West Offaly Power

Transition to Biomass

Screening for Appropriate Assessment & Natura Impact Statement

QS-0000206-01-R460-006

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1 Introduction

1.1 Objective of this report

This report presents the Screening for Appropriate Assessment (AA) which has been prepared in accordance with the requirements of Article 6(3) of the EU Habitats Directive (Directive 92/43/EEC).

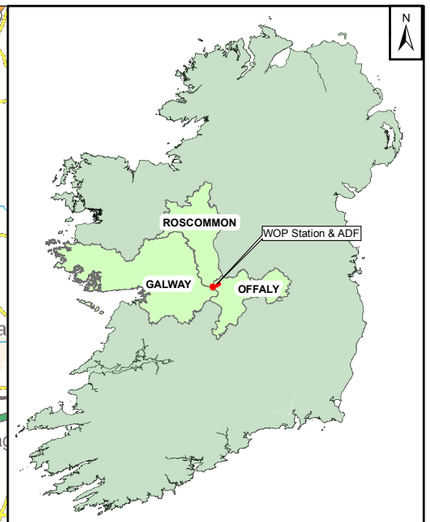
The Screening relates to the proposed modifications to the West Offaly Power (WOP) Station and associated ash disposal facility (ADF) to facilitate the continued operation of these facilities and phased transition of that station to exclusive firing with biomass. As the existing development is subject 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. This will subsequently be referred to as the 'proposed development'. The purpose of this report is to determine if the proposed development (including future operation), either alone or in combination with other plans and projects, is likely to have significant effects on any European Site(s) in view of the site's conservation objectives. 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. See **Figure 1-1** for WOP Station and ADF location.

1.2 Statement of competence

This report was prepared by Geoff Hamilton, Senior Ecologist with ESB International. He has over 12 years' experience in the fields of ecological assessment, agri-environment scheme design and implementation, rural stakeholder consultation and environmental advocacy.

He has been involved in a wide range of infrastructure projects for local authorities and private commercial clients and has carried out a significant number of field surveys to inform Environmental Impact Assessments (EIA), Ecological Impact Assessments (EcIA), AA Screening Reports and Natura Impact Statements (NIS).

He has particular experience in the production of ecological reports relating to electricity generation developments such as power stations, wind farms and solar farms. He holds a Master's degree in Zoology and is a Full Member of the Chartered Institute of Ecology and Environmental Management (CIEEM).



Inset Map

WOP Station

ADF

ATHLONE
Baile Átha Luain

BALLINASLOE
Béal Átha na Sluaighe

BANAGHER
Beannchar

SHANNONBRIDGE
Droichead na Sionainne

CLARA
Cloirtheach

FERBANE
An Féar Bán

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0 2.5 5 7.5 10 km

Legend

Development Boundary

REV	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP

PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED

CLIENT APPROVAL ☐ PLANNING ☐ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

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ESB International is a trading name of ESBI Engineering & Facility Management Ltd.

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CLIENT: **ESB**

PROJECT: **West Offaly Power, Transition to Biomass**

CONTRACT

PRODUCTION UNIT: **Civil & Environmental Engineering**

DRAWING TITLE: **Figure 1.1- Location of WOP Station & ADF**

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2 Regulatory Context

The EU Habitats Directive 92/43/EEC provides legal protection for habitats and species of European importance through the establishment of a network of designated conservation areas known as the Natura 2000 Network. The Natura 2000 network includes sites designated as Special Areas of Conservation (SAC) under the EU Habitats Directive and Special Protection Areas (SPA) designated under the EU Birds Directive 79/209/EEC. These are collectively referred to as '*European Sites*'.

The Habitats Directive was initially transposed into Irish national law in 1997, with the European Communities (Natural Habitats) Regulations, SI 94/1997. These Regulations have since been amended by SI 233/1998 & SI 378/2005. The European Communities (Birds and Natural Habitats) Regulations 2011 consolidate and replace the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats)(Control of Recreational Activities) Regulations 2010.

The requirements for an Appropriate Assessment are set out under Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC which state:

6(3) Any plan or project not directly connected with or necessary to the management of the site (Natura 2000 sites) but likely to have significant effect thereon, either individually or in combination with other plans or projects, shall be subject to Appropriate Assessment of its implications for the site in view of the sites conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

6(4) If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted. Where the site concerned hosts a priority natural habitat type and/or a priority species the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.

Definitions of conservation status, integrity and significance used in this assessment are defined in accordance with 'Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC' (European Commission, 2000).

- The conservation status of a natural habitat is defined as the sum of the influences acting on a natural habitat and its typical species that may affect

its long-term natural distribution, structure and functions as well as the long-term survival of its typical species.

- The conservation status of a species is defined as the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its population.
- The integrity of a Natura 2000 site is defined as the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified.
- Significant effect should be determined in relation to the specific features and environmental conditions of the protected site concerned by the plan or project, taking particular account of the site's conservation objectives.

2.1 Appropriate Assessment process

Key stages in the Appropriate Assessment process are set out below, as per European and Irish Government guidance (EC 2000, EC 2001 and DoEHLG 2009). The Screening for Appropriate Assessment and subsequent Natura Impact Statement relate to Article 6(3) of the Habitats Directive..

Screening for Appropriate Assessment

The first step in the Screening process is to determine if the plan or project is directly connected to or necessary for the management of a European Site. The process then identifies whether a plan or project, either alone or in combination with other plans or projects, is likely to have significant effects on a European Site in view of its conservation objectives.

Appropriate Assessment (Natura Impact Statement)

This stage considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a European Site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects. A Natura Impact Statement (NIS) must be prepared as part of this stage of the process. The AA is carried out by the competent authority, and is supported by the NIS.

3 Methodology

3.1 Assessment criteria

This assessment has been undertaken in accordance with all relevant legislation and best practice guidelines:

- Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission.

- European Communities (Birds and Natural Habitats) Regulations 2011, as amended;
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (Department of the Environment Heritage and Local Government, Revision 1, 2010);
- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission (2001); and
- Managing Natura 2000 Sites (European Commission, 2000). Assessment of plans and projects significantly affecting Natura 2000 sites. (European Commission, 2001).
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC - Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. (European Commission 2007);
- EC (2013) Interpretation Manual of European Union Habitats. Version EUR 28. European Commission (European Commission 2013); and
- Assessing Connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage. Scottish Natural Heritage (2013).

3.2 Desk review

A desktop study was conducted to examine the potential zone of influence of the proposed development at WOP Station and associated ADF as well as respective peat bogs used to supply fuel, to identify any European Sites within that area which could be impacted.

Available information consulted in the preparation of this AA Screening report included:

- The identification of all European Sites within 15 km of the study area (i.e. WOP station, ADF and respective supply bogs), and subsequent review of all associated Site Synopses and Conservation Objectives documents as appropriate. This encompasses Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).
- Conservation Status Assessment Reports (CSARs), Backing Documents and Maps prepared in accordance with Article 17 of the Habitats Directive (npws.ie);
- An examination of contemporary and historic mapping and aerial imagery for the WOP site and its surroundings to determine broad habitat types and successive land use change;
- An examination of contemporary and historic mapping and aerial imagery for the WOP site and its surroundings to determine broad habitat types and successive land use change;
- A review of the Environmental Impact Statement for the original development

of the current WOP Station (ESB International 2001) and associated background ecology reports;

- West Offaly Power, Thermal Plume Synthesis Report (ESB, 2018) (refer to AA, Appendix 1-1);
- West Offaly Power, Thermal Plume Modelling Report (ESB, 2018) (refer to AA , Appendix 1-2);
- A review of the EPA IE Licence for the site (P0611-02) and Annual Environmental Reports (AER) submitted by the station to the EPA;
- A review of a suite of reports relevant to aquatic biodiversity, including Inland Fisheries Ireland (IFI) fish survey reports, the EPA water quality monitoring database and associated reports, the Shannon RBMP 2009-2015, the Lough Ree and Upper Shannon WMU Action Plans 2009-2015 and The River Basin Management Plan for Ireland 2018-2021(Department Housing, Planning, Community and Local Government (DHCLG) (17th April,2018);
- A review of the Bord na Móna Biodiversity Action Plan 2016-2021, baseline ecological studies and data (including baseline reports produced on behalf of Bord na Móna as part off provisional studies to inform the EIA process for Bord na Móna peat supply activities), Draft Rehabilitation Plans and Land Use Mapping;
- The compilation of publicly available biodiversity data for the WOP site and its environs, as distributed via the National Parks and Wildlife Service (NPWS) and National Biodiversity Data Centre (NBDC) websites; and
- An appraisal of the BirdWatch Ireland Irish Wetlands Bird Survey (I-WeBS) database for important sites associated with the River Shannon and River Suck.

Geographic Information System (GIS) data relating to European sites, protected species distribution, hydrological connectivity and water quality was accessed using the NPWS, EPA and Water Framework Directive online mapviewers and was further interrogated locally using ArcGIS.

Aerial photography was viewed to get an overview of habitats in and around WOP Station and ADF. The National Biodiversity Data Centre (NBDC) mapviewer was also consulted, with regards to the distribution of protected habitats and species within the study area.

As part of the assessment of potential indirect impacts, peat bogs supplying WOP Station were also identified and relevant ecological data and reports for these areas and associated harvesting activities was compiled, including the Bord na Móna Biodiversity Action Plan 2016-2021, various baseline ecological survey reports and data, supply bog Draft Rehabilitation Plans and Land Use Mapping.

3.3 Potential Zone of Influence

Projects (or operational activities) have the potential to have significant effects on European Sites beyond the confines of the individual sites themselves. The Guidance on Ecological Impact Assessment (IEMA 2006) states that potential effects should be investigated which occur within the Zone of Influence (ZoI) that arises during the whole lifespan of the proposed project.

The potential Zone of Influence is defined as:

- Areas directly within the land take for the proposed development;
- Areas which will be temporarily affected;
- Areas likely to be impacted by hydrological disruption; and
- Areas where there is a risk of pollution and disturbance (e.g. noise).

The published Departmental guidance document states that '*A distance of 15 km is currently recommended in the case of plans and derives from UK guidance (Scott Wilson et al., 2006). For projects, the distance could be much less than 15 km and in some cases less than 100 m, but this must be evaluated on a case-by-case basis….'* (DEHLG, 2010).

The Zone of Influence for direct impacts was considered to comprise the footprint of the proposed development within the WOP Station and ADF site and the water column of the River Shannon downstream of the WOP thermal cooling water outfall where the thermal plume elevates the temperature of the river at least 1.5^{o}C above ambient. In-river surveys and continuous temperature monitoring data undertaken on behalf of ESB International has indicated that during certain environmental conditions, the thermal plume can be detected for up to 4 km downstream of the outfall. With regard to potential indirect impacts, all European Sites within 15 kilometres of WOP were identified and collated; sites beyond this distance threshold with viable source-receptor impact pathways (such as hydrological connections) were also considered.

In addition, European Sites within a 15 kilometre radius of the respective WOP peat supply bogs commercially operated by Bord na Móna were also identified, as well as those which are hydrologically connected to these bogs. This site identification process was carried out using Geographic Information System (GIS) software using datasets sourced from NPWS, EPA and Bord na Móna. Scottish Natural Heritage (2016) guidance relating to core foraging distances for bird species associated with SPAs was also consulted.

The potential for significant effects on European Sites from the proposed development to facilitate the transition to biomass (and the ongoing licensed operation of the power station and respective peat supply bogs during the transition and the subsequent licensed operation of WOP Station exclusively on biomass) are discussed further in Section 4. It should be noted that power generation with associated cooling water discharge to the river has taken place at this site since the 1960's.

3.4 Consultation

Consultation relevant to the biodiversity impact assessment undertaken as part of the EIAR Screening and Scoping and subsequent data gathering exercise was undertaken with the following organisations with a potential interest in biodiversity:

- An Taisce
- Birdwatch Ireland
- Offaly County Council (Environmental Section)
- Roscommon County Council (Environmental Section)
- Galway County Council (Environmental Section)
- Environmental Protection Agency (EPA)
- Bord na Móna
- Friends of the Irish Environment (FoIE)
- Inland Fisheries Ireland (IFI)
- Irish Peatland Conservation Council
- National Parks & Wildlife Services (NPWS)
- Irish Raptor Study Group

Of the above, responses were received from Offaly County Council (Environment Section), Roscommon County Council (Environment Section), An Taisce, Environmental Protection Agency, Irish Peatland Conservation Council. These responses are summarised in **EIAR Chapter 1 - Table 1-1.**

Inland Fisheries Ireland (IFI) have also been consulted as part of ESB Fisheries/Aquatic Services Unit fisheries and aquatic ecology studies undertaken in the River Shannon around Shannonbridge from 2014 through 2017.

Birdwatch Ireland have also been contacted in relation to the sourcing of Ireland Wetland Bird Survey (I-WeBS) subsite data for locations along the River Shannon upstream and downstream of WOP Station.

Rare and threatened species data for the study area (incorporating WOP station, ADF and the respective supply bogs) was requested from the NPWS Scientific Unit and reviewed upon receipt.

3.5 Site surveys

Ecology surveys undertaken by ESBI to inform the EIAR and the Appropriate Assessment process are summarised in **Table 3-1.** Further details of the aspects of the respective surveys are presented in the subsequent text.

Table 3-1: Summary of field surveys undertaken

Survey date	Nature of surveys	Surveyor
24th June 2016	Terrestrial habitat and species survey at WOP Station	G. Hamilton, ESBI
26th September 2016	Bat survey at WOP Station	T. Aughney, Bat Eco Surveys
14th October 2016	Terrestrial habitat and species survey at WOP ADF	G. Hamilton, ESBI
15th December 2016	Wintering bird survey adjacent to WOP Station & ADF	G. Hamilton, ESBI
31st January 2017	Wintering bird survey adjacent to WOP Station & ADF	G. Hamilton, ESBI
24th February 2017	Wintering bird survey adjacent to WOP Station & ADF	G. Hamilton, ESBI
14th March 2017	Terrestrial habitat and species survey at WOP Station	G. Hamilton, ESBI
5th April 2017	Terrestrial habitat and species survey at WOP ADF	G. Hamilton, ESBI
27th October 2017	Terrestrial habitat and species survey at WOP ADF	G. Hamilton, ESBI
15th January 2018	Wintering bird survey adjacent to WOP Station	G. Hamilton, ESBI
28th March 2018	Terrestrial habitat and species survey at WOP Station	G. Hamilton, ESBI
8th June 2018	Terrestrial habitat and species survey at WOP Station	G. Hamilton, ESBI

WOP Station

It should be noted that as the project design for the proposed development was iterative in nature, initial ecology surveys covered a significantly larger footprint and range of on-site habitats than the final design footprint will impinge upon; the final biomass storage areas are contained entirely within the developed footprint of WOP Station on existing artificial surfaces which are predominantly of minimal ecological value.

Terrestrial ecology surveys within and adjacent to WOP Station were carried out by an ESBI staff ecologist in June 2016, April 2017, March 2018 and June 2018. The purpose of these assessments was to identify all habitats in the receiving environment, create a comprehensive species list and to accurately map out the nature and extent of all habitats onsite. The habitats within the site were defined in relation to the habitat classification scheme published by the Heritage Council in A Guide to Habitats in Ireland (Fossitt, 2000). Habitat mapping follows Smith et al. (2011).

Terrestrial mammal walkover surveys were undertaken during the course of the habitat surveys previously described. The aims of the surveys were to determine which, if any, mammal species utilise the WOP Station site and its adjoining habitats. Mammal tracks and signs were identified according to Bang and Dahlstrom (2001).

Additionally, a specific bat activity survey of the WOP Station site was undertaken on behalf of ESBI by Bat Eco Services; as the development requires no removal or alteration of existing buildings with the potential to be used as bat roosts, a single survey on 16th and 17th September 2016 (comprising overnight passive recording monitoring and dusk/dawn heterodyne surveys) was considered adequate.

All bird species identified during the field surveys were recorded following the Countryside Bird Survey methodology and identified following Mullarney et al. (1999). Most passerine species detected were present in areas of woodland, scrub and open recolonising ground around the periphery of WOP station.

Additionally, vantage point-based wintering bird surveys based on Scottish Natural Heritage (2014) along the bank of the River Shannon immediately east of WOP Station (and at its confluence with the River Suck), as well as adjacent habitats were carried out in December 2016, January 2017 and February 2017, with a follow up survey undertaken in January 2018, as noted in **Table 3-1**. These surveys aimed to identify the frequency of occurrence of the Special Conservation Interest species for the Middle Shannon Callows SPA in the locality.

The conservation status of each bird species recorded by the study was assessed. 'Birds of Conservation Concern in Ireland' (BoCCI) (Colhoun et al. 2013[1]) are classified into three separate lists, namely Red-listed species of high conservation concern, Amber-listed species of medium conservation concern and Green listed species of no conservation concern. The EU Birds Directive (79/409/EEC) also has a list of high priority bird species, known as Annex-I listed species.

Specific surveys undertaken by and on behalf of ESB in relation to aquatic ecology in the River Shannon in the locality of Shannonbridge with reference to the WOP cooling water discharge have been carried out on an ongoing basis since 2014 (ESBI/ASU 2018 – See **AA - Appendix 1.1**). These studies comprise discrete assessments of macrophytes, diatoms, macroinvertebrates and fish, as well as continuous temperature monitoring and thermal plume modelling.

WOP ADF

Terrestrial ecology walkover surveys were also carried out by an ESBI staff ecologist at the WOP ADF in October 2016, April 2017 and October 2017, during which time habitats and species occurring at the site were assessed using the same protocols as described for the WOP Station site.

[1] Colhoun, K. & Cummins, S. (2013) Birds of Conservation Concern in Ireland 2014–2019. Irish Birds 9: 523-544.

The overall ADF site was surveyed on foot while parallel transects through the undeveloped cells to the southeast and southwest of the existing capped and open cells were walked and any mammal tracks or signs e.g. holts, dens, scats etc. were noted. The national bat landscape suitability map hosted by the NBDC was reviewed, as were bat records for the N02 hectad, (which indicated only Daubenton's bat records 8 km to the southeast of the ADF). Given the low overall landscape suitability for bat species in general and the absence of mature trees within the peripheral scrub at the site which could provide roosting habitat, no specific bat surveys were carried out.

Previous surveys have also been carried out by Bord na Móna ecologists at the Blackwater Bog site immediately surrounding the ADF, with associated habitats and species being recorded during 2010 surveys. Previous mammal surveys carried prior to the original development of the ADF and more recently as part of a baseline ecology report (refer to **AA, Appendix 1.3**) associated with ongoing harvesting activities at Blackwater bog have also been consulted as part of this assessment.

WOP peat supply bogs

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

- P0500-01 (Boora Group)
- P0501-01 (Derrygreenagh Group)
- P0502-01 (Blackwater Group)
- P0503- 01 (Allen Group)

Baseline ecology surveys have been carried out by the Bord na Móna in-house ecology team over the last decade, with supplementary baseline information being provided by commissioned sub-consultant ecologists (refer to **AA, Appendix 1.3**). 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, with land-use mapping for the supply bog estate also being created and updated as necessary. It should be noted that these draft plans may be subject to change prior to publication by Bord na Móna.

4 Screening for Appropriate Assessment

4.1 Introduction

Screening determines whether appropriate assessment is necessary by examining:

1. Whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of a European site, and
2. The potential effects of a project or plan, either alone or in-combination with other projects or plans, on a European Site in view of its conservation objectives and considering whether these effects will be significant (DoEHLG, 2010).

The proposed development is not directly connected with or necessary to the management of any European Site.

Screening for AA involves the following:

1. Description of project;
2. Identification of relevant European Sites and compilation of information on their qualifying interests and conservation objectives;
3. Assessment of likely effects – direct, indirect and cumulative; and
4. Screening statement with conclusions.

4.2 Description of the Existing Development

4.2.1 Existing Development - WOP

4.2.1.1 Existing Station Site

WOP Station is located adjacent to the town of Shannonbridge in Co. Offaly on the River Shannon, just downstream of its confluence with the River Suck. It is adjacent to the village of Shannonbridge, which is approximately 850 m to the north, while the River Shannon borders the site to the west. The site covers an area of approximately 35.5 hectares (ha).

WOP Station is fired on milled peat supplied by Bord na Móna Energy Limited with a start-up and combustion support facility for firing fuel oil. Bord na Móna supply the peat from existing bogs as licensed by the EPA.

In 2017 WOP Station exported 928,876 MWhrs of electricity to the national grid equivalent to the needs of approximately 220,000[2] households.

[2] Based on CRU average of 4,200kWhrs/year per household, 2017, https://www.cru.ie/document_group/review-of-typical-consumption-figures-decision-paper

4.2.1.2 WOP Station Facilities and Operations

The existing WOP Station site is owned by the ESB and is separated into two areas with separate entrances, the power station and associated buildings and infrastructure which is operated by ESB, and the fuel handling area which is operated by Bord na Móna. The site is accessed via two routes – leading east and west respectively along the R357.

WOP Station comprises a single boiler/turbine unit with an electrical output of 150 MWe and its main features are as follows:

- Main building housing fluidised-bed boiler and 150 MWe rated turbo-alternator unit.
- Fuel handling system comprising peat wagon tipplers, screens, conveyors and an intermediate peat storage (IPS) facility.
- Water treatment plant (WTP) for processing of water prior to its storage and use in the boiler.
- Cooling water system, comprising a pumphouse, inlet and outlet culverts and outfall, for condenser cooling.
- Flue gas system comprising cyclone separators and bag filters for removal of peat ash from exhaust gases.
- Chimney for discharge of exhaust gases to the atmosphere.
- Ash handling system comprising conveying systems and storage silos.
- Oil tank for storage of auxiliary fuel.
- Storage facilities for limestone, lime and sand.
- Generator transformers, high voltage switchgear, and unit and house transformers.
- Supporting facilities including the following:
    - Administration offices
    - fire protection system
    - auxiliary cooling water system
    - fuel oil pumphouse
    - diesel generator
    - chemicals storage tanks
    - chemical laboratory
    - sewage treatment plant
    - workshop and stores

The structural form of the station buildings is conventional structural steel supported on reinforced concrete foundations. Gantries and walkways for access to plant and equipment are constructed of stainless/galvanised steel open grating type flooring. These are supported on steel beams and columns. External walls comprise profiled

metal cladding and roofs are constructed of profiled metal decking on purlins spanning between rafters.

WOP Station is licenced to discharge a thermal cooling water load to the River Shannon, emissions to atmosphere (including dust , sulphur oxides and oxides of nitrogen) and to landfill ash from the facility at its dedicated Ash Disposal Facility.

Peat fuel is supplied to WOP Station by Bord na Móna, principally by rail but also by road. WOP Station is equipped to unload up to six rail deliveries of peat each hour and the EIS submitted as part of the planning application for the existing station (Offaly Co Co. Reg. Ref. 01/187; An Bord Pleanála Ref. PL19.125575) envisaged that there would be 74 road deliveries of peat per day.

4.2.2 Existing Development - The ADF

4.2.2.1 The Existing ADF Site

The station's off-site ADF is located on remote Bord na Móna cutaway bogland approximately 5.5 km from WOP Station. The ADF site area extends to approximately 59.2 ha. This development site extends onto lands located within four townlands - Clonfinlough, Clondelara, Leitra, and Derrylahan. The facility is operated by Bord na Móna on the behalf of ESB.

Access to the ADF is from the R357 Shannonbridge – Cloghan Regional Road, via a minor road that passes Bord na Móna's Blackwater works. The ADF is located approximately 3 km from the junction with the public road. The area is sparsely vegetated and is surrounded by tracts of production bogland.

The EPA's IE Licence P0611-02 requires the ADF to be fully in compliance with the EU Landfill Directive (Directive 1999/31/EC on the landfill of waste). The IE Licence in turn requires all relevant requirements of the Directive regarding the design, construction, operation and aftercare management of the landfills to be implemented.

There are two discrete waste streams disposed of at the ADF.

- **Fly ash** is removed from the flue gases by bag filters and conveyed to an ash silo. The ash is transported from WOP Station to the ADF by rail in an ash rake. Each rake comprises a locomotive pulling 10 to 12 wagons each of which carries two ash buckets. Before being loaded into the wagons the ash has 15 to 30% of moisture added; and each wagon has a hydraulically controlled lid to prevent dust during the journey from WOP Station to the ADF.
- The combustion of peat gives rise to the production of a relatively small volume of **bottom ash**. It is removed from the combustion chamber and conveyed to a small bottom ash silo on the WOP Station site. It is transferred from the silo by a sealed vacuum system to a skip mounted on a rail bogey and transported to the ADF, also by means of the dedicated rail line. Of the total ash arising, approximately 5% is bottom ash.

Ash is transported to the ADF on Bord na Móna's narrow gauge rail system in specially designed saddleback wagons. Typical movements of ash between WOP Station and the ADF site will comprise two to three locomotive runs per day. Each train (rake) contains up to 12 wagons and is used daily Monday – Saturday. Each wagon comprises two ash buckets with combined capacity of approximately 7-9 m^3 of ash. The ash is tipped from the wagons and is placed in the cells using low bearing pressure tracked earthmoving plant. The ash is placed semi-dry and is wetted to control potential dust emissions. It is graded to falls during the filling of the cells to ensure that ponding, resulting in leachate generation, does not occur. A tractor drawn spray tanker or fixed spray system is used in wetting the ash to aid compaction and further prevent dust nuisance. Leachate that is generated is re-circulated over the active cell to dampen the ash.

On-site, the location of the off-loading area within the ADF is dependent on which cell is operational and access is arranged by the relocation of the temporary rail tracks on the site. Tracks will be aligned so the ash can be tipped from the rake into each cell where it will be spread, compacted and levelled by a front-end loader to prevent any ponding of water on the surface.

Three cells (Cells 1, 2 and 3) are already closed and capped as per the requirements of the IE licence. Cells 4 and 5 are currently active and are accepting ash with capping being completed on an ongoing basis. It is anticipated that Cell 6 will be used from late 2019 / early 2020 and will be actively in-use when WOP Station enters its co-firing phase.

Each cell is separated from the adjoining cells by inter-cell embankments and by external embankments. Leachate is drained from each cell and recirculated or pumped to the existing leachate storage lagoon.

Cover and capping that is already in place for completed cells comprises a 1 m layer of peat / subsoil, which was added in a concave mound design. Capped cells are naturally revegetated to blend with the natural landscape. Cells 1-5 have a basal and capping liner (permanent low permeability Geosynthetic Clay Liner). The material used for the restoration layer comprises a mixture of peat and soil sourced on site from existing uprisings stockpiles and cutaway bog within the site boundary.

4.2.3 Characteristics of the Existing Development

The quantities of fuel used, energy generated and ash disposed of to the ADF for 2017 is provided in **Table 4-1.** Data is derived from the Annual Environmental Report (AER)[3].

[3] Note this AER has been resubmitted to the EPA in November 2018

Table 4-1 Annual energy generation, fuel use and ash disposal at WOP

Energy Generation, Fuel use, and ash disposal	2017
Total Energy Generated (MWHrs)	1,032,084
Electricity Consumption (MWHrs)	103,208
Nett Export of energy (MWhrs)	928,876
Light Fuel Oil (m^3)	353.5
Peat (metric tonnes)	1,243,220
Peat Ash to Landfill (metric tonnes)	46,566

4.2.4 Industrial Emission Licence P0611-02

The existing WOP Station and ADF are specified industrial activities listed in the First Schedule to the Environmental Protection Agency (EPA) Act 1992 as amended and operates under an Industrial Emission (IE) licence[4] granted and enforced by the Environmental Protection Agency. The existing licence covers the following activities:

a) the production of energy in combustion plant the rated thermal input of which is equal to or greater than 50MW, and
b) the recovery or disposal of waste in a facility, within the meaning of the Waste Management Act, 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.

By means of the Licence the EPA sets controls, monitoring and reporting requirements on emissions to the environment arising from the operation of the station and ADF and also sets requirements related to the final closure and decommissioning of the facility. Emission limits are set to ensure no adverse impact on the environment including human health and ecology. As part of the licence monitoring and reporting requirement Annual Environmental Reports (AER) are provided to the EPA, detailing its emissions and operations for the previous year. These AER reports are available on the EPA website.

Changes to IE Licence conditions can be requested by the operator of the facility or can result from changes to legislative requirements and initiated by the EPA. Such changes can be made by way of a clerical amendment, technical amendment or through a full licence review process. Currently a IE Licence Review application is

[4] http://www.epa.ie/terminalfour/ippc/ippc-view.jsp?regno=P0611-02

being made to the EPA by WOP Station which relates to the thermal cooling water emission condition in the current licence.

4.3 Description of the Proposed Development

As noted above, it is proposed to modify and continue to operate, the existing peat-fuelled WOP Station and ADF permitted under Offaly Co. Co. Reg. Ref. 01/187; Bord Pleanála Reg. Ref. PL19.125575, to facilitate the continued operation of those facilities and the phased transition of the station towards exclusive firing with biomass.

The proposed development comprises four distinct elements:

i. the continued and on-going operation of the existing generating station and the associated ADF beyond the previously permitted date of 31st December 2020, including the continued use of all structures, plant, hard-surfaced areas, boundary treatments and access ways on the existing sites - comprising structures with a combined gross floor area of c.27,073 sq.m. and other existing development on the 35.5 Ha WOP Station site; and existing development (including c.43 sq.m. of buildings, a c. 84 sq.m. wash slab, a c.1,491 sq.m. leachate lagoon (4,200 cubic metre capacity)) and other infrastructure associated with the existing operational landfill (c.128,780 sq.m. in area) located on the 59.2 Ha ADF site;

ii. the phased transition of the WOP Station from peat-firing to firing exclusively on renewable biomass – the term 'biomass' describing a range of non-waste materials such as non-pelleted woody biomass; products, co-products, by-products and residues from energy crops and agricultural industries; and manufactured wood pellets. It is anticipated that from early 2020 (subject to planning being granted by that date) WOP Station will be fuelled by reducing volumes of peat and increasing volumes of biomass, with an associated reduction in carbon dioxide emissions. By the end of 2027, the station will be fuelled exclusively by biomass;

iii. the development of fuel management and handling facilities on the WOP Station site to facilitate the change in fuel type – including the development of two biomass storage slabs (c. 3,924 sq.m. and c. 6,331 sq.m.) flanked by boundaries up to 5 m and 3.6 m high respectively; a 61 sq.m. pellet intake building (overall height 17.2m); a pellet storage silo (c. 28 sq.m. in area, 260 cubic metre capacity, maximum height 14.7m); and the re-organisation of surface storage, circulation and car parking areas – including new internal fencing and access gates, within the WOP Station site;

iv. the development of additional landfill capacity (c. 929,200 cubic metres over an area of c. 173,130 sq.m.) at the existing dedicated ADF, to facilitate the disposal of an additional c. 880,000 tonnes of ash from the WOP Station, and associated ancillary development on that site including a new leachate lagoon (surface area c. 1,400 sq.m, storage capacity 4,500 cubic metres) and associated boundary treatment.

In terms of the existing IE Licence, the proposed changes to the WOP Station and operation resulting from the planning application to transition to biomass will also trigger a review of the IE Licence. The proposed development will facilitate the continuation of use of the WOP Station, transitioning of the fuel type from peat to biomass and extending the landfill capacity as described herein. A full IE Licence Review will be required to licence the proposed activity. An application for a revised IE Licence to operate WOP Station and ADF will be made separately to the EPA subsequent to the planning application lodgement, in accordance with the requirements of the Agency.

4.3.1 Continued Operation of Existing Development Post 2020

The existing development is permitted subject to the condition (Condition 2 of OCC 01/087; ABP Ref. PL19.125575) that activity on both sites – WOP Station and the ADF, ceases on 31st December 2020.

Permission is being sought to extend the operational life of both the WOP Station and the ADF beyond that originally permitted. At the WOP Station permission is being sought for electricity generation to continue on this site in perpetuity, in-line with the phased transition of fuel outlined below (see **Section 4.4**). At the ADF permission is being sought for increased capacity to facilitate the disposal of an additional 880,000 tonnes of ash from WOP Station. Based purely on the traditional peat combustion, the combustion of 1,250,000 energy tonnes of peat per annum would give rise to a maximum disposal requirement of c.52,000 tonnes of ash. However the combustion of biomass gives rise to less ash than peat. Therefore the volume of ash arising each year will likely reduce as the proportion of biomass increases. Based on indicative calculations for the co-firing and exclusively biomass stages, it is estimated that the extended footprint can meet disposal requirements for at least 25 years, depending on the actual ash arising which in itself is a function of the fuel type and annual plant load factor. For clarity, permission is being sought to maintain *in situ* all physical development on the WOP and ADF sites associated with existing activities on those sites. These activities are those described above as the existing facilities and operations on both the WOP Station and ADF sites (**Section 4.2.1** above). On the WOP Station site, the existing structures have a combined gross floor area of c.27,073 sq.m. within the 35.5 ha site, and these will be maintained as currently developed unless specifically altered by this proposal. On the c. 59.2 ha ADF site, there is an existing landfill area of c. 128,780 sq.m. As noted above, five of the existing cells will be filled and Cell 6 will be in-use when the anticipated change to co-firing occurs. Associated with the operation of this site there are a small number of buildings (c. 43 sq.m. in area) with associated service areas including an 84 sq.m. wash slab and a c. 1,491 sq.m. leachate lagoon (with an approximate storage capacity of 4,200 m^3) which will be maintained as existing. A detailed description of each site and the relevant quanta of development is set out in the Planning Report (see **Section 3** of that report). These aspects of the development will be unchanged unless specifically indicated on the planning drawings that accompany this application.

4.4 Transition to Biomass

The burning of fuel in WOP Station generates thermal energy, a portion of which is converted into electrical energy through a steam cycle. Excess thermal energy is emitted through the boiler emission stack to the atmosphere and as thermal cooling water to the River Shannon. WOP Station operates to an overall efficiency of approximately 36% in terms of converting energy stored in fuel to electrical energy.

WOP Station is currently fired on commercial peat fuel with a peat utilisation rate of approximately 1.2 Million energy tonnes (ETs) per year. An energy tonne is that quantity of fuel with equivalent energy content of a standard tonne of peat at 55% moisture content, i.e. 7.7 Gigajoules (GJ).

It is proposed to reduce peat burn in WOP Station from early 2020 by at least 40% on current burn rate, with a maximum (capped) consumption of 60% of current peat volume of 1,250 kET/year (i.e. maximum volume of 750kET per year). This will be followed by a further reduction in capped volume to 40% (of current peat volumes) in 2025 (i.e. maximum volume of 500kET per year). Peat burn will cease at the end of 2027.

It is noted that the actual peat consumption in any year could be lower than the capped maximum for that year depending on prevailing market trends. After 2019, peat fired generation will not be subsidised and it will have to compete openly on a daily basis with other generation sources. Therefore the actual volume of peat-fired generation in each year will depend on both the wholesale market price of electricity and the cost of carbon allowances . In any year, where the actual peat consumption is lower than the maximum for that particular year, there will be no carry-over and this reduced consumption will not affect the maxima which have been set for the subsequent years.

The boiler at WOP Station is a circulating fluidised bed-type boiler capable of firing different fuel types. It can readily combust a range of biomass fuel types without any significant technical modification. It can technically operate at 100% output capacity (150MWe) firing on biomass, which in any one year operating continuously would equate to approximately 1.2 million energy tonnes of biomass. This is the maximum biomass energy tonnes that could be used in the WOP Station annually as shown in **Figure 4-1**. However, the quantity of biomass which is likely to be used in the early years will be constrained for commercial, transport and supply-chain reasons. The indicative biomass use profile is also shown in **Figure 4-1**.

Biomass volumes will ramp up immediately in early 2020 with volumes of biomass burned annually driven primarily by the availability of sufficient volumes of biomass that is both sustainable and can be sourced commercially.

At current and expected biomass prices, biomass for electricity production requires subsidised support. Since 2017 WOP Station has been approved for biomass support under REFiT3, which allows for biomass support for an output of up to 394.2 GWhrs of electricity per year. The Department of Communication, Climate Action and Environment (DCCAE) have announced details of a follow on Renewable Electricity

Support Scheme (RESS) within which WOP Station is eligible to compete for increased biomass support.

With the proposed auctions of 1000 GWhrs in 2019, and 3000 GWhrs in 2020, in theory WOP could receive sufficient biomass subsidised support to allow it to generate from biomass on full-load all year round, thereby producing up to 1,000 GWhrs annually from renewable biomass from the start.

All different biomass types have different energy content per physical tonne and per cubic metre, so biomass for energy is traded and quantified on an energy content basis, normally either Gigajoule (GJ) or else based on the equivalent energy content of one tonne of oil (toe). The energy content of one tonne of oil is equivalent to approximately 42 GJ or 5.5 standard tonnes of peat (energy tonnes).

WOP's current approved subsidised level of biomass support under REFiT3 would require approximately 513,000 energy tonnes/year (95 ktoe/year) of biomass. In order to operate on biomass all year round at full load would require approximately 1.2 million energy tonnes/year (220 ktoe/year).

The proposed fuel transition is shown on **Figure 4-1** and in **Table 4-2**. The biomass profile is indicative as it is dependent on the level of approved biomass support, availability of biomass at a commercially viable price and sustainable supply chain development.

Due to the variation in energy content of different biomass materials and of the level of moisture in that material, there can be significant variations in the amount of biomass energy contained in one truckload - ranging from approximately 20 ETs per truckload for a very high moisture content chipped wood product up to approximately 60 ETs per truck for a dry wood pellet product.

ESB projects that, in the maximum biomass scenario with a spread of different biomass deliveries as outlined above, the station would require a daily average of 100 deliveries per day over a year. Allowing for daily variations in deliveries statistical modelling indicates a 95 percentile of 129 trucks per day i.e. on 95% of days the number of deliveries is expected to be below 129 deliveries. The maximum quantity of biomass that could be delivered to the plant annually based on these delivery rates is 1.2 Million energy tonnes depending on a mix of fuel types.

Throughout the operational life of WOP Station, it will continue to require an ongoing start-up and combustion support facility for firing low volumes of fuel oil (approximately 600 m^3 per year).

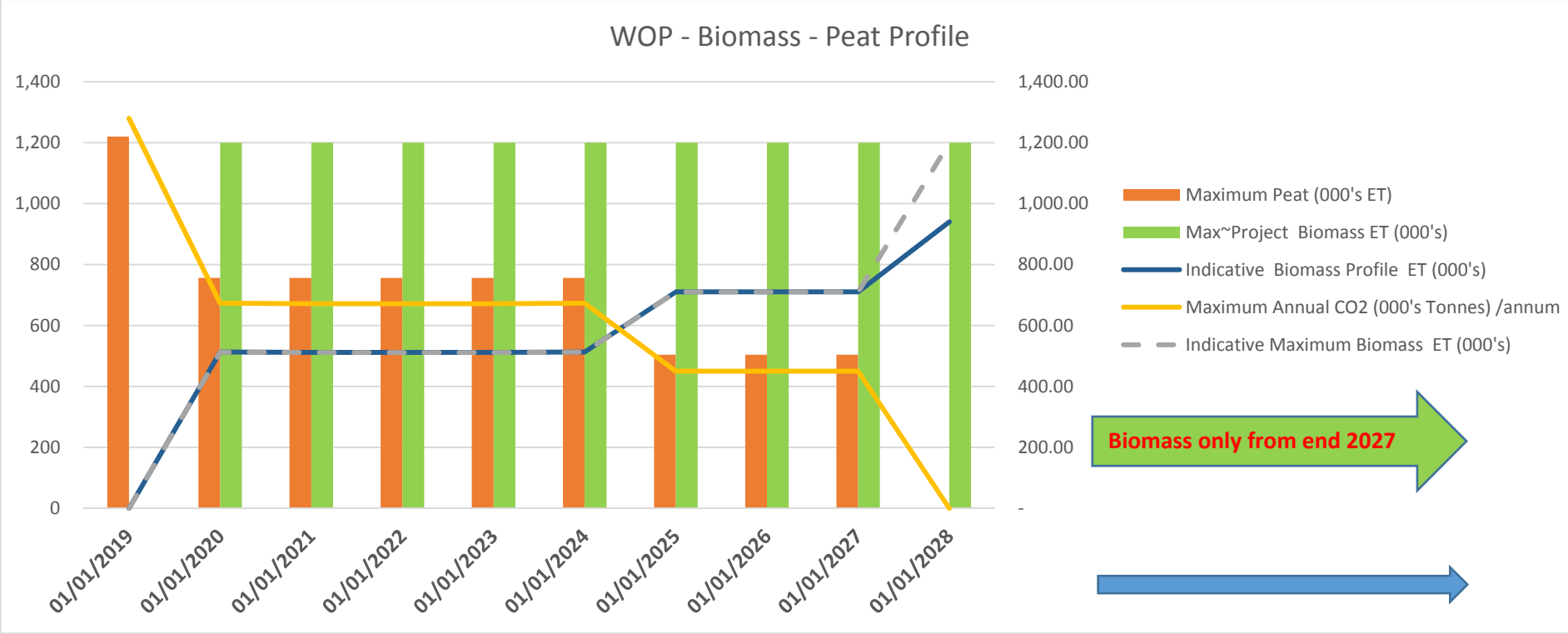


Figure 4-1: Biomass, Maximum Peat and Maximum CO_2 Profile

Table 4-2 Maximum Peat and resulting CO_2 output and Indicative Biomass

Year	Maximum Annual Peat (000's ET)	Maximum Annual CO2 (000's Tonnes) /annum	Indicative Biomass (000's ET)*
2019	1,250	1,279	0
2020	750	673	512
2021	750	671	512
2022	750	671	512
2023	750	671	512
2024	750	673	512
2025	500	450	710
2026	500	450	710
2027	500	450	710
2028 on	0	0	Up to 1,200 annually

*Indicative biomass may be higher with higher subsidies.

From the initial stage, in early 2020, biomass will be introduced as outlined in **Table 4-2** above and there will an immediate 40% reduction in the current usage of peat.

From 2020 to 2024 biomass annual usage is expected to be about 512,000 energy tonnes, equating to approximately 17,000 HGV deliveries per annum. During this period the maximum quantity of peat that will be used on an annual basis will be 750,000 energy tonnes generating a maximum amount of 676,000 tonnes of CO_2 annually.

From the beginning of 2025 to the end of 2027 biomass use will increase and peat usage will reduce to an annual maximum amount of 500,000 energy tonnes generating a maximum of 450,000 tonnes of CO_2 annually.

Post 2027 peat usage will be zero and the plant will be exclusively fuelled by sustainable biomass. At this point WOP Station will be a low-carbon dispatchable energy generation station. Energy production from WOP Station will be accounted for by the EU as “zero-carbon” under the EU Emission Trading Scheme whereby biomass is considered carbon neutral. The Greenhouse Gas (GHG) certificates that the station will receive will show zero carbon from the fuel used. The dispatchable renewable biomass energy will contribute significantly to achieving Ireland’s GHG emission targets to 2030 and also to achieving Ireland’s binding target for renewable energy generation.

The above profile of biomass and peat burn represents the worst case scenario in terms of CO_2 emissions from WOP Station. As the biomass supply chain is developed, increasing quantities of this fuel can be utilised by the WOP Station and it is possible that even in the period 2020 to 2024, with sufficient support from upcoming renewable support in place, the maximum amount of biomass, - c.1.2 million energy tonnes, could be used on an annual basis should it be commercially viable to do so.

During the co-firing stage, peat will principally continue to be delivered to the station by rail and handled using existing plant facilities although deliveries of peat by road will also take place but this will be within the overall number of fuel deliveries to the station.

Biomass will be transported by road. It will be fed directly into the existing conveyor belt system or deposited on large concrete aprons before being mechanically shovelled to the existing conveyor belt system and fed into the stations existing fuel feed system. Depending on the nature of the biomass being used, dedicated storage is included in the form of a silo which may be required to store wood pellets.

The station will continue to produce ash which will be deposited in the ADF in accordance with the IE licence requirements. Ash will be transported by rail to the existing ash disposal facility.

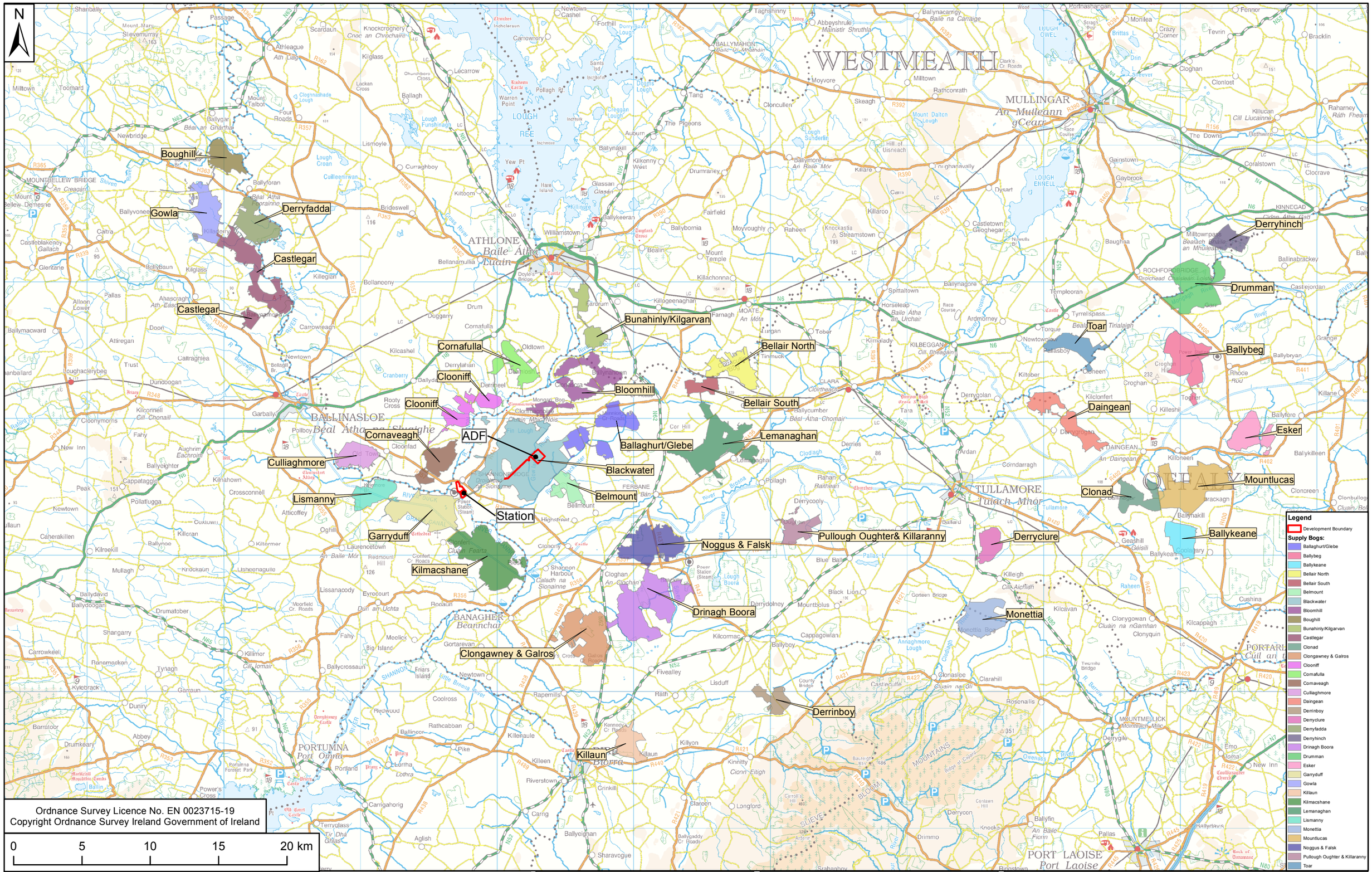
4.4.1 Peat

As indicated in **Table 4-2** above, peat will continue to be used as a fuel at WOP Station, with a reducing volume over time to the end of 2027. The combustion of peat will phased out entirely by the end of 2027.

There will be no subsidy for peat burning post 2019. REFiT 3 provides a subsidy for a portion (30%) of the biomass element when that Station is co-fired (i.e fuelled by biomass and peat). This support is in line with National and EU plans and the achievement and maintenance of EU Renewable Energy targets.

Peat will continue to be delivered to the station by rail transport and also by road.

The peat that fuels the WOP Station is harvested by Bord na Móna at a number of supply bogs. These activities are regulated by the EPA under Industrial Pollution Control (IPC) Licence Registration Numbers P0500-01 (Boora Group), P0501-01 (Derrygreenagh Group), P0502-01 （Blackwater Group), and P0503-01 (Allen Group). It is noted that many private operators also operate within the same area as Bord na Móna, however, their peat harvesting activities are generally not licensed by the EPA. The locations of the bogs that will continue to supply milled peat to WOP Station up to the end of 2027 are presented Figure 4-2**.**



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REV	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP

PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED

CLIENT APPROVAL ☐ PLANNING ☐ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

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CLIENT: **ESB**

PROJECT: **West Offaly Power, Transition to Biomass**

CONTRACT

PRODUCTION UNIT: **Civil & Environmental Engineering**

DRAWING TITLE:

Figure 4.2- Bord Na Mona Supply Bogs

DRAWN	PRODUCED	VERIFIED	APPROVED	APPROVAL DATE
E.O'Shea	E.O'Shea	E.Delaney	P.Kavanagh	20/11/2018

CLIENT REF.	NO. OF SHEETS	SIZE	SCALE
00-00	1/1	A3	1:250,000

DRAWING NUMBER: **QS-000206-01-D460-162**

The bog areas are listed in **Table 4-3** together with the maximum percentage (%) of peat supplying WOP Station for each bog.

Table 4-3: Proposed Peat Supply Bogs to Supply WOP Station 2019 – 2027 (Source: Bord na Móna)

	BnM Ownership Boundary Area (ha)	Max % of peat to WOP Station
Boora Bog Group		
Monettia	711	15%
Killaun	391	10%
Derrinboy	308	10%
Derryclure	332	10%
Bellair	570	50%
Bellair	229	50%
Lemonaghan	1127	80%
Drinagh Boora	1385	0%
Clongawney & Galros	1214	0%
Noggus & Falsk	924	0%
Pullough Oughter& Killaranny	911	0%
Derrygreenagh Bog Group		
Kinnegad (also known as Rossan)	353	0%
Derryhinch	336	15%
Drumman	1120	20%
Toar	445	10%
Ballybeg	836	10%
Ballivor	654	0%
Carranstown	306	0%
Bracklin	755	0%
Daingean	646	10%
Allen Bog Group		
Esker	571	10%
Clonad	447	10%
Ballykeane	453	10%
Mountlucas	1229	10%
Blackwater Bog Group		
Cornaveagh	500	100%
Kilmacshane (also known as Clonfert)	1298	100%
Garryduff	973	100%
Lismanny	451	100%
Cuilliaghmore (also known as Culliagh)	446	100%
Blackwater	2336	100%
Cornafulla (also known as Drumlosh)	465	100%
Belmont	319	100%
Clooniff	531	100%

	BnM Ownership Boundary Area (ha)	Max % of peat to WOP Station
Bloomhill	890	100%
Ballaghurt/ Glebe	736	100%
Bunahinly/ Kilgarvin	393	100%
Boughill	426	50%
Castlegar (includes Killaderry Bog)	1021	50%
Derryfadda	611	50%
Gowla	664	50%

Peat supplied to the WOP Station is currently, and will continue to be, sourced from those bogs listed under the aforementioned IPC Licence Registration Numbers P0500-01, P0501-01, P0502-01 and P0503-01. There is sufficient peat remaining in the peat bogs listed above to supply peat to WOP Station up to the end of 2027.

Although consent for the peat harvesting activity will not be included in a planning application submitted by ESB, the environmental impacts associated with that activity have been considered in this planning application and supporting documentation including this EIAR as required under the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, S.I.296, 2018 which enacts Directive 2014/EU/52 of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment and Assessment under the EU Habitats Directive.

No new peat supply bogs are been developed as a consequence of this project Therefore, the consideration of induced indirect effects associated with the supply of milled peat destined to WOP Station, as detailed in this EIAR, is restricted to activities within the catotelm layer of the bogs, which contains dead plant material (as distinct from the acrotelm, which comprises the active growing plant layer on the surface of the bog).

4.4.2 Biomass

4.4.2.1 Definition and Type

Biomass is derived from organic material such as trees, plants, and agricultural residues.

The recast Renewable Energy Directive[5] sets out a definition of biomass as follows:

> *"biomass' means the biodegradable fraction of products, waste and residues from biological origin from agriculture, (including vegetal and animal substances), forestry and related industries including fisheries and*

[5] Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the promotion of the use of energy from renewable sources (recast),

aquaculture, as well as the biodegradable fraction of waste, including industrial and municipal waste of biological origin"

Biomass as a fuel source for renewable electricity generation is utilised by EU Member States in increasing quantities since 2005 as reported in the European Environment Agency Report, Renewable Energy in Europe 2017[6]. With respect to biomass this states that:

"Electricity generation from solid biomass grew from 4.8 Mtoe in 2005 to 9.6 Mtoe in 2015, driven by, inter alia, the expansion of biomass cogeneration and the conversion of coal-fired power plants to biomass installations (11). The growth rate over the period 2005-2015 was 7 % (Figure 2.6). In 2015, the United Kingdom surpassed Germany in total electricity generated from solid biomass, with growth from 1.4 Mtoe in 2014 to 1.9 Mtoe in 2015. In 2015, the United Kingdom accounted for 20 % of total electricity generated from solid biomass and Germany accounted for 15 %. Finland and Sweden each had shares of 10 %. In 2016, electricity generation from solid biomass increased by 0.7 Mtoe, compared with 2015, to 10.3 Mtoe, a 7.6 % growth rate. The highest increase occurred in the United Kingdom with 0.2 Mtoe growth, further widening the gap between it and the other Member States of the EU. In comparison, Germany, the second largest generator of electricity from solid biomass increased its output by 0.1 mtoe".

Biomass used for energy generation purposes is therefore seen to be widespread in Europe, including in Ireland where Edenderry Power Limited (EPL) is co-fired with peat and biomass.

The agreed recast of the Renewable Energy Directive, REDII includes for this use and includes updated sustainability criteria which must be complied with in order for this activity to be classified as renewable energy generation.

The type of biomass that will be used for electricity generation at WOP Station will comprise both indigenous (native) sources and imported biomass. These will meet the criteria set out under REDII and will be clean biomass as defined in the EU Waste Framework Directive, the European Communities (Waste Directive) Regulations, 2011 and the EPA Guidance document on the regulation and management of wood waste. Solid municipal waste or treated post-consumer wood waste will not be used for electricity generation purposes at WOP Station.

Biomass - which will be sourced sustainably, that will be utilised at WOP Station will comprise materials such as:

- non-pelleted woody biomass, e.g.
  - products, co-products, by-products and residues of the forestry sector such as brash, thinning and other residues from the forestry sector

[6] European Environment Agency, Recent growth and knock-on effects, EEA Report No. 23/2017

where those materials are produced from the active management and felling of commercial forests;
    - products, co-products, by-products and residues - such as saw dust, sourced from timber mills, manufacturing processes and the forestry sector; and
    - wood chips produced by the timber industry – whether from commercial products or chipped wood arising from other commercial activities such as rubber tree plantations;
- products, co-products, by-products and residues from energy crops
- products, co-products, by-products and residues from agricultural industries, e.g. plant derived
    - husks,
    - shells, and
    - pulp; and
- manufactured wood pellets.

Irish Legislation, (the European Communities (Waste Directive) Regulations, 2011), excludes biomass produced for energy purposes from natural non-hazardous forestry and agriculture materials from the application of the Waste Management Act 1996(as amended), The 2011 Regulations also adopt the EU Waste Framework Directive defining requirements for by-products as follows;

- *"A substance or object, resulting from a production process, the primary aim of which is not the production of that item, may be regarded as not being waste but as being a by-product only if the following conditions are met:*
    - *further use of the substance or object is certain;*
    - *the substance or object can be used directly without any further processing other than normal industrial practice;*
    - *the substance or object is produced as an integral part of a production process; and*

further use is lawful in that the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts."

As the biomass used for energy generation purposes at WOP Station will be derived solely from non-hazardous forestry and agriculture materials or by-products meeting the requirements of the 2011 Regulations, it will therefore not be regarded as a waste material.

Activities associated with forest management produces forestry products that are of different quality, composition and value (e.g. saw-logs, pulpwood for use in panel board mills and paper mills, stakewood). Wood suitable for use as a biomass fuel includes:

- Small roundwood, which is removed from the forest to thin plantations, and allow larger diameter trees to flourish (i.e. thinnings);
- Smaller size material, which is produced when the forest is finally harvested and is unsuitable for use as sawlogs;

- Residues from final harvest operations (excluding those that must remain in the forest for environmental reasons);
- Harvested wood unsuitable for use as sawlogs due to its shape or form.

Forest by-products and residues will usually be left to dry for a period to reduce moisture content for fuel use, and may be processed into chips or pellets. Chipping of wood may occur at the forest roadside using mobile chippers or at a processing plant. Pelletising wood involves further drying and processing, but has the advantage that pellets are a more energy dense form of fuel, and are easier to handle and transport.

Sawmill residues arise when harvested timber is processed - producing wood chips, sawdust and bark, in addition to the sawn timber. The quantity of residues produced depends on the throughput at the mill. Sawmill residues can also be processed into wood pellets. Bark and sawdust residues also arise from panel board mills – whereby small roundwood is debarked to produce wood chips for the manufacture of the boards. The quantity of board mill residues depends on the quantities of pulpwood debarked at the mill.

In terms of agricultural sources of biomass, perennial energy crops suitable for cultivation in Ireland are willow - grown using a short rotation coppice (SRC) technique; and miscanthus - a woody rhizomatous grass.

In terms of potential utilisation at WOP Station biomass trials have shown that the combustion of SRC crops at WOP Station is feasible. By contrast, trials with miscanthus have shown that it is unsuitable as a fuel due to technical constraints.

SRC crops can be grown on arable land or reasonable quality permanent pasture land. Establishment of such crops requires initial intensive effort and agrochemical input, but thereafter perennial crops require less input than annual crops. Once planted they take up to four years to reach initial maturity, after which they are harvested at regular intervals – typically every two years for SRC willow. After about 20 to 25 years the crop is removed and replanted, and then the harvesting cycle begins again.

Based on forecasts of the land that could be available for perennial energy crops an estimated 203,000 ha on an all-Ireland basis could be available to grow SRC willow and miscanthus[7].

4.4.3 ESB Biomass Fuel Sustainability

ESB recognises the importance of ensuring that biomass utilised as its generating station is sourced sustainably and will ensure that the sustainability requirements of

[7] SEAI and Ricardo Energy & Environment, Bioenergy Supply in Ireland, 2015 – 2035, An update of potential resource quantities and costs, Ver 1.2, 10/17

the agreed recast EU Renewable Energy Directive II (REDII), set out in Articles 26 (2 -7) will be adhered to. The requirements for verification of compliance with the sustainability and greenhouse gas emissions saving criteria are set out in Article 27 of the recast directive.

The EU Commission Staff Working Document "State of Play on the Sustainability of Solid and Gaseous Biomass Used for Electricity, Heating and Cooling in the EU [8]" clearly outlines the important role that biomass will play in achieving the 2030 Climate and Energy Framework as follows:

> *'Solid and gaseous biomass –particularly wood and wood waste– used for electricity, heating and cooling production is the biggest source of renewable energy in the EU and is expected to make a key contribution to the 20% EU renewable energy target by 2020. Sustainable biomass can play an important role in helping to address concerns about climate change and security of energy supply, while contributing to economic growth and employment, particularly in rural areas. According to the Impact Assessment to the 2030 Climate and Energy Framework, biomass use in the heat and power sectors is expected to further increase in the medium term, in the context of the EU effort to move to a low-carbon economy by the middle of the century.'*

Key to the use of biomass for energy generation is its sustainability. In order for the increased consumption of biomass to result in a genuine and significant CO_2 reduction, the biomass must be sustainable.

Currently there are no Irish standards for Biomass Sustainability and there is no global definition of sustainability for this type of material. However, the REDII, recently agreed at EU Commission and Parliament level, provides sustainability criteria to which ESB will adhere. ESB is committed to ensuring its sustainability programme is fully compliant with these REDII criteria, in as far they are relevant to this project.

ESB intends to operate a sustainability programme to best international practice standards in this area, as outlined in this document. ESB's Sustainability Criteria for Biomass Supply has being built on several other well-developed and adopted sustainable biomass requirements and practices governing biomass sustainability internationally including;

- Standard for Heat & Electricity: Woodfuel used under the renewable Heat incentive and Renewables Obligation under UK legislation[9],
- Forest Europe's criteria for sustainable forestry[10]

[8] COMMISSION STAFF WORKING DOCUMENT, State of play on the sustainability of solid and gaseous biomass used for electricity, heating and cooling in the EU, Brussels, 28.7.2014, SWD(2014) 259 final

[9] www.usewoodfuel.co.uk/media/451137/decc_ts_guidance_training_fc_scotland_april_2015.pdf

[10] http://foresteurope.org/sfm-criteria-indicators2/

- Danish industry agreement on sustainable wooden biomass (wood chips and wood pellets) developed in adherence to the Danish Ministry of the Environment's Guidelines on Securing Sustainable Wood [11]
- UK Government Timber Procurement Policy [12]
- Orsted – Program for sustainable biomass sourcing [13].

In addition, ESB's Sustainability Criteria for Biomass Supply will comply with the principles of sustainability which are enshrined into the EU Timber Regulation (Regulation (EU) No. 995/2010) which prevents the circulation of illegally logged wood in the European Union. Under the EUTR, placing illegally harvested timber and products derived from such timber on the EU market is prohibited.

Forestry in Ireland operates within a legal and regulatory framework. This is necessary in order to protect forests and also to ensure that forestry operations and activities are carried out in compliance with the principles of sustainable forest management. As part of the regulatory framework a Felling Licence granted by the Minister for Agriculture, Food and the Marine is required and provides authority under the Forestry Act 2014 to fell or otherwise remove a tree or trees and to thin a forest for silvicultural reasons. The provisions of the Act and the Forestry Regulations 2017 (SI No 191 of 2017) came into force from 24th May 2017. Under the regulations all applications for licences for afforestation, forest road construction projects, whether grant-aided or not, and for aerial fertilisation and tree felling operations, require the prior written approval from the Minister for Agriculture, Food and the Marine. The activities covered are as follows:

- **Tree felling** – the uprooting or cutting down of any tree (subject to certain exemptions);
- **Aerial fertilisation** – aircraft application of fertiliser to a forest;
- **Afforestation** – the establishment of a forest or stand of trees in an area where there was no previous tree cover where the area involved is greater than 0.10 ha (approximately 0.25 acres);
- **Forest road construction** –construction of a forest road.

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.

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11 www.danskenergi.dk/sites/danskenergi.dk/files/media/dokumenter/2017-09/IndustryAgreement_Biomass-20160623.pdf

12 https://www.gov.uk/guidance/timber-procurement-policy-tpp-prove-legality-and-sustainablity

13 https://www.google.ie/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwivtuK6h_fdAhVGVsAKHSZUCgEQFjAAegQICRAC&url=https%3A%2F%2Forsted.com%2F-%2Fmedia%2FWWW%2FDocs%2FCorp%2FCOM%2FSustainability%2FBiomass-Sourcing-UK-021117.ashx%3Fla%3Den%26hash%3D2F1C73A252EA155B9624E203FCDC0000BCD555C8&usg=AOvVaw1k4uB1y2kEJhwttRjpO0Ul

In addition to the above licencing requirements the Department of Agriculture Food and the Marine have published a range of Forestry environmental guidelines to ensure that the environmental aspects of Sustainable Forest Management are implemented. Adherence to the guidelines is a condition of grant aid and the issuing of a felling licence[14].

4.4.3.1 ESB Sustainability Criteria for Biomass Supply

ESB will follow a sustainable biomass programme with core sustainability principles founded on the principles of legality, sustainability and independent auditing. These are detailed in **Table 4-4** and **Figure 4-3.**

Table 4-4 ESB Sustainability Criteria

No.	Sustainability Requirement	Description
1	Legal Compliance	ESB will ensure biomass related activities comply with all applicable laws & regulations of Ireland, of the country from which biomass is sourced and with all relevant international laws and agreements.
2	Environmental Compliance	ESB will ensure that appropriate measures are in place to minimise any impact of biomass related activities on air, water, soil, ecosystems and biodiversity and will comply with all applicable current and future legislation.
3	Chain of Custody	ESB will gather and maintain data on the full chain of custody ensuring that all biomass can be traced right back to point of origin.
4	Greenhouse Gas Emissions	ESB will ensure that its use of biomass for generation has a positive impact on Ireland's overall GHG emissions and will comply with all applicable current and future legislation in this regard. ESB will also ensure that management of biomass sources is carried out to ensure that global carbon sequestration is maintained.
5	Community	ESB will ensure its biomass related activities contribute positively to the socio-economic opportunity of stakeholders (including land owners, farm workers, suppliers, and the local community) and will comply with applicable labour and human rights laws. Biomass related activities will not endanger food supply or impact

[14] Department of Agriculture, Food and the Marine, https://www.agriculture.gov.ie/forestservice/publications/

No.	Sustainability Requirement	Description
		communities where the use of biomass is essential for subsistence

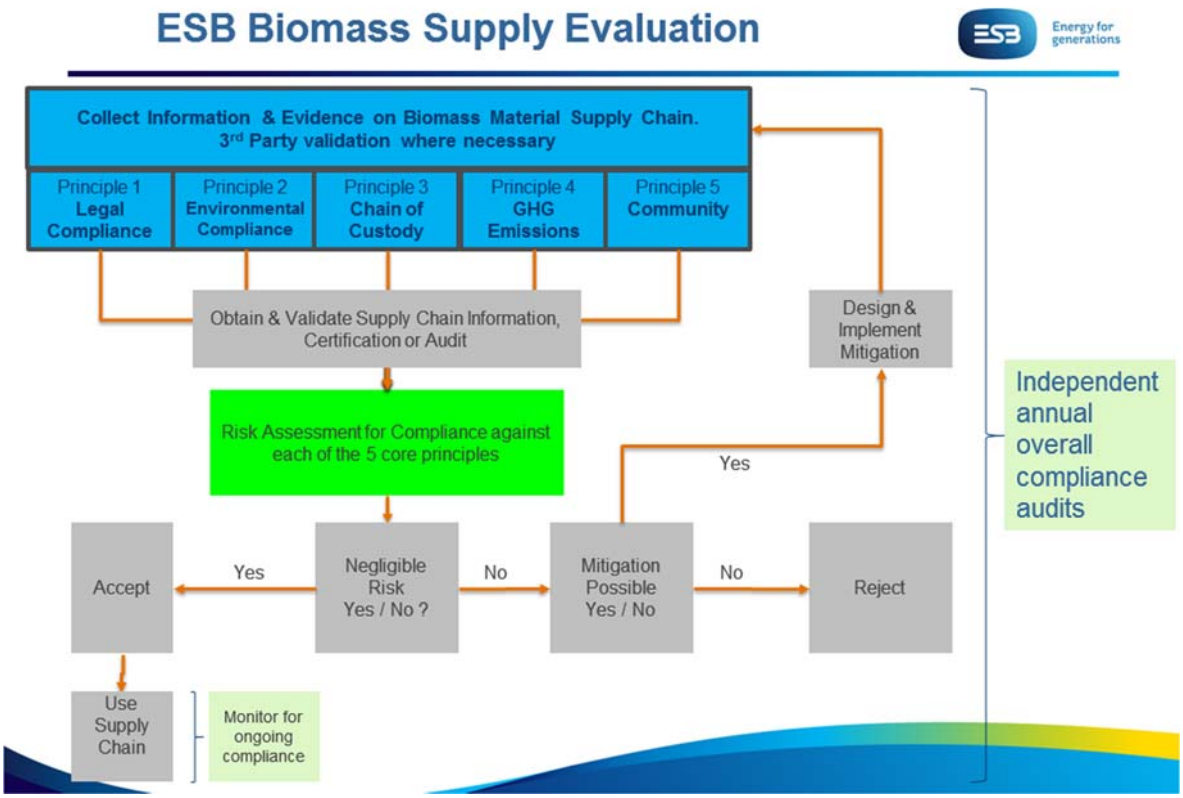

Figure 4-3 ESB Biomass Supply Evaluation

4.4.3.2 Biomass Sources

Biomass for WOP will be provided in accordance with ESB's sustainability requirements and will be sourced commercially from indigenous sources and from International sustainable sources.

Currently, there is insufficient indigenous biomass available to supply the projected biomass need of the Midland peat stations in the initial years of co-firing and imported biomass will be required. It is anticipated that in the early years indigenous biomass will provide between 20-40% of the required feedstock, with the balance coming from imported biomass. Indigenous biomass will mainly arise from commercial forestry operations and timber processing - which are both dependent on the market and the development of the national forests.

This estimation of the future availability of indigenous biomass volumes is supported by the COFORD Report – the **All Ireland Roundwood Production Forecast, 2016-**

2035[15] which identified that roundwood supply would increase significantly over the next two decades, with almost all of the increase coming from privately-owned forests in the State and primarily in the larger size assortments. As shown on **Figure 4-4**, the major increase in supply occurs from 2020 on with significant supply from private forestry occurring from 2024.

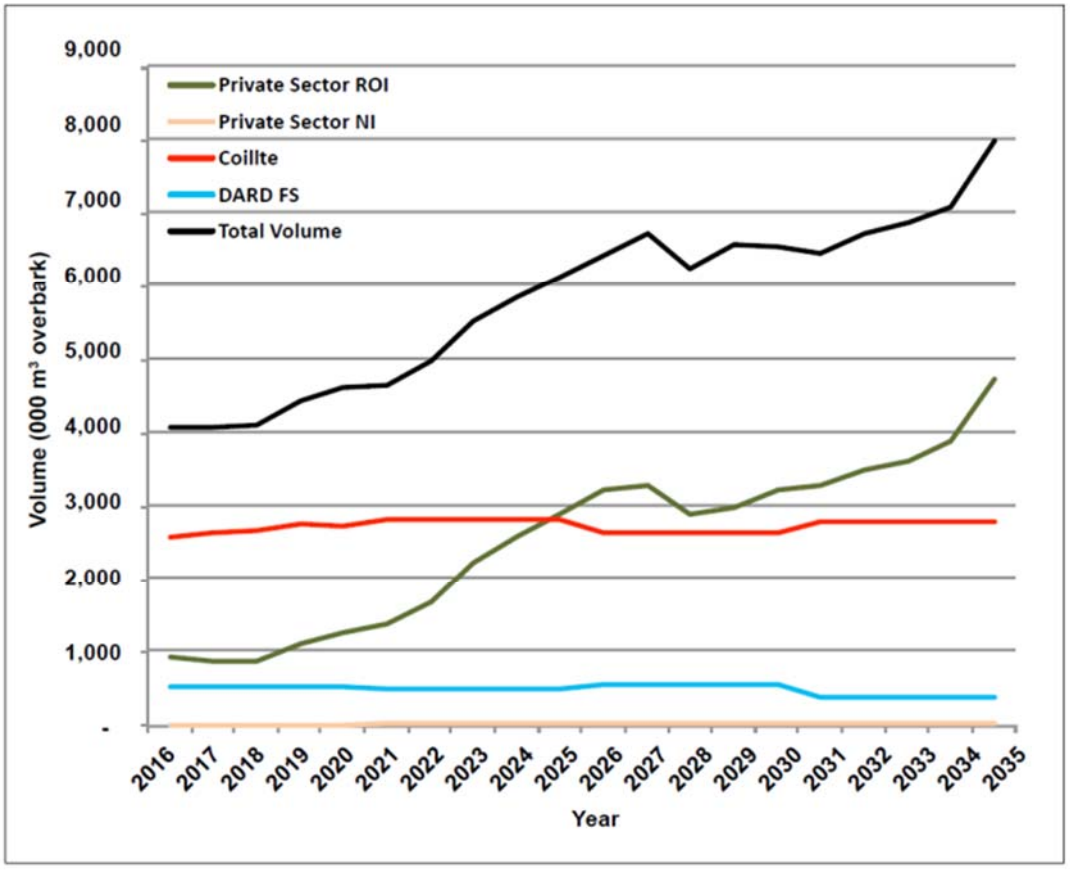

Figure 4-4: Forecast to total new realisable volume, All Ireland Roundwood Production Forecast 2016-2035, COFORD, 2016

From 2025 onwards there will be a marked increase in the availability of indigenous biomass from the forestry sector (public and private) as maturing forests reach thinning and harvestable age. Hence over time, with increasing indigenous biomass supply arising from increased forest activity in State and Private forestry and with the potential development of SRC crops, indigenous supply is expected to displace imported material.

[15] Henry Phillips et al, (2016), All Ireland Roundwood Production Forecast 2016-2035, COFORD. Available at: http://www.coford.ie/media/coford/content/publications/2016/00663CofordRoundwoodProduction2016-2035WebVersion.pdf

Solid biomass demand for the bioenergy sector in Ireland is also expected to grow significantly out to 2035 and this demand will be fulfilled mainly from the forest and agricultural sectors of the economy but also through increases in imports.

The enhancement of use of bioenergy in Ireland is a target objective set out by the Irish Government in its Bioenergy Action Plan, 2015[16]. In support of this plan SEAI updated a previously prepared study[17] on bioenergy availability which originally detailed the quantity of bioenergy resources available and their prices out to 2030.

The updated study[18] increased the number of bioenergy resources examined and extended the timeframe for analysis to 2035. The 2015 Report had indicated that;

> *'The availability of biomass resources for energy production is influenced by interactions between physical availability, cost of production and demand for the resources in alternative non-energy applications',*

The report provided an analysis of biomass availability taking these factors into account to assess biomass resources.

The 2017 report - which updated the 2015 report, extended the range of biomass sources considered and examined fourteen market ready bioenergy resources including solid biomass sources - such as forest thinnings and residues, sawmill residues, straw, perennial energy crops (such as SRC willow and miscanthus), and other solid materials.

Estimates of biomass availability for by-products arising from other commercial activity such as forestry and wood processing were assessed based on future requirements or production for that activity. Estimates of dedicated energy crops grown for bioenergy production - such as SRC willow, were determined based on the availability of land after the projections for food production were incorporated. The report stated that data from which estimates for bioenergy availability were framed were obtained from discussions with key sector representatives and key plans and data such as the **Food Wise 2025 Plan**,[19] **COFORD's All Ireland Roundwood Production Forecast , 2016 – 2035**[15] and the **EPA's National Waste Report 2012**[20].

[16] Department of Communications, Energy and natural resources, Draft Bioenergy Action plan, 2014

[17] Matthew Clancy et al, SEAI's Energy Modelling Group (EMG), Bioenergy Supply Curves for Ireland 2010-2030, October 2012

[18] SEAI and Ricardo Energy & Environment, Bioenergy Supply in Ireland, 2015 – 2035, An update of potential resource quantities and costs, Ver 1.2, 10/17

[19] Department of Agriculture Food and the Marine, (2015), Food Wise 2025 – Local roots Global reach – a 10 year vision for the Irish agri-food industry. Available at: https://www.agriculture.gov.ie/foodwise2025/

[20] EPA (2012). National Waste Report. Available at: http://www.epa.ie/pubs/reports/waste/stats/EPA_NWR12_Complete_to_web_5Aug14.pdf

The significant potential to expand the bioenergy resource to 2035 is highlighted in the 2017 report indicating a potential seven-fold increase in bioenergy resource as follows:

> *'The bioenergy resource in Ireland has significant potential to expand between now and 2035. Realisation of this potential is dependent on higher market prices than currently prevail for most resource types for bioenergy as well as mitigation of the supply-side barriers to resource development. Under favourable conditions with high market prices for bioenergy resources and mitigation of supply-side barriers, the total amount of solid, liquid and gaseous bioenergy produced in Ireland could reach 3,290 (kilotonne of oil equivalent) ktoe (138 PJ) by 2035[21]. This compares to total primary energy demand of bioenergy, including imports, of 468 ktoe (19.6 PJ) in 2014.'*

In terms of forestry biomass, Ireland's forest resource is widely spread across the country and is split between Coillte-managed State forest resources and privately owned forest (see **Figure 4-4)**. The latter is increasing due to government policies, including grants to support afforestation[22].

The long-term target is to have 18% of land cover as forest by 2050, and to support a long-term sustainable roundwood supply of 7 – 8 million cubic metres per annum (m^3/a). Increasing forest resources will lead to increased supply of pulpwood, by-product and residues which can be utilised in the bioenergy sector.

The National forest estate continues to expand as reported in **Ireland's National Forest Inventory, 2017** comprising 11% of the total land area (770,020 ha in 2017)[23], with a wide variety of forest types present. Of this, 50.8% of forests are in public ownership and 49.2% are in private ownership. The forest estate is dominated by conifer species (71.2%) with broadleaved species accounting for 28.7% of the area and with 44.9% of the stocked forest estate less than 20 years of age. The total growing stock volume of Irish forests is estimated to be over 116 million m^3 with a gross mean annual volume of 8.4 million m^3 per year.

The level of forest thinning has increased since 2013 which is regarded as a positive trend for wood mobilisation. In addition the forest estate in Northern Ireland comprises 112,000 ha (NI), some 8% of the land area.

During the 2020 to 2027 timeframe, it is anticipated that the indigenous biomass industry will begin to yield additional volumes of fuel as WOP Station - in combination with LRP and EPL, will act as a catalyst for the industry.

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[21] A tonne of oil equivalent (toe) is the conventional standardised unit of energy and is defined on the basis of a tonne of oil having a net calorific value of 41,686kJ/kg. In terms of electricity production 1 toe is required to produced 11.63 Megawatt hours of electricity (see SEAI conversion factors http://www.seai.ie/resources/seai-statistics/conversion-factors/)

[22] DAFM (Department of Agriculture Food and the Marine) (2014). 'Forests, products and people. Ireland's forest policy – a renewed vision'.

[23] Department of Agriculture, Food and the Marine, National Forest Inventory 2017, Main Findings.

It is expected that the agricultural sector will seek government support (in policy and fiscal terms) for the development of SRC e.g. willow. This will necessitate the preparation of position papers, the environmental assessment of same, and administration of a grant scheme. It is reasonable to expect that this will take c. 36 months before supports are available. This will be followed by the planting of crops and - noting that willow needs three to four years to initially develop with a greater yield occurring in the second rotation, significant volumes of these crops will likely only become commercially available in the mid-2020s.

Residues from forestry activities are therefore seen as a key resource with a large potential for biomass identified as also been potentially available from willow highlighting the importance of the agricultural sector in realising the bioenergy resource potential. This is reflected in Table 1.2 of the SEAI report with relevant figures extracted here in **Table 4-5**.

Table 4-5: Available solid biomass potential expressed in 'natural units'

Resource	Unit	2020	2025	2030	2035
Business as usual					
Forestry	'000 m3	491	1661	1621	2794
	ktoe	81	274	267	460
Biomass fibre for Electricity	ktoe	24 – 29	82 – 99	80 – 96	138 – 166
Sawmill Residue	'000 m3	862	974	1,098	1,237
	ktoe	142	160	181	204
Biomass fibre for Electricity	ktoe	42.6 - 51.1	48.1 - 57.8	54.3 - 65.2	61.2 - 73.4
Perennial energy crops	'000 m3	26	256	1,018	2,571
	ktoe	12	116	462	1,167
Biomass fibre for Electricity	ktoe	4—4	35-42	139-166	350-420
Enhanced Supply Scenario					
Forestry	'000 m3	541	1905	1811	2988
Forestry	ktoe	89	314	298	492
Biomass fibre for Electricity	ktoe	27-32	94-113	90-107	148-177
Perennial energy crops	'000 m3	32	372	1,283	2,571

Resource	Unit	2020	2025	2030	2035
	ktoe	15	169	582	1,167
Electricity only	ktoe	4—5	51-61	175-210	350-420

Note: - Oven dried tonnes. **-**1 ktoe is equivalent to 11,630 MWh[21]

The SEAI 2017 Report (Section 16.2) also provides estimates of potential availability of bioenergy for import in the future. It indicates that global trade in the biomass sector is likely to increase substantially in the future as countries increase their use of biomass.

It quotes a study - that completed for IEA Bioenergy Task 40 on Sustainable Bioenergy Trade [24], which found that trade in solid biomass could increase by a factor of about 80 by 2030 (from 2010 levels). This would give rise to trade of about 24,000 Picojoule (PJ) which is about 570 Mtoe of solid biomass. It also found that it would be likely that Europe would be a net importer drawing on exports from North and South America, Russia and the former USSR and parts of Africa.

The SEAI report goes on to state that:

> *'Ireland has deep water ports capable of receiving the large ships in which biomass is typically transported, but might need to develop the infrastructure necessary to deal with large quantities of imported biomass (e.g. bulk handling facilities at ports).'*

Biomass will be sourced Internationally on a commercial basis in accordance with the ESB sustainability criteria as set out in **Section 4.4.3.1** above and will come from Europe, Africa, Australia and North and South America but may also come from Asia.

4.4.3.3 Delivery of Biomass to the WOP Station

Biomass will be transported to the WOP Station site by road transport. The station will operate mainly on a just in time delivery basis for biomass with a 95%ile of 129 HGV biomass deliveries per day and average of 100 HGV biomass deliveries per day. Deliveries will be scheduled over a 16 hour day between (07.00 and 23.00 hours).

As noted above, indigenous biomass - in the form of by-products and residues sourced from the forestry and timber processing industries and from indigenous crops and agriculture, will typically come from sources within a 100 kilometre radius of WOP Station but could also be sourced at greater distance depending on economic factors. Imported biomass will be landed by bulk transporters of approximately 30,000 tonne capacity at key ports with facilities to handle biomass – such as Dublin Port and Greenore, Co. Louth on the east coast or Foynes Port, Co.

[24] Matzenberger, J., Daioglou, V., Junginger, M., Keramidas, K., Kranzl, L., Tromborg, E. (2013). 'Future perspectives of international bioenergy trade'. IEA Bioenergy Task 40.

Limerick in the Shannon Estuary on the West coast. It will also be possible to utilise Killybegs Harbour, Co. Donegal on the north west coast. See **Figure 4-5** over.

4.5 Proposed Fuel Management and Handling Facilities (Construction and Operation)

The proposed layout of development on the WOP Station is shown on **Figure 4-6**.

The proposed transition to biomass will not give rise to physical modifications to the power generation plant itself but require some modification of fuel storage and handling facilities.

4.5.1 Fuel Storage

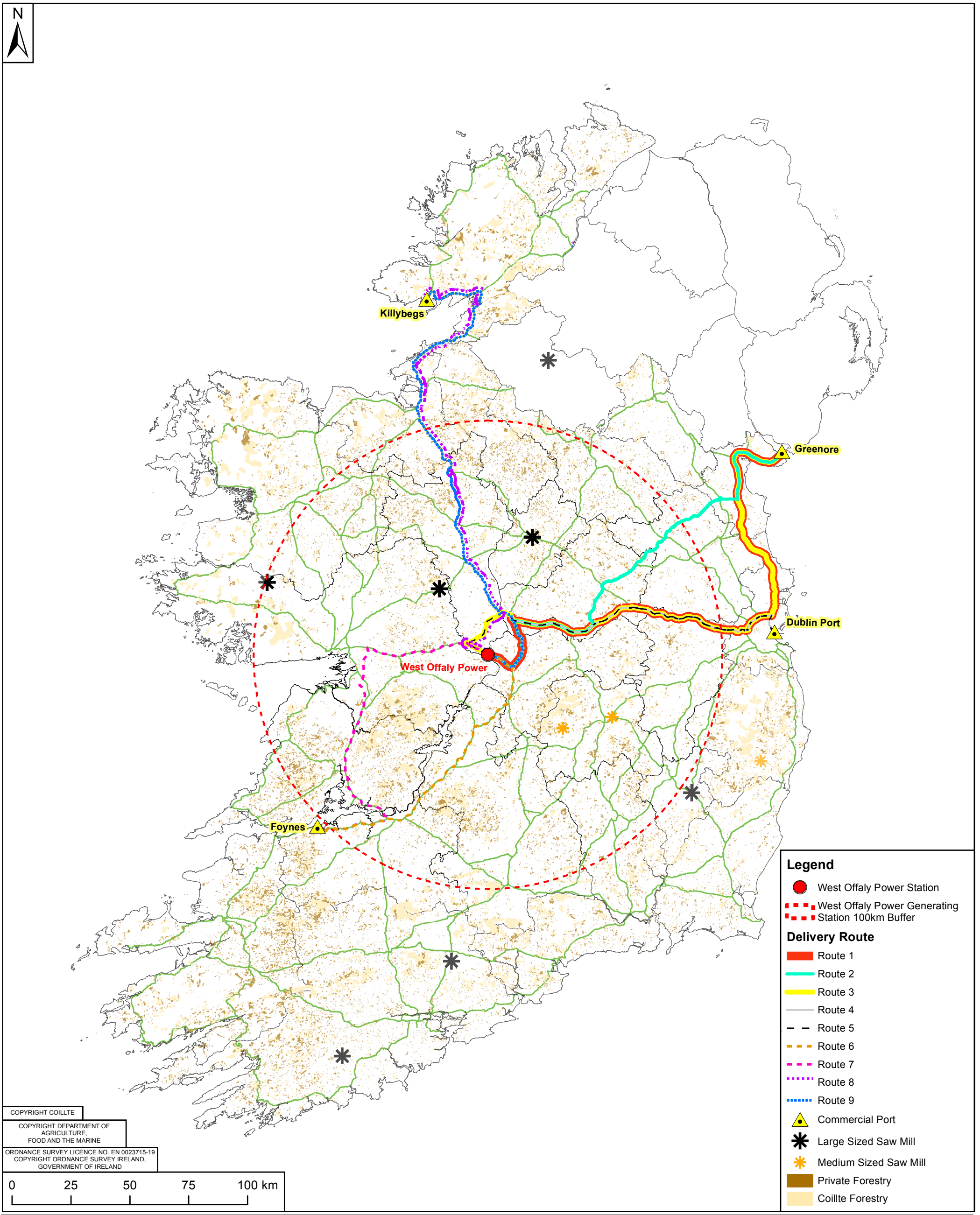
There is no proposal to deviate from the established peat handling system on the WOP Station site – namely the existing peat wagon tipplers, screens, conveyors and storage in the intermediate peat storage (IPS), described in **Section 4.1**. As noted above, permission is being sought to maintain all of those elements and to continue to utilise them.

To facilitate the transition to biomass at WOP Station, it is proposed to provide two purpose built concrete slabs for the short-term storage of biomass described in **Section 4.4.2** above. One of the proposed concrete slabs is located immediately south of the existing Intermediate Peat Storage building and is referred to as Biomass Storage Slab A. The other slab is located adjacent to the eastern entrance to the station referred to as Biomass Storage Slab B. It is also proposed to provide a silo for the storage of pellets and this will be located adjacent to the Biomass Slab A.

The slab and pellet storage designs have been prepared jointly by ESB (Storage Slab A) and by Bord na Móna (Storage Slab B and the pellet storage system).

4.5.2 Proposed Biomass Storage Slab A

Storage Slab A is located adjacent to the existing IPS building, see **Figure 4-7.** Storage Slab A will have a surface area of c. 3,924 sq.m. and will accommodate approximately 2 No. days of biomass storage – indicatively c. 9,030 cubic metres of material. Deliveries to this slab will use the existing weighbridge.



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PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED

CLIENT APPROVAL ☐ PLANNING ☐ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

DRAWING TITLE:

Figure 4.5-
Typical Indigenous Biomass Sources and Likely import Ports

CLIENT: **ESB**

PROJECT: **West Offaly Power, Transition to Biomass**

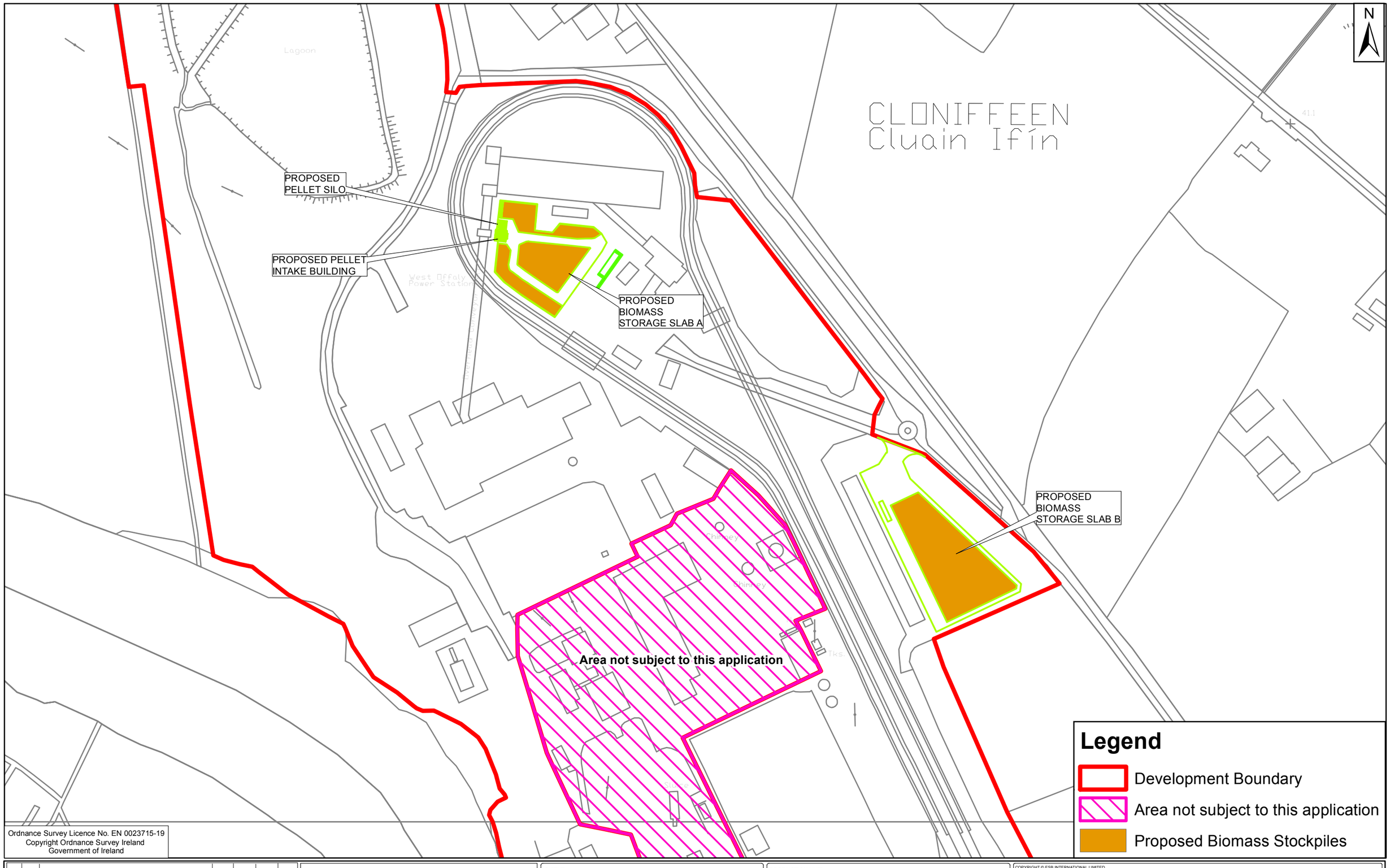
CONTRACT

PRODUCTION UNIT: **Civil & Environmental Engineering**

DRAWN	PRODUCED	VERIFIED	APPROVED	APPROVAL DATE
E.O'Shea	E.O'Shea	E. Delaney	P.Kavanagh	20/11/2018

CLIENT REF.	NO. OF SHEETS	SIZE	SCALE
00-00	00-00	A3	1:1,500,000

DRAWING NUMBER: **QS-000206-01-D460-163**



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CLIENT: ESB

PROJECT: West Offaly Power Transition to Biomass

CONTRACT

PRODUCTION UNIT: Civil & Environmental Engineering

DRAWING TITLE: Figure 4.6- WOP Station Proposed Layout Plan

DRAWN	PRODUCED	VERIFIED	APPROVED	APPROVAL DATE
E.O'Shea	E.O'Shea	E.Delaney	P.Kavanagh	20/11/2018

CLIENT REF.	NO. OF SHEETS	SIZE	SCALE
00-00	00-00	A3	1:2,500

DRAWING NUMBER: QS-000206-01-D460-164

N

EXISTING INTERMEDIATE PEAT STORAGE BUILDING

EXISTING ELECTRICAL BUILDING

EXISTING CONVEYOR GALLERY

PROPOSED PELLET SILO

PROPOSED PELLET INTAKE BUILDING

Relocated Car park

EXISTING SCREENING BUILDING

EXISTING MAINTENANCE BUILDING

PROPOSED BIOMASS STORAGE SLAB A

EXISTING RISING CONVEYOR

EXISTING RAIL LINE

0 10 20 30 40 50 m

Legend

Proposed Biomass Stockpiles

REV	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP

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CLIENT APPROVAL ☐ PLANNING ☐ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

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CLIENT: **ESB**

PROJECT: **West Offaly Power, Transition to Biomass**

CONTRACT

PRODUCTION UNIT: **Civil & Environmental Engineering**

DRAWING TITLE: **Figure 4.7- WOP Station - Biomass Storage Slab A**

DRAWN	PRODUCED	VERIFIED	APPROVED	APPROVAL DATE
E.O'Shea	E.O'Shea	E.Delaney	P.Kavanagh	20/11/2018

CLIENT REF.	NO. OF SHEETS	SIZE	SCALE
00-00	00-00	A3	1:500

DRAWING NUMBER: **QS-000206-01-D460-165**

Storage Slab A will be surrounded on three sides with a 5 m maximum height reinforced concrete retaining wall approximately 300 mm to 400 mm in thickness, subject to detailed design. This wall is intended to be supported by the reinforced concrete foundation slab where it would be locally thickened, if required, and be supported by the piles, if required. The reinforced concrete walls will be designed to support a dust (wind protection) screen positioned to the top of the wall should dust become an issue at a later stage and be required.

Additionally, a proprietary precast concrete wall, such as Alpha Bloc removable walls, is intended to be located in one area to the north west of the slab to allow for access for future maintenance works in that area. The precast A frame concrete wall will be 3.6 m in height.

Slab A will be located in the centre of an existing unused gravelled fuel handling area of the WOP Station site. This proposed location will not appreciably impact upon the existing road layout and flow of peat delivery trucks and importantly, will maintain access to the West side of the site for maintenance works and for emergencies

An overview of the general area and the approximate footprint of Storage Slab A in shown in **Figure 4-8** and **Figure 4-9**. Within this area the pellet storage silo will also be located as shown in **Figure 4-6**.

Figure 4-8: Ground view of Biomass Storage Slab A

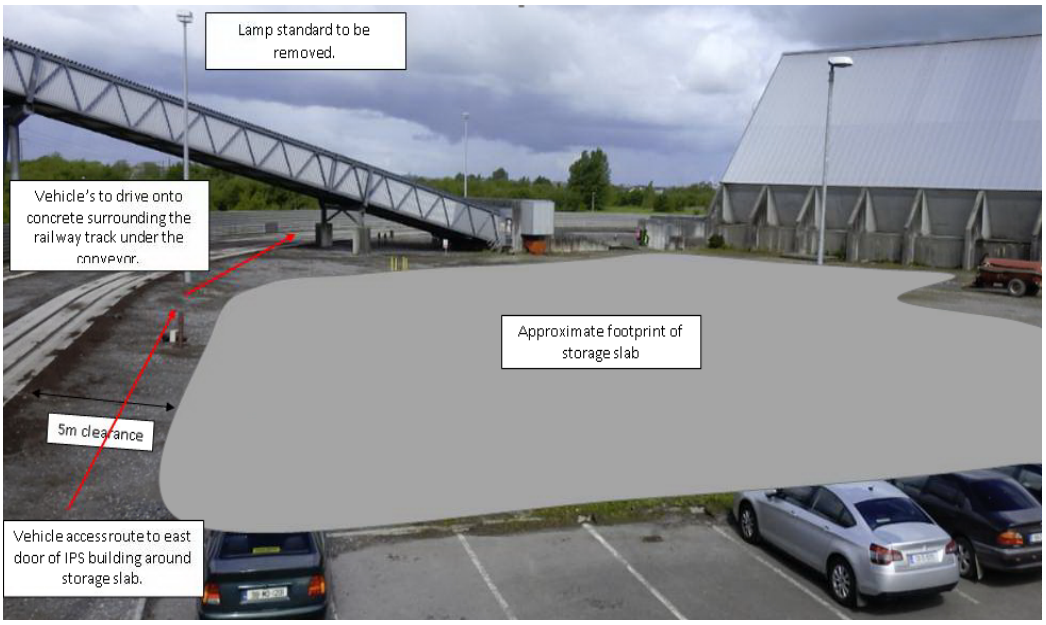

Figure 4-9: Approximate footprint of Biomass Storage Slab A

4.5.3 Proposed Biomass Storage Slab B

Biomass Storage Slab B will be located to the south-east of the existing roundabout at the entrance to the fuel handling section of the WOP Station site. It is located immediately west of a former storage building, see **Figure 4-10** below.

N

Existing Road

PROPOSED
BIOMASS
STORAGE SLAB B

Existing Building

Chimney

Area not subject to this application

TKS.

TKS.

Ordnance Survey Licence No. EN 0023715-19
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Government of Ireland

0 10 20 30 40 50 m

Legend

- Development Boundary
- Area not subject to this application
- Proposed Biomass Stockpiles

REV	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP

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CLIENT APPROVAL ☐ PLANNING ☐ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

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CLIENT: **ESB**

PROJECT: **West Offaly Power, Transition to Biomass**

CONTRACT

PRODUCTION UNIT: **Civil & Environmental Engineering**

DRAWING TITLE: **Figure 4.10- WOP Station - Biomass Storage Slab B**

DRAWN	PRODUCED	VERIFIED	APPROVED	APPROVAL DATE
E.O'Shea	E.O'Shea	E.Delaney	P.Kavanagh	20/11/2018

CLIENT REF.	NO. OF SHEETS	SIZE	SCALE
00-00	00-00	A3	1:750

DRAWING NUMBER: **QS-000206-01-D460-166**

Biomass Storage Slab B will have a surface area of c. 6,331 sq.m. It will be located adjacent to the eastern entrance to the station and will also accommodate additional biomass storage, c. 25,750 cubic metres of material. As with Storage Slab A, moveable walls (Alpha Blocs and Octoblocs) will be used to separate material within, and around the edge of, the slab.

Access to the slab will be via the roundabout and the slab will be located between an existing building and existing overhead power lines. The area currently comprises made-ground, see **Figure 4-11** below.

Figure 4-11: Proposed location of Biomass Storage Slab B

The edge of the slab will be located 3m from the existing building and 8m from the overhead power lines. Vehicular access to the existing roller shutter door at both gable ends of the existing building shall be maintained, although access to the southern end of the building may be restricted during the construction period. Access to the overhead power lines shall be maintained outside the slab area with a ramp provided at the northern end of the slab.

Deliveries of biomass to the slab shall be weighed and sampled on arrival using either the existing weighbridge or alternatively the proposed weighbridge to be provided on the biomass slab. This weighbridge may be constructed at a later stage than the slab construction as it may not be required for the initial years of the stations operation.

Existing trees located to the south-east of the slab location (as shown on **Figure 4-12)** will be removed - in accordance with the requirements of any Felling Licence, prior to the commencement of construction.

In order to achieve the proposed site levels it will be necessary to excavate material to reduce the level of the existing ground. This material shall either be removed off site for disposal, reused on site for landscaping purposes or reused offsite in accordance with the relevant Waste Regulations.

On completion of the Slab B construction, 3.6 m high precast concrete moveable wall units, Alfablocks or similar, and precast concrete blocks, Octablocks or similar, will be delivered to site and lifted into place on the slab using a mobile crane.

Figure 4-12: Existing tree stands at proposed location of Storage Slab B

4.5.4 Proposed Pellet Silo

Adjacent to Slab A, it is proposed to provide a biomass pellet silo and pellet intake building for the handling of pellets which will be delivered by lorry. This silo will have a diameter of 6 m and a maximum height of 14.7 m. It will be constructed in galvanised steel with a non-corrugated body and shall have a capacity of 260 cubic metres (m^3). The pellet intake building will be c. 61 sq.m. in area.

The pellets shall discharge from the silo to the adjacent existing conveyor via a screw conveyor and an additional screw conveyor shall be provided to the open ground west of the conveyor for emergency discharge of pellets. The proposed pellet intake building will be a steel framed building with a maximum height of 17.2 m. A bucket elevator, dust extraction plant and electrical controls will also be housed in the pellet intake building.

The pellet intake building and pellet silo may be constructed in conjunction with the construction of Biomass Slab A.

4.5.5 Delivery of peat and biomass fuel

Peat fuel will be delivered by rail and by road to the WOP Station. Peat delivered by rail will be unloaded to the underground fuel handling system directly in the tippler building. Peat delivered by road will be unloaded directly to the three lorry unloader bays directly onto the underground fuel handling system. Biomass will be delivered by road and will be unloaded directly to the underground fuel handling system or directed to the biomass storage areas as required. It will then be subsequently transferred from these storage slabs to the underground conveyor system. Pelleted biomass will be delivered directly to the pellet storage system.

4.5.6 Drainage management

4.5.6.1 Drainage Biomass Slab A and Pellet Silo

The proposed drainage for the sites of Biomass Storage Slab A and the Pellet Storage Silo will include the rerouting of some existing services and the construction of a new surface water system to capture surface runoff from the slab.

The proposed drainage system for the slab has been designed to route all flows through a combined Sustainable Urban Drainage System (SUDS). The proposed SUDS system will include a treatment train to ensure surface runoff from stored biomass and any potential oil spillages in are treated sufficiently before entry into the existing system.

4.5.6.2 Drainage Biomass Slab B

The proposed slab will be laid to a fall, and surface water shall discharge into a drainage channel that runs along the edge of the slab.

Typical details such as those that relate to oil interceptors and attenuation tanks are provided. The final design of these will be subject to detailed design.

4.5.7 Existing and Ancillary Services

4.5.7.1 Existing services

Typical existing services at Storage Slab A include surface water drains, light poles, a fire hydrant main and an 11kV electrical cable. The location has very little existing underground services and those that are present will be exposed and protected, or be relocated around the perimeter of the slab for maintenance reasons prior to construction and recorded on as-built drawings. The area where the slab is proposed to be positioned is free from overhead lines and will be surrounded by existing buildings and infrastructure minimising its impact on its surroundings.

There is an existing surface water drain located in the vicinity of the proposed silo and intake building. This pipe will be diverted and incorporated into the proposed drainage network for the area.

There are no identified underground services located in the immediate area of Storage Slab B. Slab B has been located to maintain a distance of 8 m from the existing overhead lines. As there is a 3 m separation between the existing building and the slab, existing drainage should not be affected, however if required this can be diverted. Confirmatory investigations will be undertaken by Contractor prior to any excavation to confirm assumptions with respect to services including underground cables and in accordance with health and safety regulations.

4.5.7.2 Ancillary services

New Access Gate

At Storage Slab B a new gate and new fencing will be provided. The existing gate will remain in place during construction works and will be used to secure the site. The existing gate will be removed when the new gate and fencing has been erected.

The new gate will be set back from the road edge in order to provide a splayed entrance. Due to the length and height of the new gate a mobile crane will be required to lift it into place.

New Weighbridge

At Storage Slab B a new weighbridge will be provided. The proposed weighbridge can be constructed flush with the concrete slab when the slab is constructed, or alternatively, installed at a later date when it can be supported on the slab. A crane will also be required to lift the weighbridge into position.

Fire fighting

Provision for fire safety measures have been made. Fire cabinets are proposed to be located around Biomass Slab A. These cabinets are proposed to contain 60m rolled up hoses and combined together will service all areas of the proposed biomass slab. The firefighting plan including all associated firefighting provisions will require to be designed by a fire engineering specialist. The fire fighting plan and provisions will be submitted to the local county council fire department for acceptance.

A water ring main may be provided, located around the top of the biomass storage wall, to dose the biomass as a dust mitigation measure should it be required, to be determined during the detailed design stage.

Fire hydrants with fire hoses shall also be provided at three locations in the vicinity of Storage Slab B slab and a fire water ring main will be provided for firefighting purposes.

Lighting

It is proposed that Asymmetric lights (typically up to 12 m in height and fitted with LED 150w LED 4K), would be located on top of the biomass retaining walls in Biomass Slab A to illuminate the slab for night time operations.

At Storage Slab B, circa eighteen lighting poles (up to 12 m high) shall be erected around the slab, each with 240W LED 4K asymmetric lights. It may be possible to fit six of the proposed lights to the existing building instead of providing lamp posts and this will be determined at detailed design stage.

4.5.8 Site Access

There are currently two routes to the WOP Station – that from Shannonbridge village (via the R357) to the north of the site, and that via the existing Bord na Móna works access that links with the R357 to the east of the station, see **Figure 4-13**.

Figure 4-13: WOP site access

Notwithstanding the proposed new entrance gates, there are no proposed changes to these access arrangements to facilitate either the proposed construction or operational stages.

4.5.9 Biomass Storage Construction Approach

A Contractor Specific Method Statement and Safety Risk Assessment will be prepared by the construction contractors and coordinated and reviewed by ESB for this work.

The Conditions of the IE Licence P0611-02 will be adhered to at all times during the works. A Construction and Environmental Management Plan (CEMP) will be prepared by the Contractor prior to commencement of works. This CEMP will set out the detail of the project construction and will include a Traffic Management Plan and a Waste Management Plan. This Plan must also include a Construction and Demolition Waste Management Plan in accordance with the "*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects*" published by the Department of Environment, Heritage and Local Government in 2006, and ensure that all material is disposed of at an appropriately licensed landfill site.

4.5.9.1 Phasing of construction works

It is intended that the two biomass storage slabs will be constructed in two separate phases. The Pellet Storage Silo and Pellet Intake Building will be constructed with the Storage Slab A and it is anticipated that this will be constructed in Phase 1. The construction of the Storage Slab B and associated works will be constructed in Phase 2.

4.5.9.1 Condition Survey of Nearby Structures:

After the diversion of existing services has been carried out, a pre-condition survey of any sensitive structures within the vicinity of the works would be carried out. Any

structures to be monitored would be identified in the detailed design stage of the works.

4.5.9.2 Additional site investigation works

Both a ground-bearing or piled option have been considered for the construction of the storage slabs. To inform detailed design additional site investigations will be undertaken to determine the bearing capacity of the soil and consolidation rates. The foundation design will be finally determined when detailed site investigations are carried out. The construction methodology has been developed for both of these foundation options.

4.5.9.3 Option 1 - Ground Bearing Foundations

Prior to the construction of the slabs the drainage network, manholes, silt traps and attenuation areas will be constructed. The slab construction is subject to detailed design following further confirmatory site investigation. Formwork shall be provided to form the proposed drainage channel at the edge of the slab. The detail design shall provide for water tight construction and expansion joints in the concrete.

Storage Slab A

The area will be excavated to the agreed formation level with spoil removed off site for stockpiling and possible reuse. It is estimated that a max depth of spoil to be removed in some areas will be in the order of 750 mm. Spoil is intended to be tested for reuse to ensure it meets the appropriate performance requirements. Where deemed unsuitable, soil will be tested and disposed of locally if possible and in accordance with the waste regulations.

A ground bearing slab and retaining wall would be constructed on granular material compacted in layers and likely incorporate a layer of geotextile and a layer of geogrid, in compliance with TII manual for “Specification of Highway Works”. The granular material should be compacted in layers with a vibrating roller or equivalent equipment, subject to detailed design. The reinforced concrete slab shall be designed based on the requirements of IS EN 1992 for vehicle wheel loads and the weight of the biomass as part of detailed design, and is envisaged to be approximately 300 mm in thickness. The steel reinforcing mats is envisaged to be constructed on top of a blinded formation level. The concrete slab and wall foundation is intended to be discharged by pump on site and the concrete will be vibrated before finishing.

Slab B

The existing made ground shall be excavated, tested for reuse and if unsuitable shall be removed off-site for disposal in accordance with waste regulations. Prior to the construction of the slab the drainage network, manholes, silt traps and attenuation area shall be constructed. The biomass slab shall be 300mm thick reinforced concrete laid to falls. The slab construction is subject to detailed design following further site investigation. Formwork shall be provided to form the proposed drainage channel at the edge of the slab. The detail design shall provide for water tight construction and expansion joints in the concrete.

Pellet Silo and Pellet Intake Building

The borehole information available in the vicinity of the pellet silo and pellet intake building indicates the depth of rock to be 3.7 m below existing ground level. Construction of a ground bearing foundation for the pellet silo and pellet intake building foundations entails the removal of ground to rock level and the build up to formation level in layers with compacted granular material such as 6F2 and Clause 804. The concrete floors shall be designed as ground bearing raft foundations.

4.5.9.4 Expected construction equipment – ground bearing foundations for Slab A, B and Pellet Silo

The expected construction plant needed to carry out the ground bearing foundation construction works for Storage Slabs A and B and the pellet silo is set out in **Table 4-6.**

Table 4-6 Expected Construction Plant- Ground Bearing Foundations

Slab A	Slab B	Pellet Silo and Intake Building
• 21 tonne Excavators x 2 • 6 tonne Dumper x 1 • 28 tonne Articulated Dumper x 1 • 5 tonne Vibration Mini Roller x 1 • Telehandler x 1 • Concrete pump x 1 • Concrete poker/vibrator x 4	• 21 tonne excavator x 2 • 9 tonne dumper x 1 • 5 tonne vibration mini roller x 1 28 tonne articulated dumper x 1 • Telehandler x 1 Concrete pump x 1 • Concrete poker/vibrator x 1	• 21 tonne excavator x 2 (with rock breaker attachment) • 9 tonne dumper x 1 • 5 tonne vibration mini roller x 1 • 28 tonne articulated dumper x 1 • Telehandler x 1 • Concrete pump x 1 • Concrete poker/vibrator x 2

4.5.9.5 Option 2 - Piled Foundations

Again, prior to the construction of the slabs the drainage network, manholes, silt traps and attenuation areas will be constructed. The piling and slab construction will be subject to detailed design following further confirmatory site investigation. Formwork shall be provided to form the proposed drainage channel at the edge of the slab. The detail design shall provide for water tight construction and expansion joints in the concrete.

Storage Slab A

If the assessment of the site investigations determine that excessive settlement of a ground bearing slab would likely occur, a piled foundation may need to be constructed to transmit the load to the limestone rock approximately 5m below existing ground level.

Preliminary design suggests that approximately 350 piles would be required with a diameter of approximately 375 mm and a length of 6m typically, subject to detailed design. The reinforced concrete slab thickness, steel reinforcement, and pile spacing

and design is intended to be calculated based on the requirements of IS EN 1992 for anticipated vehicle wheel loads and the weight of the biomass and IS EN 1997.

The area is intended to be excavated to the agreed formation level with spoil removed off site for stockpiling and possible reuse. It is estimated that a max depth of spoil to be removed in some areas will be of the order of 850 mm, to be confirmed. Spoil is intended to be tested for reuse to ensure it meets the requirements where practicable. Where deemed unsuitable, soil will be tested and disposed of locally if possible and in accordance with the waste regulations.

A piling platform would be constructed of granular material compacted in layers and likely incorporate a layer of geotextile and a layer of geogrid, in compliance with TII manual for “Specification of Highway Works”.

Slab B

As part of the detailed design it may be determined that piling is the most suitable option for the slab construction. In this event, the ground level will be excavated to formation level and a base shall be provided for the piling rig using compacted granular material. Bored in-situ piles shall be provided to transfer loads to the rock and these piles shall be filled with reinforced concrete. The design based on preliminary site investigation indicates a concrete slab design of 300mm thickness designed to span between piles. It is estimated that 400 piles (450mm diameter) will be required. The drainage design may have to be amended to accommodate the pile locations.

Pellet Silo and Pellet Intake building

The type of piles to be used will be determined at detailed design stage having regard to the design of the adjacent biomass slab. Due to the proximity to existing buildings, plant and equipment, however, bored piles may be the most suitable option. The number and location of the piles shall be designed so as to accommodate the walls of the pellet storage pit in the vehicle intake building. Based on the borehole information the maximum length of pile required is estimated to be less than 5m and the bored piles shall be of reinforced concrete construction.

Excavation of existing made ground will be required to accommodate the pellet storage pit and some rock breaking may be required based on the borehole information in this area. This shall be carried out in accordance with planning permission requirements and noise conditions and in accordance with the requirements of the power station operations. All excavated material shall be removed off site and disposed of locally if possible in accordance with the waste regulations.

The floor of the vehicle intake building and the base and walls of pellet storage pit shall be constructed in reinforced concrete of 300mm thickness. The proposed silo shall be supported on a 300mm thick reinforced concrete slab designed to span between piles.

4.5.9.6 Expected construction equipment - piled foundations

The expected permanent construction plant needed to carry out the piled foundation are as set out in **Table 4-7.**

Table 4-7 Expected Construction Plant- Piled Foundations

Slab A	Slab B	Pellet Silo and Intake Building
• 21 Tonne Excavators x 2 • 6 Tonne Dumper x 1 • 28 Tonne Articulated Dumper x 1 • 5 Tonne Vibration Mini Roller x 2 • Telehandler • Piling Rig x 1 • Concrete Pump x 1 • Concrete poker/vibrator x 4	• 21 tonne excavator x 2 • 9 tonne dumper x 1 • 5 tonne vibration mini roller x 1 28 tonne articulated dumper x 1 • Telehandler x 1 Piling rig x 1 Concrete pump x 1 • Concrete poker/vibrator x 1	• 21 tonne excavator x 1 (with rock breaker attachment) • 9 tonne dumper x1 • 5 tonne vibration mini roller x 1 Telehandler x 1 • Piling rig x 1 Concrete pump x 1 • Concrete poker/vibrator x 2

4.5.9.7 Site Management

All construction works on site shall be managed and supervised by competent and qualified personnel and all works shall be carried out under appropriate supervision, best practice current health and safety measures and also best practice quality control. The works shall also be supervised by Engineers on behalf of the client.

4.5.9.8 Temporary site compound and laydown areas

The following four locations have been identified as areas that can be used during the construction stage for construction staff car parking, site offices and material laydown areas. **Figure 4-14** below shows these locations. The contractor will determine in conjunction with ESB, which of these areas is the most suitable to carry out their works efficiently.

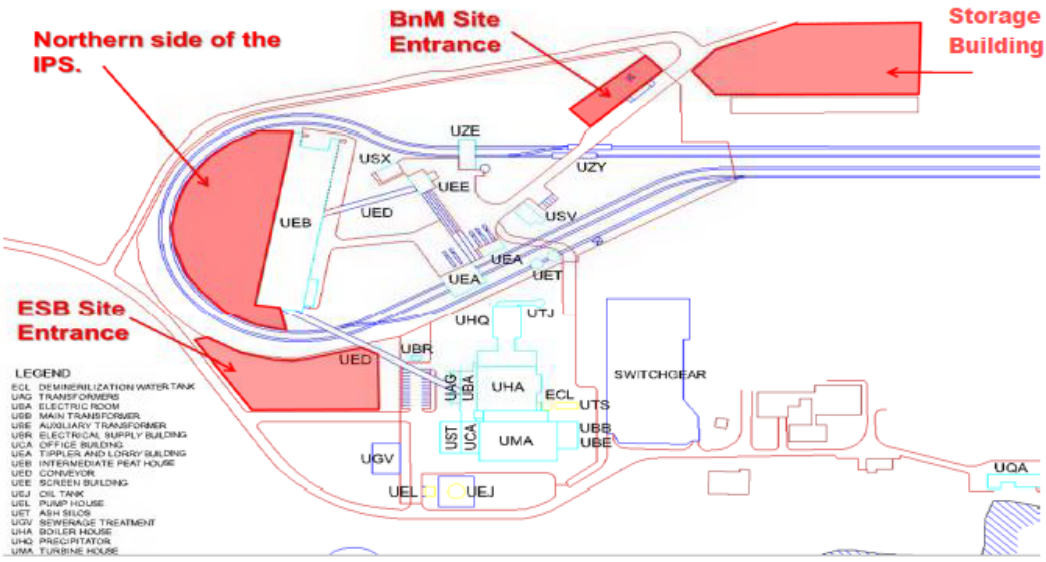


Figure 4-14: Potential Construction site laydown areas

Facilities for site employees and visitors shall be provided within the site compound. The facilities provided shall include office space, toilet facilities, drying room, site canteen with drinking water, hot water, seating and facilities to heat and refrigerate food, parking area and storage containers. All facilities shall have adequate heat and lighting and shall be maintained in a clean and tidy way. The site compound shall be fenced and secured to prevent unauthorised access. All temporary facilities shall be removed on completion of the works and the site compound area shall be reinstated.

Site and cycle parking shall be provided for construction personnel within a designated area within the site compound. A clearly marked pedestrian route shall be provided from the site compound area to the works area. All vehicles will be required to reverse park in the site compound area.

4.6 Proposed Development of Additional Landfill Capacity (Construction and Operation)

4.6.1 Future Requirements for Ash Disposal

Ash - both fly ash and bottom ash, will continue to arise from the generation activities at WOP. This will require the development of new ash disposal cells, as incorporated in the current proposal.

The proposed development will be carried out in accordance with the established and permitted operations at the ADF site. These operations take place in the context of the existing IE Licence for WOP Station and in accordance with any Licence Review and any subsequent new licence.

The existing ADF will continue to exclusively accept ash from WOP Station and there will be no intensification of activity at the ADF. There will be no increase in the levels of rail or road traffic as a consequence of the proposed development. There will be no increase in the level of plant required on site or the noise currently generated.

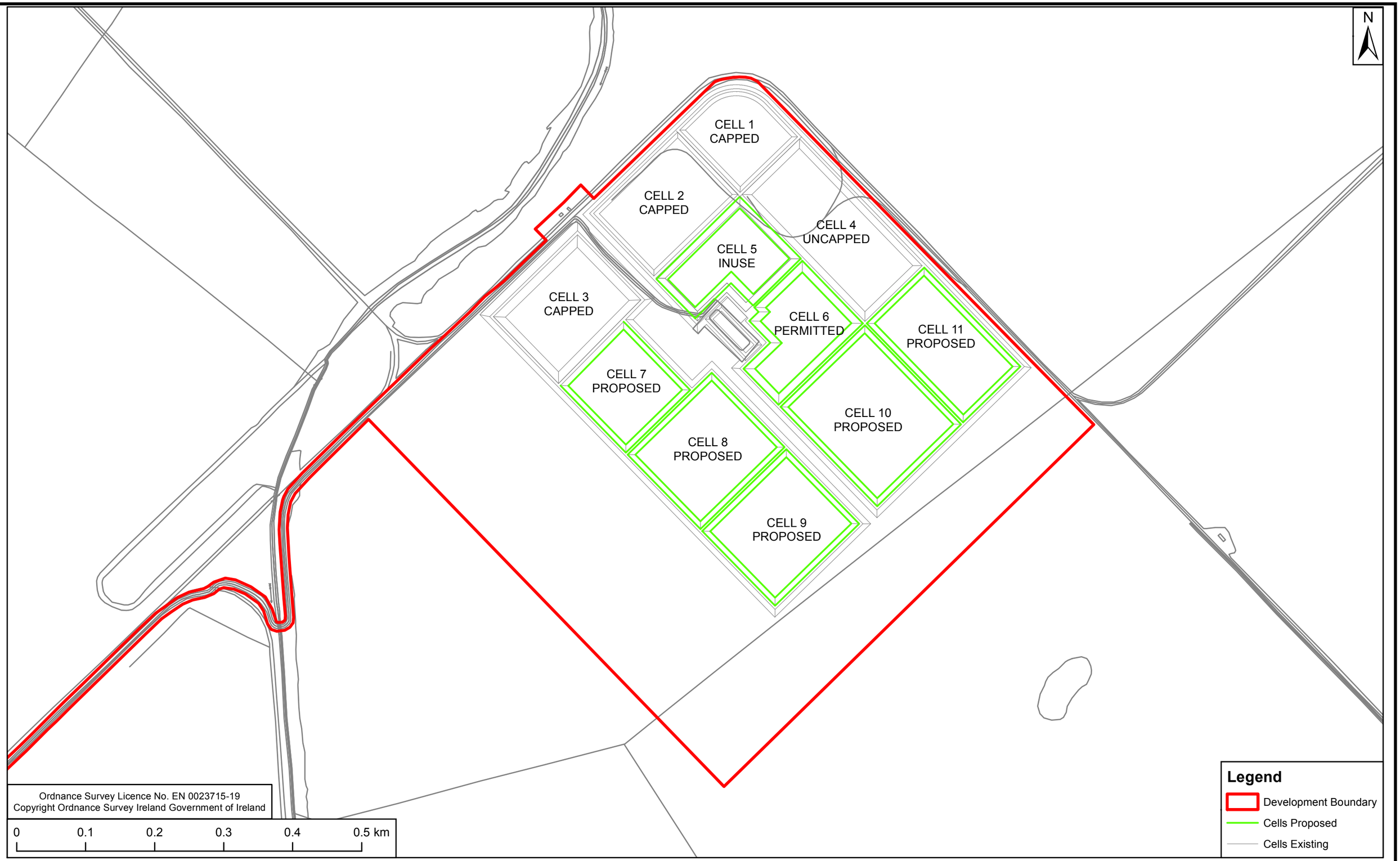
Based purely on peat combustion, the combustion of 1,250,000 energy tonnes of peat per annum would give rise to a disposal requirement of c. 52,000 tonnes of ash. However the combustion of biomass typically gives rise to less ash than peat. Therefore the percentage of ash arising each year will reduce as the proportion of biomass increases. Based on indicative calculations for co-firing and exclusively biomass stages, it is estimated that the extended footprint can meet disposal requirements for 25 years, depending on the actual ash arisings.

There will also be no increase in the volume of leachate produced due to the increased volume of ash as cells are capped as they are filled.

4.6.2 Proposed Development at the ADF

Proposed operations at the ADF will be in-line with the established operations with ash transported to the site by covered rail wagon and placed in lined landfill cells as detailed in **Section 4.1.2.2** of this EIAR.

The current extent of the landfill footprint and the proposed new development (new landfill cells) are shown on **Figure 4-15**.



REV	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP

PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED

CLIENT APPROVAL ☐ PLANNING ☐ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

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ESB International is a trading name of
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Registered Office: as above
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CLIENT: **ESB**

PROJECT: **West Offaly Power, Transition to Biomass**

CONTRACT

PRODUCTION UNIT: **Civil & Environmental Engineering**

DRAWING TITLE: **Figure 4.15- WOP ADF Proposed Layout Plan**

DRAWN	PRODUCED	VERIFIED	APPROVED	APPROVAL DATE
E.O'Shea	E.O'Shea	E.Delaney	P.Kavanagh	20/11/2018

CLIENT REF.	NO. OF SHEETS	SIZE	SCALE
00-00	00-00	A3	1:5,000

DRAWING NUMBER: **QS-000206-01-D460-167**

Three cells (Cells 1, 2 and 3) are already closed and capped as per the requirements of the IE licence. Cells 4 and 5 are currently active and are accepting ash with capping being completed on an ongoing basis in accordance with the approved Ash Landfill Operational Plan and the existing IE Licence, and as approved by the EPA. It is anticipated that Cell 6 will be used from late 2019 / early 2020 and will be actively in-use when WOP Station enters its co-firing phase. That cell will be required for acceptance of ash up until end of 2020.

It is proposed that a further five engineerd landfill cells will be developed (Cells 7, 8, 9, 10 and 11). This will extend the ADF footprint by c.173,130 sq.m. This will accommodate the disposal of an additional c. 929,200 cubic metres of ash (approximately equivalent to 880,000 tonnes). As noted above, this facility will have no defined date of closure but it is expected it can accommodate ash arisings for a period in the range of 25 years.

To facilitate the extended operation of the ADF, peat soil within the ADF site area and adjacent to the landfill footprint itself will also be excavated to a depth of circa one metre to provide material for the final landfill capping layer.

Cells will continue to be capped as they are filled.

The proposed cells will be constructed in accordance with the EPA guidance and the IE licence for the site as is currently and as detailed in **Section 4.1.2.2**. of this EIAR.

4.6.2.1 Site Services and Infrastructure

To facilitate on-going operations at the ADF, it is proposed that a new 4,500 cubic metres lagoon (surface area of 1,400 sq.m.) will be developed on the site. This will ensure all leachate will be managed on the site in-line with established practice and in accordance with the IE licence.

Existing site services and infrastructure – including the vehicular access way, surface water drains, leachate collection system and railway network will continue to be used and extended. Other than the proposed addition to the leachate collection and management system, no other works are required to facilitate the acceptance of the additional ash.

4.6.3 Operation & Maintenance

WOP Station operates an Environmental Management System (EMS) certified to ISO14001:2015. The management of the environmental aspects of the WOP Station site including the ADF complies with this EMS under ISO14001 and IE 611-02 as well as the stations environmental policy. The Station also operates under the ETS scheme with a GHG emission permit (Licence Reference IE_GHG077_10385_4) issued by the EPA

As part of the Environmental Management Programme, objectives and targets are set to deal with all potential emissions from WOP Station including the ADF. The guiding principle in the operation of the ADF is to deposit ash with due care to safety and the environment in compliance with all relevant regulations.

4.7 Construction Material Quantities and Associated Transport for the Proposed Development

This section considers the quantities of materials associated with the proposed development.

The foundation design will be finally determined when further detailed site investigations are carried out prior to construction. However a summary of the estimated construction material quantities and the associated activities during the construction period is provided in **Table 4-8** for ground bearing and in **Table 4-9** for pile bearing.

Table 4-8: Estimated Construction Materials Ground Bearing

Ground Bearing Quantities and Materials					
Slab A		**Slab B**		**Pellet Silo & Pellet Intake Building**	
Description	**Quantities**	**Description**	**Quantities**	**Description**	**Quantities**
Additional SI		Excess excavation material	4300 m^3	Excess excavation material	520 m^3
Relocating Services		6F2 granular material	3000 m^3	6F2 granular material	455 m^3
Excavation Reduce Site levels	2990 m^3	Clause 804 granular material	330 m^3	Clause 804 granular material	30 m^3
Filling – Imported stone for base	1380 m^3	Clause 505 Pipe surround	150 m^3	Concrete deliveries	75 m^3
Slab - Blinding	230 m^3	Terram and geogrid	18990 m^2	Reinforcement	10 Tonnes
Slab – Concrete pour	1380 m^3	Concrete deliveries	1900 m^3	Structural steel	6 Tonnes
Retaining walls – Concrete pour	228 m^3	Reinforcement	247 Tonnes	Cladding and doors	565 m2
Steel – Reinforcing	187 Tonnes	Drainage materials pipes, manholes etc		Equipment (bucket elevator, conveyors etc)	
Alfaboc walling		Gates and fencing		Silo	
Drainage Works	1253 m	Biomass separation walls - Octablocs	60 nr		
Car Park Relocation – Exported materials and soil disposal	179 m^3	Biomass separation walls - Alfablocs	200 nr		
Car Park Relocation – Imported Stone / Bitumen	140 m^3	Lighting			
Lighting					

Table 4-9: Estimated Construction Material Pile Bearing Quantities

Pile Bearing Quantities					
Storage Slab A		**Storage Slab B**		**Pellet Silo**	
Description	**Quantities**	**Description**	**Quantities**	**Description**	**Quantities**
Additional SI Works		Excess excavation material	2900 m^3	Excess excavation material	250 m^3
Relocating of Services		6F2 granular material	1575 m^3	6F2 granular material	0
Excavation – Reduce Site levels to Formation	3450 m^3	Clause 804 granular material	330 m^3	Clause 804 granular material	25 m^3
Filling – Imported stone for base	1380 m^3	Clause 505 Pipe surround	150m^3	Concrete deliveries	93 m^3
Piling – 310 piles approx.	205 m^3	Terram and geogrid	0	Reinforcement	12 Tonnes
Slab - Blinding	230 m^3	Concrete deliveries	2340m^3	Structural steel	6 Tonnes
Slab – Concrete pour	2070 m^3	Reinforcement	304 Tonnes	Cladding and doors	565 m^2
Steel - Reinforcing	231 Tonnes	Drainage materials pipes, manholes etc		Equipment (bucket elevator, conveyors etc)	
Retaining walls – Concrete pour	228 m^3	Gates and fencing		Silo	
Drainage Works – SUDS pipe laying and drainage diversions	1253 m	Biomass separation walls - Alfablocs	200nr		
Car Park Relocation – Exported materials and soil disposal	179 m^3	Biomass separation walls - Octablocs	60nr		
Car Park Relocation – Imported stone / Bitumen	140 m^3	Lighting			
Alfabloc Walling					
Lighting					

A summary of the estimated associated HGV deliveries during the construction period is provided in **Table 4-10**. Traffic volumes may vary during the construction stage depending on the type of construction method required.

Table 4-10 Estimated Construction Total HGV Traffic Volumes

Estimated Construction Total HGV Traffic Volumes			
	Slab A	**Slab B**	**Silo**
Ground bearing foundation design	824	1,171	143
Piled foundation design	996	914	64

4.7.1 Delivery Protocols during Construction

The contractor will inform and educate all regular suppliers and all sub-contractors and delivery drivers of the basic procedures. All deliveries will be controlled at the entrance to the fuel handling area. The designated storage areas shall be identified prior to taking delivery of the material and the driver shall be directed to the storage area.

Materials shall be sourced locally in so far as possible and potential suppliers for concrete and stone are listed in **Table 4-11**.

Table 4-11: Potential Local Material Suppliers

Potential Local Suppliers	Name	Location	Approx. Distance
Concrete	Kildea Concrete	Bealnamulia, Athlone	20 km
Concrete	Whytes Concrete	Ballinasloe	15 km
Concrete	Spollen Concrete	Glassen, Athlone	34 km
Concrete	Banagher Concrete	Banagher, Co. Offaly	17 km
Quarry Material	Roadstone	Tullamore, Co. Offaly	41 km
Quarry Material	Roadstone	Cam, Co. Roscommon	27 km
Quarry Material	McKeons sand and Gravel	Culliagh Shannonbridge	8 km

4.7.2 Fuel Consumption

An estimate of the daily fuel consumption and estimated total fuel consumption of construction equipment is provided in **Table 4-12** and **Table 4-13.** The average daily fuel consumption will depend on the intensity of use of each item.

Table 4-12: Anticipated Daily Fuel Usage

Machine Type	Fuel usage (litres/day)
21 tonne excavator	110 - 140
6 tonne dumper	36 - 45
28 tonne dumper	130 - 160
5 tonne roller	15 - 20
Telehandler	24 - 30
Piling rig	90 - 110
Concrete Pump	34 - 36

Table 4-13: Estimated Total Fuel usage during construction

Estimated Total Fuel Usage (litres)		
	Ground Bearing	**Piled**
Biomass Slab A	46,934	56,064
Biomass Slab B	56,171	62,354
Silo	11,231	92,345
Total	114,336	127,652

4.8 General Environmental Controls (Construction)

4.8.1 Control of Surface Water Runoff

During construction works, surface water runoff shall be controlled so that no silt or other pollutants enter the surface water system. The contractor shall employ best practice settling systems to ensure maximum removal of suspended solids prior to discharge of any surface water or groundwater from excavations to surface water drains.

The contractor will have to comply with the IE Licence discharge/monitoring requirement during construction. The contractor will be required to comply with best practice such as the CIRIA standard “Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors’ (CIRIA, 2001). The contractor will be required to monitor the construction related discharges before a connection to the operational site drainage and ensure that suspended sediment levels are no more than 25mg/l prior to discharge to the onsite drainage system.

4.8.2 Waste Management

All waste arising shall be managed and disposed of in a way that ensures the provisions of the Waste Management Act, 1996 and associated amendments and Regulations, are applied.

A Construction and Demolition Waste Management Plan will be prepared to minimise waste and deal with recycling and reuse of construction waste where it is deemed suitable by testing in line with legislative requirements. All non-hazardous office and canteen waste will be collected by a licensed waste collector for disposal in a licensed facility. Construction waste that cannot be reused or recycled shall be stored in a designed area for collection by a

licensed waste contractor. Waste oil and fuel shall be stored in a bunded area for collection by a licensed oil recycling contractor. Electrical waste shall be stored in designated containers for collection by a recycling contractor. Scrap metal such as off cuts from reinforcement not suitable for use shall be collected and stored separately for removal off site by a licensed scrap metal merchant.

Excess excavated material shall be removed off site by a licensed haulier for re-use or disposed of in a licensed facility. Material such as excavated soils will be tested to determine their suitability for reuse in the construction of berms in the ADF. This will reduce the amount of imported and exported fill needed.

4.8.3 Fuels and Oils

Fuels and oils used for plant and equipment on the site be stored in a bunded area within the site compound. This area will be inspected regularly and the bund shall be adequate to contain a minimum of 110% of the volume of the largest container of oil and fuel stored. Spill protection equipment such as absorbent mats, shall be available on site at all times to contain any oil spill that may occur and procedures shall be in place to deal with any such spillage. All plant shall be provided with drip trays and spill kits.

Plant operators shall carry out a visual inspection of their vehicle on a daily basis and shall be trained in how to deal with any uncontrolled spillage of oil.

4.8.4 Invasive Species

No invasive species have been identified in the proposed location for the biomass storage slabs however the following precautionary measures will be employed. Invasive species can be introduced into a location by contaminated vehicles and equipment, in particular tracked vehicles, which were previously used in locations that contained invasive species. Good site organisation and hygiene shall be maintained at all times on site, particularly during construction activities. For any material entering the site, the supplier must provide an assurance that it is free of invasive species. Plant shall be inspected upon arrival and departure from site and cleaned when necessary. All site users shall be made aware of invasive species management plans and treatment methodologies.

4.8.5 Health and Safety

All works shall be carried out so as to comply with all the requirements of the Safety and Health at Work Act 2005 and any subsequent regulations or amendments and with the requirements of the Health and Welfare at Work (Construction) Regulations, (SI 291 of 2013), any subsequent amendments and any other relevant Health and Safety legislation. All construction staff on site shall have a current Safepass card and relevant CSCS card (Construction Skills Certification Scheme). All works shall be carried out in a safe manner and in accordance with the above legislation and any other guidance notes issued by the Health and Safety Authority. In particular all excavation works shall be carried out in accordance with the HSA publication A Guide to Safety in Excavations.

Preliminary design risk assessments have been prepared for the design of the works and these will be updated during detailed design stage. This document shall be utilised to develop the Preliminary Safety and Health plan that will be provided to contractors at tender stage.

The necessary appointments shall be made for the construction works in accordance with the above legislation. The Contractor will provide a site specific construction stage safety and health plan and shall provide detailed risk assessments and method statements in advance of each element of work. The Contractor shall particularly address the interface between construction activities and the on-going power station operations in conjunction with the ESB and Bord na Móna. On completion of the works, a detailed safety file shall be prepared.

4.8.6 Traffic and Transportation

The site currently has a lot of moving plant with deliveries of peat coming in via train and trucks on a regular basis as well as station vehicles carrying out maintenance. A detailed site specific construction traffic management plan will be developed by the contractor and approved by the BnM fuel handling operations staff to ensure that the construction works and delivery of construction material does not interfere with the on-going peat deliveries and ensuring controlled and safe movement of all vehicles. A waiting area will be proposed for vehicles entering the site so that a build-up of vehicles is prevented onsite. The site construction traffic will be segregated from the pedestrian traffic for safety reasons.

4.9 Construction Programme

The construction programme is dependent on the sequencing of the works and the resources provided to complete the works. An estimated construction programme for the works is set out in **Table 4-14**. It is estimated that the overall construction period will be in the region of 6 – 9 months but will be dependent on the construction methods required which will be finalised following detailed design. It should be noted also that some of these activities could be constructed concurrently and the works could be completed in a shorted time period than that shown.

Table 4-14 Estimated Construction Programme

Estimated Construction Programme (Days)			
	Slab A	**Slab B**	**Silo**
Ground bearing foundation design	154	153	105
Piled foundation design	211	211	103

4.10 Operational Activities

Technical constraints of operating the WOP Station when firing on biomass, particularly indigenous materials such as brash from forestry operation and SRC willow, will likely require that an additive to the combustion process be utilised to prevent boiler damage from combustion gases. Where necessary additives such as lime or ash may be utilised to mitigate such effects.

4.11 Decommissioning and Reinstatement

4.11.1 WOP Station Decommissioning

The WOP Station will be decommissioned in accordance with the EPA approved Decommissioning Management Plan (DMP) as required by Condition 10.2 of the stations IE Licence.

In accordance with the DMP the site will be rendered environmentally safe and the following key activities will be undertaken during decommissioning:

- Cessation of all production.
- Cancellation of all incoming deliveries of materials to the station.
- Termination of all contracts other than those that are concerned with the DMP or related to safety of personnel or the environment.
- Return of materials to suppliers where possible, for resale or reuse.
- Isolation and purging of transfer lines from bulk storage to direct pipe contents back to bulk storage.
- Shutting and blanking of supply lines for oils and chemicals to intermediate storage and/or dilution tanks.
- Clearing of fuel stocks.
- Cleaning and decontamination of all plant and equipment.
- Removal of all laboratory chemicals.
- Cleaning and decontamination of all laboratory analytical instruments.
- Cleaning, decontamination and inspection of bunds, sumps and underground drains.
- Destocking of the workshops and stores.

- Isolation and disconnection of all electrical supplies to pumps and motors.
- Draining of oil from transformers that will not be reused elsewhere.
- Cleaning of residues from boilers and cleaning and blanking off of fuel lines.
- Draining and cleaning of lube oil systems.
- Draining of water systems such as raw feedwater tanks, condensate storage tanks and supplementary cooling systems.
- Transfer of ion exchange resins to drum storage.
- Maintenance of parts of the water supply system to provide wash-down and cleaning facilities during decommissioning and to meet the ongoing needs for fire protection and sanitary services.
- Maintenance of site drainage system and oil interceptors during decommissioning activities.
- Secure archiving of all relevant documentation including drawings, instrumentation diagrams, validation documentation, vendor manuals and data, project files, maintenance records, inspection records and other appropriate documentation.
- Maintenance of a security presence on site on a 24-hour basis, as necessary, for ongoing monitoring of the site from a safety, fire protection and environmental perspective.
- Maintenance of defined site access procedures.
- Removal off site of all materials for reuse, recycling of final waste disposal by appropriate licenced waste contractors.

It is anticipated that any necessary decontamination of plant and equipment will be carried out on site. It will primarily involve cleaning in place and power washing of internal and external surfaces with collection for final disposal by licenced waste contractors following characterisation and treatment as required.

4.11.1.1 Boiler Storage and Decommissioning

A decision on station closure would likely be preceded by a period where the station boiler is in storage, with dry storage being the preferred method. Decommissioning of the boiler will involve cleaning activities that already take place routinely at WOP Station and are managed successfully.

No non-routine environmental emissions will result from either boiler storage or boiler decommissioning at WOP Station.

4.11.1.2 Drainage Line Cleaning

Drainage systems within the power station involve seven licenced emission points combined to discharge to three separate discharge points to the River Shannon.

Protection by oil interceptors and existing surface water pond is provided as appropriate and there is no potential for impact upon the River Shannon if the drainage system is left in place after decommissioning. However, cleaning of station drains will be required to mitigate the

potential for oil residues to be present within pipelines. This will involve water jetting using the existing oil interceptor system and vacuum tankers. Residues / washings from drainage line cleaning will be disposed of appropriately following testing to confirm that their suitability for discharge. No areas of heavy or free product oil residues that would require steam cleaning are expected. On completion of decommissioning the site drainage will be in a suitable condition for removal or more likely to be left in place to continue to provide surface water drainage for the site.

The station will continue to properly operate and maintain the site drainage system prior to and during implementation of the DMP.

4.11.1.3 Asbestos

Historically, a station waste repository was operated on lands at the former Shannonbridge Generating Station that partly correspond with lands at WOP Station. Whereas asbestos buried there was removed over the years, some Bord na Móna railway lines were built upon part of the station dump area in 1974. Since then, asbestos rope was unearthed in this area beneath the railway lines. Due to the depth of the material, several metres beneath the ground, and the length of time involved, it was not feasible to remove this prior to commissioning of WOP Station. This material will be removed as part of the DMP. It is not expected that other hazardous waste will be encountered in the excavation of the buried asbestos.

Following site decommissioning WOP Station may undergo demolition. This may also generate asbestos waste material such as asbestos rope in seals and gaskets. This will also be removed by specialist contractors as part of the DMP.

4.11.1.4 ADF Decommissioning Phase

The ongoing operation of the ADF is linked to the ongoing power generation activity at WOP Station. 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 to the satisfaction of the EPA. All open cells will be capped with an impermeable barrier, a drainage layer, and a final peat capping layer and subsequently revegetated.

4.11.2 Site Demolition and Reinstatement

Following site decommissioning WOP Station may undergo demolition in accordance with any planning requirements that may be imposed.

The WOP site will be reinstated in accordance with the conditions of any planning permission granted. This will generally require the demolition of all surface structures with maximisation of materials recycling.

The site will likely remain a brownfield site which may be subject to separate industrial related development under a separate planning permission.

4.12 Impacts of the project with potential for having significant environmental effects

Impacts of the proposed development (including continued operation) with potential for having significant environmental effects are as follows:

- Impacts arising from the ongoing thermal loading of the cooling water discharge where it enters the River Shannon and subsequently disperses in the water column
- Impacts arising from air quality emissions from WOP station
- Impacts arising from site development works and future biomass handling at WOP Station
- Impacts arising from site development works at WOP ADF
- Indirect impacts associated with the ongoing operation of WOP and the associated harvesting of peat from the respective supply bogs
- Indirect impacts arising from sourcing of biomass for supply to WOP

5 Description of European Sites

5.1 Identification of European Sites within potential Zone(s) of Influence

Section 3.3 outlines the consideration of the potential Zone of Influence of the proposed development. Designated site GIS data was downloaded from npws.ie (SACs: August 2018 Revision / SPAs: June 2017 Revision). This was displayed and queried locally in ArcGIS. All European Sites within 15 km of West Offaly Power were identified. In addition, European Sites within approximately 15 kilometres of the various WOP supply bogs were also identified as well as sites beyond this distance threshold with viable source-receptor impact pathways (such as hydrological connections). See **Figure 4.16**.

Table 5-1 presents information relating to the European Sites within 15 km of WOP Station and WOP ADF (or those hydrologically connected). **Table 5-2** presents information relating to all European Sites within 15 km of any of the respective WOP supply bogs (or those hydrologically connected to such supply bogs). With respect to hydro-geological connections, a review of the aquifer vulnerability dataset was also carried out using GIS.

It is noted that impacts to the vast of majority of European Sites within the 15 km radius of WOP Station and ADF can be ruled out on the basis of separation distance and the absence of feasible impact pathways (such as being located upstream or in a separate river sub-catchment). An outline of the source-impact-receptor pathways for the respective European Sites is also included in **Table 5-1** and **Table 5-2** presenting the rationale for screening out sites or the requirement for any further assessment

N

LONGFORD
WESTMEATH
MEATH
ROSCOMMON
LAOIS
OFFALY

Ballinturly Turlough SAC(000588)
Aughrim (Aghrane) Bog SAC(002200)
River Suck Callows SPA(004097)
Lough Lurgeen Bog/Glenamaddy Turlough SAC(000301)
Lisduff Turlough SAC(000609)
Four Roads Turlough SAC(001637)
Four Roads Turlough SPA(004140)
Camderry Bog SAC(002347)
Lough Croan Turlough SAC(000610)
Lough Croan Turlough SPA(004139)
Curraghlehanagh Bog SAC(002350)
Lough Funshinagh SAC(000611)
Ballygar (Aghrane) Bog SAC(002199)
Boughill
Shankill West Bog SAC(000326)
Carrownagappul Bog SAC(001242)
Derryfadda
Killeglan Grassland SAC(002214)
Gowla
Ballynamona Bog And Corkip Lough SAC(002339)
Castlesampson Esker SAC(001625)
Castlegar
Carn Park Bog SAC(002336)
Crosswood Bog SAC(002337)
Castlesampson Esker SAC(001625)
River Shannon Callows SAC(000216)
Castlegar
Middle Shannon Callows SPA(004096)
River Suck Callows SPA(004097)
Bunahinly/Kilgarvan
Bellair North
Cornafulla
Bellair South
Middle Shannon Callows SPA(004096)
River Shannon Callows SAC(000216)
Clooniff
Bloomhill
Mongan Bog SAC(000580)
Pilgrim's Road Esker SAC(001776)
Clooniff
Ballaghurt/Glebe
Culliaghmore
ADF
Fin Lough (Offaly) SAC(000576)
Cornaveagh
Clara Bog SAC(000572)
Glenloughaun Esker SAC(002213)
Lemanaghan
Belmount
Ferbane Bog SAC(000575)
River Suck Callows SPA(004097)
Moyclare Bog SAC(000581)
Blackwater
Lismanny
Garryduff
WOP Station
Noggusboy
Oughter
Kilmacshane
River Shannon Callows SAC(000216)
Middle Shannon Callows SPA(004096)
Clongawny More
Drinagh Boora
Clonaslee Eskers And Derry Bog SAC(000859)
Ardgraigue Bog SAC(002356)
Redwood Bog SAC(002353)
All Saints Bog And Esker SAC(000566)
All Saints Bog SPA(004103)
Ridge Road, SW of Rapemills SAC(000919)
River Shannon Callows SAC(000216)
Middle Shannon Callows SPA(004096)
River Little Brosna Callows SPA(004086)
Dovegrove Callows SPA(004137)
Ballyduff/Clonfinane Bog SAC(000641)
Slieve Bloom Mountains SAC(000412)
Slieve Bloom Mountains SPA(004160)
Kilcarren-Firville Bog SAC(000647)
Arragh More (Derrybreen) Bog SAC(002207)
Liskeenan Fen SAC(001683)
Island Fen SAC(002236)
Sharavogue Bog SAC(000585)
Lisduff Fen SAC(002147)
Sharavogue Bog SAC(000585)
Wooddown Bog SAC(002205)
River Boyne and River Blackwater SPA(004232)
Ballymore Fen SAC(002313)
Lough Ree SAC(000440)
Lough Ree SPA(004064)
Mount Hevey Bog SAC(002342)
Lough Ennell SAC(000685)
Lough Ennell SPA(004044)
Derryhinch
Split Hills And Long Hill Esker SAC(001831)
Drumman
Split Hills And Long Hill Esker SAC(001831)
Toar
Ballybeg
Raheenmore Bog SAC(000582)
The Long Derries, Edenderry SAC(000925)
Daingean
Esker
Charleville Wood SAC(000571)
Clonad
Mountlucas
Derryclure
Ballykeane
Monettia
River Barrow And River Nore SAC(002162)
Slieve Bloom Mountains SPA(004160)
Mountmellick SAC(002141)
River Barrow And River Nore SAC(002162)
Slieve Bloom Mountains SAC(000412)
Slieve Bloom Mountains SAC(000412)

Legend

- Development Boundary
- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)
- 15km Buffer WOP Supply Bogs

Supply Bogs:

- Ballaghurt/Glebe
- Ballybeg
- Ballykeane
- Bellair North
- Bellair South
- Belmount
- Blackwater
- Bloomhill
- Boughill
- Bunahinly/Kilgarvan
- Castlegar
- Clonad
- Clongawney & Galros
- Clooniff
- Cornafulla
- Cornaveagh
- Culliaghmore
- Daingean
- Derrinboy
- Derryclure
- Derryfadda
- Derryhinch
- Drinagh Boora
- Drumman
- Esker
- Garryduff
- Gowla
- Killaun
- Kilmacshane
- Lemanaghan
- Lismanny
- Monettia
- Mountlucas
- Noggus & Falsk
- Pullough Oughter & Killaranny
- Toar

0 5 10 15 20 25 km

REV	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP

PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED

CLIENT APPROVAL ☐ PLANNING ☐ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

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CLIENT: **ESB**

PROJECT: **West Offaly Power, Transition to Biomass**

CONTRACT

PRODUCTION UNIT: **Civil & Environmental Engineering**

DRAWING TITLE: **Figure 4.16- SACs and SPAs within 15 km of WOP Peat Supply Bogs**

DRAWN	PRODUCED	VERIFIED	APPROVED	APPROVAL DATE
E.O'Shea	E.O'Shea	G.Hamilton	P.Kavanagh	20/11/2018

CLIENT REF.	NO. OF SHEETS	SIZE	SCALE
00-00	1/1	A1	1:180,000

DRAWING NUMBER: **QS-000206-01-D460-168**

Table 5-1: European Sites within 15 km of WOP Station & ADF

Designated site	Distance from WOP Station	Distance from WOP ADF	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore U = Site-specific Conservation Objective Under Review	Possible impact pathways	Potential for significant effects
River Shannon Callows SAC	0 km	3.7 km	– Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] **[G]** – Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) [6510] **[G]** – Limestone pavements [8240] **[G]** – Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] **[G]** – Lutra lutra (Otter) [1355] **[G]**	Direct hydrological connection between SAC and WOP Station/ADF- WOP Station site also directly abuts SAC	Given the spatial proximity of WOP Station to the SAC and the existence of direct discharges to the River Shannon, there is potential for significant effects from continued operational activities and development at the WOP Station site. Potential for significant effects to the River Shannon Callows SAC is considered in Section 6.
Middle Shannon Callows SPA	0 km	3.5 km	– Whooper Swan (Cygnus cygnus) [A038] **[G]** – Wigeon (Anas penelope) [A050] **[G]** – Corncrake (Crex crex) [A122] **[G]** – Golden Plover (Pluvialis apricaria) [A140] **[G]** – Lapwing (Vanellus vanellus) [A142] **[G]** – Black-tailed Godwit (Limosa limosa) [A156] **[G]** – Black-headed Gull (Chroicocephalus ridibundus) [A179] **[G]** – Wetland and Waterbirds [A999] **[G]**	Direct hydrological connection between SPA and WOP Station/ADF- WOP Station site also directly abuts SPA	Given the spatial proximity of WOP Station to the SPA and the existence of direct discharges to the River Shannon, there is potential for significant effects from continued operational activities and development at the WOP Station site. Potential for significant effects to the Middle Shannon Callows SPA is considered in Section 6.
Suck River Callows SPA	1 km	7.5 km	– Whooper Swan (Cygnus cygnus) [A038] **[G]** – Wigeon (Anas penelope) [A050] **[G]** – Golden Plover (Pluvialis apricaria) [A140] **[G]** – Lapwing (Vanellus vanellus) [A142] **[G]** – Greenland White-fronted Goose (Anser albifrons flavirostris) [A395] **[G]** – Wetland and Waterbirds [A999] **[G]**	WOP Station site within 1 km of SPA	A hydrological impact pathway is absent as all WOP Station discharges are located downstream of River Suck confluence. Given the spatial proximity of WOP Station to the SPA, there is potential for significant effects from continued operational activities and development at the WOP Station site.

Designated site	Distance from WOP Station	Distance from WOP ADF	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore U = Site-specific Conservation Objective Under Review	Possible impact pathways	Potential for significant effects
					Potential for significant effects to the Suck River Callows SPA is considered in Section 6.
Pilgrim's Road Esker SAC	3.25 km	3.8 km	– Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] **[G]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Pilgrim's Road Esker SAC from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity (i.e. upstream of WOP station).
Fin Lough (Offaly) SAC	7.25 km	1 km	– Alkaline fens [7230] **[G]** – Vertigo geyeri (Geyer's Whorl Snail) [1013] **[G]**	WOP ADF site within 1 km of SAC – Potential for dust transmission into SAC from ADF.	Given the spatial proximity of WOP ADF to the SAC, there is potential for significant effects from continued operational activities and development at the WOP ADF site. Potential for significant effects to the Fin Lough (Offaly) SAC is considered in Section 6.
Mongan Bog SAC	8 km	2.75 km	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Mongan Bog SAC from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity.
Mongan Bog SPA	8 km	2.75 km	– Greenland White-fronted Goose (Anser albifrons flavirostris) [A395] **[G]**	No feasible impact pathways from WOP Station or ADF as a consequence of	The WOP ADF occurs within the core foraging distance range for this species (5-8km) as per SNH (2016). However there have been no recent

Designated site	Distance from WOP Station	Distance from WOP ADF	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore U = Site-specific Conservation Objective Under Review	Possible impact pathways	Potential for significant effects
				separation distance and absence of hydrological connectivity.	records of this species utilising this SPA, as detailed in the 2014 NPWS site synopsis. Consequently, it is considered that there is no potential for significant effects to Mongan Bog SPA from continued operational activities and development at the WOP Station site.
Moyclare Bog SAC	10 km	5 km	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Moyclare Bog SAC from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity.
Redwood Bog SAC	12.5 km	16.5 km	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Redwood Bog SAC from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity.
River Little Brosna Callows SPA	12.5 km	16 km	– Whooper Swan (Cygnus cygnus) [A038] **[G]** – Wigeon (Anas penelope) [A050] **[G]** – Teal (Anas crecca) [A052] **[G]** – Pintail (Anas acuta) [A054] **[G]** – Shoveler (Anas clypeata) [A056] **[G]** – Golden Plover (Pluvialis apricaria) [A140] **[G]** – Lapwing (Vanellus vanellus) [A142] **[G]** – Black-tailed Godwit (Limosa limosa) [A156] **[G]** – Black-headed Gull (Chroicocephalus ridibundus) [A179] **[G]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to River Little Brosna Callows SPA from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity.

Designated site	Distance from WOP Station	Distance from WOP ADF	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore U = Site-specific Conservation Objective Under Review	Possible impact pathways	Potential for significant effects
			– Greenland White-fronted Goose (Anser albifrons flavirostris) [A395] **[G]** – Wetland and Waterbirds [A999] **[G]**		
Ferbane Bog SAC	13 km	7 km	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Ferbane Bog SAC from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity.
All Saints Bog and Esker SAC	13.5 km	15 km	– Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] **[R]** – Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]** – Bog woodland [91D0] **[R]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to All Saints Bog and Esker SAC from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity.
All Saints Bog SPA	13.5 km	15 km	– Greenland White-fronted Goose (Anser albifrons flavirostris) [A395] **[G]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to All Saints Bog SPA from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity.
Glenloughaun Esker SAC	14.5 km	19.5 km	– Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] **[G]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Glenloughaun Esker SAC from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity.

Designated site	Distance from WOP Station	Distance from WOP ADF	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore U = Site-specific Conservation Objective Under Review	Possible impact pathways	Potential for significant effects
Castlesampson Esker SAC	14.5 km	15 km	– Turloughs [3180] **[G]** – Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] **[G]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Castlesampson Esker SAC from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity.
Crosswood Bog SAC	18 km	13 km	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Crosswood Bog SAC from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity.
Lough Ree SPA	18 km	14.8 km	– Little Grebe (Tachybaptus ruficollis) [A004] **[G]** – Whooper Swan (Cygnus cygnus) [A038] **[G]** – Wigeon (Anas penelope) [A050] **[G]** – Teal (Anas crecca) [A052] **[G]** – Mallard (Anas platyrhynchos) [A053] **[G]** – Shoveler (Anas clypeata) [A056] **[G]** – Tufted Duck (Aythya fuligula) [A061] **[G]** – Common Scoter (Melanitta nigra) [A065] **[G]** – Goldeneye (Bucephala clangula) [A067] **[G]** – Coot (Fulica atra) [A125] **[G]** – Golden Plover (Pluvialis apricaria) [A140] **[G]** – Lapwing (Vanellus vanellus) [A142] **[G]** – Common Tern (Sterna hirundo) [A193] **[G]** – Wetland and Waterbirds [A999] **[G]**	No feasible impact pathways from WOP Station or ADF as a consequence of separation distance and absence of hydrological connectivity (upstream of WOP Station and ADF).	There is no potential for significant effects to Lough Ree SPA from continued operational activities and development at the WOP Station site as a consequence of separation distance and absence of hydrological connectivity.

Table 5-2: European Sites within 15 km of respective WOP peat supply bogs

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
River Shannon Callows SAC [216]	0 km (Kilmacshane/ Garryduff/Clooniff/ Bloomhill)	Refer to Table 5-1.	Close spatial proximity and direct hydrological connection between SAC and Bord na Móna peat supply bog(s) (discharges and drainage)	Given the existence of direct discharges to the River Shannon and its tributaries from several peat supply bogs, there is potential for significant effects from continued peat harvesting activities in the catchment. Qualifying interest habitats may also be hydrologically affected by drainage associated with these bogs. Potential for significant effects to the River Shannon Callows SAC is considered in Section 6.
Middle Shannon Callows SPA [4096]	0 km (Kilmacshane/ Garryduff/Clooniff/ Bloomhill)	Refer to Table 5-1.	Close spatial proximity and direct hydrological connection between SAC and Bord na Móna peat supply bog(s) (discharges and drainage)	Given the existence of direct discharges to the River Shannon and its tributaries from several peat supply bogs, there is potential for significant effects from continued peat harvesting activities in the catchment. Qualifying interest habitats may also be hydrologically affected by drainage associated with these bogs. Potential for significant effects to the River Shannon Callows SAC is considered in Section 6.
Mongan Bog SAC [580]	0 km (Bloomhill)	Refer to Table 5-1.	Close spatial proximity between SAC and Bord na Móna peat supply bog(s)	Given the close spatial proximity of the SAC to Bloomhill supply bog, there is potential for significant effects from continued peat harvesting activities in the locality.

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
				Potential for significant effects to the Mongan Bog SAC is considered in Section 6.
Mongan Bog SPA [4017]	0 km (Bloomhill)	Refer to Table 5-1.	Close spatial proximity between SPA and Bord na Móna peat supply bog(s)	Given the close spatial proximity of the SPA to Bloomhill supply bog, there is potential for significant effects from continued peat harvesting activities in the locality. Potential for significant effects to the Mongan Bog SAC is considered in Section 6.
Suck River Callows SPA [4097]	0 km (Lismanny/Garryduff/ Culliaghmore/Castlegar/ Deryfadda)	Refer to Table 5-1.	Close spatial proximity and direct hydrological connection between SPA and Bord na Móna peat supply bog(s) (discharges and drainage)	Given the existence of direct discharges to the River Shannon and its tributaries from several peat supply bogs, there is potential for significant effects from continued peat harvesting activities in the catchment. Qualifying interest habitats may also be hydrologically affected by drainage associated with these bogs. Potential for significant effects to the Suck River Callows SPA is considered in Section 6.
Pilgrim's Road Esker SAC [1776]	0 km (Bloomhill)	Refer to Table 5-1.	Close spatial proximity between SAC and Bord na Móna peat supply bog(s)	Given the close spatial proximity of the SPA to Bloomhill supply bog, there is potential for significant effects from continued peat harvesting activities in the locality.

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
				Potential for significant effects to the Pilgrim's Road Esker SAC is considered in Section 6.
Fin Lough (Offaly) SAC [576]	0 km (Blackwater)	Refer to Table 5-1.	Close spatial proximity and potential hydrological connection between SAC and Bord na Móna peat supply bog(s) (drainage)	Given the close spatial proximity of the SPA to Blackwater supply bog, there is potential for significant effects from continued peat harvesting activities in the locality. Potential for significant effects to the Fin Lough (Offaly) SAC is considered in Section 6.
Moyclare Bog SAC [581]	0.5 km (Belmont)	Refer to Table 5-1.	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Moyclare Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Raheenmore Bog SAC [582]	0.8 km (Toar)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Raheenmore Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
River Barrow And River Nore SAC [2162]	1 km (Monettia)	– Estuaries [1130] **[M]** – Mudflats and sandflats not covered by seawater at low tide [1140] **[M]** – Reefs [1170] **[M]** – Salicornia and other annuals colonising mud and sand [1310] **[M]** – Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] **[R]** – Mediterranean salt meadows (Juncetalia maritimi) [1410] **[R]**	Close spatial proximity and direct hydrological connection between SAC and Bord na Móna peat supply bog (discharge)	Given the existence of direct discharges to a tributary of the River Barrow, there is potential for significant effects from continued peat harvesting activities in the catchment. Potential for significant effects to the River Barrow And River Nore SAC is considered in Section 6.

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
		– Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] **[M]** – European dry heaths [4030] – Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] **[M]** – Petrifying springs with tufa formation (Cratoneurion) [7220] **[M]** – Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] **[R]** – Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] **[R]** – *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016] **[M]** – *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] **[U]** – *Austropotamobius pallipes* (White-clawed Crayfish) [1092] **[M]** – *Petromyzon marinus* (Sea Lamprey) [1095] **[R]** – *Lampetra planeri* (Brook Lamprey) [1096] **[R]** – *Lampetra fluviatilis* (River Lamprey) [1099] **[R]** – *Alosa fallax fallax* (Twaite Shad) [1103] **[R]** – *Salmo salar* (Salmon) [1106] **[R]** – *Lutra lutra* (Otter) [1355] **[R]** – *Trichomanes speciosum* (Killarney Fern) [1421] **[M]** – *Margaritifera durrovensis* (Nore Pearl Mussel) [1990] **[R]**		
Split Hills And Long Hill Esker SAC [1831]	1.75 km (Toar)	– Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] [G]	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Split Hills And Long Hill Esker SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Killeglan Grassland SAC [2214]	2.3 km (Derryfadda)	– Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Killeglan Grassland SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
Ferbane Bog SAC [575]	2.5 km (Lemanaghan)	Refer to Table 5-1.	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Ferbane Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Four Roads Turlough SAC [1637]	2.9 km (Boughill)	– Turloughs [3180] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Four Road Turlough SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Four Roads Turlough SPA [4140]	2.9 km (Boughill)	– Golden Plover (*Pluvialis apricaria*) [A140] **[G]** – Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] **[G]** – Wetland and Waterbirds [A999] **[G]**	The WOP Supply Bog occurs within the core foraging distance range for this species (5-8km) as per SNH (2016).	The Four Roads turlough provides a foraging site for the River Suck Callows goose flock (NPWS site synopsis). This SPA is north east of the River Suck, while Boughill Bog lies to the south west. Given the physical separation of these sites and the fact that commuting geese will not fly over the supply bog, there is no potential for significant effects to Four Roads Turlough SPA .
Mount Hevey Bog SAC [2342]	3.3 km (Ballivor)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Mount Hevey Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
All Saints Bog And Esker SAC [566]	3.5 km (Clongawney & Galros)	Refer to Table 5-1.	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to All Saints Bog And Esker SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
Clonaslee Eskers And Derry Bog SAC [859]	3.5 km (Derrinboy)	– Alkaline fens [7230] **[G]** – *Vertigo geyeri* (Geyer's Whorl Snail) [1013] **[G}**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Clonaslee Eskers And Derry Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Crosswood Bog SAC [2337]	3.5 km (Kilgarvin)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Crosswood Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Ballyduff/Clonfinane Bog SAC [641]	4.0 km (Boughill)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Ballyduff/Clonfinane Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Ridge Road, SW of Rapemills SAC [919]	4.0 km (Clongawney & Galros)	– Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Ridge Road, SW of Rapemills SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
All Saints Bog SPA [4103]	4.3 km (Clongawney & Galros)	Refer to Table 5-1.	The NPWS site synopsis notes that All Saints Bog was formerly used by part of the internationally important Greenland White-fronted Goose population based on the River Little Brosna. The WOP Supply Bog occurs within the core foraging distance range for	The NPWS site synopsis also notes that there has been little or no recent use of All Saints Bog by the geese following a general trend of less usage of raised bogs in favour of grassland sites. The last record of Greenland White-fronted Goose within the site was 75 individuals in 1993/94. Consequently, there is no potential for significant effects to All Saints Bog

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
			this species (5-8km) as per SNH (2016).	SPA on the basis of an absence of the Special Conservation Interest species from the site. No further assessment is deemed necessary.
Slieve Bloom Mountains SAC [412]	4.5 km (Derrinboy)	– Northern Atlantic wet heaths with Erica tetralix [4010] **[R]** – Blanket bogs (* if active bog) [7130] **[R]** – Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Slieve Bloom Mountains SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Carn Park Bog SAC [2336]	4.5 km (Bunahinly/Kilgarvan)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Carn Park Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Aughrim (Aghrane) Bog SAC [2200]	4.8 km (Boughill)	– Degraded raised bogs still capable of natural regeneration [7120] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Aughrim (Aghrane) Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Ballygar (Aghrane) Bog SAC [2199]	5.0 km (Boughill)	– Degraded raised bogs still capable of natural regeneration [7120] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Ballygar (Aghrane) Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Island Fen SAC [2236]	5.0 km (Killaun)	– *Juniperus communis* formations on heaths or calcareous grasslands [5130] **[G]** – Alkaline fens [7230] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Ballygar (Aghrane) Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
Dovegrove Callows SPA [4137]	5.0 km (Killaun)	– Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	The WOP Supply Bog occurs within the core foraging distance range for this species (5-8km) as per SNH (2016).	The Dovegrove Callows SPA provides a foraging site for the Little Brosna Callows goose flock (NPWS site synopsis).Killaun supply bog lies to the southeast of Dovegrove callows, and therefore is located outside the commuting corridor between the two SPAs. Given the physical separation of these sites and the fact that commuting geese will not fly over the supply bog, there is no potential for significant effects to Dovegrove Callows SPA.
Lough Croan Turlough SAC [610]	5.3 km (Boughill)	– Turloughs [3180] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Lough Croan Turlough SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Lisduff Fen SAC [2147]	5.5 km (Killaun)	– Petrifying springs with tufa formation (Cratoneurion) [7220] **[G]** – Alkaline fens [7230] **[G]** – *Vertigo geyeri* (Geyer's Whorl Snail) [1013] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Lisduff Fen SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Lough Croan Turlough SPA [4139]	5.5 km (Boughill)	– Shoveler (*Anas clypeata*) [A056] **[G]** – Golden Plover (*Pluvialis apricaria*) [A140] **[G]** – Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] **[G]** – Wetland and Waterbirds [A999] **[G]**	The WOP Supply Bog occurs within the core foraging distance range for Greenland White-fronted Goose (5-8km) as per SNH (2016).	The Lough Croan turlough provides a foraging site for the River Suck Callows goose flock (NPWS site synopsis). This SPA is north east of the River Suck, while Boughill Bog lies to the south west. Given the physical separation of these sites and the fact that commuting geese will not fly over the supply bog, there is no potential for significant effects to Lough Croan Turlough SPA.

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
River Little Brosna Callows SPA [4086]	6 km (Clongawney & Galros)	Refer to Table 5-1.	The WOP Supply Bog occurs within the core foraging distance range for Greenland White-fronted Goose (5-8km) as per SNH (2016). The Clongawney & Galros supply bog is located to the north east of the SPA, with the All Saints Bog SPA located between the two sites.	The NPWS site synopsis for All Saints Bog SPA notes that the was formerly used by part of the internationally important Greenland White-fronted Goose population based on the River Little Brosna. It also notes that there has been little or no recent use of All Saints Bog by the geese following a general trend of less usage of raised bogs in favour of grassland sites. The last record of Greenland White-fronted Goose within the site was 75 individuals in 1993/94. On the basis of the above, it is concluded that the goose flock primarily forages on the callows and adjacent grassland habitats and does not significantly utilise bog habitats to the east of the SPA, including those associated with the Clongawney& Galros supply bog. There is therefore no potential for significant effects to River Little Brosna Callows SPA on the basis of an absence of the Special Conservation Interest species at and adjacent to the supply bog. No further assessment is deemed necessary.
Lisduff Turlough SAC [609]	6.5 km (Boughill)	– Turloughs [3180] **[M]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Lisduff Fen SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
Castlesampson Esker SAC [1625]	6.6 km (Castlesampson)	– Turloughs [3180] **[G]** – Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Castlesampson Esker SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Lough Ennell SAC [685]	6.7 km (Toar)	– Alkaline fens [7230] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Lough Ennell SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Lough Ree SAC [440]	7 km (Kilgarvin)	– Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation [3150] **[R]** – Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) [6210] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Alkaline fens [7230] **[M]** – Limestone pavements [8240] **[M]** – Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] **[U]** – Bog woodland [91D0] **[R]** – *Lutra lutra* (Otter) [1355] **[M]**	Kilgarvin bog is located downstream of Lough Ree (as are all other WOP supply bogs). There are therefore no feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Lough Ree SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Redwood Bog SAC [2353]	7.0 km (Kilmacshane)	Refer to Table 5-1.	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Redwood Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Sharavogue Bog SAC [585]	7.0 km (Killaun)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation	There is no potential for significant effects to Sharavogue Bog SAC on the basis of an absence of feasible

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
		– Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	distance and absence of hydrological connectivity.	pathways. No further assessment is deemed necessary.
Lough Ree SPA [4064]	7 km (Kilgarvin)	– Little Grebe (*Tachybaptus ruficollis*) [A004] **[G]** – Whooper Swan (*Cygnus cygnus*) [A038] **[G]** – Wigeon (*Anas penelope*) [A050] **[G]** – Teal (*Anas crecca*) [A052] **[G]** – Mallard (*Anas platyrhynchos*) [A053] **[G]** – Shoveler (*Anas clypeata*) [A056] **[G]** – Tufted Duck (*Aythya fuligula*) [A061] **[G]** – Common Scoter (*Melanitta nigra*) [A065] **[G]** – Goldeneye (*Bucephala clangula*) [A067] **[G]** – Coot (*Fulica atra*) [A125] **[G]** – Golden Plover (*Pluvialis apricaria*) [A140] **[G]** – Lapwing (*Vanellus vanellus*) [A142] **[G]** – Common Tern (*Sterna hirundo*) [A193] **[G]** – Wetland and Waterbirds [A999] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity. Kilgarvan bog is located outside the core foraging range for Whooper Swan of (5km) as per SNH (2016).	There is no potential for significant effects to Lough Ree SPA on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Carrownagappul Bog SAC [1242]	7.4 km (Gowla)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Carrownagappul Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Lough Ennell SPA [4044]	7.8 km (Toar)	– Pochard (*Aythya ferina*) [A059] **[G]** – Tufted Duck (*Aythya fuligula*) [A061] **[G]** – Coot (*Fulica atra*) [A125] **[G]** – Wetland and Waterbirds [A999] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Lough Ennell SPA on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Ballynamona Bog And Corkip Lough SAC [2339[	8.3 km (Derryfadda)	– Turloughs [3180] **[R]** – Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Ballynamona Bog And Corkip Lough SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
		– Depressions on peat substrates of the Rhynchosporion [7150] **[R]** – Bog woodland [91D0] **[R]**		
The Long Derries, Edenderry SAC [925]	8.5 km (Esker)	– Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to The Long Derries, Edenderry SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Curraghlehanagh Bog SAC [2350]	9.2 km (Gowla)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Curraghlehanagh Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Ballinturly Turlough SAC	9.3 km (Boughill)	– Turloughs [3180] [G]	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Ballinturly Turlough SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Glenloughaun Esker SAC [2213]	9.3 km (Castlegar)	– Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Glenloughaun Esker SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Camderry Bog SAC [2347]	9.6 km (Boughill)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Camderry Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Wooddown Bog SAC [2205]	10.1 km (Derryhinch)	– Degraded raised bogs still capable of natural regeneration [7120] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation	There is no potential for significant effects to Wooddown Bog SAC on the basis of an absence of feasible

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
			distance and absence of hydrological connectivity.	pathways. No further assessment is deemed necessary.
Lough Funshinagh SAC [611]	10.3 km (Boughill)	– Turloughs [3180] **[G]** – Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation [3270] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Lough Funshinagh SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Mountmellick SAC [2141]	10.8 km (Ballykeane)	– Vertigo moulinsiana (Desmoulin's Whorl Snail) [1016] [G]	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Mountmellick SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Ardgraigue Bog SAC [2356]	11.0 km (Lismanny)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Ardgraigue Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Arragh More (Derrybreen) Bog SAC [2207]	12.0 km (Killaun)	– Degraded raised bogs still capable of natural regeneration [7120] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Arragh More (Derrybreen) Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Kilcarren-Firville Bog SAC [647]	12.0 km (Killaun)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Kilcarren-Firville Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Charleville Wood SAC [571]	12.6 km (Toar)	– Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] **[G]** – *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation	There is no potential for significant effects to Charleville Wood SAC on the basis of an absence of feasible

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
			distance and absence of hydrological connectivity.	pathways. No further assessment is deemed necessary.
Shankill West Bog SAC [326]	12.6 km (Gowla)	– Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Shankill West Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Clara Bog SAC [572]	12.8 km (Toar)	– Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] **[R]** – Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]** – Bog woodland [91D0] **[M]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Clara Bog SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Lough Lurgeen Bog/Glenamaddy Turlough SAC [301]	13.3 km (Boughill)	– Turloughs [3180] **[R]** – Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation [3270] **[M]** – Active raised bogs [7110] **[R]** – Degraded raised bogs still capable of natural regeneration [7120] **[R]** – Depressions on peat substrates of the Rhynchosporion [7150] **[R]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Lough Lurgeen Bog/Glenamaddy Turlough SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Liskeenan Fen SAC [1683]	14.0 km (Killaun)	– Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance and absence of hydrological connectivity.	There is no potential for significant effects to Liskeenan Fen SAC on the basis of an absence of feasible pathways. No further assessment is deemed necessary.
Slieve Bloom Mountains SPA [4160]	14.5 km (Ballykeane)	– Hen Harrier (Circus cyaneus) [A082] **[G]**	No feasible impact pathways from peat supply bogs as a consequence of separation distance, which is outside	There is no potential for significant effects to Slieve Bloom Mountains SPA on the basis of an absence of feasible

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
			the potential disturbance radius from Hen Harrier breeding sites (1.2 km).	pathways. No further assessment is deemed necessary.
River Boyne And River Blackwater SAC [2299]	20 km (Derryhinch)	– Alkaline fens [7230] **[G]** – Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] **[G]** – *Lampetra fluviatilis* (River Lamprey) [1099] **[G]** – *Salmo salar* (Salmon) [1106] **[G]** – *Lutra lutra* (Otter) [1355] **[G]**	Hydrological connection between SAC and Bord na Móna peat supply bog(s) (discharge).	Given the existence of direct discharges to a tributary of the River Boyne from a peat supply bog, there is potential for significant effects from continued peat harvesting activities in the catchment; Qualifying Interest species may extend their range further upstream than the SAC boundary. Potential for significant effects to the River Boyne And River Blackwater SAC is considered in Section 6.
River Boyne and River Blackwater SPA [4232]	20 km (Derryhinch)	– *Kingfisher (Alcedo atthis) [A229] [G]*	Hydrological connection between SPA and Bord na Móna peat supply bog(s) (discharge).	While there is direct discharge to a tributary of the River Boyne from a peat supply bog, much of this watercourse is considered sub-optimal for Kingfisher as a consequence of absence of suitable nesting bank height, material and profile. The optimal riparian habitats associated with the SPA, located 20 km downstream will be unaffected by peat harvesting activities. Potential impacts to the foraging resource for kingfisher (e.g. stickleback, minnow and invertebrates) as a result of potential polluting material release to watercourses are considered to be negligible as a consequence of the large dilution factor

Designated Site	Distance from closest WOP supply bog	Qualifying Interest / Special Conservation Interest Conservation objectives indicated as appropriate [R, M , G, U] R = Restore specific QI/SCI M = Maintain specific QI/SCI G = Generic CO for all QI/SCI in N2000 site, i.e. Maintain or Restore	Possible impact pathways	Potential for significant effects
				arising from the large separation distance. There is no potential for significant effects to the River Boyne and River Blackwater SPA on the basis of negligible impact significance and large separation distance. No further assessment is deemed necessary.

6 Assessment of likely effects

An assessment of likely effects of the proposed development (including continued development) is presented herein. It should be noted at this stage that developments and operations associated with WOP Station and WOP ADF are assessed for both direct and indirect effects on European Sites. Peat supply to WOP Station is assessed for indirect effects, insofar as it is carried out by a third party (Bord na Móna) under a contractual agreement with ESB.

6.1 Direct Impacts

6.1.1 WOP Station

6.1.1.1 Site development and activities to facilitate biomass transition

Developments at WOP Station to facilitate the proposed development (and continued operation) are entirely contained within the industrialised footprint of the existing power station.

The River Shannon Callows SAC and Middle Shannon Callows SPA directly abut the western boundary of the WOP site, while the Suck River Callows SPA is located 1 km to the west. Given the relatively minor works required to facilitate the reception and storage of biomass, only these three European Sites are considered to be within the Zone of Influence of the proposed site development works. No feasible impact pathways to the remainder of the European Sites identified in **Section 5.1** exist, based on separation distance and absence of hydrological connections.

From information garnered from the desktop study and field surveys, **Table 6-1** below outlines the potential presence of the Qualifying Interests and Special Conservation Interests of the respective European Sites within the potential Zone of Influence.

Table 6-1: Presence of European Site Qualifying Interests / Special Conservation Interests in Zone of Influence of WOP Station

European Site	Qualifying Interest / Special Conservation Interest/ Conservation Objective	Code	Occurrence/ distribution in Zone of Influence	Rationale
River Shannon Callows SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) CO: Maintain or Restore	6410	**Potentially present**	The landscape around the River Shannon to the south of Shannonbridge comprises extensive areas of callow, or seasonally flooded, semi-natural, lowland wet grassland, along both sides of the river. The callows are mainly too soft for intensive farming but are used for hay or silage or for summer grazing. Areas with more prolonged seasonal waterlogging more often correspond to the Molinia meadows QI, with these forming a grading mosaic with the lowland hay meadows QI in somewhat drier areas.
	Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) CO: Maintain or Restore	6510	**Potentially present**	

European Site	Qualifying Interest / Special Conservation Interest/ Conservation Objective	Code	Occurrence/ distribution in Zone of Influence	Rationale
				A relatively large area of seasonally flooded wet grassland occurs at Leitra Callow, circa 450 m southeast of the cooling water discharge.
	Limestone pavement (priority habitat) CO: Maintain or Restore	8240	Not present	The area of limestone pavement at Clorhane represents the only known example in Co. Offaly. It is predominantly colonised by mature Hazel (*Corylus avellana*) woodland, with areas of open limestone and calcareous grassland interspersed. This is a terrestrial habitat 3 km northeast of Shannonbridge.
	Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) CO: Maintain or Restore	91E0	Not present	The alluvial forest QI associated with the SAC occurs on a series of alluvial islands just below the ESB weir near Meelick, 18 km downstream of Shannonbridge.
	Otter CO: Maintain or Restore	1355	**Potentially present**	Otter occurs widely along the course of the River Shannon. Feeding remains were found on the east bank of the river 250 m upstream of the cooling water outfall in January 2017 and on the west bank of the river under the R357 bridge in March 2018. A 2010 record also exists for the Bord na Móna Garryduff property 2 km to the west (spraint at settlement pond).
Middle Shannon Callows SPA	Whooper Swan Wigeon Corncrake Golden Plover Lapwing Black-tailed Godwit Black-headed gull Wetlands and Waterbirds CO: Maintain or Restore	A038 A050 A122 A140 A142 A156 A179 A999	**Potentially present**	The habitats around the confluence of the Shannon and Suck are attractive to waterfowl, with the riverside reedbeds and cutover bog habitats south of Shannonbridge all potentially being used to varying degrees by foraging or roosting flocks. Whooper Swan, Wigeon, Golden Plover, Black-headed gull and Lapwing were all recorded during the most recent (2011/12) IWeBS survey for the Shannon Harbour – Shannonbridge subsite. These species were also directly observed around Shannonbridge during the 2016/2017/2018 surveys. Wintering Whooper Swan flocks of up to 40 individuals have been observed feeding on Clonfert Bog, adjacent to the west bank of the River, opposite WOP station. The 2015 NPWS site synopsis for the SPA notes that there is “no surviving breeding population” of corncrake. This is considered to be as consequence of a series of summer flooding events inundating the meadow habitats used by

European Site	Qualifying Interest / Special Conservation Interest/ Conservation Objective	Code	Occurrence/ distribution in Zone of Influence	Rationale
				nesting corncrake, a species which has been negatively impacted by changes to modern agricultural practices (silage production etc).

Construction phase

The construction period for the proposed development will be approximately 6-9 months, with the scope of works considered to be relatively minor.

During the construction phase there is also 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;
- Cell construction at the ADF;
- 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.

It is likely given the location and relatively minor nature of the proposed works that the pathway to the surface water receptors would be via the existing drainage network on site.

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. 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 respective European Sites.

Site activities which could contribute to increased levels of disturbance (through noise and human activity

- Overall construction activities (including ground excavation, auger piling for biomass storage slabs if necessary); and
- Construction traffic (deliveries etc).

These construction activities have the potential to cause disturbance to Special Conservation Interest species of the Middle Shannon Callows SPA.

The potential for significant effects upon the aforementioned European Sites arising from construction activities at WOP Station is uncertain in the absence of mitigation measures; such impacts and any associated mitigation must be further assessed in the Natura Impact Statement (see Section 8).

Operational phase

As with any operational industrial facility, in the absence of specific environmental control measures, there is the potential for accidental leaks and spills of potentially polluting substances (e.g. oils, etc.) to impact on European Sites, particularly given the close proximity of WOP Station to the River Shannon, and the existence of several surface water discharges from the site.

Any impact associated with anthropogenic polluting substances during the station's operation could have an impact on the water quality of the river and on the respective European Sites.

Operational activities causing noise (e.g. biomass and peat deliveries) also have the potential to cause disturbance to Special Conservation Interest species of the Middle Shannon Callows SPA.

The potential for significant effects upon the aforementioned European Sites arising from operational activities at WOP Station is uncertain in the absence of mitigation measures; such impacts and any associated mitigation must be further assessed in the Natura Impact Statement (see Section 8).

6.1.1.2 Cooling water abstraction and discharge

The primary direct impact pathway related to the ongoing operation of WOP Station during the biomass transition is associated with the cooling water abstraction from and discharge to the River Shannon. The thermal cooling water discharge from West Offaly Power occurs just upstream of the Bord na Móna railway Bridge at Shannonbridge and on the east bank of the river Shannon. The abstraction point is sited approximately 190 m upstream of the discharge location.

The cooling water consists of a flow through the condenser of 5.5 m^3/s which is subject to a temperature rise of approximately 8.5°C. The flow through the condenser can vary slightly depending on the level of the River Shannon but load will vary with a corresponding variation in the rise in temperature.

The thermal plume arising from the cooling water discharge disperses in the water column downstream of the outfall (i.e. within the River Shannon Callows SAC and Middle Shannon Callows SPA). This has the potential to directly impact upon the aquatic ecology of the receiving water associated with these European Sites as a result of changes in water column temperature downstream of WOP station.

The River Shannon Callows SAC is predominantly designated for the presence of habitats which are associated with the seasonally flooded, semi-natural, lowland wet

grassland, along and beside the river. However, the site is also internationally important for numbers and species of wintering waterfowl; consequently much of the SAC overlaps with the Middle Shannon Callows SPA.

The cooling water outfall is located downstream of the River Suck confluence and consequently the thermal plume is not expected to affect the habitats associated with the River Suck (and the European Site associated with this waterbody, the Suck River Callows SPA). There are no hydrological impact pathways to any other European Sites.

Potential impacts to the River Shannon Callows SAC and Middle Shannon Callows SPA occurring as a result of the proposed development (including continued operation) are determined as:

- Impacts on water quality (due to temperature change and effluent input) in the River Shannon arising as a result of WOP Station discharges, with consequent impacts on species dependent on the aquatic and seasonally flooded habitats of the respective European Sites.

Studies on a range of ecological indicators and physical parameters in the River Shannon upstream and downstream of the cooling water discharge have been undertaken in recent years. Their findings are summarised below.

River Shannon Temperature Monitoring

Continuous monitoring of temperature in the River Shannon has been undertaken at seven defined sampling points on the eastern and western banks at WOP (Six downstream, one upstream) during 2016 and 2017. Data from the monitoring programme indicates that there is no observable temperature rise at any of the western bank monitoring locations until water levels fall below 2.4 m at the Shannonbridge gauge. OPW records indicate that the 75 percentile level at this gauge is 2.392 m.

At water levels above 2. 4 m, the thermal plume tends to flow along the eastern bank of the River Shannon.

From the continuous temperature monitoring at the 6 locations downstream, it is not possible to determine if the thermal plume covers more than 25% of the cross sectional area at any location when levels are above approximately 2.3 m.

There is evidence of the simultaneous presence of thermal plume at all monitoring locations on a number of occasions from May 2017 to August 2017. From the data it can be inferred that with when waters levels at the Shannonbridge gauge falls below 2.3 m the thermal plume extends across the river cross channel. However, it is noted that there is no evidence of a significant environmental impact on

aquatic species or habitats in the receiving water (refer to biotic communities and fisheries studies outlined below).

Effects of Cooling Water Discharge on Biotic communities

The West Offaly Power Thermal Discharge Synthesis Report (ESBI/ASU 2018) outlines the findings of a suite of biological studies undertaken from 2014 through 2017 on communities of potential ecological indicators for the River Shannon upstream and downstream of WOP. In summary, the findings were as follows:

(i) *Macrophytes:* *Transect-based quadrat sampling of macrophytes at a number of sampling sites did not reflect any clear thermal influence on aquatic plant communities. The only exception to this was the presence of the red macro alga (Thorea hispida) which was clearly promoted at WOP by the presence of the thermal discharge. The presence of unusual and luxuriant growth forms of freshwater sponge within the thermal discharge was the only other aspect of the macrophyte survey effort that provided evidence of a thermal response. Overall, the general tolerance of the existing plant community combined with the heavy influence of hydromorphology on that community (substrate, flow and depth/light) means that the general macrophyte community at this site, apart from the exceptions referred to above, is unlikely to provide any useful monitoring information.*

(ii) *Diatoms:* *Studies indicated a relationship between increased water temperature downstream of the thermal discharge and decreased ecological status classification according to specific diatom communities. In terms of Trophic Diatom Index (TDI) and hence Ecological Quality Ratio (EQR) and Water Framework Directive Status (WFD Status, sites upstream of the thermal discharge tended to have Good or High Status which dropped to Good or Moderate in the stretch immediately below the thermal discharge before recovering to Good or High Status some distance downstream. The distance downstream required to regain the same Good or High Status as upstream from the discharge varied between years. In 2014, Good Status was regained from between 184 m to 218 m. In 2015 High Status, which was present immediately upstream of the discharge, was regained within about 101m downstream; EQR returned again to High Status 184 m downstream of the discharge. In 2016, High Status, which pertained*

immediately upstream of the thermal discharge, was regained within 218 m.

In all years therefore, the status pertaining immediately upstream of the thermal discharge in each year was regained at most within 218m downstream of the discharge. This indicates a short zone of influence at WOP. Moreover, it would appear than in the case of diatoms at least, the background (i.e. upstream) quality status tends to be more High than Good at WOP.

(iii) *Macroinvertebrates: The macroinvertebrate community at WOP is characterised by species tolerant or very tolerant of impaired water quality. Moreover, the community is overwhelmingly dominated numerically by a small number of invasive species two of which are major ecosystem-altering species namely zebra mussels and Asian clams, the latter only recently arrived and still expanding its range. Like macrophytes, the importance of hydromorphological factors including substrate and flow in particular seems to be the main factors determining the nature of the very patchy invertebrate community at any given site and because of that any thermal effects are either not occurring or are masked by these other factors. Some temperature related trends were noted for species such as the crustacean Chelicorophium curvispinum and Zebra mussels but it was not possible to conclusively rule out substrate preferences as factors giving rise to this apparent effect.*

The Synthesis Report concludes that diatoms were the most reliable assessment species relating to potential ecological impacts in the River Shannon at WOP. The subsequent assessment identified that an impact does occur but that this is within the thermal plume actual mixing zone with the river returning to at least Good Status within 200-400 m of the discharge location. The thermal plume impact does not affect the status of the rest of the water body length and is localised in effect.

Effects of Cooling Water Discharge on Fisheries

A Water Framework Directive (WFD) fish monitoring survey was undertaken by IFI on the Shannon in 2010 on the Shannon at Clonmacnoise just upstream of the WOP Subsequent IFI surveys were undertaken in 2016 (IFI, 2017), which included sites just

upstream and downstream of WOP also. Site-specific fisheries studies were also undertaken to survey the area within the plume and external to the plume of the cooling water outfall point located at the WOP Station (ESB Fisheries 2016 & 2017). The objective of these studies was to see if there was any difference in fish populations between the warmer water areas below the outfall point and along the thermal plume areas and into the cooler non-thermal plume affected Shannon waters. Any potential barrier effects to fish population migration arising from thermal influences were also considered by these studies.

The fisheries study found perch, roach, bream, roach-bream hybrids, eel, pike, gudgeon and trout in the sampled sites along the River Shannon near WOP. No juvenile nor adult salmon were recorded at any sampling site. This is consistent with the findings of Inland Fisheries Ireland as part of the water framework directive fish assessments carried out in 2010 and also in 2016. 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.

The fisheries study presents an analysis of the River Shannon salmon census data for the 2016/2017 season, which indicates that the vast majority of the wild salmon (n=1,153), which entered the upper Shannon catchment in 2016 do so during the period when the thermal plume is greatest. However, it is noted that the thermal plume at WOP is located in a riverine section of the Shannon whereas it is considered likely that migrating salmon will continue to inhabit the cooler and deeper waters of Lough Derg until late summer before ascending further upstream.

The Thermal Discharge Synthesis Report concludes that overall, based on the data available from the ESB fyke net surveys and the IFI surveys, there is no clear evidence that the thermal discharge is having an adverse impact on the resident fish community at WOP. The report does note the potential for subtle effects at the level of individuals within the population (that for example may be stimulated to spawn earlier or perhaps grow faster) but concludes that such changes would probably not be possible to detect using normal survey methods. This finding is in keeping with the findings of an extensive survey of fish communities in the vicinity of nuclear power stations on French rivers (Daufresne and Boet, 2007) that concluded there was little evidence of a thermal impact at community level.

In summary, the aforementioned ecological studies undertaken between 2014 and 2017 indicate that evidence of effects to ecological indicators are measureable within the thermal mixing zone downstream of WOP; however, WFD status of the receiving

waterbody quickly returns to ‘Good’ and consequently the overall impact is not considered to be significant. The proposed biomass transition will not result in any change to the cooling water discharge to the River Shannon. The absence of a significant impact to the aquatic habitats associated with the River Shannon Callows and SAC and Middle Shannon Callows SPA which is evidenced above is therefore expected to persist throughout the proposed development (including continued operation).

Based on the above assessment, none of the aquatic habitats associated with the European Sites within the Zone of Influence of WOP Station are therefore considered likely to be subject to significant impacts as a result of the continuance of the thermal discharge to the River Shannon. Potential impacts are therefore ruled out and no further assessment is deemed necessary. The River Shannon callows are mainly composed of lowland wet grassland. Different plant communities occur, depending on elevation, and therefore flooding patterns. Two habitats listed on Annex I of the E.U. Habitats Directive are well-represented within the site – Molinia meadows and lowland hay meadows. The Shannon callows are used for summer dry-stock grazing (mostly cattle, with some sheep and a few horses), and permanent hay meadow. The NPWS site synopsis notes that the threats to these qualifying interests may arise as a result of fertilising of botanically-rich fields, the use of herbicides, reversion of hay meadow to pasture and the overall neglect of pasture and hay meadow. Any interaction between river water under the thermal influence of the cooling water discharge and these callow-related habitats only occurs during seasonal flooding, during which time the thermal assimilative capacity of the river is significantly increased. Additionally, the cooling water discharge does not comprise any increased nutrient concentrations and consequently any effect on the callow habitats (as a result of flooding and subsequent receding of water levels leaving enriched areas of higher trophic value standing water) is not expected to occur. No negative impacts to the callow habitats which correspond to Molinia meadows or Lowland hay meadows are therefore envisaged.

Otter occurs widely along the course of the River Shannon. A survey along the river bank in January 2017 found positive signs of otter in the form of feeding remains. This location was 250 m upstream of the cooling water outfall. A subsequent survey in March 2018 also recorded spraints under the R357 bridge on the west bank of the River Shannon. Additionally, a 2010 record exists for the Bord na Móna Garryduff property, approximately 2 km to the west of the Shannon-Suck confluence. As a highly mobile species, otter would not be expected to be negatively impacted by any localised increases in water temperature. Fisheries studies undertaken indicate that the River Shannon at this location comprises a wide diversity of cyprinid species in good numbers; these are likely to provide an excellent local foraging resource for otter. No negative impacts to otters are therefore envisaged.

The majority of the Special Conservation Interest species of the SPA are wintering waterfowl, predominantly associated with the wet callow grassland as well as the fringing reed beds along the River Shannon.

Despite being currently listed as a Special Conservation Interest (SCI) for the SPA, the NPWS site synopsis for the Middle Shannon Callows SPA notes that “there is no surviving breeding population” of corncrake. This is considered to be as a consequence of a series of summer flooding events inundating the meadow habitats used by nesting corncrake, a species which has been negatively impacted by changes to modern agricultural practices (silage production etc.).

The remainder of the wintering species listed as SCIs for the SPA typically occur on the Shannon callows between October and March (peaking December-January), a period when average water levels can be expected to be elevated and average ambient water temperatures reduced. Consequently, the thermal assimilative capacity of the receiving water under such conditions is expected to be relatively large and as a result, influence on wintering bird populations is expected to be negligible. As previously noted, the cooling water discharge does not comprise any increased nutrient concentrations and consequently any effect on bird species feeding on the callow habitats as a result of local trophic changes is not expected to occur. Wintering bird surveys undertaken by ESB International between November 2016 and January 2018 found that the closest aggregation of special conservation interest species was an occasional flock of up to 40 whooper swans which gathered on Clonfert Bog, 1.5 km west of WOP station, foraging on recolonising vegetation on the peat harvesting fields. Birds were observed commuting into Clonfert from the north, presumably from roosting areas further north towards Clonmacnoise; small numbers of whooper swan and wigeon were occasionally observed resting on the river and wet grassland at the confluence of the Shannon and Suck rivers, upstream of the cooling water discharge. There are no large areas of reedbed suitable for significant numbers of roosting birds immediately downstream of WOP station, the closest being on the eastern bank of the river at Derryholmes, approximately 2.5 km downstream of the cooling water outfall. No impacts to the special conservation interests of the Middle Shannon Callows SPA as a result of the ongoing cooling water discharge are therefore predicted.

None of the terrestrial habitats or water-dependent species associated with the European Sites within the Zone of Influence of WOP Station are therefore considered likely to be significantly impacted as a result of the continuance of the cooling of the thermal discharge. Potential impacts are therefore ruled out and no further assessment is deemed necessary.

6.1.1.3 Other discharges

In addition to the cooling water outfall (SW1 / SW2 Combined Emission Point), a number of other emission points exist on the WOP site (SW3 – SW7) which also discharge to the River Shannon; all of the site discharges are currently licensed under IE License P0611-02.

The potential for significant effects upon the aforementioned European Sites arising from operational discharges at WOP Station is uncertain in the absence of mitigation

measures; such impacts and any associated mitigation must be further assessed in the Natura Impact Statement (see Section 8).

6.1.1.4 Atmospheric emissions

As outlined in Chapter 10, the NO_x modelling results indicate that the ambient ground level concentrations are below the relevant air quality standard for NO_x for the protection of ecosystems. Emissions from the facility lead to an ambient NO_x concentration including background for the 'Maximum Existing Scenario' which is 29.6% of the annual limit value at the worst-case location within the adjacent European Sites. Emissions for Maximum Proposed Scenario lead to slightly lower annual NO_x concentrations within the European Sites reaching 29.2% of the annual limit value for the protection of ecosystems.

The SO_2 modelling results indicate that the ambient ground level concentrations including background are below the relevant air quality standard for SO_2 for the protection of ecosystems for Maximum Existing Scenario reaching 17% of the annual limit value. The results for are well below the applicable limit value for the protection of vegetation.

Overall, the modelling results for the plant operation (as presented in Chapter 10 of the EIAR) demonstrate that ambient pollutant concentrations (including background) are well below the applicable air quality limit values at all off-site receptors. The Station operating in compliance with its current IE Licence emission limits or in compliance with the requirements of the new BAT conclusions will have an imperceptible impact on the receiving environment over the medium term. The results of the air dispersion modelling study with respect to traffic emissions indicate that the impacts of the WOP facility on air quality are predicted to be imperceptible with respect to the operational phase local air quality assessment for the long and short term.

None of the European Sites within the Zone of Influence of WOP Station are therefore considered likely to be significantly impacted as a result of the continuance of the air emissions from WOP station. Potential impacts are therefore ruled out and no further assessment is deemed necessary.

6.1.2 WOP ADF

6.1.2.1 Site development and activities during biomass transition

The future operation of the ADF to facilitate ongoing reception of ash from WOP Station will involve the successive development of ash cells and drainage network. However, the site development will be restricted to within the proposed planning boundary of the ADF and is limited to the localised conversion of cutover bog habitats into bare ground during the active ash deposition phase before capping and colonisation by grassland. No European Sites will be directly impacted by the earthworks associated with the development and operation of the ADF (the closest site is Fin Lough SAC, 1 km to the north). Given the large separation distance, no

hydrological influence on Fin Lough SAC is predicted as a result of the development and ongoing operation of the ADF.

None of the European Sites within the Zone of Influence of WOP ADF are therefore considered likely to be significantly impacted as a result of its continued operation and cell development. Potential impacts are therefore ruled out and no further assessment is deemed necessary.

6.1.2.2 Discharges

The existing drainage network at WOP ADF collects run-off migrating through the ash and discharges to the leachate lagoon on site. This leachate is used to wet the ash to prevent dust nuisance and help condition the ash. Leachate is also discharged intermittently to the Gowlan River via ADF-SW1, which eventually reaches the River Shannon at Derrryholmes via the River Blackwater; such discharge only occurs when the parameters are within the ELVs as set out in the IE licence. Surface run-off that has not come into contact with ash (i.e. from capped cells and other areas) is diverted through the existing silt pond prior to discharge to the Gowlan River.

The ADF is located within the surface water catchment of the River Shannon Callows SAC or Middle Shannon Callows SPA; these European Sites are therefore within the Zone of Influence of discharges arising from the ADF.

The potential for significant effects upon the aforementioned European Sites arising from operational discharges at WOP ADF is uncertain in the absence of mitigation measures; such impacts and any associated mitigation must be further assessed in the Natura Impact Statement (see Section 8).

6.1.2.3 Atmospheric emissions

Under certain conditions, transport and deposition of ash at the WOP ADF have the capacity to generate airborne dust. Deposition of ash of adjacent habitats is considered to be a potential impact, though the spatial extent of any effect is likely to be limited to European Sites comprising sensitive floral communities which are in the locality of the ADF. The closest such site is Fin Lough SAC, which is 1 km to the north of the ADF.

Table 6-2: Presence of European Site Qualifying Interests / Special Conservation Interests in Zone of Influence of WOP ADF

European Site	Qualifying Interest / Special Conservation Interest/ Conservation Objective	Code	Occurrence/ distribution in Zone of Influence	Rationale
Fin Lough SAC	Alkaline fens CO: Maintain or Restore	7230	**Potentially present**	The fen habitat at Fin Lough occupies the transitional ground between the lake and surrounding bog habitats. The NPWS site synopsis notes that the alkaline fen is species-rich, with characteristic plants including Black Bog-rush (*Schoenus nigricans*) and the sedge species, *Carex flacca, C. lepidocarpa* and *C. panicea*. The total flora of the Fin Lough wetland is remarkably rich: 210 species of vascular

European Site	Qualifying Interest / Special Conservation Interest/ Conservation Objective	Code	Occurrence/ distribution in Zone of Influence	Rationale
				plants and 29 species of bryophytes have been identified to date.
	Vertigo geyeri (Geyer's Whorl Snail) CO: Maintain or Restore	1013	**Potentially present**	*Vertigo geyeri* at the site is associated with the fen habitat described above.

Given the physical separation distance between the sites, deposition of airborne ash on sensitive habitats therein is considered highly unlikely.

None of the European Sites within the Zone of Influence of WOP ADF are therefore considered likely to be significantly impacted as a result of its atmospheric emissions arising as a result of the continued operation and cell development at the ADF. Potential impacts are therefore ruled out and no further assessment is deemed necessary.

6.2 Indirect impacts

6.2.1 WOP Supply Bogs

Potential indirect impacts to European Sites occurring as a result of the ongoing extraction of peat from the respective WOP supply bogs are determined as:

- Hydrological impacts on Qualifying Interest or Special Conservation Interest habitats due to ongoing drainage required to facilitate peat harvesting activities.
- Impacts on water quality (due to silt and ammonia release to surface waters) arising as a result of peat harvesting activities.
- Under certain conditions, peat supply activities have the capacity to generate airborne dust. Harvesting is typically the stage wherein most dust is generated. Deposition of peat dust on adjacent sensitive habitats is considered to be a potential impact.

6.2.1.1 Disturbance to habitats (including hydrological effects)

The National Raised Bog SAC Management Plan 2017-2022 (DCHG 2017) notes that "*Quantifying the impacts of marginal drains on peat structure proves particularly important for Irish raised bogs as one of the principal threats to their ecology comes from marginal drainage associated with peat cutting. Basic engineering calculations (using the Dupuit-Forcheimer solution for unconfined systems (Forchheimer, 1898)) show that changes in water levels in peat (and the changes they cause to its thickness) depend on how deep a drain has cut into the bog margin. The impact of these changes becomes progressively less moving away from the drain. Critically water levels change by a fixed proportion for each interval of distance. For example, if the water level reaches back to half its original level over 20 m, it will be another*

quarter, or half of a half, over the next 20 m." The plan proceeds to outline empirical data gathered from Fir Bog (part of Lough Ree SAC), which relates organic matter in peat to distance to the closest drain (as the main influence on the change in peat organic matter content is water level changes). It is worth noting that nearly all the data points presented by the model in DCHG (2017) show the majority of the impact relationship occurs within 100 m of the closest drain; a minimal level of impact was noted at a number of locations <10 m from the closest drain, though a very small proportion of data points noted a measureable impact between 150 m and 200 m from the nearest drain.

A 100 m external buffer from the IPC boundaries was utilised for this exercise, however, it should be noted that Bord na Móna have commenced investigations on a number of sites to determine appropriate buffers between designated sites and actual production area boundaries to mitigate against any potential dust and hydrology impacts. 100 m from the IPC boundary was considered to be an adequate buffer to appropriately capture sites where there is the potential for impacts, as actual production area boundaries generally have greater separation distance from designated sites when compared to IPC boundaries. A GIS-based proximity analysis of European Sites within 100 m of the respective WOP supply bogs' IPC boundaries was therefore undertaken to inform this AA Screening; as a result of practical constraints, harvesting of peat does not typically extend to the IPC boundaries, so this is considered a highly conservative estimate of the extent of the respective active harvesting areas, within which the outermost harvesting drains would be located.

The following European Sites were identified by this 100 m buffer analysis:

- River Shannon Callows SAC
- River Barrow and River Nore SAC
- Fin Lough (Offaly) SAC
- Middle Shannon Callows SPA
- Suck River Callows SPA

The potential for significant effects upon the aforementioned European Sites is uncertain in the absence of mitigation measures; such impacts and any associated mitigation must be further assessed in the Natura Impact Statement (see Section 8).

Two further overlapping European Sites (Mongan Bog SAC and Mongan Bog SPA) were also identified by the GIS proximity analysis. However, Mongan Bog, whilst within the Bord na Móna IPC licence boundary for the Blackwater Bog grouping, is mostly publicly owned; An Taisce own an 119 hectare section of the site, which is a designated Nature Reserve. Consequently, it is not a commercial Bord na Móna production site and will not be developed as such in the future. Various bog restoration works have been carried out at the site over the past 30 years, with the most recent being the active LIFE project which aims to block over 1,400 m of drains on the high bog. No significant effects upon Mongan Bog SAC and Mongan Bog SPA are therefore envisaged; potential impacts to these two sites are specifically ruled out upon this basis.

In relation to potential for impacts arising from dust generation, transferral and deposition into European Sites, a buffer of 1.5 km from the respective supply bogs was considered. Only one European Site was identified within this buffer, namely:

- Pilgrim's Road Esker SAC

Given the close spatial proximity of this SAC to the southwest boundary of Bloomhill Bog (50 m), there is some potential for dust arising from peat harvesting to be carried inside the SAC boundary. The potential for significant effects upon the aforementioned European Site is uncertain in the absence of mitigation measures; such impacts and any associated mitigation must be further assessed in the Natura Impact Statement (see Section 8).

6.2.1.2 Disturbance to species

Activities associated with peat supply can generate noise via the operation of mobile machinery comprising harvesters, tractors and staff vehicles, as well as the operation of the narrow gauge railway network with associated small diesel locomotives and wagons.

While peat harvesting areas within the Bord na Móna estate are of low ecological value in general, they are known to support a number of Annex 1 bird species which are Special Conservation Interests of the Middle Shannon Callows SPA and Suck River Callows SPA, which are adjacent to active peat harvesting areas. Golden plover and lapwing may roost or rest on bare peat fields. Wintering flocks of Whooper swan may occur on harvesting areas where there are temporary areas of standing water found in association with recolonizing surface vegetation upon which the flocks forage. These species may be locally displaced by human activity and noise generated by machinery at the respective supply bogs.

The potential for significant effects upon the European Sites is uncertain in the absence of mitigation measures; such impacts and any associated mitigation must be further assessed in the Natura Impact Statement (see Section 8).

6.2.1.3 Surface water discharges

Potential indirect impacts arising as a result of the ongoing peat harvesting at the respective supply bogs are related to ongoing drainage and discharges occurring at each bog.

The WOP supply bog estate is distributed over a number of river catchments; a GIS analysis was undertaken to identify these catchments and hydrological connectivity between the supply bogs and receiving waterbodies. These are presented in **Table 6-3**, which presents the WFD status of the individual waterbodies within the broader catchments and notes the European Site associations of the respective catchments.

Table 6-3: WFD Waterbodies and Current Status in or adjacent to the Study Area

Waterbody (WFD name)	WB Code	Type	Ecological Status 2010-2015	Chemical Status	Chemistry Conditions	Objective	Element causing < good
River Shannon (Shannon (Lower)_010)	IE_SH_25S 012000)	River	Unassigned	NA	NA	Restore/Protect	NA
Blackwater (Shannonbridge_ 020)	IE_SH_25B 270200)	River	Good	Not Reported	Good	Protect	NA

The majority of the bogs that supply WOP are located within water body catchment areas of Moderate / Poor Status. While there are a number of pressures affecting river water quality in this area, the current Shannon International River Basin District Management Plan (SIRBDMP) 2009 – 2015 does identify peat harvesting as one of the contributing pressures. Additionally, the Draft Ireland River Basin Management Plan 2018 – 2021 notes that "*Peat extraction has been identified as causing a significant risk to ecological status in 119 water bodies, which represents 8% of all water bodies that have been identified as At Risk. Of these, 115 are rivers, 3 are lakes and 1 is groundwater. The environmental impacts generally relate to suspended solids, ammonia and hydromorphological alterations. There is evidence that high levels of ammonia are being released from peat-extraction activities during the draining process and, along with suspended solids, may be causing ecological impacts in receiving water bodies"*.

Bord na Móna owns 370 km^2 (18.5%) of peatlands in the River Shannon Catchment. The remaining 1,630 km^2 of peatlands in the Shannon Catchment falls into the following categories:

- Peatlands used by commercial turf and peat producers
- Peatlands used for private turf production
- Virgin peatlands, some of which are designated sites

Of the 370 km^2 of peatlands owned by Bord na Móna in the Shannon Catchment, drainage is maintained by means of gravity and pumping, on 300 km^2 of peatlands. This represents 1.69% of the total land-use in the catchment.

The following European Sites were identified by the hydrological connectivity analysis:

- River Shannon Callows SAC
- River Barrow and River Nore SAC
  River Boyne and River Blackwater SAC

Peat extraction has the potential to release silt particles and aqueous ammonia to surface waters under typical rainfall conditions and drainage regimes; these inputs

have the potential to negatively impact upon the ecology of receiving waterbodies as a consequence of increased turbidity, sediment deposition and chemical change.

The potential for significant effects upon the aforementioned European Sites is uncertain in the absence of mitigation measures; such impacts and any associated mitigation must be further assessed in the Natura Impact Statement (see Section 8).

6.2.1.4 Atmospheric emissions

Under certain conditions, peat supply activities have the capacity to generate airborne dust. Harvesting (3 to 5 contiguous days, recurring on average 12 times per annum), is typically the stage wherein most dust is generated. Deposition of peat dust on adjacent habitats is considered to be a potential impact, though the spatial extent of any effect is likely to be limited to European Sites comprising sensitive floral communities (such as species-rich grassland or orchid communities found on eskers) which are located directly adjacent to harvesting areas. While the impact pathway is different (airborne versus hydrological), it is considered that directly adjacent European Sites are already captured by the 100 m buffer analysis outlined in Section 6.2.1.1.

6.2.2 Potential indirect impacts arising from sourcing of biomass for supply to WOP

In order to assess the potential indirect impacts, from biomass supply a review of current forestry and agricultural best practices and legislation has been undertaken to gain an understanding of the baseline conditions and existing issues.

The principle source of indigenous fuel will be by-products from the Irish forest sector (brash, thinnings and residues), by-products from Irish sawmills, agricultural by-products and residues and energy crops.

The primary biodiversity issues associated with biomass production are habitat change arising during afforestation, roading or harvesting and aquatic discharges arising from clear-felling 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 generally within a 100 km radius of WOP station.

Under the Forestry Regulations 2017 (S.I. No. 191 of 2017) all applications for licences for afforestation, forest road construction projects, whether grant-aided or not, and for aerial fertilisation and tree felling operations, require the prior written approval from the Minister for Agriculture, Food and the Marine. The activities are as follows

- **Tree felling** – the uprooting or cutting down of any tree (subject to certain exemptions);
- **Aerial fertilisation** – aircraft application of fertiliser to a forest;

- **Afforestation** – the establishment of a forest or stand of trees in an area where there was no previous tree cover where the area involved is greater than 0.10 hectares (approximately 0.25 acres);
- **Forest road construction** –construction of a forest road.

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. As required under the Habitats Directive and as set out under S.I.477 of 2011 (European Communities (Birds & Natural Habitats) Regulations 2011) and S.I.191 of 2017 (Forestry Regulations 2017), on receipt of an application for a felling licence, the Forest Service must undertake screening to assess whether or not the project is likely to have a significant effect on a SAC or SPA, either individually or in combination with other plans or projects, in view of both the conservation objectives of that Natura site (available at www.npws.ie/protectedsites/) and best scientific knowledge. Details of the Forest Service Appropriate Assessment Procedure (AAP) are set out in the Forestry Standards Manual.

In addition to the above licencing requirements the Forest Biodiversity Guidelines (Forest Service 2000) apply to all grant-aided projects and to all activities associated with a Felling Licence. These guidelines make provisions for the following:

- Site development planning;
- SAC, SPAs and pNHAs/NHAs;
- Local biodiversity factors;
- Species selection and diversity;
- Age and structural diversity;
- Overmature trees and deadwood;
- Biodiversity enhancement;
- Retained habitats;
- Pest management and troublesome species; and
- Machine operations.

These biodiversity guidelines are reflected in the content of the Forestry Standards and Procedures Manual (Forest Service 2015), which also contains specific appendices relating to:

- Natura Impact Statement Guidance and Framework
- Appropriate Assessment Procedure and Hen Harrier
- Appropriate Assessment Procedure and Freshwater Pearl Mussel

With the application of the Forest Service Licencing procedure and adherence to the Guidelines no indirect impacts are envisaged.

Agriculture is the largest land use in Ireland and also constitutes the most prevalent pressure with a focus on water quality impairment. As such there are many measures proposed nationally (see River Basin Management Plan (RBMP) for Ireland (DHPLG 2018)) to prevent and mitigate potential impacts.

Additionally, with regard to aquatic ecology, the River Basin Management Plan for Ireland also acknowledges that the Forest Service 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 Principal Actions have been proposed in the 2018 RBMP for Ireland to address these pressures at a strategic level as follows:

Forestry

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 & FMP in Ireland, and will continue its engagement with KerryLIFE, with a view to assessing and adopting appropriate measures for possible wider application.

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 The DAFM and the 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.

Agriculture

1 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.

2 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.

3 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.

4 A new collaborative initiative between Government and industry called the "Sustainability Support and Advisory Programme" has been put in place for cycle 2 (2018–2021) to support the implementation of best practice (i) in 190 prioritised Areas for Action, to address existing environmental pressures (see Section 10), and (ii) across all dairy farmers through the Dairy Sustainability Initiative. A total of 30 sustainability advisers are being assigned to the programme, 20 of whom will be located in Teagasc, while 10 will operate within the dairy processors' organisational structures. The objective of the new approach is to encourage and support behavioural change, to facilitate knowledge transfer and to achieve better on-farm environmental outcomes.

5 The Dairy Sustainability Initiative — a joint industry/farmer/government forum, initiated by the Irish Dairy Industry Association — will drive the development and rollout of a targeted knowledge-transfer programme to all 18,000 dairy farms. This will effectively deliver the key lessons from the Agricultural Catchments Programme to dairy farmers. It is envisaged that this will consist of both cooperative-led farm pilot programmes and wider promotion programmes for nutrient management and management of farm pollution point sources.

6 In addition, and to promote the adoption of best environmental practice across different sectors of agriculture, €100 million has been allocated from the RDP for a knowledge-transfer programme with the purpose of upskilling farmers and agricultural advisers. Over the lifetime of the RDP, this programme will, on a voluntary basis, roll out professional advisory and knowledge-transfer services to around 20,000 farmers across all sectors.

7 Teagasc will promote best practice in water-quality protection through its discussion groups and on-farm advisory services. Teagasc will also facilitate the training of non-Teagasc advisers/consultants to facilitate the wider dissemination of water-quality advice to farmers. To further support good nutrient management across the entire country, an online nutrient-management planning system has been launched by Teagasc and made available to all Farm Advisory System (FAS)-approved planners. Use of this system is mandatory for farmers in GLAS and for derogation farmers — accounting for almost 60,000 farmers.

8 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. The GLAS Scheme prioritises vulnerable and high-status catchments, and has a strong focus on ensuring that farmers understand the environmental benefits of their actions. Also under the RDP, the TAMS scheme will facilitate total investment of around €500–600 million for better management and storage of animal manures, including more efficient spreading equipment. The "targeting" of these agri-environmental schemes and interventions rolled out by the DAFM will continue, responding to emerging knowledge and evidence (such as catchment characterisation)

> *9 It is accepted that Ireland faces significant challenges in meeting water quality targets while increasing production in the agricultural sector, and 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. In particular, the ACP programme will model and monitor the impacts of agricultural development under Food Wise 2025 in specific catchments. The ACP will develop an integrated environmental-economic modelling system to identify the impacts of expansion under Food Wise 2025 and to advise on the overall costs and benefits associated with sustainable intensification practices at field, farm and catchment scales. New targeted initiatives will be developed as necessary to ensure that the sustainability objectives of Food Wise 2025 are met.*

The RBMP for Ireland also notes:

> *"Recent forestry policies have been clearly aligned with the objectives of the WFD. These include changes in relation to replanting policy (as set out in the DAFM's Felling & Reforestation Policy document) and to the availability of support schemes from the DAFM, which have now been tailored to include water-protection measures. These include the Native Woodland Establishment Scheme, the Native Woodland Conservation Scheme and the Environmental Enhancement of Forests Scheme (the latter is being finalised at the time of publication of this Plan). The mandatory Environmental Requirements for Afforestation, released in December 2016, include enhanced provisions for water protection during afforestation and early forest development. In addition, the Native Woodland Establishment Scheme promotes the establishment of water related ecosystem services produced by a combined water-setback and native-woodland zone. Consideration is being given to how the measures can be targeted and promoted in priority catchments, such as catchments for high status rivers or lakes."*

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

Biomass supply from agricultural lands will only occur in the context of the existing agricultural legislation and within the implementation framework of the measures set out above. No European Sites are therefore considered likely to be significantly impacted as a result of the proposed supply of biomass to WOP Station during the transitional and subsequent exclusive firing phases. Potential impacts are therefore ruled out and no further assessment is deemed necessary.

6.3 In-combination effects

The potential cumulative impact of the proposed development in combination with other existing and/or approved developments in the area is considered below with

the purpose of identifying the influence the proposed development will have on European Sites when considered cumulatively and in combination with relevant existing and/or approved projects.

6.3.1 Existing plans, projects and activities

WOP Station is located adjacent to Shannonbridge village, which is served by a wastewater collection network which routes untreated sewage to the Shannonbridge wastewater treatment plant (WWTP), which subsequently discharges treated effluent via an outfall on the eastern shore, approximately 1.5 km upstream of the cooling water outfall. The WWTP is currently licensed under a Waste Water Discharge Authorisation (Irish Water Reference A0171-01). The Inspectors Report (2011) noted that while the WWTP was overloaded at the time, it was considered that subject to the mitigation measures proposed in the associated Stage 2 Appropriate Assessment, the discharge was not likely to have a significant impact, in terms of maintaining favourable conservation status of the qualifying interests, on the designated European Site. The WWTP was subsequently upgraded with a Pumped Flow Biofilm Reactor (PFBR) package plant in 2013; this has increased the capacity of the plant. Given the absence of any chemical or organic enriching aspect of the cooling water discharge, it is not envisaged that there is any interaction between the WWTP and power station discharges which could negatively impact upon the SAC or SPA.

The NPWS site synopsis for the River Shannon Callows SAC notes that "*The Shannon Callows are used for summer dry-stock grazing (mostly cattle, with some sheep and a few horses), and permanent hay meadow. About 30 ha is a nature reserve owned by voluntary conservation bodies. The River Shannon is also used increasingly for recreational purposes with coarse angling and boating accounting for much of the visitor numbers. Intermittent and scattered damage to the habitats has occurred due to over-deepening of drains and peat silt deposition, water-skiing, ploughing and neglect of hay meadow (or reversion to pasture).*" Despite these localised pressures, the site synopsis concludes that "*none of these damaging activities can yet be said to be having a serious impact.*"

Several of the bogs which supply fuel peat to WOP Station also supply the other ESB-owned midland power station at Lanesborough (Lough Ree Power (LRP) station), which also receives peat exclusively from a number of other supply bogs in the region. The Bord na Móna-owned Edenderry Power Limited (EPL) power 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.

LRP Station also discharges cooling water to the River Shannon immediately upstream of Lough Ree, approximately 50 km upstream of WOP station; there is no spatial overlap in the thermal influence of the discharges of WOP and LRP stations.

EPL station discharges a combined wastewater stream (including cooling water) through a settlement lagoon to the Figile River, a tributary of the River Barrow. Consequently both LRP and EPL station are considered to be outside the potential Zone of Influence of WOP Station and in-combination effects arising from the operation of the respective power stations are therefore ruled out on the basis of physical separation and absence of hydrological connections.

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.

6.3.2 Proposed plans and activities

To address possible in-combination effects from future developments within a 15 km radius of WOP Station and ADF, a search was undertaken for planning applications within this radius. This was completed to ensure that all projects which have secured approval/planning permission but which may not yet have been constructed were identified and included in the assessment for in-combination effects. To fully consider in-combination effects with the potential indirect impacts associated with the supply of peat to WOP station, this search was extended to cover a 15 km radius from the WOP supply bog estate. This relates to an area encompassing serval midland counties, namely Offaly, east Galway, Roscommon, Westmeath, Laois, west Kildare and southwest Meath.

Strategic infrastructure projects were considered relevant as these tend to be significant developments whose applications are generally accompanied by an environmental impact statement. In the case of the planning applications submitted to the Local Authorities (in their role as Planning Authorities), the screening criteria for plans and projects to have the potential for significant effects were those where either an Environmental Impact Statement and / or a Natura Impact Statement were prepared. In the case of planning applications, all planning permissions granted within the relevant Local Authority areas within the last 5 years and which met the screening criteria described above were assessed.

From the long list of permissions granted or pending (including appealed permissions), the applications were initially screened to remove small residential or agricultural permissions which were considered to be minor in scale to the extent that no significant in-combination effect was deemed likely to arise. The remaining permissions were compiled and classified according to the nature of the development.

Based on a review of the feasible impact pathways associated with activities at WOP station, ADF and respective supply bogs, the aforementioned planning application shortlist was subsequently reviewed for any proposed developments with potential impacts with the capacity to interact with the identified impacts of the proposed WOP development (e.g. as a consequence of their immediate proximity to WOP station,

ADF or peat supply bogs due to spatial proximity or via hydrological impacts as a result of discharges or drainage). These projects are presented in **Table 6-4**.

Table 6-4: Potential in-combination projects

Development name, location and description	Nature of potential interaction	Assessment of potential interaction
Lumcloon Energy, Clonliffeen, Co. Offaly **Battery Storage: Energy storage facility sited in field immediately south of proposed biomass storage slab B.** **Planning Ref: 17278**	Close spatial proximity to WOP Station and temporal overlap of development/ operational phases.	An AA Screening was carried out as part of the planning application which concluded no significant impacts to any European Site, direct, indirect or in-combination. Given the contained nature of the battery storage development and the absence of any impacts arising therefrom, no in-combination impacts with the proposed WOP operation and developments or peat supply are predicted.
Lisbeg Wind Farm, Co. Galway **Wind farm comprising 5 turbines.** **Planning Ref: 151571 (Currently appealed)**	Close spatial proximity to Garryduff supply bog	A Natura Impact Statement was submitted as part of the wind farm planning application which concluded no significant impacts to any European Site, direct, indirect or in-combination. Given the absence of any impacts arising therefrom, no in-combination impacts with the proposed WOP operation and developments or peat supply are predicted.
A biomass processing combined heat and power (CHP) facility, Rhode, Co. Offaly **Planning Ref: 9537 (Planning extension on 2010 approval submitted in 2015)**	In same hydrological catchment as Ballybeg supply bog	Environmental Impact Report submitted as part of original planning application concludes no impacts to ecology and notes environmental control measures to downstream discharges to mitigate against aquatic impacts. Given the absence of any impacts arising therefrom, no in-combination impacts with the proposed WOP operation and developments or peat supply are predicted.
Yellow River Wind Farm, Rhode, Co. Offaly	In same hydrological catchment as Ballybeg supply bog	An AA Screening was carried out as part of the wind farm planning application which concluded no significant impacts to any European Site, direct, indirect or in-combination.

Development name, location and description	Nature of potential interaction	Assessment of potential interaction
Wind farm comprising 29 turbines. **Planning Ref: ABP PA0032**		Given the absence of any impacts arising therefrom, no in-combination impacts with the proposed WOP operation and developments or peat supply are predicted.
Clooncreen Wind Farm, Co. Offaly **Wind farm comprising 29 turbines.** **Planning Ref: ABP PA0047**	Spatial proximity to Esker supply bog	A Natura Impact Statement was submitted as part of the wind farm planning application which concluded no significant impacts to any European Site, direct, indirect or in-combination. Given the absence of any impacts arising therefrom, no in-combination impacts with the proposed WOP operation and developments or peat supply are predicted.
Landfill, Derryclure, Co. Offaly **Planning Ref: 10307 (Planning extension on 2011 approval submitted in 2016)**	Spatial proximity to Derryclure supply bog	An AA Screening was carried out as part of the landfill planning application which concluded no significant impacts to any European Site, direct, indirect or in-combination. Given the absence of any impacts arising therefrom, no in-combination impacts with the proposed WOP operation and developments or peat supply are predicted.
Quarry (sand and gravel), Derryarkin, Co. Offaly **Planning Ref: 1849**	Spatial proximity to Drumman supply bog	An AA Screening was carried out as part of the landfill planning application which concluded no significant impacts to any European Site, direct, indirect or in-combination. Given the absence of any impacts arising therefrom, no in-combination impacts with the proposed WOP operation and developments or peat supply are predicted.
Moanvane Wind Farm **Wind farm comprising 12 turbines.** **Planning Ref: 17335 (Currently appealed)**	In same hydrological catchment as Bellair North supply bog	An AA Screening was carried out as part of the wind farm planning application which concluded no significant impacts to any European Site, direct, indirect or in-combination. Given the absence of any impacts arising therefrom, no in-combination impacts with the proposed WOP operation and developments or peat supply are predicted.

Development name, location and description	Nature of potential interaction	Assessment of potential interaction
Wind farm, Stonestown, Co.Offaly **Wind farm comprising 9 turbines.** **Planning Ref: 14188**	Spatial proximity to Clongawney & Galros and Drinagh Boora bogs	A Natura Impact Statement was submitted as part of the wind farm planning application which concluded no significant impacts to any European Site, direct, indirect or in-combination. Given the absence of any impacts arising therefrom, no in-combination impacts with the proposed WOP operation and developments or peat supply are predicted.
100MW gas fired power plant, Monksland, Athlone, Co. Roscommon **Planning Ref: 18256**	Spatial proximity to River Shannon (plant will not result in any discharges to River Shannon).	An AA Screening was carried out as part of the power plant planning application which concluded no significant impacts to any European Site, direct, indirect or in-combination. Given the absence of any impacts arising therefrom, no in-combination impacts with the proposed WOP operation and developments or peat supply are predicted.

This project screening process concluded that there were no other proposed projects in the identified Zone of Influence with the potential to interact to a sufficient degree with the proposed development (including continued operation) (as a consequence of an absence of interaction pathways or the absence of impacts from the identified projects within the Zone of Influence) that could significantly impact upon any European Site.

A number of strategic and local plans are currently in operation with the potential to influence the significance of the potential impacts of the proposed development, including:

- National Raised Bog Special Areas of Conservation Management Plan 2017 - 2022 (DCHG 2017)
- National Peatlands Strategy (NPWS 2015)
- River Basin Management Plan for Ireland 2018-2021 (DHPLG 2018)
- Biodiversity Action Plan 2016 - 2021 (Bord na Móna 2016)
- National Biodiversity Plan 2017 – 2021 (NPWS 2017)
- Supply bog rehabilitation plans (Bord na Móna, Draft)
- Forestry Programme 2014 – 2020 (Department of Agriculture 2015)
- National Mitigation Plan (Department of Communications, Climate Action and Environment 2017)
- Respective Local Authority Development Plans

7 Screening statement and conclusion

This screening process has examined the details of the proposed biomass transition at WOP Station project and has considered the risk and significance of potential impacts to European Sites in the Zone of Influence.

The assessment has determined that significant effects on European Sites, as a result of the ongoing operation of WOP Station and the associated WOP ADF through the biomass transition period, are not predicted, however the potential for significant effects during the construction phase in the absence of mitigation is unclear and requires further assessment.

The assessment has also determined that the potential for significant effects on a number of European Sites arising from the ongoing harvesting and supply of peat to WOP Station during the biomass transition period, individually or in combination with other plans or projects, in the absence of mitigation, cannot be excluded.

The assessment is summarised in the Appropriate Assessment Screening matrix presented in **Table 7-1**. As a consequence, an Appropriate Assessment under the Habitats Directive is required for the proposed development (including continued operation), to include the harvesting and supply of peat during this transition period.

Table 7-1: Appropriate Assessment Screening Matrix

Appropriate Assessment Screening Matrix		
Project / Plan	Brief description of the project or plan	West Offaly Power Generating Station (WOP) is located adjacent to the River Shannon at Shannonbridge, County Offaly. The station is a peat fired base load station i.e. continuous operation, subject to availability. The installed capacity is 150MWe and the station was commissioned in 2005. The milled peat-fired boiler generates steam which is used to drive turbines which produce electricity. The steam is then cooled to hot water and recirculated to the boiler. The steam is cooled by water abstracted from and returned to the River Shannon. The proposed development constitutes two discrete elements – the changeover in fuel type from peat to peat and biomass and ultimately biomass; and the physical works proposed to facilitate that. The development will comprise:

		• the continued operation of the existing development (WOP station and the ADF site) beyond the permitted date of 31st December 2020 [See Section 4.1]; • the phased transition of the WOP Station to firing exclusively on biomass [see Section 4.2]; • the development of fuel management and handling facilities on the WOP site to facilitate the change in fuel type [see Section 4.3]; • the development of additional landfill capacity at the existing dedicated ADF to accept additional ash from WOP and thereby facilitate on-going power generation. The station's off-site Ash Disposal Facility (ADF) is located on remote Bord na Móna cutaway bogland at Derrylahan, Co. Offaly, 5.5 km from the power station. Fly ash and bottom ash are transported to the ADF on Bord na Móna's narrow gauge rail system in specially designed saddleback wagons. The ash is tipped from the wagons. It is placed semi-dry and is wetted to control potential dust emissions. The peat that fuels WOP is harvested by Bord na Móna at a number of supply bogs. These activities are regulated by the EPA under Industrial Pollution and Control (IPC) Licence Registration Numbers P0500-01 (Boora Group), P0501-01 (Derrygreenagh Group), P0502-01 (Blackwater Group) and P0503- 01 (Allen Group).
European Site under Consideration	Brief description of the European Site(s)	• River Shannon Callows SAC • Middle Shannon Callows SPA • Suck River Callows SPA • Fin Lough (Offaly) SAC • Moyclare Bog SAC • Raheenmore Bog SAC • River Boyne And River Blackwater SAC • River Boyne and River Blackwater SPA • Mongan Bog SAC • Mongan Bog SPA • Pilgrim's Road Esker SAC • Split Hills And Long Hill Esker SAC • Killeglan Grassland SAC

		• Ferbane Bog SAC • Four Roads Turlough SAC • Four Roads Turlough SPA • Mount Hevey Bog SAC • All Saints Bog And Esker SAC • Clonaslee Eskers And Derry Bog SAC • Crosswood Bog SAC • Ballyduff/Clonfinane Bog SAC • Ridge Road, SW of Rapemills SAC • All Saints Bog SPA • Slieve Bloom Mountains SAC • Aughrim (Aghrane) Bog SAC • Ballygar (Aghrane) Bog SAC • Island Fen SAC • Dovegrove Callows SPA • Lough Croan Turlough SAC • Lisduff Fen SAC • Lough Croan Turlough SPA • River Little Brosna Callows SPA • Lisduff Turlough SAC • Castlesampson Esker SAC • Lough Ennell SAC • Lough Ree SAC • Redwood Bog SAC • Sharavogue Bog SAC • Lough Ree SPA • Carrownagappul Bog SAC • River Barrow And River Nore SAC • Lough Ennell SPA • Ballynamona Bog And Corkip Lough SAC • The Long Derries, Edenderry SAC • Curraghlehanagh Bog SAC • Ballinturly Turlough SAC • Glenloughaun Esker SAC • Camderry Bog SAC • Wooddown Bog SAC • Lough Funshinagh SAC • Mountmellick SAC • Ardgraigue Bog SAC • Arragh More (Derrybreen) Bog SAC • Kilcarren-Firville Bog SAC • Charleville Wood SAC • Shankill West Bog SAC • Clara Bog SAC • Lough Lurgeen Bog/Glenamaddy Turlough SAC • Carn Park Bog SAC • Liskeenan Fen SAC • Slieve Bloom Mountains SPA

Assessment Criteria	Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Site	The ongoing operation of WOP Station and its associated ADF are not expected likely to give rise to significant impacts to any European Sites. The harvesting and supply of peat to fuel WOP Station during the biomass transition period has the potential to cause indirect impacts to European Sites.
	Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of: • Size and scale • Land-take • Distance from the European Site or key features of the site • Resource requirements • Emissions • Excavation requirements (e.g. impacts of local hydrogeology) • Transportation requirements • Duration of construction, operation etc.	• Release of polluting material from WOP site to surface waters during biomass storage slab construction phase. • Impacts to European Sites are likely to arise as a result of the peat extraction requirements to supply peat fuel to WOP station. The transition to biomass will involve a phased replacement of the peat fuel supply over a 10 year period, during which peat harvesting will continue at the respective supply bogs. Impacts which may occur by virtue of the proximity and footprint of the respective harvesting areas to European Sites are as follows: o Excavation of peat may lead to hydrological impacts on adjacent habitats within European Sites. o Emissions to surface waters from supply bogs may lead to impacts on water quality. o Dust generated during peat harvesting may be deposited inside adjacent European Sites.
	Describe any likely changes to the site arising as a result of: • Reduction of habitat area • Disturbance to key species	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

	• Habitat or species fragmentation • Reduction in species density • Changes in key indicators of conservation value (e.g. water quality, etc.)	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; • Cell construction at the ADF; • Stockpiling of materials; • Accidental spillage of anthropogenic polluting substances in or adjacent to waterbodies and drainage networks; and • Construction plant and vehicle washing. Peat extraction has the potential to release silt particles and aqueous ammonia to surface waters under typical rainfall conditions and drainage regimes; these inputs have the potential to negatively impact upon the ecology of receiving waterbodies as a consequence of increased turbidity, sediment deposition and chemical change. Significant indirect effects to water quality in receiving waterbodies associated with the following European Sites arising as a result of peat harvesting activities have the potential to occur in the absence of mitigation: • River Shannon Callows SAC • River Barrow and River Nore SAC • River Boyne and River Blackwater SAC Peat harvesting activities require ongoing drainage of peat supply bogs. Indirect impacts upon habitats within the following European Sites arising as a result of ongoing drainage have the potential to occur in the absence of mitigation: • River Shannon Callows SAC • Pilgrim's Road Esker SAC • River Barrow and River Nore SAC • Fin Lough (Offaly) SAC • Middle Shannon Callows SPA • Suck River Callows SPA Under certain conditions, peat supply activities have the capacity to generate airborne dust. Deposition of peat dust of adjacent habitats is considered to be a potential impact, though the

		spatial extent of any effect is likely to be extremely limited and only related to European Sites comprising sensitive floral communities which are located directly adjacent to harvesting areas (same list as for hydrological impacts). Indirect impacts upon habitats within the following European Sites arising as a result of ongoing drainage are considered likely in the absence of mitigation: • Pilgrim's Road Esker SAC • Fin Lough (Offaly) SAC • River Shannon Callows SAC
	Describe any likely impacts on the European Site as a whole in terms of: • Interference with the key relationships that define the structure of the site • Interference with key relationships that define the function of the site	In the absence of mitigation, emissions to surface water from the respective supply bogs may interfere with trophic pathways and physical parameters in the waterbodies associated with the various European Sites; this is a consequence of increased turbidity, sediment deposition and chemical change. Dust arising from source bogs being deposited on terrestrial habitats has the potential to physically affect sensitive plant community structure therein through such mechanisms as reduction in light absorption and stomatal blocking.
	Provide indicators of significance as a result of the identification of impacts set out above in terms of: • Reduction of habitat area • Disturbance to key species • Habitat or species fragmentation • Loss • Change to key elements of the site (e.g. water quality, hydrological regime, etc)	• Ecological status of receiving waters of European Sites. • Hydrological status of habitats of European Sites, measureable by changes in associated plant communities or species usage. • Changes in plant community structure in European Sites adjacent to peat supply bogs. •
	Describe from the above those elements of the project, or	• Impacts to water quality as a result of construction activities

	combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	• Impacts to water quality as a result of bog discharges • Impacts to habitats as a result of bog drainage • Impacts to habitats as a result of dust deposition
Conclusion	**European Sites where significant impacts are considered likely in the absence of mitigation (Refer to Section 8 - Natura Impact Statement)**	• River Shannon Callows SAC • Pilgrim's Road Esker SAC • River Barrow and River Nore SAC • Fin Lough (Offaly) SAC • Middle Shannon Callows SPA • Suck River Callows SPA • River Boyne and River Blackwater SAC
	European Sites where significant impacts are not considered likely (Refer to Tables 5-1 and 5-2 for rationale for screening out of impacts).	• Moyclare Bog SAC • Raheenmore Bog SAC • River Boyne and River Blackwater SPA • Mongan Bog SAC • Mongan Bog SPA • Split Hills And Long Hill Esker SAC • Killeglan Grassland SAC • Ferbane Bog SAC • Four Roads Turlough SAC • Four Roads Turlough SPA • Mount Hevey Bog SAC • All Saints Bog And Esker SAC • Clonaslee Eskers And Derry Bog SAC • Crosswood Bog SAC • Ballyduff/Clonfinane Bog SAC • Ridge Road, SW of Rapemills SAC • All Saints Bog SPA • Slieve Bloom Mountains SAC • Aughrim (Aghrane) Bog SAC • Ballygar (Aghrane) Bog SAC • Island Fen SAC • Dovegrove Callows SPA • Lough Croan Turlough SAC • Lisduff Fen SAC • Lough Croan Turlough SPA • River Little Brosna Callows SPA • Lisduff Turlough SAC • Castlesampson Esker SAC • Lough Ennell SAC • Lough Ree SAC • Redwood Bog SAC • Sharavogue Bog SAC • Lough Ree SPA • Carrownagappul Bog SAC

		• Lough Ennell SPA • Ballynamona Bog And Corkip Lough SAC • The Long Derries, Edenderry SAC • Curraghlehanagh Bog SAC • Ballinturly Turlough SAC • Glenloughaun Esker SAC • Camderry Bog SAC • Wooddown Bog SAC • Lough Funshinagh SAC • Mountmellick SAC • Ardgraigue Bog SAC • Arragh More (Derrybreen) Bog SAC • Kilcarren-Firville Bog SAC • Charleville Wood SAC • Shankill West Bog SAC • Clara Bog SAC • Lough Lurgeen Bog/Glenamaddy Turlough SAC • Carn Park Bog SAC • Liskeenan Fen SAC • Slieve Bloom Mountains SPA

8 Natura Impact Statement

This Natura Impact Statement (NIS) considers any adverse impacts that the proposed development (including continued operation) might have on the integrity of the following European Sites:River Shannon Callows SAC

- Pilgrim's Road Esker SAC
- River Barrow and River Nore SAC
- Fin Lough (Offaly) SAC
- Middle Shannon Callows SPA
- Suck River Callows SPA
- River Boyne and River Blackwater SAC

The most recently updated site synopses and conservation objectives documents have been sourced from the NPWS website.

This NIS presents a scientific examination of the proposed development (including continued operation) in the context of any relevant Natura site(s) and associated qualifying interests and conservation objectives. The purpose of this scientific examination is to identify and characterise any possible impact the project may have (individually or in combination with other plans and projects) on the qualifying interests of the Natura site(s), and to identify and detail any proposed mitigation measures to avoid, reduce or offset the risk of these impacts.

When describing changes/activities and impacts on ecosystem structure and function, the types of impacts that are commonly presented are;

- direct and indirect effects,
- short and long-term effects,
- construction, operational and decommissioning effects, and
- isolated, interactive and cumulative effects.

Impacts that could potentially occur through the implementation of the project can be categorised under a number of impact categories as follows:

- Loss/Reduction of habitat area,
- Disturbance to key species,
- Habitat or species fragmentation,
- Reduction in species density, and
- Changes in key indicators of conservation value such as decrease in water quality and quantity.

EC (2000) defines European Site integrity as follows; ‘The integrity of a site involves its ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the site’s conservation objectives’.

The precautionary principle is detailed in Article 191 of the *Treaty on the Functioning of the European Union*. It aims at ensuring a higher level of environmental protection through preventative decision-taking in the case of risk and underpins the Habitats Directive (DoEHLG 2010). The precautionary principle is the underlying concept of

sustainable development which implies that prudent action be taken to protect the environment even in the absence of scientific certainty (DoEHLG 2010).

8.1 River Shannon Callows SAC

The AA Screening for the proposed development (including continued operation) identified potential pathways to impact upon the River Shannon Callows SAC. Potential impacts on the respective Qualifying Interests may arise as a result of:

- Discharges to surface waters from WOP Station and ADF leading to impacts on water quality within or upstream of the River Shannon Callows SAC.
- Excavation of peat leading to hydrological impacts on adjacent habitats within the River Shannon Callows SAC.
- Dust generated during peat harvesting may be deposited inside the River Shannon Callows SAC.

The generic conservation objective of this designated site is: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected. **Table 8-1** highlights the Qualifying Interests occurring in the potential Zone of Influence for which the above impact pathways may result in adverse effects.

Table 8-1: SAC Qualifying Interests and Potential Impact Pathways

QI	Assessment of Pathway for Effects
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	Potential impacts on the QI may arise in the form of emissions to surface waters resulting from construction or operational activities at WOP Station or ADF. Surface water discharges, hydrological changes and atmospheric emissions (i.e. dust) associated with peat supply may also impact upon this QI. The potential for adverse effects on this habitat is considered further in this document.
Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	Potential impacts on the QI may arise in the form of emissions to surface waters resulting from construction or operational activities at WOP Station or ADF. Surface water discharges, hydrological changes and atmospheric emissions (i.e. dust) associated with peat supply may also impact upon this QI. The potential for adverse effects on this habitat is considered further in this document.
Otter (Lutra lutra)	Potential impacts on the QI may arise in the form of discharges to the River Shannon resulting from construction or operational activities at WOP Station and from discharges from peat supply bogs the River Shannon and its broader

QI	Assessment of Pathway for Effects
	catchment. The potential for adverse effects on this species is considered further in this document.

8.1.1 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

The Status of EU Protected Habitats and Species in Ireland (NPWS 2013), outlines the following summary of this habitat:

> *The Annex I habitat 6410 is represented in Ireland by both fen and grassland communities on nutrient poor soils. The 6410 habitat is either managed as traditional hay meadows (cut only once a year in late summer or autumn with the hay crop removed) or more usually by extensive pasture. Within Ireland Molinia meadows occur in lowland plains on neutral to calcareous gleys, sometimes with a Marl layer beneath the surface, or on peaty soils both in lowland and upland situations.Molinia meadows generally have a central to north-western distribution in Ireland that follows the distribution of Cirsium dissectum, one of the key indicator species for the habitat. The Annex I habitat is very rare in the east of the country with only one site recorded within the five eastern counties that border the Irish Sea. The 6410 habitat is comprised of a few distinct communities belonging to the Junco-Molinion. These communities can be classified within the Cirsium dissectum – Potentilla erecta (O'Neill et al. 2013), the Carex panicea – Festuca rubra community (Heery 1991) and M24: Molinia caerulea – Cirsium dissectum fen meadow (Rodwell 1991).*

The range of this habitat in Ireland has been assessed as *Favourable* and the habitat area assessed as *Bad (Stable)*. The structures and function of the habitat as well as its future prospects have both been assessed as *Bad (Declining)*. The overall assessment of conservation status is *Bad (Declining).*

The pressures and threats (National level) relating to this habitat, as identified in NPWS (2013) are as follows:

- Abandonment of pastoral systems, lack of grazing - high importance
- Abandonment / lack of mowing - high importance
- Water abstractions from groundwater - high importance
- Species composition change (succession) - high importance
- Forest planting on open ground - low importance
- Paths, tracks, cycling tracks - low importance
- Problematic native species - medium importance
- Agricultural intensification - low importance
- Artificial planting on open ground (non-native trees) - low importance
- Forest and Plantation management & use - low importance
- Intensive cattle grazing - medium importance
- Intensive horse grazing - medium importance

- Fertilisation - low importance
- Accumulation of organic material - medium importance

Based on a review of the above threats and pressures, increased input of organic material (wherein organic peat sediment arising from supply bog discharges entering the Shannon catchment may be deposited on callows grassland during seasonal flooding periods) is considered to be a potential impact arising from peat harvesting activities. Potentially polluting material discharged to the River Shannon during the construction or operational phases at WOP Station or ADF may be deposited on callows habitats during elevated water levels and result in species composition change. Additionally, dust deposition on callows habitat within the SAC has the potential to lead to species composition change.

Whilst only the generic Conservation Objectives are currently available for the River Shannon Callows SAC, targets and attributes for the conservation of this habitat are published for other comparable SACs; targets for this habitat type are commonly drawn from O'Neill et al. (2013). For the purposes of this assessment, attributes and related targets for this habitat are referenced from the Lower River Shannon SAC. These are listed in **Table 8-2** below, together with an assessment of the potential impacts on each attribute.

Table 8-2: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Lower River Shannon SAC)

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes	There will be no direct land take arising from construction or operational activities at WOP Station or ADF in areas comprising Annex I habitat 6410. This is also the case for the respective peat supply bogs. Hydrological influence on habitat is dominated by River Shannon; localised drainage associated with peat supply bogs is not expected to affect the Molinia meadows component of the callows habitat distribution along the river.
Habitat distribution	No decline, subject to natural processes	There will be no direct land take in areas comprising Annex I habitat 6410. Hydrological influence on this habitat is dominated by River Shannon; localised drainage associated with peat supply bogs is not expected to affect the Molinia meadows component of the callows habitat distribution along the river.

Attribute	Target	Assessment
Vegetation structure: broadleaf herb: grass ratio	Broadleaf herb component of vegetation between 40 and 90%	Vegetation structure and composition for Annex 1 habitat 6410 has the capacity to be influenced by organic enrichment of underlying soils which may occur as a result of peat sediment entering the Shannon catchment and being deposited on areas of callows grassland distributed throughout its floodplain. The NPWS Site Synopsis notes that "*Intermittent and scattered damage to the habitats has occurred due to over-deepening of drains and peat silt deposition…However, none of these damaging activities can yet be said to be having a serious impact*." In the absence of mitigation measures relating to waterborne peat silt, adverse effects cannot be ruled out. Release of pollutants to surface water (e.g. fuel spills or elevated pH discharges) from WOP Station or ADF, either during the construction or operational phases, may effect vegetation composition as a consequence of being deposited in callows habitats during elevated water levels. Additionally, deposition of dust arising from peat harvesting activities has some potential to alter vegetation composition and structure. Broadleaf species may be more susceptible to inhibitive mechanisms such as reduction in light absorption and stomatal blocking, when compared to grasses. Localised succession pressure towards rank grassland may occur as a result. However, this effect is not anticipated to be a significant issue with regard to the Shannon callows as heavier dust particles will drop out close to source and will not be carried in sufficient quantities into such habitats. Furthermore, it is anticipated that finer peat dust which may carry further will be readily washed off plants during rainfall without causing significant deleterious effects. Hydrological influence on this habitat is dominated by River Shannon; localised
Vegetation structure: sward height	30-70% of sward between 10 and 80cm high	
Vegetation composition: typical species	At least 7 positive indicator species present, including 1 "high quality" species	
Vegetation composition: notable species	No decline, subject to natural processes	
Vegetation composition: negative indicator species	Negative indicator species collectively not more than 20% cover, with cover by an individual species less than 10%. Non-native invasive species, absent or under control	
Vegetation composition: negative indicator moss species	Bog mosses (Sphagnum spp.) not more than 10% cover; hair mosses (Polytrichum spp.) not more than 25% cover	

Attribute	Target	Assessment
		drainage associated with peat supply bogs is not expected to adversely effect the Molinia meadows component of the callows habitat distribution along the river.

Measures which mitigate against the potential adverse effects noted in **Table 8-2** above are presented in **Section 8.9**.

8.1.2 Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)

The Status of EU Protected Habitats and Species in Ireland (NPWS 2013), outlines the following summary of this habitat:

> *The Annex I habitat 6510 is represented in Ireland by mesotrophic semi-natural grasslands that are almost always managed as traditional hay meadows (cut only once a year in late summer or autumn with the hay crop removed). These meadows are synonymous with the fertile plains of the larger river systems such as the Shannon. However, they have been found on flatter ground amongst low hills, drumlins, and there are also some sites on the coast. The habitat is only rarely found in submontane (200-400 m) areas. Overall the Shannon Callows accounts for approximately 40% of the areas of 6510 within the State.The 6510 habitat is comprised of a few distinct meadow communities belonging to the Arrhenatherion. These communities can be classified within the Trifolium pratense - Plantago lanceolata (O'Neill et al. 2013), Lathyrus pratensis community (Heery 1991) and MG4/MG5 (Rodwell 1992).*

The range of this habitat in Ireland has been assessed as *Bad (Stable)* and the habitat area assessed as *Bad (Stable)*. The structures and function of the habitat as well as its future prospects have both been assessed as *Bad (Stable)*. The overall assessment of conservation status is *Bad (Stable).*

The pressures and threats (National level) relating to this habitat, as identified in NPWS (2013) are as follows:

- Grassland removal for arable land - high importance
- Abandonment / lack of mowing - high importance
- Fertilisation - high importance
- Species composition change (succession) - medium importance
- Problematic native species - low importance
- Dredging / removal of limnic sediments - low importance
- Agricultural intensification - high importance

Based on a review of the above threats and pressures, dust deposition on callows habitat within the SAC has the potential to lead to species composition change. Potentially polluting material discharged to the River Shannon during the construction or operational phases at WOP Station or ADF may be deposited on callows habitats during elevated water levels and result in species composition change.

Whilst only the generic Conservation Objectives are currently available for the River Shannon Callows SAC, targets and attributes for the conservation of this habitat are published for other SACs; these are typically coastal sites, but targets for this habitat type are commonly drawn from O'Neill et al. (2013). For the purposes of this assessment, attributes and related targets for this habitat are referenced from the Slyne Head Peninsula SAC. These are listed in **Table 8-3** below, together with an assessment of the potential impacts on each attribute.

Table 8-3: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Slyne Head Peninsula SAC)

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes	There will be no direct land take resulting from construction or operational activities at WOP Station or ADF in areas comprising Annex I habitat 6510. This is also the case for the respective peat supply bogs. Hydrological influence on habitat is dominated by River Shannon; localised drainage associated with peat supply bogs is not expected to affect the Lowland hay meadow component of the callows habitat distribution along the river. No potential for adverse effects on habitat area.
Habitat distribution	No decline, subject to natural processes	There will be no direct land take in areas comprising Annex I habitat 6510. Hydrological influence on this habitat is dominated by River Shannon; localised drainage associated with peat supply bogs is not expected to affect the Lowland hay meadow component of the callows habitat distribution along the river. No potential for adverse effects on habitat distribution.
Vegetation structure:	Broadleaf herb component of vegetation between 40 and 90%	Vegetation structure and composition for Annex 1 habitat 6510 has the capacity to be influenced by organic enrichment of

Attribute	Target	Assessment
broadleaf herb: grass ratio		underlying soils which may occur as a result of peat sediment entering the Shannon catchment and being deposited on areas of callows grassland distributed throughout its floodplain. The NPWS Site Synopsis notes that "*Intermittent and scattered damage to the habitats has occurred due to over-deepening of drains and peat silt deposition…However, none of these damaging activities can yet be said to be having a serious impact*." In the absence of mitigation measures relating to waterborne peat silt, adverse effects cannot be ruled out. Release of pollutants to surface water (e.g. fuel spills or elevated pH discharges) from WOP Station or ADF, either during the construction or operational phases, may effect vegetation composition as a consequence of being deposited in callows habitats during elevated water levels.Additionally, deposition of dust arising from peat harvesting activities has some potential to alter vegetation composition and structure. Broadleaf species may be more susceptible to inhibitive mechanisms such as reduction in light absorption and stomatal blocking, when compared to grasses. Localised succession pressure towards rank grassland may occur as a result. However, this effect is not anticipated to be a significant issue with regard to the Shannon callows as heavier dust particles will drop out close to source and will not be carried in sufficient quantities into such habitats. Furthermore, it is anticipated that finer peat dust which may carry further will be readily washed off plants during rainfall without causing significant deleterious effects. Hydrological influence on this habitat is dominated by River Shannon; localised drainage associated with peat supply bogs is not expected to affect the Lowland hay meadow component of the callows habitat distribution along the river.
Vegetation structure: sward height	At least 50% of sward between 10cm and 50cm tall	
Vegetation structure: litter	Litter cover not more than 25%	
Vegetation composition: typical species	At least 7 positive indicator species present, including 1 "high quality" species	
Vegetation composition: negative indicator species	Negative indicator species collectively not more than 20% cover, with cover by an individual species less than 10%.	
Vegetation composition: non-native species	Non-native invasive species, absent or under control	
Vegetation composition: woody species and bracken	Cover of woody species and bracken (*Pteridium aquilinum*) not more than 5%	

Attribute	Target	Assessment
Physical structure: bare soil	Not more than 5% bare soil	No potential for adverse effects on physical structure.
Physical structure: disturbance	Area showing signs of serious grazing or other disturbance less than 20m²	

Measures which mitigate against any potential adverse effects noted in **Table 8-3** above are presented in Section 8.9.

8.1.3 Otter (*Lutra lutra*)

The Status of EU Protected Habitats and Species in Ireland (NPWS 2013), outlines the following summary of this species:

> *Dramatic declines occurred in many European otter populations during the latter half of the 20th Century. As a result, otters became extinct in several countries. However, Ireland has remained a strong-hold for the species and the latest estimate puts the population at approximately 15-20,000 animals. Otters have two basic requirements: aquatic prey and safe refuges where they can rest. In Ireland, otter populations are found along clean rivers and lakes, where fish and other prey are abundant, and where the adjacent habitat offers plenty of cover. Otters maintain territories and will defend their stretches of river bank or lake shore from other otters. In lowland rivers and fish-rich lakes otters only need to maintain small territories, but on smaller rivers and in upland areas, where food tends to be less abundant, otter territories can stretch to 10 or 20 km. Along coasts otters require sources of freshwater to wash their coats and their territories will always include a stream or spring.*

The range of this species in Ireland has been assessed as *Favourable* and the population assessed as *Favourable*. The supporting habitat for this species as well as its future prospects have both been assessed as *Favourable*. The overall assessment of conservation status is *Favourable.*

The pressures and threats (National level) relating to this species, as identified in NPWS (2013) are as follows:

- Roads, motorways - medium importance
- Professional passive fishing - low importance
- Pollution to surface waters (limnic & terrestrial, marine & brackish) – low importance

Based on a review of the above threats and pressures, emissions to surface waters leading to pollution within or upstream of the River Shannon Callows SAC have the potential to affect otter populations.

Whilst only the generic Conservation Objectives are currently available for the River Shannon Callows SAC, targets and attributes for the conservation of this habitat are published for other SACs. For the purposes of this assessment, attributes and related targets for this habitat are referenced from the Lower River Shannon SAC. These are listed in **Table 8-4** below, together with an assessment of the potential impacts on each attribute.

Table 8-4: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Lower River Shannon SAC)

Attribute	Target	Assessment
Distribution	No significant decline	No land take outside the WOP station boundary is required as a result of construction or operational activities; no loss of terrestrial habitat (including potential couching sites or holts) will therefore occur. No physical alterations to any watercourses are required as a result of construction or operational activities; no loss of aquatic habitat will therefore occur. With regards to potential changes to distribution arising as a result of impacts upon available foraging resources, refer to 'Fish biomass available' row.
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9 ha along river banks / around ponds	
Extent of marine habitat	No significant decline. Area mapped and calculated as 4,461.6 ha	
Extent of freshwater (river) habitat	Length mapped and calculated as 500.1 km	
Extent of freshwater (lake/lagoon) habitat	No significant decline. Area mapped and calculated as 125.6ha	
Couching sites and holts	No significant decline	
Fish biomass available	No significant decline	The existing cooling water discharge from WOP is actively utilised by cyprinids; the ongoing operation of this discharge is likely to promote an improved localised foraging resource for otter. A potential pollution event arising during construction or operational activities has the potential to lead to a localised fish kill, thereby reducing the localised fish biomass available to otter. In the absence

Attribute	Target	Assessment
		of mitigation, this could have an effect on the local otter population. Aquatic discharges from the respective supply bogs in the Shannon catchment have the potential to reduce fish biomass as a result of siltation and chemical content (i.e. Ammonia). In the absence of mitigation, this could have an effect on the broader otter population in the catchment.
Barriers to connectivity	No significant increase	The proposed development will not lead to any barriers to foraging or commuting otters.

Measures which mitigate against the potential adverse effects noted in **Table 8-4**

Table 8-4 above are presented in Section 8.9.

8.2 Middle Shannon Callows SPA

The AA Screening for the proposed WOP transition to biomass identified potential pathways to impact upon the Middle Shannon Callows SPA. Potential impacts on the respective Qualifying Interests may arise as a result of:

- Excavation of peat leading to hydrological impacts on adjacent habitats within the Middle Shannon Callows SPA.
- Emissions to surface waters leading to impacts on water quality within or upstream of the Middle Shannon Callows SPA.
- Construction and operational activities causing noise have the potential to cause disturbance to Special Conservation Interest species of the Middle Shannon Callows SPA.

Table 8-5 highlights the Special Conservation Interest (SCI) species and supporting habitats occurring in the potential Zone of Influence for which the above impact pathways may result in adverse effects.

Table 8-5: SPA SCIs and Potential Impact Pathways

SCI	Assessment of Pathway for Effects
Whooper Swan **Wigeon** **Golden Plover** **Lapwing** **Black-tailed Godwit** **Black-headed Gull**	Potential impacts on these SCIs may arise in the form of discharges to the River Shannon resulting from construction or operational activities at WOP Station and ADF, as well as from discharges from peat supply bogs to the River Shannon and its broader catchment. Noise associated with construction and operational activities at the WOP Station site also have the potential to disturb these SCI species. The potential for adverse effects on these SCI species is considered further in this document.
Wetlands and Waterbirds	Potential impacts on this SCI may arise in the form of discharges to the River Shannon resulting from construction or operational activities at WOP Station and from discharges from peat supply bogs the River Shannon and its broader catchment. Potential habitat change arising from peat supply bog drainage may also occur. The potential for adverse effects on this SCI is considered further in this document.

To acknowledge the importance of Ireland's wetlands to wintering waterbirds, “Wetlands and Waterbirds” is included as a Special Conservation Interest for the Middle Shannon Callows SPA as it comprises a wetland site of significant importance to one or more of the species of Special Conservation Interest. Thus, a specific Conservation Objective is as follows:

“To maintain or restore the favourable conservation condition of the wetland habitat at Middle Shannon Callows SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.”

While no site-specific targets and attributes are published for the Middle Shannon Callows SPA, it is assumed that the following apply (based on the Conservation Objectives of other SPAs of importance to wintering bird flocks, such as the Wexford Harbour and Slobs SPA).

Table 8-6: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Wexford Harbour and Slobs SPA)

Attribute	Target	Assessment
Population trend (all SCI species)	Long term population trend stable or increasing	A potential pollution event arising during the construction or operational phases at WOP Station or ADF has the potential to lead to a localised drop off in aquatic

Attribute	Target	Assessment
Distribution (all SCI species)	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	vegetation and fish which form the dietary resource used by the respective SCI species. This has the potential to cause localised declines in populations. Aquatic discharges from the respective supply bogs in the Shannon catchment have the potential to reduce foraging resources for bird flocks as a result of increased turbidity leading to lower aquatic vegetation productivity. Similarly, fish biomass in the Shannon catchment may also be negatively affected by siltation and ammonia inputs; this may impact upon piscivorous species. In the absence of mitigation, this could have an effect on population numbers and distribution of SCI species in the catchment. With regard to construction and operational noise potentially affecting the local distributions of the respective SCI species, it is noted that there are no large areas of reedbed suitable for significant numbers of roosting birds in the proximity of WOP station, the closest being on the eastern bank of the river at Derryholmes, approximately 2.5 km downstream of the station. Wintering bird surveys undertaken by ESBI between November 2016 and January 2018 found that the closest aggregation of special conservation interest species was an occasional flock of whooper swans which gathered on Clonfert Bog, 1.5 km west of WOP station, foraging on recolonising vegetation on the peat harvesting fields. Birds were observed commuting into Clonfert from the north, presumably from roosting areas further north towards Clonmacnoise; small numbers of whooper swan and wigeon were occasionally observed resting on the river and wet grassland at the confluence of the Shannon and Suck rivers, upstream of the cooling water discharge. Additionally, the observed area of Whooper Swan foraging on Clonfert bog (1.5 km to the west) is comprehensively screened from the WOP

Attribute	Target	Assessment
		Station site by a mature strip of peripheral bog woodland. Construction activities within the WOP site boundary will not result in a significant noise or other sources of disturbance (e.g. percussive piling). Given the described absence of significant areas of roosting or foraging habitat on the River Shannon immediately around the WOP Station site (in the context of more extensive areas of such habitat at Leitra Callows (2 km southeast) and Clonmacnoise (7 km northeast) (as well as natural screening between the WOP Station site and a known Whooper Swan foraging location) no adverse effects to the distribution of the respective SCI species will occur as a result of the proposed development with reference to the baseline scenario. Activities associated with peat supply can generate noise via the operation of mobile machinery comprising harvesters, tractors and staff vehicles, as well as the operation of the narrow gauge railway network with associated small diesel locomotives and wagons. Golden plover and Lapwing may roost or rest on bare peat fields, while wintering flocks of Whooper swan may occur on harvesting areas where there are temporary areas of standing water found in association with recolonizing surface vegetation upon which the flocks forage. These species may be locally displaced by human activity and noise generated by machinery at the respective supply bogs.
Wetland habitat	The permanent area occupied by the wetland habitat should be stable other than that due to natural patterns of variation	Ongoing peat harvesting has the potential to lead to drying of peripheral remnant bog habitats as a result of localised drainage and the resultant localised fall in the water table in such areas. Drying out of such peripheral habitats has the potential to reduce the suitability and availability of such habitat to the SCI species, such as Golden Plover.

Attribute	Target	Assessment
		A GIS analysis of the intercepts between a 100 m buffer around the respective supply bogs and the boundaries of the Middle Shannon Callows SPA (refer to Section 6.2.1.1) indicated that such intercepts occur at a number of locations along the course of the River Shannon. These intercepts predominantly relate to callows grassland habitats which abut the IPC boundaries of a number of peat supply bogs along the River Shannon. Hydrological influence on habitat is dominated by River Shannon; localised drainage associated with peat supply bogs is not expected to affect the Lowland hay meadow component of the callows habitat distribution along the river. A review of aerial imagery of these intercepts indicate that only a very minor proportion relate to peripheral areas of remnant bog between the existing peat harvesting areas and the aforementioned callows habitats. The NPWS Natura 2000 data form notes that 5% of the SPA coverage relates to bog habitat. The aforementioned intercept areas form a non-significant proportion of this 5% bog area. Additionally, several areas are adjacent to peat harvesting fields recently or soon to be taken out of production and are in the process of (or will be) recolonising as cutaway bog habitats that may be utilised by bird flocks associated with the SPA such as golden plover and whooper swan. Consequently ongoing peat harvesting activities are not predicted to result in significant permanent loss of wetland habitat associated with the Middle Shannon Callows SPA.

Measures which mitigate against the potential adverse effects noted in **Table 8-6** above are presented in Section 8.9.

8.3 Suck River Callows SPA

The AA Screening for the proposed WOP transition to biomass identified potential pathways to impact upon the Suck River Callows SPA. Potential impacts on the respective Special Conservation Interests may arise as a result of:

- Excavation of peat leading to hydrological impacts on adjacent habitats within the Suck River Callows SPA.
- Emissions to surface waters leading to impacts on water quality within or upstream of the Suck River Callows SPA.

Table 8-7 highlights the Special Conservation Interest (SCI) species and supporting habitats occurring in the potential Zone of Influence for which the above impact pathways may result in adverse effects.

Table 8-7: SPA SCIs and Potential Impact Pathways

SCI	Assessment of Pathway for Effects
Whooper Swan **Wigeon** **Golden Plover** **Lapwing** **Greenland White-fronted Goose**	Potential impacts on these SCIs may arise from discharges from peat supply bogs to the River Suck and its broader catchment. The potential for adverse effects on these SCI species is considered further in this document. A pollution event occurring during the construction or operational phases at WOP Station or ADF is not expected to give rise to water quality impacts in the River Suck, due to an absence of hydrological connectivity; the main channel of the Shannon effectively forms a hydrological barrier between these locations and the River Suck. Any pollution-related impacts relating to bird species which may move between the Suck River Callows SPA and Middle Shannon Callows SPA are addressed in Section 8.2 above.
Wetlands and Waterbirds	Potential impacts on this SCI may arise in the form of discharges from peat supply bogs to the River Suck and its broader catchment. Potential habitat change arising from peat supply bog drainage may also occur. The potential for adverse effects on this SCI is considered further in this document.

To acknowledge the importance of Ireland's wetlands to wintering waterbirds, “Wetlands and Waterbirds” is included as an SCI for the Suck River Callows SPA as it comprises a wetland site of significant importance to one or more of the species of Special Conservation Interest. Thus, a specific Conservation Objective is as follows:

“To maintain or restore the favourable conservation condition of the wetland habitat at Suck River Callows SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.”

While no site-specific targets and attributes are published for the Middle Shannon Callows SPA, it is assumed that the following apply (based on the Conservation Objectives of other SPAs of importance to wintering bird flocks, such as the Wexford Harbour and Slobs SPA).

Table 8-8: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Wexford Harbour and Slobs SPA)

Attribute	Target	Assessment
Population trend (all SCI species)	Long term population trend stable or increasing	Aquatic discharges from the respective supply bogs in the Suck catchment have the potential to reduce foraging resources as a result of increased turbidity leading to lower aquatic vegetation productivity. In the absence of mitigation, this could have an adverse effect on population numbers and distribution of SCI species in the catchment.
Distribution (all SCI species)	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	
Wetland habitat	The permanent area occupied by the wetland habitat should be stable other than that due to natural patterns of variation	Ongoing peat harvesting has the potential to lead to drying of peripheral remnant bog habitats as a result of localised drainage and the resultant localised fall in the water table in such areas. Drying out of such peripheral habitats has the potential to reduce the suitability and availability of such habitat to the SCI species, such as Golden Plover. A GIS analysis of the intercepts between a 100 m buffer around the respective supply bogs and the boundaries of the Middle Shannon Callows SPA (refer to Section 6.2.1.1) indicated that such intercepts occur at a number of locations along the course of the River Shannon. These intercepts predominantly relate to callows grassland habitats which abut the IPC boundaries of a number of peat supply bogs along the River Shannon. Hydrological influence on habitat is dominated by River Shannon; localised drainage associated with peat supply bogs is not expected to affect the Lowland

Attribute	Target	Assessment
		hay meadow component of the callows habitat distribution along the river. A review of aerial imagery of these intercepts indicate that only a very minor proportion relate to peripheral areas of remnant bog between the existing peat harvesting areas and the aforementioned callows habitats. The NPWS Natura 2000 data form notes that 5% of the SPA coverage relates to bog habitat. The aforementioned intercept areas form a non-significant proportion of this 5% bog area. Additionally, several areas are adjacent to peat harvesting fields recently or soon to be taken out of production and are in the process of (or will be) recolonising as cutaway bog habitats that may be utilised by bird flocks associated with the SPA such as golden plover and whooper swan. Consequently ongoing peat harvesting activities are not predicted to result in significant permanent loss of wetland habitat associated with the Middle Shannon Callows SPA.

Measures which mitigate against the potential adverse effects noted in

Table 8-8 above are presented in Section 8.9.

8.4 Pilgrim's Road Esker SAC

The AA Screening for the proposed development (including continued operation) identified potential pathways to impact upon the Pilgrim's Road Esker SAC. Potential impacts on the respective Qualifying Interests may arise as a result of:

- Dust generated during peat harvesting at Bloomhill Bog may be deposited inside the River Pilgrim's Road Esker SAC.

Table 8-9 highlights the Qualifying Interests occurring in the potential Zone of Influence for which the above impact pathways may result in adverse effects.

Table 8-9: SAC QIs and Impact Pathways

SCI	Assessment of Pathway for Effects
Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	Potential impacts on the QI may arise in the form of atmospheric emissions (i.e. dust) associated with peat supply being deposited within the SAC. The potential for adverse effects on this habitat is considered further in this document.

8.4.1 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)

The Status of EU Protected Habitats and Species in Ireland (NPWS 2013), outlines the following summary of this habitat:

> *The Annex I habitat 6210 comprises species-rich plant communities found on shallow, well-drained calcareous substrates. It is considered a priority habitat only if it is an important orchid site. The Annex I habitat includes a mixture of grasses and herbs, with calcicole species typically frequent. It usually occurs on obvious geological features such as eskers, outcropping limestone rock and in association with limestone pavement. The Burren and Aran Islands (Clare/Galway) and Dartry Mountains (Sligo/Leitrim) are particularly important areas within the State for this Annex I habitat.*

The range of this habitat in Ireland has been assessed as *Favourable* and the habitat area assessed as *Bad (Stable)*. The structures and function of the habitat as well as its future prospects have both been assessed as *Bad (Stable)*. The overall assessment of conservation status is *Bad (Stable).*

The pressures and threats (National level) relating to this habitat, as identified in NPWS (2013) are as follows:

- Composition change (succession) - high importance
- Problematic native species - high importance
- Fertilisation - medium importance
- Intensive cattle grazing - medium importance
- Abandonment of pastoral systems, lack of grazing - medium importance
- Agricultural intensification - medium importance
- Walking, horseriding and non-motorised vehicles - low importance
- Garbage and solid waste - low importance
- Stock feeding - low importance

While no site-specific targets and attributes are published for the Pilgrim's Road Esker SAC, it is assumed that the following apply (based on the Conservation Objectives of a similar SAC, namely the Long Derries SAC).

Table 8-10: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Wexford Harbour and Slobs SPA) (based on Long Derries SAC)

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes	There will be no direct land take in areas comprising Annex I habitat 6210. Deposition of airborne dust on sensitive calcareous grasslands has the potential to facilitate succession of the habitat to rank grassland and/or scrub The eastern boundary of the SAC is within 150 m of the active harvesting area of Bloomhill Bog. Significant volumes of dust being carried into the esker grasslands are not envisaged due to prevailing winds from the south and west carrying dust away from the SAC and the fact that heavier dust particles are expected drop out close to source and will not be carried in significant quantities into such habitats. However, under certain climatic conditions, finer dust may be deposited within the SAC. Nevertheless, it is anticipated that the majority of finer peat dust which may carry further will be readily washed off plants during rainfall without causing significant deleterious effects. Broadleaf species may be more susceptible to inhibitive mechanisms such as reduction in light absorption and stomatal blocking, when compared to grasses. Deposition of dust arising from peat harvesting activities therefore has some potential to alter vegetation composition and structure, though the localised influences on such deposition discussed above should be noted.
Habitat distribution	No decline, subject to natural processes	
Vegetation structure: broadleaf herb: grass ratio	Broadleaf herb component of vegetation between 40 and 90%	
Vegetation structure: sward height	At least 30% of sward between 5cm and 40cm tall	
Vegetation structure: litter	Litter cover not more than 25%	
Vegetation composition: typical species	At least 7 positive indicator species present, including 2 "high quality" species	
Vegetation composition: negative indicator species	Negative indicator species collectively not more than 20% cover, with cover by an individual species less than 10%.	
Vegetation composition: non-native species	Cover of non-native species not more than 1%	
Vegetation composition: woody species and bracken	Cover of woody species and bracken (*Pteridium aquilinum*) not more than 5%	
Physical structure: bare soil	Not more than 10% bare soil	There is no potential for adverse effects on physical structure within the SAC.
Physical structure: disturbance	Area showing signs of serious grazing or other	

Attribute	Target	Assessment
	disturbance less than 20m²	

Measures relating to dust management are conditioned under the IPC licencing regime (as enforced by the EPA, and implemented in full by Bord na Móna) which mitigate against the potential adverse effects noted in **Table 8-10** above are presented in Section 8.9.

8.5 Fin Lough (Offaly) SAC

The AA Screening for the proposed WOP transition to biomass identified potential pathways to impact upon the Fin Lough (Offaly) SAC. Potential impacts on the respective Qualifying Interests may arise as a result of:

- Excavation of peat leading to hydrological impacts on adjacent habitats within the Fin Lough (Offaly) SAC.

Table 8-11 highlights the Qualifying Interests (QI) and supporting habitats occurring in the potential Zone of Influence for which the above impact pathways may result in adverse effects.

Table 8-11: SAC QIs and Potential Impact Pathways

QI	Assessment of Pathway for Effects
Alkaline fens	Hydrological changes within the fen habitats associated with drainage for peat supply from Blackwater Bog to the south may also impact upon this QI. The potential for adverse effects on this habitat is considered further in this document.
***Vertigo geyeri* (Geyer's Whorl Snail)**	Hydrological changes within the fen habitats associated with drainage for peat supply from Blackwater Bog to the south may also impact upon this QI as a consequence of stratified shifts in the very specific vegetation communities which support this species. The potential for adverse effects on this species is considered further in this document.

8.5.1 Alkaline fens

The Status of EU Protected Habitats and Species in Ireland (NPWS 2013), outlines the following summary of this habitat:

> *Alkaline fens are typically base-rich basin or flush fen systems with extensive areas of species-rich small sedge communities of the alliance Caricion davallianae. These fen systems are often a complex mosaic of habitats, with*

tall sedge beds, reedbeds, wet grasslands, springs and open-water often co-occurring at a given fen site. Alkaline fen habitat can occur beyond peat-forming fen systems, such as in dune slacks and wet grasslands. Based on aphytosociological description of small-sedge vegetation in Ireland, the associations Campylio-Caricetum dioicae, Schoenetum nigicantis and Juncetum subnodulosi correspond with 7230 Alkaline fens. The most extensive areas of alkaline fens in Ireland are thought to occur in lowland basins associated with limestone groundwater bodies with a karstic or poorly productive flow regime.

Alkaline fens within flushes in upland and lowland regions, along the fringes of calcareous lakes and within turloughs, dune slacks and machair are thought to be more limited in extent but more widespread.

The range of this habitat in Ireland has been assessed as *Favourable* and the habitat area assessed as *Inadequate*. The structures and function of the habitat has been assessed as *Bad (Trend unknown),* while the future prospects have been assessed as *Bad (Improving)*. The overall assessment of conservation status is *Bad (Trend unknown).*

The pressures and threats (National level) relating to this habitat, as identified in NPWS (2013) are as follows:

- Water abstractions from groundwater - high importance
- Reclamation of land from sea, estuary or marsh - high importance
- Diffuse groundwater pollution due to agricultural and forestry activities - high importance
- Abandonment of pastoral systems, lack of grazing - high importance
- Water abstractions from surface waters - medium importance
- Infilling of ditches, dykes, ponds, pools, marshes or pits - medium importance
- Invasive non-native species - medium importance
- Diffuse pollution to surface waters due to agricultural and forestry Activities
- - medium importance
- Peat extraction - medium importance
- Artificial planting on open ground (non-native trees) - medium importance
- Agricultural intensification - medium importance
- Restructuring agricultural land holding - low importance
- Roads, motorways - low importance
- Disposal of household / recreational facility waste - low importance

Based on a review of the above threats and pressures, localised hydrological change to fen habitats is considered to be a potential impact arising from peat harvesting activities.

Whilst only the generic Conservation Objectives are currently available for the Fin Lough (Offaly) SAC, targets and attributes for the conservation of this habitat are published for other SACs. For the purposes of this assessment, attributes and related targets for this habitat are referenced from the Galway Bay Complex SAC. These are

listed in **Table 8-12** below, together with an assessment of the potential impacts on each attribute.

Table 8-12: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Galway Bay Complex SAC)

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes	There will be no land take in areas comprising Annex I habitat 7230 and consequently no direct loss of habitat area or distribution.
Habitat distribution	No decline, subject to natural processes	
Hydrological regime	Appropriate natural hydrological regime necessary to support the natural structure and functioning of the habitat	The GIS-based proximity analysis carried out as part of the AA Screening indicated that the western boundary of Fin Lough (Offaly) SAC was within 100 m of the IPC licence boundary of Blackwater Bog. The NPWS site synopsis notes that Drainage works to facilitate peat milling activities adjoining the site have reduced the extent of open water in the site, and large areas of the former lake basin are now overgrown by reedswamp and scrub woodland. Historic peat milling activities along the western SAC boundary noted in the NPWS site synopsis have now ceased; based on data supplied by Bord na Móna, the active harvesting area currently in operation is now located 700 m southwest of the SAC. The intervening habitat comprises decommissioned cutaway and biodiversity area which is progressively recolonising with scrub. Consequently, it is envisaged that ongoing peat extraction within the active harvesting area of Blackwater Bog will not significantly further affect the existing hydrological regime in Fin Lough (Offaly) SAC. Bord na Móna have confirmed that there will be no northward expansion of the harvesting area towards Fin Lough. Additionally, piezometer pipes are currently being installed in the area between the harvesting area and Fin Lough to confirm the spatial extent of any hydrological effect north of the active

Attribute	Target	Assessment
		harvesting area. Monitoring at this location will run for approximately 18 months.
Peat formation	Active peat formation, where appropriate	Refer to hydrological regime assessment above.
Water quality: Nutrients	Appropriate water quality to support the natural structure and functioning of the habitat	Blackwater Bog does not discharge into the open water habitats of Fin Lough.
Vegetation Composition: **typical species**	Maintain vegetation cover of typical species including brown mosses and vascular plants	The hydrological regime required to support the existing vegetation composition will be unaffected, as outlined above.
Vegetation Composition: **Trees and Shrubs**	Cover of scattered native trees not more than 10%	No introduction of trees will result from ongoing peat extraction at Blackwater Bog.
Physical structure: **Percentage disturbed bare ground**	Cover of disturbed bare ground not more than 10%. Where tufa is present, disturbed bare ground not more than 1%	No physical disturbance inside the SAC boundary will result from ongoing peat extraction at Blackwater Bog.
Physical structure: **Percentage drainage**	Area showing signs of drainage as a result of drainage ditches or heavy trampling less than 10%	Historic peat milling activities along the western SAC boundary noted in the NPWS site synopsis have now ceased; based on data supplied by Bord na Móna, the active harvesting area currently in operation is now located 700 m southwest of the SAC. No new drainage will be established in the area between the active harvesting area and the SAC.

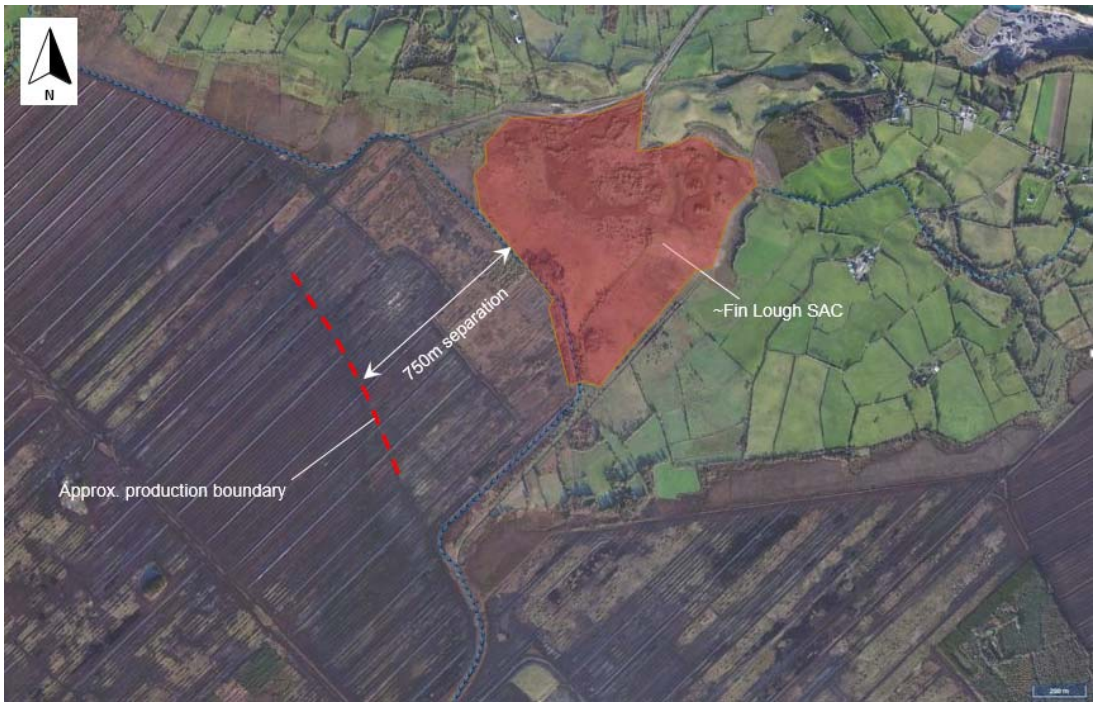

Figure 8.1: Separation of Fin Lough from active peat production area of Blackwater Bog

No additional mitigation is proposed in relation to Fin Lough SAC.

8.5.2 *Vertigo geyeri* (Geyer's Whorl Snail)

The Status of EU Protected Habitats and Species in Ireland (NPWS 2013), outlines the following summary of this species:

> *Vertigo geyeri is one of 8 species of whorl snail (genus Vertigo) living in Ireland. The whorl snails are amongst the smallest of the country's land molluscs with a size ranging from 1.7 to 2.7mm in height and 1 to 1.5mm in width. Illustrations, descriptions and photographs can be found in Kerney & Cameron (1979), Pokryszko (1990) and on the Conchological Society web site (Buckle, 2012).All whorl snails favour damp or wet habitats, where they live mostly in moss, leaves and decaying vegetation. They feed on bacterial films and decaying vegetation. Vertigo geyeri is consistent in where it lives, within the saturated and decaying roots of small sedges (particularly Carex viridula ssp. brachyrrhyncha), associated fen mosses (particularly Drepanocladus revolvens and Campyllium stellatum). It is stringent in its requirement of saturated water conditions in calcareous, ground water fed flushes. This microhabitat is generally found in mosaics of suitable patches that are often limited in size to a few metres square within wider fen macro-habitats, which in Ireland can themselves fall within wider site habitats as diverse as raised bog laggs, transition mires, lake shores, hill or mountain slopes, and wetlands associated with coastal dunes and machair (Moorkens*

& Killeen 2011). It requires an openness of habitat that prevents succession by shade loving plants and more competitive shade loving snails. There is a general requirement for stable conditions and Vertigo geyeri is particularly sensitive to changes in hydrology. Within its macro-habitat, V.geyeri needs constancy of hydrological conditions, but with enough variation to provide refugia for the meteorological extremes that the habitat must endure.

The range and population for this species in Ireland has been assessed as *Inadequate (Declining)* as per NPWS (2013). The habitat for the species has been assessed as *Inadequate (Stable)* and future prospects for the species have been assessed as *Inadequate (Declining)*. On the basis of the above, the overall assessment of conservation status is *Inadequate (Declining).*

The pressures and threats (National level) relating to this habitat, as identified in NPWS (2013) are as follows:

- Abandonment of pastoral systems, lack of grazing (high importance).
- Intensive grazing (medium importance).
- Water abstractions from groundwater (medium importance).
- Surface water abstractions for public water supply (low importance).
- Abandonment of pastoral systems, lack of grazing (high importance).
- Intensive grazing (medium importance).
- Water abstractions from groundwater (medium importance).
- Surface water abstractions for public water supply (low importance).
- Roads, motorways (low importance)

Based on a review of the above threats and pressures, localised hydrological change to habitats which support this species is considered to be a potential impact arising from peat harvesting activities.

Whilst only the generic Conservation Objectives are currently available for the Fin Lough (Offaly) SAC, targets and attributes for the conservation of this habitat are published for other SACs. For the purposes of this assessment, attributes and related targets for this habitat are referenced from the Ballyness Bay SAC. These are listed in **Table 8-13** below, together with an assessment of the potential impacts on each attribute.

Table 8-13: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Ballyness Bay SAC)

Attribute	Target	Assessment
Distribution: occupied sites	No decline	Areas within the complex of wetland habitats within Fin Lough with the capacity to support *Vertigo geyeri* are predominantly influenced by the hydrological regime present in these areas. Minor changes in water table have

Attribute	Target	Assessment
		the potential to move or reduce the area of suitable microhabitats for this species. Drainage associated with peat harvesting in close proximity to such areas may result in such hydrological changes. Historic peat milling activities along the western SAC boundary noted in the NPWS site synopsis have now ceased; based on data supplied by Bord na Móna, the active harvesting area currently in operation is now located 750 m southwest of the SAC. The intervening habitat comprises decommissioned cutaway and biodiversity area which is progressively recolonising with scrub. Consequently, it is envisaged that ongoing peat extraction within the active harvesting area of Blackwater Bog will not significantly affect the existing hydrological regime in Fin Lough (Offaly) SAC. Bord na Móna have confirmed that there will be no northward expansion of the harvesting area towards Fin Lough. As a result, no changes to the distribution of *Vertigo geyeri* within the Fin Lough site is expected. Additionally, piezometer pipes are currently being installed in the area between the harvesting area and Fin Lough to confirm the spatial extent of any hydrological effect north of the active harvesting area. Monitoring at this location will run for approximately 18 months.

No additional mitigation measures in relation to Fin Lough SAC are proposed.

8.6 River Boyne and River Blackwater SAC

The AA Screening for the proposed WOP transition to biomass identified potential pathways to impact upon the River Boyne and River Blackwater SAC. It is noted that the boundary of this SAC is functionally over 20 km downstream of the easternmost WOP supply bog (Derryhinch). However, the distribution of a number of the Qualifying Interest species of the SAC extend further inland into the various tributary rivers of the catchment, and therefore contribute to the overall integrity of the

respective populations. Potential impacts on the respective Qualifying Interests may arise as a result of:

- Emissions to surface waters leading to impacts on water quality in the surface water catchment of the River Boyne and River Blackwater SAC.

The generic conservation objective of this designated site is: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.

Table 8-14 highlights the Qualifying Interests occurring in the potential Zone of Influence for which the above impact pathways may result in adverse effects.

Table 8-14: SAC Qualifying Interests and Potential Impact Pathways

QI	Assessment of Pathway for Effects
Alkaline fens	The main areas of alkaline fen in this site are concentrated in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough. These are considerably spatially removed from the respective WOP supply bogs and consequently are considered to be unaffected by ongoing peat harvesting activities.
Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	The alluvial woodland component of the Boyne catchment is associated with the lower reaches of the River; consequently these areas are considered to be unaffected by ongoing peat harvesting activities.
River Lamprey	Potential impacts on these QIs may arise from discharges from peat supply bogs within the Boyne/Blackwater catchments. The potential for adverse effects on these species is considered further in this document.
Salmon	
Otter	

8.6.1 River lamprey (*Lampetra fluviatilis*)

Three indigenous species of lamprey occur in Ireland; the non-parasitic resident brook lamprey *Lampetra planeri*, and the parasitic anadromous river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus*.

Maitland (2003), notes: "*The river lamprey is intermediate in size between the large sea lamprey and the small brook lamprey. The average adult length is around 30 cm with a corresponding weight of about 60 g, but specimens over 40 cm can be found. It is a migratory species, which grows to maturity in estuaries… then moves into fresh water to spawn in clean rivers and streams. The larvae spend several years in silt beds before metamorphosing and migrating downstream to estuaries*."

The Natura Impact Statement for Edenderry Power Plant (Mott MacDonald 2016) outlines desk and baseline assessments undertaken by Ecofact Environmental Consultants for lamprey populations in the respective sub-catchments of the Boyne

system, specifically referencing those receiving outflows from Ticknevin, Ballybeg, Derryhinch, Drumman and Toar Bogs, all of which are also WOP supply bogs.

Of these sub-catchments, only the Yellow River was considered to be of importance due to an absence of suitable habitat or conditions in the other rivers (e.g. due to absence of gravels, calcification of substrate or small overall size of watercourse). The Yellow River receives surface water run-off from Ballybeg and Toar and Drumman bogs. The Edenderry Power Plant NIS notes that River Lamprey are poor swimmers and cannot jump or climb (Rousson et al, 2011), so have significant difficulty getting past the main stem weirs on the River Boyne. The existence of numerous weirs on the lower reaches of the River Boyne suggests that this species is likely to be confined to the lower reaches of the River Boyne. It is also noted that the lamprey recorded in the Yellow River (O'Connor 2006) were probably brook lamprey; these were deemed to be at an overall favourable conservation status level at this time. River lamprey are therefore not predicted to occur in significant numbers in the watercourses in closest proximity to the respective WOP supply bogs in the Boyne catchment.

The range and population for this species in Ireland has been assessed as *Favourable* as per NPWS (2013). The habitat for the species has been assessed as *Favourable* and future prospects for the species have been assessed as *Favourable.* On the basis of the above, the overall assessment of conservation status is *Favourable.*

The pressures and threats (National level) relating to this species, as identified in NPWS (2013) are as follows:

- Dredging/ removal of limnic sediments - high importance
- Siltation rate changes, dumping, depositing of dredged deposits - high importance
- Reduction in migration/ migration barriers - high importance
- Other point source pollution to surface water - high importance
- Invasive non-native species - medium importance
- Diffuse pollution to surface waters due to agricultural and forestry activities – medium importance

Based on a review of the above threats and pressures, siltation in receiving waterbodies which support this species is considered to be a potential impact arising from peat harvesting activities, as well as overall reductions in water quality.

Whilst only the generic Conservation Objectives are currently available for the River Boyne and Blackwater SAC, targets and attributes for the conservation of this habitat are published for other SACs. For the purposes of this assessment, attributes and related targets for this habitat are referenced from the Lower River Shannon SAC. These are listed in **Table 8-15** below, together with an assessment of the potential impacts on each attribute.

Table 8-15: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Lower River Shannon SAC)

Attribute	Target	Assessment
Distribution	Access to all water courses down to first order streams	While it considered that the majority of the River Lamprey population of the Boyne is associated with the lower part of the catchment, there remains some potential for surface water run-off from the WOP peat supply bogs to the Yellow River to result in adverse impacts on the defined attributes associated with River Lamprey within the River Boyne and River Blackwater SAC. This is primarily associated with potential siltation on spawning habitat, which has consequent effects on juvenile density and population structure. As a result, in the absence of mitigation, there is potential for surface water run-off from Ballybeg, Toar and Drumman bogs to have an effect on the conservation objectives of River Lamprey in the River Boyne and Blackwater SAC.
Population structure of juveniles	At least three age/size groups of river/brook lamprey present	
Juvenile density in fine sediment	Mean catchment juvenile density of river/brook lamprey at least 2/m²	
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	More than 50% of sample sites positive	

8.6.2 Salmon

The Status of EU Protected Habitats and Species in Ireland (NPWS 2013), outlines the following summary of this species:

> *The Atlantic Salmon is an anadramous species indigenous to the North Atlantic. In freshwater it is found in an arc from Northern Portugal in the east, to Connecticut River, New England, United States in the west. Salmon use rivers to reproduce and as nursery areas during their juvenile phase. Adults spend one to three years at sea where growth rates are much greater. Eggs are deposited during the winter in a depression, called a redd, excavated in river gravels. The eggs are then covered over with gravel. The eggs develop protected within the substrate and during spring hatch into alevins, at this stage the juvenile fish feed exclusively from their yolk sac, when this is depleted they begin to feed and become known as fry, the fry feed for the summer then over the autumn and gradualy develop characteristic vertical bars and become parr. Fry and parr feed primarily upon invertebrates. The Irish population generally comprises fish that spend two winters (small numbers spend one or three winters) in freshwater before going to sea, in spring, as smolts. The smoltification process involves physiological, morphological and behavioural changes which begin when the parr reach around 10-25 cm in length. The smolts migrate to sea mainly from April to June. At sea the salmon feed upon crustaceans such as amphipods and*

euphausiids, and fish such as capelin and sandeels as they migrate to feeding grounds in the North Atlantic; growth is rapid. The majority of Irish fish spend one winter at sea before returning to their natal rivers, mainly during the summer, as grilse. Smaller numbers spend two winters at sea, returning mainly in spring, hence "spring" salmon. Older salmon are uncommon. A small proportion of the adult population returns to the sea post-spawning (known at this spent stage as a kelt) and can return to spawn again.

The Natura Impact Statement for Edenderry Power Plant (Mott MacDonald 2016) outlines desk and baseline assessments undertaken by Ecofact Environmental Consultants for salmon populations in the respective sub-catchments of the Boyne system, specifically referencing those receiving outflows from Ticknevin, Ballybeg, Derryhinch, Drumman and Toar Bogs, all of which are also WOP supply bogs.

Of these sub-catchments, only the Yellow River was considered to be of importance to salmon due to an absence of suitable habitat or conditions in the other rivers (e.g. due to absence of spawning gravels, sluggish flows, calcification of substrate or small overall size of watercourse). The Yellow River receives surface water run-off from Ballybeg and Toar and Drumman bogs. The Edenderry Power Plan NIS notes that "*The Yellow River is likely to support Salmon as it has some areas considered suitable for salmonid spawning and has features that provide adequate cover for juvenile salmon*".

The range for this species in Ireland has been assessed as *Favourable* as per NPWS (2013). The population has been assessed as *Inadequate (Stable)*, while the habitat for the species has been assessed as *Favourable* and future prospects for the species have been assessed as *Favourable.* On the basis of the above, the overall assessment of conservation status is *Inadequate (Stable).*

The pressures and threats (National level) relating to this habitat, as identified in NPWS (2013) are as follows:

- Agricultural intensification - high importance
- Intensive sheep grazing - medium importance
- Fertilisation - medium importance
- Artificial planting on open ground (non-native trees) - medium importance
- Forest replanting (non native trees) - medium importance
- Use of fertilizers (forestry) - medium importance
- Peat extraction - low importance
- Disposal of household / recreational facility waste - high importance
- Disposal of industrial waste - medium importance
- Intensive fish farming, intensification - medium importance
- Poaching - high importance
- Pollution to surface waters by industrial plants - low importance
- Forestry activities - high importance
- Diffuse pollution to surface waters due to household sewage and waste waters - high importance
- Invasive non-native species - low importance

- Modification of hydrographic functioning, general - low importance
- Water abstractions from surface waters - medium importance
- Management of aquatic and bank vegetation for drainage purposes - low importance
- Predation - medium importance

Based on a review of the above threats and pressures, reduction in water quality and change to spawning habitat arising as a result of peat harvesting activities are considered to be potential impacts arising from peat harvesting activities. It is reiterated that the boundary of this SAC is functionally over 20 km downstream of the easternmost WOP supply bog (Derryhinch).

Whilst only the generic Conservation Objectives are currently available for the River Boyne and Blackwater SAC, targets and attributes for the conservation of this habitat are published for other SACs. For the purposes of this assessment, attributes and related targets for this habitat are referenced from the Lower River Shannon SAC. These are listed in **Table 8-16** below, together with an assessment of the potential impacts on each attribute.

Table 8-16: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Lower River Shannon SAC)

Attribute	Target	Assessment
Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary	Peat harvesting activities will not lead to any river channel barriers.
Adult spawning fish	Conservation Limit (CL) for each system consistently exceeded	The Yellow River is likely to support Salmon as it has some areas considered suitable for salmonid spawning and has features that provide adequate cover for juvenile salmon. There is some potential for surface water run-off from the WOP peat supply bogs to the Yellow River to result in adverse impacts on the following attributes associated with Salmon within the River Boyne and River Blackwater SAC. This is primarily associated with potential siltation on suitable spawning habitat, which has consequent effects on fry abundance density and population structure. As a result, in the absence of mitigation, there is potential for surface water run-off from Ballybeg, Toar and Drumman bogs
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	
Out-migrating smolt abundance	No significant decline	
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes	

Attribute	Target	Assessment
		to have an effect on the conservation objectives of Salmon in the River Boyne and Blackwater SAC.
Water quality	At least Q4 at all sites sampled by EPA	The first Q-rating site inside the SAC downstream of the peat supply bogs, Inchamore Bridge, achieved a Q-rating of Q4-5 in 2015, an improvement on its previous result of 4 in 2012. Drops in water quality results downstream of this location can be attributed to other point and diffuse pressures such as agriculture and wastewater discharges.

8.6.3 Otter

Section 8.1.3 presents the potential for impacts to otters arising from peat harvesting activities in the Shannon catchment. The same potential impacts can be considered applicable to the Boyne and Blackwater catchments. Mitigation measures relating to otter populations in the River Boyne and River Blackwater SAC are presented in Section 8.9.

8.7 River Barrow and River Nore SAC

The AA Screening for the proposed WOP transition to biomass identified potential pathways to impact upon the River Barrow and River Nore SAC.

Industrial peat production at Monettia Bog occurs within the central region of the bog. Peat harvesting activities at their closest point, are located 450m from the River Barrow and River Nore SAC. The harvesting area of Monettia Bog drains via two silt ponds on the north and east boundaries of the bog, to the Glashagh Water river; this flows into the River Barrow and River Nore SAC less than 1 km downstream of the silt pond outfalls. The Glashagh Water river is a tributary of the River Barrow.

Potential impacts on the respective Qualifying Interests may arise as a result of:

- Emissions to surface waters leading to impacts on water quality in the River Barrow and River Nore SAC.

The conservation objectives document for this SAC of this designated site presents specific targets and attributes for the respective Qualifying Interests. **Table 8-17** highlights the Qualifying Interests occurring in the potential Zone of Influence for which the above impact pathways may result in adverse effects.

Table 8-17: SAC Qualifying Interests and Potential Impact Pathways

QI	Assessment of Pathway for Effects
Estuaries **Mudflats and sandflats not covered by seawater at low tide** **Reefs** **Salicornia and other annuals colonising mud and sand** **Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)** **Mediterranean salt meadows (*Juncetalia maritimi*)**	It is considered that, due to the considerable hydrological separation distance between activities associated with the peat extraction at Monettia Bog, and tidal and estuary habitats in the lower reaches of the Barrow, these habitats are not likely to be impacted by peat extraction activities in light of the respective conservation objectives.
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] **Petrifying springs with tufa formation (*Cratoneurion*) [7220]**	Primary distribution of these habitats is associated with the River Nore catchment. Due to the hydrological separation between activities associated with peat extraction at Monettia Bog, these habitats are not likely to be impacted by peat extraction activities in light of the respective conservation objectives.
European dry heaths [4030] **Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]**	These QIs relate to terrestrial habitats and species with no impact pathways from peat extraction activities at Monettia Bog. These habitats and species are not likely to be impacted by peat extraction activities in light of the respective conservation objectives.
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	This QI occurs in association with habitats found along the floodplain of slow flowing stretches of river within the SAC. It does not occur in the upland parts of the Barrow catchment. This habitat is not likely to be impacted by peat extraction activities in light of the respective conservation objectives.
***Margaritifera durrovensis* (Nore Pearl Mussel) [1990]** ***Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029]**	Nore Pearl Mussel is associated with the Nore catchment and therefore there are no impact pathways from peat extraction activities at Monettia Bog. This species is not likely to be impacted by peat extraction activities in light of the conservation objectives.

Vertigo moulinsiana **(Desmoulin's Whorl Snail) [1016]** ***Petromyzon marinus*** **(Sea Lamprey) [1095]** **Alosa fallax fallax (Twaite Shad) [1103]** ***Trichomanes speciosum*** **(Killarney Fern) [1421]**	There is considerable hydrological separation distance between activities associated with the peat extraction at Monettia Bog, and the habitats associated with the lower Barrow catchment which support these species. These species are therefore not likely to be impacted by peat extraction activities in light of the respective conservation objectives.
Alluvial forests with *Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	The closest area of alluvial woodland (based on Perrin et al. 2008) is Rathcoffey wood on the northern edge of the Slieve Bloom mountains. This site is upstream of Monettia Bog. This habitat is not likely to be impacted by peat extraction activities in light of the respective conservation objectives.
Austropotamobius pallipes **(White-clawed Crayfish) [1092]** ***Lampetra planeri*** **(Brook Lamprey) [1096]** ***Lampetra fluviatilis*** **(River Lamprey) [1099]** ***Salmo salar*** **(Salmon) [1106]** ***Lutra lutra*** **(Otter) [1355]**	Potential impacts on these QIs may arise from the licensed discharge from Monettia Bog to the River Barrow; these impacts relate to potential reductions in water quality as a result of this discharge. The potential for adverse effects on these species is considered further in this document.

8.7.1 River/Brook Lamprey

A summary of lamprey ecology, conservation status and pressures is presented in Section 8.6.1. Based on this, siltation in receiving waterbodies which support this species is considered to be a potential impact arising from peat harvesting activities, as well as overall reductions in water quality.

The Conservation Objectives for the River Barrow and River Nore SAC aim to restore the favourable conservation condition of Brook Lamprey and River Lamprey in the site. This is defined by the list of attributes and targets presented in **Table 8-18** below, together with an assessment of the potential impacts on each attribute.

Table 8-18: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Lower River Shannon SAC)

Attribute	Target	Assessment
Distribution	Access to all water courses down to first order streams	King (2006) surveyed the Barrow catchment for juvenile lampreys; low numbers were recorded in the Barrow at Clarahill and Twomilebridge. Given the inland nature of the catchment here, it is assumed that these were Brook Lamprey, though juveniles cannot be definitely distinguished from River Lamprey in the field. It is therefore considered likely that, at minimum, Brook Lamprey are present in the River Barrow immediately downstream of the Monettia Bog silt pond discharge point. Release of peat sediment from the Monettia Bog has the potential to lead to silt deposition on spawning habitat, which has consequent effects on juvenile density and population structure. As a result, in the absence of mitigation, there is potential for surface water run-off from Monettia Bog to have an effect on the conservation objectives of River/Brook Lamprey in the River Boyne and Blackwater SAC.
Population structure of juveniles	At least three age/size groups of river/brook lamprey present	
Juvenile density in fine sediment	Mean catchment juvenile density of river/brook lamprey at least 2/m²	
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	More than 50% of sample sites positive	

8.7.2 Salmon

A summary of Salmon ecology, conservation status and pressures is presented in Section 8.6. Based on a review of this, reduction in water quality and change to spawning habitat arising as a result of peat harvesting activities are considered to be potential impacts arising from peat harvesting activities.

The Conservation Objectives for the River Barrow and River Nore SAC aim to restore the favourable conservation condition of Salmon in the site. This is defined by the list of attributes and targets presented in **Table 8-19** below, together with an assessment of the potential impacts on each attribute.

Table 8-19: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Lower River Shannon SAC)

Attribute	Target	Assessment
Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary	Peat harvesting activities will not lead to any river channel barriers.

Attribute	Target	Assessment
Adult spawning fish	Conservation Limit (CL) for each system consistently exceeded	Inland Fisheries Ireland electrofishing surveys undertaken in 2015 (IFI 2017) found that salmon were present at 57% of the sites surveyed on the main channel. The only site of importance in relation to juvenile salmon was the upper most site on the main channel at Rathcoffey Bridge, Clarahill, Co. Laois. This site recorded the highest density estimate of juvenile salmon fry (0+) throughout the entire Barrow Catchment survey in July 2015. This location is approximately 5 km upstream of Monettia Bog; consequently it is envisaged that the Barrow downstream of Monettia Bog is, at minimum, of importance to salmon migrating to spawning habitats further upstream. It is likely that suitable spawning habitats may also occur in the Barrow channel downstream of the Monettia Bog silt pond outfall. As a result, in the absence of mitigation, there is potential for surface water run-off from Monettia Bog to have an effect on the conservation objectives of Salmon in the River Barrow and River Nore SAC.
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	
Out-migrating smolt abundance	No significant decline	
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes	
Water quality	At least Q4 at all sites sampled by EPA	The first EPA Q-rating site downstream of the Monettia Bog discharge has been consistently Q4 (good) since 2006, prior to which it varied between Q3-4 to Q4. It is therefore not envisaged that the silt pond discharge is having any negative impact upon water quality.

8.7.3 Otter

Section 8.1.3 presents the potential for impacts to otters in the Shannon catchment. The same potential impacts can be considered applicable to the Barrow catchment. Positive otter records have been recorded at the Monettia Bog silt pond outlet (McCorry, 2011 – Biodiversity Ireland webmapper record); this is indicative of an absence of negative impacts on the local otter population close to Monettia Bog.

8.7.4 White-clawed crayfish

The Status of EU Protected Habitats and Species in Ireland (NPWS 2013), outlines the following summary of this species:

The crayfish occupies a wide range of habitat in Ireland from small headwater streams to some substantial lakes. It is considered there is sufficient habitat to support the long-term survival of the species. Declines in water quality or a significant reduction in the heterogeneity of habitat could impact the habitat resource for the species but there is perhaps a greater tolerance for apparently sub-optimal conditions than previously considered. However there are now policies in place to maintain and improve water quality in rivers and lakes and to mitigate the potential impact of drainage maintenance work which should benefit this species.

Habitat quality in particular the loss of heterogeneity along river systems and a reduction in water quality in some lakes caused the loss of some populations before the Directive came into force. However there has been recovery in range, habitat quality and population. If there is no change in the trend of improving water quality and no alteration in the area of habitat, the prospects for the species should be good.

White-clawed crayfish is present almost throughout the River Barrow and River Nore SAC; the Conservation Objectives document (NPWS 2011) maps the Barrow distribution extending from Rathcoffey, upstream of Monettia Bog, to almost the tidal limit of the Barrow at Graiguenamanagh.

The pressures and threats (National level) relating to this species, as identified in NPWS (2013) are as follows:

- Invasive non-native species - high importance
- Leisure fishing - low importance
- Dredging/ removal of limnic sediments - low importance
- Management of aquatic and bank vegetation for drainage purposes - low importance
- Introduction of disease (microbial pathogens) - high importance
- Pollution to surface waters (limnic & terrestrial, marine & brackish) - high importance

With reference to the above ‘Introduction of disease’ threat to crayfish populations, crayfish plague has recently been recorded in the River Barrow. This relates to the lower Barrow, from just upstream of Leighlinbridge to downstream of Graiguenamanagh.

Based on a review of the above threats and pressures, reduction in water quality and change to spawning habitat arising as a result of peat harvesting activities are considered to be potential impacts arising from peat harvesting activities.

The Conservation Objectives for the River Barrow and River Nore SAC aim to maintain the favourable conservation condition of Crayfish in the site. This is defined by the list of attributes and targets presented in **Table 8-20 below**, together with an assessment of the potential impacts on each attribute.

Table 8-20: Impact Assessment in relation to Attributes and Targets of Conservation Objectives (based on Lower River Shannon SAC)

Attribute	Target	Assessment
Distribution	No reduction from baseline.	Distribution and population structure is dependent on maintaining existing levels of recruitment in the population. Changes in habitat or water quality which may impact upon eggs or hatchlings have the potential to reduce local recruitment rates. It is likely that crayfish occur in the Barrow channel downstream of the Monettia Bog silt pond outfall. As a result, in the absence of mitigation, there is potential for surface water run-off from Monettia Bog to have an effect on the conservation objectives of crayfish in the River Barrow and River Nore SAC.
Population structure: recruitment	Juveniles and/or females with eggs in at least 50% of positive samples	
Negative indicator species	No alien crayfish species	There is no alien species introduction pathway associated with the peat harvesting activities at Monettia Bog.
Disease	No instances of disease	There is no crayfish disease introduction pathway associated with the peat harvesting activities at Monettia Bog.
Water quality	At least Q3-4 at all sites sampled by EPA	The first EPA Q-rating site downstream of the Monettia Bog discharge has been consistently Q4 (good) since 2006, prior to which it varied between Q3-4 to Q4. It is therefore not envisaged that the silt pond discharge is having any negative impact upon water quality.
Habitat quality: heterogeneity	No decline in heterogeneity or habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree-roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus such as leaf litter. These conditions must be available on the whole length of occupied habitat. Siltation in a watercourse has the potential to reduce this heterogeneity. As a result, in the absence of mitigation, there is potential for surface water run-off from Monettia Bog to have an effect on the

Attribute	Target	Assessment
		conservation objectives of crayfish in the River Barrow and River Nore SAC.

8.8 Other Plans and Projects

Article 6(3) of the Habitats Directive requires that: Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.

It is therefore required that the potential impacts of the continued use and operation of WOP Station (including associated peat supply activities) are considered in combination with any other relevant plans or projects.

The assessment of potential in-combination impacts is presented as part of the Screening for Appropriate Assessment (refer to Section 6.3). No in-combination impacts with other plans and projects were identified and no additional mitigation is therefore proposed as part of the Natura Impact Statement.

8.9 Mitigation

This section outlines measures which reduce the potential for adverse effects on European Sites from the construction activities at the WOP Station site to facilitate biomass storage, as well as its continued operation and the associated harvesting and supply of peat fuel to WOP Station.

8.9.1 WOP Station

8.9.1.1 Construction phase mitigation

Sections 8.1 and 8.2 have identified a number of potential adverse effects arising during the construction phase at WOP Station (in the absence of mitigation). These are presented in Table 8-21.

Table 8-21: Potential adverse effects for WOP Station construction phase

European Site	QI/SCI	Potential adverse effect
River Shannon Callows SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	Release of pollutants to surface water (e.g. fuel spills) during the construction phase at WOP Station, may adversely affect vegetation composition as a consequence of being deposited in callows habitats during elevated water levels.

European Site	QI/SCI	Potential adverse effect
	Otter	A potential pollution event arising at WOP Station during the construction phase has the potential to lead to a localised fish kill, thereby reducing the localised fish biomass available to otter.
Middle Shannon Callows SPA	Whooper Swan Wigeon Golden Plover Lapwing Black-tailed Godwit Black-headed Gull	A potential pollution event arising during the construction phase at WOP Station has the potential to lead to a localised drop off in aquatic vegetation and fish which form the dietary resource used by the respective SCI species. This has the potential to cause localised declines in populations.

Here follows a suite of mitigation measures which will be implemented during the construction phase at WOP Station:

Surface water mitigation - Adherence to established construction guidelines

To avoid the release of polluting materials to the River Shannon during the construction phase, all construction works will be completed in line with the recommendations of a number of key guidelines. These are well-established evidence-based protocols developed by, or in association with environmental stakeholders that effectively reduce the risk of pollution incidents to a negligible level and will be contained in the Construction and Environmental Management Plan (CEMP) for the proposed development.

- Guidelines on protection of fisheries during construction works in and adjacent to waters (Inland Fisheries Ireland, 2016);
- CIRIA C649 ‘Control of Water Pollution from Linear Construction Projects: Site Guide’ (Murnane et al. 2006);
- CIRIA C532 ‘Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors’ (CIRIA, 2001); and
- UK Environment Agency
    - 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..

The implementation of the above guidelines will effectively mitigate against impacts to the European Sites associated with the River Shannon; specific mitigation measures from the aforementioned Inland Fisheries Ireland guidelines are presented in **Table 8-22**, in the context of the respective objective and effect of each measure. Similar or duplicate measures in the

other referenced guidelines, while not presented below, have the same objectives and effects.

Table 8-22: Construction mitigation measures, based on IFI (2016).

Mitigation measure	Objective/effect of mitigation
When cast-in-place concrete is required, all work must be done in the dry and effectively isolated from any flowing water (or water that may enter streams and rivers) for a period sufficient to ensure no leachate from the concrete.	Risk of release of uncured concrete to surface waters is eliminated, thereby minimising risk of deleterious effects to aquatic ecology of European Sites.
No direct discharges be made to waters where there is potential for cement or residues in discharges.	Risk of release of concrete residues to surface waters is eliminated, thereby minimising risk of deleterious effects to aquatic ecology of European Sites.
Designated impermeable cement washout areas must be provided.	Risk of release of uncured concrete or concrete residues to surface waters is eliminated, thereby minimising risk of deleterious effects to aquatic ecology of European Sites.
The pH of any and all discharges made from and during constructions works shall be in the range 6.0 – 9.0 units and alter the pH of any receiving fisheries waters by more than +/- 0.5 pH units.	Risk of excessively high or low pH discharges surface waters is eliminated, thereby minimising risk of deleterious effects to aquatic ecology as a consequence of changes of pH in waterbodies associated with European Sites.
Silt traps/settlement ponds or other forms of containment shall be constructed at locations that will intercept run-off to streams. Traps shall not be constructed immediately adjacent to natural watercourses. A buffer zone should remain between the silt trap and the watercourse with natural vegetation left intact. Alternatively, imported materials such as terram, straw bales, coarse to fine gravel should be used either separately or in combination as appropriate to remove suspended matter from discharges.	Risk of release of high concentrations of sediment to surface waters is eliminated, thereby minimising risk of deleterious effects to aquatic ecology of European Sites.
The level of suspended solids in any discharges to fisheries waters as a consequence of construction works shall not exceed 25mg/l, nor result in the deposition of silts on gravels or any element of the aquatic flora or fauna.	Risk of release of high concentrations of sediment to surface waters is eliminated, thereby minimising risk of deleterious effects to aquatic ecology of European Sites.
All oils and fuels shall be stored in secure bunded areas and care and attention taken during refuelling and maintenance operations. Particular attention shall be paid to gradient and	Risk of release of hydrocarbons to surface waters is eliminated, thereby minimising risk of deleterious effects to aquatic ecology of European Sites.

Mitigation measure	Objective/effect of mitigation
ground conditions which could increase the risk of discharge to waters.	
Temporary oil interceptor facilities shall be installed and maintained where site works involve the discharge of drainage water to receiving rivers and streams.	Risk of release of hydrocarbons to surface waters is eliminated, thereby minimising risk of deleterious effects to aquatic ecology of European Sites.
There shall be no visible oil film in any discharges from construction works to waters.	Risk of release of hydrocarbons to surface waters is eliminated, thereby minimising risk of deleterious effects to aquatic ecology of European Sites.
That all containment and treatment facilities are regularly inspected and maintained.	Risk of release of any potentially polluting material to surface waters is eliminated, thereby minimising risk of deleterious effects to aquatic ecology of European Sites.
Waterproofing and other chemical treatment to structures in close proximity to waters shall be applied by hand.	Risk of release of any potentially polluting material to surface waters is eliminated, thereby minimising risk of deleterious effects to aquatic ecology of European Sites.

Surface water mitigation - Contractor actions and CEMP

In addition, to facilitate the above, the following measures will be implemented by the contractor during the construction phase and will also form part of the CEMP:

- Provision of measures to prevent the release of sediment to the Shannon River Lower river water body (WB1) and Blackwater (Shannonbridge water river body (WB2) during the construction works will include but not be limited to silt fences, silt curtains, settlement lagoons and filter materials;
- Temporary construction surface drainage and sediment control measures will be in place before 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 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.

Surface water mitigation - Water quality monitoring

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.

The IE Licence will require the licence holder (ESB) to undertake a monitoring regime to include the River Shannon, 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 is reported to the EPA to comply with the conditions of the licence.

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 25 mg/l prior to discharge to the onsite drainage system.

The onsite drainage system includes oil interceptors for both PS-SW7 and PS-SW6 (IE Licenced discharge points at WOP).

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.

The above mitigation measures will ensure that the identified potential adverse effects to the respective QI/SCIs during the construction phase at WOP Station (see **Table 8-21**) will be negated.

8.9.1.2 Operational phase

Sections 8.1 and 8.2 have identified a number of potential adverse effects arising during the construction phase at WOP Station (in the absence of mitigation). These are presented in **Table 8-23**.

Table 8-23: Potential adverse effects for WOP Station operational phase

European Site	QI/SCI	Potential adverse effect
River Shannon Callows SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	Release of pollutants to surface water (e.g. fuel spills) during the operational phase at WOP Station, may adversely affect vegetation composition as a consequence of being deposited in callows habitats during elevated water levels.
	Otter	A potential pollution event arising at WOP Station during the operational phase has the potential to lead to a localised fish kill, thereby reducing the localised fish biomass available to otter.
Middle Shannon Callows SPA	Whooper Swan Wigeon Golden Plover Lapwing Black-tailed Godwit Black-headed Gull	A potential pollution event arising during the operational phase at WOP Station has the potential to lead to a localised drop off in aquatic vegetation and fish which form the dietary resource used by the respective SCI species. This has the potential to cause localised declines in populations.

Here follows a suite of mitigation measures which will be implemented during the operational phase at WOP Station:

Surface water mitigation – IE Licence environmental control measures

A suite of environmental control measures (conditioned as part of IE Licence P0611-02) will continue to be implemented through the operational phase of the proposed development, as follows:

- 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;
- Monitoring is carried out on the River Shannon 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.

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.

Noise mitigation – IE Licence control measures

While it is noted in Section 8.2 that significant noise-related disturbance to SCI species is not predicted, noise-related mitigation measures will be implemented during the operational phase (as conditioned under IE Licence P0611-02). The primary source of noise during continued operation of the site will be from the mechanical shovels used to move biomass. These have been specified to be equipped with the white noise variety warning sirens with no tonal components to reduce potential noise from the site and achieve compliance with the station's noise emission limits. The operational phase of the proposed development will see an increase of trucks accessing WOP Station, but deliveries of biomass and peat will enter the site from the northeast, from access gates which are well screened from the River Shannon. Noise attenuation will also be provided by the concrete and block walls located around the biomass storage areas as part of the biomass storage design and there will be no change to the normal operational noise of the WOP Station from the main generating plant itself.

The above mitigation measures will ensure that the identified potential adverse effects to the respective QI/SCIs during the operational phase of WOP Station (see Table 8-23) will be negated.

8.9.2 WOP ADF

Sections 8.1 and 8.2 have identified a number of potential adverse effects arising during the concurrent construction/operational phases at WOP Station (in the absence of mitigation). These are presented in **Table 8-24**.

Table 8-24: Potential adverse effects for WOP construction/operational phase

European Site	QI/SCI	Potential adverse effect
River Shannon Callows SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	Release of pollutants to surface water (e.g. fuel spills) during the construction/operational phase at WOP ADF, may adversely affect vegetation composition as a consequence of being transmitted downstream via the Gowlan and Blackwater Rivers and subsequently being deposited in callows habitats during elevated water levels.
	Otter	A potential pollution event arising at WOP ADF during the construction/operational phase has the potential of being transmitted downstream via the Gowlan and Blackwater Rivers to the River Shannon and causing a localised fish kill therein; this may reduce the localised fish biomass available to otter.
Middle Shannon Callows SPA	Whooper Swan Wigeon Golden Plover Lapwing Black-tailed Godwit Black-headed Gull	A potential pollution event arising during the construction/operational phase at WOP ADF has the potential of being transmitted downstream via the Gowlan and Blackwater Rivers to the River Shannon and causing a localised decline in aquatic vegetation and fish biomass which form the dietary resource used by the respective SCI species. This has the potential to cause localised displacement of foraging birds.

Here follows a suite of mitigation measures which will be implemented during the construction/operational phase at WOP ADF:

Surface water mitigation - IE Licence environmental control measures

The ADF will continue to discharge as currently conditioned under IE Licence P0611-02 with the discharge thresholds as defined by the license.

A suite of environmental control measures (conditioned as part of IE Licence P0611-02) will continue to be implemented through the operational phase of the proposed development, as follows:

- 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 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.

A review of the compliance monitoring datasets from 2014 onwards indicates that the discharge arising from ADF-SW1 is fully compliant with the requirements of the IEL (ELVs of 6-9 for pH and 35 ppm for suspended solids (SS)). The discharge is mildly alkaline in nature (2017 weekly monitoring indicates a pH range of 7.3 to 8.4); this is

within the natural range expected for rivers in Ireland. SS values of the discharged leachate are typically in the order of 10% of the ELV. The most recent EPA biological sampling of the River Blackwater, 2.5 km downstream of the Gowlan River confluence (Blackwater Bridge - RS25B270200) indicates ongoing good ecological conditions (Q4). This is evidence of the effective nature of the existing environmental control measures at the ADF site which will continue to be implemented as part of the proposed development.

The above mitigation measures will ensure that the identified potential adverse effects to the respective QI/SCIs during the construction/operational phase at WOP ADF (see Table 8-24) will be negated.

8.9.3 WOP Supply Bogs

Sections 8.1 and 8.2 have identified a number of potential adverse effects arising as a result of peat harvesting at the respective WOP supply bogs (in the absence of mitigation). These are presented in **Table 8-25**.

Table 8-25: Summary of potential adverse effects arising from peat supply to WOP Station

European Site	QI/SCI	Potential adverse effect
River Shannon Callows SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	Vegetation structure and composition for Annex 1 habitats 6410 and 6510 has the capacity to be influenced by organic enrichment of underlying soils which may occur as a result of peat sediment entering the Shannon catchment and being deposited on areas of callows grassland distributed throughout its floodplain. In the absence of mitigation measures relating to waterborne peat silt, adverse effects cannot be ruled out.
	Otter	Aquatic discharges from the respective supply bogs in the Shannon catchment have the potential to reduce fish biomass as a result of siltation and chemical content (i.e. Ammonia). In the absence of mitigation, this could have an effect on the broader otter population in the catchment.
Middle Shannon Callows SPA	Whooper Swan Wigeon Golden Plover Lapwing Black-tailed Godwit Black-headed Gull	Aquatic discharges from the respective supply bogs in the Shannon catchment have the potential to reduce foraging resources for bird flocks as a result of increased turbidity leading to lower aquatic vegetation productivity. Similarly, fish biomass in the Shannon catchment may also be negatively affected by siltation and ammonia inputs; this may impact upon piscivorous species. In the absence of mitigation, this could have an

European Site	QI/SCI	Potential adverse effect
		effect on population numbers and distribution of SCI species in the catchment. Activities associated with peat supply can generate noise via the operation of mobile machinery comprising harvesters, tractors and staff vehicles, as well as the operation of the narrow gauge railway network with associated small diesel locomotives and wagons. Golden plover and Lapwing may roost or rest on bare peat fields, while wintering flocks of Whooper swan may occur on harvesting areas where there are temporary areas of standing water found in association with recolonizing surface vegetation upon which the flocks forage. These species may be locally displaced by human activity and noise generated by machinery at the respective supply bogs.
Suck River Callows SPA	Whooper Swan Wigeon Golden Plover Lapwing Greenland White-fronted Goose	Aquatic discharges from the respective supply bogs in the Suck catchment have the potential to reduce foraging resources as a result of increased turbidity leading to lower aquatic vegetation productivity. In the absence of mitigation, this could have an adverse effect on population numbers and distribution of SCI species in the catchment.
Pilgrim's Road Esker SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	Significant volumes of dust being carried into the esker grasslands are not envisaged due to prevailing winds from the south and west carrying dust away from the SAC and the fact that heavier dust particles are expected drop out close to source and will not be carried in significant quantities into such habitats. However, under certain climatic conditions, finer dust may be deposited within the SAC. Broadleaf species may be more susceptible to inhibitive mechanisms such as reduction in light absorption and stomatal blocking, when compared to grasses. Deposition of dust arising from peat harvesting activities therefore has some potential to alter vegetation composition and structure.
River Boyne and River Blackwater SAC	River Lamprey	There is potential for surface water run-off from the Ballybeg, Toar and Drumman bogs in the surface catchment of the Yellow River to result in adverse impacts on the following attributes associated with River Lamprey within the River Boyne and River Blackwater SAC. This is primarily associated with potential siltation on spawning habitat, which has consequent effects on juvenile density and population structure.

European Site	QI/SCI	Potential adverse effect
	Salmon	There is potential for surface water run-off from the Ballybeg, Toar and Drumman bogs in the surface catchment of the Yellow River to result in adverse impacts on the following attributes associated with Salmon within the River Boyne and River Blackwater SAC. This is primarily associated with potential siltation on suitable spawning habitat, which has consequent effects on fry abundance density and population structure.
	Otter	Aquatic discharges from the respective supply bogs in the Boyne and Blackwater catchments have the potential to reduce fish biomass as a result of siltation and chemical content (i.e. Ammonia). In the absence of mitigation, this could have an effect on the broader otter population in the catchment.
River Barrow and River Nore SAC	River/Brook Lamprey	It is considered likely that, at minimum, Brook Lamprey are present in the River Barrow immediately downstream of the Monettia Bog silt pond discharge point. Release of peat sediment from Monettia Bog has the potential to lead to silt deposition on spawning habitat, which has consequent effects on juvenile density and population structure.
	Salmon	It is envisaged that the Barrow downstream of Monettia Bog is, at minimum, of importance to salmon migrating to spawning habitats further upstream. It is likely that suitable spawning habitats may also occur in the Barrow channel downstream of the Monettia Bog silt pond outfall. As a result, in the absence of mitigation, there is potential for surface water run-off from Monettia Bog to have an effect on the conservation objectives of Salmon in the River Barrow and River Nore SAC.
	Otter	Aquatic discharges from the respective supply bogs in the Barrow catchment have the potential to reduce fish biomass as a result of siltation and chemical content (i.e. Ammonia). In the absence of mitigation, this could have an effect on the broader otter population in the catchment.
	White-clawed crayfish	Changes in habitat or water quality as a result of peat sediment release to the River Barrow may impact upon eggs or hatchlings; this has the potential to adversely affect local recruitment rates. Siltation in a watercourse also has the potential to reduce habitat heterogeneity which is required by the different life stages of crayfish.

Here follows a suite of mitigation measures which will be implemented during WOP Station peat supply activities:

Surface water mitigation – IPC License Measures

A series of standard measures aimed at protecting surface water quality currently implemented at the WOP supply bogs are required under the conditions of the respective IPC licenses as regulated by the EPA. These license conditions are reproduced in **Table 8-26**.

Table 8-26: Peat Supply Bog IPC License Conditions for Surface Water Quality

Measure	Mechanism by which water quality is protected
All drainage water from all boglands in the licensed area are discharged via an appropriately designed silt pond treatment arrangement	Silt ponds facilitate settlement of peat particles in suspension, prior to discharging of drainage water to surface water catchment. Silt content of discharge is significantly reduced.
Silt ponds serving operational bogs are cleaned at a minimum twice a year, once before ditching and once before harvesting, and more frequently as inspections may dictate. The outlet of the silt pond is blocked during cleaning operations to prevent release of sediment during cleaning.	Removal of settled peat silt which has accumulated in silt ponds ensures maximum efficiency of pond operation.
Drainage manholes are protected and maintained free of excessive peat	Combined implementation of these four measures ensure that localised high volumes of milled peat do not directly enter the drainage system (such as during periods of heavy rainfall).
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 is minimised by blocking the silt pond outlet while piping or ditching	Settled peat silt which is disturbed during cleaning of silt pond is not permitted to escape pond prior to re-settlement.
Outfalls are controlled to minimise silt discharge during cleaning operations	
Drains are ditched in dry weather	Loose peat on sides and base of drains will remain in-situ and will not be readily transported to silt ponds during dry weather.
While ditching, outfalls are blocked and ditch towards outfall	

Measure	Mechanism by which water quality is protected
Outlets from stockpile field drains are blocked during stockpile loading	Blocked drains provide additional settlement time for peat silt during stockpile loading, prior to discharge to settlement ponds.
Field drains adjacent to stockpiles are cleaned as soon as practicable after stockpile loading	Settled peat silt which is deposited in drains during stockpile loading is not permitted to escape to silt pond.
Adequate room is allowed for rail beds beside Peco stockpiles	Avoids disturbance of loose peat on Peco stockpiles .
All fields that have been milled are ridged at the end of the production season	Ridging of milled peat minimises run-off of peat particles to drains.
All fields liable to winter flooding are cleared of milled peat or re-compacted at the end of the production season	Minimises suspension and subsequent discharge of peat particles during periods of flooding.
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.	Removal of settled peat silt which has accumulated in silt ponds ensures maximum efficiency of pond operation.
All silt ponds serving operational bogs achieve the following minimum performance criteria (flood periods excepted): - Maximum flow velocity < 10 cms^{-1} - Silt design capacity of lagoons, minimum 50m3 per nett ha of bog serviced	Minimum criteria for silt pond capacity ensures maximum efficiency of pond operation in relation to scale of area of bog drained. Maximum flow velocity ensures optimum deposition of suspended peat particles prior to pond discharge.

Surface water mitigation – Silt ponds

Ongoing drainage of the respective WOP supply bogs is required to reduce peat moisture content prior to harvesting. The respective WOP supply bogs drain to the nearest surface waterbody. A network of managed silt ponds intercept the drainage prior to discharge, primarily to facilitate the removal of suspended solids.

This silt pond system is considered to reflect proven technologies and procedures for the mitigation of the effects of surface water run-off from peat bogs. The silt ponds are operated as requirements of the conditions of the respective supply bog grouping IPC Licences which are regulated by the EPA. The ELV for suspended solids under these licences is 35mg/l; this is consistently monitored for all silt ponds by Bord na Móna.

Bord na Móna have an on-going silt pond maintenance programme. These silt ponds are currently being surveyed in order to identify silt ponds that may require extensions and other improvements in capacity as a result of changes to drainage catchments or impending peat regulations. Changes to drainage catchments are due to the extent of resource extraction since the silt ponds

were originally developed as well as changes to internal outfalls and drainage regimes.

Surface water mitigation - River Basin Management Plan

The River Basin Management Plan (RBMP) for Ireland, published in 2018, identified peat extraction as causing a significant risk to ecological status objectives in 119 (8%) of the assessed waterbodies. Additionally, peat extraction is identified as a significant pressure in 16 (13%) high ecological status water bodies. The plan relates environmental impacts to suspended solids, ammonia and hydromorphological alterations (DHPLG, 2017). The RBMP notes that:

> *"Peat extraction has been identified as causing a significant risk to ecological status in 119 water bodies, which represents 8% of all water bodies that have been identified as At Risk […] Of these, 115 are rivers, 3 are lakes and 1 is groundwater. The environmental impacts generally relate to suspended solids, ammonia and hydromorphological alterations. There is evidence that high levels of ammonia are being released from peat-extraction activities during the draining process and, along with suspended solids, may be causing ecological impacts in receiving water bodies. The EPA plans to investigate the background concentrations of ammonia in peatlands to determine if they can be a contributory factor in elevated ammonia concentrations in water bodies."*

It should be noted in relation to the above, that high levels of naturally occurring ammonia are known to be released from pristine bogs, bogs where peat extraction has ceased and bog where peat extraction is currently active, though ammonia release from the former tends to be higher than the latter site types.

Section 7.4 of the RBMP also notes that of the 119 river water bodies that are *At Risk* because of activities taking place within peatlands, 46 (39%) of them are in areas that have peatlands owned by Bord na Móna, which has 87 peatlands in these areas. The remaining 73 water bodies are at risk from other activities, such as domestic turf extraction, unauthorised peat extraction, wind-farm construction, forestry or other commercial peat activities.

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

- *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 (≤ 30ha) under a new local authority licensing system incorporating EIA and AA, as necessary, and enforcement powers.

- *The DCHG, 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.*
- *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.*
- *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.*
- *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.*
- *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.*

Expected outcome of the RBMP

Bord Na Móna expects to rehabilitate 9,000 ha. of cutaway bogs (covering 25 peatlands) by 2021 and will look to implement best-available mitigation measures to further reduce water quality impacts caused by peat extraction while the phasing-out process is taking place; this is conditioned under Condition 10 of the relevant IPC Licence. Such measures are the subject of a research proposal for inclusion in the EPA's 2018 research call. The proposal involves evaluating mitigation strategies from improving water quality from drained peatlands.

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 are 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.

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.

As part of the above Bord na Móna, in conjunction with the EPA, are assessing measures to mitigate the generation and impact of ammonia from their cutaway peatlands. In addition Bord Na Móna commenced work in 2017 on preparing Environmental Impact Assessments on all of 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.

It is also noted that 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. This in turn will contribute to delivering upon the attributes and targets of the various Qualifying Interests/Special Conservation Interests of the respective European Sites identified in Sections 8.1 through 8.7.

As noted in the RBMP measures, Bord na Móna is implementing a programme of rehabilitation (drain blocking, rewetting, vegetation) plans in order to stabilise former peat production areas and enhance biodiversity. The rewetting of former peat production areas and the development of wetland habitats will inevitably reduce potential for loss of suspended solids to the drainage network and ultimately to the Shannon river system, Boyne river system and Barrow river system.

Dust control

The production of milled peat at Bloomhill Bog is a potential dust source that could have the effect, in the absence of mitigation, of causing adverse impacts on the qualifying features of the Pilgrim's Road Esker SAC through dust deposition.

The following mitigation measures relating to dust management are conditioned under the IPC licencing regime, as enforced by the EPA, and implemented in full by Bord na Móna. The mitigation measures prescribed are proven technologies and procedures for the control of dust and comprise;

- Production operations are suspended in windy weather;
- Where possible machinery uses grassed pathways;
- Headlands are kept clean and free of excessive loose peat;
- Stockpiles are sheeted where possible;
- Moving machinery is maintained at slow speeds when travelling along dusty headlands;
- When harvesting, the jib is maintained low to the stockpile;
- Shelter belts are planted around outloading facilities; and and

- Peat production activities cease in identified dust sensitive areas in adverse weather conditions.

Noise and human disturbance

The production of milled peat at bogs adjacent to the Middle Shannon Callows SPA and Suck River Callows SPA could have the effect, in the absence of mitigation, of causing adverse impacts on Golden plover, Lapwing and Whooper swan as a consequence of disturbance and displacement.

The following mitigation measures relating to such disturbance are conditioned under the IPC licencing regime, as enforced by the EPA, and implemented in full by Bord na Móna.

- Noise emissions during peat extraction are limited by the IPC licensing regimes for the respective bogs, namely;
    - Activities on-site shall not give rise to noise levels off site at any noise sensitive location which exceed the following sound pressure limits (Leq,30min) subject to Condition 3:
        - Daytime: 55 dB(A)
        - Night-time: 45 dB(A)
    - There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise sensitive location.
- Peat extraction typically only occurs during daylight hours, without any artificial lighting other than vehicular lights; and
- Minimal lighting at staff workshops.

The above mitigation measures will ensure that the identified potential adverse effects to the respective SCIs as a consequence of peat supply (Table 8-25) will be negated.

8.10 Residual Impacts

The mitigation measures described in Section 8.9 have been carefully considered to avoid, reduce or offset the possibility of adverse impacts on the integrity of European Sites in light of their conservation objectives. The mitigation measures are best practice and comprise proven technologies as appropriate.

Assuming implementation of the mitigation measures during the construction phase at WOP Station and the ongoing operation of measures during continued peat supply activities the proposed development will not, either alone or in combination with other projects and plans, adversely impact the integrity of any relevant European Site. This conclusion has been reached on the basis of complete, precise and definitive findings and on the basis of best scientific knowledge and no scientific doubt remains as to

the absence of the identified potential effects in circumstances where the mitigation measures will be implemented.

8.11 Conclusion of NIS

This NIS provides a complete, precise and scientifically robust assessment, in the light of the best scientific knowledge, of the possible adverse effects of the proposed development (including continued operation) on the integrity of any European Sites within the identified Zone of Influence.

The assessment has shown beyond reasonable scientific doubt that, based on the evaluation completed and following the implementation of mitigation measures, the proposed continued operation and transition to biomass of WOP Station including the ongoing harvesting and supply of peat fuel during the transition will not, either alone or in combination with any other projects or plans, adversely affect the integrity of any European Site.

This Natura Impact Statement contains information which the Competent Authority (An Bord Pleanala), may consider in carrying out its Appropriate Assessment, and making its own complete, precise and definitive findings and conclusions.

8.12 References

Bord na Móna (2016) Biodiversity Action Plan 2016-2021. Brosna Press, Ferbane.

Bord na Móna (2017) Allen Bog Group Draft Rehabilitation Plan - A document to detail the rehabilitation and aspects of decommissioning of the Bord na Móna Allen Bog Group in compliance with Condition 10 of IPC Licence Ref. No. P0503-01.

Bord na Móna (2017) Blackwater Bog Group Draft Rehabilitation Plan - A document to detail the rehabilitation and aspects of decommissioning of the Bord na Móna Allen Bog Group in compliance with Condition 10 of IPC Licence Ref. No. P0503-01.

Bord na Móna (2017) Boora Bog Group Draft Rehabilitation Plan - A document to detail the rehabilitation and aspects of decommissioning of the Bord na Móna Allen Bog Group in compliance with Condition 10 of IPC Licence Ref. No. P0503-01.

Bord na Móna (2017) Derrygreenagh Bog Group Draft Rehabilitation Plan - A document to detail the rehabilitation and aspects of decommissioning of the Bord na Móna Allen Bog Group in compliance with Condition 10 of IPC Licence Ref. No. P0503-01.

Buckle, P. (2012) Identifying British Vertigos. Conchological Society of Great Britain and Ireland.

DAFM (2017) Nitrates Explanatory Handbook for Good Agricultural Practice for the Protection of Waters Regulations 2018.

DEHLG (2010) Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of the Environment Heritage and Local Government.

DHCLG (2017) National Raised Bog Special Areas of Conservation (SACs) Management Plan 2017–2022.

DHCLG (2018) The River Basin Management Plan for Ireland 2018-2021. Department of Housing, Planning and Local Government.

EPA (2011) Inspector’s Report: Application for a Waste Water Discharge Authorisation from Offaly Re: County Council, for the agglomeration named Shannonbridge, Reg. No. A0171-01.

ESB/ASU (2018) West Offaly Power Thermal Discharge Synthesis Report. Jointly prepared by ESB International and Aquatic Services Unit, Cork.

European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.

Forchheimer, P. (1898) Grundwasserspiegel bei brunnenanlagen. Z. Osterreichhissheingenieur Architecten Ver, 44:629–635, 1898.

Forest Service (2000) Forest Biodiversity Guidelines. Department of Agriculture and Food.

Forest Service (2015) Forestry Programme 2014 – 2020. Submitted in accordance with European Union Guidelines on State aid for agriculture and forestry and in rural areas 2014 to 2020. Department of Agriculture, Food and the Marine.

Forest Service (2015) Forestry Standards and Procedures Manual. Department of Agriculture, Food and the Marine.

Inland Fisheries Ireland “Guidelines on protection of fisheries during construction works in and adjacent to waters” (IFI, 2016).

Heery S. (1991) The plant communities of the grazed and mown grasslands of the River Shannon callows. Proceedings of the Royal Irish Academy 91B: 919-217.

Kelly, F.L., Matson, R., Delanty, K., Connor, L., O’Briain, R., Gordon, P., Corcoran, W., McLoone, P., Connor, L., Coyne, J., Morrissey, E., Cierpal, D., Rocks, K., Buckley, S., Kelly, K., McWeeney, D. and Puttharee, D. (2017) Sampling Fish in Rivers 2016. National Research Survey Programme. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland

Kerney M.P., Cameron R.A.D. (1979) Field guide to the land snails of the British Isles and northwestern Europe. Collins Press London.

King, J.J. (2006) A survey of juvenile lamprey populations in the R. Barrow SAC. National Parks and Wildlife Service, Dept. of Environment, Heritage and Local Government.

Managing Natura 2000 Sites (European Commission, 2000). Assessment of plans and projects significantly affecting Natura 2000 sites. (European Commission, 2001).

Moorkens, E.A. & Killeen, I.J. (2011) Monitoring and Condition Assessment of Populations of Vertigo geyeri, Vertigo angustior and Vertigo moulinsiana in Ireland. Irish Wildlife Manuals, No. 55. National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht.

Mott MacDonald (2016) Revised Natura Impact Statement (NIS) Edenderry Power Plant. Report on behalf of Bord na Mona.

Mott MacDonald (2016) Revised Screening for Appropriate Assessment Edenderry Power Plant. Report on behalf of Bord na Mona.

Mott MacDonald (2016) Terrestrial Ecological Baseline Evaluation - Bord na Móna Peat Fuel Supply Bogs. Report on behalf of Bord na Mona.

NPWS (2008) The Status of EU Protected Habitats and Species in Ireland. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

NPWS (2011) Conservation Objectives: River Barrow and River Nore SAC 002162. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) Site Synopsis: Middle Shannon Callows SPA 004096. Department of Arts, Heritage and the Gaeltacht.

NPWS (2013) Site Synopsis: River Shannon Callows SAC 000216. Department of Arts, Heritage and the Gaeltacht.

NPWS (2013) The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) Site Synopsis: Pilgrim's Road Esker SAC 001776. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) Site Synopsis: River Boyne and River Blackwater SAC 002299. Generic Version 6.0. Department of Arts, Heritage and the Gaeltacht.

NPWS (2016) Site Synopsis: River Barrow and River Nore SAC 002162. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2018) Conservation objectives for Fin Lough (Offaly) SAC 000576. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) Conservation objectives for Middle Shannon Callows SPA 004096. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) Conservation objectives for River Boyne and River Blackwater SAC 002299. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) Conservation objectives for River Shannon Callows SAC 000216. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) Conservation objectives for River Suck Callows SPA 004097. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) Conservation Objectives: Pilgrim's Road Esker SAC 001776. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) Site Synopsis: Fin Lough (Offaly) SAC 000576. Department of Arts, Heritage and the Gaeltacht.

O'Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013) The Irish semi-natural grasslands survey 2007-2012. Irish Wildlife Manuals, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht

Perrin, P.M, Martin, J.R., Barron, S.J., O'Neill, F.H., McNutt, K.E. and Delaney, A. (2008) National Survey of Native Woodlands 2003-2008. Unpublished report submitted to National Parks and Wildlife Service, Dublin

Pokryszko, B. M. 1990. The Vertiginidae of Poland (Gastropoda: Pulmonata: Pupilloidea) - a systematic monograph. - Annales Zoologici 43 (8): 133-257. Warszawa.

Rodwell, J.S. (ed.) 1991. British Plant Communities. Volume 2. Mires and heath. Cambridge University Press.

Rodwell, J.S. (ed.) 1992. British Plant Communities. Volume 3. Grassland and montane communities. Cambridge University Press.