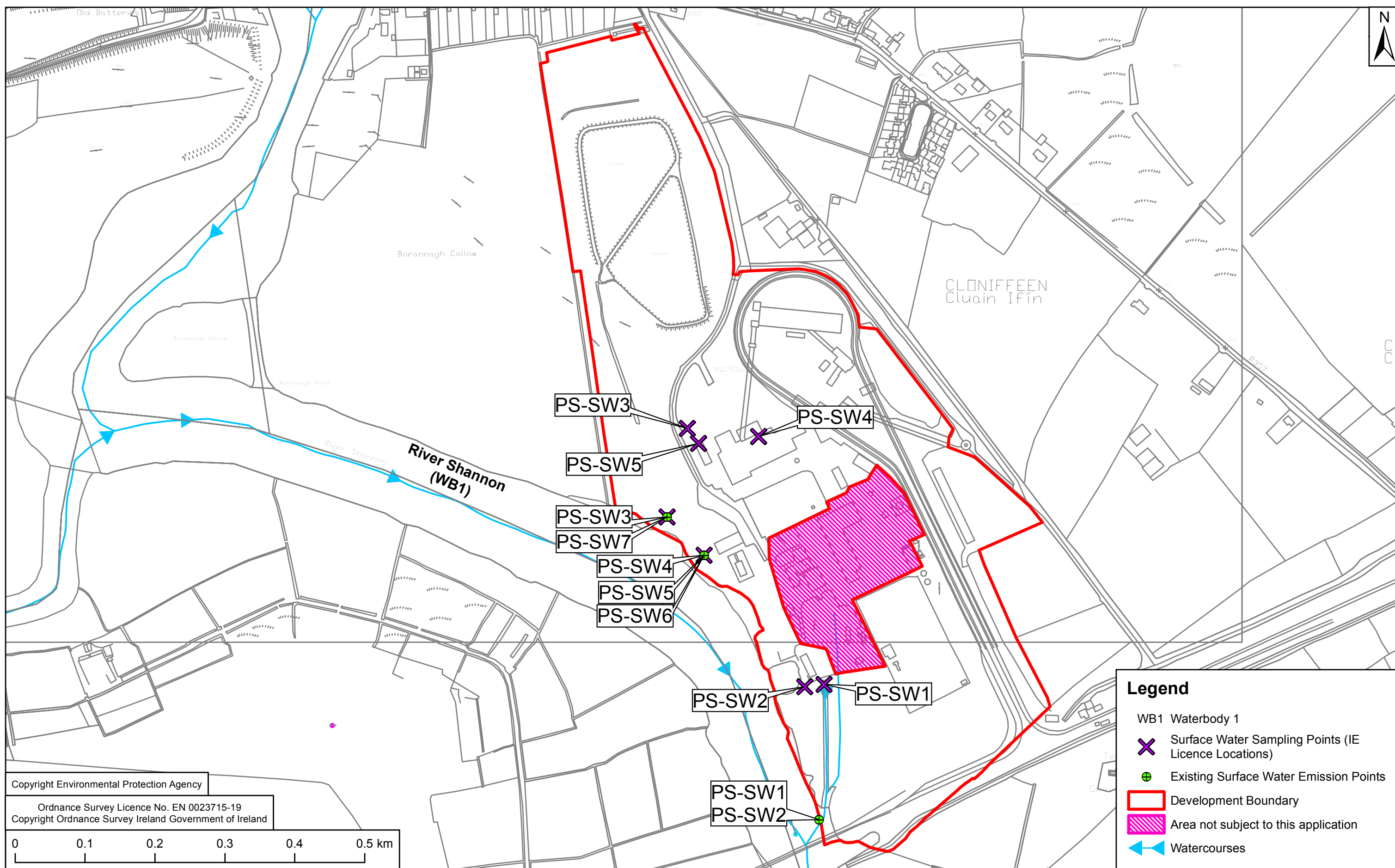
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DRAWING TITLE:	<b>Figure 8.1- WOP Station &amp; ADF - Hydrological Catchments/ Sub Catchments &amp; Environmental Pressures</b>
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0 0.1 0.2 0.3 0.4 0.5 km

**Legend**

- WB1 Waterbody 1
- ✕ Surface Water Sampling Points (IE Licence Locations)
- ⊕ Existing Surface Water Emission Points
- ▭ Development Boundary
- ▨ Area not subject to this application
- ↔ Watercourses

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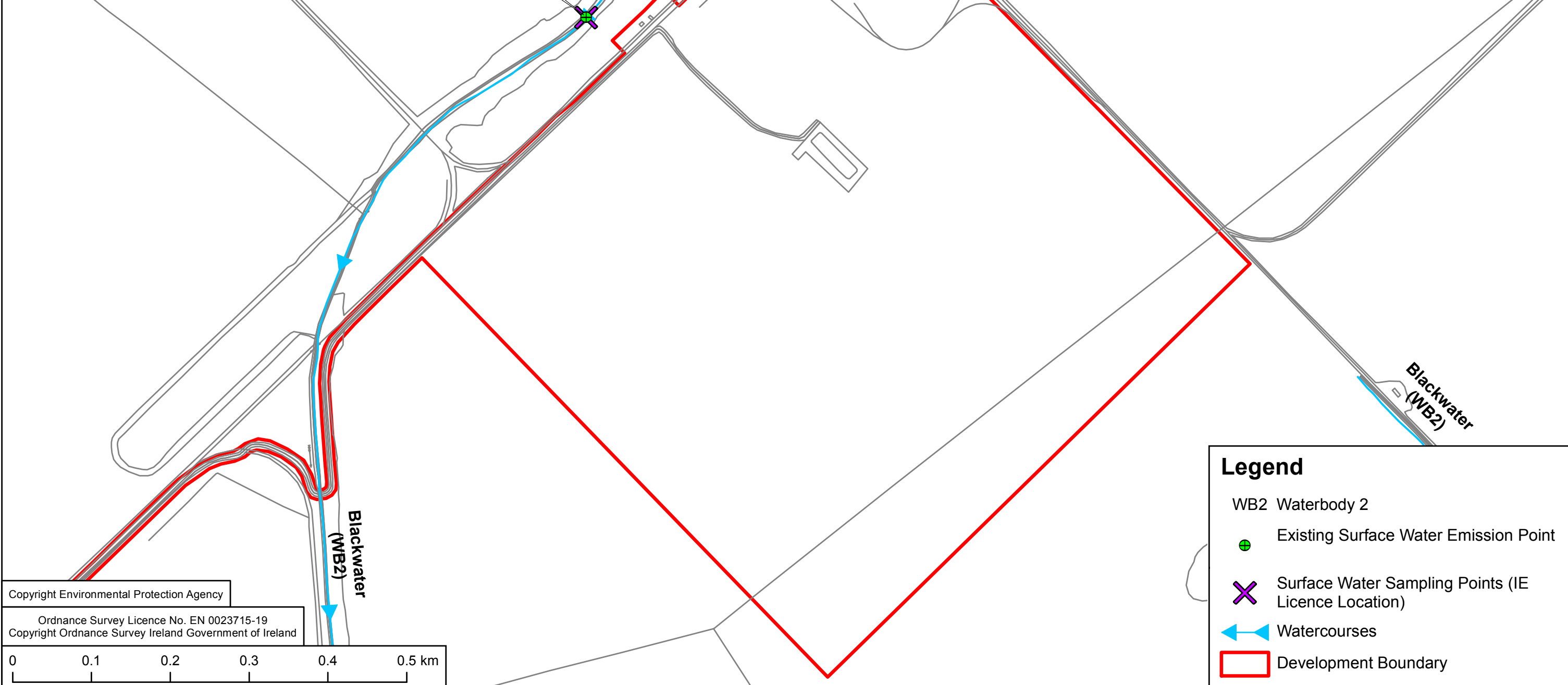
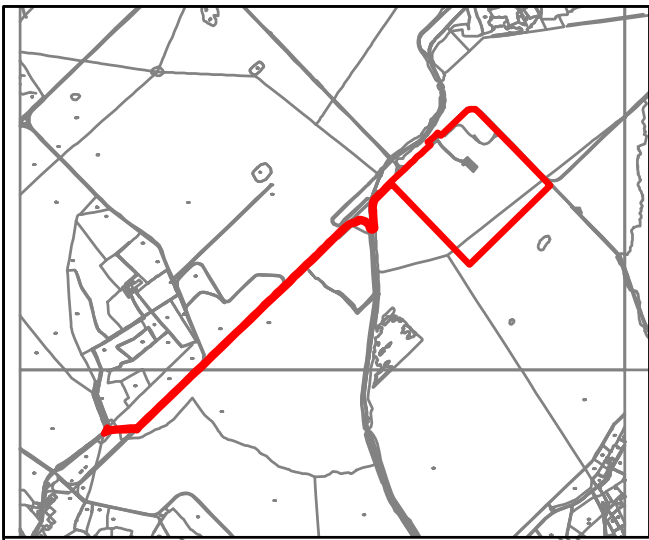
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**Legend**

- WB2 Waterbody 2
- Existing Surface Water Emission Point
- Surface Water Sampling Points (IE Licence Location)
- Watercourses
- Development Boundary

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CONTRACT: **Figure 8.3-  
WOP ADF -  
Surface Water Quality Monitoring and  
Discharge Locations and Waterbodies**

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APPROVED: **P.Kavanagh**

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In relation to Condition 5.5 a number of non-compliances have been issued by the EPA. These non-compliances have been issued based on the results of the thermal plume surveys undertaken in 2014 and the ongoing continuous monitoring undertaken at the station site since August 2016. In 2014 a study of the thermal plume and its potential effect in particular on aquatic species including fish was commenced by ESB. Further details of this study are contained in **Chapter 6** specifically **Appendix 6.2: The West Offaly Power Thermal Discharge Synthesis Report** (ESB, 2017). It is noted that Condition 5.5 of the current IEL is the principal subject of an IE licence review with the EPA.

In addition to the discharge from the station site leachate generated at the ADF is discharged (via AL-SW1) to an adjacent waterbody.

In terms of fuel peat is exclusively supplied to the WOP Station (principally by rail) from Bord na Móna and harvested, under licence, from a defined number of existing supply bogs. Biomass will be transported to the WOP Station by road principally from imported sources until such time as indigenous biomass is available to meet the demand of the project.

The applicable BAT documents of relevance to the WOP Station in the context of surface water are:

- The EC Large Combustion Plant BAT Reference Document (BREF) 2017 and the Commission Implementing Decision (EU) 2017/1442 of 31 July 2017 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for large combustion plants (notified under document C(2017) 5225) (Text with EEA relevance); and
- The EC Integrated Pollution Prevention and Control (IPPC), Reference Document on the application of Best Available Techniques to Industrial Cooling Systems, December 2001.

## 8.2.2 Baseline Data Gathering

### 8.2.2.1 Desktop Study

A desk study was carried out to collate the available information on the surface water environment of the study area with the following data sources referenced:

- Ordnance Survey of Ireland (OSI) - current and historic mapping;
- Aerial photographs;
- EPA - water quality monitoring database and reports;
- Met Éireann ([www.met.ie](http://www.met.ie));
- EPA - flow and water level measurements (EPA Hydronet System);
- Water Framework Directive Ireland Database ([www.wfdireland.ie](http://www.wfdireland.ie));
- The Shannon RBMP 2009-2015 and the Lough Ree and Upper Shannon WMU Action Plans 2009-2015;
- The River Basin Management Plan for Ireland 2018-2021 (Department Housing, Planning, Community and Local Government (DHCLG), (2018);

- National Parks and Wildlife Service for designated sites;
- Inland Fisheries Ireland (IFI) data;
- The Shannon River Basin District Catchment Flood Risk Assessment and Management Study (CFRAMS) (OPW, 2018);
- West Offaly Power Industrial Emissions Licence P0610-02 and associated licence documents;
- West Offaly Power, Thermal Plume Synthesis Report (ESB, 2018);
- West Offaly Power, Thermal Plume Modelling Report (ESB, 2018);
- West Offaly Power certified EMS documentation (ESB, various dates);
- Shannon Bridge New Peat Power Station Project Environmental Impact Statement (ESB, 2001);
- Offaly County Development Plan 2014-2020;
- The EPA IPC licenced Bord na Móna peat extraction documentation:
- Forestry Service ([www.agriculture.gov.ie/forests-service/](http://www.agriculture.gov.ie/forests-service/)); and
- Forest Service (of the Department of Agriculture Food and the Marine (DAFM)), Forestry Standards Manual (DAFM, 2015).

Full references are provided in **Section 8.11**.

### 8.2.2.2 Baseline Water Quality Monitoring

As part of the IE Licence requirements surface water monitoring is carried out on the River Shannon and the tributary of the Blackwater (known also as the Gowlan River) up and downstream of discharge points biannually for the following parameters;

- Temperature;
- Chlorine;
- Suspended Solids;
- Dissolved Solids;
- Ortho-phosphate (as P);
- Sulphate; and
- Heavy Metals.

In addition monitoring was undertaken at the cooling water inlet over a six week period from March to April 2016 for the following parameters:

- PH;
- Conductivity;
- Dissolved Oxygen (DO);
- Total Residual chlorine;
- Ammoniacal Nitrogen as N and NH<sub>4</sub>;

- Total Oxidised Nitrogen as N;
- Chloride;
- Total Phosphorus; and
- Ortho-phosphate as P04 and P.

### 8.2.2.3 River Shannon Temperature Monitoring

Irish Hydrodata have undertaken five (boat based) thermal plume surveys along the River Shannon at the WOP Station between August 2014 and July 2016.

In addition since August 2016 there is an ongoing programme of continuous temperature monitoring at a number of fixed points in the Shannon River. As part of this continuous monitoring programme monthly reports are issued to the EPA on the findings.

### 8.2.2.4 Aquatic Ecology Surveys

Further details of the aquatic ecology surveys undertaken in relation to the thermal plume are contained within **Chapter 6: Biodiversity** and **Appendix 6.2**. In summary the following surveys were undertaken:

- Aquatic Services Unit (ASU), UCC undertook biological surveys in 2014, 2015 and 2016 which covered the following:
  - Diatoms;
  - Macrophytes; and
  - Macroinvertebrates.
- ESB Fisheries undertook five fyke net surveys at Shannonbridge in August 2016, October 2016, February 2017, November 2017 and December 2017.

### 8.2.2.5 Hydrology

A network of hydrometric gauges are managed and operated throughout the Shannon by the OPW, EPA, ESB and Waterways Ireland. Within the study area the OPW and ESB measure and record water level as outlined in **Table 8-1**.

At certain locations, a series of flow measurements have been taken and a relationship between water level and flow (known as a rating curve) developed. In the absence of a rated hydrometric gauge at Shannonbridge (see **Table 8-1**) and for the purpose of this assessment it was necessary to derive river flows using records from elsewhere on the Shannon, see **Section 0**.

**Table 8-1: Gauging Stations within the Study Area**

Station No	Location	Water Level	Rated for Flow	Data Source:
26028	Shannonbridge	X		OPW
26067	Athlone	X	X	ESB
25017	Banagher	X	X	OPW
26007	Bellagill (Suck)	X	X	OPW

### 8.2.2.6 Consultation

Consultation undertaken as part of the EIAR and of relevance to the surface water impact assessment was undertaken with the following organisations:

- The EPA\*;
- The National Parks and Wildlife Service (NPWS);
- Offaly County Council\*;
- Irish Water (IW); and
- Inland Fisheries Ireland (IFI)

Consultation responses to the EIA scoping report (indicated above by\*) are summarised in **Chapter 1**.

### 8.2.3 Thermal Plume Modelling Methodology

A thermal plume model for the WOP Station was developed using Telemac-3D. Telemac-3D is a three dimensional hydrodynamic modelling software. The model was used to determine the extent of the thermal plume associated with the station with the following scenarios were run:

1. Medium Flow Conditions (the 75%ile flow at Athlone);
2. Low Flow Conditions (the 95%ile flow at Athlone); and
3. Baseline Conditions for the purpose of model calibration and verification for July 2014.
4. Baseline Conditions for the purpose of model calibration and verification for April 2016

In relation to the thermal plume methodology the following is noted;

- It is difficult to estimate the flows at Shannonbridge as there is no flow gauge at this location. Therefore two methods have been used to estimate flow based on professional judgement;
- The model assumes that the ambient temperature is constant throughout the model domain but the results of the continuous monitoring shows that there is a natural variation in temperature of up to 1°C;
- The effects of wind, solar radiation, cloud cover, humidity and air temperature have not been taken into account in the model. These effects are considered to be small as the model results are in good agreement with the thermal plume surveys.
- The Ordnance Survey definition of the river banks has been used and this does not take account of the vegetation in the river close to the river banks which may affect the currents in the river; and
- The cooling water temperature rise is assumed to be constant. In reality the temperature rise fluctuates.

Further details of the modelling methodology are included in **Appendix 8.1**.

## 8.2.4 Flood Risk Assessment Methodology

A Flood Risk Assessment (FRA) in line with the Guidelines for Planning Authorities (GPA) 20: The Planning System and Flood Risk Management (OPW, 2009), has been conducted for the proposed development for both the station and the ADF sites. GPA20 outlines the key principles that should be used to assess flood risk and recommends a staged approach as follows:

- **Stage 1:** Flood Risk Identification: to identify any flood risks that may warrant further investigation;
- **Stage 2:** Initial Flood Risk Assessment: to confirm sources of flooding, to appraise the availability of existing information and to assess the potential for mitigation measures; and
- **Stage 3:** Detailed Flood Risk Assessment: to allow design of the proposed development and assess the effectiveness of proposed mitigation measures.

The FRAs were carried out as part of the assessment of the proposed development to provide an overview of the potential flood risks to the proposed site and to assess the potential impact of the project on flood risk, see **Appendix 8.2**. A summary of the outputs of the FRAs are contained in **Section 8.5.4** of this chapter.

## 8.2.5 Appraisal Method used for Assessment of Impacts

The following impact assessment methodology was adapted from the NRA Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009), specifically **Section 5.6** (impact quality, type, magnitude/ significance and duration are considered relative to the importance of the hydrological attribute), see Table 13.2 to Table 13.4. These published guidelines are specific to the hydrological environment. The assessment methodology also took account of the guidance set out in the EPA Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2002) (and revised and draft guidelines 2017).

The quality of the impacts will be classed as positive, negative or neutral in line with EPA guidance. In addition the duration of these potential impacts will also be outlined as follows:

- Temporary - < 1 year;
- Short term - < 7 years;
- Medium term - 7-15 years;
- Long term - > 15 years; and
- Permanent - > 60 years.

Impact types considered are direct, indirect, do nothing, cumulative and residual.

The significance of the impacts will be identified as outlined in the assessment criteria in **Table 8-2** to **Table 8-4**.



Table 8-2: Criteria for Rating Site Receptors

Receptor Importance	Criteria	Typical example
<b>Extremely High</b>	Attribute has a high quality or value on an international scale	River, wetland or surface waterbody ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European communities (Quality of Salmonid Waters) Regulations, 1988.
<b>Very High</b>	Attribute has a high quality or value on a regional or national scale	River, wetland or surface waterbody ecosystem protected by national legislation (NHA status). Regionally important potable water source supplying >2500 homes. Quality Class A (Biotic Index Q4, Q5). Flood plain protecting more than 50 residential or commercial properties from flooding.
<b>High</b>	Attribute has a high quality or value on a local scale	Salmon fishery. Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding.
<b>Medium</b>	Attribute has a medium quality or value on a local scale	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.
<b>Low</b>	Attribute has a low quality or value on a local scale	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.

**Table 8-3: Criteria for Rating Impact Significance - Estimation of Magnitude of Impact on Hydrology Attribute**

Magnitude of Impact	Criteria
<b>Large Adverse</b>	Results in loss of attribute and/ or quality and integrity of attribute.
<b>Moderate Adverse</b>	Results in impact on integrity of attribute or loss of part of attribute.
<b>Small Adverse</b>	Results in minor impact on integrity of attribute or loss of small part of attribute.
<b>Negligible</b>	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity
<b>Minor Beneficial</b>	Results in minor improvement of attribute quality.
<b>Moderate Beneficial</b>	Results in moderate improvement of attribute quality.
<b>Major Beneficial</b>	Results in major improvement of attribute quality.

**Table 8-4: Rating of Significant Environmental Impacts**

		Magnitude of impact			
		Negligible	Small(minor)	Moderate	Large(major)
Importance	Extremely High	Imperceptible	Significant	Profound	Profound
	Very High	Imperceptible	Significant/ Moderate	Profound	Profound
	High	Imperceptible	Moderate/ Slight	Significant / Moderate	Profound/ Significant
	Medium	Imperceptible	Slight	Moderate	Significant
	Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

### 8.3 Study Area

The below sections outlines the study area considered for the surface water assessment.

#### 8.3.1 West Offaly Power Station including ADF

The assessment focuses on surface water receptors within 1km of the proposed development boundary and primarily those waterbodies adjacent to and on the downstream extents of surface waters receptors in the vicinity of the station and ADF site; this was extended as required dependent upon professional judgement.

In relation to the thermal plume the water model and the assessment extended from immediately upstream to 4km downstream of the discharge point as shown in **Figure 8.4**.

### 8.3.2 Peat Supply to West Offaly Power Station

Peat is exclusively supplied to the WOP Station from Bord na Móna and harvested, under licence, from a defined number of existing supply bogs as follows:

- P0500-01 - Boora Group,
- P0501-01- Derrygreenagh Group;
- P0502-01- Blackwater Group; and
- P0503- 01 - Allen Group.

The peat will principally be delivered to the station by rail and handled using existing plant facilities.

In order to assess the potential indirect impacts from the proposed development, a review of the current EPA IPC licence requirements for each bog group supplying WOP and the RBMP was undertaken to gain an understanding of:

- the baseline conditions,
- existing discharges/issues; and
- current licence EPA IPC licence conditions and monitoring requirements.

In addition the WFD status, risk category and significant pressures was collated and reviewed for waterbodies within a 50m buffer of the supply bog IPC licence boundaries.

### 8.3.3 Biomass Supply to West Offaly Power Station

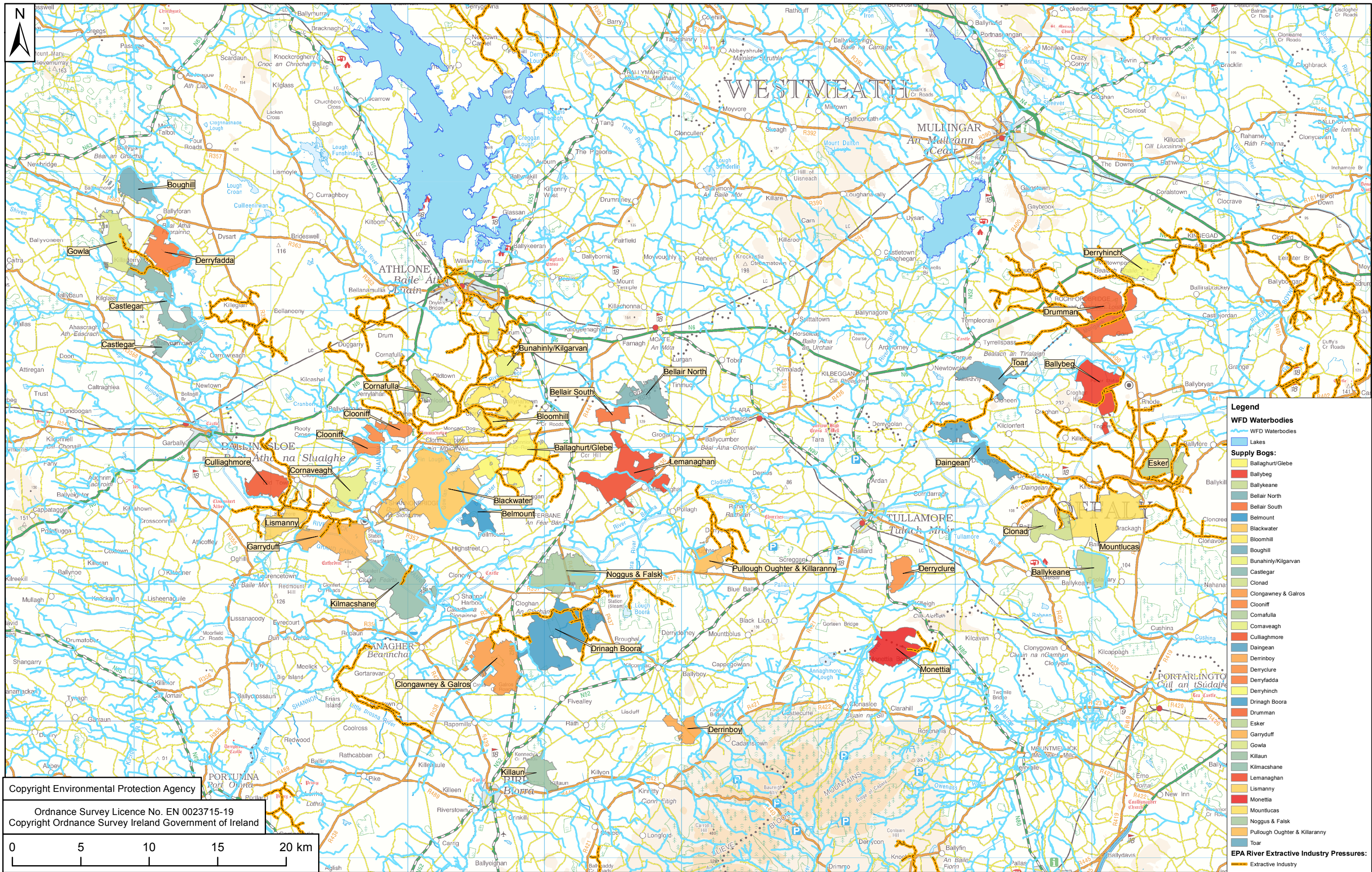
Biomass will be transported to the WOP Station by road principally from imported sources until such time as indigenous biomass is available to meet the demand of the project. Indigenous biomass will be transported via the road network. In order to assess the potential indirect impacts, a review of current forestry best practices and legislation requirements and the RBMP has been undertaken to gain an understanding of the baseline conditions in relation to forestry and agricultural practices, and an understanding of the current licencing requirements.

## 8.4 Receiving Environment

### 8.4.1 Surface Waterbodies

The proposed development is located within Hydrometric Area 25 in the Lower Shannon Catchment (WFD code:25B) and Sub Catchment (SC\_030). The station is located within Shannon (Lower)\_010 WFD River Sub Basin and the ADF is located within the Blackwater (Shannonbridge)\_020 River Sub Basin, see **Table 8-5**.





**Legend**

**WFD Waterbodies**  
 WFD Waterbodies  
 Lakes

**Supply Bogs:**

- Ballaghur/Glebe
- Ballybeg
- Ballykeane
- Bellair North
- Bellair South
- Belmont
- Blackwater
- Bloomhill
- Boughill
- Bunahin/Kilgarvan
- Castlegar
- Clooniff
- Clongawney & Galros
- Cornafulla
- Cornaveagh
- Cullaghmore
- Dangean
- Derrinboy
- Derryclare
- Derryfadda
- Derryhinch
- Drinagh Boora
- Drumman
- Esker
- Garryduff
- Gowla
- Killaun
- Kilmacshane
- Lemanaghan
- Lismanny
- Monettia
- Mountlucas
- Noggs & Falsk
- Pullough Oughter & Killaranny
- Toar

**EPA River Extractive Industry Pressures:**  
 Extractive Industry

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DRAWING TITLE: **Figure 8.4 - Bord Na Mona Supply Bogs & Waterbodies**

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**Table 8-5: Relevant WFD Water Regions**

Water Region	WOP Station		ADF
Hydrometric Area	25		
Catchment	Lower Shannon 25B		
Sub Catchment	Shannon(Lower)_SC_030 (25B_2)		
River Sub Basin	Shannon (Lower)_010	Blackwater (Shannonbridge)_020	
WFD Waterbody <sup>2</sup>	Suck_160 Shannon (Upper)_130 <sup>3</sup> Shannon (Lower)_010	Blackwater (Shannonbridge)_020 (known also as the Gowlan River)	

The Lower Shannon catchment (25B) covers an area of 982km<sup>2</sup> and is characterised by a wide flat plain underlain by mostly impure limestones. The Lower Shannon sub catchment (25B\_2) has an area of 120.2km<sup>2</sup> with much of the sub catchment being made up of peat bogs operated by Bord na Móna (EPA, 2017<sup>4</sup>). The majority of this sub catchment is made up of the Blackwater River Sub Basin and the Shannon (lower) Sub Basin.

**Table 8-6** and **Figure 8.2** and **Figure 8.3** outline the location of the waterbodies relevant to the proposed development site.

**Table 8-6 Study Area Context**

No.	Waterbody (WFD name)	Length (km) <sup>5</sup>	Location relevant to proposed development
WB1	River Shannon (Shannon (Lower)_010)	44.89	Located adjacent to the west of the WOP Station site. The hydraulic connection is through existing station drainage system (PS-SW6 & PS-SW7).
WB2	Blackwater (Shannonbridge)_020	35.45	Located adjacent to the north west of the ADF. Hydraulic connection is through existing ADF drainage system (AL-SW1).

## 8.4.2 Hydrology and Hydrometrics

As noted in **Section 8.2.2.5**, there is a water level gauge located on the Shannon at Shannonbridge (station no 26028) upstream of WOP Station. However this is an unrated

<sup>2</sup> Not all WFD waterbodies within the river sub basin are listed only those of relevance to the assessment.

<sup>3</sup> Both the Suck and the Shannon Upper waterbodies are located upstream of WOP Station site and discharges, see Figure 8.2.

<sup>4</sup> Catchments.ie

<sup>5</sup> Catchments.ie

gauge therefore flows on the Shannon are not available at this point. It is necessary to derive river flows using records from elsewhere on the Shannon as follows:

**Flow Estimation Method 1** - Flows at Shannonbridge can also be estimated from the values at Athlone using ratios of relative upstream catchment area as outline in the table below.

**Flow Estimation Method 2** - The OPW operates hydrometric gauge 26007 on the river Suck at Bellagill upstream of Ballinasloe. This is a rated gauge so flow can be estimated from the water level. The flow at Shannonbridge can be estimated by adding the discharge from Athlone to the flow at Bellagill.

Further detail of the hydrometrics of the study area is contained in the Thermal Model Report **Appendix 8.1.** and the Synthesis Report in **Appendix 6.2.**

### 8.4.3 Overview of WFD and Surface Water Quality

#### 8.4.3.1 Water Framework Directive Classification

The WFD ecological status, chemical status or conditions (where available) of the waterbodies adjacent to the site are detailed in **Table 8-7**. The WFD ecological status of the Shannon River water body in which WOP is situated is currently unassigned and the status of Blackwater River is good. It can be seen from **Table 8-7** that the status of the River Shannon in the vicinity of the station has remained unassigned since the beginning of the WFD implementation and the status of the Blackwater in the vicinity of the ADF has improved from moderate to good.

**West Offaly Power Transition to Biomass**

**Table 8-7: WFD Waterbodies and Current status in or adjacent to the Study Area**

Waterbody (WFD name)	WB Code	Type	Ecological Status			Chemical Status	Chemistry Conditions	Objective	Element causing < good
			2007-2009	2012-2012	2010-2015				
<b>River Shannon (Shannon (Lower)_010)</b>	IE_SH_25S01 2000)	River	Unassigned	Unassigned	Unassigned	NA	NA	Restore/ Protect	NA
<b>Blackwater (Shannonbridge_020)</b>	IE_SH_25B27 0200)	River	Moderate	Moderate	Good	Not Reported	Good	Protect	NA

### 8.4.3.2 Water Quality and EPA Classification

The EPA assesses the water quality of rivers and streams across Ireland using a biological assessment method. The EPA assigns biological river quality (biotic index) ratings from Q5-Q1 to waterbody sections where Q5 denotes a waterbody with high water quality and high community diversity, whereas Q1 denotes very low community diversity and a bad water quality.

**Table 8-8** provides details of the Q water quality status of the water bodies for the period 2004-2015 as shown in the EPA Envision Mapper (EPA 2017).

**Table 8-8: EPA Monitoring Station Locations and Current Status**

EPA River Reference	Station ID.	Q Value	Status 2004-2016
<b>River Shannon</b>	RS25S011960 (d/s of the station)	Q4-5	High status
<b>Blackwater River</b>	RS25B270200 (d/s of the ADF)	Q4	Good status

### 8.4.3.3 Baseline Water Quality Monitoring Results

As part of the IE Licence monitoring requirements surface water monitoring is undertaken on the Shannon and the Blackwater Rivers up and down stream of the station and ADF respectively for a number of parameters as outlined in **Section 8.2.2.2**. A review of 2014 to 2017 results was undertaken and where available these were compared to the Annual Average Environmental Quality standards (AAEQS) in the Surface Water Regulations. In most instances the parameters were in line with the surface water regulations AAEQS requirements. Levels of total chromium did not exceed the upper limit for chromium III but some results did exceed the upper limit for chromium VI. The levels of suspended sediment were below 25mg/l.

### 8.4.3.4 Aquatic Ecology Monitoring (Diatoms)

Diatoms were collected from macrophytes for analysis at eight sites from WOP respectively in 2014 and from 10 sites in 2015 and in 2016. These collections were analysed for Trophic Diatom Index (TDI) which in turn is used to generate EQR (Ecological Quality Ratio) which is used to determine the WFD Ecological Status of a given site. In terms of TDI and hence EQR and WFD Status, sites upstream of the station tended to have Good or High Status which dropped to Good or Moderate in the stretch immediately below the station before recovering to Good or High Status some distance downstream. More detail on the aquatic ecology monitoring is contained in **Chapter 6** specifically **Appendix 6.2**.

## 8.4.4 Water Supply Sources

The Lower Shannon is designated as a drinking water upstream of the WOP Station to Banagher. This includes part of the Blackwater River downstream of the ADF. There is one known public surface water abstraction point at Banagher some 10 km downstream. The station itself is served by the public water supply.



### 8.4.5 Known Environmental Pressures<sup>6</sup>

There is one IE Licence within the study area and this is associated with the WOP Station (including the ADF) itself and one surrendered IPPC licence associated with the former Shannonbridge Power Station.

Irish Water operate a Waste Water Treatment Plant (authorisation no. A0171-01) in Cloniffeen townland North West of the study area. The Shannonbridge Wastewater Treatment Plant (WWTP) discharges to the River Shannon (upstream of the WOP discharge point) and this discharge point is located within the study area, see **Figure 8.1**.

Bord na Móna operate peat extraction under IPC licence no P0502-01. This is associated with the Blackwater Group which is made up of the Blackwater and Attymon bogs. The bog resources within the Blackwater group are used for the production of milled peat which is used to supply the WOP generating station at Shannonbridge. The Extractive Industry

The WOP generating station uses an onsite septic tank with raised percolation area to treat foul water prior to discharge to the River Shannon.

The Shannon (Lower)\_010 is considered to be “under review” in terms of risk of not achieving its WFD objectives and the associated significant pressure is Urban Waste Water. The Blackwater (Shannonbridge\_020) is “not at risk” of achieving its WFD objectives.

### 8.4.6 Ecological Designations

There are a number of European and nationally designated sites within 15 km of the WOP Station and the ADF. Further details of all the designated areas are included in **Chapter 6: Biodiversity** and in **Appendix 6.1: Screening for Appropriate Assessment and Natura Impact Statement (NIS)**. Sites within close proximity and off relevance to this surface water assessment are as follows:

- River Shannon Callows Special Area of Conservation (SAC) and proposed Natural Heritage Area (pNHA) (site code: 000216);
- Middle Shannon Callows Special Protection Areas (SPA) (site code: 004096); and
- Suck River Callows NHA (site code: 000222).

### 8.4.7 Aquatic Ecology including Fisheries

It is noted that the waterbodies are not Salmonid Rivers under the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. 293 of 1988) neither are they Water Bodies intersecting with WFD Designated Salmonid Waters.

Further details of the baseline in relation to aquatic ecology and fisheries within the study area is detailed in **Chapter 6: Biodiversity** specifically **Appendix 6.2**. In summary nine

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<sup>6</sup> Discharges, Integrated Pollution Control/Industrial Emissions Licenced Facilities and Urban Wastewater Treatment Plants

species of fish were recorded in the River Shannon at the WOP Station dominated in terms of species and numbers by coarse fish and eel whereas brown trout (the only salmonid present) was represented by comparatively small numbers overall. A single lamprey was also caught. The overwhelming numerical dominance of cyprinid fish, as well as the greater diversity of this group at WOP, indicates that the main channel of the Shannon at this location can be classified as a cyprinid water, see further detail in **Chapter 6**.

### 8.4.8 History of Flooding and Flood Risk Assessment

With reference to the OPW National Flood Hazard Mapping ([www.floodmaps.ie](http://www.floodmaps.ie)) which contains flood information, two historical flood events were identified within the study area around the station site but there is no record of any flood events at the ADF, refer to **Appendix 8.2**.

As part of the Shannon Catchment Flood Risk and Management Study (CFRAMS) the station was identified as an Individual Risk Receptor (IRR) within Unit of Management (UoM) 25/26 and thus features within the Flood Maps published in June 2016. The ADF did not form part of the mapping for the CFRAMS.

Fluvial flood extent maps indicate that in the event of severe flood conditions flood waters from the River Shannon will likely encroach on the eastern part of the property boundary during the 10% 1% and 0.1% Annual Exceedance Probability (AEP) flood event. However, flood extent mapping illustrates that the flood zones do not encroach on the proposed work areas.

### 8.4.9 Receptor (waterbody) Importance

**Table 8-9** summarises the importance of the surface waterbodies (receptors) within the study with reference to the criteria from NRA Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, professional judgement.

**Table 8-9: Receptor Importance within the Study Area**

No.	Receptor	Attributes Considered	Type	Importance	Rationale
<b>WB1</b>	River Shannon	<ul style="list-style-type: none"> <li>o WFD Ecological Status</li> <li>o EPA Water Quality</li> <li>o Ecological Designations incl. salmonid</li> </ul>	River	Extremely High	<p>The WFD status of the Shannon River (Lower) is unassigned.</p> <p>This river forms part of the River Shannon Callows SAC and Middle Shannon Callows SPA.</p>

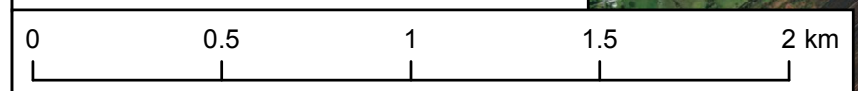
## West Offaly Power Transition to Biomass

No.	Receptor	Attributes Considered	Type	Importance	Rationale
<b>WB2</b>	Blackwater River		River	Very High	<p>The water quality of this waterbody is good.</p> <p>This river discharges to the River Shannon which is part of the River Shannon Callows SAC and Middle Shannon Callows SPA.</p>





Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



**Legend**

- Development Boundary
- Area not subject to this application
- Cooling Water Outfall
- Cooling Water Intake
- Thermal Plume Model Extent

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CONTRACT:

DRAWN: **E.O'Shea**

PRODUCED: **E.O'Shea**

VERIFIED: **O.Duffy**

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### 8.4.10 Peat Supply Bogs

There are a number of waterbodies associated with these existing supply bog as shown in **Figure 8.5** and detailed in **Appendix 8.3**. The WFD status for the waterbodies within close proximity to peat production bogs (50m buffer zone from the IPC licence boundary) are tabulated in **Appendix 8.3** in addition to the risk category and the known significant pressures. The majority of the waterbodies in the vicinity of the bogs that supply WOP are of unassigned status and where ecological status is assigned this ranges from bad to high with the majority at poor or good status, see **Appendix 8.3**. A number of waterbodies within proximity to the peat supply bogs are considered “at risk” of not achieving their WFD objectives. Many of these waterbodies are considered to be under significant pressure from the extractive industry, see **Figure 8.5** and see **Appendix 8.3**. Many of the waterbodies are also at risk from other significant pressure including agriculture, hydromorphology, industry, urban waste water. With many waterbodies having more than one significant pressures.

All the Bord na Móna supply bogs are licenced by the EPA and there are a number of conditions stipulated under each licence in order to provide for the protection of the environment by way of control, limitation, treatment and monitoring of emissions, see extract from a Bord na Móna IPC Licence specifically Condition 6 and 9 in **Appendix 8.4**.

The IPC licences were granted in 1999 however over the period of 2012 to 2013 the IPC Licences that supply the WOP Station were subject to a technical amendment in accordance with the requirements of the European Communities Environmental Objectives (Surface Water) Regulations 2009 as amended. As a result of this process a number of modifications to the relevant conditions of the Bord na Móna licences were subsequently made through a technical amendment to the licence (see **Appendix 8.4** of this EIAR). This included a revised Surface Water Discharge Monitoring Programme which was submitted to the EPA in 2013 and is currently being implemented by Bord na Móna. The programme comprises a review of the existing measures in place, an assessment of the baseline conditions of the peat production areas and the receiving waters, an assessment of the effectiveness of silt pond control measures and implementation of a silt pond upgrade programme (Bord na Móna, 2016).

A review of the (Annual Environmental Reports (AERs) and the EPA Inspection Report for the period 2015-2017 was undertaken for the purpose of this assessment. The majority of sites reported no breaches with suspended solids ELVs and compliance with Threshold Limit Values (TLV) for ammonia over this period. In addition all sites related to peat supply for WOP have been subject to EPA inspection over the last two years with correction actions identified as required.

Draft rehabilitation plans of the respective bogs have been prepared by Bord na Móna and submitted to the EPA for approval as part of the respective bog grouping IPC licences, see further detail of this and the Bord na Móna Biodiversity Action Plan in **Chapter 6**.

The second River Basin Management Plan published in 2018 identified peat extraction as causing a significant risk to ecological status objectives in 119 waterbodies. Of these 119 waterbodies, 46 (or 39%) are in areas that have peatland owned by Bord na Móna. The RBMP relates environmental impacts to suspended solids, ammonia and hydromorphological alterations (DHPLG, 2018). Of the 119 water bodies where peat

extraction and associated drainage works have been identified as a significant pressure, 6 are expected to meet their WFD objectives by 2021. (None of these is associated with Bord Na Móna peatlands.) A further 62 water bodies are expected to meet their WFD objectives by 2027. (Of these, 21 are associated with Bord Na Móna peatlands.) Another 51 water bodies are expected to meet their WFD objectives after 2027. (Of these, 25 are associated with Bord Na Móna peatlands.)

There are a number of principle actions proposed in the published RBMP to address these pressures at a strategic scale as follows:

- “
1. *The Minister for Housing, Planning, Community and Local Government intends to make regulations in 2017 as soon as possible that will require the EPA to carry out EIA for all existing and new large-scale peat extraction (> 30ha) as part of its examination of IPC license applications for the activity. When these regulations are made, proposals will be developed for public consultation relating to a new regulatory regime that will bring smaller-scale commercial peat extraction ( $\leq$  30ha) under a new local authority licensing system incorporating EIA and AA, as necessary, and enforcement powers.*
  2. *The DCHG<sup>7</sup>, together with the Peatlands Strategy Implementation Group, will oversee the implementation of the National Peatland Strategy and the first national management plan for Ireland's raised-bog Special Areas of Conservation (SACs) network.*
  3. *The Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs will oversee the implementation of the Peatland strategy the principal aim of which is to provide a framework for determining and ensuring the most appropriate future use of cutover and cutaway bogs.*
  4. *Bord na Móna will implement its Sustainability 2030 Strategy and Biodiversity Action Plan 2016-2021 which addresses the long-term rehabilitation of its cutaway bogs.*
  5. *By 2021, Bord Na Móna will rehabilitate an additional 25 peatlands covering approximately 9,000ha. This is subject to several assumptions, including the availability of cutaway bogs for rehabilitation.*
  6. *The EPA has identified this priority issue as the subject of a research proposal for inclusion in its 2018 research call. The proposal involves evaluating mitigation strategies for improving water quality from drained peatlands. The project proposal, if selected, is intended to integrate with the ongoing mitigation trials being undertaken by Bord Na Móna.”*

As part of the above Bord na Móna, in conjunction with the EPA, are assessing whether peat harvesting gives rise to ammonia release and also measures to mitigate the generation and impact of ammonia from their cutaway peatlands if these are required. In addition Bord Na Móna commenced work in 2017 on preparing Environmental Impact Assessments on all of

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<sup>7</sup> Department of Culture, Heritage and the Gaeltacht.

its peatlands including AA, where necessary, in anticipation of the new streamlined licensing system for large-scale peat extraction (> 30ha) that will be operated by the EPA.

The Strategic Environmental Assessment (SEA) undertaken for the RBMP has determined that the above proposed measures will have broadly positive effect on the water environment.

#### 8.4.11 Biomass Supply

The principle source of indigenous fuel will be products, co-products, by-products and residues from the Irish forest sector (brush, thinnings and residues), residues and by-products from Irish sawmills and agricultural biomass sources including some energy crops. The primary emissions to water associated with the Irish forest sector are discharges arising from forestry operations including clear-felling, establishment and replanting activities and management activities such as fertilisation.

The exact location of biomass source within Ireland has not been yet been identified but will be a combination of state and privately owned forest estates and agricultural lands generally within a 100km radius from the WOP Station as described in **Chapter 4**.

As outlined in **Chapter 4** of this EIAR under the Forestry Regulations 2017 (S.I. No. 191 of 2017) all applications for licences for the following activities afforestation, forest road construction projects, aerial fertilisation and tree felling operations, require the prior written approval from the Minister for Agriculture, Food and the Marine, see **Section 4.4.3**. Before the Minister can grant approval for any of the above activities, they must first determine if the project is likely to have a significant environmental effect.

In addition to the above licencing requirements the Forests and Water Quality Guidelines were developed by the Forest Service and apply to all grant-aided projects and to all activities associated with a Felling Licence. These guideline make provisions for the following:

- SAC, SPAs and pNHAs/NHAs;
- Areas sensitive to acidification;
- Areas sensitive to erosion;
- Buffer Zones;
- Ground preparation and drainage works;
- Fertiliser application and storage;
- Chemicals, fuel and machine oils;
- Roads, bridges, culverts and fords; and
- Harvesting.

In relation to the development of energy crops within the agriculture sector (such as Short Rotation Coppice (SRC) of willow), environmental protection is facilitated through the implementation of cross-compliance and agri-environmental schemes (e.g. GLAS) under the

Common Agricultural Policy, the application of measures under the Nitrates Action Programme (as required under the EU Nitrates Directive (91/676/EEC)) and the ongoing employment of the European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011 (as amended).

The second River Basin Management Plan also acknowledges that the Forest Service<sup>8</sup> is aware of the negative impacts inappropriately sited forests and poorly managed forest operations can give rise to. In addition the RBMP acknowledges agriculture as a significant pressure in approximately 53% of At Risk water bodies due to excess nutrients; chemicals, including those used in pesticides; and sediment loss due to poor land management have all been identified as likely pressures in certain water bodies (DHPLG,2018). A number of principle actions have been proposed in the RBMP to address these pressures at a strategic level as follows:

“

- 1. The DAFM will implement the forestry-related regulations, policies and requirements that are being realigned with national water policy.*
- 2. Coillte, which owns over half of Ireland's forested lands, will continue to implement and refine its integrated Environmental Risk Assessment approach to its forestry operations.*
- 3. The DAFM will promote the uptake of the National Woodland Establishment Scheme and the Native Woodland Conservation Scheme, and will finalise and launch the Environmental Enhancement of Forests Scheme.*
- 4. With regard to the protection of freshwater pearl mussel populations from forestry pressures, the DAFM will develop and implement the proposed plan for Forestry and FMP in Ireland ....;*
- 5. Through the strengthened inter-agency co-operation structures, the DAFM will work with other stakeholders — with local authorities, in particular — to ensure the strategic deployment of forestry measures. Particular focus will be given to the protection of high-status-objective waters and to progressing the other priorities set out in this RBMP.*
- 6. DAFM and EPA will continue to undertake forestry and water research to inform future forestry practices, so that they contribute to the protection and enhancement of water quality.*
- 7. The new, strengthened Nitrates Action Programme (2018–2021) will be the key agricultural measure for preventing and reducing water pollution from nutrients (nitrogen and phosphorus) arising from agricultural sources. It will be complimented by other supporting measures listed below.*
- 8. The integrated Governmental approach to the enforcement of the Nitrates Action Programme (2018–2021) will be maintained and strengthened. The inter-agency/ inter-departmental Water Quality and Agriculture working group will ensure increased targeting of inspections by local authorities based on water quality results and the outputs of the characterisation process.*

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<sup>8</sup> Part of the Department of Agriculture, Food and Marine (DAFM)  
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9. *The Pesticides Regulations and the Agriculture Environmental Impact Assessment Regulations will continue to form a key part of the actions over the second cycle. These will be strengthened by other supporting measures as outlined*
10. *Teagasc will promote best practice in water-quality protection through its discussion groups and on-farm advisory services.....*
11. *The GLAS Scheme, which is under the RDP, has a budget of €1.4 billion for the period 2014–2020. This period will see 50,000 farmers participating in the scheme and implementing actions to improve the rural environment, including actions to improve water quality.....*
12. *..... a key recommendation of the Food Wise 2025 strategy is that the environmental impacts of the strategy should be monitored. The DAFM will work closely with relevant agencies to ensure that this monitoring takes place.....”*

The SEA undertaken for the RBMP has determined that the above proposed measures will have a broadly positive effect on the water environment.

Biomass will be sourced from demonstrably sustainable sources only which will be audited and certified, see **Chapter 4**.

## 8.5 Impacts of the Development

This section considers and assesses the impact of the proposed development with regards to surface water receptors.

Flooding impacts are addressed in detail in the FRA specialist report contained in **Appendix 8.2** and are summarised in **Section 8.5.4**.

### 8.5.1 West Offaly Power Station Site

#### 8.5.1.1 Construction

The construction period for the proposed development will be approximately 6 – 9 months. The scope of works is relatively small scale however during the construction phase there is the potential for pollution of surface waterbodies due to sediment loading and associated anthropogenic polluting substances entering waterbodies as a result of surface water runoff and/or spills/inappropriate storage on-site. Potential sources of sediment and/or polluting substances during the construction phase of the proposed development include:

- Excavations including those associated with the provision of new drainage works;
- Site clearance works;
- Reconstructive and resurfacing works;
- Stockpiling of materials;
- Accidental spillage of anthropogenic polluting substances in or adjacent to waterbodies and drainage networks; and
- Construction plant and vehicle washing.

It is noted that there will be no instream or bankside works required as part of the proposed development.

Given the location and relatively minor nature of the proposed works the pathway to the surface water receptors would be via the existing drainage network on site. Control measures are in place in relation to the operational site including an oil interceptor on PS-W7 and a settlement pond and a petrol interceptor on PS-SW6 and drains systems that have been tested in accordance with the requirement of the IE licence.

In terms of the physico-chemical parameters relating to water quality, the main potential contaminant during the construction phase will be suspended solids. In addition polluting substances such as hydrocarbons can enter the surface water system as a result of spills or inappropriate storage. Potential impacts from the construction works in the absence of construction phase mitigation measures on the sensitive receptor (River Shannon) are described below.

The Shannon River Lower (WB1) forms part of the River Shannon Callows SAC/SPA and is considered to be a receptor of extremely high importance. Any impact associated with increased sediment release or anthropogenic polluting substances during construction could have an impact on the water quality of the river and on the SAC. Impacts on water quality of WB1 from the construction of the proposed development are considered to be direct (sediment laden runoff, spills), **temporary, negative, and significant**. This is particularly the case in relation to any construction related discharges via PS-SW7 where the discharge would not be via the existing station surface water settlement pond.

Ecological Impacts on the designated sites, fisheries and aquatic species are considered in **Chapter 6**.

### 8.5.1.2 Operational Phase

If the WOP Station were to close in 2020 then there would no longer be any emissions to surface waterbodies as currently occurs under the station IE Licence. There would be no surface water impacts from the plant and the water quality baseline would reflect this fact. The proposed project will see the continued operation of the WOP Station with continued emissions from the plant to surface waterbodies. It is important therefore to determine the impact arising from the new elements related to the biomass but also from those emissions which would continue to be licenced by the EPA.

The WOP Station including the ADF currently operates under the Environmental Protection Agency (EPA) Industrial Emissions (IE) licence P0611-02. There are a number of existing discharges in relation to the station and the ADF as in **Section 8.2.1**. The following control measures are currently in place and will remain in place for the duration of the proposed development:

- Monitoring of all surface water discharges in line with IE Licence requirements;
- Oil interceptors which are checked and cleaned regularly;
- Storage tanks, chemical stores, transformers, barrels and containers are kept in permanent or temporary bunds;
- Discharges to greenfield runoff rates;
- Certified Environmental Management System (EMS) including but not limited to the following procedures:

- Oil Spill Response Plan; and
  - Emergency Procedures for Chemical, Fire or Crisis.
- Oil spill equipment is available on site;
  - The recirculation of leachate for dust suppression ensures that not all of the leachate is discharged from the WOP ADF.
  - Before discharging leachate from the ADF, a sample is taken to confirm that the Emission Limit Values (ELVs) will not be exceeded.
  - Monitoring is carried out on the River Shannon and the tributary of the Blackwater (known also as the Gowlan River) up and downstream of discharge points biannually for the following parameters;
    - Temperature;
    - Chlorine;
    - Suspended Solids;
    - Dissolved Solids;
    - Ortho-phosphate (as P);
    - Sulphate; and
    - Heavy Metals.
  - Frequent inspections of settlement ponds are carried out.
  - Bord na Móna (who operate the ADF on behalf of ESB) have developed Specified Engineering Work (SEW) proposals for the construction of each cell within the ADF. These documents detail the scope of the work to be carried out and also includes the specifications to which this work will be completed in accordance with IE Licence P0611-02. Controls included are:
    - All plant and machinery is refuelled using a mobile fuel unit transported to the site by rail;
    - All plant operators are familiar with the Emergency Response Procedure ERP 2.0 (Oil, Diesel & Petrol Spillages) and the Emergency Response in the Event of Oil Spillage; and
    - All service trains / tractors contain a spill kit / dry peat, in the event of an oil / diesel spill.

There are no additional discharge points proposed as part of the proposed development and there are no instream or bankside works required. Surface water runoff generated from the new biomass storage slabs (Slab A and B) and from the new pellet storage area will connect to the existing drainage network associated with PS-SW6, see **Appendix 8.5**. Drainage from the new biomass and pellet storage areas associated with the proposed development will be subject to the following mitigating design measures:

- The Biomass Storage areas (Slab A and Slab B) will incorporate the following:
  - New attenuation system;
  - Drainage channels;
  - New silt traps;
  - New settlement tank;
  - New oil interceptor.

- The Pellet Storage area will incorporate the following:
  - New attenuation system associated with slab A above.

All surface water runoff will then pass through the existing interceptor and settlement system associated with PS-SW6. Further detail of the drainage design for the proposed project are contained in **Appendix 8.5**.

It is noted that as part of the Certified EMS the following operating procedures/controls are in place in relation to oil spills, emergency procedures and general minimisation of environmental impact:

- EMS 10.1-01 - Emergency Procedures for Chemical spill, Fires, Crisis and national Electrical System Emergency
- EMS 10.1-03 - Accident prevention procedure
- EMS 10.1-06 - Oil Spill Response Plan
- EMS 9.1-04 - Procedure for Maintenance of Power Plant to Minimise Environmental Impacts
- EMS 11.2-04 - Procedure for Testing of Bunds & Safety Shower Checks

There will be no change to the potable water supply or to the treatment of foul water at the station or ADF sites as part of this proposed development. Discharges of foul water are operated and monitored under the conditions of the IE licence.

The WOP Station will continue to intake cooling water and discharge thermal cooling, some process related and surface drainage water as currently undertaken under the IE Licence with the established controls and design specified above in place. The thermal plume model outputs (see **Appendix 8.1**) demonstrate that during low flow (95%ile) conditions that the thermal plume can extend some 3 km downstream prior to dissipation. During medium flow condition (75%ile) the thermal plume dissipates some 650m downstream of its discharge point. The Thermal Plume does have an impact but this is localised in its effect and the “status” of the waterbody is considered to return to at least Good downstream of the discharge location. Therefore the thermal plume is not considered to be impeding the water body i.e. the Shannon (lower)\_110 (44.89 km) from maintaining or achieving a WFD status of good (current status unassigned). Therefore potential impacts on WB1 from the thermal discharge of the proposed development are considered to be **direct (operational discharge), long term, negative, and imperceptible**. Further details of the aquatic ecological assessment and the assessment of the thermal plume are provided in **Chapter 6**, specifically **Appendix 6.2**.

The potential effects from the proposed development have been assessed with the existing controls (required under the IE Licence and the Station accredited EMS) and mitigation by design (biomass surface water drainage design) in place. Therefore no other effects are anticipated to the Shannon River (WB1) as a result of the proposed development (including continued operation) with the existing control measures in place and the proposed (operational) drainage design.

## 8.5.2 Ash Disposal Facility

Cell construction is an ongoing activity at the ADF with a new cell being developed as another cell approaches capacity. The current cell status of the ADF is as follows:

- Cell 1 to 3 – filled and closed;
- Cell 4 - in operation; and
- Cells 5 - in development.

To date a number of cells have been constructed, filled and capped in accordance with the IE Licence requirement and more specifically the details submitted to the EPA for approval as specified in IE Licence Condition 3.13.4. As part of the proposed development additional capacity (or cells) will be required at the ADF. As above the main potential contaminant during this construction phase (i.e. cell construction) in relation to the ADF will be suspended solids or accidental spillages. Surface water runoff from the ADF currently discharges via the onsite drainage system to a holding lagoon prior to discharge to the Blackwater River (WB2) (also known as the Gowlan River) north of the site. WB2 ultimately discharges to the River Shannon which forms part of the River Shannon Callows SAC/SPA downstream of the ADF. Therefore, WB2 is considered to be a receptor of very high importance. However, there are existing measures in place in relation to the ADF cell construction including existing drainage system and monitoring requirements. Prior to discharging to WB2 runoff is subject to an ELV of 35mg/l for suspended solids and this is monitored prior to discharge to the BNM surface water drainage system. Therefore potential impacts on water quality of WB2 from the construction of the proposed development specifically the ADF cell construction is considered to be **direct (sediment laden runoff, spills), temporary, negative, and imperceptible** due to existing established controls in place.

Ecological Impacts are considered in **Chapter 6**.

### 8.5.2.1 Operational Phase

The ADF will continue to discharge as currently undertaken under the IE Licence with the established controls specified in **Section 8.5.1.2** in place. Therefore there are no effects anticipated to the Blackwater River (WB2) as a result of the proposed development (including continued operation) of the ADF with these existing control in place.

### 8.5.2.2 Summary Construction and Operational Impacts

**Table 8-10** provides a summary of the potential effects associated with the construction and operation of the proposed development taking into consideration the established mitigation and design specified in **Section 8.5.1.2**.

**Table 8-10: Summary of Environmental Impacts**

Receptor	Importance	Source of Effect	Effect Summary Description	Potential Effect Unmitigated		
				Magnitude	Significance	Impact Type
River Shannon (lower)	Extremely High	<b>Construction</b> <ul style="list-style-type: none"> <li>Construction Runoff</li> <li>Accidental Spills</li> </ul>	Sediment laden runoff and/or accidental spillage of deleterious material entering waterbody and causing a deterioration in water quality.	Small	Significant	Direct Negative Temporary
		<b>Operation</b> <ul style="list-style-type: none"> <li>Operational discharges</li> </ul>	Cooling water discharges resulting in a Thermal Plume on the waterbody.  Due to established controls and design specified in <b>Section</b> Error! Reference source not found. no other effects are anticipated.	Negligible	Imperceptible	Direct Negative Long Term
				NA	NA	NA
Blackwater River	Very High	<b>Construction</b> <ul style="list-style-type: none"> <li>Construction Runoff</li> <li>Accidental Spills</li> </ul>	Sediment laden runoff and/or accidental spillage of deleterious material entering waterbody and causing a deterioration in water quality.	Negligible	Imperceptible	Direct Negative Temporary
		<b>Operation</b> <ul style="list-style-type: none"> <li>Operational discharges</li> </ul>	Due to established controls and design specified in <b>Section 8.5.1.2</b> no effects are anticipated.	NA	NA	NA

### 8.5.3 Decommissioning Phase

Decommissioning activities are outlined in **Chapter 4** of this EIAR. Potential impacts associated with the decommissioning phase will be similar to the construction phase impacts identified above i.e. suspended solids and/or polluting substances entering the waterbody receptors. Upon the cessation of power generation and disposal activities, the closure requirements outlined in the prevailing planning and licensing consents, and as required by the EPA, will be adhered to. Specifically, the EPA approved Decommissioning Management Plan (DMP) and Closure, Restoration and Aftercare Management Plan (CRAMP) as required by Section 10.2 of the current IE Licence and any future licence requirements will be implemented.

### 8.5.4 Flood Risk Summary

Based on the assessment undertaken, there is no significant risk of flooding to the proposed works at WOP Station. It has been concluded that the site of the new works lies within Flood Zone C as defined by the guideline document to Planning Authorities in relation to Flood Risk Management. The proposed works within the station will not increase the current flood risk in the catchment.

In relation to the ADF this is located in Flood Zone C and therefore has a low risk of flooding. In addition the risk of pluvial and groundwater flooding are considered minimal and the design and operation of the facility will ensure there is no increased flood risk elsewhere due to the proposed development.

The proposed development is therefore considered to be in overall compliance with the objectives of the Planning and Flood Risk Management Guidelines. The Flood Risk Assessment for both the station and the ADF site are contained in **Appendix 8.2**.

### 8.5.5 Indirect Impacts - Peat Supply to West Offaly Power Station

It is noted that there will be no requirement for the development of any new raised bog areas within the supply bog estate but the ongoing peat supply to the WOP Station is associated to the continued operation of the Bord na Móna peat supply bogs identified in **Section 0**.

The primary emissions to water associated with peat harvesting are discharges arising from the bog surface water drainage channels. Under the EPA IPC licence discharge of suspended solids are limited to 35mg/l for all surface water outfalls from boglands within the licensed area. In addition there are a number of parameters monitored on a quarterly basis such as PH, flow, suspended solids, total solids, total phosphorus, total Ammonia, colour and COD.

Surface water run-off from hardstanding areas at the Bord na Móna sites is also a potential source of impact. The EPA IPC Licence for the Bord na Móna sites

provides for visual inspection and chemical analysis (COD) of such emissions on a weekly and monthly basis, respectively.

In addition to the above controls Trigger levels for Ammonia and COD were introduced in 2013 under Condition 6.14 of the IPC licence and these require Bord na Móna to notify the EPA if limits are exceeded. There are a number of other conditions stipulated under each licence in order to:

- provide for the protection of the environment by way of control, limitation, treatment and monitoring of emissions ;and
- provide for the protection of surface waters and groundwater.

Condition 6 and 9 of the IPC licences, see extracts in **Appendix 8.4** specify a number of conditions to provide for this protection as follows:

- Operational procedure for de-silting of the silt ponds.
- Silt ponds serving the operational bogs are cleaned as a minimum twice a year, once before ditching and once before harvesting, and more frequently as inspections may dictate.
- All existing silt ponds serving operational bogs are designed to achieve the following minimum performance criteria (flood periods excepted):
  - Maximum flow velocity < 10 cms-1; and
  - Silt design capacity of lagoons, minimum 50m<sup>3</sup> per nett ha of bog serviced.
- All silt ponds prone to flooding are de-silted by 1st November of each year.
- Excavated sludge is removed for disposal to a location outside the flood plain.
- Silt control measures include :
  - drainage manholes are protected and maintained free of excessive peat,
  - headlands are kept clean and free of excessive loose peat,
  - all new manholes and outfalls are set well back from turning grounds, drivers of bog plant do not turn short (over drains) at headlands,
  - harrows, millers, ridgers do not drag loose peat onto manholes or into drains, outside harrow spoons are directed away from drains,
  - silt run-off, while piping or ditching, is minimised,
  - outfalls are controlled to minimise silt discharge during cleaning operations,
  - drains are ditched in dry weather,
  - while ditching, outfalls are blocked and ditch towards outfall,
  - outlets from stockpile field drains are blocked during stockpile loading,
  - field drains adjacent to stockpiles are cleaned as soon as practicable after stockpile loading,
  - adequate room is allowed for rail bed beside stockpiles,



- all fields that have been milled are ridged at the end of the production season,
- all fields liable to winter flooding have been cleared of milled peat or recompactd at the end of the production season.
- Monitoring of Workshop/Depot Surface Water Run-off.
- The loading and unloading of fuel oils is carried out in designated areas protected against spillage and leachate run-off.
- Oil interceptors are in place.
- Containment booms and/or suitable absorbent material are available to contain and absorb any spillage.

A review of the AERs and the EPA Inspection Report for the period 2015-2017 was undertaken for the purpose of this assessment. The majority of sites reported no breaches with suspended solids ELVs and compliance with Threshold Limit Values (TLV) for ammonia over this period. In addition sites related to peat supply for WOP have been subject to EPA inspection over the last two years with correction actions identified by the EPA as required.

Impacts on water resources related to the supply bogs from the continued operation of the WOP Station are considered to be **indirect, long term, negative, and negligible** with the implementation of existing control measures required under the IPC Licence and ongoing enforcement of the IPC Licence conditions by the EPA.

Reference should be made to **Chapter 6** in term of the draft Rehabilitation Plans for the peatlands supplying WOP.

### 8.5.6 Indirect Impacts - Biomass Supply to West Offaly Power Station

The primary emissions to water associated with biomass production are discharges arising from forestry operations, agricultural activities and management activities such as fertilisers.

There are a number of legislative requirement in existence in relation to the forestry sector as detailed in **Section 8.4.11**.

In relation to the biomass supplies ESB will ensure that only biomass which has received sustainability certification is used, see **Chapter 4**.

Impacts on water resources related to the biomass supply from the continued operation of the WOP Station considered to be **indirect, long term, negative, and negligible** with existing control measures as detailed in **Section 8.4.11** and with sustainability certification in place.

### 8.5.7 Do-Nothing Scenario Impact

The “do nothing” scenario is the outcome that would be achieved if the proposed development was not constructed or continued.

In the absence of the proposed development it is anticipated that the baseline water quality of the River Shannon (WB1) in the vicinity of the thermal plume would improve primarily in the absence of this cooling water discharge. Therefore potential impacts on WB1 from the cessation of the thermal discharge are considered to be **direct (operational discharge), long term, positive, and negligible**.

Peat extraction to supply WOP for energy purposes would cease and if no other peat extraction purpose is envisaged for these bogs they would likely be rehabilitated earlier than currently anticipated with reduced potential for sediment generation, pollutant release and water quality impact. However it is noted that there are numerous controls in place at the peat site therefore potential impact from the do nothing would be **indirect, long-term, positive an negligible**.

In terms of biomass it is likely that production or generation of such materials would continue as part of the Renewable Heat Initiative programme with associated potential for water quality impacts unless properly controlled. However it is noted that there are numerous controls in place at a legislative level therefore potential impact from the do nothing would be **indirect, long-term, positive an negligible**.

## 8.6 Mitigation

### 8.6.1 Construction Phase Mitigation

To avoid the pollution of waterbodies during the construction phase all construction works will be completed in line with the recommendations of the following guidelines:

- CIRIA C649 Control of Water Pollution from Linear Construction Projects: Site Guide (Murnane et al. 2006);
- ‘Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors’ (CIRIA, 2001).
- Inland Fisheries Ireland “Guidelines on protection of fisheries during construction works in and adjacent to waters” (IFI, 2016).
- Requirements for the protection of fisheries habitat during Construction and development works at river Sites”;
- UK guidance:
  - GPP5 Guidance for Pollution Prevention Works and Maintenance in or near Water;
  - GPP21 Pollution Incident Response Planning;
  - GPP22 Dealing with Spills; and

- PPG26 Pollution Prevention Guidelines Drums and Intermediate Bulk Containers.

To avoid the pollution of waterbodies during the construction phase the following measures to be implemented by the contractor:

- Provision of measures to prevent the release of sediment to WB1 and WB2 during the construction works will include but not be limited to silt fences, silt curtains, settlement lagoons, settlement tanks and filter materials;
- Temporary construction surface drainage and sediment control measures will be in place before any earthworks commence;
- Provision of exclusion zones and barriers (sediment fences) between earthworks, stockpiles and temporary surfaces and waterbodies to prevent sediment washing into the waterbodies or drainage system;
- Limiting the extent of vegetation clearance and thereby minimising the potential release of sediment from bare ground following clearance;
- No storage of hydrocarbons or any toxic chemicals will occur within 50 m of any waterbody.
- Fuel storage tanks chemical containers etc. will be bunded to a capacity at least 110% of the volume of the storage tank.
- Re-fuelling of plant will not occur within 50 m of any waterbody and only in bunded refuelling areas. Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures.

### 8.6.1.1 Monitoring During Construction

Water quality monitoring will be undertaken as indicated in the IE Licence as agreed by the EPA and this will be supported by monitoring undertaken by the contractor.

WOP will undertake the biannual monitoring regime to include the Shannon River, with key pollution indicators analysed on a regular basis from locations on site and up and downstream of the site. The results of this monitoring will be reported to the EPA to demonstrate no adverse effects.

The contractor will be required to monitor the construction related discharge before it joins the operational site drainage and ensure that suspended sediment levels are no more than 25mg/l and contains no oily water prior to discharge to the onsite drainage system.

The onsite drainage system includes oil interceptors for both PS-W7 and PS-SW6.

In addition, daily visual inspections of the surface drainage and sediment control measures and the waterbodies will be undertaken by the contractor and these will be documented and reported to the station environmental officer. Indicators that water pollution may have occurred include the following:

- Change in water colour;
- Change in water transparency;

- Increases in the level of silt in the water;
- Oily sheen to water surface;
- Floating detritus; or
- Scums and foams.

### 8.6.2 Operation Phase Mitigation

There are a number of existing control measures in place at the station and ADF site as outlined in **Section 8.5.1.2** and these control measure will continue to be implemented for the duration of the proposed development.

Measures to attenuate and treat the runoff have been incorporated into the drainage design of the proposed new elements, namely slab A and Slab B, of the proposed development. No further mitigation is proposed above that outlined in **Section 8.5.1.2**.

There are no additional mitigation measures proposed in relation to the peat supply bogs over those required as part of the current IE Licence requirements, see also **Chapter 6**.

ESB will ensure that only biomass which has received sustainability certification is used. No other mitigation measures are proposed in relation to the biomass supply.

#### 8.6.2.1 Monitoring During Operation

Water quality monitoring will be undertaken as indicated in the IE Licence as agreed by the EPA and supported by the existing on site certified EMS system. No further monitoring is proposed above IE Licence requirements.

## 8.7 Difficulties Encountered in Compiling Information

Detailed Catchment assessment are not yet available as they are currently being completed by the Environmental Protection Agency's Catchment Science and Management Unit.

## 8.8 Residual Impacts

The residual impacts associated with the proposed development after implementation of the mandatory mitigation measures during the construction phase and ongoing compliance with the stations IE Licence requirements during the operational phase are detailed in **Table 8-11**.

**Table 8-11: Residual Impact after Mitigation Measures for Construction**

Receptor	No	Importance	Significance pre mitigation	Significance pre mitigation
<b>River Shannon</b>	(WB1)	Extremely High	Significant	Negligible
<b>Blackwater River</b>	(WB2)	Very High	Moderate	Negligible

The drainage design for the proposed development has been considered in the operational impact assessment. It is concluded that there will be no significant impact as a result of the proposed development in terms of water quality. Residual impacts on the water quality of the proposed development will be negative, long term, negligible.

## 8.9 Cumulative Impact

The cumulative impact of the proposed development and other existing and approved developments in the area was assessed by taking into account the existing baseline environment and the predicted impacts of this and other approved developments in the area.

With regard to potential impacts to surface water arising from the proposed development at WOP Station and ADF, together with peat harvesting and supply activities to WOP Station, the following cumulative pathways have been identified:

- Discharges from WOP Station and ADF to the same surface water catchments as supply bogs; and
- Discharges as a result of other developments or activities in the immediate vicinities of WOP Station and ADF.

Several of the bogs which supply fuel peat to WOP Station also supply LRP station, which also receives peat exclusively from a number of other supply bogs in the region. EPL station is also supplied by Bord na Móna bogs, predominantly in the east midlands. Bord na Móna also harvests peat for other end uses (e.g. horticulture) on a suite of sites around the midlands, within the same surface water catchments as the WOP supply bogs. These other bogs are also subject to IPC licencing and associated conditioned water quality protection measures. Based on the assessment of impacts for the directly comparable WOP supply bogs presented in **Section 8.5.5** and the respective licensing regimes which are implemented for each site/activity, impacts arising from the proposed development at WOP Station and ADF, cumulatively with other peat harvesting activities are considered to be negligible.

A review of online planning portals showed that there is one electricity battery storage project (Lumcloon Energy Ltd.) which will be developed on lands adjacent to the WOP Station. Permission has been granted to develop a 100MW battery electricity storage at this site with connection to the transmission grid in the area. The development consists of an industrial building which if constructed at the same

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time as the WOP biomass storage facilities would have the potential for cumulative impact on water quality arising from sediment release or oil spills associated with construction. However mitigation measures have been proposed to address potential impacts during construction of the proposed development. There will be no potential for operational cumulative issues as the Lumcloon Energy facility will only discharge surface drainage water from the site.

The Lough Ree Power (LRP) Station which is situated on the Shannon River will also be subject to a planning application in relation to the transition of the station from peat to biomass. However, the LRP site is located approximately 50 km upstream of the WOP Station. LRP is subject to its own IE licence requirement. Therefore due to its distance upstream and current control no cumulative impacts are anticipated. There is one other power station in Ireland which co-fires with peat and biomass, namely the Bord na Mona Edenderry Power Station in Co. Offaly. This station is located in Hydrometric Area number 14 in the former South Eastern RBD and there is no hydrological connection to the Shannon Catchment therefore no cumulative impacts are anticipated between this station and WOP. The Lough Ree Power Station and the Edenderry Power Limited power station are also supplied by Bord na Móna bogs, predominantly in the east Midlands. These supply bogs are also subject to IPC licencing and associated conditioned water quality protection measures therefore no cumulative impacts are anticipated.

Third-party harvesting of peat also occurs on bogs throughout the Midlands, ranging from small scale turbary for domestic fuel to commercial scale peat removal for horticultural purposes. Several of these are located in close proximity to Bord na Móna properties and drains from these sites discharge to the same receiving waterbodies via sediment control systems of varying scales. Impacts arising from the proposed development at WOP Station and the ADF, cumulatively with these third-party peat harvesting activities are considered to be negligible.

There are no other known proposals for development within the study area that could result in a cumulative impacts.

### 8.10 Water Framework Directive Compliance

The EU WFD has introduced environmental targets with specific objectives including:

- Prevention of deterioration in the status of surface water bodies; and
- Protection, enhancement and restoration of all surface water bodies with the aim of achieving good ecological and chemical status by 2015.

The proposed development will not cause the deterioration of water quality within the water bodies adjacent to the proposed development either during construction (with implementation of appropriate mitigation measures) or during the subsequent operational phase with existing controls and design. There are no instream or bankside works required as part of the construction proposed development and no increase in discharge rates from the proposed development operation therefore it

will not result in any significant hydromorphological impacts. The biodiversity and more specifically the aquatic ecology assessment presented in **Chapter 6** concluded that there would be no significant residual impacts to aquatic ecology including fish. Therefore it can be concluded that the proposed development will not compromise the ability of the Waterbodies namely the River Shannon and the Blackwater River from maintaining and achieving good status, and the development is therefore in compliance with the provisions of the WFD.

## 8.11 References

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  - P0503- 01- Allen Group; and
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