Appendix 5B

Peat & Spoil Management Plan

[THIS PAGE INTENTIONALLY LEFT BLANK]

Proposed Proposed Derrygreenagh Power Project, Co. Offaly

Peat & Spoil Management Plan

Bord na Móna Powergen Limited

Project number: 60699676

January 2024

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
Grisel Calcagno Graduate Environmental Consultant	POC	POC	POC

Revision History

Revision	Revision date	Details	Authorized	Name	Position
Rev 0	Final		POC		TD

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

Bord na Móna Powergen Limited

Prepared by:

AECOM Ireland Limited
4th Floor
Adelphi Plaza
Georges Street Upper
Dun Laoghaire
Co. Dublin A96 T927
Ireland

T: +353 1 696 6220
aecom.com

Table of Contents

Figures

Tables

1. Introduction

1.1 Background

AECOM Ireland Limited (hereafter referred to as 'AECOM') has been appointed on behalf of Bord na Móna Powergen Limited (hereafter referred to as the 'Applicant') to prepare a Peat & Soil Management Plan (PSMP) in relation to a planning application to An Bord Pleanála (ABP), for a Combined Cycle Gas Turbine (CCGT) unit and an Open Cycle Gas Turbine (OCGT) unit, and electricity grid connections including substations and associated buildings and infrastructure ('the Proposed Development') on land within the Derrygreenagh bog group in Counties Offaly, Westmeath and Meath (hereafter referred to as the 'Site'). Derrygreenagh bog group consists of the lands of Derryhinch Bog, Drumman Bog, Derryarkin Bog and Ballybeg Bog which have been designated for development of energy generation projects. These lands are termed as Bord na Móna Energy Park (c. 3,000 hectares (ha)) for communication purposes.

The Scottish Government published the guidance document *'Guidance on Developments on Peatland – Site Surveys'* in 2014, where peat is defined as:

> *"Peat is defined as the partially decomposed remains of plants and soil organisms which have accumulated at the surface of the soil profile. Peat accumulates where the rate of input of organic material from the surface exceeds the rate of decomposition and 'turn-over' of this new material. A peat layer does not include a mineral fraction (hence being differentiated from topsoil).*
>
> *Peat soil is an organic soil which contains more than 60 per cent of organic matter and exceeds 50 centimetres in thickness."*

Peat instability in this report is defined as a mass movement of a body of peat that would have a significant adverse impact on the surrounding environment. Peat instability excludes localised movement of peat that would occur below a floating access road, creep movement or localised erosion type events.

1.2 Objective

The role of the PSMP is to demonstrate that the management of peat excavated during construction phase of the Proposed Development has been considered and will be treated appropriately. Adherence to the PSMP should also reasonably minimise the potential for all such peat movements. The PSMP outlines the overall design approach that has been applied to the Proposed Development to minimise peatland disruption and aims to ensure that all opportunities to minimise peat disturbance and extraction during construction will be taken. The PSMP identifies appropriate and industry-proven methods for the reuse of excess peat without significant environmental or health and safety implications, to restore the effects of construction activities and reduce the release of carbon and minimise risk in terms of human health.

This PSMP also includes general recommendations for good construction practice which will be implemented during the construction phase of the Proposed Development and a contingency plan should peat instability/failure occur at the Site. The PSMP acts as a live document arising from information presented during the consenting process, planning conditions, and the content of which will be updated as work is carried out on-site via a full Contractor's PSMP, to be prepared prior to commencement of construction.

1.3 Guidance

The legislation and guidance regarding the management of peat includes:

- Department of Housing, Local Government and Heritage (2023), *'National Peatlands Strategy Mid-Term Review and Implementation Plan'*;
- EPA (2011), *'BOGLAND: Sustainable Management of Peatlands in Ireland'*;

- Scottish Environment Protection Agency (SEPA) (2010), '*Regulatory Position Statement – Developments on Peat*';
- SEPA (2017), *'Developments on Peat and Off-Site Uses of Waste Peat'*;
- Scottish Government (2014), *'Guidance on Developments on Peatland – Site Surveys'*;
- Scottish Natural Heritage (2011), *'Floating Roads on Peat'*; and
- Scottish Renewables and SEPA (2014), *'Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste'*.

Many of the publications listed above have been developed by the Scottish Government. The Scottish documents are considered to be best practice in Ireland and are therefore appropriate for use within this PSMP.

SEPA has provided a hierarchy of management approaches in which the effectiveness of the approach to peat management is optimised at development sites as summarised below (SEPA, 2010 & 2014):

1. Prevention: avoiding generating excess peat during construction (e.g., by avoiding peat areas or by using construction methods that do not require excavation, such as floating tracks);
2. Reuse: re-use peat produced on-site in habitat restoration of hardstanding or landscaping;
3. Recycling/recovery/treatment: modify peat produced on-site for use as fuel, or as a compost/soil conditioner, or dewater peat to improve its mechanical properties in support of reuse; and
4. Storage: temporarily store peat on-site (for example, during short periods in the construction phase) and then reuse.

This SPMP has been prepared in accordance with the principles set out by the aforementioned Scottish Renewables and SEPA (2014) Guidance document for Stage 1 and proposes that prevention and reuse are the most appropriate means of managing peat excavated during construction at this Site. This report details the methodologies required to assess all potential surplus materials and presents the expected volume of excavated materials and required reuse volumes for reinstatement and restoration purposes.

2. Peat Description

Organic material less than 0.5m depth is not defined as peat. This is in accordance with guidance from:

- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland states that '*Peat soil is an organic soil which contains more than 60 per cent of organic matter and exceeds 50 centimetres in thickness*'; and
- The James Hutton Institute define shallow peat as having '*a prescribed depth of organic matter of 50 – 100 cm*[1]'

Also, The Forestry Commission use 45 cm as the critical depth for peat to occur ('*Understanding the greenhouse gas (GHG) implications of forestry on peat soils in Scotland*', 2010[2]);

- Peat can therefore be classified as organic material over 0.5m in depth.

Peat can be separated into three main layers: acrotelm (the upper living layer), catotelm (the middle to lower layer) and occasionally amorphous (lower layer) peat:

- Acrotelm peat is the living layer of the peat including the peat turf or turve being a thin, floating vegetation mat layer. The acrotelm is found within the top layer of peat (often less than 0.5m) depending on the degree of decomposition and fibrous nature of the peat (H1 to H6 on the von post classification scale). The acrotelm is generally of high permeability, decreasing with depth. The water table fluctuates in this layer and conditions vary from aerobic to anaerobic. Material may be fibrous or pseudofibrous (plant remains recognisable), spongy, and when excavated strength is lost but retains integral structure and can stand unsupported when stockpiled >1m.
- Catotelm peat is the dead layer of peat found deeper than acrotelm peat which has some remnant plant structures. Material has high water content and is permanently below the water table (saturated) therefore organic matter decomposes anaerobically. Some plant structures may be recognisable but are highly humified losing most of their characteristics (approximately H6 to H9 on the von post classification scale) and strength. Water flow in the catotelm is slow unless peat structures such as sink holes or peat pipes are present.

The best management option to minimise potential surplus peat is to prevent its production. Therefore, the design of the project has aimed to minimise peat excavation where possible.

In relation to the SEPA guidance, the following has been applied to the design and construction of the proposed project:

1. Floating tracks are proposed along temporary construction access tracks to tower locations with suitable gradients.
2. Reuse of excavated material is proposed for landscaping and restoration of excavations such as at tower sites, along the underground cable route and at the power plant and substations.
3. Off-site recycling/recovery of excavated materials is not appropriate or required on this site; and
4. Temporary storage and reuse of excavated peat is proposed (to the east of the power plant area).

[1] https://www.hutton.ac.uk/learning/exploringscotland/soils/organicsoils
[2] https://www.forestresearch.gov.uk/publications/understanding-the-greenhouse-gas-ghg-implications-of-forestry-on-peat-soils-in-scotland/

3. Proposed Development Description

3.1 Components of the Proposed Development

The Proposed Development is situated in Derrygreenagh and adjacent townlands (Derryarkin, Derryiron, Ballybeg, Barrysbrook, Togher and Coole), Co. Offaly, Ireland (Irish Grid Reference N49525 38259). The components of the Proposed Development include the Thermal Power Plant, gas above ground installation (AGI), water abstraction and water treatment infrastructure, respective surface and process water discharge connection routes, and the Electricity Grid Connection. The latter will consist of a 220kV substation, pylon towers, overhead lines, undergrounding compound, underground cabling, associated cabling and connections to a new loop-in 400-220kV (herein '400kV substation site') substation site and compound. The location of the Proposed Development and overall surrounding environs are illustrated below in Figure 3-1.

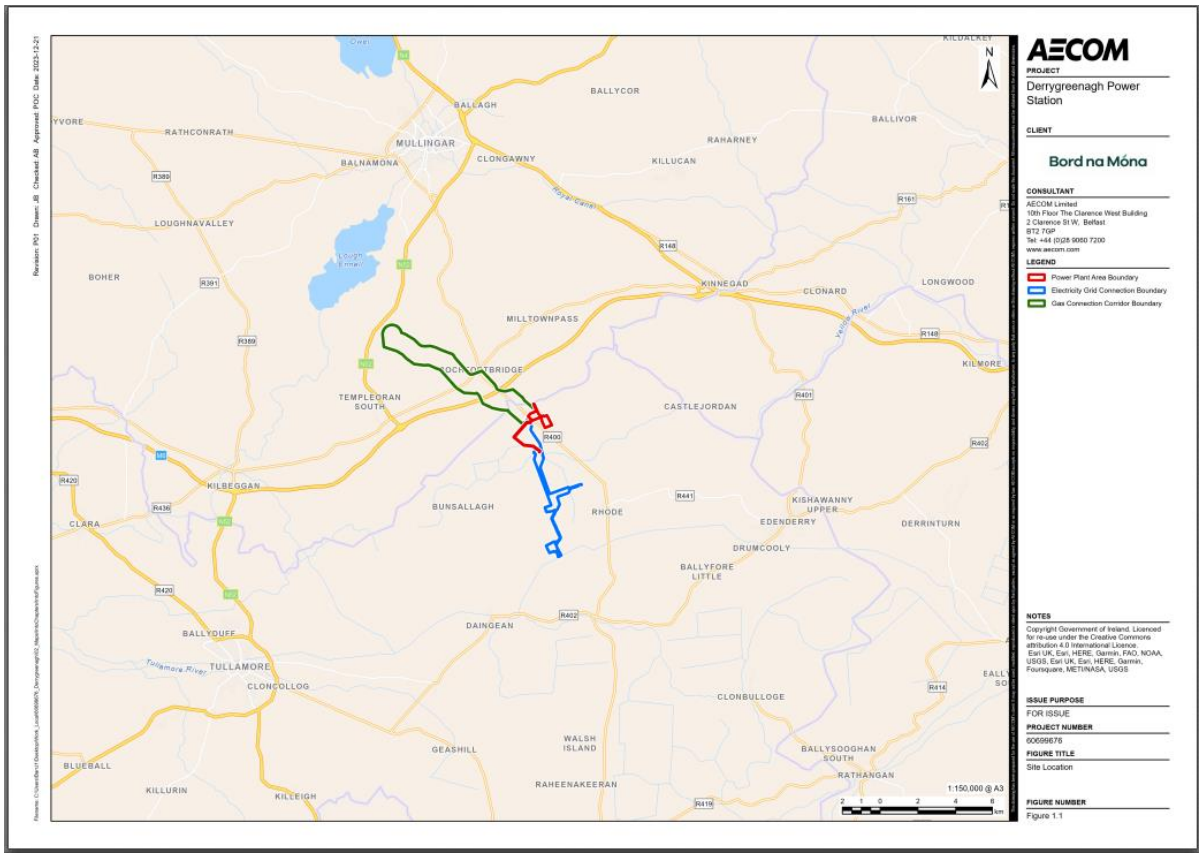

Figure 3-1. Proposed Development Location and Surrounding Environs

Temporary works to facilitate construction of the Proposed Development will include contractor compound for AGI, upgrade to public roads, upgrade to machine passes, peat deposition areas, pipe dumps, floating access tracks, bog mats and tower hard stands. Respective areas within and adjacent to the Site will be used for the contractor's compound, material storage and laydown, parking, and office areas during the construction phase.

For a detailed description of the components of the Proposed Development, refer to Chapter 5: Proposed Development of the EIAR prepared for this application.

3.2 Site Description

The Power Plant Area containing CCGT and OCGT units and supporting is located within Drumman bog on the existing Derrygreenagh Works site east of the R400 road. There are currently a number of buildings associated with Bord na Móna Derrygreenagh Works, such as workshops, stores, and offices; paved and concreted areas, outhouses, car-parking facilities, and machinery yards. The site also contains mature trees, hedges, and grassland; and a narrow railway, part of a network of railways connecting the site to the surrounding bog complex. The area was formerly used for servicing and

repairing peat harvesting and transport equipment, it is currently servicing equipment required for site management and environmental monitoring of post-peat extraction activities.

The existing operations at the Derrygreenagh Works site will be decommissioned prior to the construction of the power plant. The proposals for discharge pipelines from the power plant are for the treated process water to discharge to the Yellow River to the southwest of the Power Plant Area, and clean surface water to discharge to the Mongagh River northeast of the Power Plant Area; both are to have respective pipeline routing along existing railway lines and machine pass corridors.

The proposed Electricity Grid Connection 220kV substation is located west of the R400 road within a brownfield site in the wider Derryarkin bog complex with limited mature trees and grassland, and cutover bogs with varying degrees of vegetation, with the narrow railway crossing from west to east into the Power Plant Area via underpass below the R400 road. It is proposed that 220kV overhead lines from the 220kV substation will run for approximately 5 km via a series of double circuit pylon tower sets with three conductors hanging either side, through bogs associated with historic peatland harvesting in the area, crossing the haul road leading into Kilmurray S&G (active quarry) and the Yellow River (between Derryarkin Bog and Ballybeg Bog). The route design of the proposed overhead lines is angled at the passage from Derryarkin Bog to Ballybeg Bog, so as to comply with EirGrid's policy on wind turbine clearance to overhead lines in respect of consented wind turbine locations under development. The overhead lines traverse through Ballybeg Bog before linking into a proposed underground cabling connection at the south end of Ballybeg Bog. The underground connection follows the route of an existing peat railway for approximately 2.6 km south, including a crossing of Coolcor stream, crossing the L1010 Togher road via an existing underpass, until it links into the 400kV substation on agricultural land adjacent to the west side of the Bord na Móna Energy Park lands and south of the L1010 road.

4. Peat Conditions

4.1 Peat Conditions on Site

The site was assessed for peat vegetation in desktop review of maps and plans, previous SI data, site walkovers by ecologists and hydrologists in 2023; and in intrusive site investigation in 2023 which included:

- Drilling and trial pit excavation, including coring to bedrock, at the locations of the 18 proposed overhead powerline towers along the largely peatland northern section of the Electricity Grid Connection route,
- Trial pits along the along the southern underground section of the Electricity Grid Connection route
- Drilling and trial pitting at the 2x substations, the interface compound and power plant which are located on non-peatland areas.

The total area within the planning boundary of the Proposed Development is c. 312 hectares.

The Power Plant area is at an elevation between 82 and 87 metres OD (Ordnance Datum Malin Head) with the proposed 220kV Substation Site to the west of the R400 roadway at between 79 and 84 metres OD. The Electricity Grid Connection route ranges in altitude between just over 74 and 81 mOD, with the southern 400kV substation at an elevation of 81mOD.

The Power Plant site and Substation is an island of mineral soils surrounded by peatlands, whereas the Electricity Grid Connection route is characterised by drained cutover peatland with few areas of standing water.

The land cover for the Electricity Grid Connection route comprises of highly degraded, cutover peatland with some intact peat in the surrounding area. The majority of the natural vegetation has been removed resulting in extensive areas of bare peat. Harvesting is likely to have been halted very recently in some areas and recolonization by native species is taking place. This results in a mosaic of habitats representing various stages in ecological succession, including bare peat, scrub, immature woodland, and bog woodland. The climax habitat type along the Electricity Grid Connection route will likely be bog woodland (see Chapter 09 Biodiversity).

The peat is generally <1.0m thick, with the majority of the central portion of the Electricity Grid Connection route (between trial pits TPT 04 and TPT 15) reporting logged peat thicknesses of less than 0.5m, and therefore not strictly classified as ‘peat’, according to the guidance cited in Section 2 of this report. Thicker peat is logged at the northern and southern ends of the Electricity Grid Connection route (logged as over 2.0m thick in BHT 01, BHT 02, BHT 17, TPT 01, TPT 02, and TPT 17 which may represent areas of unharvested peat close to the edges of Derrygreenagh and Ballybeg Bogs.

The peat layer overlies silt-, sand- or gravel-dominated subsoils.

4.2 Data Collection Methodology

To obtain a detailed understanding of the spatial and depth distribution of peat and its properties, a series of tasks have been completed which include:

- Habitat mapping detailed within the Chapter 6 - Biodiversity.
- Drilling and trial pit excavation (see Appendix 15A) as follows:
  - At the power plant site,
  - At the 220kV and 400kV substations
  - At overhead cable pylon locations (x18),
  - Along the underground cable route and
  - At the proposed peat stockpile area;

- Measurement and description of peat layers.
- Collection of peat samples for laboratory analysis, including moisture content;
- Development of a peat depth map to indicate the maximum depth of peat at all investigated points across the proposed Electricity Grid Connection route development;
- Calculation of the maximum potential peat volumes that will be removed due to excavation for infrastructure based on the depth penetration probing results; and,
- Examination of areas where peat is re-used to allow calculation volumes.

A comparison of the peat depth with the site infrastructure footprint. These data indicate that peat (>0.5m depth) is present across <50% of the Electricity Grid Connection route.

Peat Characteristics

The peat encountered was generally less than 0.5m thick along the overhead section of the Electricity Grid Connection route but was up to 2.6m thick at the northern and southern ends of the overhead route (trial pits TPT 01, TPT 02, TPT 03, TPT 05, TPT 17, TPT18). The peats encountered along the Electricity Grid Connection overhead route were generally described as pseudo-fibrous brown/black peat and rootlets were commonly identifiable, up to 20mm thick in TPT07. The decomposition state of the peats along the overhead route was generally assessed as H4 to H6 on the Von Post scale.

The site investigations at the Interface Compound (trial pit TP CC 01) and along the proposed underground route, which follows an existing peatland access track way (trial pits TP C 01 to TP C 09), encountered peat up to 4+ m thick and largely assigned a grade of H4 to H6. In places, this peat was overlain by made ground up to 0.9 m thick associated with the existing access track.

At the Power Plant site, peat soils between 2.45 to 4.50m thick was reported along the northern and eastern edges of the proposed development (at trial pits TP201 to TP203 and at TP205 and at Boreholes BH102, BH104, BH109, BH116, BH117, BH118) and the composition was variable, with both highly decomposed amorphous peat (H8/H9) and lighter fibrous peat (H2/H3) containing tree stumps reported.

Across the central and southern portions of the Power Plant are (trial pits TP204 and TP206A to TP212) peat was only reported as a buried layer beneath existing Made Ground at TP204 (1.1 m thick, H2) and TP206A (0.35m thick, H6) in the north west of the proposed Power Plant area.

Elsewhere across the Power plant area, in the east of the 220kV Substation site (trial pits TP213 to TP215) and at the former waste disposal area, outside the southern boundary of the proposed Development (trial pits TP206 to TP220) no peat was encountered, consistent with the description of the Derrygreenagh Works being on an island of mineral soils within the surrounding peat land.

No clear basal layer of amorphous peat (H9/H10) was observed was observed in any trial pit. Tree roots were frequently encountered on the site at the peat-subsoil boundary. The peat characterisation studies concluded that the site comprises drained cut-over peatland across much of the route.

These values have been used in calculations of volumes of peat across the site where the peat contour map indicates that peat is present (e.g., >0.5m proven depth).

Habitat Conditions

Habitat mapping was undertaken by Project Ecologists and is detailed within Chapter 9 Biodiversity of the EIAR. Full details of the habitat survey carried out by Woodrow APEM are presented and discussed in Appendix 9B.

The majority of the Power Plant and 220kV substation areas are occupied by artificial surfaces (BL3), cutover peat (PB4a and PB4b) habitat, dry meadows and grassy verges (GS2), amenity grassland (GA2) and bog woodland (WN7).

The overhead Electricity Grid Connection route to the south crosses cut-over peatland with significant areas of re-vegetating peatland mapped as Scrub and Immature Woodland Mosaic (W) to the north of the Yellow River, and with areas of Bog Woodland (WN7), Scrub (WS1 Immature Woodland (WS2),

Mixed Broadleaf/Conifer Woodland (WD2) and Cutaway Bog (partly vegetated, PB4b) to the south of the Yellow River.

The underground cable route is bordered to the west by a mix of Improved Grassland (GA1), Hedgerow (WL1) and Buildings and Artificial Surfaces (BL3) and on the east by Improved Grassland (GA1), Cutaway Bog (mainly bare peat, PB4a) and an area of degraded Raised Bog (PB1 (7120) – a priority Annex 1 habitat)

The majority of peatland systems recorded in the Power Plant Area are highly degraded, where the natural vegetation has been removed resulting in extensive areas of bare peat. Harvesting is likely to have been halted very recently in some areas and recolonization by native species is taking place. This results in a mosaic of habitats representing various stages in ecological succession, including bare peat, scrub, immature woodland, and bog woodland. The climax habitat type here will likely be bog woodland.

The peat depth is but is deep (>80cm) in places, so the peat resource has not been exhausted. In places the peat surface is loose and milled, while in others it is more compact and drier. For the purposes of habitat mapping, a distinction was made between areas of cutover bog which are still mainly bare peat (PB4a) and cutover areas which are at least partly colonised by vegetation (PB4b).

4.3 Site Conditions

Chapter 13: Soils & Geology carried out an assessment of current Site conditions which has informed this PSMP. The PSMP should be read in conjunction with the EIAR as the information presented herein refers only to findings relevant to this report.

Establishment of the baseline environment involved reference to existing data sources, consultation with statutory bodies and other organisations, and fieldwork surveys. The following sources of information were reviewed:

- Geohive website for historical Ordnance Survey of Ireland (OSI) maps of 1:2,500 scale and 1:10,560 scale (1837 to 1913) and aerial photographs (1995, 2000, 2005, 2013 and 2018);
- Geological Survey Ireland (GSI) website for Public Viewer Geoheritage, Geotechnical, Geochemistry, Geohazards, Natural Resources (Minerals/Aggregates) and Groundwater mapping;
- EPA website for groundwater, industrial licencing and land use information;
- Environmental Sensitivity Mapping (ESM) website for soil and water data;
- Previous site investigation reports (Glover 2008, Bord na Mona 2009, Anua 2013);
- Local authority web portals;
- Previous environmental impact statements for the site (Mott McDonald 2008 EIAR and interpretive reports); and
- Information was also obtained from a geo-environmental site walkover undertaken by AECOM on 22 March 2022 and from ground investigation undertaken by IDL at the site during the period 13th April 2023 to 31st July 2023, comprising trial pits, cone penetrometer boreholes, cable percussion boreholes, rotary boreholes, well installations, geophysical surveys and infiltration tests.

The purpose of the ground investigations was to supplement previous site investigation findings at the power station site and obtain an overview of the ground and groundwater conditions present at the Power Plant Site and along the Electricity Grid Connection, including the presence or otherwise of soil and groundwater contamination.

5. Peat and Spoil Management Plan

5.1 Construction Activities Covered by the PSMP

The overall layout of the proposed project is shown in Figure 1-1 of the EIAR. This figure shows the proposed locations of the wind turbines and associated hardstanding areas, substation, meteorological mast, temporary construction compounds, peat deposition areas, borrow pits, internal access roads and the main site entrance.

The following activities will generate peat and spoil or are considered to have potential for possible peat stability problems during the construction phase of the Proposed Development:

- Excavation in peat for:
  - Power Plant Foundations;
  - Hardstanding foundations;
  - Interface Compound foundations;
  - Surface and process water discharge connection routes;
  - Construction compounds;
  - Underground cables;
  - Overhead powerlines foundations;
  - Peat Deposition Area(s)
  - All other infrastructure foundations;
- Construction of new temporary floating access tracks over peat;
- Upgrade of existing access tracks (excavate and replace tracks); and

5.2 Proposed Measures

In relation to the SEPA Guidance documents published in 2010 and 2014, the following has been applied to the design and construction of the Proposed Development:

- Floating tracks are proposed along access tracks with suitable gradients;
- Reuse of material is proposed for landscaping and restoration of borrow pits;
- Recycling/recovery is not appropriate on this Site; and
- Temporary storage and reuse are proposed (outside of borrow pits).

This methodology includes procedures that are to be included in the construction phase to minimise peat excavations. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations.

The Principal Contractor (hereafter referred to as the ‘Contractor’) will produce a detailed Method Statement identifying where and how excavated peat will be used in reinstatement or landscaping works. Specific requirements for the excavation, handling, storage, and reinstatement of peat will be outlined in this Method Statement. The Contractor will consider potential impacts on downstream receptors and the potential for instability issues with the excavated material.

Some of the requirements to be contained within this are outlined below. The majority of the Site comprises drained cut-over peatland and mineral soils. No founded roads are proposed for access to construction sites on peatland, such as the overhead cable pylon foundations and the Interface Compound, and only temporary floating roadways will be used, except in areas with shallow peat and highly trafficked areas (e.g., site entrances and access roads in and out of borrow pits). Works will be scheduled to minimise access requirements to areas of soft/wet ground during winter months.

Classification of excavated materials will depend on their identified reuse in reinstatement works. At this Site, it is anticipated that the material to be excavated will comprise peat, made ground (at Derrygreenagh Works) and mineral subsoils of variable composition.

A total of 5-7km of temporary access tracks for the overhead route are proposed at the Site, with the existing 2.4km of Bord na Mona track alongside which the underground cable route runs being upgraded to a 4m wide paved and gated service road.

Ground investigation in the form of trial pitting has been carried out at the power plant area, at the substations and along the entire Electricity Grid Connection Route consisting of trial pits and/or boreholes at suitable locations to inform the depth of excavation and upfill required.

Volume calculations provide an approximate estimation of fill required for all of the hardstanding foundations. It is calculated that 245,764m^3 of peat and spoil material will be generated as part of the Power plant and Electricity Grid Connection elements of the Proposed Development (as tabulated below). This material will be reused on-site or deposited at a thickness of up to 1m in the Peat Deposition Area or Soil Deposition Area.

Table 1: Power Plant Area - Peat/Soil Excavation (for onsite Deposition Areas)

DEVELOPMENT COMPONENT	AVERAGE PEAT/SPOIL DEPTH (m)	PEAT/SPOIL VOLUME (m^3) EXCAVATED	PEAT/SPOIL VOLUME (m3) FACTORED FOR BULKING (20%)
Power Plant Area - Main	2.0	132,000	158,400
Power Plant Area - AGI	1.0	39,354	47,225
Power Plant Area – Discharge Routes	1.0	8,000	9,600

Table 2: Electricity Grid Connection - Peat/Soil Excavation (for onsite Deposition Areas)

DEVELOPMENT COMPONENT	AVERAGE PEAT/SPOIL DEPTH (m)	PEAT/SPOIL VOLUME EXCAVATED (m^3)	PEAT/SPOIL VOLUME FACTORED FOR BULKING (m^3) (20%)
Electricity Grid Connection -220kV Substation	1.6	33,458	40,150
Electricity Grid Connection -Towers	3.5	5,954	7,144
Electricity Grid Connection - Line-cable Interface Compound	1.6	1,914	2,297
Electricity Grid Connection – Underground Cable Route	1.5	3,600	4,320
Electricity Grid Connection - 400kV Substation	0.5	21,484	25,780
Totals		**66,410**	**77,691**

Peat management of the above construction activities are covered individually in this report.

5.2.1 Excavation in Peat for Power Plant Foundations?

The volumes of granular fill (sand and stone) required for the construction of the Power Plant Area are based on the Power Plant Area element footprints, the anticipated excavation levels to suitable formation or suitable subgrade, and the proposed final levels for the infrastructure components. Construction grade granular fill and higher quality, final surfacing fill (including sand) will both be required for the construction of the Proposed Development.

Granular fill volumes have been estimated using the following methodology:

- The peat beneath the Power Plant Area site and all associated proposed hardstanding areas, including temporary construction compounds, will be excavated and replaced with construction grade granular fill up to the existing ground level.
- The hardstanding areas and roads will be constructed to the 100-year flood level. Roads will generally comprise approximately 650mm of granular fill and approximately 150mm of final surfacing layer (or capping). Geotextiles separators will be placed on the subgrade and geogrids will be installed within the road build-up.
- The peat and unsuitable soil excavated beneath the Power Plant Area footprint will be replaced with select granular fill. The final 250mm shall comprise capping material.

Table 3: Power Plant Area - Volume of Granular Fill Required

DEVELOPMENT COMPONENT	STONE FILL REQUIRED VOLUME (m^3)
Power Plant Area - Main	132,000
Power Plant Area - AGI	39,354
Power Plant Area - Discharge Routes	8,000

Temporary stilling ponds/settlement ponds will be used to attenuate runoff from works areas (i.e., hardstand areas, construction compounds, and the substations) of the site during the construction phase. The purpose of the temporary stilling ponds is to intercept runoff potentially laden with sediment and to reduce the amount of sediment leaving the disturbed area by reducing runoff velocity.

Constructed Peat Deposition Areas (PDAs) are required in the vicinity the Power Plant Area. Excavated Peat arising from the formation of the foundations will be placed in designed and dedicated deposition areas in close proximity on cut-over peat land to the east of the Power Plant Area (see Figure xxx). Peat will be deposited to a maximum depth of 1m across these areas. Once excavations at the Power Plant site are completed and following the commissioning of the project, the PDAs will be allowed to naturally re-vegetate.

5.2.2 Excavation in Peat for Substation Foundation

The peat and/or unsuitable soil beneath the substations, Line Interface compound and all associated hardstanding areas, including temporary construction compounds, will be excavated and replaced with construction grade granular fill up to the existing ground level.

The main 220kV and 400kV substations will be accessed directly off existing roads during construction and will not require roadways crossing soft ground, however access to the Line Interface Compound may require a short section of floating road due to the presence of peat along the access route from the existing Bord na Mona service track to the south).

The substation and interface compounds and associated hardstanding areas will be constructed to the 100-year flood level and greater than 1m above local road heights. Roadways will generally comprise approximately 650mm of granular fill and approximately 150mm of final surfacing layer (or capping). Geotextiles separators will be placed on the subgrade and geogrids will be installed within the road build-up.

The peat and unsuitable soil excavated beneath the substation and interface compounds footprints will be replaced with select granular fill of Clause 804 material in accordance with Eirgrid requirements. The final 250mm shall comprise capping material of site-won 6F2 material.

The internal site underground cable trenches will be approximately 1200mm in depth. The cable trench will be backfilled up to approximately 600mm with sand, within which the ducting will be placed. Suitable materials from the excavations of the trenches will be reinstated to form the final layer of the trench.

Table 4: Electricity Grid Connection – Substations - Volume of Granular Fill Required

DEVELOPMENT COMPONENT	STONE FILL REQUIRED VOLUME (m^3)
Electricity Grid Connection - 220kV Substation	33,458
Electricity Grid Connection - Line Cable Interface Compound	3,654
Electricity Grid Connection - 400kV Substation	43,928

All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. Buffer zones around the existing natural drainage features have been used to inform the layout of the Electricity Grid Connection.

Temporary stilling ponds/settlement ponds will be used to attenuate runoff from works areas (i.e., hardstand areas, construction compounds, and the substations) of the site during the construction phase. The purpose of the temporary stilling ponds is to intercept runoff potentially laden with sediment and to reduce the amount of sediment leaving the disturbed area by reducing runoff velocity.

Once all construction works are complete, the work areas will be finished with a 6F2 capping layer, which will provide the finished surface within the compound fence line.

A constructed soil deposition area is required in the vicinity of and to the west of the 400kV substation site. Excavated soil arising from the formation of the substation foundations will be placed in designed and dedicated deposition areas in close proximity. Soil will be deposited to a depth of up to 1m across these areas. Once construction works are completed and following the commissioning of the project, the soil deposition area will be allowed to naturally revegetate.

5.2.3 Excavation in Peat for Surface and Process Water Discharge Connection Routes

The planned process wastewater discharge pipe is to extend west of the R400 road and discharge to the Yellow River at approximately 3km southwest of the Power Plant Area (Easting 649758, Northing 736426) (Chapter 12).

Surface water run-off will be discharged northward to the Mongagh River in accordance with Sustainable Urban Drainage System (SUDs) guidance. The planned rain/surface water discharge, consisting of stormwater runoff from hardstanding areas within the power plant site, is be treated in an on-site stormwater system, incorporating oil interceptors, to enable the legislative limits to be achieved, prior to controlled discharge to the Mongagh River at approximately 700m north of the Power Plant Area (Easting 649504 Northing 738976) (Chapter 12). Surface water will be conveyed directly to the discharge point on the Mongagh River via a pipeline following a former bog railway line across cutover peatland, to eliminate the possibility of sediment entrainment.

Foul water will be treated in a proprietary secondary treatment system on the site and discharged via pipeline to the Yellow River (Chapter 12 Water of the EIAR Volume I) .

5.2.4 Excavation in Peat for Construction Compounds

For the Electricity Grid Connection substations (both the 220kV and the 400kV substations) the construction and laydown area will be 2 No. temporary construction compounds - north of the 220kV substation and north of the 400kV substations. In addition, there will be 2 No. satellite compounds along the OHL transmission route.

At the commencement of the relevant construction phase, a construction compound will be constructed to provide temporary office space, parking, stores, welfare facilities, concrete wash out areas, hardstand laydown areas for storing materials and hazardous materials, which are within the red-line boundary but outside the existing substation fence line. The hardstanding areas shall be constructed to the 100-year flood level average heights of 0.5m above existing ground level and greater than 1m above local road heights.

Volume calculations in the descriptions of the Power Plant and Substations excavations include an estimation of fill required for the temporary compound areas. It is likely that the fill material volume to surface the temporary construction compounds will be sourced on site and/or imported from locally approved quarries.

The construction of the substation foundation will require removal of peat and soil to a competent founding layer and upfilling with concrete or structural fill to the required finished floor level. Ground investigations at the substation location have been undertaken and have been used to inform the depth of excavation and upfill required. Peat/peaty soil is present on the northern and eastern sides of the Power Plant area at the proposed locations of Construction compounds. Peat is between 2.8 and 4.5m thick beneath the proposed northern construction compound and 0.3 to 2.6 m thick beneath the eastern proposed construction compound. TP 214 is the only site investigation location in the proposed construction compound to the north of the proposed 220kV substation and west of the Power Plant Area and reported a peat thickness of 1.0m.

During construction, peat will be excavated to the substrate to make room for concrete foundations, and for a small working area surrounding the foundation footprint. Once excavated, peat will be reused to batter the edges of platforms grading the bases into the local topography.

5.2.5 Excavation in Peat for Underground Cables

It is EirGrid policy that for environmental and engineering reasons the routing of underground cables through peatland shall be avoided if at all possible.

To a large extent, underground cable routes will utilise existing railway line and machine pass infrastructure and was chosen with cognisance of nearest sensitive receptors and crossing utilities. It is proposed to excavate the trenches for the underground cable at a uniform level in peat or overburden material. The trenches will typically be 1.2m wide and 1.2m deep. These existing access tracks will be upgraded to form 5m wide paved roads to permit heavy vehicle access to the cable joint chambers on the underground cable route and to the interface compound.

This methodology includes procedures that are to be included during the construction phase to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations.

With respect to placement of arisings from excavation, the guidelines below are to be followed.

- All excavations within peat are to be adequately supported or peat slopes are to be battered to a safe slope inclination typically of 1 (v): 2 or 3 (h). This slope inclination will be reviewed during construction, as appropriate;
- Where areas of weaker peat are encountered then slacker slopes will be required;
- Excavations shall always be kept reasonably free from water; and
- Backfill requirements for the cable trench will be decided as part of the detailed design/construction.

All cable laying works will be carried out as per ESBN requirements, but it is assumed that initially the Contractor will excavate cable trenches and then lay high density polyethylene (HDPE) ducting in the trench in a surround of CBM (cement bound material). A rope will be inserted into the ducts to facilitate cable-pulling later. The as-constructed detail of the cable duct locations will be carefully recorded. Cable marker strips will be placed 75mm above the ducts with two communication ducts also laid.

An additional layer of cable marker strips will be laid above the communication ducts and the trench backfilled. Back-filling and reinstatement in public roads will be to a specification to be agreed with the road authority.

Table 5: Electricity Grid Connection – Underground Cable Route - Volume of Granular Fill Required

DEVELOPMENT COMPONENT	STONE FILL REQUIRED VOLUME (m^3)
Electricity Grid Connection - Underground Cable Route	3,600

A similar construction methodology will apply for cable trenches laid within the Site access tracks. In this case the cable-ducts will generally be laid after the track has been constructed and will be within the Site access tracks. The trenches within these locations will generally be backfilled using the excavated material.

5.2.6 Excavation in Peat for Overhead Powerlines Foundations

Temporary access tracks (required due to ground conditions and/or landowner requirements) to the pylon locations will consist of timber or aluminium bog mats or crushed rock on a geotextile fabric along the 5km overhead cable route to spread the weight of machinery over a greater area to prevent damage to the ground. If necessary, a low ground pressure excavator may also be utilised to spread weight across a wider area thereby reducing the pressure exerted on the ground.

To provide internal access to the Electricity Grid Connection overhead powerline route to facilitate the delivery of construction materials and construction staff, a number of short, internal floating access roads will also need to be constructed to connect the OHL route to the existing network of internal and local roads. These internal access roads will be required at:

- the north end of the OHL at Derrygreenagh Hill (access via 220kV entrance west of R400 road)
- south end of the OHL in Derryarkin (access via an existing Bord na Mona haul route)
- at the north of Ballybeg (access via existing Bord na Mona haul route) and
- south on Ballybeg (access north from the L1010 road).

There will be a requirement to upgrade existing internal access roads (machine passes) for development of floating road access to the OHL satellite compounds.

Access routes will be carefully selected to avoid any damage to land. Local consultation will be carried out with the relevant landowners to ensure that any potential disturbance will be minimised. Prior to the commencement of construction, the contractor will assess all access routes and determine the requirement for bog mats. Any such requirements will be incorporated into the relevant method statement.

For each leg of the 21 No. masts (84 legs in total) a foundation circa. 4.5m x 4.5m x 3.5m deep is required. To allow for safe construction where ground conditions are good, the excavation will be stepped back, which requires additional area to be excavated. In the cut away bog where conditions are poor (i.e., poor ground and/or high water table) it may be necessary to use sheet piles supported by hydraulic frame(s) to prevent collapse of the sides and also to prevent the excavation becoming too large.

The excavated material will be temporarily stored close to the excavation and excess peat or soil material will be used as berms along the site access roads.

To aid construction, a concrete pipe is placed into each excavation to allow operatives level the pylon at the bottom of the excavation. If sheet piles are used, the requirement for a concrete pipe (which is normally used in tower foundations) is removed.

A setting template is used to set and hold the pylon stubs in position while the foundation concrete is being poured direct from a concrete tuck and cured. Any water in the foundation excavation is pumped out prior to any concrete being poured. During such dewatering activities for pylon leg foundations, a standard water filtration system will be utilised to control the amount of sediment in surface water runoff.

Once the concrete has set the excavated area around the pylon foundations will be backfilled one leg at a time with the material previously excavated at the location. This backfill will be placed and

compacted in layers, with an earth mat, consisting of copper wire, laid circa 600mm below ground around the mast.

Table 6: Electricity Grid Connection – Overhead Powerlines Foundations - Volume of Granular Fill Required

DEVELOPMENT COMPONENT	STONE FILL REQUIRED VOLUME (m^3)
Electricity Grid Connection - OHL tower foundations	5,954

All surplus excavated material will be removed from the mast locations and stored in berms for reuse across the construction site.

Construction of the mast body will require a hardstand area for the crane will be created at each pylon location by laying geogrid material on the ground surface and overlaying this geogrid with a suitable grade of aggregate. The base and body section of each pylon will be constructed lying flat on the ground beside the recently installed pylon base. The pylon section will be lifted into place using the crane and guide ropes. The body sections will be bolted into position.

Upon completion of the works, all hardstand areas and roadway mats will be removed.

All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. Buffer zones around the existing natural drainage features have been used to inform the layout of the Electricity Grid Connection.

Temporary stilling ponds/settlement ponds will be used to attenuate runoff from works areas (i.e., hardstand areas, construction compounds, and at the substations) of the site during the construction phase. The purpose of the temporary stilling ponds is to intercept runoff potentially laden with sediment and to reduce the amount of sediment leaving the disturbed area by reducing runoff velocity.

Once all construction works are complete, the work areas will be reinstated with excavated peat or soil as appropriate and either seeded out with native species, allowed to vegetate naturally or reinstated with excavated grass turves and will be restored to their original condition.

5.2.7 Excavation in Peat for Borrow Pits

It not proposed to open borrow pits for the construction of the Proposed Development.

5.2.8 Construction of Temporary Floating Access Tracks Over Peat

Access tracks will be needed to accommodate the construction works and provide access to 18 Overhead cable pylons and the Interface Compound during the Construction Phase of the Proposed Development. Approximately 10km of temporary access tracks are to be constructed which will provide access to necessary locations along the Electricity Grid Connection route.

The access tracks in peatland areas will be constructed as floating roads only, built directly on top of the peat and soft soils, except in arras of very thin peat or at heavily trafficked area such as entrances/junctions.

Ground investigation, in the form of trial pitting and borehole drilling, has been carried out along the proposed access Electricity Grid Connection route to inform the depth of peat present. No peat material is proposed to be excavated to construct roadways.

5.2.8.1 Track Construction Types

To provide access within the Site and to connect pylons, substations and associated infrastructure, new tracks will need to be constructed or existing tracks upgraded. The identification of the access track layout is an iterative procedure. Where practical, tracks on-site will be constructed on mineral soil or along the route of existing Bord na Mona tracks/railways, there are some locations where construction on peat will be required.

The track construction preliminary design has considered the following key factors:

- Requirement to minimise disruption to peat hydrology;
- Minimise excavation arisings;
- Serviceability requirements for construction, delivery, and maintenance vehicles; and
- Buildability considerations.

Whilst the above key factors are used to determine the track design the actual construction technique employed for a particular length of track will be determined on the prevailing ground conditions encountered along that length of track.

The majority of Electricity Grid Connection and discharge pipeline construction will utilise a temporary access track networks for access and egress, and this access will be constructed in advance of other ground works in a sequential manner.

It is intended that the access tracks will be constructed using will consist of either timber or aluminium bog mats or crushed rock on a geotextile fabric Site-won material as subbase and unbound crushed aggregates and incorporate drainage to maintain the performance of the pavement during wet weather. No invasive works will be undertaken when placing the matting. The access tracks shall be constructed to average heights of 0.5m above existing ground level.

Ground investigations in the form of trial pitting has been carried out along the proposed Electricity Grid Connection route to inform upfill required for the access tracks. The discharge pipeline routes largely follow existing constructed Bord na Mona tracks or railway lines.

Table 7: General Construction of Access Tracks

Construction Method	Typical Site Conditions		
	Description	Typical Peat Depth	Typical Slope Inclination
Construction of new excavated tracks in peat	Flat slopes with relatively shallow peat	Typically, less than 0.5m, locally up to 1m	Less than 3 degrees
Construction of new floating tracks over peat	Flat slopes with relatively deeper peat	>1m	Less than 3 degrees

It should be noted that Table 7 summarises the general track construction techniques only. Prior to the construction of any access tracks, on-site a detailed design will be carried out.

5.2.8.2 Excavated Track Construction Methodology

Given the flat topography and relatively shallow peat on-site, temporary floated access tracks are deemed an appropriate construction technique for the majority of the Electricity Grid Connection and excavated tracks are not proposed to be used, except in localised areas with shallow peat and highly trafficked areas (e.g., site entrances and junctions).

For any excavated track sections required, the following methodology will be used:

- Interceptor drains will be installed upslope of the access track alignment to divert any surface water away from the construction area;
- Excavation of tracks shall be to the line and level given in the design requirements. Excavation will take place to a competent stratum beneath the peat (as agreed with the site designer);
- Track construction, where required, will be carried out in sections of approximately 50m lengths or shorter; i.e., no more than 50m of access track will be excavated without re-placement with stone fill unless otherwise agreed with the resident engineer on-site;
- All excavated peat shall be placed/spread alongside the excavations or placed in the PDA;

- Side slopes in peat shall be not greater than 1 (v): 2 or 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required. Battering of the side slopes of the excavations will be carried out as the excavation progresses;
- The surface of the finished excavated access track will be finished above current ground level;
- A layer of geogrid/geotextile may be required at the surface of the competent stratum (to be confirmed by the designer);
- At transitions between floating and excavated tracks a length of track of about 10m shall have all peat excavated and replaced with suitable fill. The surface of this fill shall be graded so that the track surface transitions smoothly from floating to excavated track;
- If slopes of greater than 5 degrees are encountered along with relatively deep peat (i.e., greater than 1.5m) and where it is proposed to construct the access track perpendicular to the slope contours, it is best practice to start construction at the bottom of the slope and work towards the top, where possible. This method avoids any unnecessary loading to the adjacent peat and greatly reduces any risk of peat instability. It should be noted that slopes greater than 5 degrees are not envisaged along the Electricity Grid Connection route access tracks; and
- A final surface layer shall be placed over the excavated track, as per design requirements, to provide a track profile and graded to accommodate construction and delivery traffic.

Access tracks require careful monitoring to ensure that there is no significant standing water forming, which would lead to potholes in the surface. If areas of track are causing concern, repairs will be carried out in favourable, preferably dry, conditions, to ensure that there is no saturation of the surface of the track.

5.2.8.3 Construction of new Floating Tracks over Peat

Floating roads are built directly on top of the peat and soft soils. As peat of variable thickness is present along the majority of the Overhead Line section of the Electricity Grid Connection route and only construction stage vehicular access is envisaged, temporary floating roads will be used on peatland areas, other than where proposed infrastructure follows existing constructed trackways or railway lines.

The access tracks shall be constructed to average heights of up to 0.5m above existing ground level. It is expected that floated tracks will constitute the majority of the access roads at the Site, however founded tracks may be used in localised, heavily trafficked areas like entrances and junctions.

Floating track sections will be designed by a geogrid manufacturer, or by a consultant assisted by a geogrid manufacturer. It can also be designed in-house by a contractor with experience in track construction over peat. The design will have a geotechnical input to fully understand the principles at work in the floating track. Design can be by calculation or, more usually by the application of semi-empirical rules based on experience of the European standard (EN) Eurocode 7: Geotechnical design (EN 1997).

5.2.8.4 Floating Access Track Construction Methodology

This methodology includes procedures that are to be included in the construction phase to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations. Note that details of geogrid arrangement will be provided by the specialist geogrid provider/designer.

For temporary floating track sections, the following methodology will be used:

- Temporary access tracks (required due to ground conditions and/or landowner requirements) will consist of timber or aluminium bog mats or crushed rock on a geotextile fabric to spread the weight of machinery over a greater area to prevent damage to the ground.
- If necessary, a low ground pressure equipment may also be utilised to spread weight across a wider area, thereby further reducing the pressure exerted on the ground.
- No invasive works will be undertaken when placing the matting/geotextile.

- Upon completion of the works, all mats, fill and/or geotextile will be removed immediately. Temporary access routes will be carefully selected to avoid any damage to land.
- Local consultation will be carried out with the relevant landowners to ensure that any potential disturbance will be minimised.
- Prior to the commencement of construction, the contractor will assess all access routes and determine the requirement for bog mats. Any such requirements will be incorporated into the relevant method statement.
- Once all construction works are complete, the work areas will be reinstated and either seeded out with native species, allowed to vegetate naturally or reinstated with excavated grass turves and will be restored to their original condition.
- Transitions between the Site floating tracks and excavated tracks (or other forms of track not subject to long term settlement) will be gentle (e.g., 1:10 basal transition slope) in order to minimise likelihood of track failure at the boundary between construction types.

The typical make-up of new floating access track is generally between 600mm and 1000mm of selected granular fill with 2 no. layers of geogrid with possibly the inclusion of a geotextile separator. This may vary depending on designer requirements.

Following the detailed design of the floating access tracks it may be deemed necessary to include pressure berms either side of the access track in some of the deeper peat areas. The inclusion of a 2 to 5m wide pressure berm (typically 0.5m in height) either side of the access track will reduce the likelihood of potential bearing failures beneath the access track.

The finished track width will be approximately 6m (to be confirmed by the designer). Stone delivered to the floating track construction shall be end-tipped onto the constructed floating track. Direct tipping of stone onto the peat shall not be carried out. To avoid excessive impact loading on the peat due to concentrated end-tipping all stone delivered to the floating track shall be tipped over at least a 10m length of constructed floating track. Where it is not possible to end-tip over a 10m length of constructed floating track then dumpers delivering stone to the floating track shall carry a reduced stone load (not greater than half full) until such time as end- tipping can be carried out over a 10m length of constructed floating track.

Following end-tipping suitable machinery shall be employed to spread and place the tipped stone over the base geogrid along the line of the track. A final surface layer shall be placed over the floating track, as per design requirements, to provide a track profile and graded to accommodate construction and delivery traffic.

5.2.9 Upgrade of Existing Access Tracks

The general construction methodology for upgrading of existing section of excavated roads or tracks is summarised below:

- The edge of the existing tracks will be cut back by 1m and a Combigrid™ (a geocomposite stabilisation and reinforcement geogrid product) placed over the proposed area to be widened. The cutting back of the existing track allows an anchorage of the Combigrid under the existing track.
- Granular fill will be placed in layers to match the depth of stone on the existing track and in accordance with the contractor's specification. A geogrid will be applied at this level across the existing and widened road area.
- The surface of the existing/widened access track will be overlain with up to a 300mm of selected granular fill.
- A layer of geogrid/geotextile may be required at the surface of the existing access road and in the widened section of road, where excessive rutting is anticipated (to be confirmed by contractor and onsite engineer).

- Where excavations in peat are required, side slopes shall be not greater than 1 (v): 2 or 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required. Battering of the side slopes of the excavations will be carried out as the excavation progresses.
- The finished road width will be approximately 5m.
- If required, interceptor drains will be installed upslope of the access road alignment to divert any surface water away from the construction area.

A final capping layer shall be placed over the existing access track, as per design requirements, to provide a suitable road profile and will be graded to accommodate construction traffic and HGV movements.

5.2.10 Peat Deposition Area

Peat reuses around and within infrastructure areas is an important aspect of the Proposed Development as it allows an opportunity to maintain the integrity of the excavated peat and enhance habitats. Any landscaping or road batters will be limited to the areas of ground already disturbed.

Three Peat Deposition Areas (PDAs) are proposed within the Overall Project (see Chapter 5):

- A permanent PDA is provided on cut-over peatland to the east of the Power Plant Area, as a result of the construction phase of the Power Plant Area, to store excess overburden material which cannot be used in localised landscaping or backfill. Excavated peat and soil arising from the formation of the foundations will be placed in the designed and dedicated deposition area in close proximity on land to the east of the Power Plant Area (refer to planning drawings). Peat deposition in this area will be carried out by an approved contractor, under the management of Bord na Móna, in accordance with the requirements of any planning conditions. The peat and soil deposition area will not exceed 1m above ground level across the 222,410m² main PPA PDA area and will be suitably profiled to eliminate risk of movement or slippage of material. Once excavations are completed and following the commissioning of the project, the PDA will be allowed to naturally revegetate.
- A permanent PDA is provided in the vicinity of the 400kV Substation to store excess overburden material which cannot be used in localised landscaping or backfill. Excavated peat and soil arising from the formation of the substation foundation will be placed in a designed and dedicated deposition area in close proximity on land to the north of the 400kV substation (refer to planning drawins).
- A permanent PDA is provided in the vicinity of the 220kV Substation to store excess overburden material which cannot be used in localised landscaping or backfill. Excavated peat and soil arising from the formation of the substation foundation will be placed in a designed and dedicated deposition area in close proximity on land to the southwest of the 220kV substation (refer to planning drawings).

It is proposed to construct internal access routes within the PDAs, in order to minimise the handling and disturbance of any underlying cut-over peat. The roads will be constructed by laying a geotextile reinforcing material directly on the native peat and depositing compacted rockfill to form the haul roads. Trucks will deliver and unload the peat at the PDA. The peat will then be placed using low ground bearing pressure trailers for dispersal within the deposition area to a maximum thickness of 1 metre.

Reinstatement of vegetation will be focused on natural regeneration utilising peat vegetated turfs. To encourage stabilisation and early establishment of vegetation cover, where available or other vegetation turves in keeping with the surrounding vegetation type will be used to provide a dressing for the final surface.

Appropriate drainage will be required where peat is used in reinstatement, so that the deposited peat will be maintained in a saturated condition.

5.2.11 Excavation and Storage of Peat and Soil

It will be necessary to extract peat and subsoil on-site as part of the construction phase. This will largely consist of areas of peat due to the nature of the Site. Bedrock is covered with thick glacial deposits, resulting in local variations in topography such as Derrygreenagh Hill. The majority of the Site is located on relatively flat-lying areas, currently overlain by cutover blanket peat bog.

It is intended that peat and unsuitable founding soils will be side cast, i.e., placed adjacent to works locations, with the balance placed in Peat Deposition areas. Considering the relatively flat topography, it should be appropriate to do this across most of the Site, subject to geotechnical assessment.

The following recommendations / best practice guidelines for the placement of peat and non-peat soil alongside the proposed infrastructure elements will be considered and taken into account during construction.

Any surplus excavated material (peat and non-peat) will be reused, either in profiling/landscaping or constructing berms as close to the excavation areas as possible. The northern 5km of the Electricity Grid Connection route crosses cut-over peatland that has been drained, resulting in extensively trafficked, partly-revegetated peat. Peat present in the north and east of the Power Plant area is largely drained peat covered in a layer of fill material.

The placement of excavated peat and soil is to be avoided without first establishing the adequacy of the ground to support the load. The placement of peat and soil within the placement areas may require the use of long reach excavators, low ground pressure machinery and possibly bog mats in particular for drainage works.

The most environmentally sensitive and stable way of handling and moving of peat is its placement across the site and at locations as close as possible to the excavation areas. A peat deposition area and soil deposition area has been included to facilitate the construction phase of the Power Plant Area site.

All placed soil will be allowed to revegetate naturally from the extensive seed source of the plants that have already colonised in the area. Alternatively, if significant areas of bare soil are still evident after a three-year period and possibly in addition, seeding of the placed soil could be carried out which would aid in stabilising the placed soil in the long term.It is a goal of the Proposed Development to incorporate sustainability into its design and construction phases as much as practically possible. Where mineral soils are encountered in the excavation and construction of the Power Plant area, Site roads, Substations, Construction Compounds, bases, etc., this material will be stockpiled for assessment and subsequent reuse, where possible. Where mineral soil is not directly suitable for construction, it will be used for reinstatement works and will be geo-engineered as necessary.

In addition to the Peat Deposition Area, a Soil Deposition area is proposed to the west of the 400kV substation site, for deposition of unsuitable or unneeded mineral soils, which will be deposited to a maximum thickness of 1 m.

5.2.11.1 Excavation and Storage of Arisings Methodology

This methodology includes procedures that are to be included in the construction phase to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction, such as drainage and environmental considerations. Prior to any excavations, the Contractor will produce a detailed Method Statement identifying where and how excavated peat will be used in reinstatement or landscaping works. Specific requirements for the excavation, handling, storage, and reinstatement of peat will be outlined in the excavation Method Statement. The Contractor will consider potential impacts on downstream receptors and the potential for instability issues with the excavated material.

Some of the requirements to be contained within the Method Statement are outlined below. The majority of the Power Plant Area Site comprises mineral soils, with any areas of peat covered by a layer of fill material, whereas the northern 5 km section of the Electricity Grid Connection route consists of bare or revegetating cut-over peat bog, of varying thickness. Areas of peat or unsuitable soil within the footprint of proposed excavations will have the top layer of made ground or vegetation stripped prior to construction by an experienced specialist sub-contractor. Underlying peat or bare peat will then be removed.

Classification of excavated materials will depend on their identified reuse in reinstatement works. At this Site, it is anticipated that the material to be excavated will comprise granular fill, peat and mineral subsoil.

The handling, management and reuse of excavated materials are of importance during the construction phase of the Proposed Development. Excavated material will arise from all infrastructure elements of the Proposed Development. Areas where the peat is noted to extend to a depth of 2m bgl or greater have been identified on-site (At the northern and eastern edges of the Derrygreenagh Plant at the northern and southern ends of the Overhead Line section of the Electricity Grid Connection route. As such, these areas may not prove suitable for certain aspects of the Proposed Development due to the large quantities of peat that would require removal to avoid instability issues.

It is intended that unsuitable founding soils and peat will be side-casted, bermed and profiled, i.e., placed adjacent to works locations or transported to the designated Peat Deposition or Soil Deposition Areas. It is anticipated that the height of berms and thickness of peat and unsuitably found soils that are either side casted or disposed of in the designated deposition areas will not be greater than 1m in general.).

Excavated peat will only be moved short distances from the point of extraction and used locally for landscaping. In total, approximately 66,410m^3 of peat will be excavated and either reused close to the source or placed in the designated peat deposition area.

Excess material will be used on the Site of the Proposed Development for landscaping and reinstatement. Where contaminants are found, the material will be removed from the Site and disposed at an appropriately licenced facility.

Landscaping areas will be sealed and levelled using the back of an excavator bucket to prevent erosion. Where possible, the upper vegetative layer will be stored with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the landscaped peat. These measures will prevent the erosion of peat in the short and long term. Peat, overburden, and rock will be reused where possible on-site to reinstate excavations where appropriate.

Peat soils will be either side casted on to the existing cutover bog or placed in the Peat deposition area. Where side casting occurs, it is anticipated that the existing vegetation extensive area and existing drainage system will remove any risk from generation of silt to surface water bodies. At the larger excavation locations, such as pylon leg foundations and substations, silt control measures will be incorporated into work area drainage with the discharge onto cutover bog rather than directly to surface water, which will provide additional silt control.

It is anticipated that peat deposition to the designated peat deposition area will be required, which is located on level cut-over peatland east of the Power Plant area. It is anticipated that deposited peat thickness will not exceed 1m. The deposition area will be designed to be completed in phases and will include specific drainage and silt controls. On completion the peat deposition area surfaces will be stabilised by the establishment of natural peat land vegetation.

5.2.12 General Recommendations for Good Construction Practice

The following measures outline an overview of the tasks for the construction phase on peatland:

- Applicant’s Geotechnical Engineer to provide a Geotechnical Induction to all contractor supervisory staff;
- Applicant to appoint a Site Geotechnical Supervisor to carry out supervision of site works as required. The Site Geotechnical Supervisor will be required to inspect that works are carried in accordance with the requirements of the Peat Stability Risk Assessment (PSRA), identifying new risks and ensuring all method statements for works are in place and certified;
- Retain a Site Geotechnical Folder which contains all the information relevant to the geotechnical aspects of the Site including but not limited to Site Investigation information, Method Statements, etc.;
- Contractor to develop a Method Statement for the works to be carried out in each of the PSRA areas cognisant of the required mitigating measures;

- Applicant's Geotechnical Engineer/Site Geotechnical Supervisor to approve the method statement;
- Contractor to provide Toolbox Talks and on-site supervision prior to and during the works;
- Daily sign off by supervising staff on completed works; and
- Implementation of emergency plan and unforeseen event plan by the Contractor.

In addition to the above, the following best practice guidelines for the placement of peat alongside the Proposed Development's different infrastructure elements will be adhered to during construction:

- All excavated peat will be reused where possible for reinstatement or by being placed/spread alongside the proposed infrastructure elements on-site;
- The peat placed adjacent to the proposed infrastructure elements should be restricted to a maximum height of 1m over a 10m wide corridor on both sides of the Proposed Development's elements (pylon footings or underground cable route. It should be noted that the designer should define/confirm the maximum restricted height for the placed peat;
- The placement of excavated peat and spoil is to be avoided without first establishing the adequacy of the ground to support the load. The placement of peat within the deposition area will likely require the use of long reach excavators, low ground pressure machinery and possibly bog mats in particular for drainage works;
- Where a peat stability analysis following the confirmatory ground investigation reveals areas with an unacceptable risk of peat instability, then no material shall be placed on to the peat surface;
- The surface of any placed peat will be shaped to allow efficient run-off of surface water. Where possible, shaping of the surface of the peat should be carried out as placement of peat within the placement area progresses. This will reduce the likelihood of debris run-off;
- Finished/shaped side slopes in the placed peat shall be not greater than 1 (v): 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat and spoil are encountered then slacker slopes will be required;
- The acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the placed peat within the placement areas;
- Movement monitoring instrumentation may be required adjacent to areas where peat has been placed. The locations where monitoring is required will be identified by the designer on-site;
- An interceptor drain will be installed upslope of the designated peat placement areas to divert any surface water away from these areas. This will help reduce the likelihood of debris run-off; and
- All the aforementioned general guidelines and requirements should be confirmed by the designer prior to construction.

The following outlines an overview of the tasks for the operation and maintenance phase:

- Communication of residual peat risk to appropriate site operatives; and
- Ongoing monitoring of residual risks and maintenance, if required. Such items would consist of regular inspection of drains and culverts to prevent blockages and inspections of specific areas such as settlement ponds and floated access roads after a significant rainfall event.

5.3 Summary of Excavated Peat Volumes On-Site

The breakdown and combined total of excavated peat volume estimated to be required on-site for the completion of the Proposed Development is summarised in Table 8 and Table 9. Note, a factor of 20% (bulking factor of 15% and contingency factor of 5%) has been applied and is included in the excavated peat and soil volumes below to allow for expected increase in volume upon excavation and to allow for a variation in ground conditions across the site.

Table 8: Excavated Peat Volume Summary

DEVELOPMENT COMPONENT	PLAN AREA (m2)	ASSUMED PEAT/SPOIL DEPTH TO BE EXCAVATED (m)	PEAT/SOIL VOLUME TO BE EXCAVATED (m^3)	PEAT/SOIL VOLUME (m3) FACTORED FOR BULKING (20%)
Power Plant Area – Contractor's Compound (1m of fill over geotextile layer - no peat excavation envisaged)	37,360	0.0	0	0
Power Plant Area – Additional Parking (0.5m of fill over geotextile layer - no peat excavation envisaged)	12,405	0.0	0	0
Power Plant Area – Central equipment area	66,000	1.5	99,000	118,800
Power Plant Area – AGI (2m of fill over geotextile layer - no peat excavation envisaged)	11,000	0.0	0	0
Power Plant Area – Green Areas	39,354	0.5	19,677	23,612
Power Plant Area – Discharge Routes	8,000	1.0	8,000	9,600
Total – Power Pant Area	**174,119**	**0.0 to 1.5m**	**126,677**	**152,012**
Electricity Grid Connection - 220kV Substation (excavations to between 1.0 and 2.0 m)	20,656	1.0 to 2.0	29,756	35,707
Electricity Grid Connection - 220kV Substation access road (excavation to 2.0 m)	1,851	2.0	3,702	4,442
Electricity Grid Connection -Tower bases (3.5m excavation envisaged)	1,701	3.5	5,954	7,144
Electricity Grid Connection -Tower Access roads (1.5m of fill over geotextile layer, floating road - no peat excavation envisaged)	18,235	0.0	0	0
Electricity Grid Connection - Line-cable Interface Compound	1,160	1.65	1,914	2,297
Electricity Grid Connection – Underground Cable Route	2,400	1.5	3,600	4,320
Electricity Grid Connection - 400kV Substation (excavations to between 0.2 and 0.5 m)	31,300	0.2 to 0.5	6,806	8,167
Electricity Grid Connection - 400kV Substation access road (excavation to 2.0 m)	9,785	1.5	14,678	17,613
Total – Electricity Grid Connection	**87,088**	**0.0 to 3.5m**	**66,410**	**79,690**
Totals (PPA and EGC Components)	**261,207**	**0.0 to 3.5m**	**193,087**	**231,702**

The three proposed Peat Deposition Areas have the following plan areas and calculated peat and spoil storage capacities:

Table 9: Peat Deposition Area Summary

DEVELOPMENT COMPONENT	PDA PLAN AREA (m2)	MAXIMUM PEAT/SOIL THICKNESS TO BE DEPOSITED (m)	PEAT/SOIL DEPOSITION CAPACITY AVAILABLE (m^3)	ESTIMATED PEAT/SOIL STORAGE REQUIREMENT (m^3)
Power Plant Area PDA	222,500	1.0	222,500	153,000
Electricity Grid Connection - 220kV Substation PDA	50,200	1.0	50,200	48,000
Electricity Grid Connection - 400kV Substation PDA	75,300	1.0	75,300	33,000
Totals	**348,000**	**1.0 m**	**348,000**	**234,000**

The three peat and soil deposition areas will therefore have sufficient capacity for the total estimated peat and soil storage requirement arising from the PPA and EGC components of the project, even allowing for the bulking and contingency assumptions outlined above, and this conservative conclusion does not assume any on-site re-use of excavated peat and soil.

Peat will be deposited to a maximum height of 1m above ground level in all three PDAs and will be allowed to naturally revegetate once excavations are completed and following the commissioning of the project.

6. Summary

The total volume of excavated peat and soil associated with the Power Plant footprint, substations, Waste water discharge routes and the overhead and underground sections of the Electricity Grid Connections Route, including access routes, has been calculated at about 193,087m^3 (equivalent to approximately 231,702m^3 of material requiring deposition, allowing for excavated materials bulking and contingency assumptions), predominately drained lowland blanket bog in a revegetating cutover bog site.

The potential reuse of excavated peat and soil has been calculated and will be reused on-site. Based on the peat depth, characteristics, and distribution investigations undertaken across the Site and the layout of the Proposed Development, a surplus of peat and soil is expected to be generated by the Proposed Power Plant Development. Where possible, excavated peat will be reused for restoration work during the construction, operation, and decommissioning phases, with any additional peat to be relocated to designed, dedicated Peat Deposition Areas on cut-over peatland.

The three PDAs have a combined peat and spoil deposition capacity of up to 234,000m^3, which exceeds the conservative calculated bulked peat and soil storage requirement of 231,702m^3.

Floating roads and other measures are utilised on-site to minimise the volume of excavation. An ECoW will maintain a record of actual peat volumes excavated and the subsequent peat reuse volumes. This record during the construction, operation, decommissioning phases of the Proposed Development will be made available for review by regulatory authorities as required.

The full Contractor's PSMP will be prepared prior to commencement of construction and with the approval of the Applicant and ABP. Additionally, the PSMP should be read in conjunction with the EIAR and outline CEMP prepared for the Proposed Development.

aecom.com