3 Alternatives Considered

3.1 Introduction

This Chapter provides a description of the alternatives considered by ScottishPower Renewables (the Applicant) in the design of the Development. It considers the following:

- The location of the Development;
- The design of the Development;
- Grid Connection options;
- Alternative processes for the Development; and
- Alternative scales for the proposed turbines.

Alternatives were assessed taking commercial, construction, operational and key environmental constraints into consideration.

Figures supporting this Chapter are provided in **Volume III**.

3.2 Development Brief

The purpose of a windfarm development is to harness the power in the wind to generate electricity. The rationale is therefore to locate windfarms in areas exposed to high wind speeds, with turbines arranged in an optimum formation so as to maximise efficiency and energy output. However, this rationale alone does not take into account the potential environmental effects of a windfarm. The design of a windfarm must create a balance between achieving an acceptable level of environmental effects whilst maximising energy yield.

The Development Brief also includes the installation of an Energy Storage Unit (further details are provided in **Chapter 2: Development Description)**.

The Development Brief is therefore to design a repowered windfarm including an Energy Storage Unit, representing an optimum fit within the technical and environmental parameters of the Site, including maximising the use of existing infrastructure.

3.3 Methodology

3.3.1 Approach to Alternatives

The Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Union, 2017) states that reasonable alternatives "*must be relevant to the proposed project and its specific characteristics, and resources should only be spent on assessing these alternatives"* and that "*the selection of alternatives is limited in terms of feasibility. On the one hand, an alternative should not be ruled out simply because it would cause inconvenience or cost to the Developer. At the same time, if an alternative is very expensive or technically or legally difficult, it would be unreasonable to consider it to be a feasible alternative".*

The Draft EPA Guidelines state that "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 is deciding on the selected option."

3.4 Site Selection and Examination of Alternatives

3.4.1 Requirements for Alternatives Assessment

Article 5(3)(d) of the EIA Directive requires the following:

> *"outline of the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account the environmental effects".*

Article 5(1) of the Revised EIA Directive requires:

> "*Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least: ...*
>
> *(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment"*;

Annex IV of the Revised EIA Directive (Information Referred to in Article 5(1) (Information for the Environmental Impact Assessment Report) states that:

> "*… 2. A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studies by the developer, which are relevant for the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of environmental effects*".

The Revised EIA Directive Consultation states that transposition of these provisions are mandatory, and that:

> "*Guidance will be developed on the requirement to study reasonable alternatives, including reference to the fact that some alternatives may already have been studied in relevant SEAs. The guidance will also deal with relevant considerations, including 'do nothing' alternative(s), alternative site(s), alternative design(s)/layout(s), alternative processes(s), alternative mitigation measure(s). Reference will also be made to the requirement that "reasonable alternatives ... relevant to the project and its specific characteristics" are required to be studied*".

The Environmental Protection Agency, in its guidance document on EIS preparation[1] , stipulates the following:

> "*The presentation and consideration of the various alternatives investigated by the applicant is an important requirement of the EIA process…. and the alternatives can include:*
>
> - *alternative locations;*
> - *alternative designs; and*
> - *alternative processes".*

The nature of the obligation under the EIA Directive to assess "the main alternatives" was the subject of a CJEU ruling in November 2018 in *Holohan* (Case C-461/17). The CJEU was asked to consider whether the obligation meant that the developer must supply information on the environmental effects of the proposed development and of all of the main alternatives studied, even if some or all of those alternatives were rejected at an early stage. The CJEU held that the 'main' alternatives must be those which influence the environmental effects of the project, and it is irrelevant whether they were rejected at an early or later stage. The CJEU also confirmed that there is no need to carry out an environmental impact assessment of those main alternatives, as the Directive refers only to the developer providing an 'outline' to the competent authority. An outline must be provided of all of the main alternatives, and the developer must offer reasons for the choice, taking into account (i.e. specifically addressing) the environmental effects of that choice.

The CJEU did not consider the obligation to provide a description of the reasonable alternatives studied by the developer which are relevant to the project and its specific characteristics.

The presentation and consideration of the various reasonable alternatives investigated by the developer is an important requirement of the EIA process.

The objective is for the developer to present a representative range of the practicable alternatives considered which would achieve the project objectives. 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. As confirmed by the CJEU in *Holohan*, this does not require an EIA of each alternative considered.

In an effective EIA process, different types of alternatives may be considered at several key stages during the process. As environmental issues emerge during the preparation of the EIAR, alternative designs may need to be considered

[1] EPA. (2002). Guidelines on the information to be contained in Environmental Impact Statements.

early in the process or alternative mitigation options may need to be considered towards the end of the process. These various levels of alternatives are set out in this section of this document.

The following text provides information on the consideration of alternatives, including 'do nothing' (**Section 3.3.4**), alternative locations (**Section 3.3.5**), alternative designs / layouts (**Section 3.3.6**), and alternative processes (**Section 3.3.15**). Alternative mitigation measures are considered where appropriate in the EIAR technical chapters.

3.4.2 Site Selection Process

The Site is considered appropriate for the development of a repowered windfarm due to the following:

- The Site currently has the Operational Barnesmore Windfarm and from wind data collected on site to date, has proven good average wind speeds and generation capacity;
- The turbine technology on the Site is dated and more modern wind turbines are capable of producing more electricity using fewer turbines. The operational site has 25 turbines with a generation capacity of 15 MW but the Development would have 13 turbines and a capacity of over 65 MW;
- Much of the existing windfarm infrastructure can be reused for the Development which reduces environmental effects compared to an undeveloped greenfield site, particularly in relation to landscape and visual effects and effects on the peatland habitats;
- The Development can comply with the policies and principles outlined in Chapter 1: Introduction in terms of the need for additional renewable energy in Ireland;
- The Applicant has collected a significant amount of data relating to the Site and the local area and this information has been used during the Development design process, in particular in considering alternative design technologies such as the Energy Storage Unit;
- There is an existing Site Access Track for the Operational Barnesmore Windfarm which can be reused with small sections requiring realignment;
- The Development can contribute to the achievement of national energy targets; and
- Can provide significant social and economic benefits for the local area and the wider region.

3.4.3 Do-nothing Scenario

Under the 'do nothing' scenario, the existing 25 turbines of the Operational Barnesmore Windfarm would continue to operate as permission exists to operate in perpetuity. This would mean that the existing renewable energy capacity of 15 MW would likely be maintained, albeit with an incrementally increasing servicing and maintenance burden.

In addition to any changes arising from economic and agricultural policies and economic market conditions, it is predicted that biodiversity and the landscape are likely to undergo some level of change, as a result of climate change.

Owing to the complexities and uncertainties inherent in attempting to predict the nature and extent of such changes to landscape and biodiversity during the lifetime of the Development it has been assumed that the current Baseline Scenario will persist. It is considered that this represents a precautionary and appropriate approach for EIA purposes.

The Development will result in an increase in renewable energy generation and an additional saving of CO_2 per year over the existing windfarm or 'do nothing' scenario. The 'do nothing' scenario will therefore not additionally contribute to Ireland's commitment to meet its EU and national emissions targets and a significant potential use of County Donegal's renewable energy capacity will remain underutilised. The 'do nothing' scenario would fail to meet the objectives of the RED II insofar as it obliges member states to facilitate the repowering of existing renewable energy assets.

Additionally, the opportunity for development contributions would be lost and rates and investment in County Donegal would remain as per the existing lower capacity 15 MW Operational Barnesmore Windfarm, meaning the opportunity for increased rate revenues and community benefits from the increased capacity of the Development would be lost.

3.4.4 Alternative Locations

The Applicant has undertaken a review of their operational windfarm portfolio on sites approaching 20 years of operation with a view to determining if they should be decommissioned, the life extended or if there were opportunities for Repowering. It was then decided which of the sites should be taken forward for Repowering first. The Operational Barnesmore Windfarm was considered suitable for Repowering due to the success of the existing Site, the age of the existing turbines, the wind regime on Site and access to grid infrastructure.

The land is under the ownership of the Applicant and the Development is for Repowering of the Operational Barnesmore Windfarm with newer, more modern and efficient technology and therefore, an assessment of alternative locations is not considered to be applicable in this instance.

However, a number of studies were undertaken in 2017 and 2018 to assess the potential for the Site to be repowered for an increased capacity windfarm. To this end, ecological, ornithological and landscape and visual assessments were carried out as part of an overall feasibility study for the site. The main design results of this are outlined in the Section below.

3.4.5 Alternative Layout Designs

3.4.5.1 Feasibility Study Designs

In 2013, the Applicant commissioned an initial feasibility study of the Operational Barnesmore Windfarm to consider its suitability for Repowering. This identified that, due to the surrounding NHA designation, any repower would be required to reuse as much of the existing infrastructure as possible to reduce any impacts on the peatland habitats which surround the existing infrastructure. It advised that there was good potential to repower the windfarm, however recommended that further research and consultation be undertaken to confirm key assumptions in the report.

It was recognised that closely reusing the existing footprint of the Operational Barnesmore Windfarm for the Development would likely constrain the ability to have a landscape and visual-led site design approach, as the opportunity to horizontally relocate turbine locations is limited. Therefore, in 2017 a further Feasibility Study was commissioned to specifically consider the Landscape and Visual aspects of the repower concept design. This report was primarily focused on considering what turbine typology could be deployed on the site as well as exploring the limited options for alternative layout of turbines.

Subsequent to this, a Transport and Access Study was also undertaken to confirm that the components associated with the recommended turbine typologies could be successfully delivered to the Site.

Site constraints considered in the feasibility studies included:

- Following the existing Site Access Tracks and locating new infrastructure within or as close to existing infrastructure as possible;
- Minimising encroachment into the NHA and avoiding more sensitive areas of peatland habitats;
- Avoiding areas of steep slope or potentially unstable ground;
- Maintain separation from natural watercourses and waterbodies present on the Site;
- Constraints in relation to local and national planning policy and wind energy guidance with regard to separation from dwellings, avoidance of landscape designations etc.;
- Maintaining sufficient physical spacing for turbines to operate in a productive and efficient manner;
- Proposed turbines should be located no further west within the Site than current turbines in order to provide physical separation with, and reduce visual effects upon residential properties to the west;
- First principles assessment of the potential for a repower to impact upon any local designations; and
- Scale of the landscape and capacity to receive larger modern turbines.

Through the feasibility process, 3 separate concept layouts were reviewed following the criteria above. Layout No. 1 resulted in a 12 turbine layout with the following results:

- All proposed turbines were located adjacent to existing Site Access Track network and / or pads associated with the existing windfarm to minimise potential landscape impacts;
- A single turbine within the northern portion of the layout was located within land categorised as EHSA;
- 4 turbines were located on land defined (at that time) as ‘Not Acceptable’ for wind energy proposals;
- A single turbine was located in close proximity to the existing Substation; and
- A single turbine was located in close proximity to the overhead Grid Connection line.

Refer to **Figure 3.1**.

Layout No. 2, **Figure 3.1,** resulted in a 12 turbine layout which sought to locate all turbines within the area defined (at that time) as ‘Acceptable for Augmentation’ for wind energy development in the Donegal County Development Plan. It was found that sufficient spacing could not be achieved between turbines for them to operate efficiently and that such a layout would lead to increased landscape and visual issues for the Development.

Layout No. 3 resulted in a 12 turbine layout (refer to **Figure 3.1**.) the results of which are as follows:

- All turbines were located adjacent to existing Site Access Track network and / or Turbine Hardstands associated with existing windfarm to minimise potential landscape impacts;
- All turbines were located within land not categorised as EHSA;
- Movement of turbines to provide increased separation between existing Substation facility and overhead lines;
- Turbines were located to provide separation between turbine location and the EHSA area and Barnesmore Gap; and
- Turbine spacing of 400m downwind and 300m crosswind applied to the indicative layout to maximise potential output from turbine locations (dependent upon chosen rotor diameters).

The Landscape and Visual Feasibility Report went on to consider the implications of a range of turbine sizes with regard to the landscape capacity of the Site. They advised that the larger proposed tip heights could be accommodated by the landscape, although would be more visually distinct than smaller ones.

The Site feasibility process resulted in a 12 turbine layout (Layout 3). This layout was taken forward into the Site design and EIA process, such as habitat and flora and fauna surveys, ornithological surveys, consultation with telecommunications operators, archaeological studies, hydrology and hydrogeology and soil and geological assessment including peat probing and piezometers and observations in terms of slope stability.

3.4.6 Key Environmental Considerations

The specific environmental factors considered in the design of the Development are set out in the following Chapters for each technical discipline.

3.4.6.1 Landscape and Visual

Landscape and visual effects have been a key consideration throughout the design process taking account of positioning and scale of the turbines. To this end, a number of key design viewpoints were identified, including:

- Views from Lough Eske;
- Views from Lough Derg; and
- Views from the N15 at Barnesmore Gap.

Donegal County Council were consulted on the full list of proposed viewpoint locations as part of the Scoping consultation process.

The landscape and visual design objectives were as follows:

- To consider the latest wind turbine technology available, larger rotor sizes and turbine hub heights to arrive at a turbine tip height considered appropriate for the Site;
- To create a visually legible design, taking account of other environmental and technical issues and constraints where relevant, and create a simple, positive layout, viewed consistently from different positions;
- To create a compact scheme which relates to the underlying landform, with turbines laid out to extend along the ridgeline;
- To reuse sections of the existing Site Access Track into the Operational Barnesmore Windfarm, minimising the need for additional Site Access Tracks; and
- To group turbines to create a balanced and coherent image, avoiding where possible ‘stacking’ or overlapping of turbine rotors in lines, favouring an evenly spaced and elevated group, that reflects the nature of the landscape.

3.4.6.2 Hydrology, Hydrogeology, Geology, Soils and Peat

As part of the EIA process, a desktop assessment was undertaken to identify all water features on the site that could potentially be affected by the Development. This was subsequently supplemented by site-based surveys to verify the findings of the desk based assessment and identify any features previously unidentified. The aim of this was to achieve a design layout that avoids significant effects on hydrological receptors. The following were considered:

- Areas of deep peat;
- Minimisation of watercourse crossings;
- Minimisation of new infrastructure in proximity to loughs;
- Achieve a buffer of 50 m from natural watercourses and 20 m from man-made drains;
- Avoidance of hydrologically sensitive areas of the Site; and
- Use of existing infrastructure where possible.

The presence of peat has been a key design consideration across the Site. Peat is present across the Site to varying depths. Peat is a carbon storage feature and is supported by bog vegetation on the surface which are valuable habitats as demonstrated by the NHA designation surrounding the existing infrastructure. Where possible, areas of active peat have been avoided and as much of the existing infrastructure from the Operational Barnesmore Windfarm has been reused as possible in the windfarm design. There has been continuous engagement with the NPWS throughout the process, including a site visit. The Irish Peatland Council were also consulted as part of the Scoping consultation process and their response has been considered in the design of the Development. There are areas of the Site where some erosion of the peat is evident from the existing infrastructure and this was considered a risk in the design of the Development and has been considered in the final layout.

3.4.6.3 Ecology and Fisheries

The Site, outside of the existing infrastructure, is located within the Barnesmore Bog NHA, designated, at the National level, for its blanket bog habitats. The Project team have worked with the NPWS to minimise potential effects on the blanket bog peatland habitats. The design has sought to reuse as much of the existing infrastructure as possible to minimise additional land take and therefore, effects on the peat on site. It is envisaged that areas of existing infrastructure which are not required for the Development will be restored to wet heath or similar habitat that will contribute to supporting the conservation status of the NHA.

3.4.6.4 Ornithology

Baseline ornithological surveys were undertaken during 2017, 2018 and 2019 to identify the use of the Site by bird species, in both winter and summer. This was a key consideration in the design of the Development with the key objective of minimising effects on birds, particularly in terms of disturbance and displacement of breeding birds and collision risk during both construction and operation. Consultation responses received from the NPWS and Bird Watch Ireland have also been taken into account in the assessment of ornithology in the EIAR.

3.4.6.5 Noise

Given the location of the Site, existing sensitive receptors are located over 1.6 km from the nearest existing turbine and significant effects relating to noise have not been observed. The design of the Development has sought to maintain this level of separation from sensitive receptors. The closest receptor to a proposed turbine is an abandoned house which is located 1.3 km to the west of the Site. Otherwise, the closest houses are located off the N15 to the northwest of the Site a minimum of 1.8 km from the nearest turbine.

The noise levels for the Development have been assessed using the methods defined by ETSU-R-97[2] and will be compliant with current and emerging noise limits such as those of the World Health Organisation (WHO)[3] contained in the draft revised Wind Energy Development Guidelines[4].

The Energy Storage Unit will emit relatively low levels of noise and its facility will be located as far as possible from sensitive receptors along with the upgraded 110 kV Substation.

3.4.6.6 Archaeology and Cultural Heritage

A desk-based assessment and site walkover was undertaken during the iterative design process and no known archaeological features were found to be present on Site. Therefore, archaeological and cultural heritage aspects were not considered to be a major constraint on the layout design.

3.4.6.7 2019 Design Evolution

The preliminary Site layout design for the Development was developed based on the results of previous feasibility studies. A key aim of the design strategy was to minimise effects on habitats and flora and fauna and therefore the design has attempted to keep within the existing infrastructure footprint as far as possible. The final turbine layout was developed through an iterative design process informed by the constraints identified during the feasibility study process

[2] ETSU for the DTI. (1996). ETSU-R-97: Acoustics-The Assessment & Rating of Noise from Wind Farms:
[3] WHO. (2018). Environmental Noise Guidelines for the European Region. Available at: http://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf?ua=1 (accessed on 27/11/19)
[4] Department of Housing, Planning and Local Government (2019), Draft Revised Wind Energy Development Guidelines. Available at https://www.housing.gov.ie/sites/default/files/public-consultation/files/draft_revised_wind_energy_development_guidelines_december_2019.pdf

and refined as the EIA progressed. This section details this design evolution. **Figure 3.2** shows the existing Operational Barnesmore Windfarm layout.

An iterative layout process was completed to optimise the Development. In total, seven variations of the concept layout were completed. Revisions 1 to 4 were for minor alterations to the layout such as a micro-siting of individual turbines and changes to the Development redline planning boundary. The main changes resulting from this process are now detailed:

- T5 & T6 moved from their original locations to avoid telecommunications links (Drumbar & Mongorry Links). The turbine was moved back to its original location following consultation with the operators of the links and review of additional environmental implications of the proposed alternative locations. (Refer to **Chapter 1: Introduction** for consultation responses).

- The concept layout was further developed in April 2019 where T13 was added. T13 was located to the south of the existing turbines of the Operational Barnesmore Windfarm adjacent to the main Site Access Track. The April 2019 layout is shown on **Figure 3.3**.

- Following Site visits undertaken in June 2019 by the Project team to ground truth the turbine locations, the concept layout was further revised with the aim of reducing the potential effects on peatland habitats, ornithology and peat depths and to avoid slopes in some areas where turbines had been located. This resulted in Concept Layout Revision 5 (**Figure 3.4**) which had the following alterations made to the layout of the Development:
    - The location of T1 was moved c. 20 m to the northwest to avoid a steep slope (14 to 5 degrees) and the Turbine Hardstand was reoriented to the northwest due to the slope and areas of deep peat (>2.4 m).
    - T2 was moved c. 20 m to the southwest to avoid a steep slope and to increase the buffer to a small lough.
    - The location of T3 was moved c. 70 m to the south of the proposed location onto an existing turning head area. This avoided a steep slope (up to c. 26 degrees) and increased separation to a small lough. The Turbine Hardstand was also orientated to the south to take in an area of the existing T15 Turbine Hardstand to minimise habitat loss in the peatland.
    - T5 was moved further to the north to the location of an existing turning head close to the existing T08. This was due to the presence of deep peat (5.7 m in some areas) and a steep slope (6 degrees) at the previous proposed location close to the existing T9.
    - The location of T6 was moved approximately 30 m to the north to avoid a steep slope and increase separation to the Freshwater Pearl Mussel catchment and to allow the Turbine Hardstand to be reoriented to the northwest to take advantage of an area of exposed rock and thus minimise disturbance to peatland habitat.
    - The location of T8 was moved from the access road between the existing T11 and T12 to the existing T12 Turbine Hardstand as this avoids streams in the vicinity and minimises peatland habitat loss by using more of the existing infrastructure.
    - T9 was moved to the east from the existing T22 location to the existing T23 location to avoid steep slopes and potential peat stability issues as a result and the need for large amounts of imported fill material and reduce erosion potential towards Lough Golagh.
    - The location of the Turbine Hardstand at T10 was reoriented to the west to minimise loss of peatland habitat.
    - The location of T12 was moved to the south of the existing road due to the presence of deep peat (> 3 m depth) on the proposed location to the north of the existing Site Access Track and the presence of cutover peat, more degraded habitat and rock close to the surface to the south of the Site Access Track.

Following further review of Layout 5, additional changes were made to the layout after consultation with turbine manufacturers. The results of this are shown on **Figure 3.4** which is Concept Layout 6 and are as follows:

- The location of T10 was moved approximately 290 m south down from the ridge to south of the existing Site Access Track to a location previously identified during the Project team Site visit. This is to maintain an appropriate spacing of the turbines between T9 and T10.

- T13 was moved approximately 21.5 m east to avoid a stream. The Turbine Hardstand at T13 was reoriented to the north to move the Turbine Hardstand further from streams and avoid the requirement to culvert one of the streams for the construction of the Turbine Hardstand.

The location of T7 was subsequently micro-sited approximately 25 m northeast to avoid a watercourse that crosses the road at the previously proposed turbine location. This resulted in Concept Layout 7.

The final proposed layout takes into consideration all significant on-site constraints and distances from houses. The layout is based on results of all geotechnical site investigations and environmental assessments undertaken prior to and as part of the EIA process. The iterative design process took account of findings at each stage of the EIA which were used to refine the design with the aim of minimising environmental effects. The final proposed layout has also taken account of feedback received from statutory and non-statutory consultees during the Scoping process undertaken in June and July 2019 as well as issues raised during the public consultation process. The main issues considered were:

- Habitats, particularly those related to the Natural Heritage Area (NHA);
- Ornithological considerations;
- Peat depths and slope stability;
- Hydrological and hydrogeological considerations;
- Views from sensitive locations in the area;
- Noise Guideline recommendations;
- Turbine heights and capacity;
- Archaeological potential;
- Interference with telecommunications links; and
- Turbine spacing to maximise wind yield.

Throughout the design process, relevant guidance was followed such as Wind Energy Development Guidelines (DoEHLG, 2006), Best Practice Guidelines for the Irish Wind Energy Industry (IWEA, 2012); Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2017), and the Interim Guidelines for Planning Authorities on Statutory Plans, Renewable Energy and Climate Change – July 2017. The Donegal County Development Plan (CDP) policies and guidance were also considered (although replacement wind energy policy is currently being developed).

3.4.7 Haul Route & Access

The Haul Route is from Killybegs Harbour. Other ports were considered, including Foyle Port in Derry, Foynes Port in County Limerick, Belfast Harbour and Dublin Port. Killybegs Harbour is considered to be the best option due to its proximity to the Site and its proven success when previously used by other windfarm developments nearby.

This reduces the likely requirements for additional works on the Haul Route and associated disturbance to the general public and road users. Turbine component transportation is typically managed by the turbine manufacturer and they reserve the right to alter the Haul Route for abnormal loads should a better option become apparent at a later stage. Should this be the case, it would be arranged in consultation with the Council and TII and captured within the Transport Management Plan (TMP).

The route from the N15 to the Site is predominantly that used for a previous windfarm development in the local area. It is anticipated that some minor upgrade works will be required to deliver turbine components, should the largest of the candidate turbines be chosen. There is no better alternative to these works given the constraints present on all other potential routes to the Site.

3.4.8 Site Access Tracks

Existing Site Access Tracks for access to the existing turbines will be used to access the proposed turbines. Construction of new Site Access Tracks to turbine locations across the Development Site would likely result in unacceptable significant effects on the peatland habitat of the NHA and is therefore not a viable option.

3.4.9 Grid Connection

The Commissioner for Regulation of Utilities has approved the Enduring Connection Policy (ECP-1) process, which replaces the previous Gate or group processing approach to grid connection. In order to participate in the ECP process, it is necessary to have a prior grant of planning permission for the site. In processing connection applications and

modifications, ESBN and / or EirGrid must give due consideration to the efficient development of the transmission and distribution networks but must also give due regard to the environment.

Following initial consultation with EirGrid the following connection options were identified:

1. Maintain the existing T-connection with minimal upgrade to EirGrid/ESB Networks compound except for new controllability and signal requirements;
2. 110 kV tailed connection using the existing 110 kV line from Golagh substation, removal of the T connection point and instead running a new short section of cable into Clogher substation from the existing T connection location. This would also require some upgrade of the existing Golagh 110 kV substation; or
3. 110 kV loop-in connection which would require an upgrade to Golagh substation to a 3 bay substation and a new second 110 kV circuit connected to the Letterkenny – Clogher 110 kV overhead line or connected directly to Clogher 110 kV substation.

The key criteria in selecting the route options were as follows:

- Minimisation of environmental constraints, particularly the blanket bog and peatland habitats and Freshwater Pearl Mussel habitat.
- Minimisation of watercourse crossings, particularly in the Freshwater Pearl Mussel catchment.
- Minimisation of disruption to local residents.
- Minimisation of traffic and transportation obstruction.
- Outcomes of engagement with landowners.
- Have regard to the requirement to deliver the Grid Connection on the basis of the least cost, technically feasible option (which in itself considers environmental constraints).

From consideration of the viable options, the best option is deemed to be Option 2 outlined above, as this offers significantly reduced environmental effects in comparison with the other viable alternatives. Upgrade of the existing 110 kV Golagh Substation rather than construction of a new 110 kV substation will mean reduced environmental effects due to its smaller land take in peatland habitat. Refer to **Figure 2.13**.

The Operational Barnesmore Windfarm is currently connected to the Cathaleen's Fall-Golagh Tee 110 kV Overhead Line (OHL). It is proposed to reconfigure this OHL to connect directly to the 110 kV Clogher Substation, removing the tee-connection with the Cathaleen's Fall – Letterkenny line as the current arrangement does not have the capacity for the increased Maximum Export Capacity (MEC) of the repowered windfarm. This will involve the construction of a new cable interface tower between Structure 130T and structure 310. Refer to **Figure 3.5**.

3.4.10 Energy Storage Unit

The Development includes an Energy Storage Unit capable of storing up to 15 MW of renewable energy. The Energy Storage Unit will allow excess energy to be stored and provide enhanced services to the grid operators. The location of this Unit is proposed to be on land to the west of the existing 110 kV Substation on site. There is limited scope for alternatives to the location of this facility given that it needs to be located as close as possible to the (existing) onsite Substation. The location of the Unit is shown on **Figure 1.2**.

3.4.11 Borrow Pits

Due to the peatland habitats and NHA designation on parts of the infrastructure locations, borrow pits are not proposed for the Development. Rock materials for construction of the Turbine Hardstands, Substation and Energy Storage Unit and upgrades of the existing Site Access Tracks will need to be imported to the Site from local authorised quarries.

3.4.12 Temporary Construction Compound

The Temporary Construction Compound is proposed to be located close to the existing Substation and operational control compound on the Site. Once the turbines have been erected and commissioned, the site of the Temporary Construction Compound will be used for the location of the Energy Storage Unit.

3.4.13 Operation and Maintenance Facility

The construction of an operation and maintenance (O&M) facility was considered during the design process but was discounted to reduce effects on the peatland habitat of the Site.

3.4.14 Alternative Processes

Alternatives processes are with respect to alternative technologies for the generation of electricity for supply to the national grid. EIAR **Chapter 4: Planning Policy Context** provides context for the international and national policy for increasing electricity generation from renewable energy sources, and specifically from repowering. This has a number of drivers and benefits such as the security of energy supply, security of the cost of electricity (due to variability of international fossil fuel costs), efficient renewable energy project delivery costs, and reducing emissions.

Consideration was given to the potential for solar, hydropower and alternative wind energy technologies such as vertical axis turbines, however none of these are considered viable at the Site.

3.4.15 Alternative Mitigation

The mitigation measures proposed are detailed in the relevant technical chapters of the EIAR and are those that are considered to be best practice and most suitable for the Development, having regard to the potential effects identified.

3.5 Summary and Conclusions

The Site is currently used for the Operational Barnesmore Windfarm and is wholly in the ownership of the Applicant. The proposal is to repower the existing windfarm with less, more modern and efficient turbines to increase the installed capacity from 15 MW up to 76 MW. Through appropriate consideration of the reasonable alternatives, as outlined in this chapter, the Site has been shown to be a suitable location for the Development given consideration of the main criteria of distances from dwellings, wind speeds, potential environmental effects and available Grid Connection.