

Derrygreenagh Power Project Environmental Impact Assessment Report

Chapter 3: Need and Alternatives

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3.0 NEED AND ALTERNATIVES

3.1 Introduction

- 3.1.1 This chapter of the Environmental Impact Assessment Report (EIAR) sets out the need and reasonable alternatives, and the design progression that has been considered during the evolution of the Proposed Development and design process as presented in the EIAR Chapter 5: The Proposed Development and Overall Project.
- 3.1.2 Schedule 6 to the Planning and Development Regulations, as substituted by Article 97 of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (the 'EIA Regulations'), states that the Environmental Impact Assessment Report (EIAR) should contain '*A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment*'. This chapter recognises and fulfils this requirement in respect of the Proposed Development and the Overall Project.
- 3.1.3 This does not impose a general requirement to assess potential alternatives, only to describe those "**reasonable** alternatives" that have been "studied by the person or persons who prepared the EIAR" (emphasis added) as set out in Annex IV (2) of the EIA Directive (2014/52/EU) and in Schedule 6 of the Planning and Development Regulations, 2001, as amended ("the Regulation").
- 3.1.4 In relation to alternatives, '*Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment August 2018*' states (Section 4.2) that the information provided must include '*A description of the reasonable alternatives studied by the developer*' and '*an indication of the main reasons for the option chosen...*'. Reasonable alternatives as defined in the Government guidance ('*Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment August 2018*') refer to Section 4.12 and 4.13) '*may relate to matters such as project design, technology, location, size and scale*' however there is no requirement for each of these alternatives to be assessed in detail and the guidance states that a broad description of each main (and reasonable) alternative studied and the key environmental issues associated with each is sufficient.
- 3.1.5 Furthermore, the guidance is clear in that '*some projects may be site specific so the consideration of alternative sites may not be relevant*' (Section 4.13). This statement is particularly relevant to the Proposed Development and Overall Project.
- 3.1.6 In addition, the 2022 EPA EIA Guidelines¹ states (Section 3.4.1), that '*the objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required.*'
- 3.1.7 In this context, the consideration of reasonable alternatives and design evolution has been undertaken with the aim of avoiding and/or reducing adverse environmental effects (following the mitigation hierarchy of avoid, reduce and, if possible, remedy), while

maintaining operational efficiency and cost-effectiveness, and considering other relevant matters such as available land and planning policy.

3.2 The Need for the Proposed Development

- 3.2.1 Ireland is in the process of transitioning from a centralised, fossil fuel based electrical power generation network to a more distributed, renewable energy-based generation network. To facilitate the continued expansion of Ireland's renewable generation capacity, and support security of supply, modes of supporting the electricity network during periods when there is a gap between renewable power generation and power demand will be needed. This project is designed specifically for this purpose, being able to respond quickly to shortfalls in power generation at times of high demand.
- 3.2.2 As a responsive power generator, the proposed power plant (located in the Power Plant Area) will facilitate the integration of more renewable generation into the electricity network, helping to maintain security of supply and supporting Ireland in its transition to a low carbon economy. This type of generation capacity is urgently required – not just to support the transition to renewables but also given the heightened level of power supply risk facing the country due to factors such as:
- Lower than expected availability of existing power stations;
 - Anticipated new power stations not being delivered as planned;
 - Growth in demand for electricity, due to increased activity by high energy industries and electrification of heat and transport;
 - The closure & expected closure in the coming years of existing power stations (e.g., Kilroot & Moneypoint) which provide approx. 25% of the national conventional generation capacity.
- 3.2.3 The need for the Proposed Development is recognised at national, regional, and local level as detailed in EIAR Chapter 2 which also provides a summary of relevant action plans and policy documents.

3.3 The 'Do Nothing' Scenario

- 3.3.1 A 'Do Nothing' scenario in which the Proposed Development does not proceed is the baseline against which the impacts of the Proposed Development will be compared within the assessment. Should the Proposed Development not proceed, neither will the Overall Project (which includes the Gas Connection Corridor).
- 3.3.2 An application for a gas thermal power plant was granted in 2010 under Strategic Infrastructure Development (SID) (Ref: 19.PA0011) with an extension of appropriate period under Section 42 Planning and Development Act until 11 April 2025.
- 3.3.3 The extant planning permission for the power plant cannot be developed out without consents being in place for overall project including the Gas Connection Corridor to the north and Electricity Grid Connection to the south. Given the requirements for consent applications it is appropriate to consider the extant consent of planning for appropriateness against current policy, law and environmental standards. The CID (2021/2326) best available techniques (BAT) for large combustion plants sets more stringent standards for new plants over existing plants and derogations would not be possible for new plants in accordance with Article 15 of the Industrial Emissions Directive (2010/75/EU). Therefore, any new power plant for the Proposed Development will be designed to be compliant with current standards and by extension, this is what is available from the market. There is also a requirement for the power plant to be compliant with long term climate action strategy including displacement of natural gas consumption by zero emission biomethane and hydrogen gas injections.
- 3.3.4 For the purposes of this EIAR, the 'Do Nothing' scenario assumes no development of a thermal power plant at the Derrygreenagh site (and no electricity grid connection to the south) and majority of lands remaining under the management of the IPC Licence (Reg No. P0501-01) post peat extraction or continues in agricultural use in respect of the site for the proposed 400kV substation. The 'Do Nothing' scenario would not enable the Applicant to create additional electricity generating capacity, thus would exacerbate security of supply concerns for Ireland resulting in significant adverse effects on population.
- 3.3.5 In relation to the 'Do Nothing' scenario, Chapters 7-18 of this EIAR provide a comparison where the environmental effects of the Proposed Development as set out in this EIAR would not occur.

3.4 Alternative Site Locations

- 3.4.1 Beginning in 1946, Bord na Móna PLC, a publicly owned company, acquired extensive peatlands and associated areas principally for the industrial harvesting of peat for energy (electricity production and briquettes) and as horticultural growing media. These lands extend in total to about 80,000 hectares and are located mainly in the Irish midlands. In January 2021 Bord na Móna formally took the decision to cease industrial scale peat extraction on its land bank.
- 3.4.2 The EU's Recovery and Resilience Facility, through the National Recovery and Resilience Programme, is investing up to €108 million in the Enhanced Decommissioning, Rehabilitation and Restoration Scheme (EDRRS) to rehabilitate 33,000 hectares of peatlands over 82 Bord na Móna bogs, previously used for peat extraction for electricity generation. The EDRRS is the largest programme of bog rehabilitation in the State's history, involving a wide array of engineering and ecology works designed to encourage and accelerate natural processes. Once rehabilitated, the peatlands will include peat forming bogs and a mosaic of wetlands, grasslands, and native woodlands, protecting the storage of 100 million tonnes of carbon, enhancing biodiversity and contributing to Ireland's target of carbon neutrality no later than 2050, while developing the capacity of peatland communities to respond to challenges faced by transitioning to a net-zero economy. The Scheme is regulated under the Bord Na Móna Bog Rehabilitation Scheme which is administered by the Department of the Environment, Climate and Communications (DECC) and regulated by the National Parks and Wildlife Service (NPWS) of the Department of Housing, Local Government and Heritage. It will involve many other diverse stakeholders including Bord na Móna, the EPA, relevant NGOs, local authorities, representative organisations and importantly, the local community.
- 3.4.3 The Proposed Development is located entirely within Co. Offaly, primarily on Bord na Móna land (i.e., Drumman, Derryarkin and Ballybeg Bogs which are located in the Derrygreenagh Bog Group), with the exception of an area of agricultural land required for a loop-in connection to the Oldstreet-Woodland 400kV line.
- 3.4.4 The bogs on which the Proposed Development is situated (i.e., Drumman, Derryarkin and Ballybeg) are not included under EDRRS for enhanced rehabilitation, while some bogs and other areas within the Derrygreenagh Bog Group are nominated for enhanced rehabilitation. The decommissioning and rehabilitation work required (in accordance with Condition 10 of the IPC Licence (No. P0501-01)) for the bogs included in the licence boundary are less onerous than those required for bogs included under EDRRS.
- 3.4.5 Thus, the potential to develop and deliver renewable energy infrastructure on land that has not been designated for enhanced rehabilitation presents a unique opportunity to utilise land to meet Ireland's climate change and biodiversity enhancement commitments. The Bord na Móna Derrygreenagh Bog Group is well connected to national infrastructure including major road, fibre, gas and grid networks. The bog group has already been the subject of numerous post peat extraction activities including development of quarries, commercial forestry and biomass storage and chipping. The landbank presents particular benefits for developing climate action solutions including its scale (present in large blocks), the history of industrial development on now brown-field sites, suitable for redevelopment in open, unenclosed landscapes with good linkage within it by a network of rail or road passageways.
- 3.4.6 The proposed technology is a responsive, flexible, dispatchable, power generation facility and has the capability to rapidly start to fill the gap between renewable power generation and demand. The reserve power provided by the Proposed Development will be critical to maintaining security of supply for the electricity system in Ireland.

3.4.7 The technology chosen requires suitable available land of sufficient dimensions and also requires a main fuel supply (gas) and an Electricity Grid Connection. The Applicant, Bord na Móna Powergen Limited, and the owner of lands under IPC Licence (Reg No. P0501-01), Bord na Móna Energy Limited (Derryarkin Bog) and Bord na Móna Biomass Limited (Drumman & Ballybeg Bogs); are all subsidiaries of Bord na Móna PLC. Bord na Móna own the existing Derrygreenagh Works site where the Power Plant Area is to be largely located, in addition to the route of the overhead and underground electricity grid connection and therefore has an interest in the existing site. Non-environmental factors can have equal or overriding importance including the project economics, land availability, engineering feasibility or planning considerations. The proposed new, lower carbon power generation plant will require connection to the existing high pressure gas pipeline to the north and the 400kV existing Oldstreet-Woodland 400kV electricity transmission line to the south. The relative equidistant proximity from the Power Plant Area to the key primary infrastructure requirements (i.e., the gas supply for primary fuel and electrical connection for power export) and land available to Bord na Móna is a key consideration in the selection of the site at Derrygreenagh.

Power Plant Area

- 3.4.8 The site benefits from a current valid planning consent for a gas fired thermal power plant on the existing Derrygreenagh Works lands. Planning consent was granted in 2010 under Strategic Infrastructure Development (SID) (Ref: 19.PA0011) with an extension of appropriate period under Section 42 Planning and Development Act until 11 April 2025. While planning consent will soon expire, the principle of power generation development on the site is established. A comprehensive site selection process was undertaken as part of the extant permission. The constraints and facilitators outlined in that assessment continue to be relevant.
- 3.4.9 Alternative sites were considered for Tier 1 (Regional Site Selection), Tier 2 (per National Spatial Strategy) and Tier 3 (a more detailed appraisal of locations within the selected zone) in support of the existing site location and the extant planning consent.
- 3.4.10 At the regional tier the power generated by the Proposed Development will be critical to maintaining security of supply for the Irish Grid.
- 3.4.11 The technology chosen requires suitable available land of sufficient dimensions, means to deliver fuel to the Site and a high voltage electrical grid connection.
- 3.4.12 It should be noted that the Site of the Proposed Development, within an existing industrial setting, is on land which is zoned for Economic Development within the Strategic Development Location in the Offaly County Development Plan (CDP) 2021-2027.
- 3.4.13 The Proposed Development is clearly consistent with the strategic development objectives for the site and wider area.
- 3.4.14 Pursuant to Section 3.4.1 of the EPA's guidelines, '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*'⁴, the consideration of alternatives is cognisant of the fact that 'in some instances some of the alternatives described will not be applicable - e.g., there may be no relevant 'alternative location'. The availability of sufficient, suitable land under the control of the Applicant together with proximity to existing key infrastructure (connection to electricity transmission networks, proximity to national road network), renders the proposed footprint location on the site the most appropriate for the Proposed Development.

Electricity Grid Connection

- 3.4.15 A preliminary grid options assessment was carried out by the Bord na Móna Powergen Grid Development Team with input from other in-house specialists as required including

the Bord na Móna Works Management, Central Engineering, Construction, Ecology, and Land and Property teams. The assessment was conducted in accordance with EirGrid technical standards on design and construction of new transmission assets namely substations, cables and overhead lines. Factors which will influence the solution decision include technical, economic and environmental considerations.

- 3.4.16 The Maynooth-Shannonbridge 200kV power line runs to the north of the power plant site is one of the lowest rated power lines of this voltage in Ireland. The Derryiron 110kV substation 5km to the south (adjacent to Rhode Peaking Power Plant) is at capacity. It is necessary to facilitate this type of large power output development to connect into the 400kV Oldstreet-Woodland power line. Eirgrid has indicated that it wishes to locate a 400kV substation node in the Midlands to re-enforce the supply and a node at Derrygreenagh would fulfil this requirement.
- 3.4.17 A connection method option of a new tail 220kV substation to loop in 400kV substation best suits the development given the distance from the electricity infrastructure per standard EirGrid connection options.
- 3.4.18 The 220kV substation is required to be located in close proximity to the power plant site and the location requirement was indicated in the application information for the extant planning consent, though the substation was not itself consented by that permission.
- 3.4.19 The possibility of running an underground cable south from the 220kV substation site along the R400 road to a selected site for a new loop 400kV substation was explored but was later raised as a concern by Offaly County Council, given the existing consent of planning for another high voltage underground cable in the R400 road for another energy project consented and under development. The R400 was therefore deemed to not have sufficient carrying capacity for another underground high voltage cable. Therefore, the availability for connection through Bord na Móna lands dictated that the only suitable location for a new tail 220kV substation would be west of the Power Plant site, in the same general location indicated in the extant consent of planning (19.PA0011).
- 3.4.20 Following an ecological constraints survey in 2022 (Woodrow / APEM) the remnant area of raised bog within Bord na Móna ownership at the 400kV line was deemed unsuitable as a location for a 400kV substation based on the sensitivity of the vegetation and habitat details recorded. There was therefore a requirement to select alternate lands adjacent to Bord na Móna Derrygreenagh Bog Group of lands and within a cable length of the 400kV line for the proposed loop in 400kV substation.
- 3.4.21 The availability of land under the control of the Applicant and proximity to the grid connection and utilities identified the chosen location as the optimum location available to the Applicant. Therefore, identification of sites not under the Applicant's control is not a reasonable alternative that is required to be considered in this EIAR.

Temporary Construction Works

- 3.4.22 There will be a temporary construction contractors compound serving the Power Plant Area and an additional 2 no. temporary construction compounds serving the electricity grid connection in the construction phases. All sites chosen are appropriately sized, located in close proximity to each element of the development and located to facilitate ease of access from public roads. In the case of the power plant site (east off the R400 road), the 220kV substation site (west off the R400 road) and at the 400kV substation (south off the L1010 road). The use of multiple temporary construction compounds is appropriate to facilitate separate construction phases of elements of the proposed development and to allow efficient construction practices given the scale of the site, particularly as regards the electricity grid connection.

3.4.23 Access tracks are required onsite to enable transport of infrastructure and construction materials within the Proposed Development. Such tracks will be of a gradient and width sufficient to allow safe movement of equipment and vehicles. Temporary access tracks will be required along the corridor of the overhead line, and to anchor access from the corridor of the overhead line to the railway line and machine passes as required. Existing access tracks will be used to develop underground cable sections.

Gas Connection Corridor

3.4.24 The location of the Derrygreenagh AGI (as defined in Chapter 1 and Chapter 5 of this EIAR) will be within the planning boundary of the Power Plant Area and will be consented as part of the planning application. There is a requirement to connect the Derrygreenagh AGI with a location on the Gas Pipeline to the West (BGE/77) c. 9.7km to the north of the Power Plant Area. The process for establishing the route of the Gas Connection Corridor has been the subject of a GNI feasibility study. The Gas Connection Corridor has been determined as the preferred route at the time of writing and is the route that has been considered throughout this EIAR. As previously stated, the Gas Connection Corridor is not being applied for in the planning application for the Proposed Development (as it will be applied for by Gas Networks Ireland (GNI) under separate consenting processes). The route of the Gas Connection Corridor is the preferred route, as indicated by GNI, at the time of writing, but may be subject to change as part of the detailed design process to be carried out.

3.5 Alternative Technical Solutions

3.5.1 The Proposed Development aims to provide security of supply to the Irish electricity network in a manner that is complementary to the growing installed levels of intermittent renewable generation and the forecast increase in energy demand. This requires high availability of rapidly dispatchable generation which can only be achieved, at the large scale, using thermal plant. The project will also facilitate a new node on the 400kV line for a substation that will greatly enhance electricity grid infrastructure to meet needs for the future and the requirements of the TSO and TAO in the Midlands.

Power Plant Area

3.5.2 Technology selection and configuration for the Power Plant Area were determined to comply with policy and legal requirements for gas-fired technology in support of renewable generation. The technical solutions allow for the power plant to provide flexible load response as demanded by the receiving power system but also providing system services including inertia necessary for the stability and reliability of the overall power system. The selection of technology allows for project dynamism to adapt to changing realities from forecast of renewables power generation. The co-location of gas-fired units also offers synergies which reduce the operation and maintenance costs in areas such as staffing, fuel procurement and general services. The technology selected will support transitioning to the net zero carbon emission by 2050 by having capability to operate with a minimum of 5% hydrogen blended into the natural gas supply. The maximum hydrogen blend percentage is manufacturer dependent and is subject to ongoing research and development to increase the maximum percentage on new and existing machines. The ability to burn natural gas/hydrogen blends thus improves sustainability over the period to 2050 as supply chains for hydrogen develop in accordance with the Hydrogen Strategy for Ireland.

3.5.3 The selection of a mix of a CCGT and OCGT gas fired technology over CCGT or OCGT only solutions give the Proposed Development the maximum flexibility in operation to respond to generation capacity required by the system to support renewable generation.

3.5.4 Storage tanks for a secondary fuel supply has been included in the Power Plant Area to comply with the Grid Code requirements.

3.5.5 Due to the site being inland with no proximity to a suitable watercourse or large water body the use of once through water cooling and wet or hybrid cooling towers is not feasible. An Air-Cooled Condenser (ACC) is therefore required for the proposed development. While the ACC slightly reduces the plant overall efficiency compared to the water-cooling options, it consumes no water and therefore does not give rise to a visible water vapour plume.

Electricity Grid Connection

3.5.6 The route design chosen is a hybrid of overhead line (c. 5km) and underground cable (c. 2.4km – 3.4km) connected by a Line-Cable Interface Compound with associated connections. It is EiGrid policy (220kV and 400kV Underground Cable Functional Specification Document (2021) Reference: CDS-GFS-00-001-R1 110kV) that overhead lines are the preferred transmission infrastructure to be used for traversing peatland (both blanket and / or raised bogs). The type and nature of the electricity grid connection is selected from a balance of considerations including available area, visual impact, ground conditions, local watercourses, access to the site, environmental constraints, efficiency of operation, maintenance, cost, and cumulative developments.

3.5.7 Single circuit options were rejected because connecting the proposed level of generation on a single circuit introduces considerable operational risk, as a single event such as the loss of the connecting circuit could disconnect power supply to the system. The 220kV

overhead lines will be facilitated by a double circuit steel lattice pylon tower set with three conductors hanging either side. They are called 'double circuit' towers because each tower supports two independent electrical circuits, one on each side of the tower. The pylon towers will be c. 45m in height.

3.5.8 There are two main design solutions being proposed for double circuit towers:

- Suspension towers are used where the transmission towers are in a straight line or have a very small deviation angle (up to 10 degrees). The insulators and wires are strung vertically from the crossarms. Although designed to withstand high wind speeds, suspension towers hold up the wires but don't require a pull on them to change the transmission line direction, therefore these towers have a smaller base and are lighter in weight. The overhead line was designed for incorporating the use of these towers as far as practicable.
- Strain towers are generally used where the transmission line change direction (beyond 10 degrees). These towers exert a pull on the wires and are designed to take the tension strain of the wires. Generally, strain towers are larger at the base and heavier compared to suspension towers. The insulators and wires are strung horizontally on the crossarms on strain towers with some hanging insulators to help hold the conductors in place. These towers were required in consideration of navigating the route against known constraints in 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 (i.e. Yellow River Wind Farm) under development.

3.5.9 It is EirGrid policy that for environmental and engineering reasons the routing of underground cables through peatland shall be avoided if at all possible. The underground cable will utilise existing railway line and machine pass infrastructure and was chosen with cognisance of nearest sensitive receptors and crossing utilities. A minimum 4m paved and gated service road designed for heavy traffic will be installed to provide safe access for inspection, maintenance and fault repair along the entire cable route. A minimum easement of 5m in respect of the 220kV cable route is required and considered in the design.

3.5.10 As part of the assessment of the electricity substation options for the 220kV substation and the 400kV substation, a gas insulated switchgear (GIS) substation, an air insulated switchgear (AIS) substation and a hybrid switchgear model that combines components of both were considered. GIS substations components are housed indoor and use Sulphur hexafluoride (SF₆) gas as an insulation between circuits, whereas AIS substations are located outdoors and use natural air as insulation between circuits. The GIS type substation has a much smaller compound footprint and has a nondescript industrial building type appearance whereas the AIS type substation has a larger footprint with components out in the open giving it a very distinctive substation appearance. On that basis the following were selected:

- GIS-AIS Substation hybrid design chosen at the 220kV substation to allow for ease of maintenance on some of the components.
- GIS Substation design chosen at the 400kV substation to enclose all components given there is more exposure to nearby sensitive receptors at this location and its proximity to the Grand Canal.

Gas Connection Corridor

3.5.11 As previously stated, the Gas Connection Corridor is not being applied for in the planning application for the Proposed Development (as it will be applied for by Gas Networks

Ireland (GNI) under separate consenting processes). The route of the Gas Connection Corridor is the preferred route, as indicated by GNI, at the time of writing but may be subject to change as part of the detailed design process to be carried out. Similarly, the technical solutions and design of the Gas Connection Corridor may be subject to change, but an envisaged pipeline is presented below for assessment purposes.

- 3.5.12 The pipeline will likely be constructed from carbon steel pipe capable of transporting hydrogen or hydrogen / natural gas blends. The design proposal for the pipeline will be 300 - 400 millimetres nominal diameter, the design pressure of the high-pressure line is 85barg. Pipeline wall thickness depends on design factor to be determined by GNI; a thicker walled pipe will be used near residences and within road and other crossings as required. The pipeline will be buried for its entire length, with a minimum cover of 1.2m.

3.6 Alternative Layouts

- 3.6.1 The design for the Proposed Development considered alternative technologies and layouts. In addition to selection of technology, the design for the Proposed Development considered a number of layout options. These options took into consideration the available land, existing constraints and included proximity to receptors, value engineering, future use of the site, visual impact.
- 3.6.2 As detailed in Section 3.1.6 of this EIAR chapter the 2022 EPA EIA Guidelines states that ‘...*The alternatives should be described with ‘an indication of the main reasons for selecting the chosen option’. It is generally sufficient to provide a broad description of each main alternative...*’.

Power Plant Area – Alternative Layouts

- 3.6.3 An area covering approximately 5.6 Hectares predominantly to the east of the R400 was predetermined for a thermal power plant area as part of the previous planning application. Upon examination of previous constraints and facilitators the existing Derrygreenagh Works was the only suitable option for a Power Plant Area due to the presence of made ground (i.e. lack of deep peat), road access and other considerations. While the general location of the plant did not change throughout the design process, a number of layouts within this area were explored, as discussed below.
- 3.6.4 An area was included on all of the options for carbon capture and storage based on current estimates from the OEMs in terms of designing a site that will be ready for retrofitting CCS technology as required under Article 36 of the Industrial Emissions Directive, except the 2010 Scheme.

Layout Review – Option A (2010 Consented Layout)

- 3.6.5 Option A was an exact replica of the 2010 consented layout. The layout is shown in plate 3.1.
- 3.6.6 In 2019 Bord na Móna commissioned Fichtner Consulting Engineers to carry out a OCGT and CCGT technology review (Document reference S2683-0030-0001). The report advised on current CCGT and OCGT market products, and changes that an updated planning permission would need to include to accommodate these products.
- 3.6.7 Following a project review exercise that took the 2019 report and updated geotechnical and topographical information etc into account it was determined that Option A was not a viable proposal in light of Best Available Techniques (BAT) for large scale thermal plants.

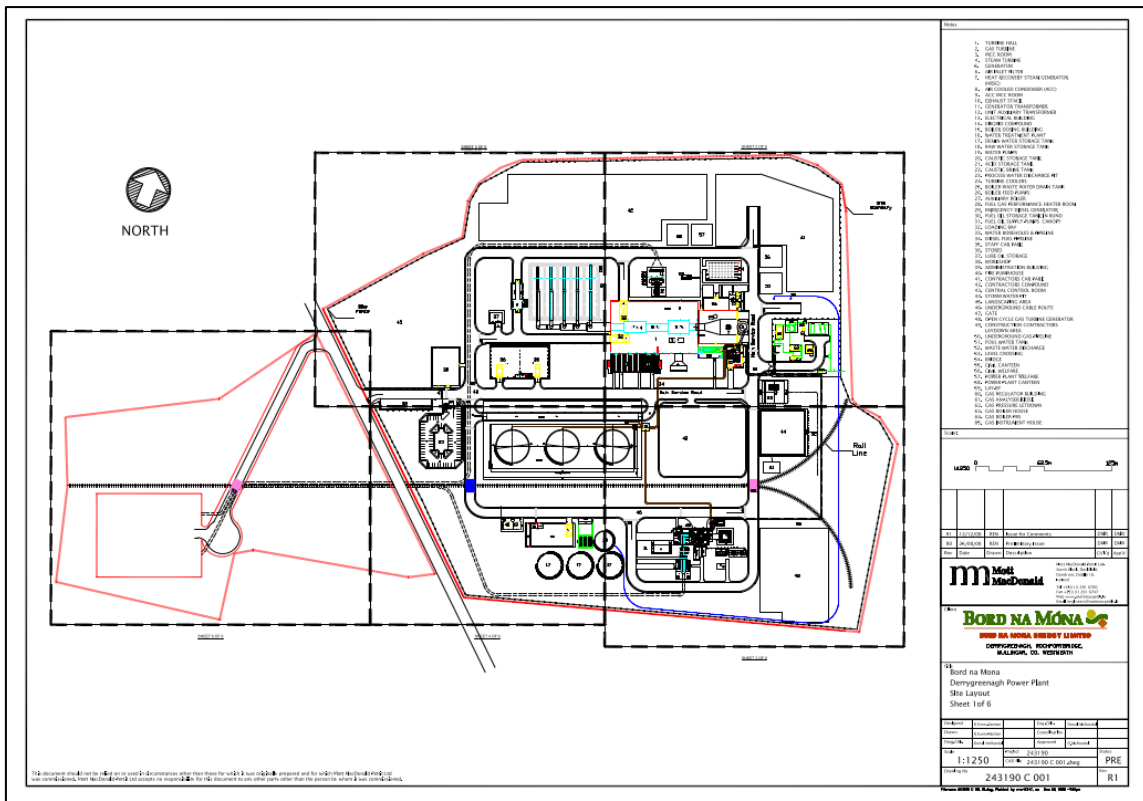


Plate 3.1: Power Plant Area Site Plan – Layout Option A

Layout Review – Proposed Final Layout (Revisions from 2010 Layout – Option A)

- 3.6.8 The Final layout was developed from a project review exercise that took the 2019 report and updated geotechnical and topographical information into account.
- 3.6.9 The Closed Cycle Gas Turbine (CCGT) unit is in the same general location as in the consented 2010 layout with the stack position having the same co-ordinates as in the 2010 layout.
- 3.6.10 The CCGT gas turbine intake (6) and CCGT power block electrical room (13) have been moved from the south to the north to reflect the standard layout of the majority of the OEM's.
- 3.6.11 The Air-Cooled Condenser (ACC) (8) has been increased in size to reflect the enhancement in the CCGT unit output since the 2010 planning application. The ACC Motor Control Centre (MCC) room has been located under the ACC in line with general practice.
- 3.6.12 The proposed Derrygreenagh Above Ground Infrastructure (AGI) (46) was moved from the east of the site to the northwest corner to reflect the preferred gas connection route.
- 3.6.13 The power plant gas reception facility has been located alongside the AGI for convenience. This area contains the pressure reduction station (53) for the CCGT plant and, if required, the gas compressor(s) and associated fin/fan coolers (54). The compressor station and ancillaries are space reserves should gas compression be required.
- 3.6.14 The fuel gas performance heater (28) has moved from the south to the north side of the CCGT unit as the gas supply is on the north side.

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- 3.6.15 The surface water attenuation tank has been moved to the northeast corner of the area to reflect the site topography and the discharge route to the Mongagh River.
- 3.6.16 The raw water pumps (19), water treatment plant (16) and associated tanks etc have been moved from the southwest to the west side of the Power Plant Area, adjacent to the raw water borehole location.
- 3.6.17 Ammonia solution tanks and pumphouse (41) have been located adjacent to the other chemical storage tanks to the south of the water treatment plant. A dedicated layby is provided for chemical unloading adjacent to the tanks. The ammonia solution tanks and pumphouse are space reserves should the need arise for Selective Catalytic Reduction to be fitted to the CCGT HRSG for NO_x level control.
- 3.6.18 The secondary fuel storage (30) has been consolidated into two tanks and they have been moved to the east.
- 3.6.19 The Open Cycle Gas Turbine (OCGT) has been moved from south of the railway line to the space freed up by moving the secondary fuel oil storage tank. This move has the advantage of providing a shorter cable route between the OCGT Generator transformer and the 220 kV substation as well as a more compact site arrangement.
- 3.6.20 The OCGT arrangement shows two gas turbine units. This reflects that the most likely technical solution will involve two gas turbine units either driving one generator or with a generator each. In the later case the output from both generators will be combined in the generator transformer providing a single output to the 220 kV substation. The two-generator option is shown on the site arrangement drawings.
- 3.6.21 The plant control room, changing room and most of the plant welfare facilities have been consolidated in the administration building (39). Welfare facilities are also provided in the workshop and stores building (34/36).
- 3.6.22 The process wastewater tank (23) and lube oil storage building (35) have been located to the east of the workshop and stores building for convenience.
- 3.6.23 The site access road has been moved north to provide better sightlines along the R400.
- 3.6.24 The car park (33) has been relocated from the south of the administration building to west of it. This reflects the revised location of the site access road.
- 3.6.25 The contractor's compound and laydown areas (47) have been consolidated into the north and southeast parts of the site.
- 3.6.26 An area for the outage contractors compound (40) is located in the north part of the site to the east of the gas receiving facility.

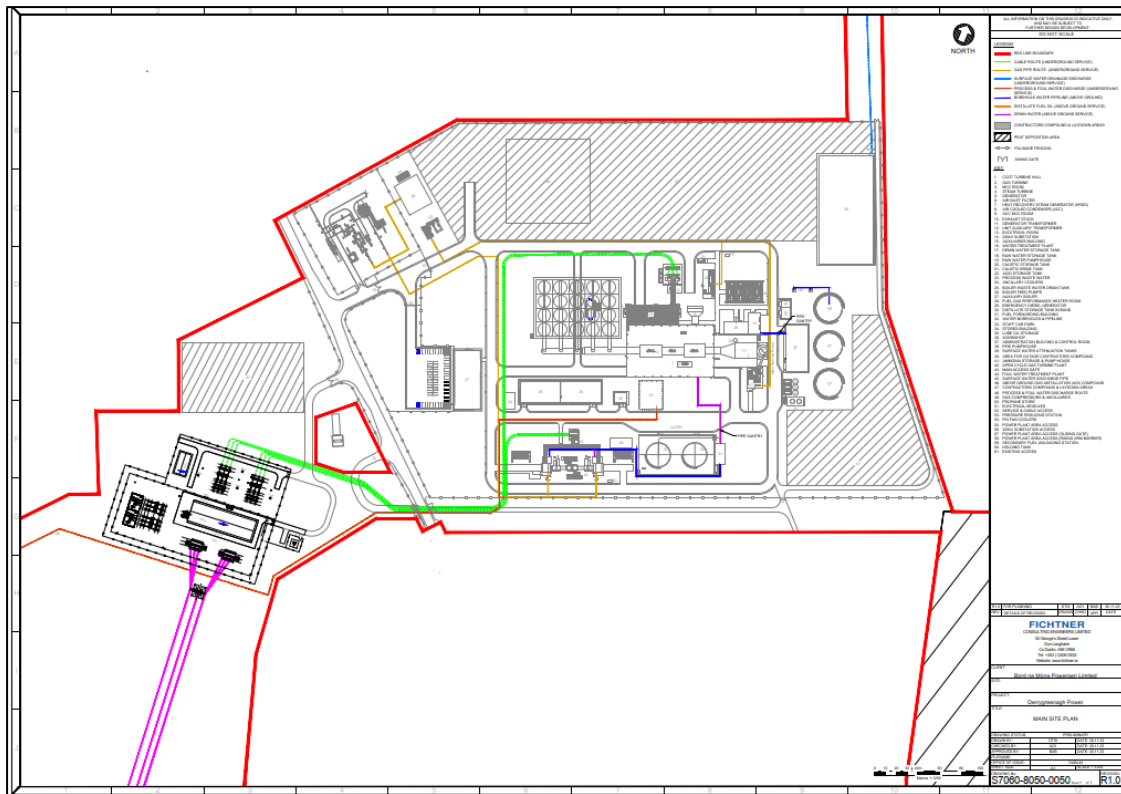


Plate 3.2 Power Plant Area Site Plan – Final Layout

Electricity Grid Connection – Alternative Layouts

Layout Review – 220kV Substation

3.6.27 The 220kV substation site is required to be located in close proximity to the Power Plant Area site. Any other route to the 400kV line other than through Bord na Móna was rejected and therefore the option west of the R400 road connecting to the power plant site and utilising the underpass underneath the road was the most favourable option appropriate for the proposed development. The site will utilise the existing access onto the R400, west of the R400 road and will allow for separate access for the TSO / TAO.

Layout Review – Overhead Grid Connection

3.6.28 This route has been chosen based on a desk top analysis and feasibility study conducted on known constraints. It is EirGrid policy that overhead lines are the preferred transmission infrastructure to be used for traversing peatland (both blanket and / or raised bogs). The main constraint on this route is the presence of water along the route and the land can be prone to flooding. Tower locations have been chosen taking this into account and require the installation of special foundations to allow for this.

3.6.29 The cable compound (the Line-Cable Interface Compound) location has been proposed due to proximity to a nearby access track under the ownership of Bord na Móna and its closeness to an existing tree line reducing its visibility from surrounding dwellings. The underground cable option from the compound to the 400kV substation follows along the route of the existing railway line and machine pass, beneath the L1010 road and the rail line south of the L10101. The underground grid connection cable will ensure minimal disruption to nearby sensitive receptors. The nearest sensitive receptor to the Underground Grid Connection Cable is located approximately 1km from the route. The use of an underground cable route will also avoid the requirement for crossing or interfering with the existing 110kV overhead line. Other cable routes considered for the

other 400kV substation options were no longer considered when the alternative substation sites were determined to be not suitable.

Layout Review – 400kV Substation

- 3.6.30 The original preference for the 400kV substation was to keep the entire footprint on Bord na Móna land, but as outlined in Section 3.6.28, the section of bog at the 400kV line was deemed unsuitable for development based on ecological constraints.
- 3.6.31 A number of other options were considered along the 400kV line on the basis of a desktop study against a variety of criteria including reasonable distance from the cable route off Bord na Mona lands, available area under the 400kV line for a GIS type substation (which allowed greater flexibility given its lower footprint, topography for contribution to visual impact, location of watercourse and risk of flooding, accessibility from project or public road network and any environmental constraints). On the basis of a preliminary landscape study, GIS options with mitigation measures implemented are considered to be very effective to reduce potential for significant visual impacts to occur. See Table 3.3 below on comparison of options based on key considerations and environmental effects.

Gas Connection Corridor – Alternative Layouts

- 3.6.32 The Gas Connection Corridor is part of the Overall Project and will enable the Proposed Development to connect to the existing high pressure Gas Pipeline to the West (BGE/77), and north of the Power Plant Area via AGI at the tie-in location and underground routing of pipeline. The underground gas connection is not being applied for in the planning application for the Proposed Development (as it will be applied for by Gas Networks Ireland), however the underground connection corridor and construction and operation is assessed in this EIAR as part of the Overall Project Site.
- 3.6.33 The route of the Gas Connection Corridor chosen for assessment within the EIAR is a relatively direct route between the Power Plant Area and the Gas Pipeline to the West (BGE/77) and relatively unconstrained through mainly agricultural land suitable for pipeline construction. A trenchless crossing of the M6 motorway is required and a section of the route is proposed within the R400 public road using conventional construction methods.
- 3.6.34 The final route of the underground gas connection will be determined and applied for by Gas Networks Ireland and as such alternative corridor routes have not been considered in this EIAR.

3.7 Comparison of Key Considerations and Environmental Effects

3.7.1 A comparison of key considerations and relevant environmental effects between the reasonable alternatives studied is presented below in Table 3.2. The environmental effects of key considerations have been appraised alongside technical and commercial considerations.

Power Plant Area

3.7.2 The specific location within the Site was chosen due to its availability in having built infrastructure and/or plant in place and provides the required footprint area for the Power Plant area and its associated infrastructure.

Table 3.1: Layout Design – Key Considerations

DESCRIPTION OF DESIGN ELEMENT	SUMMARY OF OPTIONS CONSIDERED	COMPARISON OF EFFECTS	OUTCOME
Sizing of Proposed Development	The size of the proposed development (Final Layout) is a commercial, technical and planning based selection on the basis of available technology, the capacity of gas import available to the onsite AGI, and the export capacity to the power grid.	The condensed footprint associated with the Final Layout allows for more optionality on future use of Bord na Móna lands	There is availability in the market to meet the range of requirements at the output outlined and flexibility of operation in accordance with requirements.
CCGT Positioning	The CCGT is generally in the same location as the 2010 scheme	Some aspects of the CCGT plant are larger such as the heat recovery stream generator and ACC due to the larger output units available.	Operations can allow for flexibility in build out an operation to respond to power market capacity requirements.
OCGT Positioning	The OCGT has been moved from the 2010 Scheme (Layout A) to allow for efficiencies in design (Final Layout) and flexibility on technology selection.	Movement of the OCGT reduces the visual impact of the proposed development	The Final Layout is optimal design for engineering and landscape or visual impact
Emissions stack height	The Air Dispersion model was carried out at the stack heights in the extant planning permission	The stack heights are considered optimal as regards impact on air quality.	Air Dispersion Modelling determined that 65m stack height for CCGT and 45m stack height for OCGT are optimal in balancing the visual impacts against further benefit to air quality from human health or ecological receptors. The size of the unit and temperature at the stack and type of structures
AGI Location	The AGI for the proposed development is optimal location for receiving the gas	The AGI has been appropriately sized for the Final Layout	AGI appropriate for GNI purposes during construction and operation.

DESCRIPTION OF DESIGN ELEMENT	SUMMARY OF OPTIONS CONSIDERED	COMPARISON OF EFFECTS	OUTCOME
	pipeline connection from the preferred option outlined by GNI (TAO) with appropriate setback from the plant gas turbines as required.		

3.7.3 A summary of the environmental effects against the key environmental topics in this EIAR is presented in qualitative terms below in Table 3.2 in relation to the Power Plant Area.

Table 3.2: Review of Layout Options - Power Plant Area

ENVIRONMENTAL TOPIC	POWER PLANT AREA ALTERNATIVE LAYOUT OPTION A (2010 LAYOUT)	POWER PLANT AREA ALTERNATIVE LAYOUT FINAL OPTION
Population & Human Health	The main determinant for impact is location and the site on Derrygreenagh Power Plant is >500m from the nearest sensitive receptor which is advantageous regarding impacts.	The main determinant for impact is location and the site on Derrygreenagh Power plant is >500m from the nearest sensitive receptor which is advantageous regarding impacts. The condensed layout should improve the landscape and visual impact from the proposed power plant development.
Air and Climate	Balance between landscape and visual impact versus air dispersions. Determined by the air dispersion modelling in relation to impact on sensitive receptors.	Balance between landscape and visual impact versus air dispersions. Determined by the air dispersion modelling in relation to impact on sensitive receptors.
Cultural Heritage	The option would not present any cultural heritage constraints of significance.	The option would not present any cultural heritage constraints of significance.
Biodiversity	The site will require site and clearance and demolition of the Derrygreenagh Works site. Appropriate consideration on mitigation as required for bats, existing	The site will require site and clearance and demolition of the Derrygreenagh Works site. Appropriate consideration on mitigation as required for bats, existing. Condensed nature of the site will allow for retaining of mature trees to the south of the site.
Landscape and Visual	Site location is advantageous regarding impact on landscape and visual impact	Site location is advantageous regarding impact on landscape and visual impact Condensed nature of the should help reduce the visual impact from the site.
Noise and Vibration	Site location is advantageous regarding noise impact on sensitive receptors.	Site location is advantageous regarding noise impact on sensitive receptors.
Water Environment	Site location is advantageous regarding impact on water environment.	The surface water discharge to the Mongagh River is proposed to be piped directly.
Soils and Geology	No constraints of significance to soil and geology.	No constraints of significance to soil and geology.
Traffic	No constraints of significance to traffic.	Proposal for additional access onto the R400 road for benefit of GNI

ENVIRONMENTAL TOPIC	POWER PLANT AREA ALTERNATIVE LAYOUT OPTION A (2010 LAYOUT)	POWER PLANT AREA ALTERNATIVE LAYOUT FINAL OPTION
Land Use	No land use constraints.	No land use constraints, though the layout allows for more optionality for future use of Bord na Móna lands.
Material Assets	No material assets constraints.	Proposal for additional access onto the R400 road for benefit of GNI.

Electricity Grid Connection

220kV Substation

- 3.7.4 The 220kV configuration has evolved to accommodate and tie in with the Power Plant Area and the overall route of the grid connection.

Overhead Grid Connection

- 3.7.5 The route design chosen is a hybrid of overhead line (c. 5km) and underground cable (c. 2.4km – 3.4km) connected by a Line-Cable Interface Compound with associated connections. It is EiGrid policy (220kV and 400kV Underground Cable Functional Specification Document (2021) Reference: CDS-GFS-00-001-R1 110kV) that overhead lines are the preferred transmission infrastructure to be used for traversing peatland (both blanket and / or raised bogs).

Underground Grid connection

- 3.7.6 As above the route design chosen is a hybrid of overhead line (c. 5km) and underground cable (c. 2.4km – 3.4km) connected by a Line-Cable Interface Compound with associated connections. It is EiGrid policy (220kV and 400kV Underground Cable Functional Specification Document (2021) Reference: CDS-GFS-00-001-R1 110kV) that overhead lines are the preferred transmission infrastructure to be used for traversing peatland (both blanket and / or raised bogs).

400kV Substation

- 3.7.7 The 400kV configuration has evolved to accommodate the Power Plant Location and the overall route of the grid connection. Table 3.3 shows the reviews of the layout options for the 400kV substation.

Table 3.3: Review of Layout Options – 400Kv Substation.

ENVIRONMENTAL- TOPIC	ALTERNATIVE LOCATION		
	OPTION 1 (FINAL LAYOUT) WEST OF BALLYBEG BOG, NORTH OF 400KV LINE	OPTION 2 EAST OF BALLYBEG BOG, NORTH OF 400KV LINE	OPTION 3 FURTHER WEST OF BALLYBEG BOG SOUTH OF 400KV LINE
Population & Human Health	Sensitive receptors, 2 within 500m, 15 within 750 of substation option. Immediate access from the cable route and off the L1010 road.	Sensitive receptors, 11 within 500m, 46 within 750 of substation option. Disruption in the construction phase on L1010 road for cable route, longer cable route requirements through third party lands and additional access requirement off R400 road south of Rhode.	Sensitive receptors, 2 within 500m, 15 within 750 of substation option. Longer cable route and access road required through third party lands from the cable route.
Biodiversity	Habitat is GA1 improved grassland.	Habitat is GA1 improved grassland.	Habitat is GA1 improved grassland.
Land, Soils & Geology	Mix of limestone till and drained peat soil, limestone bedrock (Lucan formation)	Mix of limestone till and drained peat soil, limestone bedrock (Edenderry Oolite)	Predominantly limestone till, limestone bedrock (Lucan formation)
Water (Hydrology & Hydrogeology)	Medium GW vulnerability, local drainage arrangements	Medium GW vulnerability, local drainage arrangements	Medium to high GW vulnerability, local drainage arrangements. Least suitable option for flood risk, additional design considerations required.
Air & Climate	Proposed substation is within cable length of 400kV line- which reduces the grid connection construction build out period and infrastructure/footprint and reduces dust generation and emissions as vehicles are onsite for the shorter grid connection construction period.	Proposed substation is within cable length of 400kV line- which reduces the grid connection construction build out period and infrastructure/footprint and reduces dust generation and emissions as vehicles are onsite for the shorter grid connection construction period. Additional construction required for longer cable route and requirement for access from R400 road, additional traffic movements.	Proposed substation is within cable length of 400kV line- which reduces the grid connection construction build out period and infrastructure/footprint and reduces dust generation and emissions as vehicles are onsite for the shorter grid connection construction period. Additional construction required for longer cable route

ENVIRONMENTAL- TOPIC	ALTERNATIVE LOCATION OPTION 1 (FINAL LAYOUT) WEST OF BALLYBEG BOG, NORTH OF 400KV LINE	ALTERNATIVE LOCATION OPTION 2 EAST OF BALLYBEG BOG, NORTH OF 400KV LINE	ALTERNATIVE LOCATION OPTION 3 FURTHER WEST OF BALLYBEG BOG SOUTH OF 400KV LINE
Noise & Vibration	Lower consideration for nearby sensitive receptors.	Greatest consideration for nearby sensitive receptors	Lower consideration for nearby sensitive receptors.
Landscape & Visual	Screened from the vantage of Croghan Hill. Through micro-siting and design, Option 1 substation is the preferred option. The location is c. 400m from the Grand Canal pNHA.	Visible from more vantage points than the other options. The location is c. 470m from the Grand Canal pNHA.	The location is c. 300 from the Grand Canal pNHA.
Cultural Heritage & Archaeology	No recorded archaeological sites within the immediate vicinity	Archaeological and architectural features at Toberdaly. Recorded archaeological remains within the vicinity of substation site not related to Toberdaly House. The location has potential to contain unrecorded archaeological remains.	No recorded archaeological sites within the immediate vicinity. Slightly greater potential to impact on unknown subsurface archaeology due to longer cable route.
Material Assets	Least disruption to roads and shortest cable route.	Disruption of the L1010 road during construction phase c. 1.2 – 1.5km. Less efficient construction practices as additional underground cable required	Less efficient construction practices as additional underground cable required

Gas Connection Corridor

3.7.8 The Gas Connection Corridor is part of the Overall Project and will enable the Proposed Development to connect to the existing high pressure Gas Pipeline to the West (BGE/77), and north of the Power Plant Area via AGI at tie-in location and underground routing of pipeline. The underground gas connection is not being applied for in the planning application for the Proposed Development (as it will be applied for by Gas Networks Ireland), however the underground connection corridor and construction and operation is assessed in this EIAR as part of the Overall Project Site.

3.8 Design Option Process Summary

3.8.1 The design process for the Proposed Development considered alternative layouts and technologies as detailed above.

3.8.2 Preliminary appraisal was undertaken through desk based and site assessments to inform the design option process. Formal consultations have been undertaken prior to the submission of this EiAR, and lands in the immediate vicinity of and within the Proposed Development Site have been the subject of a planning application for separate power related development in recent years, which has included the submission of an EIS and a grant of consent for a power plant project. In the preparation of this EiAR, cognisance has been undertaken of relevant formal consultation, consultee responses and third-party comments in relation to that separate project and this current project.

Power Plant Area

3.8.3 The design of the Proposed Development was established taking into account the availability of suitable land within the existing Site, the most commercially and technically suitable technology to support security of supply, and site constraints including existing infrastructure and location of and proximity to the existing electrical substation.

3.8.4 The design evolution of the Proposed Development demonstrates that alternative fuels, technologies, and layouts were considered in the development of the design for the Proposed Development site, proposing and configuring technology to meet the needs of the energy market and utilising the space available.

Electricity Grid Connection

3.8.5 The route design chosen is a hybrid of overhead line (c. 5km) and underground cable (c. 2.4km – 3.4km) connected by a Line-Cable Interface Compound with associated connections. It is EiGrid policy (220kV and 400kV Underground Cable Functional Specification Document (2021) Reference: CDS-GFS-00-001-R1 110kV) that overhead lines are the preferred transmission infrastructure to be used for traversing peatland (both blanket and / or raised bogs).

3.8.6 The type and nature of the electricity grid connection is selected from a balance of considerations including available area, visual impact, ground conditions, local watercourses, access to the site, environmental constraints, efficiency of operation, maintenance, cost, and cumulative developments.

Temporary Construction Works

3.8.7 There will be a temporary construction contractors compound serving the Power Plant Area and an additional 2 no. temporary construction compounds serving the electricity grid connection in the construction phases. All sites chosen are appropriately sized, located in close proximity to each element of the development and located to facilitate ease of access from public roads.

Gas Connection Corridor

3.8.8 Gas Connection Corridor is not being applied for in the planning application for the Proposed Development (as it will be applied for by Gas Networks Ireland (GNI) under separate consenting processes). The route of the Gas Connection Corridor is the preferred route, as indicated by GNI, at the time of writing but may be subject to change as part of the detailed design process to be carried out. Similarly, the technical solutions and design of the Gas Connection Corridor may be subject to change.

3.9 References

European Union Planning and Development (Environmental Impact Assessment) Regulations 2018 S.I. No. 296/2018

Government of Ireland, (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment <https://www.opr.ie/wp-content/uploads/2019/08/2018-Environmental-Impact-Assessment-1.pdf>

Environmental Protection Agency (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports https://www.epa.ie/publications/monitoringassessment/assessment/EIAR_Guidelines_2022_Web.pdf

Government of Ireland (2021), Policy Statement on Security of Electricity Supply

Environmental Protection Agency (2022) Draft Guidance on Article 15 of Industrial Emissions Directive (2010/75/EU) draft_guidance_art15_IED.pdf (epa.ie)

Eirgrid, 220kV and 400kV Underground Cable Functional Specification Document (2021) Reference: CDS-GFS-00-001-R1 110kV [Microsoft Word - EirGrid UGC Functional Specification - 110kV 220kV 400kV \(eirgridgroup.com\)](Microsoft Word - EirGrid UGC Functional Specification - 110kV 220kV 400kV (eirgridgroup.com))

Woodrow APEM Group (2023) Derrygreenagh Power – Constraints Surveys