

## 3. CONSIDERATION OF REASONABLE ALTERNATIVES

### 3.1 Introduction

Article IV of the EIA Directive as amended by Directive 2014/52/EU states that the information provided in an Environmental Impact Assessment Report (EIAR) should include 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 environmental effects. The consideration of alternatives typically refers to alternative design, technology, location, size and scale.

This section of the EIAR contains a description of the reasonable alternatives that were considered for the proposed wind farm development in terms of site selection, other land-use options for the site as well as site layout and transport route options to the site. This section also outlines the design considerations in relation to the wind farm, including the associated substation, construction compound and borrow pits and indicates the main reasons for selecting the chosen option with regards to its environmental impacts.

The consideration of alternatives is an effective means of avoiding environmental impacts. As set out in the *'Draft Guidelines on The Information to be Contained in Environmental Impact Assessment Reports'* (Environmental Protection Agency, 2017), the presentation and consideration of reasonable alternatives investigated is an important part of the overall EIA process.

It is important to acknowledge that although the consideration of alternatives is an effective means of avoiding environmental impacts, there are the existence of difficulties and limitations when considering alternatives. These include hierarchy, non-environmental factors and site-specific issues as outlined below.

#### Hierarchy

EIA is concerned with projects. The Environmental Protection Agency's draft guidelines (EPA, 2017) state that in some instances neither the applicant nor the competent authority can be realistically expected to examine options that have already been previously determined by a higher authority, such as a national plan or regional programme for infrastructure which are examined by means of a Strategic Environmental Assessment (SEA), the higher tier form of environmental assessment.

#### Non-environmental Factors

EIA is confined to the potential significant environmental effects that influence consideration of alternatives. However, other non-environmental factors may have equal or overriding importance to the developer of a project, for example project economics, land availability, engineering feasibility or planning considerations.

#### Site-specific Issues

The EPA guidelines state that the consideration of alternatives also needs to be set within the parameters of the availability of the land, i.e. the site may be the only suitable land available to the developer, or the need for the project to accommodate demands or opportunities that are site-specific. Such considerations should be on the basis of alternatives within a site, for example design and layout.

## Methodology

The EU Guidance Document (EU, 2017) on the preparation of EIAR outlines the requirements of the EIA Directive and states that, in order to address the assessment of reasonable alternatives, the Developer needs to provide the following:

- A description of the reasonable alternatives studied; and
- An indication of the main reasons for selecting the chosen option with regards to their environmental impacts.

There is limited European and National guidance on what constitutes a ‘reasonable alternative’ however the EU Guidance Document (EU, 2017) states that reasonable alternatives “*must be relevant to the proposed project and its specific characteristics, and resources should only be spent assessing these alternatives*”.

The guidance also acknowledges 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 current Draft EPA Guidelines (EPA, 2017) 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 in deciding on the selected option. A detailed assessment (or ‘mini-EIA’) of each alternative is not required.*”

Consequently, taking consideration of the legislative and guidance requirements into account, this chapter addresses alternatives under the following headings:

- ‘Do Nothing’ Alternative;
- Alternative Locations;
- Alternative Layouts;
- Alternative Designs; and
- Alternative Mitigation Measures.

Each of these is addressed in the following sections.

When considering a wind farm development, given the intrinsic link between layout and design, the two will be considered together in this chapter.

## Consideration of Alternatives

### ‘Do-Nothing’ Option

Article IV, Part 3 of the EIA Directive states that the description of reasonable alternatives studied by the developer should include “an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.” This is referred to as the “do nothing” alternative. EU guidance (EU, 2017) states that this should involve the assessment of “an outline of what is likely to happen to the environment should the Project not be implemented – the so-called ‘do-nothing’ scenario.”

An alternative land-use option to the development of a renewable energy project at the proposed development site would be to leave the site as it is, with no changes made to existing land-use practices. If the proposed development were not to proceed, the site would continue to be managed under the

requirements of the relevant IPC licence, and existing commercial forestry, telecommunications and wind measurement would continue. The rail lines that supply peat to Derrinlough Briquette Factory would continue to be used until the manufacture of peat briquettes ceases.

When peat extraction activity ceases, a Rehabilitation Plan will be implemented in accordance with the IPC licence requirements, to environmentally stabilise the site through encouragement of re-vegetation of bare peat areas, with targeted active management being used to enhance re-vegetation and the creation of small wetland areas (if required).

In implementing the ‘Do-Nothing’ alternative, however, the opportunity to capture a significant part of County Offaly’s renewable energy resource would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions. The opportunity to generate local employment, a development contribution, rates and investment would also be lost. Also, the proposed amenity access points and associated carpark would not be constructed as part of the rehabilitation and therefore this recreational opportunity would be lost as well as the potential connectivity with Lough Boora Parklands. On the basis of the positive environmental effects arising from the project, the do-nothing scenario was not the chosen option.

### 3.3.2 Alternative Locations

Bord na Móna owns circa 80,000 hectares of land, primarily in the midlands of Ireland. An assessment of potential future uses of this landbank was published by Bord na Móna in 2011 in a document entitled 'Strategic Framework for the Future Use of Peatlands'. This report clearly identified the potential for the development of renewable energy (in particular Wind Energy) and other developments on Bord na Móna lands.

The Project Ireland 2040 National Planning Framework identifies a range of Key future planning and development and place-making policy priorities for the Eastern and Midland Region that includes:

*“Harnessing the potential of the region in renewable energy terms across the technological spectrum from wind and solar to biomass and, where applicable, wave energy, focusing in particular on the extensive tracts of publicly owned peat extraction areas in order to enable a managed transition of the local economies of such areas in gaining the economic benefits of greener energy.”*

Consequently, when considering suitable locations for the proposed development, the assessment was confined to lands within the Bord na Móna landholding only as these lands have been identified in a national and regional context as being suitable for this type of development. An examination of sites outside of the landholding was not included as part of the process.

The assessment carried out for the determination of a suitable location for the proposed development was a two-stage process. The first stage comprised the identification of a number of candidate sites while the second phase comprised a site-specific assessment. Each of these stages are described in the following sections.

#### 3.3.2.1 Selection of Candidate Sites

In order to identify candidate sites i.e. sites considered suitable for wind energy development, Bord na Móna conducted a technical review of lands which are either cut away or will be cut away before 2030. This involved desk studies and on-site surveys of the landbank. Known constraints were then applied across the landbank. The constraints applied were derived from various industry and regulatory guidelines, available Geographical Information Systems (GIS) datasets and on-site surveys (carried out as part of the peat extraction activity), and included the following:

- > Planning Policy Context;
- > Proximity to Sensitive Receptors;
- > Peat Depths;
- > Consistent suitable wind speeds;
- > Proximity to the national electricity grid; and
- > Proximity to Designated sites/Environmental Sensitivities.

This methodology was used to generate a list of potential sites for further consideration. Fifteen sites were identified as having a higher potential for wind energy development and were then brought forward for the site-specific assessment, as detailed overleaf.

A review of the Offer Process Application Information that is provided on the publicly available EirGrid website indicates a total of 18 Bord na Móna sites that were in the application process for grid connection under the Gate 3 mechanism. These sites are outlined in Table 3.1 below:

Table 3.1: Bord na Móna Grid Connection Applications (January 2016)

Bord na Móna Grid Connection Applications (Gate 3)	
Derryadd <sup>Note 1</sup>	Clorhane 1
Derryarogue <sup>Note 1</sup>	Clorhane 2
Clongawny	Coolnamona
Drinagh	Leamonoghan
Littleton	Derryarkin
Ballydermot 1	Garryhinch
Ballydermot 2	Timahoe 1 <sup>Note 1</sup>
Ballydermot 3	Timahoe 2
Lisclogher	Ballybeg

**Note 1:** At the time of the assessment the Derryadd and Derryarogue sites and the Timahoe 1 site had already been selected for development, Derryadd Wind Farm and Timahoe North Solar Farm, respectively. Therefore, these sites were not considered as part of the assessment for the proposed development.

### 3.3.2.2 Site Specific Assessments

The site-specific assessments were conducted by the Bord na Móna Powergen wind energy development team with input from other in-house experts where required e.g. the Bord na Móna Works Management, Central Engineering, Construction, Ecology and Land and Property teams. The aim of the site-specific assessments was to gauge the sites with the best potential to deliver a successful wind farm project by the early to mid-part of the next decade, i.e. 2020 - 2025. The ultimate end goal was to select a project to bring forward, for which preliminary engineering designs and a planning application could be prepared.

The site-specific assessment of the candidate sites was guided by the 2013 ‘*Methodology for Local Authority Renewable Energy Strategies*’ report from the Sustainable Energy Authority of Ireland (SEAI). For the site-specific assessment of candidate sites, a number of criteria were chosen which not only covered the broad range of issues which can arise in wind farm development but also allowed for direct comparison of the candidate sites to each other to determine their relative suitability for wind farm development.

The site-specific selection criteria and an outline of the basis for assessment for each criterion are listed in Table 3.2. The criteria can be regarded as either a constraint to the proposed development or a

facilitator for the proposed development. For example, the level of flooding at the site may reduce the available 'buildable' area or the lack of flooding may highlight the suitability of the site. The environmental effect of significant flooding may arise due to a requirement for deeper and more extensive drainage leading to potential downstream surface water impacts. In the case of Bord na Móna lands the existing onsite drainage is a facilitator to the project as surface water is already managed in accordance with the EPA administrated IPC licence.

Following selection of the criteria an assessment of each site was carried out under each criterion. Greater emphasis was given to key criteria such as environmental sensitivity, grid access/capacity, County Development Plans/zoning and proximity to houses. Following the assessment, the most suitable site (within the short list of suitable sites) was selected for the proposed wind energy development.

### 3.3.2.3 Site Selection Results

The findings of the site-specific assessment process, which included a comparison of the site selection criteria and potential environmental effects is provided in Table 3.3.

Of these sites, Derrinlough (Clongawny/Drinagh) was selected as a site with low potential for environmental effects similar to a number of the other sites on the list that met the relevant criteria. Due to the close proximity of potential grid connection (and resulting environmental and project viability benefits), it was deemed that Derrinlough should be progressed for detailed assessment and planning consideration.

It is noteworthy that the process described in the preceding paragraphs is not a one-off assessment of the entire Bord na Móna landholding in terms of its suitability for renewable energy developments. The site selection process is revisited in its entirety for each individual project and the criteria updated to suit the technology type proposed and to take account of any changes that have occurred (i.e. policy, legislative, environmental etc.) since the previous site selection process was conducted.

Table 3.2: Site-specific Selection Criteria and Basis for Assessment

Criterion	Basis for Assessment	Potential Environmental Effect
<b>Grid Access/ Capacity</b>	Grid Access/Capacity means potential of the National Grid to accommodate future projects on the network. The proximity of the project to suitable grid nodes (i.e. those with spare capacity) should facilitate the selection of a project for a viable grid connection offer.	<b>Direct:</b> Land, Soil and Geology, Hydrology and Hydrogeology, Biodiversity. <b>Indirect:</b> Noise and Vibration, Population and Human Health.
<b>Wind Resource Assessment</b>	The available wind resource (i.e. wind speed) directly translates into how much electrical output is available from the site.	<b>Direct:</b> Air Quality and Climate. <b>Indirect:</b> Air Quality and Climate.
<b>County Development Plans (CDP) and Zoning</b>	County Development Plans typically indicate the areas of a county which are deemed preferred, open to consideration and not suitable for wind farm development.	<b>Direct:</b> Landscape and Visual, Cultural Heritage, Biodiversity.
<b>Proximity to Houses</b>	Proximity to houses refers to how close the wind turbines are to residences.	<b>Direct:</b> Population and Human Health, Noise and Vibration, Shadow Flicker. <b>Indirect:</b> Landscape and Visual.
<b>Environmental Sensitivity</b>	Environmental Sensitivity is the ecological sensitivity of the site based on proximity to sensitive areas within or around the site.	<b>Direct:</b> Biodiversity. <b>Indirect:</b> Hydrology and Hydrogeology.
<b>Landscape Capacity/ Cumulative Impact</b>	This refers to the landscape’s capacity to absorb wind farm developments.	<b>Direct:</b> Landscape and Visual. <b>Indirect:</b> Cultural Heritage.
<b>Aviation</b>	Airspace control and use to be considered. For the assessment, the criterion examines proximity of the site to local and regional airports (including Casement Aerodrome),	<b>Direct:</b> Telecommunications, Aviation and Electromagnetic Frequency.

Criterion	Basis for Assessment	Potential Environmental Effect
	proximity to National Motorway network, parachute zone, Military Operating Areas etc.	
<b>Land Use</b>	Internal Bord na Móna consideration relating to the residual peat depth on-site, peat harvesting plans and alternative uses for each bog.	<b>Direct:</b> Cultural Heritage, Land, Soils and Geology, Hydrology and Hydrogeology, Biodiversity.
<b>Communications Infrastructure</b>	Telecoms masts and signals in the vicinity and across the sites to be considered.	<b>Direct:</b> Telecommunications, Aviation and Electromagnetic Frequency.
<b>Flood Plain Analysis</b>	Flood Plain Analysis assesses the wind farm's location in terms of historical flooding data. It also considers if the site is pumped or gravity drained.	<b>Direct:</b> Hydrology and Hydrogeology. <b>Indirect:</b> Traffic and Transportation.
<b>Supporting Infrastructure</b>	Proximity to national and regional road network Sites with better road access require less modifications or upgrade to the local infrastructure to facilitate construction or delivery of turbine components to site.	<b>Direct:</b> Traffic and Transportation. <b>Indirect:</b> Noise and Vibration, Air Quality and Climate.

Table 3.3: Site-specific Selection Criteria and associated potential effects

Candidate Sites	Grid Access/ Capacity	Wind Resource Assessment	CDP and Zoning	Proximity to Houses	Environmental Sensitivity	Landscape Capacity/ Cumulative Impact	Aviation	Land Use	Communications Infrastructure	Flood Plain Analysis	Supporting Infrastructure
Proposed Derrinlough Wind Farm Site (Clongawny and Drinagh Bogs)	Site is in close proximity to existing grid infrastructure with available grid capacity. A number of 110kV lines run close to the site.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups is typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Partially within an area open for consideration	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are generally designed for turbine setback distance of 750m or greater.	No Natura areas within the site, significant number of Natura sites in the wider area, mixture of low, medium and high value habitat within the site (large wetland in Drinagh East)	There are five windfarm sites (either constructed or consented) within 20km of the site.	The site is at a significant distance from local and regional airports as well as the main motorway network.	Significant areas (>75%) of the site have low levels of peat. There is a low level of commercial forestry at the site and also a large area of biodiversity.	There is a mast on adjacent lands.	The site is pumped. It has no recognised flood point in the local area.	The site has direct access to the N62 and R357.
Littleton	110 kV network runs to the west of the site but there is a lack of available capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups is typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	In an area, open for consideration	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are generally designed for turbine setback distance of 750m or greater.	No Natura areas within the site, Low to medium number of Natura sites in the wider area, mixture of low, medium and high value habitat within the site	There are nine windfarm sites (either constructed or consented) within 20km of the site.	The site is at a significant distance from local and regional airports. It is located in proximity to the main motorway network.	Significant areas (>75%) of the site have low levels of peat. There is a low level of commercial forestry at the site.	There are a number of masts on the mountains to the east	The site is pumped. It has no recognised flood point in the local area.	The site has restricted access to the regional roads but is on close proximity to the M8.
Ballydermot 1,2,3	110kV network runs to the west and south of Ballydermot bog. Potential available capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups is typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Offaly section in area open for consideration, Kildare sections in medium risk areas	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are generally designed for turbine setback distance of 750m or greater.	No Natura areas within the site, low level of Natura sites in the vicinity, mixture of low, medium and high value habitats within the site	There are four windfarm sites (either constructed or consented) within 20km of the site.	The eastern part of the site is in relatively close proximity to Casement Aerodrome.	Significant areas (>75%) of the site have low levels of peat. There is a low level of commercial forestry at the site.	There are a maximum of 5 links crossing the site.	The site is pumped. It has no recognised flood point in the local area.	The site has limited access to the regional and national road network.
Lislogher (Ballivor)	110kV network runs through centre of Ballivor bog group. Potential available capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups is typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Site within High risk area (Landscape) County Development specifies cutaway peatland for this type of development	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are generally designed for turbine setback distance of 750m or greater.	No Natura areas within the site, low level of Natura sites in the vicinity, mixture of low, medium and high value habitats within the site (excluding Lislogher west)	There is one windfarm site (either constructed or consented) within 20km of the site.	The site is at a significant distance from local and regional airports as well as the main motorway network.	Significant areas (>75%) of the site have low levels of peat. There are some areas dedicated to Biodiversity on the site.	There are 7 links that pass through the site that include a main regional telecoms link.	The site is not pumped. It has no recognised flood point in the local area	The site has access to the R159 regional road.

Candidate Sites	Grid Access/ Capacity	Wind Resource Assessment	CDP and Zoning	Proximity to Houses	Environmental Sensitivity	Landscape Capacity/ Cumulative Impact	Aviation	Land Use	Communications Infrastructure	Flood Plain Analysis	Supporting Infrastructure
Clorhane 1,2 (Blackwater)	Site is in close proximity to existing grid infrastructure at Shannonbridge with good available grid capacity. A number of 110kV lines run close to the site.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups is typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Partially in preferred area, partially within buffered area from Clonmacnoise	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are generally designed for turbine setback distance of 750m or greater.	No Natura areas within the site, high density of Natura sites in the local area, close proximity to the River Shannon, large areas of high value habitat within the site.	There are three windfarm sites (either constructed or consented) within 20km of the site. This site is also located near Clonmacnoise.	The site is at a significant distance from local and regional airports as well as the main motorway network.	Significant areas (>75%) of the site have low levels of peat. There is a low level of commercial forestry at the site and also some areas of biodiversity.	There are a number of masts located in Shannonbridge.	The site is pumped. It has 7 recognised flood points in the local area.	The site has access to the R357 and R444 regional roads.
Coolnamona	110kV network runs to the north of Coolnamona bog but there is poor available capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups is typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Completely within preferred area	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are generally designed for turbine setback distance of 750m or greater.	No Natura sites within the site, medium level of Natura sites in the wider area (reasonable proximity to Slieve Bloom SPA). Mainly low with some medium value habitat within the site.	There are two windfarm sites (consented) within 20km of the site.	The site is at a significant distance from local and regional airports. It is located in close proximity to the M7.	Large areas of the site have medium to high levels of peat. There are no other significant uses at the site.	There are two masts adjacent to the site.	The site is not pumped. It has no recognised flood point in the local area	The site has access to the regional road R445 and is adjacent to the M7.
Leamonaghan	Site is within reasonable proximity to existing grid infrastructure at Shannonbridge with good available grid capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups is typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Mainly within area open for consideration	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are generally designed for turbine setback distance of 750m or greater.	No Natura areas in the site, low number of Natura sites in the wider area, Mainly low value habitat on the site	There are three windfarm sites (either constructed or consented) within 20km of the site.	The site is at a significant distance from local and regional airports as well as the main motorway network.	A significant portion of the site has medium levels of peat. There are no other significant uses at the site.	There is a mast at Corr Hill with potential links through the site.	The site is pumped. It has 3 recognised flood points in the local area.	The site has direct access to the N62
Derryarkin	Site is within reasonable proximity to existing 110 kV grid infrastructure with potential available grid capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups is typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Within High risk for Westmeath, low risk area for Offaly.	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are generally designed for turbine setback distance of 750m or greater.	No Natura areas in the site, low to medium number of Natura sites in the wider area, Mixture of low, moderate and high value habitat on the site	There are four windfarm sites (either constructed or consented) within 20km of the site.	The site is at a significant distance from local and regional airports. It is located in close proximity to the M6.	Significant areas (>75%) of the site have low levels of peat. There is a low level of commercial forestry at the site and also some areas of quarrying.	There is a mast in Derrygreenagh works with 5 identified links through the site.	The site is not pumped. It has no recognised flood point in the local area	The site has access to the R400 and is adjacent to the M6.
Garryhinch	Site is within reasonable proximity to existing 110 kV grid infrastructure	The Irish Wind Atlas outlines that wind speeds in midlands bog	Within area open for consideration	This criterion is neutral with respect to the outlined environmental effects	No Natura areas in the site, low number of Natura sites in the wider area, Mixture of	There are three wind farm sites (constructed) within 20km of the site.	The site is at a significant distance from local and	Significant areas (>75%) of the site have low levels of peat. There are no	There is a major telecoms hub on the Sliabh Blooms and two masts adjacent to	The site is pumped. It has no recognised	The site has limited access to the regional and

Candidate Sites	Grid Access/ Capacity	Wind Resource Assessment	CDP and Zoning	Proximity to Houses	Environmental Sensitivity	Landscape Capacity/ Cumulative Impact	Aviation	Land Use	Communications Infrastructure	Flood Plain Analysis	Supporting Infrastructure
	with potential available grid capacity.	groups is typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.		as BnM wind farms are generally designed for turbine setback distance of 750m or greater.	low to moderate value habitat on the site		regional airports as well as the main motorway network	other significant uses at the site.	the site with multiple links.	flood point in the local area.	national road network.
Timahoe 2 (Timahoe South)	110kV network runs to the north of Timahoe South bog (i.e. through Timahoe North bog) with potential available capacity	The Irish Wind Atlas outlines that wind speeds in midlands bog groups is typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	In medium risk area	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are generally designed for turbine setback distance of 750m or greater.	No Natura areas in the site, low number of Natura sites in the wider area, Mixture of low, moderate and high value habitat on the site	There are two wind farm sites (either constructed or consented) within 20km of the site.	This site is also close to Casement Aerodrome. It is located proximate to the M4.	Large areas of the site have low levels of peat. The site is also used for waste processing and as an engineered landfill.	There are some links on the northern boundary.	The site is pumped. It has no recognised flood point in the local area.	The site has direct access to the R415
Ballybeg	110 kV grid infrastructure runs to south of Ballybeg with potential available grid capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups is typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Partially in preferred, partially with scenic buffer zone (Croghan Hill)	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are generally designed for turbine setback distance of 750m or greater.	No Natura sites within the boundary, Low number of Natura sites in the wider area, mixture of low and high value habitats within the site.	There are four wind farm sites (either constructed or consented) within 20km of the site.	The site is at a significant distance from local and regional airports. It is located in relative proximity to the M6.	Significant areas (>75%) of the site have low levels of peat. There are no other significant uses at the site.	It has 5 links that cross the site.	The site is pumped. It has no recognised flood point in the local area.	The site has access to the R400.

### 3.3.3 Alternative Renewable Electricity Technologies

Alternative sources of renewable electricity generation considered for this site, given its scale, is solar energy. To achieve the same energy output from solar energy, the site would require a significantly larger development footprint. In addition, a solar development would have a higher potential environmental effect on Hydrology and Hydrogeology, Traffic and Transport (construction phase) and Biodiversity (habitat loss) at the site. Chapter 2 of this EIAR also sets out the need and benefits of the proposed development. For this reason, wind energy is considered the most suitable renewable electricity generation option for the site.

### 3.3.4 Alternative Turbine Numbers and Model

The proposed wind turbines will have a potential power output in the 3-5 megawatt (MW) range. It is proposed to install 21 turbines at the site which could achieve approximately 88.2 MW output. Such a wind farm could also be achieved on the proposed site by using smaller turbines (for example 2.5 MW machines). However, this would necessitate the installation of over 35 turbines to achieve a similar output. Furthermore, the use of smaller turbines would not make efficient use of the wind resource available having regard to the nature of the site. A larger number of smaller turbines would result in the wind farm occupying a greater footprint within the site, with a larger amount of supporting infrastructure being required (i.e. roads etc.) and increasing the potential for negative environmental impacts to occur on biodiversity, hydrology and traffic and transportation. The proposed number of turbines takes account of all site constraints and the distances to be maintained between turbines and features such as roads and houses, while maximising the wind energy potential of the site. The 21-turbine layout selected for the site has the smallest development footprint of the other alternatives considered, while still achieving the optimum output at a more consistent level than would be achievable using different turbines.

The turbine model to be installed on the site will be the subject of a competitive tendering process. The maximum height of the turbines that will be selected for construction on the site will not exceed 185 metres when measured from top of foundation level to blade tip. For the purposes of this EIAR a range of turbines within this size envelope has been assessed (e.g. tallest turbine within defined range has been assessed for visual impact, widest rotor diameter within the defined range has been assessed for shadow flicker etc.). The EIAR therefore provides a robust assessment of the turbines that could be considered within the overall development description. The use of alternative smaller turbines at this site would not be appropriate as they would fail to make the most efficient use of the wind resource passing over the site. Furthermore, the increased use of materials, excavation and movement of peat and increase in visual impact associated with a larger number of smaller turbines would result in a higher level of negative environmental effects than the chosen option.

### 3.3.5 Alternative Turbine Layout and Design

The design of the proposed development has been an informed and collaborative process from the outset, involving the designers, developers, engineers, landowners, environmental, hydrological and geotechnical, archaeological specialists and traffic consultants.

Throughout the preparation of the EIAR, the layout of the proposed development has been revised and refined to take account of the findings of all site investigations and baseline assessments, which have brought the design from its first initial layout to the current proposed layout. The design process has also taken account of the recommendations and comments of the relevant statutory and non-statutory organisations, the local community and local authorities as detailed in Section 2.5 of Chapter 2.

### 3.3.5.1 Constraints Mapping

The design and layout of the proposed wind energy development follows the recommendations and guidelines set out in the *‘Wind Energy Development Guidelines’* (Department of the Environment, Heritage and Local Government (DoEHLG), 2006) and the *‘Best Practice Guidelines for the Irish Wind Energy Industry’* (Irish Wind Energy Association, 2008). The *‘Wind Energy Development Guidelines’* (DoEHLG, 2006) are currently the subject of a targeted review. The proposed changes to the assessment of impacts associated with onshore wind energy developments are outlined in the document *‘Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review’* (2013), the *‘Review of the Wind Energy Development Guidelines 2006 – Preferred Draft Approach’* (June 2017), and the Draft Revised Wind Energy Development Guidelines, December 2019.

The constraints mapping process involves the placing of buffers around different types of constraints so as to identify clearly the areas within which no development works will take place. The size of the buffer zone for each constraint has been assigned using a combination of desktop assessments, baseline information and guidance presented in the *‘Wind Energy Development Guidelines’* (DoEHLG, 2006). As it is considered likely that the new guidelines will be adopted during the application process timeframe, current proposed changes have been incorporated into the design.

The constraints map for the site, as shown in Figure 3.1, encompasses the following constraints and associated buffers:

- Residential dwellings plus a minimum 750-metre buffer (exceeding the proposed requirement for a 4 times tip height separation distance from the curtilage of properties in line with the new draft guidelines);
- 2km setback from Cloghan Village Core as per the Offaly County Development Plan;
- Natura 2000 and Designated sites plus 200-metre buffer;
- Habitats of County Importance (see Chapter 6: Biodiversity);
- Telecommunication Links plus operator specific buffer;
- Overhead transmission lines plus 3.5 times proposed rotor diameter buffer (as required by EirGrid);
- Design distances from adjacent wind farms (constructed and consented) to take account of turbulence and wake effects in accordance with relevant guidance requirements.
- Watercourses plus 50-metre buffer; and
- Archaeological Sites or Monuments, 50-metre buffer, plus ‘Zone of Notification’ as required by the National Monuments Service (ROI).

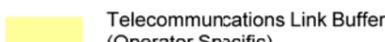
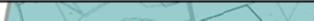
Facilitators at the site build on the existing advantages and include the following:

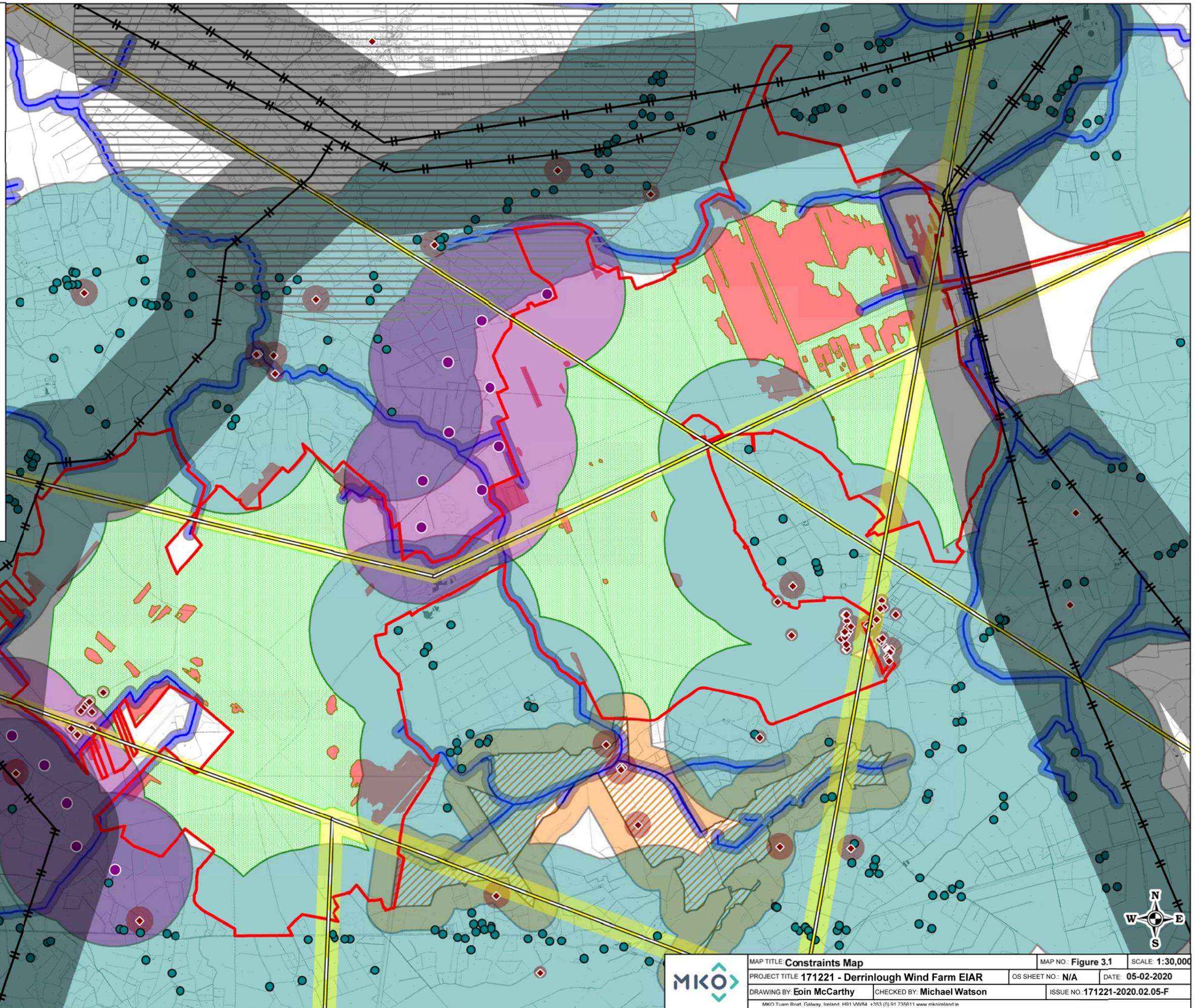
- Lands are available for development;
- No Natura 2000 or Designated sites located within the proposed development site;
- Proximity to existing 110kV transmission lines for grid connection;
- Absence of recognised flood points on site; and
- Accessibility of site via National/Regional Roads;
- Existing site access points/entrances.

The inclusion of the constraints on a map of the study area allows for a viable area to be identified. An initial turbine layout is then developed to take account of all the constraints mentioned above and their associated buffer zones and the separation distance required between the turbines.

Following the mapping of all known constraints, detailed site investigations were carried out. These investigations included habitat mapping and ecological surveying of the site and also hydrological and geotechnical investigations of the site of the proposed development.

### Map Legend

-  EIAR Site Boundary
-  Dwelling Location
-  750m Dwelling Buffer
-  2km Cloghan Village Core Buffer
-  Other Existing, Permitted & Proposed Turbine Locations
-  Turbulence and Wake Effect Buffer
-  Archaeological Site/Monument
-  50m (plus 'Zone of Notification') Archaeological Site/Monument Buffer
-  Natural Watercourses
-  50m Watercourse Buffer
-  Telecommunications Links (Various Operators)
-  Telecommunications Link Buffer (Operator Specific)
-  Habitats of County Importance
-  Proposed Natural Heritage Area (pNHA)
-  200m pNHA Buffer
-  Overhead Transmission Lines (OHL)
-  525m OHL Buffer
-  Remaining Viable Area



	MAP TITLE: <b>Constraints Map</b>	MAP NO.: <b>Figure 3.1</b>	SCALE: <b>1:30,000</b>
	PROJECT TITLE: <b>171221 - Derrinlough Wind Farm EIAR</b>	OS SHEET NO.: <b>N/A</b>	DATE: <b>05-02-2020</b>
	DRAWING BY: <b>Eoin McCarthy</b>	CHECKED BY: <b>Michael Watson</b>	ISSUE NO.: <b>171221-2020.02.05-F</b>
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Following the initial constraints mapping, where specific areas were deemed to be sensitive to the proposed development for any reason the project design/layout was further amended and circulated to all members of the project team so that the final design has been reviewed in full and potential impacts assessed.

### 3.3.5.2 Turbine Layout

There were several reviews carried out as part of optimisation of the turbine layout on site (refer to Figure 3.2). As information regarding the site of the proposed development was compiled and assessed, the number of turbines and the proposed layout was revised and amended to take account of the physical constraints of the site and the requirement for buffer zones and other areas which were not favourable for turbine location, as well as cumulative impacts. The selection of turbine number and layout has also had regard to wind-take, noise and shadow flicker impacts and the separation distance to be maintained between turbines. The baseline environmental assessment of the site and wind farm design was an iterative process, where findings at each stage of the assessment were used to further refine the design, always with the intention of minimising the potential for environmental impacts.

It is noteworthy that Bord na Móna opted to exclude Drinagh East from the available wind turbine developable area from the outset of the turbine layout design process given its ecological potential as a wetland area, despite these lands being included within the wind energy development area for County Offaly. The area of commercial forestry in North Drinagh was identified as a natural buffer between east and west Drinagh for the purpose of turbine layout design.

The initial constraints study identified a significant viable area within the overall site and a design of 28-turbines was developed around these constraints. This layout was refined to a 24-turbine layout following feedback from the project team on site investigations and baseline assessments; in addition to feedback from the Community Information Sessions which informed the sensitive receptor dataset and raised concerns around noise and visual impact.

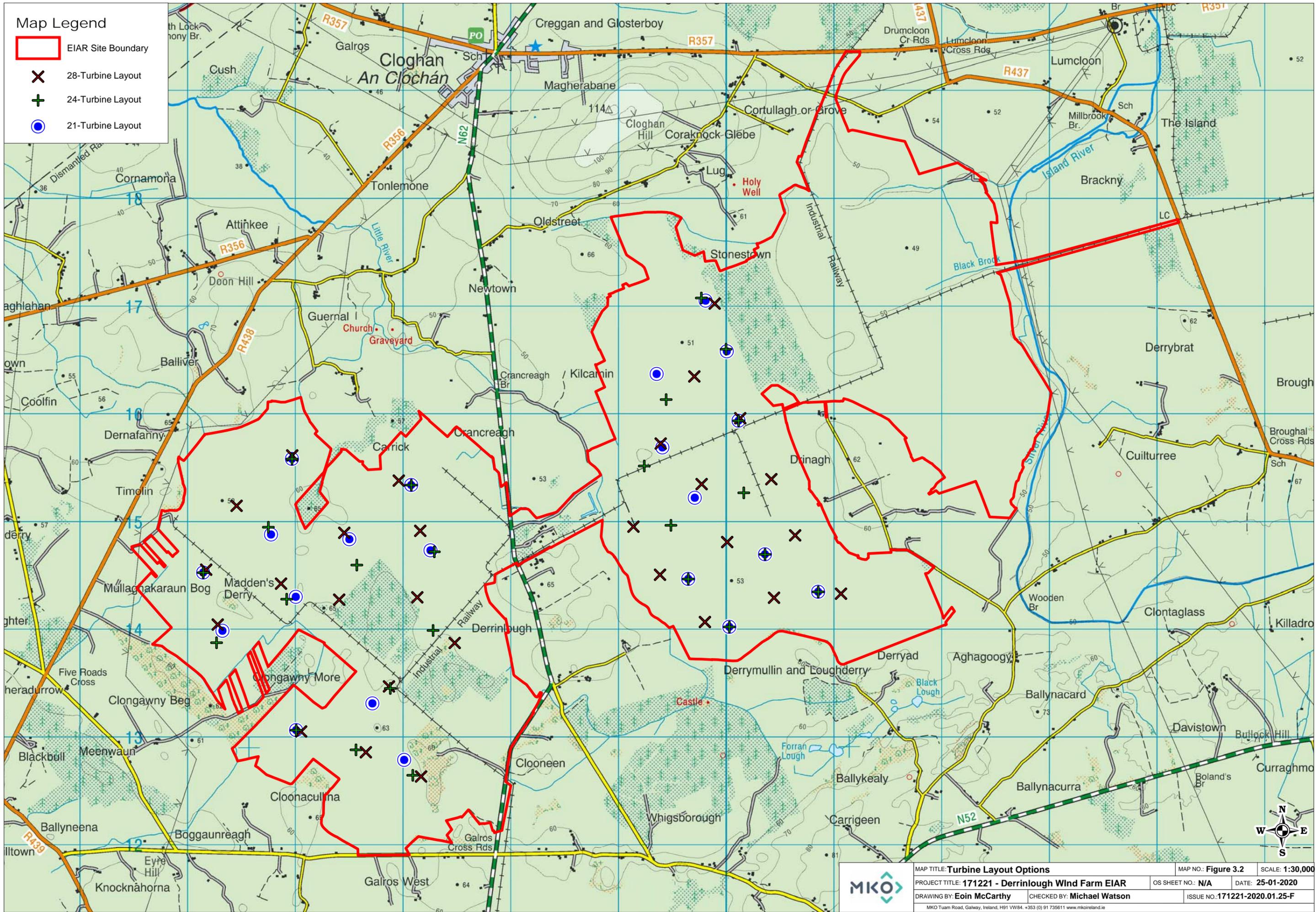
Following the lodgement of a planning application for proposed amendments to Cloghan Wind Farm in August 2019 the layout was further revised to a 21-turbine layout as the proposed amendments (which comprised an increase in rotor diameter and the micro-siting of 6 No. turbines) impacted on turbines in an upwind and downwind direction.

The final proposed turbine layout takes account of all site constraints (e.g. ecology, ornithology, hydrology, peat depths etc.) and design constraints (e.g. setback distances from houses and third party lands/infrastructure and distances between turbines on-site etc.). The layout also takes account of the results of all site investigations and baseline assessments that have been carried out during the EIAR process in addition to feedback from ongoing discussions with the local community.

The final chosen turbine layout is considered the optimal layout given it has the least potential for environmental effects.

Map Legend

- EIAR Site Boundary
- ✕ 28-Turbine Layout
- + 24-Turbine Layout
- ⊕ 21-Turbine Layout



MAP TITLE: Turbine Layout Options	MAP NO.: Figure 3.2	SCALE: 1:30,000
PROJECT TITLE: 171221 - Derrinlough Wind Farm EIAR	OS SHEET NO.: N/A	DATE: 25-01-2020
DRAWING BY: Eoin McCarthy	CHECKED BY: Michael Watson	ISSUE NO.: 171221-2020.01.25-F

### 3.3.5.3 Road Layout

Access tracks are required onsite in order to enable transport of infrastructure and construction materials within the proposed development. Such tracks must be of a gradient and width sufficient to allow safe movement of equipment and vehicles. It was decided at an early stage during the design of the proposed development that maximum possible use would be made of existing tracks where available to minimise the potential for impacts by using new roads as an alternative.

As the turbine layout was finalised, the most suitable routes between each component of the development were identified, taking into account the shortest routes, existing access tracks, the physical constraints of the site and associated buffers and utilising the most direct route between turbines in order to minimise the footprint. Locations were identified where upgrading of the existing road would be required and where new roads are to be constructed, in order to ensure suitable access to and linkages between the various project elements, and efficient and safe movement of vehicles around the site by applying the required vehicle turning radii. The road layout was modified with each revision of the turbine layout. Passing bays were designed for selected locations along the internal roads. These bays were located in specific areas to ensure minimum environmental effect by locating the passing bays away from higher value habitat and also in a configuration that facilitates the design of the amenity pathways/cycleways.

Finally, amenity paths were added linking the overall development to the public access points around the site.

An alternative option to making maximum use of the existing road network within the site would be to construct a new road network, having no regard to existing roads or tracks. This approach was deemed less desirable, as it would require unnecessary disturbance to the site and create the potential for additional environmental impacts to occur.

### 3.3.6 Location of Ancillary Structures

The ancillary structures required for the proposed development include temporary construction compounds, an electricity substation and associated grid connection, internal cabling and met masts.

#### 3.3.6.1 Construction Compounds

The construction compounds will be used for the storage of all construction materials and turbine components. The construction compounds are interspersed at five locations throughout the site and are accessed off the internal site roads that will be constructed. The use of multiple temporary construction compounds was deemed preferable to the alternative of a single large compound in the centre of the site for a number of reasons. Principally, it will facilitate more efficient construction practices and will result in shorter distances for traffic movements within the site during construction. As a result, vehicle emissions and the potential for dust arisings will be reduced.

#### 3.3.6.2 Electricity Substation and Grid Connection

At the outset of the project two potential locations were identified for the proposed substation, namely Drinagh North (Option 1) and West Clongawny (Option 2) as depicted on Figure 3.3.

As assessment of both options was carried out, taking into account the constraints associated with the site in addition to criteria such as grid capacity, access, peat depths/ground conditions, and set back from turbines.

Following the assessment, Option 1 emerged as the preferred option given the available capacity on the adjacent 110 kV line, ease of access from the local Stonestown Road, good ground conditions and limited environmental constraints. Therefore Option 1 is the only option being assessed in this EIAR.

It should also be noted that while the operational lifespan of the proposed turbines is expected to be 30 years (following which they may be replaced or decommissioned) the electricity substation and associated infrastructure will become an ESB asset and will be a permanent feature of the proposal as it will be required to continue to form part of the electrical infrastructure of the area in the event of the remainder of the site being decommissioned.

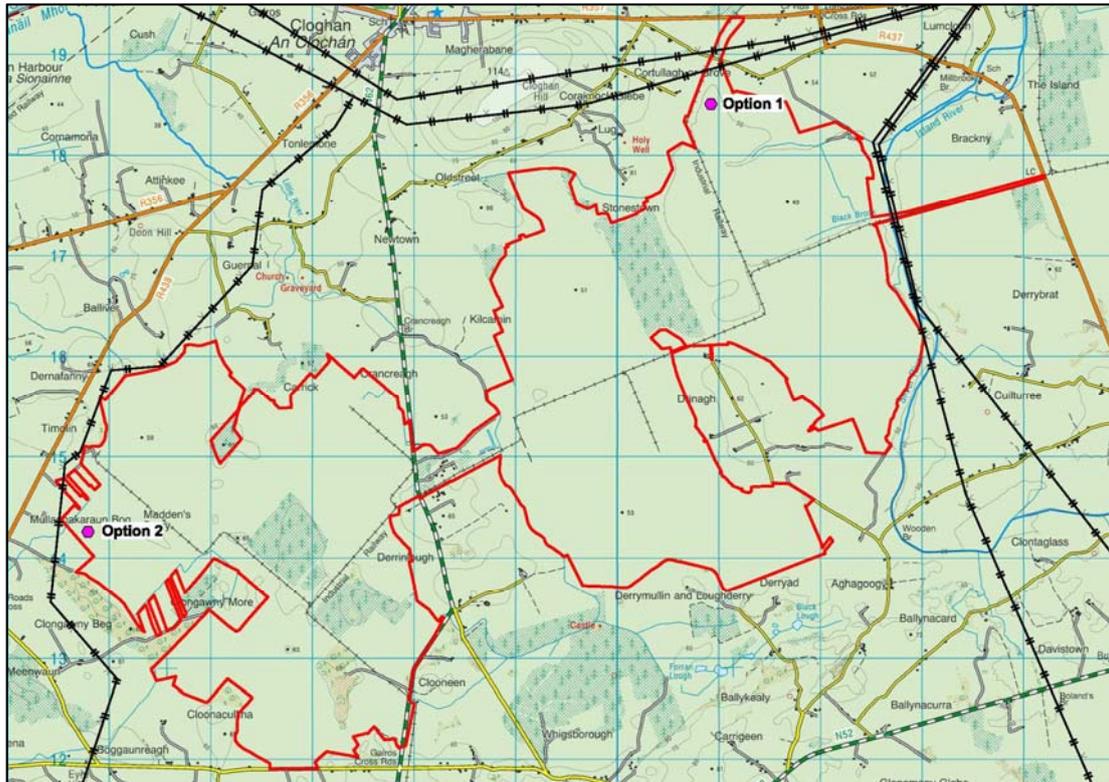


Figure 3.3 Substation Location Options

### 3.3.6.3 Borrow Pits

A review of potential borrow pit locations was carried out in consultation with internal Bord na Móna personnel with input from field studies and external geotechnical experts who were familiar with the site. Existing GIS data and site constraints were also considered, namely aerial photography, peat depths, biodiversity, on site drainage, proximity to the proposed internal road network, and proximity to sensitive receptors

Arising from this process, approximately 15 potential locations were identified and geological site investigations were carried out on site to determine their potential suitability. The findings of the geological site investigations did not present any evidence of borrow pit potential and consequently no borrow pits are included as part of the proposed development.

### 3.3.7 Site Entrances

Arising from peat extraction activities on site, there are a number of existing access points to both Clongawny and Drinagh Bogs. These comprise a mixture of machine and rail entrances. An initial review of all existing locations was carried out to identify the most suitable locations for site entrances.

Following the review, a number of potential site entrance points were identified and considered for their suitability for construction, operational or amenity access. The locations identified are discussed in the following paragraphs.

### 3.3.7.1 Clongawny

Five entrance points to Clongawny Bog were identified and considered as part of the design process as follows:

- Location 1: Existing machinery entrance on the N62 approximately 300m north of Derrinlough Briquette Factory.
- Location 2: Existing works entrance on the N62 immediately opposite Derrinlough Briquette Factory.
- Location 3: Existing machinery entrance on the N62 approximately 650m north of Galros crossroads;
- Location 4: Via a laneway off the R438 providing access to Clongawny Bog; and
- Location 5: Via a new entrance through Bord na Móna land off the L3006 local road west of Galros Cross Roads.

The assessment identified Location 1 as the optimal location for delivery of turbines and construction materials as it reduces the potential impact of this type of traffic on the local roads around the site, meets sightline requirements and has a lesser potential for environmental impacts. Location 2 was not considered suitable from a road safety perspective given its location on a bend opposite the briquette factory and Location 3 was discounted due to the potential for impacts on biodiversity in that area. Location 4 was considered less optimal than Location 1 for delivery of turbines and construction materials because of the requirement for third party land along the laneway for the road upgrade/new road required to access Bord na Móna lands. Therefore Location 1 was taken forward for assessment as part of this EIAR.

### 3.3.7.2 Drinagh

Five entrance points were also identified for Drinagh Bog and considered as part of the design process as follows:

- Location 1: Existing machinery entrance on the N62 approximately 190m north of Derrinlough Briquette Factory.
- Location 2: Existing Derrinlough Briquette Factory entrance.
- Location 3: Existing access off the L7009 Stonestown Road to the north of Drinagh.
- Location 4: Existing entrance off the R357 to the north of Drinagh.
- Location 5: Entrance off L7005 local Drinagh Road.

The assessment identified Location 1 as the optimal location for delivery of turbines and construction materials as it reduces the potential impact of this type of traffic on the local roads around the site, meets sightline requirements and has a lesser potential for environmental impacts. Location 2 was not considered suitable for delivery of turbines and construction materials from a road safety perspective and because of potential for conflict with operations at the Briquette Factory. However, it was considered that this location would be suitable for occasional use by windfarm maintenance personnel during the operational phase given the low volume of traffic associated with these elements.

Location 3 and Location 5 were also discounted as a construction entrance because of the potential impacts of traffic on this local road and the extent of widening /upgrade required and associated potential for environmental effects. Location 3 was however, considered suitable as an operational entrance for substation and windfarm maintenance personnel in addition to local amenity access given the low volumes of traffic associated with these elements.

Location 4 was considered to be suitable for delivery of construction materials and components for construction of the proposed substation only. It was also considered that this entrance could be retained as an operational amenity access point with car parking facilities. It was not considered suitable for turbine delivery given the requirements for third party land take and road upgrade requirements as discussed in Section 3.3.8.2, Turbine Delivery Route. Therefore locations 1, 2, 3 and 4 have been included for assessment as part of this EIAR.

Further information on entrances is provided in Chapter 4, Description of the Proposed Development.

### 3.3.8 Alternative Transport Route

Wind turbine components (blades, nacelles and towers) are not manufactured in Ireland and therefore must be imported from overseas and transported overland to the site of a proposed development. With regard to the selection of a transport route to the proposed development site, alternatives were considered in relation to turbine components, general construction-related traffic, and site access locations.

#### 3.3.8.1 Port of Entry

The alternatives considered for the port of entry of wind turbines into Ireland for the proposed development include Shannon-Foynes Port, County Limerick and the Port of Galway. Shannon Foynes Port is the principal deepwater facility on the Shannon Estuary and caters for dry bulk, break bulk, liquid and project cargoes. The Port of Galway also offers a roll-on roll-off procedure to facilitate import of wind turbines. Both ports and indeed others in the state (including Cork and Dublin), offer potential for the importing of turbine components.

#### 3.3.8.2 Turbine Delivery Route

For turbine transport, cognisance was taken of the haul routes used for other wind farm developments in Offaly in addition to the general preference to primarily use National and Regional roads where possible with minimal requirements for junction accommodation works. This approach was deemed preferable to using local roads to minimise significant upgrade works to local roads and associated environmental effects.

The assessment of the most suitable delivery routes was conducted in parallel with the assessment of potential site entrances as outlined above. Two potential transport routes were therefore identified for turbine delivery to the site as follows:

- Option 1 comprised use of the M6 before turning south onto the N52 at Junction 5 (Tullamore/Kilbeggan). The route would follow the N52 south for approximately 50km bypassing Tullamore to the east and passing through the settlements of Blue Ball, Kilcormac and Five Alley. Deliveries would then turn right onto the N52 (at the junction known as Kennedy's Cross) and proceed northwards for circa 8km towards Cloghan to the proposed site entrances, immediately north of Derrinlough Briquette Factory.
- Option 2 would follow the same route as Option 1 as far as Blue Ball. From there deliveries would turn north onto the R357 for 19km to Cloghan Village turning south in the village centre onto the N62 for circa. 5km to the proposed site entrances just north of Derrinlough Briquette Factory.

As assessment of both options was carried out taking account of criteria such as third party land take, road upgrade requirements and associated environmental effects. Option 1 emerged as the preferred option given the limited road upgrade work required and its proven suitability for the transport of turbine components from the recently constructed Meenwaun Wind Farm, which is located directly to the south west of the proposed development site.

Further, the transport analysis (as presented in Chapter 14 of this EIAR), shows that only localised accommodation works will be required to accommodate delivery of the proposed Derrinlough Wind Farm turbines and these works are assessed in the EIAR. The turbine transport route will utilise the national and primary roads available to ensure the road network holds the capacity to manage large loads.

### 3.3.9 **Alternative Mitigation Measures**

Mitigation by avoidance has been a key aspect of the proposed project's evolution through the selection and design process. Avoidance of the most ecologically sensitive areas of the site limits the potential for environmental effects. As noted above, the site layout aims to avoid any environmentally sensitive areas. Where loss of habitat occurs in the site, this has been mitigated with the proposal of enhancement lands. The alternative to this approach is to encroach on the environmentally sensitive areas of the site and accept the potential environmental effects and risk associated with this.

The best practice design and mitigation measures set out in this EIAR will contribute to reducing any risks and have been designed to break the pathway between the site and any identified environmental receptors. The alternative is to either not propose these measures or propose measures which are not best practice and effective and neither of these options is sustainable.